From:	Cronin,Dan
To:	Hardesty, Duane
Cc:	Shea,Brian C
Subject:	[External_Sender] FW: I-132 and I-131 ORIGEN Results - UFTR
Date:	Monday, November 07, 2016 10:44:50 AM
Attachments:	22MHA385.inp 22MHA385.out

From: Dan Cronin <dcronin@ufl.edu>
Date: Friday, September 23, 2016 at 12:04 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: Re: I-132 and I-131 ORIGEN Results - UFTR

Duane,

Attached are the ORIGEN input and output for a 385 day full-power run followed by 10 days shutdown. Note that between 3 and 4 days following shutdown the I-132 inventory becomes less than I-131.

The I-132 inventory following shutdown is a combination of the undecayed I-132 (t1/2=2.295 hours) produced from the fission process and the I-132 produced by the decay of Te-132 (t1/2=3.204 days). So, In less than a day following shutdown, the only significant source of I-132 becomes the decay of Te-132. Therefore, the inventory of I-132 follows the half-life of Te-132 in the days following shutdown. Please let me know if you want this explanation included in the RAI response.

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

From: Duane Hardesty <Duane.Hardesty@nrc.gov>
Date: Wednesday, September 21, 2016 at 3:10 PM
To: Dan <dcronin@ufl.edu>
Cc: Brian Shea <bshea@ufl.edu>, David Springfels <dspringfels@gmail.com>, Kelly Jordan <kjordan@mse.ufl.edu>, Alexander Adams <Alexander.Adams@nrc.gov>
Subject: RE: Re: I-132 and I-131 ORIGEN Results - UFTR

Dan:
This is *not* merely academic, as you suggest. Nor, is there anything specific that leads me to believe the ORIGEN results you provided are, per se, wrong. The technical reviewers have requested the 1-yr time frame for the following reasons:

- In SAR Table 13-1 UFTR has listed a number of isotopes including I-129 and Kr-85. These isotopes will not be in saturation if the ORIGEN ruin is only for 30 days. It takes at least 1 year to get close to saturation. Most licensees use 1 year and the NRC has accepted that.

- From the text supplied in the previous email, the I-131 and 132 numbers appear to have changed by about 10-20% so rerunning the old analysis seems to be yielding significant changes.

I am under the impression that running ORIGEN for 1 year takes no more time than running it for 30 days. If you feel that it is truly outside of the available UFTR man-hours allotted for this process, I will need to better understand what you feel are the labor ramifications.

Sincerely,
Duane

Duane A. Hardesty
Sr. Project Manager - Research & Test Reactors
U.S. Nuclear Regulatory Commission

From: Cronin,Dan [mailto:dcronin@ufl.edu]
Sent: Wednesday, September 21, 2016 1:13 PM
To: Hardesty, Duane <Duane.Hardesty@nrc.gov>
Cc: Shea,Brian C <bshea@ufl.edu>; David Springfels <dspringfels@gmail.com>; Jordan, Kelly A <kjordan@mse.ufl.edu>; Adams, Alexander <Alexander.Adams@nrc.gov>
Subject: [External_Sender] Re: I-132 and I-131 ORIGEN Results - UFTR

Duane,

This is problematic. Running ORIGEN out to a year for training purposes or to better understand the code, is outside the scope of our SAR and Tech Specs and outside of the available man-hours we've allotted for this process so far. The numbers we provided are very comparable to what was provided and approved under the conversion in 2006.

Do you have anything that leads you to believe the ORIGEN results we provided are wrong?

Thanks,

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

From: Duane Hardesty <Duane.Hardesty@nrc.gov>
Date: Wednesday, September 21, 2016 at 1:00 PM
To: DJC <dcronin@ufl.edu>
Cc: Brian Shea <bshea@ufl.edu>, David Springfels <dspringfels@gmail.com>, Kelly Jordan <kjordan@mse.ufl.edu>, Alexander Adams <Alexander.Adams@nrc.gov>
Subject: RE: I-132 and I-131 ORIGEN Results - UFTR

Dan:
I believe you are very close to the answer, for which we are looking:

Identifying Origen as your code is useful. To ensure we understand we would like to see the ORIGEN input and output.
We would ask that the run be at full power for at least 1 year to get the isotopes of interest into saturation.
The run should also show the decay time (perhaps 3 days).
This will give us all the inventory information needed.

Please let me know if any of that requires additional clarification or is problematic.
Regards,
Duane

From: Cronin,Dan [mailto:dcronin@ufl.edu]
Sent: Tuesday, September 20, 2016 5:11 PM
To: Hardesty, Duane <Duane.Hardesty@nrc.gov>
Cc: Shea,Brian C <bshea@ufl.edu>; David Springfels <dspringfels@gmail.com>; Jordan, Kelly A <kjordan@mse.ufl.edu>
Subject: [External_Sender] I-132 and I-131 ORIGEN Results - UFTR

Hi Duane,

I need more detail regarding the basis for one of the technical RAIs to better understand what's expected in the response and why.

Here's the text of the RAI:
UFTR SAR Table 13-1 radionuclide list includes I-132, and the quantity is listed as greater than that for I-131. The NRC staff does not understand how the quantity of I-132 can be greater than the quantity of I-131 given their relative half-lives. Provide the undecayed inventory of radionuclides for this accident and explain how the decay of this inventory was accomplished.

Do you have a comparable ORIGEN calc (or some other isotope tracking code) that leads you to believe the UFTR ORIGEN results are flawed? It's easy enough to provide decayed and undecayed ORIGEN inventories (see draft attached) but more detail is needed to understand the RAI basis and expectation with respect to "*...explain how the decay of this inventory was accomplished*" since the isotope generation and depletion was accomplished by ORIGEN.

Thank you,

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

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

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                   Job Information
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      Job started on DAVIDSPRINGFELS on Thu 22/09/2016 05:04:28
      Working directory:
C:\Users\David\AppData\Local\Temp\scale.David.40724
      Input file name  :
C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA_2.inp
      Output file name :
C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA_2.out


*********************************************************************
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*********
           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 05:04:29.442 on 09/22/2016.
    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=1 end
  power=0.00545 burn=1 end
  power=0.00545 burn=1 end
  power=0.00545 burn=2 end
  power=0.00545 burn=5 end
  power=0.00545 burn=5 end
  power=0.00545 burn=5 end
  power=0.00545 burn=10 end
  power=0.00545 burn=10 end
  power=0.00545 burn=10 end
  power=0.00545 burn=25 end
  power=0.00545 burn=25 end
  power=0.00545 burn=25 end
  power=0.00545 burn=25 end
  power=0.00545 burn=25 end
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  power=0.00545 burn=25 end
  power=0.00545 burn=25 end
  power=0.00545 burn=25 end
  power=0.00545 burn=25 end
  power=0.00545 burn=25 end
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```
        power=0.00545 burn=25 end
        power=0.00545 burn=35 end
        power=1e-99 burn=10 nlib=10 end
      end burndata
      read timetable
      end timetable
      read opus
        title="curies"
        symnuc=ag-109 ag-110 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 sb-132 sm-147 sm-149 sm-150 sm-151 sm-152
      tc-99 te-132 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  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 1.58 seconds cpu time for the current pass.

    secondary module crawdad  will be called at 05:04:31.023 on
09/22/2016.

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

    secondary module bonami   will be called at 05:04:32.599 on
09/22/2016.

    module bonami   is finished. completion code     0. cpu time used 2.92
seconds.
```

secondary module worker will be called at 05:04:35.516 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.81 seconds.

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

secondary module worker will be called at 05:04:39.368 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.13 seconds.

module t6-depl used 0.39 seconds cpu time for the current pass.

secondary module kenovi will be called at 05:04:40.907 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 189.43 seconds.

secondary module kmart6 will be called at 05:07:50.338 on 09/22/2016.

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 05:07:50.569 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.65 seconds.

secondary module origen will be called at 05:07:51.214 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.14 seconds.

module t6-depl used 0.18 seconds cpu time for the current pass.

secondary module bonami will be called at 05:07:51.540 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.63 seconds.

secondary module worker will be called at 05:07:54.168 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.48 seconds.

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

secondary module worker will be called at 05:07:57.683 on 09/22/2016.

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 05:07:58.823 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 188.03 seconds.

secondary module kmart6 will be called at 05:11:06.859 on 09/22/2016.

module kmart6 is finished. completion code 0. cpu time used 0.11 seconds.

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

secondary module couple will be called at 05:11:07.110 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.66 seconds.

secondary module origen will be called at 05:11:07.767 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.39 seconds.

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

secondary module bonami will be called at 05:11:08.313 on 09/22/2016.

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

secondary module worker will be called at 05:11:10.876 on 09/22/2016.

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

seconds.

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

secondary module worker will be called at 05:11:14.505 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.11 seconds.

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

secondary module kenovi will be called at 05:11:15.653 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 186.81 seconds.

secondary module kmart6 will be called at 05:14:22.462 on 09/22/2016.

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 05:14:22.696 on 09/22/2016.

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

secondary module origen will be called at 05:14:23.331 on 09/22/2016.

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

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

secondary module bonami will be called at 05:14:23.734 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.39 seconds.

secondary module worker will be called at 05:14:26.128 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.49 seconds.

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

secondary module worker will be called at 05:14:29.653 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 05:14:30.794 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 186.33 seconds.

secondary module kmart6 will be called at 05:17:37.123 on 09/22/2016.

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

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

secondary module couple will be called at 05:17:37.349 on 09/22/2016.

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

secondary module origen will be called at 05:17:37.978 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.80 seconds.

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

secondary module bonami will be called at 05:17:38.922 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.02 seconds.

secondary module worker will be called at 05:17:40.945 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.56 seconds.

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

secondary module worker will be called at 05:17:44.548 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.12 seconds.

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

secondary module kenovi will be called at 05:17:45.719 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.97 seconds.

secondary module kmart6 will be called at 05:20:53.685 on 09/22/2016.

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

module t6-depl used 0.86 seconds cpu time for the current pass.

secondary module couple will be called at 05:20:54.638 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.64 seconds.

secondary module origen will be called at 05:20:55.278 on 09/22/2016.

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

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

secondary module bonami will be called at 05:20:55.699 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.00 seconds.

secondary module worker will be called at 05:20:57.692 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.50 seconds.

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

secondary module worker will be called at 05:21:01.235 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.11 seconds.

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

secondary module kenovi will be called at 05:21:02.391 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 188.05 seconds.

secondary module kmart6 will be called at 05:24:10.436 on 09/22/2016.

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

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

secondary module couple will be called at 05:24:10.659 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.64 seconds.

secondary module origen will be called at 05:24:11.299 on 09/22/2016.

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 05:24:11.709 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.34 seconds.

secondary module worker will be called at 05:24:14.046 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.48 seconds.

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

secondary module worker will be called at 05:24:17.560 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10

seconds.

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

secondary module kenovi will be called at 05:24:18.702 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.59 seconds.

secondary module kmart6 will be called at 05:27:26.298 on 09/22/2016.

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 05:27:26.527 on 09/22/2016.

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

secondary module origen will be called at 05:27:27.155 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.26 seconds.

module t6-depl used 0.18 seconds cpu time for the current pass.

secondary module bonami will be called at 05:27:27.601 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.48 seconds.

secondary module worker will be called at 05:27:30.081 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.70 seconds.

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

secondary module worker will be called at 05:27:33.808 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 05:27:34.954 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 188.63 seconds.

secondary module kmart6 will be called at 05:30:43.588 on 09/22/2016.

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

module t6-depl used 0.34 seconds cpu time for the current pass.

secondary module couple will be called at 05:30:44.022 on 09/22/2016.

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

secondary module origen will be called at 05:30:44.659 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.26 seconds.

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

secondary module bonami will be called at 05:30:45.065 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 1.98 seconds.

secondary module worker will be called at 05:30:47.043 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.52 seconds.

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

secondary module worker will be called at 05:30:50.604 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 05:30:51.757 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.59 seconds.

secondary module kmart6 will be called at 05:33:59.350 on 09/22/2016.

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 05:33:59.577 on 09/22/2016.

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

secondary module origen will be called at 05:34:00.207 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.28 seconds.

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

secondary module bonami will be called at 05:34:00.642 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.04 seconds.

secondary module worker will be called at 05:34:02.691 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.58 seconds.

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

secondary module worker will be called at 05:34:06.303 on 09/22/2016.

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 05:34:07.444 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.58 seconds.

secondary module kmart6 will be called at 05:37:15.028 on 09/22/2016.

module kmart6 is finished. completion code 0. cpu time used 0.13 seconds.

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

secondary module couple will be called at 05:37:15.313 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.67 seconds.

secondary module origen will be called at 05:37:15.984 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.30 seconds.

module t6-depl used 0.43 seconds cpu time for the current pass.

secondary module bonami will be called at 05:37:16.713 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.09 seconds.

secondary module worker will be called at 05:37:18.806 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.95 seconds.

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

secondary module worker will be called at 05:37:22.793 on 09/22/2016.

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

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

secondary module kenovi will be called at 05:37:23.929 on 09/22/2016.

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

187.41 seconds.

secondary module kmart6 will be called at 05:40:31.341 on 09/22/2016.

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 05:40:31.571 on 09/22/2016.

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

secondary module origen will be called at 05:40:32.195 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.31 seconds.

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

secondary module bonami will be called at 05:40:32.657 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.41 seconds.

secondary module worker will be called at 05:40:35.067 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.54 seconds.

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

secondary module worker will be called at 05:40:38.646 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.11 seconds.

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

secondary module kenovi will be called at 05:40:39.799 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.55 seconds.

secondary module kmart6 will be called at 05:43:47.343 on 09/22/2016.

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

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

secondary module couple will be called at 05:43:47.568 on 09/22/2016.

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

secondary module origen will be called at 05:43:48.197 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.34 seconds.

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

secondary module bonami will be called at 05:43:48.685 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.00 seconds.

secondary module worker will be called at 05:43:50.690 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.62 seconds.

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

secondary module worker will be called at 05:43:54.354 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 05:43:55.500 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.85 seconds.

secondary module kmart6 will be called at 05:47:03.346 on 09/22/2016.

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 05:47:03.575 on 09/22/2016.

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

secondary module origen will be called at 05:47:04.205 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.34 seconds.

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

secondary module bonami will be called at 05:47:04.693 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.18 seconds.

secondary module worker will be called at 05:47:06.874 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.75 seconds.

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

secondary module worker will be called at 05:47:10.662 on 09/22/2016.

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 05:47:11.804 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.23 seconds.

secondary module kmart6 will be called at 05:50:19.032 on 09/22/2016.

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

seconds.

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

secondary module couple will be called at 05:50:19.261 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.79 seconds.

secondary module origen will be called at 05:50:20.043 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.34 seconds.

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

secondary module bonami will be called at 05:50:20.539 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.32 seconds.

secondary module worker will be called at 05:50:22.853 on 09/22/2016.

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

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

secondary module worker will be called at 05:50:26.657 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.12 seconds.

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

secondary module kenovi will be called at 05:50:27.819 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.18 seconds.

secondary module kmart6 will be called at 05:53:34.999 on 09/22/2016.

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 05:53:35.226 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 1.04 seconds.

secondary module origen will be called at 05:53:36.262 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.34 seconds.

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

secondary module bonami will be called at 05:53:36.762 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.10 seconds.

secondary module worker will be called at 05:53:38.862 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.49 seconds.

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

secondary module worker will be called at 05:53:42.392 on 09/22/2016.

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 05:53:43.536 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 186.52 seconds.

secondary module kmart6 will be called at 05:56:50.057 on 09/22/2016.

module kmart6 is finished. completion code 0. cpu time used 0.25 seconds.

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

secondary module couple will be called at 05:56:50.447 on 09/22/2016.

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

secondary module origen will be called at 05:56:51.079 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.35 seconds.

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

secondary module bonami will be called at 05:56:51.578 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.09 seconds.

secondary module worker will be called at 05:56:53.663 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.48 seconds.

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

secondary module worker will be called at 05:56:57.185 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 05:56:58.329 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 186.79 seconds.

secondary module kmart6 will be called at 06:00:05.115 on 09/22/2016.

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 06:00:05.349 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.64 seconds.

secondary module origen will be called at 06:00:05.988 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.34 seconds.

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

secondary module bonami will be called at 06:00:06.485 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 1.97 seconds.

secondary module worker will be called at 06:00:08.456 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.72 seconds.

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

secondary module worker will be called at 06:00:12.214 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 06:00:13.361 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.42 seconds.

secondary module kmart6 will be called at 06:03:20.777 on 09/22/2016.

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 06:03:21.004 on 09/22/2016.

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

seconds.

secondary module origen will be called at 06:03:21.635 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.56 seconds.

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

secondary module bonami will be called at 06:03:22.358 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 1.99 seconds.

secondary module worker will be called at 06:03:24.346 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.49 seconds.

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

secondary module worker will be called at 06:03:27.874 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 06:03:29.023 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.66 seconds.

secondary module kmart6 will be called at 06:06:36.683 on 09/22/2016.

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 06:06:36.913 on 09/22/2016.

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

secondary module origen will be called at 06:06:37.543 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.34 seconds.

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

secondary module bonami will be called at 06:06:38.035 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.36 seconds.

secondary module worker will be called at 06:06:40.401 on 09/22/2016.

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 06:06:44.041 on 09/22/2016.

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 06:06:45.175 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.89 seconds.

secondary module kmart6 will be called at 06:09:53.068 on 09/22/2016.

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 06:09:53.294 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.97 seconds.

secondary module origen will be called at 06:09:54.267 on 09/22/2016.

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

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

secondary module bonami will be called at 06:09:54.785 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 1.99 seconds.

secondary module worker will be called at 06:09:56.781 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.55 seconds.

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

secondary module worker will be called at 06:10:00.363 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 06:10:01.511 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.46 seconds.

secondary module kmart6 will be called at 06:13:08.963 on 09/22/2016.

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 06:13:09.196 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.83 seconds.

secondary module origen will be called at 06:13:10.022 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.35

seconds.

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

secondary module bonami will be called at 06:13:10.532 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.34 seconds.

secondary module worker will be called at 06:13:12.876 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.51 seconds.

module t6-depl used 0.11 seconds cpu time for the current pass.

secondary module worker will be called at 06:13:16.497 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.12 seconds.

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

secondary module kenovi will be called at 06:13:17.658 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.47 seconds.

secondary module kmart6 will be called at 06:16:25.127 on 09/22/2016.

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 06:16:25.355 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.85 seconds.

secondary module origen will be called at 06:16:26.208 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.35 seconds.

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

secondary module bonami will be called at 06:16:26.708 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.17 seconds.

secondary module worker will be called at 06:16:28.872 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.81 seconds.

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

secondary module worker will be called at 06:16:32.728 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 06:16:33.868 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.77 seconds.

secondary module kmart6 will be called at 06:19:41.636 on 09/22/2016.

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

module t6-depl used 0.37 seconds cpu time for the current pass.

secondary module couple will be called at 06:19:42.099 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.65 seconds.

secondary module origen will be called at 06:19:42.748 on 09/22/2016.

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 06:19:43.258 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.22 seconds.

secondary module worker will be called at 06:19:45.477 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 4.48 seconds.

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

secondary module worker will be called at 06:19:50.094 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.11 seconds.

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

secondary module kenovi will be called at 06:19:51.247 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.82 seconds.

secondary module kmart6 will be called at 06:22:59.068 on 09/22/2016.

module kmart6 is finished. completion code 0. cpu time used 0.12 seconds.

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

secondary module couple will be called at 06:22:59.323 on 09/22/2016.

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

secondary module origen will be called at 06:22:59.952 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.40 seconds.

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

secondary module bonami will be called at 06:23:00.507 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 1.99 seconds.

secondary module worker will be called at 06:23:02.499 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.49 seconds.

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

secondary module worker will be called at 06:23:06.020 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.11 seconds.

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

secondary module kenovi will be called at 06:23:07.170 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.80 seconds.

secondary module kmart6 will be called at 06:26:14.965 on 09/22/2016.

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 06:26:15.193 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.83 seconds.

secondary module origen will be called at 06:26:16.031 on 09/22/2016.

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

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

secondary module bonami will be called at 06:26:16.445 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.32

seconds.

secondary module worker will be called at 06:26:18.762 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.76 seconds.

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

secondary module worker will be called at 06:26:22.599 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 06:26:23.742 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 186.90 seconds.

secondary module kmart6 will be called at 06:29:30.651 on 09/22/2016.

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

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

secondary module couple will be called at 06:29:30.911 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.64 seconds.

secondary module origen will be called at 06:29:31.543 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.26 seconds.

module t6-depl used 0.17 seconds cpu time for the current pass.

secondary module bonami will be called at 06:29:31.979 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 3.51 seconds.

secondary module worker will be called at 06:29:35.491 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.55 seconds.

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

secondary module worker will be called at 06:29:39.079 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.12 seconds.

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

secondary module kenovi will be called at 06:29:40.239 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.43 seconds.

secondary module kmart6 will be called at 06:32:47.666 on 09/22/2016.

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

module t6-depl used 0.83 seconds cpu time for the current pass.

secondary module couple will be called at 06:32:48.600 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.65 seconds.

secondary module origen will be called at 06:32:49.249 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.26 seconds.

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

secondary module bonami will be called at 06:32:49.661 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 1.99 seconds.

secondary module worker will be called at 06:32:51.645 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.84 seconds.

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

secondary module worker will be called at 06:32:55.521 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.11 seconds.

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

secondary module kenovi will be called at 06:32:56.672 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.28 seconds.

secondary module kmart6 will be called at 06:36:03.957 on 09/22/2016.

module kmart6 is finished. completion code 0. cpu time used 0.36 seconds.

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

secondary module couple will be called at 06:36:04.447 on 09/22/2016.

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

secondary module origen will be called at 06:36:05.072 on 09/22/2016.

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 06:36:05.483 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.37 seconds.

secondary module worker will be called at 06:36:07.855 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.50

seconds.

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

secondary module worker will be called at 06:36:11.392 on 09/22/2016.

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

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

secondary module kenovi will be called at 06:36:12.531 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.84 seconds.

secondary module kmart6 will be called at 06:39:20.365 on 09/22/2016.

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 06:39:20.599 on 09/22/2016.

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

secondary module origen will be called at 06:39:21.225 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.26 seconds.

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

secondary module bonami will be called at 06:39:21.642 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.19 seconds.

secondary module worker will be called at 06:39:23.834 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.50 seconds.

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

secondary module worker will be called at 06:39:27.377 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 06:39:28.523 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.46 seconds.

secondary module kmart6 will be called at 06:42:35.991 on 09/22/2016.

module kmart6 is finished. completion code 0. cpu time used 0.38 seconds.

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

secondary module couple will be called at 06:42:36.530 on 09/22/2016.

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

secondary module origen will be called at 06:42:37.160 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.26 seconds.

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

secondary module bonami will be called at 06:42:37.565 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.57 seconds.

secondary module worker will be called at 06:42:40.133 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.49 seconds.

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

secondary module worker will be called at 06:42:43.660 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 06:42:44.802 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.65 seconds.

secondary module kmart6 will be called at 06:45:52.455 on 09/22/2016.

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 06:45:52.684 on 09/22/2016.

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

secondary module origen will be called at 06:45:53.317 on 09/22/2016.

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 06:45:53.723 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 2.68 seconds.

secondary module worker will be called at 06:45:56.412 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.49 seconds.

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

secondary module worker will be called at 06:45:59.944 on 09/22/2016.

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 06:46:01.083 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.71 seconds.

secondary module kmart6 will be called at 06:49:08.800 on 09/22/2016.

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 06:49:09.029 on 09/22/2016.

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

secondary module origen will be called at 06:49:09.660 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.26 seconds.

module t6-depl used 0.17 seconds cpu time for the current pass.

secondary module bonami will be called at 06:49:10.091 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 3.06 seconds.

secondary module worker will be called at 06:49:13.150 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 3.60 seconds.

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

secondary module worker will be called at 06:49:16.789 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.11

seconds.

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

secondary module kenovi will be called at 06:49:17.937 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 187.72 seconds.

secondary module kmart6 will be called at 06:52:25.658 on 09/22/2016.

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

module t6-depl used 0.83 seconds cpu time for the current pass.

secondary module couple will be called at 06:52:26.573 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.64 seconds.

secondary module origen will be called at 06:52:27.215 on 09/22/2016.

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 06:52:27.622 on 09/22/2016.

module bonami is finished. completion code 0. cpu time used 1.99 seconds.

secondary module worker will be called at 06:52:29.618 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 4.17 seconds.

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

secondary module worker will be called at 06:52:33.820 on 09/22/2016.

module worker is finished. completion code 0. cpu time used 1.10 seconds.

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

secondary module kenovi will be called at 06:52:34.957 on 09/22/2016.

module kenovi is finished. completion code 0. cpu time used 188.06 seconds.

secondary module kmart6 will be called at 06:55:43.020 on 09/22/2016.

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

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

secondary module couple will be called at 06:55:43.252 on 09/22/2016.

module couple is finished. completion code 0. cpu time used 0.94 seconds.

secondary module origen will be called at 06:55:44.201 on 09/22/2016.

module origen is finished. completion code 0. cpu time used 0.31 seconds.

module t6-depl used 0.18 seconds cpu time for the current pass.

secondary module opus will be called at 06:55:44.689 on 09/22/2016.

module opus is finished. completion code 0. cpu time used 0.31 seconds.

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

secondary module opus will be called at 06:55:45.055 on 09/22/2016.

module opus is finished. completion code 0. cpu time used 0.04 seconds.

module t6-depl is finished. completion code 0. total cpu time used 111.36 minutes.

Scale is finished at 06:55:50.778 on 09/22/2016
_plot00000000000000000.plt copied to
C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA_2.00000000000000000.plt.
_plot00000000000000001.plt copied to

```
C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA_2.00000000000000001.
plt.
_vol0000000000000000000.volumes copied to
C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA_2.000000000000000000
.volumes.
22MHA_2.html copied to
C:\Users\David\Dropbox\NewAnalysis\m22\Ch13\22MHA_2.html.
1

*********************************************************************
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                 . OO.
                  .OOO..                .OOOOOOOOOOOOOOOOOO=.
                  .OOOO.                .7O...........::?ZOOOOOO?.
                 . OO.OOO.               OO:                ....7OOOO..
                  .OO..+OO.             .$O.
..:OOO:.
                   OO.  .OOO.           .$O:
..IOOO.
                  .OO.  ..7OO,.         .$O.     ..,.,........
.,OO=.
                 ..OO....  .7OO~..       OO.     .~OOOOOOOOOOOOOO~ ...
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    7..          .IOO 7OO.  . ..OOO,.. .OO..O.
..OOO~OOOOOOOOOOOOOOOO$.  .OZ:OOOO,.IOOOOOOOOOOOOOOO,.
    OO,.         .OO7.OOO=...OOOOOOOOO..OO..OO..
..~OOO?~OOOOOOOOOOOOOO.:OOOOI..OOOOOOO:,
    OOO=.        .OO.OOOOO ..OO7,,     .OO OOO=.
.OOOOO$:=OOI7,~IOOOOO:..=OOOOO~.    .
    OO7OO..     .~OOOOOOOO7  :OO.     .?O,OOOOO.
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    OO. .OOO    .OOO,..OOOOO. .OO.    7OOOOOOOOO,
:OOOOOOOOOOO:..,OOOO7.          ..+~OZOOZ,..
    OO.  .?OO,  OO..  .IOOOO+..ZO,    OOOO..OOOOO
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   .OO..OO.   .ZOO+..   .OOOOO.. OO.  ..    .=OOOO,  OOOOOOOOOOOOOOOOOO~
.. .?OOOO7..,OOOOOOOOOOOOO7..
  .,OO.OOO.   . .+OOO:....OOOOO  ,OO .      ..OOOOO  $OOOOOOOOOOOO$...
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  .OO~+OOOO..,OOOOOOOOO.  OOOOO,..OO..      . OOOOO
7OOOOOOOOZ,OOOOOOOOOO,...   . OOOO.     . .+OOOOOOOOO~.....
  .OO,OOOOO~  OO~....     .OOOOO. .OO.        OOOOO
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 .OOOOO,OOOOO..OO7.        .OOOOO ..OO.
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...7OOOOOOOO~ZOO=?~..~?OOOOI.~OOOOOOOOOO. ..ZOOOOOOOOI?$=I$7OOOOO.
 .... .  OOOOOO. ~OO..       .OOOOO..=OO=OOOOOOO.
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 ..~=,.. .OOOOOO..:OO7.      .?OOOO+ .OOOOOOOO.
....OOOOOOO+   .OOOOOOOOOOOOOOOOZ.
 .O..OI. ..OOOOOO.  OOO+     . OOOOO  :OOOOO=...
:OOOOOOOOO..   ... . ...... ......
 ,O.M.O~.  .OOOOOOI...IOOOOOOOOOOOOO$..OOO.. .?O$.
..$OOOOOOOOOOOO...
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  . ,O7..ZMMMM..,O=..          ....OOOOO..,OOOOOOOOOOOOOOOOOOOO$Z,..
    . .?O..MMMMM...OO~.. ..       .:OOOOO .?O~OO$...
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...,:7OO~....:~=~:,.....

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..O..MMM..$..:O..MMMMMMMMMMMMM...O..MMMM~.MMMMMMMMMMMMMMMMM..MMMMMM==M
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            ..+:.MMMN.O..
$..MMMI.IMMMMMMMMM,....MMM..M$.....MMM........MMMM...ZO,..,MMM....MMI.
..O.
              .O.,MMM.==.
~Z.MMMM........MMMM....MMM.....O:..MMM..O:?=.MMMM.:Z,...7:.MMMM...MMMM
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~.+=..

.$~.MMM..O...O..MMM..:OOO:..MMM....MMM=.O?,.O..MMM..O.?..MMMM.:OOOOO..
.MMM=..MMMMMM$.O+.. . .
               .:O.DMMM.O=
O..MMMO~......MMMM....MMM7.O...O..MMM..O.:O.MMMMZ.......MMMM,...MMM..M
MZ.OOOOO?..
               ..Z..MMM..O .+O.MMMMMMMMMMMMMMM.~..MMM8.O,..O..MMM..O
.O,.MMMMMMMMMMMM.....:MMM...MM$......O,..
                 ,O.MMM7.O, .O.?MMMOMMMMMMM...OZO.MMMM.O,
O..MMM.,O...+O............,OOO.. MM..7..7MM...M..O+.
                 .O..MMM..? .$..MMM.....MMMM..O=O.MMMM.O:.,O..MMM..O.
..=OOOOOOOOO$=,..:OO~....O$O.~MM.MMM7.IZ..
                 .O.$MMM..O,.:O.MMM..OO..MMMM..OO.MMMM.ZI.$..M....:O.
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                 .+O...MM..O..O..MMM.O~O,.MMMM....8MMM..O.~O..~OOZ~.
.++..MMMN.:O~.
                  ..?O+....O..O..MMM..O,7..MMMMM,......OZ. .....
.~O+..D..$
                     ,?OOO~..O...=78.O~:O.......:OOOZ+,.
.:O,..O+
                            .:OOOO$$O7..~OOOZ?:,.
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*********************************************************************
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1
   TTTTTTTTTTTT     666666666666                  DDDDDDDDDDDD
EEEEEEEEEEEE   PPPPPPPPPPPP    LL
   TTTTTTTTTTTT    6666666666666                 DDDDDDDDDDDDD
EEEEEEEEEEEE   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
EEEEEEEE       PPPPPPPPPPPPP   LL
        TT         6666666666666   -------------  DD         DD
EEEEEEEE       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
EEEEEEEEEEEE   PP              LLLLLLLLLLLL
```

```
        TT          66666666666                    DDDDDDDDDDDD
EEEEEEEEEEEEE   PP              LLLLLLLLLLLL


   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                 11        66         66
```

```
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666



      0000000      5555555555555                      0000000
44                     22222222222     99999999999
     000000000     5555555555555                     000000000
444                    2222222222222   9999999999999
    00       00    55                    :::        00       00
4444           :::       22         22   99         99
   00         00   55                    :::       00         00
44 44           :::                  22   99         99
   00         00   55                    :::       00         00
44  44           :::                  22   99         99
   00         00   555555555555                    00         00
44   44                               22     9999999999999
   00         00   5555555555555                   00         00
44    44                            22        999999999999
   00         00              55         :::       00         00
444444444444         :::            22                    99
   00         00              55         :::       00         00
4444444444444         :::          22                      99
    00       00    55         55         :::        00       00
44           :::        22                        99
     000000000     5555555555555                    000000000
44                    2222222222222   9999999999999
      0000000       55555555555                       0000000
44                    2222222222222   999999999999
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
```

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

************************************************************************
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************************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
```

```
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:04:29.51
*****
        *****
*****
        *****
*****

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

**********************************************************************
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**********************************************************************
*********************************************
        ***
***
        ***                                  ********** 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.40724\ft11f001             short cross
section library        ***
        ***
***
        ***           91
->Data\Local\Temp\scale.David.40724\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.

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

  34 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      1.00
0.00          2.72500E-03
         2          2                1         0.545E-02      1.00
0.00          8.17500E-03
         3          3                1         0.545E-02      1.00
0.00          1.36250E-02
         4          4                1         0.545E-02      2.00
0.00          2.18000E-02
         5          5                1         0.545E-02      5.00
0.00          4.08750E-02
         6          6                1         0.545E-02      5.00
0.00          6.81250E-02
         7          7                1         0.545E-02      5.00
0.00          9.53750E-02
         8          8                1         0.545E-02      10.0
0.00          1.36250E-01
         9          9                1         0.545E-02      10.0
0.00          1.90750E-01
        10         10                1         0.545E-02      10.0
0.00          2.45250E-01
        11         11                1         0.545E-02      25.0
0.00          3.40625E-01
        12         12                1         0.545E-02      25.0
0.00          4.76875E-01
        13         13                1         0.545E-02      25.0
0.00          6.13125E-01
```

```
        14         14                1         0.545E-02      25.0
0.00          7.49375E-01
        15         15                1         0.545E-02      25.0
0.00          8.85625E-01
        16         16                1         0.545E-02      25.0
0.00          1.02188E+00
        17         17                1         0.545E-02      25.0
0.00          1.15813E+00
        18         18                1         0.545E-02      25.0
0.00          1.29438E+00
        19         19                1         0.545E-02      25.0
0.00          1.43063E+00
        20         20                1         0.545E-02      25.0
0.00          1.56688E+00
        21         21                1         0.545E-02      25.0
0.00          1.70313E+00
        22         22                1         0.545E-02      25.0
0.00          1.83938E+00
        23         23                1         0.545E-02      35.0
0.00          2.00288E+00
        24         24                1         0.100E-09      1.00
0.00          2.09825E+00
        25         24                2         0.100E-09      1.00
0.00          2.09825E+00
        26         24                3         0.100E-09      1.00
0.00          2.09825E+00
        27         24                4         0.100E-09      1.00
0.00          2.09825E+00
        28         24                5         0.100E-09      1.00
0.00          2.09825E+00
        29         24                6         0.100E-09      1.00
0.00          2.09825E+00
        30         24                7         0.100E-09      1.00
0.00          2.09825E+00
        31         24                8         0.100E-09      1.00
0.00          2.09825E+00
        32         24                9         0.100E-09      1.00
0.00          2.09825E+00
        33         24               10         0.100E-09      1.00
0.00          2.09825E+00

-------------------------------------------------------------------------
------------------------------
 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 =     0.50 days (   0.001 y), Burnup =2.725E-06 GWd/MTIHM,
Transport k= 0.7651

                    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    7.1687E+08
2.8097E+09
            2       0.000    0.00231     N/A       7.8754E+08
2.5110E+09
            3       0.000    0.00122     N/A       7.5355E+08
2.3744E+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 =     1.50 days (   0.004 y), Burnup =8.175E-06 GWd/MTIHM,
Transport k= 0.7657

                    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    7.1646E+08
2.8073E+09
             2       0.000    0.00231     N/A       7.8631E+08
2.5085E+09
             3       0.000    0.00122     N/A       7.5268E+08
2.3721E+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 =     2.50 days (   0.007 y), Burnup =1.363E-05 GWd/MTIHM,
Transport k= 0.7662

                    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    7.1682E+08
2.8115E+09
             2       0.000    0.00231     N/A       7.8678E+08
2.5113E+09
             3       0.000    0.00122     N/A       7.5293E+08
2.3745E+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 =     4.00 days (   0.011 y), Burnup =2.180E-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    7.1689E+08
2.8082E+09
             2       0.000    0.00231     N/A       7.8738E+08
2.5111E+09
             3       0.000    0.00122     N/A       7.5381E+08
2.3743E+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 =     7.50 days (   0.021 y), Burnup =4.088E-05 GWd/MTIHM,
Transport k= 0.7661

                    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    7.1659E+08
2.8097E+09
             2       0.000    0.00231     N/A       7.8653E+08
2.5115E+09
             3       0.000    0.00122     N/A       7.5253E+08
2.3738E+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 =    12.50 days (   0.034 y), Burnup =6.812E-05 GWd/MTIHM,
Transport k= 0.7661

                    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    7.1651E+08
2.8064E+09
             2       0.000    0.00231     N/A       7.8656E+08
2.5076E+09
             3       0.000    0.00122     N/A       7.5293E+08
2.3702E+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.   7 (MW/MITHM) ---
       Time =    17.50 days (   0.048 y), Burnup =9.537E-05 GWd/MTIHM,
Transport k= 0.7660

                    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    7.1634E+08
2.8069E+09
             2       0.000    0.00231     N/A       7.8640E+08
2.5078E+09
             3       0.000    0.00122     N/A       7.5250E+08
2.3708E+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. 8 (MW/MITHM) ---
Time = 25.00 days (0.068 y), Burnup =1.362E-04 GWd/MTIHM, Transport k= 0.7661

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	7.1677E+08	2.8050E+09
2	0.000	0.00231	N/A	7.8667E+08	2.5060E+09
3	0.000	0.00122	N/A	7.5246E+08	2.3691E+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. 9 (MW/MITHM) ---
Time = 35.00 days (0.096 y), Burnup =1.907E-04 GWd/MTIHM, Transport k= 0.7662

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	7.1687E+08	2.8095E+09
2	0.000	0.00231	N/A	7.8729E+08	2.5105E+09
3	0.000	0.00122	N/A	7.5341E+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.  10 (MW/MITHM) ---
       Time =    45.00 days (   0.123 y), Burnup =2.452E-04 GWd/MTIHM,
Transport k= 0.7650

                    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    7.1666E+08
2.8076E+09
             2       0.000    0.00231     N/A       7.8713E+08
```

```
2.5099E+09
             3       0.000    0.00122     N/A       7.5351E+08
2.3731E+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.  11 (MW/MITHM) ---
       Time =    62.50 days (   0.171 y), Burnup =3.406E-04 GWd/MTIHM,
Transport k= 0.7656

                    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    7.1647E+08
2.8041E+09
             2       0.000    0.00231     N/A       7.8657E+08
2.5070E+09
             3       0.000    0.00122     N/A       7.5309E+08
2.3703E+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.  12 (MW/MITHM) ---
       Time =    87.50 days (   0.240 y), Burnup =4.769E-04 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    7.1677E+08
2.8072E+09
             2       0.000    0.00231     N/A       7.8684E+08
2.5089E+09
             3       0.000    0.00122     N/A       7.5297E+08
2.3718E+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.  13 (MW/MITHM) ---
       Time =   112.50 days (   0.308 y), Burnup =6.131E-04 GWd/MTIHM,
Transport k= 0.7665

                    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    7.1651E+08
2.8057E+09
             2       0.000    0.00231     N/A       7.8615E+08
2.5074E+09
             3       0.000    0.00122     N/A       7.5238E+08
2.3702E+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.  14 (MW/MITHM) ---
       Time =   137.50 days (   0.376 y), Burnup =7.494E-04 GWd/MTIHM,
Transport k= 0.7658

                    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    7.1669E+08
2.8063E+09
             2       0.000    0.00231     N/A       7.8668E+08
2.5083E+09
             3       0.000    0.00122     N/A       7.5277E+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.  15 (MW/MITHM) ---
       Time =   162.50 days (   0.445 y), Burnup =8.856E-04 GWd/MTIHM,
Transport k= 0.7661

                    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    7.1648E+08
2.8065E+09
             2       0.000    0.00231     N/A       7.8614E+08
2.5067E+09
             3       0.000    0.00122     N/A       7.5207E+08
2.3694E+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.  16 (MW/MITHM) ---
       Time =   187.50 days (   0.513 y), Burnup =1.022E-03 GWd/MTIHM,
Transport k= 0.7655

                    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    7.1659E+08
2.8052E+09
             2       0.000    0.00231     N/A       7.8664E+08
2.5066E+09
             3       0.000    0.00122     N/A       7.5293E+08
2.3697E+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.  17 (MW/MITHM) ---
       Time =   212.50 days (   0.582 y), Burnup =1.158E-03 GWd/MTIHM,
Transport k= 0.7663

                    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    7.1667E+08
2.8074E+09
             2       0.000    0.00231     N/A       7.8714E+08
2.5089E+09
             3       0.000    0.00122     N/A       7.5315E+08
2.3713E+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.  18 (MW/MITHM) ---
       Time =   237.50 days (   0.650 y), Burnup =1.294E-03 GWd/MTIHM,
Transport k= 0.7665

                    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    0.99648      0.005    7.1680E+08
2.8072E+09
             2       0.000    0.00230     N/A       7.8609E+08
2.5075E+09
             3       0.000    0.00122     N/A       7.5235E+08
2.3700E+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. 19 (MW/MITHM) ---
Time = 262.50 days (0.719 y), Burnup =1.431E-03 GWd/MTIHM, Transport k= 0.7654

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	7.1639E+08	2.8083E+09
2	0.000	0.00231	N/A	7.8688E+08	2.5092E+09
3	0.000	0.00122	N/A	7.5296E+08	2.3722E+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. 20 (MW/MITHM) ---
Time = 287.50 days (0.787 y), Burnup =1.567E-03 GWd/MTIHM, Transport k= 0.7652

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	7.1677E+08	2.8059E+09
2	0.000	0.00231	N/A	7.8753E+08	2.5094E+09
3	0.000	0.00122	N/A	7.5402E+08	

```
2.3728E+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.  21 (MW/MITHM) ---
       Time =   312.50 days (   0.856 y), Burnup =1.703E-03 GWd/MTIHM,
Transport k= 0.7658

                    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    7.1633E+08
2.8074E+09
            2       0.000    0.00231     N/A       7.8677E+08
2.5096E+09
            3       0.000    0.00122     N/A       7.5316E+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.  22 (MW/MITHM) ---
       Time =   337.50 days (   0.924 y), Burnup =1.839E-03 GWd/MTIHM,
Transport k= 0.7655

                    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    7.1667E+08
2.8076E+09
             2       0.000    0.00231     N/A       7.8727E+08
2.5100E+09
             3       0.000    0.00122     N/A       7.5356E+08
2.3728E+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.  23 (MW/MITHM) ---
       Time =   367.50 days (   1.006 y), Burnup =2.003E-03 GWd/MTIHM,
Transport k= 0.7658

                    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    7.1676E+08
2.8071E+09
             2       0.000    0.00231     N/A       7.8651E+08
2.5079E+09
             3       0.000    0.00122     N/A       7.5276E+08
2.3714E+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.  24 (MW/MITHM) ---
       Time =   385.50 days (   1.055 y), Burnup =2.098E-03 GWd/MTIHM,
Transport k= 0.7652

                    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 *     0.000    0.99647      0.000    1.3145E+01
5.1448E+01
             2       0.000    0.00231     N/A       1.4427E+01
4.5976E+01
             3       0.000    0.00122     N/A       1.3810E+01
4.3471E+01
         Total       0.000    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.  25 (MW/MITHM) ---
       Time =   386.50 days (   1.058 y), Burnup =2.098E-03 GWd/MTIHM,
Transport k= 0.7662

                    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 *     0.000    0.99647      0.000    1.3139E+01
5.1416E+01
             2       0.000    0.00231     N/A       1.4419E+01
4.5945E+01
             3       0.000    0.00122     N/A       1.3795E+01
4.3428E+01
         Total       0.000    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.  26 (MW/MITHM) ---
       Time =   387.50 days (   1.061 y), Burnup =2.098E-03 GWd/MTIHM,
Transport k= 0.7661

                    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 *     0.000    0.99647      0.000    1.3156E+01
5.1512E+01
             2       0.000    0.00231     N/A       1.4437E+01
4.6036E+01
             3       0.000    0.00122     N/A       1.3819E+01
4.3516E+01
         Total       0.000    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.  27 (MW/MITHM) ---
       Time =   388.50 days (   1.064 y), Burnup =2.098E-03 GWd/MTIHM,
Transport k= 0.7655

                    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 *     0.000    0.99647      0.000    1.3145E+01
5.1485E+01
             2       0.000    0.00231     N/A       1.4425E+01
4.6030E+01
             3       0.000    0.00122     N/A       1.3809E+01
4.3512E+01
         Total       0.000    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. 28 (MW/MITHM) ---
Time = 389.50 days (1.066 y), Burnup =2.098E-03 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 *	0.000	0.99647	0.000	1.3147E+01	5.1528E+01
2	0.000	0.00231	N/A	1.4438E+01	4.6029E+01
3	0.000	0.00122	N/A	1.3811E+01	4.3502E+01
Total	0.000	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. 29 (MW/MITHM) ---
Time = 390.50 days (1.069 y), Burnup =2.098E-03 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 *	0.000	0.99647	0.000	1.3141E+01	5.1533E+01
2	0.000	0.00231	N/A	1.4448E+01	4.6074E+01
3	0.000	0.00122	N/A	1.3824E+01	4.3545E+01
Total	0.000	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. 30 (MW/MITHM) ---
Time = 391.50 days (1.072 y), Burnup =2.098E-03 GWd/MTIHM, Transport k= 0.7651

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 *	0.000	0.99647	0.000	1.3147E+01	5.1533E+01
2	0.000	0.00231	N/A	1.4443E+01	4.6063E+01
3	0.000	0.00122	N/A	1.3830E+01	4.3555E+01
Total	0.000	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.  31 (MW/MITHM) ---
       Time =   392.50 days (   1.075 y), Burnup =2.098E-03 GWd/MTIHM,
Transport k= 0.7655

                    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 *     0.000    0.99647      0.000    1.3153E+01
5.1595E+01
```

```
            2       0.000    0.00231     N/A       1.4438E+01
4.6080E+01
            3       0.000    0.00122     N/A       1.3817E+01
4.3563E+01
        Total       0.000    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.  32 (MW/MITHM) ---
       Time =   393.50 days (   1.077 y), Burnup =2.098E-03 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 *     0.000    0.99647      0.000    1.3146E+01
5.1538E+01
             2       0.000    0.00231     N/A       1.4432E+01
4.6054E+01
             3       0.000    0.00122     N/A       1.3804E+01
4.3524E+01
         Total       0.000    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.  33 (MW/MITHM) ---
       Time =   394.50 days (   1.080 y), Burnup =2.098E-03 GWd/MTIHM,
```

```
Transport k= 0.7657

                    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 *     0.000    0.99647      0.000    1.3152E+01
5.1527E+01
             2       0.000    0.00231     N/A       1.4446E+01
4.6058E+01
             3       0.000    0.00122     N/A       1.3830E+01
4.3548E+01
         Total       0.000    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. ***

     133 time dumps found on this set of libraries.
     File ft71f001 contains origen/opus-formatted binary data for 133 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       2.5000E-01      6.8446E-04
         3         3       5.0000E-01      1.3689E-03
         4         4       7.5000E-01      2.0534E-03
         5         5       1.0000E+00      2.7379E-03
         6         6       2.5000E-01      3.4223E-03        Pass no.
2 First depletion calculation, mixture no.   1
         7         7       5.0000E-01      4.1068E-03
```

```
         8          8       7.5000E-01      4.7912E-03
         9          9       1.0000E+00      5.4757E-03
        10         10       2.5000E-01      6.1602E-03        Pass no.
3 First depletion calculation, mixture no.   1
        11         11       5.0000E-01      6.8446E-03
        12         12       7.5000E-01      7.5291E-03
        13         13       1.0000E+00      8.2136E-03
        14         14       5.0000E-01      9.5825E-03        Pass no.
4 First depletion calculation, mixture no.   1
        15         15       1.0000E+00      1.0951E-02
        16         16       1.5000E+00      1.2320E-02
        17         17       2.0000E+00      1.3689E-02
        18         18       1.2500E+00      1.7112E-02        Pass no.
5 First depletion calculation, mixture no.   1
        19         19       2.5000E+00      2.0534E-02
        20         20       3.7500E+00      2.3956E-02
        21         21       5.0000E+00      2.7379E-02
        22         22       1.2500E+00      3.0801E-02        Pass no.
6 First depletion calculation, mixture no.   1
        23         23       2.5000E+00      3.4223E-02
        24         24       3.7500E+00      3.7645E-02
        25         25       5.0000E+00      4.1068E-02
        26         26       1.2500E+00      4.4490E-02        Pass no.
7 First depletion calculation, mixture no.   1
        27         27       2.5000E+00      4.7912E-02
        28         28       3.7500E+00      5.1335E-02
        29         29       5.0000E+00      5.4757E-02
        30         30       2.5000E+00      6.1602E-02        Pass no.
8 First depletion calculation, mixture no.   1
        31         31       5.0000E+00      6.8446E-02
        32         32       7.5000E+00      7.5291E-02
        33         33       1.0000E+01      8.2136E-02
        34         34       2.5000E+00      8.8980E-02        Pass no.
9 First depletion calculation, mixture no.   1
        35         35       5.0000E+00      9.5825E-02
        36         36       7.5000E+00      1.0267E-01
        37         37       1.0000E+01      1.0951E-01
        38         38       2.5000E+00      1.1636E-01        Pass no.
10 First depletion calculation, mixture no.   1
        39         39       5.0000E+00      1.2320E-01
        40         40       7.5000E+00      1.3005E-01
        41         41       1.0000E+01      1.3689E-01
        42         42       6.2500E+00      1.5400E-01        Pass no.
11 First depletion calculation, mixture no.   1
        43         43       1.2500E+01      1.7112E-01
        44         44       1.8750E+01      1.8823E-01
        45         45       2.5000E+01      2.0534E-01
        46         46       6.2500E+00      2.2245E-01        Pass no.
12 First depletion calculation, mixture no.   1
        47         47       1.2500E+01      2.3956E-01
        48         48       1.8750E+01      2.5667E-01
        49         49       2.5000E+01      2.7379E-01
```

```
        50          50       6.2500E+00      2.9090E-01        Pass no.
13 First depletion calculation, mixture no.   1
        51          51       1.2500E+01      3.0801E-01
        52          52       1.8750E+01      3.2512E-01
        53          53       2.5000E+01      3.4223E-01
        54          54       6.2500E+00      3.5934E-01        Pass no.
14 First depletion calculation, mixture no.   1
        55          55       1.2500E+01      3.7645E-01
        56          56       1.8750E+01      3.9357E-01
        57          57       2.5000E+01      4.1068E-01
        58          58       6.2500E+00      4.2779E-01        Pass no.
15 First depletion calculation, mixture no.   1
        59          59       1.2500E+01      4.4490E-01
        60          60       1.8750E+01      4.6201E-01
        61          61       2.5000E+01      4.7912E-01
        62          62       6.2500E+00      4.9624E-01        Pass no.
16 First depletion calculation, mixture no.   1
        63          63       1.2500E+01      5.1335E-01
        64          64       1.8750E+01      5.3046E-01
        65          65       2.5000E+01      5.4757E-01
        66          66       6.2500E+00      5.6468E-01        Pass no.
17 First depletion calculation, mixture no.   1
        67          67       1.2500E+01      5.8179E-01
        68          68       1.8750E+01      5.9890E-01
        69          69       2.5000E+01      6.1602E-01
        70          70       6.2500E+00      6.3313E-01        Pass no.
18 First depletion calculation, mixture no.   1
        71          71       1.2500E+01      6.5024E-01
        72          72       1.8750E+01      6.6735E-01
        73          73       2.5000E+01      6.8446E-01
        74          74       6.2500E+00      7.0157E-01        Pass no.
19 First depletion calculation, mixture no.   1
        75          75       1.2500E+01      7.1869E-01
        76          76       1.8750E+01      7.3580E-01
        77          77       2.5000E+01      7.5291E-01
        78          78       6.2500E+00      7.7002E-01        Pass no.
20 First depletion calculation, mixture no.   1
        79          79       1.2500E+01      7.8713E-01
        80          80       1.8750E+01      8.0424E-01
        81          81       2.5000E+01      8.2136E-01
        82          82       6.2500E+00      8.3847E-01        Pass no.
21 First depletion calculation, mixture no.   1
        83          83       1.2500E+01      8.5558E-01
        84          84       1.8750E+01      8.7269E-01
        85          85       2.5000E+01      8.8980E-01
        86          86       6.2500E+00      9.0691E-01        Pass no.
22 First depletion calculation, mixture no.   1
        87          87       1.2500E+01      9.2402E-01
        88          88       1.8750E+01      9.4114E-01
        89          89       2.5000E+01      9.5825E-01
        90          90       8.7500E+00      9.8220E-01        Pass no.
23 First depletion calculation, mixture no.   1
```

```
        91         91       1.7500E+01      1.0062E+00
        92         92       2.6250E+01      1.0301E+00
        93         93       3.5000E+01      1.0541E+00
        94         94       2.5000E-01      1.0548E+00        Pass no.
24 First depletion calculation, mixture no.   1
        95         95       5.0000E-01      1.0554E+00
        96         96       7.5000E-01      1.0561E+00
        97         97       1.0000E+00      1.0568E+00
        98         98       2.5000E-01      1.0575E+00        Pass no.
25 First depletion calculation, mixture no.   1
        99         99       5.0000E-01      1.0582E+00
       100        100       7.5000E-01      1.0589E+00
       101        101       1.0000E+00      1.0595E+00
       102        102       2.5000E-01      1.0602E+00        Pass no.
26 First depletion calculation, mixture no.   1
       103        103       5.0000E-01      1.0609E+00
       104        104       7.5000E-01      1.0616E+00
       105        105       1.0000E+00      1.0623E+00
       106        106       2.5000E-01      1.0630E+00        Pass no.
27 First depletion calculation, mixture no.   1
       107        107       5.0000E-01      1.0637E+00
       108        108       7.5000E-01      1.0643E+00
       109        109       1.0000E+00      1.0650E+00
       110        110       2.5000E-01      1.0657E+00        Pass no.
28 First depletion calculation, mixture no.   1
       111        111       5.0000E-01      1.0664E+00
       112        112       7.5000E-01      1.0671E+00
       113        113       1.0000E+00      1.0678E+00
       114        114       2.5000E-01      1.0684E+00        Pass no.
29 First depletion calculation, mixture no.   1
       115        115       5.0000E-01      1.0691E+00
       116        116       7.5000E-01      1.0698E+00
       117        117       1.0000E+00      1.0705E+00
       118        118       2.5000E-01      1.0712E+00        Pass no.
30 First depletion calculation, mixture no.   1
       119        119       5.0000E-01      1.0719E+00
       120        120       7.5000E-01      1.0726E+00
       121        121       1.0000E+00      1.0732E+00
       122        122       2.5000E-01      1.0739E+00        Pass no.
31 First depletion calculation, mixture no.   1
       123        123       5.0000E-01      1.0746E+00
       124        124       7.5000E-01      1.0753E+00
       125        125       1.0000E+00      1.0760E+00
       126        126       2.5000E-01      1.0767E+00        Pass no.
32 First depletion calculation, mixture no.   1
       127        127       5.0000E-01      1.0773E+00
       128        128       7.5000E-01      1.0780E+00
       129        129       1.0000E+00      1.0787E+00
       130        130       2.5000E-01      1.0794E+00        Pass no.
33 First depletion calculation, mixture no.   1
       131        131       5.0000E-01      1.0801E+00
       132        132       7.5000E-01      1.0808E+00
```

133	133	1.0000E+00	1.0815E+00	
267	1	0.0000E+00	0.0000E+00	Weighted sum of concentrations for selected materi
268	2	2.5000E-01	6.8446E-04	
269	3	5.0000E-01	1.3689E-03	
270	4	7.5000E-01	2.0534E-03	
271	5	1.0000E+00	2.7379E-03	
272	6	2.5000E-01	3.4223E-03	
273	7	5.0000E-01	4.1068E-03	
274	8	7.5000E-01	4.7912E-03	
275	9	1.0000E+00	5.4757E-03	
276	10	2.5000E-01	6.1602E-03	
277	11	5.0000E-01	6.8446E-03	
278	12	7.5000E-01	7.5291E-03	
279	13	1.0000E+00	8.2136E-03	
280	14	5.0000E-01	9.5825E-03	
281	15	1.0000E+00	1.0951E-02	
282	16	1.5000E+00	1.2320E-02	
283	17	2.0000E+00	1.3689E-02	
284	18	1.2500E+00	1.7112E-02	
285	19	2.5000E+00	2.0534E-02	
286	20	3.7500E+00	2.3956E-02	
287	21	5.0000E+00	2.7379E-02	
288	22	1.2500E+00	3.0801E-02	
289	23	2.5000E+00	3.4223E-02	
290	24	3.7500E+00	3.7645E-02	
291	25	5.0000E+00	4.1068E-02	
292	26	1.2500E+00	4.4490E-02	
293	27	2.5000E+00	4.7912E-02	
294	28	3.7500E+00	5.1335E-02	
295	29	5.0000E+00	5.4757E-02	
296	30	2.5000E+00	6.1602E-02	
297	31	5.0000E+00	6.8446E-02	
298	32	7.5000E+00	7.5291E-02	
299	33	1.0000E+01	8.2136E-02	
300	34	2.5000E+00	8.8980E-02	
301	35	5.0000E+00	9.5825E-02	
302	36	7.5000E+00	1.0267E-01	
303	37	1.0000E+01	1.0951E-01	
304	38	2.5000E+00	1.1636E-01	
305	39	5.0000E+00	1.2320E-01	
306	40	7.5000E+00	1.3005E-01	
307	41	1.0000E+01	1.3689E-01	
308	42	6.2500E+00	1.5400E-01	
309	43	1.2500E+01	1.7112E-01	
310	44	1.8750E+01	1.8823E-01	
311	45	2.5000E+01	2.0534E-01	
312	46	6.2500E+00	2.2245E-01	
313	47	1.2500E+01	2.3956E-01	
314	48	1.8750E+01	2.5667E-01	
315	49	2.5000E+01	2.7379E-01	
316	50	6.2500E+00	2.9090E-01	

317	51	1.2500E+01	3.0801E-01
318	52	1.8750E+01	3.2512E-01
319	53	2.5000E+01	3.4223E-01
320	54	6.2500E+00	3.5934E-01
321	55	1.2500E+01	3.7645E-01
322	56	1.8750E+01	3.9357E-01
323	57	2.5000E+01	4.1068E-01
324	58	6.2500E+00	4.2779E-01
325	59	1.2500E+01	4.4490E-01
326	60	1.8750E+01	4.6201E-01
327	61	2.5000E+01	4.7912E-01
328	62	6.2500E+00	4.9624E-01
329	63	1.2500E+01	5.1335E-01
330	64	1.8750E+01	5.3046E-01
331	65	2.5000E+01	5.4757E-01
332	66	6.2500E+00	5.6468E-01
333	67	1.2500E+01	5.8179E-01
334	68	1.8750E+01	5.9890E-01
335	69	2.5000E+01	6.1602E-01
336	70	6.2500E+00	6.3313E-01
337	71	1.2500E+01	6.5024E-01
338	72	1.8750E+01	6.6735E-01
339	73	2.5000E+01	6.8446E-01
340	74	6.2500E+00	7.0157E-01
341	75	1.2500E+01	7.1869E-01
342	76	1.8750E+01	7.3580E-01
343	77	2.5000E+01	7.5291E-01
344	78	6.2500E+00	7.7002E-01
345	79	1.2500E+01	7.8713E-01
346	80	1.8750E+01	8.0424E-01
347	81	2.5000E+01	8.2136E-01
348	82	6.2500E+00	8.3847E-01
349	83	1.2500E+01	8.5558E-01
350	84	1.8750E+01	8.7269E-01
351	85	2.5000E+01	8.8980E-01
352	86	6.2500E+00	9.0691E-01
353	87	1.2500E+01	9.2402E-01
354	88	1.8750E+01	9.4114E-01
355	89	2.5000E+01	9.5825E-01
356	90	8.7500E+00	9.8220E-01
357	91	1.7500E+01	1.0062E+00
358	92	2.6250E+01	1.0301E+00
359	93	3.5000E+01	1.0541E+00
360	94	2.5000E-01	1.0548E+00
361	95	5.0000E-01	1.0554E+00
362	96	7.5000E-01	1.0561E+00
363	97	1.0000E+00	1.0568E+00
364	98	2.5000E-01	1.0575E+00
365	99	5.0000E-01	1.0582E+00
366	100	7.5000E-01	1.0589E+00
367	101	1.0000E+00	1.0595E+00
368	102	2.5000E-01	1.0602E+00

369	103	5.0000E-01	1.0609E+00
370	104	7.5000E-01	1.0616E+00
371	105	1.0000E+00	1.0623E+00
372	106	2.5000E-01	1.0630E+00
373	107	5.0000E-01	1.0637E+00
374	108	7.5000E-01	1.0643E+00
375	109	1.0000E+00	1.0650E+00
376	110	2.5000E-01	1.0657E+00
377	111	5.0000E-01	1.0664E+00
378	112	7.5000E-01	1.0671E+00
379	113	1.0000E+00	1.0678E+00
380	114	2.5000E-01	1.0684E+00
381	115	5.0000E-01	1.0691E+00
382	116	7.5000E-01	1.0698E+00
383	117	1.0000E+00	1.0705E+00
384	118	2.5000E-01	1.0712E+00
385	119	5.0000E-01	1.0719E+00
386	120	7.5000E-01	1.0726E+00
387	121	1.0000E+00	1.0732E+00
388	122	2.5000E-01	1.0739E+00
389	123	5.0000E-01	1.0746E+00
390	124	7.5000E-01	1.0753E+00
391	125	1.0000E+00	1.0760E+00
392	126	2.5000E-01	1.0767E+00
393	127	5.0000E-01	1.0773E+00
394	128	7.5000E-01	1.0780E+00
395	129	1.0000E+00	1.0787E+00
396	130	2.5000E-01	1.0794E+00
397	131	5.0000E-01	1.0801E+00
398	132	7.5000E-01	1.0808E+00
399	133	1.0000E+00	1.0815E+00

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

```
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999             //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


      0000000      5555555555555                      0000000
44                            44        0000000
     000000000     5555555555555                    000000000
444                           444       000000000
    00       00    55                    :::        00       00
4444           :::              4444      00       00
   00         00   55                    :::       00         00
44 44           :::             44 44     00         00
   00         00   55                    :::       00         00
44  44           :::            44  44     00         00
   00         00   555555555555                    00         00
44   44                        44   44     00         00
   00         00   5555555555555                   00         00
44    44                       44    44     00         00
   00         00              55         :::       00         00
444444444444         :::        444444444444   00         00
   00         00              55         :::       00         00
4444444444444         :::       4444444444444   00         00
    00       00    55         55         :::        00       00
44           :::                44      00       00
     000000000     5555555555555                    000000000
44                            44       000000000
      0000000       55555555555                      0000000
```

```
44                              44        0000000
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE




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

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        *****
```

```
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:04:40.93
*****
        *****
*****
        *****
*****

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1

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

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

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


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


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

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        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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

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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  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
    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
```

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    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
    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
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    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
    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
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    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
    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
```

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    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
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    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
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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

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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       ........

                                ........     0.01300 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

   0.00283 minutes were required for starting.   total elapsed time is
0.01583 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
12	7.66209E-01	7.63294E-01	1.55369E-03	0.00000E+00
13	7.63259E-01	7.63291E-01	1.40537E-03	0.00000E+00
14	7.66343E-01	7.63545E-01	1.30789E-03	0.00000E+00
15	7.68414E-01	7.63920E-01	1.26003E-03	0.00000E+00
16	7.65453E-01	7.64029E-01	1.17169E-03	0.00000E+00
17	7.64784E-01	7.64080E-01	1.09194E-03	0.00000E+00
18	7.67025E-01	7.64264E-01	1.03787E-03	0.00000E+00
19	7.68531E-01	7.64515E-01	1.00670E-03	0.00000E+00
20	7.62396E-01	7.64397E-01	9.56404E-04	0.00000E+00
21	7.71307E-01	7.64761E-01	9.75037E-04	0.00000E+00
22	7.69160E-01	7.64981E-01	9.50799E-04	0.00000E+00
23	7.69957E-01	7.65218E-01	9.34915E-04	0.00000E+00
24	7.66443E-01	7.65273E-01	8.93144E-04	0.00000E+00
25	7.55929E-01	7.64867E-01	9.45195E-04	0.00000E+00
26	7.68147E-01	7.65004E-01	9.15217E-04	0.00000E+00
27	7.68044E-01	7.64641E-01	4.14345E-03	0.00000E+00
28	7.66371E-01	7.64987E-01	2.96377E-03	0.00000E+00
29	7.67537E-01	7.65412E-01	2.35401E-03	0.00000E+00
30	7.66010E-01	7.65497E-01	1.92470E-03	0.00000E+00
31	7.70244E-01	7.66091E-01	1.76504E-03	0.00000E+00
32	7.63832E-01	7.65840E-01	1.55482E-03	0.00000E+00
33	7.65083E-01	7.65764E-01	1.37384E-03	0.00000E+00
34	7.69833E-01	7.66134E-01	1.29505E-03	0.00000E+00
35	7.76465E-01	7.66995E-01	1.71374E-03	0.00000E+00
36	7.63110E-01	7.66696E-01	1.41076E-03	0.00000E+00

37	7.62105E-01	7.66368E-01	1.34518E-03	0.00000E+00
38	7.62875E-01	7.66135E-01	1.38012E-03	0.00000E+00
39	7.64178E-01	7.66013E-01	1.31408E-03	0.00000E+00
40	7.72001E-01	7.66365E-01	1.17440E-03	0.00000E+00
41	7.73937E-01	7.66786E-01	1.39807E-03	0.00000E+00
42	7.58343E-01	7.66342E-01	1.21629E-03	0.00000E+00
43	7.71645E-01	7.66607E-01	1.18396E-03	0.00000E+00
44	7.67483E-01	7.66648E-01	1.12406E-03	0.00000E+00
45	7.61018E-01	7.66392E-01	1.10238E-03	0.00000E+00
46	7.61910E-01	7.66198E-01	1.07069E-03	0.00000E+00
47	7.69691E-01	7.66343E-01	1.03431E-03	0.00000E+00
48	7.68000E-01	7.66409E-01	9.92684E-04	0.00000E+00
49	7.68221E-01	7.66479E-01	9.54906E-04	0.00000E+00
50	7.61083E-01	7.66279E-01	9.40656E-04	0.00000E+00
51	7.63032E-01	7.66163E-01	9.13113E-04	0.00000E+00
52	7.76710E-01	7.66527E-01	9.57228E-04	0.00000E+00
53	7.56749E-01	7.66201E-01	9.83312E-04	0.00000E+00
54	7.63197E-01	7.66104E-01	9.55237E-04	0.00000E+00
55	7.73442E-01	7.66333E-01	9.53780E-04	0.00000E+00
56	7.66526E-01	7.66339E-01	9.23513E-04	0.00000E+00
57	7.65052E-01	7.66301E-01	8.95940E-04	0.00000E+00
58	7.67358E-01	7.66332E-01	8.69746E-04	0.00000E+00
59	7.65114E-01	7.66298E-01	8.45247E-04	0.00000E+00
60	7.60350E-01	7.66137E-01	8.37897E-04	0.00000E+00
61	7.65028E-01	7.66108E-01	8.15488E-04	0.00000E+00
62	7.56576E-01	7.65863E-01	8.32457E-04	0.00000E+00

63	7.66209E-01	7.65872E-01	8.10879E-04	0.00000E+00
64	7.55202E-01	7.65612E-01	8.34174E-04	0.00000E+00
65	7.67017E-01	7.65645E-01	8.14296E-04	0.00000E+00
66	7.67733E-01	7.65694E-01	7.96224E-04	0.00000E+00
67	7.58996E-01	7.65542E-01	7.92947E-04	0.00000E+00
68	7.65689E-01	7.65545E-01	7.74723E-04	0.00000E+00
69	7.73193E-01	7.65711E-01	7.76155E-04	0.00000E+00
70	7.59428E-01	7.65577E-01	7.71290E-04	0.00000E+00
71	7.68151E-01	7.65631E-01	7.56686E-04	0.00000E+00
72	7.65941E-01	7.65637E-01	7.40782E-04	0.00000E+00
73	7.64588E-01	7.65616E-01	7.25823E-04	0.00000E+00
74	7.69043E-01	7.65684E-01	7.14455E-04	0.00000E+00
75	7.64541E-01	7.65662E-01	7.00664E-04	0.00000E+00
76	7.66783E-01	7.65683E-01	6.87396E-04	0.00000E+00
77	7.59392E-01	7.65566E-01	6.84672E-04	0.00000E+00
78	7.64883E-01	7.65554E-01	6.71992E-04	0.00000E+00
79	7.71144E-01	7.65654E-01	6.67447E-04	0.00000E+00
80	7.69029E-01	7.65713E-01	6.58187E-04	0.00000E+00
81	7.66446E-01	7.65726E-01	6.46664E-04	0.00000E+00
82	7.61069E-01	7.65647E-01	6.40471E-04	0.00000E+00
83	7.65558E-01	7.65645E-01	6.29524E-04	0.00000E+00
84	7.66098E-01	7.65653E-01	6.18989E-04	0.00000E+00
85	7.67866E-01	7.65688E-01	6.09837E-04	0.00000E+00
86	7.65452E-01	7.65685E-01	5.99933E-04	0.00000E+00
87	7.71189E-01	7.65771E-01	5.96765E-04	0.00000E+00
88	7.60901E-01	7.65696E-01	5.92275E-04	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.

                                0.7612                   0.7641
0.7670

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

```
*     |         I
         |                                                        I
*|             I
         |                                                       I
*  |         I
         |                                                        I
*   |       I
         |                                                            I
*|         I
      35 +                                                            I
|      *             I
         |
I       |   *           I
         |                                                          I
|*           I
         |                                                       I
*|          I
         |                                                       I
* |        I
      40 +                                                           I
|*         I
         |
I      |    *           I
         |                                                          I
|*         I
         |
I      |  *         I
         |
I     |   *        I
      45 +                                                            I
|*         I
         |                                                          I
*        I
         |
I       |*        I
         |
I      |*        I
         |
I     | *       I
      50 +                                                            I
*       I
         |                                                           I
*|      I
         |
I     | *        I
         |                                                           I
*       I
         |                                                           I
*|      I
      55 +
I      |*       I
         |
```

```
I      |*        I
         |
I      |*       I
         |
I      |*       I
         |
I      *        I
      60 +                                                          I
*|     I
         |
I      *|      I
         |                                                            I
*  |   I
         |                                                            I
*  |   I
         |                                                         I
*    | I
      65 +                                                          I
*    | I
         |                                                          I
*    | I
         |                                                         I
*     |I
         |                                                         I
*     |I
         |                                                           I
*    | I
      70 +                                                          I
*     |I
         |                                                          I
*    |I
         |                                                          I
*    |I
         |                                                          I
*    |I
         |                                                           I
*    |I
      75 +                                                           I
*    |I
         |                                                           I
*    |I
         |                                                          I
*     I
         |                                                          I
*     I
         |                                                           I
*    |I
      80 +                                                            I
*    |I
         |                                                            I
*   |I
         |                                                           I
```

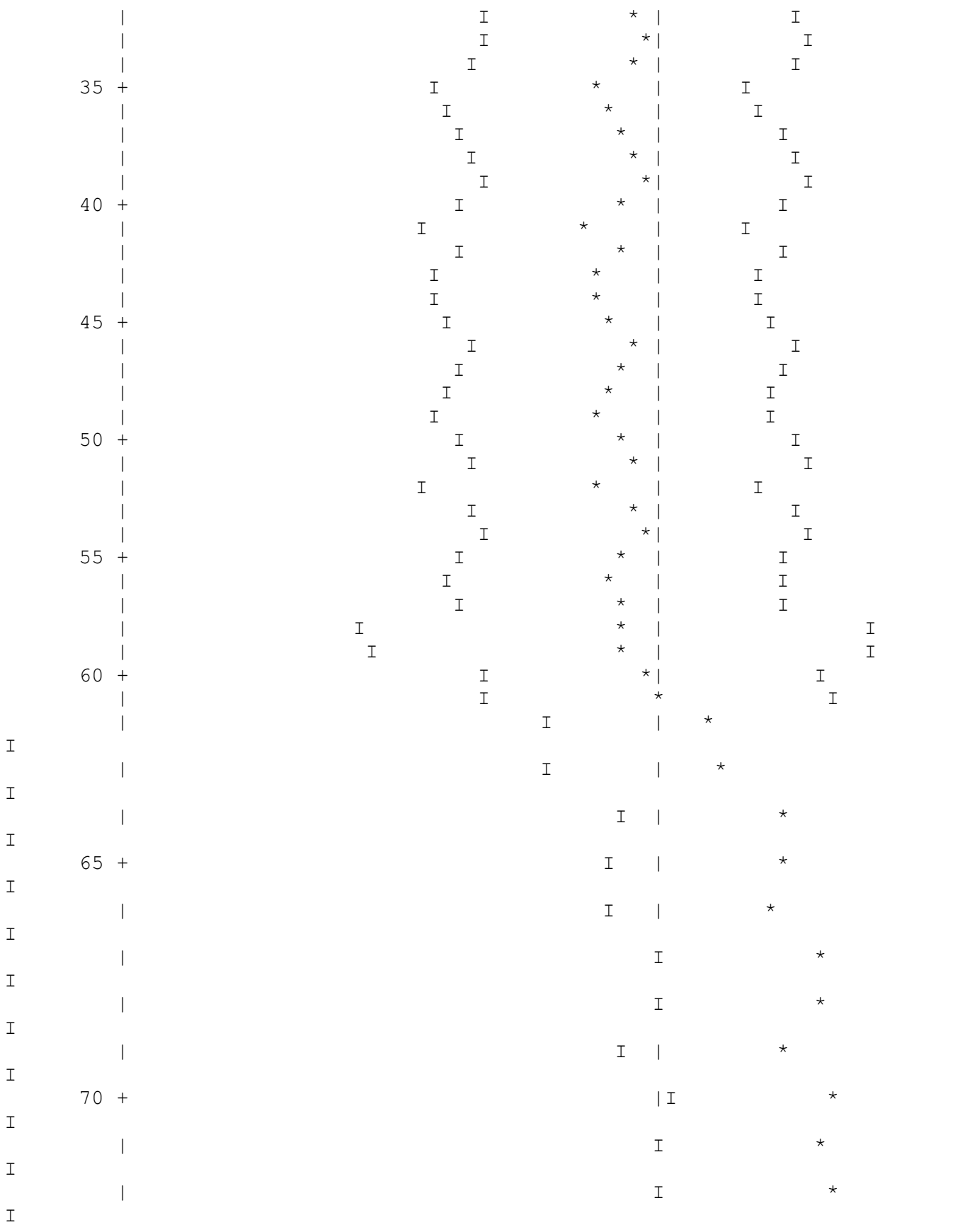
```
*    I
         |                                                              I
*    I
         |                                                               I
*    I
      85 +                                                               I
*    |I
         |                                                               I
*    I
         |                                                                I
*   |I
         |                                                               I
*    I
         |                                                                I
*   |I
      90 +                                                                I
*   |I
         |
I    *  | I
         |                                                                I
*   |I
         |
I   *   |I
         |
I    *  | I
      95 +                                                                 I
*  | I
         |
I   *   |I
         |
I   *   |I
         |
I    *  |I
         |
I    *  | I
     100 +
I    * |  I
         |
I    * |  I
         |
I    * | I
         |
I    * | I
         |
I   * |  I
     105 +
I   * |  I
         |
I   *|   I
         |
I   *|  I
         |
```

```
I   *|  I
         |
I   *|   I
     110 +
I   *|   I
         |
I   *   I
         |
I   *|   I
         |
I   *|  I
         |
I   *   I
     115 +
I   *   I
         |
I   *   I
         |
I   *   I
         |
I  |*   I
         |
I  *   I
     120 +
I  *   I
         |
I   *   I
         |
I   *   I
         |
I  *   I
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.

```
                                 0.7657                   0.7667
0.7676

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


35
40
45
50
55
60
65
70

```
         |                                          |I             *
I
         |                                         I             *
I
      75 +                                          |I             *
I
         |                                          |I             *
I
         |                                          |     I
*             I
         |                                          |      I
*             I
         |                                          |   I
*             I
      80 +                                          |  I             *
I
         |                                          |  I
*              I
         |                                          |      I
*             I
         |                                          |       I
*              I
         |                                          |       I
*               I
      85 +                                          |      I
*               I
         |                                          |       I
*                I
         |                                          |    I
*                I
         |                                          |         I
*               I
         |                                          |        I
*               I
      90 +                                          |      I
*                I
         |                                          |   I
*                 I
         |                                          |        I
*                 I
         |                                          |       I
*                I
         |                                          |   I
*                I
      95 +                                          |     I
*                  I
         |                                          |           I
*                 I
         |                                          |             I
*                 I
         |                                          |            I
*                  I
```

```
         |                                          |         I
*                   I
     100 +                                          |  I
*                 I
         |                                          |   I
*                 I
         |                                          |    I
*                   I
         |                                          |       I
*                   I
         |                                          |    I
*                     I
     105 +                                          |  I
*                     I
         |                                 I        |            *
I
         |                                        I|
*                   I
         |                                      I |
*                    I
         |                                I       |              *
I
     110 +                                I        |              *
I
         |                        I                |        *
I
         |                                I       |
*                         I
         |                                  I     |
*
         |                            I            |         *
I
     115 +                    I                    | *
I
         |         I                               |   *
I
         |      I                                   |         *
I
         |            I            *             I  |
         |        I                   *             |    I
     120 +                        *                 |              I

   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
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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
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

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   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
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
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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

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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  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                deviation
deviation                    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
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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				

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  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
  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
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
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

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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
  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  +
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or - 0.0002

elapsed time 3.11717 minutes

random number= 28BAEB6231D8119F

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total 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
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
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*********************************************
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        ***
***
        ***   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     3.11433 minutes


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1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //                22
22             //              11        6666666666666
   00         00              99        //              22
22              //                11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666


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

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

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE




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

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

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************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:07:58.84
*****
        *****
*****
        *****
```

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1

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

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

```
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

**********************************************************************
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                                 ........ finished preparing input data
........
1
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****************************
                  ***
```

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

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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  ***
                 ***
***

*********************************************************************
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                                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  1.18664E-14  3.57987E-15    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  6.04530E-08  1.81193E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                    12/17/09
    1005011  3.30325E-17  1.08859E-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  6.99985E-14  1.73732E-12   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  1.63591E-08  4.50050E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  5.47693E-13  1.52316E-11   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.65796E-08  4.66047E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  1.80139E-12  5.11768E-11   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.67244E-09  7.67231E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  1.09650E-20  3.04942E-19   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  4.82856E-15  1.37176E-13   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  6.78606E-09  1.96848E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.71718E-08  5.03252E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.50678E-12  4.46111E-11   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.86553E-09  2.05321E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  4.07261E-14  1.20575E-12   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.43510E-12  4.33470E-11   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  1.10161E-12  3.36034E-11   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  7.97118E-13  2.45542E-11   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  4.80318E-13  1.49392E-11   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  1.07629E-13  3.41205E-12   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  2.82902E-15  8.71439E-14   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.35055E-13  4.24103E-12   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.22415E-14  3.84407E-13   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.88754E-14  1.24404E-12   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.47860E-14  4.77582E-13   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  2.13915E-15  6.97349E-14   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  8.98584E-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  4.16978E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90071E-09  9.89016E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56228E-10  2.62371E-08   48116   115.9048     cd116 4855
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endf/b7 rel0 rev7 mod1                12/17/09
    1049115  8.73274E-17  3.00363E-15   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  9.64582E-08   50116   115.9017     sn116 5037
endf/b7 rel0 rev7 mod1                12/17/09
    1050117  1.46854E-09  5.13892E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63124E-09  1.63448E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64254E-09  5.84618E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22980E-09  2.23595E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85331E-10  3.23060E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10714E-09  4.10635E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.48414E-14  5.59356E-13   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.46724E-16  9.37238E-15   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  6.48420E-14  2.50200E-12   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  9.35789E-13  3.77906E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  1.22595E-14  4.80385E-13   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.86137E-13  1.13836E-11   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  5.70705E-13  2.30467E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  6.27700E-15  2.49722E-13   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.71245E-18  6.86406E-17   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  2.14269E-13  8.65271E-12   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.65809E-12  6.79510E-11   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29219E-08  1.35902E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  1.61598E-12  6.76781E-11   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.48365E-12  6.16900E-11   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  8.46211E-13  3.56925E-11   58141   140.9083     ce141 5840
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endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.33844E-12  5.68553E-11   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  1.49689E-12  6.40358E-11   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  1.44566E-12  6.22775E-11   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  3.32870E-15  1.40401E-13   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  1.93867E-13  8.29337E-12   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.66999E-15  7.14394E-14   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  8.52863E-16  3.67394E-14   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  4.82633E-13  2.09356E-11   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  8.11761E-13  3.54556E-11   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  6.25872E-13  2.75243E-11   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  4.44626E-13  1.96868E-11   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  9.88658E-15  4.34785E-13   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.05672E-20  4.67885E-19   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  2.14397E-13  9.55716E-12   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.19260E-18  5.24473E-17   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.44461E-14  6.43957E-13   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  5.45926E-18  2.44989E-16   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.00810E-09  1.35894E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  7.14839E-14  3.25075E-12   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  3.93951E-14  1.80333E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.42833E-09  6.45262E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.55915E-09  7.13703E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.75150E-17  8.07002E-16   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  8.19221E-15  3.79908E-13   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.32804E-15  6.19852E-14   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77401E-12  2.62575E-10   64152   151.9198     gd152 6425
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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  5.90967E-10  2.75824E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51812E-10  2.12231E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17131E-10  3.39007E-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
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  9.22548E-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
    1093237  3.79148E-16  2.69034E-14   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.00251E-20  7.14359E-19   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  7.66382E-14  5.48403E-12   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  1.17357E-20  8.43294E-19   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.99933E-21  7.21526E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.07007E-20  7.75342E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00006E-20  7.21621E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  5.94991E-21  4.31116E-19   95242   242.0596     am242 9546
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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  1.33243E-20  9.65443E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.99967E-21  7.27551E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.99948E-21  7.30534E-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
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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
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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:
  9719 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

                                            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       ........

                                  ........     0.01517 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
0.01600 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 15617 independent fission points were generated for generation 1
          1       7.68160E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15626 independent fission points were generated for generation 2
          2       7.66414E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15481 independent fission points were generated for generation 3
          3       7.58116E-01      7.58116E-01      0.00000E+00
0.00000E+00      0.00000E+00
```

4	7.60908E-01	7.59512E-01	1.39621E-03	0.00000E+00	0.00000E+00
5	7.64959E-01	7.61328E-01	1.98664E-03	0.00000E+00	0.00000E+00
6	7.65144E-01	7.62282E-01	1.69809E-03	0.00000E+00	0.00000E+00
7	7.72639E-01	7.64353E-01	2.45377E-03	0.00000E+00	0.00000E+00
8	7.64823E-01	7.64431E-01	2.00503E-03	0.00000E+00	0.00000E+00
9	7.62936E-01	7.64218E-01	1.70797E-03	0.00000E+00	0.00000E+00
10	7.62319E-01	7.63981E-01	1.49807E-03	0.00000E+00	0.00000E+00
11	7.63515E-01	7.63929E-01	1.32218E-03	0.00000E+00	0.00000E+00
12	7.68091E-01	7.64345E-01	1.25372E-03	0.00000E+00	0.00000E+00
13	7.65185E-01	7.64421E-01	1.13659E-03	0.00000E+00	0.00000E+00
14	7.59604E-01	7.64020E-01	1.11253E-03	0.00000E+00	0.00000E+00
15	7.61809E-01	7.63850E-01	1.03742E-03	0.00000E+00	0.00000E+00
16	7.62822E-01	7.63776E-01	9.63263E-04	0.00000E+00	0.00000E+00
17	7.65396E-01	7.63884E-01	9.03228E-04	0.00000E+00	0.00000E+00
18	7.62063E-01	7.63771E-01	8.52527E-04	0.00000E+00	0.00000E+00
19	7.75822E-01	7.64479E-01	1.06951E-03	0.00000E+00	0.00000E+00
20	7.65000E-01	7.64508E-01	1.00876E-03	0.00000E+00	0.00000E+00
21	7.68784E-01	7.64733E-01	9.80363E-04	0.00000E+00	0.00000E+00
22	7.65321E-01	7.64763E-01	9.30518E-04	0.00000E+00	0.00000E+00
23	7.64516E-01	7.64751E-01	8.85176E-04	0.00000E+00	0.00000E+00
24	7.69394E-01	7.64962E-01	8.69974E-04	0.00000E+00	0.00000E+00
25	7.64903E-01	7.64960E-01	8.31293E-04	0.00000E+00	0.00000E+00
26	7.61510E-01	7.64816E-01	8.08773E-04	0.00000E+00	0.00000E+00
27	7.60415E-01	7.64056E-01	6.47319E-03	0.00000E+00	0.00000E+00
28	7.64765E-01	7.64197E-01	3.54584E-03	0.00000E+00	0.00000E+00
29	7.65064E-01	7.64342E-01	2.54116E-03	0.00000E+00	0.00000E+00

30	7.63485E-01	7.64219E-01	1.92375E-03	0.00000E+00
31	7.74080E-01	7.65452E-01	2.25745E-03	0.00000E+00
32	7.71933E-01	7.66172E-01	2.77302E-03	0.00000E+00
33	7.62130E-01	7.65768E-01	2.23463E-03	0.00000E+00
34	7.62462E-01	7.65467E-01	2.08350E-03	0.00000E+00
35	7.61272E-01	7.65118E-01	1.97760E-03	0.00000E+00
36	7.63485E-01	7.64992E-01	1.82360E-03	0.00000E+00
37	7.58278E-01	7.64513E-01	1.79112E-03	0.00000E+00
38	7.62247E-01	7.64362E-01	1.70982E-03	0.00000E+00
39	7.68218E-01	7.64603E-01	1.57945E-03	0.00000E+00
40	7.68578E-01	7.64836E-01	1.54466E-03	0.00000E+00
41	7.69899E-01	7.65118E-01	1.53736E-03	0.00000E+00
42	7.68541E-01	7.65298E-01	1.50208E-03	0.00000E+00
43	7.70211E-01	7.65543E-01	1.48123E-03	0.00000E+00
44	7.67747E-01	7.65648E-01	1.52504E-03	0.00000E+00
45	7.60249E-01	7.65403E-01	1.35599E-03	0.00000E+00
46	7.67075E-01	7.65476E-01	1.27542E-03	0.00000E+00
47	7.63186E-01	7.65380E-01	1.21244E-03	0.00000E+00
48	7.63382E-01	7.65300E-01	1.16851E-03	0.00000E+00
49	7.68337E-01	7.65417E-01	1.11649E-03	0.00000E+00
50	7.66631E-01	7.65462E-01	1.07764E-03	0.00000E+00
51	7.58257E-01	7.65205E-01	1.05735E-03	0.00000E+00
52	7.71500E-01	7.65422E-01	1.02206E-03	0.00000E+00
53	7.59108E-01	7.65211E-01	9.69858E-04	0.00000E+00
54	7.55104E-01	7.64885E-01	1.14362E-03	0.00000E+00
55	7.59790E-01	7.64726E-01	1.13699E-03	0.00000E+00

56	7.67402E-01	7.64807E-01	1.07020E-03	0.00000E+00
57	7.56615E-01	7.64566E-01	1.12615E-03	0.00000E+00
58	7.61854E-01	7.64489E-01	1.12568E-03	0.00000E+00
59	7.72751E-01	7.64718E-01	1.12045E-03	0.00000E+00
60	7.55210E-01	7.64461E-01	1.12032E-03	0.00000E+00
61	7.64291E-01	7.64457E-01	1.08926E-03	0.00000E+00
62	7.68315E-01	7.64556E-01	1.08746E-03	0.00000E+00
63	7.67891E-01	7.64639E-01	1.04832E-03	0.00000E+00
64	7.66081E-01	7.64674E-01	1.02425E-03	0.00000E+00
65	7.58427E-01	7.64526E-01	9.87258E-04	0.00000E+00
66	7.66546E-01	7.64572E-01	9.59794E-04	0.00000E+00
67	7.60077E-01	7.64470E-01	9.31760E-04	0.00000E+00
68	7.61221E-01	7.64398E-01	9.34107E-04	0.00000E+00
69	7.71379E-01	7.64550E-01	9.21956E-04	0.00000E+00
70	7.63020E-01	7.64517E-01	8.98985E-04	0.00000E+00
71	7.62437E-01	7.64474E-01	8.85438E-04	0.00000E+00
72	7.61804E-01	7.64419E-01	8.60295E-04	0.00000E+00
73	7.68757E-01	7.64506E-01	8.37137E-04	0.00000E+00
74	7.68287E-01	7.64580E-01	8.28093E-04	0.00000E+00
75	7.63389E-01	7.64557E-01	8.10557E-04	0.00000E+00
76	7.64110E-01	7.64549E-01	7.93428E-04	0.00000E+00
77	7.72060E-01	7.64688E-01	8.04268E-04	0.00000E+00
78	7.74029E-01	7.64858E-01	8.36314E-04	0.00000E+00
79	7.65352E-01	7.64867E-01	8.22345E-04	0.00000E+00
80	7.69056E-01	7.64940E-01	8.25133E-04	0.00000E+00
81	7.65691E-01	7.64953E-01	8.14292E-04	0.00000E+00

```
         82       7.68108E-01      7.65007E-01      8.03252E-04
0.00000E+00      0.00000E+00
         83       7.66137E-01      7.65026E-01      7.92562E-04
0.00000E+00      0.00000E+00
         84       7.62172E-01      7.64979E-01      7.78111E-04
0.00000E+00      0.00000E+00
         85       7.67475E-01      7.65019E-01      7.66306E-04
0.00000E+00      0.00000E+00
         86       7.61875E-01      7.64969E-01      7.50830E-04
0.00000E+00      0.00000E+00
         87       7.61770E-01      7.64919E-01      7.47188E-04
0.00000E+00      0.00000E+00
         88       7.64874E-01      7.64918E-01      7.35012E-04
0.00000E+00      0.00000E+00
         89       7.58838E-01      7.64826E-01      7.36208E-04
0.00000E+00      0.00000E+00
         90       7.74677E-01      7.64973E-01      7.09787E-04
0.00000E+00      0.00000E+00
         91       7.63385E-01      7.64950E-01      6.93765E-04
0.00000E+00      0.00000E+00
         92       7.64426E-01      7.64942E-01      6.84553E-04
0.00000E+00      0.00000E+00
         93       7.62574E-01      7.64909E-01      6.67657E-04
0.00000E+00      0.00000E+00
         94       7.66623E-01      7.64933E-01      6.56009E-04
0.00000E+00      0.00000E+00
         95       7.56320E-01      7.64813E-01      6.54799E-04
0.00000E+00      0.00000E+00
         96       7.69719E-01      7.64880E-01      5.46646E-04
0.00000E+00      0.00000E+00
         97       7.67772E-01      7.64919E-01      5.40559E-04
0.00000E+00      0.00000E+00
         98       7.66515E-01      7.64941E-01      5.33640E-04
0.00000E+00      0.00000E+00
         99       7.65014E-01      7.64942E-01      5.26478E-04
0.00000E+00      0.00000E+00
        100       7.69159E-01      7.64996E-01      5.22460E-04
0.00000E+00      0.00000E+00
        101       7.70315E-01      7.65065E-01      6.23041E-04
0.00000E+00      0.00000E+00
        102       7.63564E-01      7.65046E-01      6.04049E-04
0.00000E+00      0.00000E+00
        103       7.64023E-01      7.65033E-01      5.95473E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=B3D98200F8D9AE74
        104       7.64336E-01      7.65024E-01      5.86984E-04
0.00000E+00      0.00000E+00
        105       7.61098E-01      7.64976E-01      5.83954E-04
0.00000E+00      0.00000E+00
        106       7.71020E-01      7.65049E-01      4.96733E-04
0.00000E+00      0.00000E+00
```

```
        107       7.67850E-01      7.65082E-01      5.71461E-04
0.00000E+00      0.00000E+00
        108       7.66502E-01      7.65099E-01      5.64299E-04
0.00000E+00      0.00000E+00
        109       7.63128E-01      7.65076E-01      5.54039E-04
0.00000E+00      0.00000E+00
        110       7.64347E-01      7.65068E-01      5.47295E-04
0.00000E+00      0.00000E+00
        111       7.65779E-01      7.65076E-01      5.41012E-04
0.00000E+00      0.00000E+00
        112       7.70317E-01      7.65135E-01      5.36530E-04
0.00000E+00      0.00000E+00
        113       7.64133E-01      7.65124E-01      5.29292E-04
0.00000E+00      0.00000E+00
        114       7.60776E-01      7.65076E-01      5.25821E-04
0.00000E+00      0.00000E+00
        115       7.62940E-01      7.65053E-01      5.19928E-04
0.00000E+00      0.00000E+00
        116       7.66847E-01      7.65072E-01      5.13155E-04
0.00000E+00      0.00000E+00
        117       7.66641E-01      7.65089E-01      5.06827E-04
0.00000E+00      0.00000E+00
        118       7.72139E-01      7.65163E-01      5.06244E-04
0.00000E+00      0.00000E+00
        119       7.61629E-01      7.65126E-01      4.45457E-04
0.00000E+00      0.00000E+00
        120       7.67798E-01      7.65154E-01      4.41671E-04
0.00000E+00      0.00000E+00
        121       7.65609E-01      7.65158E-01      4.37119E-04
0.00000E+00      0.00000E+00
        122       7.65792E-01      7.65165E-01      4.32684E-04
0.00000E+00      0.00000E+00
        123       7.61178E-01      7.65125E-01      4.30180E-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=06ABA7F756EB7B64
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55002E-05 + or -  1.20330E-08             generation time
=  2.99318E-05 + or -  2.21715E-08
 nu bar   =  2.43894E+00 + or -  9.86291E-06       average fission group
=  2.17562E+02 + or -  1.02894E-02
                      energy(ev) of the average lethargy causing fission
=  5.66090E-02 + or -  1.29132E-04
                                                 system mean free path (cm)
=  6.52702E-01 + or -  1.72361E-04
```

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories	variance deviation of (per cent)
23	0.76512	+ or - 0.00043	0.76469 to 0.76555	0.76426 to 0.76599	0.76383 to 0.76642	2000000	12.8927
24	0.76508	+ or - 0.00043	0.76465 to 0.76551	0.76422 to 0.76595	0.76378 to 0.76638	1980000	13.0220
25	0.76508	+ or - 0.00044	0.76465 to 0.76552	0.76421 to 0.76596	0.76377 to 0.76639	1960000	12.9825
26	0.76512	+ or - 0.00044	0.76468 to 0.76556	0.76424 to 0.76600	0.76380 to 0.76644	1940000	13.0767
27	0.76517	+ or - 0.00044	0.76473 to 0.76561	0.76429 to 0.76605	0.76384 to 0.76649	1920000	13.2497
28	0.76517	+ or - 0.00045	0.76473 to 0.76562	0.76428 to 0.76607	0.76383 to 0.76651	1900000	13.2109
29	0.76517	+ or - 0.00045	0.76472 to 0.76563	0.76427 to 0.76608	0.76382 to 0.76653	1880000	13.1685
30	0.76519	+ or - 0.00046	0.76474 to 0.76565	0.76428 to 0.76610	0.76383 to 0.76656	1860000	13.1633
31	0.76510	+ or - 0.00045	0.76465 to 0.76555	0.76420 to 0.76600	0.76375 to 0.76645	1840000	13.2613
32	0.76502	+ or - 0.00045	0.76457 to 0.76547	0.76412 to 0.76592	0.76368 to 0.76637	1820000	13.4976
37	0.76522	+ or - 0.00046	0.76476 to 0.76569	0.76430 to 0.76615	0.76384 to 0.76661	1720000	14.1296
42	0.76508	+ or - 0.00048	0.76460 to 0.76557	0.76412 to 0.76605	0.76364 to 0.76653	1620000	14.6053
47	0.76504	+ or - 0.00050	0.76454 to 0.76555	0.76404 to 0.76605	0.76354 to 0.76655	1520000	15.1459
52	0.76500	+ or - 0.00052	0.76448 to 0.76552	0.76397 to 0.76604	0.76345 to 0.76656	1420000	15.9980
57	0.76541	+ or - 0.00050	0.76491 to 0.76592	0.76441 to 0.76642	0.76390 to 0.76692	1320000	17.1523

```
      62          0.76549   + or - 0.00050     0.76499 to 0.76598
0.76450 to 0.76648    0.76400 to 0.76698    1220000      17.3386

      67          0.76564   + or - 0.00051     0.76513 to 0.76615
0.76461 to 0.76667    0.76410 to 0.76718    1120000      18.2209

      72          0.76580   + or - 0.00055     0.76526 to 0.76635
0.76471 to 0.76690    0.76416 to 0.76744    1020000      19.1197

      77          0.76564   + or - 0.00062     0.76502 to 0.76626
0.76440 to 0.76687    0.76378 to 0.76749     920000      18.1465

      82          0.76529   + or - 0.00062     0.76468 to 0.76591
0.76406 to 0.76653    0.76344 to 0.76715     820000      20.8546

      87          0.76549   + or - 0.00065     0.76484 to 0.76614
0.76419 to 0.76679    0.76355 to 0.76744     720000      24.4492

      92          0.76553   + or - 0.00065     0.76488 to 0.76618
0.76423 to 0.76683    0.76359 to 0.76748     620000      25.4983

      97          0.76571   + or - 0.00064     0.76507 to 0.76635
0.76442 to 0.76699    0.76378 to 0.76764     520000      22.1294

     102          0.76542   + or - 0.00074     0.76468 to 0.76616
0.76395 to 0.76690    0.76321 to 0.76764     420000      26.0212

     107          0.76535   + or - 0.00084     0.76451 to 0.76619
0.76367 to 0.76703    0.76283 to 0.76786     320000      32.1397

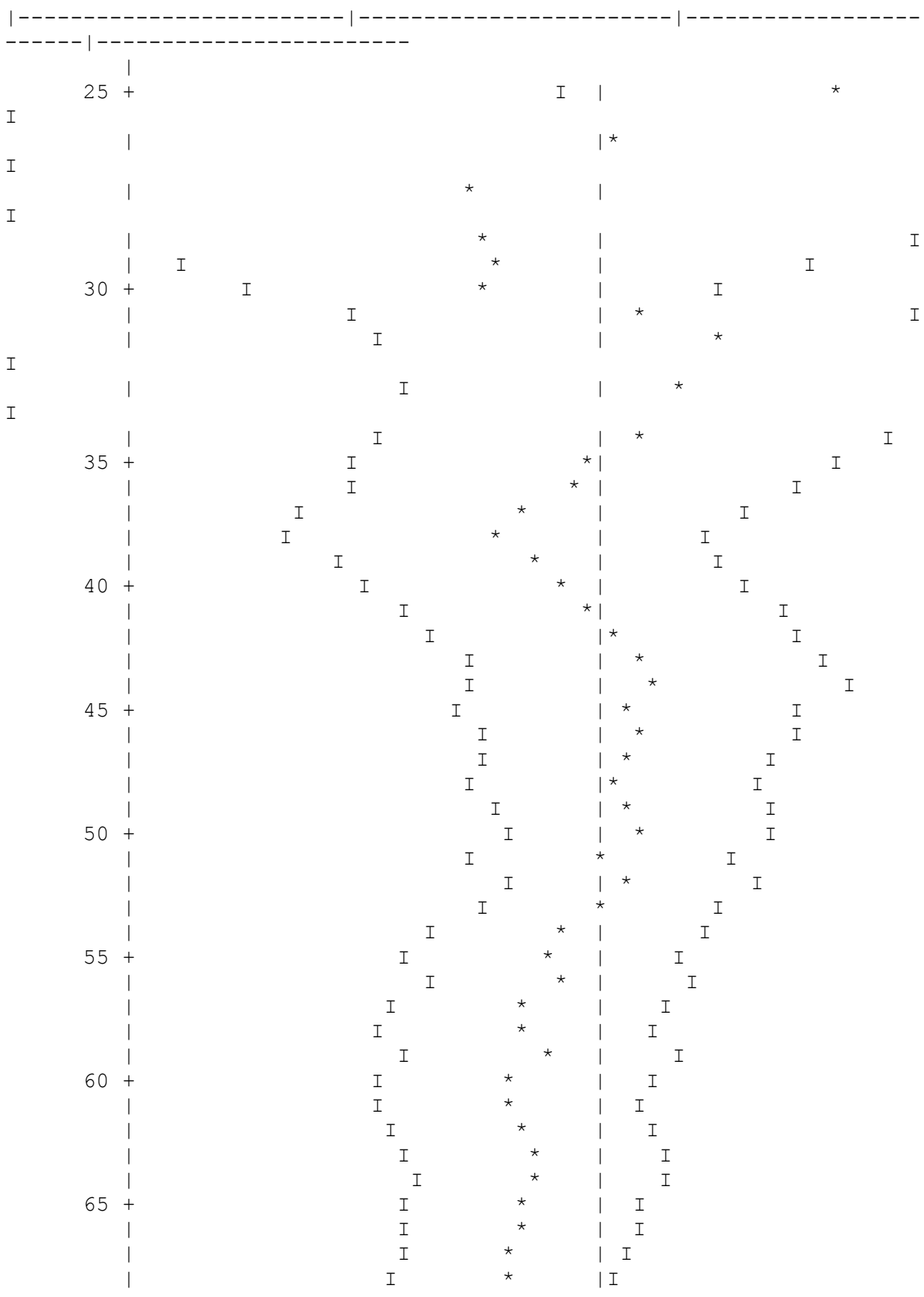
     112          0.76504   + or - 0.00144     0.76360 to 0.76649
0.76216 to 0.76793    0.76071 to 0.76937     220000      23.4430
1                                                 fuel bundle

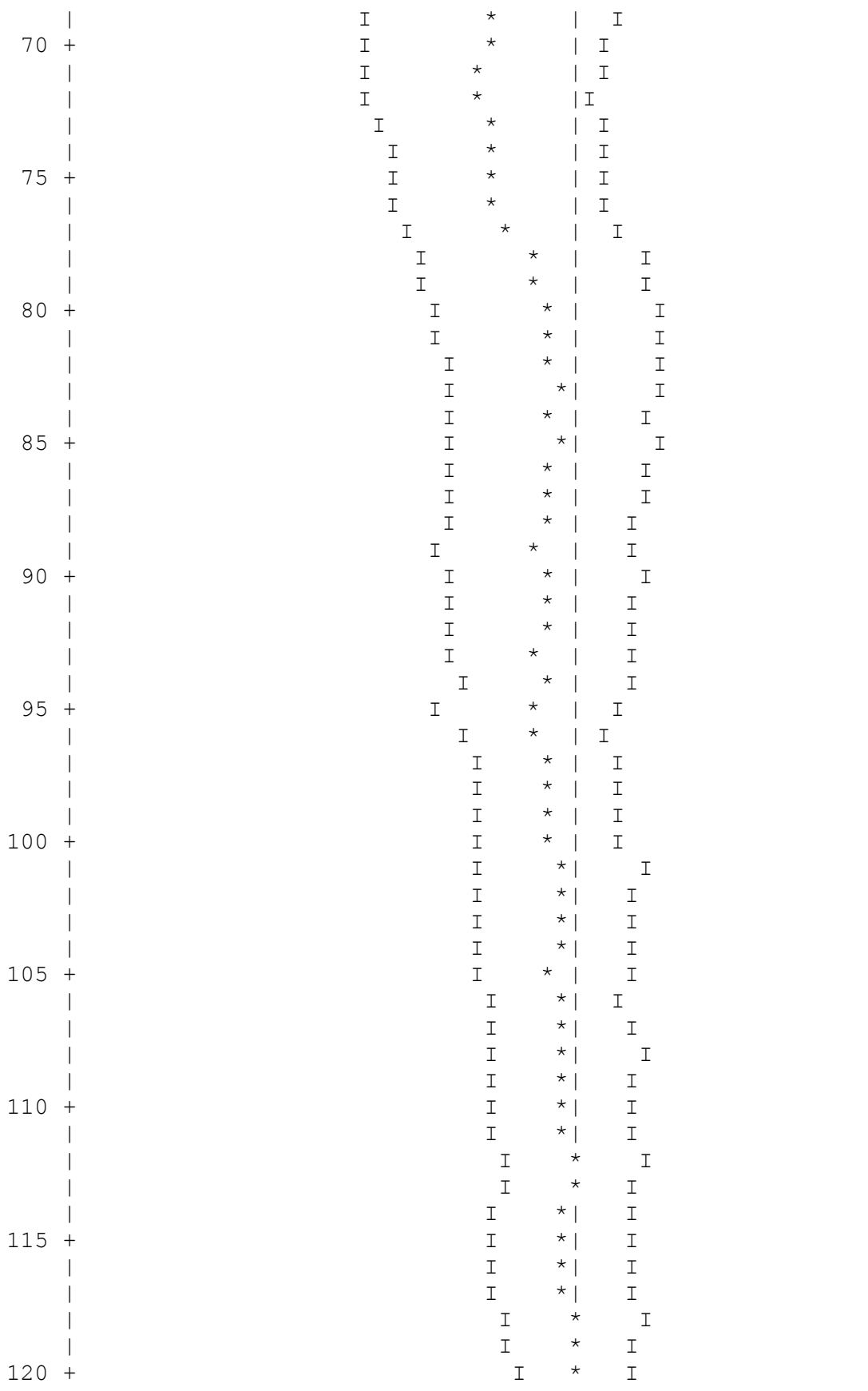
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76569   + or - 0.00318     0.76251 to 0.76887
0.75933 to 0.77206    0.75614 to 0.77524     120000      16.1839
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76512 + or - 0.00043 which occurs for
123 generations run.

                                0.7641                   0.7667
0.7694
```




70
75
80
85
90
95
100
105
110
115
120

```
         |                                I   *   I
         |                                I   *   I
         |                               I    *   I
1                           fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7651 + or - 0.0004 which occurs for 23 generations skipped.

```
                                 0.7635                    0.7647
0.7660

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

```
I
         |                                                  I         *|
I
         |                                                 I         * |
I
         |                                                I         *  |
I
      45 +                                                I         * |
I
         |                                                I         * |
I
         |                                                I         * |
I
         |                                                I          *|
I
         |                                                I          * |
I
      50 +                                                I         *  |
I
         |                                                  I         *|
I
         |                                                I         *  |
I
         |                                                I          *|
I
         |                                                     I       | *
I
      55 +                                                      I      |
*         I
         |                                                     I       |
*         I
         |                                                        I    |
*         I
         |                                                          I   |
*         I
         |                                                         I     |
*          I
      60 +                                                            I |
*        I
         |                                                            I |
*         I
         |                                                           I  |
*         I
         |                                                          I   |
*         I
         |                                                          I   |
*         I
      65 +                                                            I |
*          I
         |                                                            I |
*          I
         |                                                              I
```

```
*          I
         |                                                          |I
*         I
         |                                                        I|
*         I
      70 +                                                          I
*         I
         |                                                          |I
*          I
         |                                                          | I
*          I
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      90 +                                                 I      |
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   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                 4.64691E-07    70.3526
3.85303E-07    36.6255       0.00000E+00     0.0000
    3    0.0000                 1.32144E-05    10.7304
2.01867E-05     4.3802       0.00000E+00     0.0000
    4    0.0000                 2.02810E-05     8.3946
3.37547E-05     3.8039       0.00000E+00     0.0000
    5    0.0000                 2.61712E-05     7.3264
5.48048E-05     3.2399       0.00000E+00     0.0000
    6    0.0001                 9.04464E-05     4.3168
2.22142E-04     1.6748       0.00000E+00     0.0000
    7    0.0001                 1.10724E-04     3.2250
2.01337E-04     1.6047       0.00000E+00     0.0000
    8    0.0003                 2.40038E-04     2.2420
3.23359E-04     0.9782       0.00000E+00     0.0000
    9    0.0005                 3.90791E-04     1.3135
4.45499E-04     0.6145       0.00000E+00     0.0000
   10    0.0003                 2.01980E-04     1.6639
2.08187E-04     0.7184       0.00000E+00     0.0000
   11    0.0012                 9.05838E-04     0.7208
5.23079E-04     0.5106       0.00000E+00     0.0000
   12    0.0010                 7.63139E-04     0.6840
2.99201E-04     0.6734       0.00000E+00     0.0000
   13    0.0003                 2.28813E-04     1.4186
9.08832E-05     1.4042       0.00000E+00     0.0000
   14    0.0013                 1.00894E-03     0.6398
4.12380E-04     0.6332       0.00000E+00     0.0000
   15    0.0010                 7.58325E-04     0.7872
3.26922E-04     0.7777       0.00000E+00     0.0000
   16    0.0002                 1.88267E-04     1.2080
8.65167E-05     1.1887       0.00000E+00     0.0000
   17    0.0001                 6.69209E-05     1.8244
3.25368E-05     1.7887       0.00000E+00     0.0000
   18    0.0001                 5.11039E-05     2.4138
2.58147E-05     2.3630       0.00000E+00     0.0000
   19    0.0001                 8.06664E-05     1.4469
4.26363E-05     1.4161       0.00000E+00     0.0000
```

20	0.0001	5.98121E-05	1.5641	3.27665E-05	1.5278
0.00000E+00	0.0000				
21	0.0002	1.17691E-04	1.0987	6.64856E-05	1.0723
0.00000E+00	0.0000				
22	0.0001	1.04027E-04	1.2066	6.16409E-05	1.1774
0.00000E+00	0.0000				
23	0.0001	1.07392E-04	1.0802	6.55280E-05	1.0538
0.00000E+00	0.0000				
24	0.0000	2.50371E-05	2.3507	1.55478E-05	2.2873
0.00000E+00	0.0000				
25	0.0000	3.05158E-05	1.9391	1.90752E-05	1.8864
0.00000E+00	0.0000				
26	0.0000	1.71767E-05	2.3394	1.07977E-05	2.2710
0.00000E+00	0.0000				
27	0.0001	5.31407E-05	1.4122	3.31595E-05	1.3832
0.00000E+00	0.0000				
28	0.0001	9.69312E-05	1.0896	6.04682E-05	1.0702
0.00000E+00	0.0000				
29	0.0001	9.76726E-05	1.1235	6.15390E-05	1.1098
0.00000E+00	0.0000				
30	0.0000	1.22736E-05	2.6152	7.70029E-06	2.5960
0.00000E+00	0.0000				
31	0.0001	9.63819E-05	1.0571	6.08962E-05	1.0441
0.00000E+00	0.0000				
32	0.0001	3.85638E-05	1.6329	2.46434E-05	1.6002
0.00000E+00	0.0000				
33	0.0000	3.23241E-05	1.5782	2.02445E-05	1.5578
0.00000E+00	0.0000				
34	0.0001	7.46010E-05	1.2273	4.68726E-05	1.2093
0.00000E+00	0.0000				
35	0.0001	4.53205E-05	1.6039	2.84433E-05	1.5791
0.00000E+00	0.0000				
36	0.0001	4.38327E-05	1.3738	2.71290E-05	1.3610
0.00000E+00	0.0000				
37	0.0000	2.89038E-05	1.6153	1.81304E-05	1.5811
0.00000E+00	0.0000				
38	0.0000	3.36835E-05	1.5863	2.12133E-05	1.5468
0.00000E+00	0.0000				
39	0.0002	1.27683E-04	1.0099	8.12701E-05	0.9857
0.00000E+00	0.0000				
40	0.0002	1.20077E-04	0.9264	7.76296E-05	0.9086
0.00000E+00	0.0000				
41	0.0002	1.59693E-04	0.7834	1.06727E-04	0.7594
0.00000E+00	0.0000				
42	0.0002	1.38070E-04	0.7508	9.39329E-05	0.7330
0.00000E+00	0.0000				
43	0.0001	7.85508E-05	1.1775	5.64165E-05	1.1292
0.00000E+00	0.0000				
44	0.0001	1.13929E-04	1.0057	8.36463E-05	0.9663
0.00000E+00	0.0000				
45	0.0001	5.86494E-05	1.0250	4.73808E-05	0.9409
0.00000E+00	0.0000				

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   46    0.0000                 1.40599E-05     1.9563
1.13226E-05     1.8173       0.00000E+00     0.0000
   47    0.0001                 4.08054E-05     1.6718
3.16943E-05     1.6156       0.00000E+00     0.0000
   48    0.0000                 1.21118E-05     3.9796
9.40038E-06     3.8710       0.00000E+00     0.0000
   49    0.0001                 7.98598E-05     1.8011
6.29866E-05     1.7656       0.00000E+00     0.0000
   50    0.0001                 5.61495E-05     1.6663
4.62519E-05     1.6354       0.00000E+00     0.0000
   51    0.0000                 1.50157E-05     3.2010
1.24811E-05     3.1382       0.00000E+00     0.0000
   52    0.0001                 4.01153E-05     2.3031
3.46934E-05     2.2469       0.00000E+00     0.0000
   53    0.0002                 1.57608E-04     0.9276
1.54928E-04     0.8621       0.00000E+00     0.0000
   54    0.0001                 7.54642E-05     1.9302
7.00783E-05     1.8615       0.00000E+00     0.0000
   55    0.0002                 1.66220E-04     1.2727
1.52331E-04     1.2424       0.00000E+00     0.0000
   56    0.0002                 1.19069E-04     1.7394
1.10370E-04     1.6973       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                 1.47400E-04     1.5571
1.33778E-04     1.5182       0.00000E+00     0.0000
   58    0.0001                 8.57419E-05     2.0317
7.50546E-05     1.9747       0.00000E+00     0.0000
   59    0.0002                 1.58379E-04     1.5126
1.42309E-04     1.4501       0.00000E+00     0.0000
   60    0.0004                 2.73317E-04     1.1167
2.47894E-04     1.0532       0.00000E+00     0.0000
   61    0.0000                 2.86132E-05     3.5281
2.20067E-05     3.4137       0.00000E+00     0.0000
   62    0.0002                 1.60240E-04     1.9252
1.34466E-04     1.8703       0.00000E+00     0.0000
   63    0.0002                 1.21017E-04     1.9549
9.96343E-05     1.8880       0.00000E+00     0.0000
   64    0.0001                 1.03416E-04     2.3867
8.32810E-05     2.3108       0.00000E+00     0.0000
   65    0.0000                 3.52705E-05     3.6334
3.48540E-05     3.5239       0.00000E+00     0.0000
   66    0.0002                 1.73638E-04     1.6818
1.54053E-04     1.6295       0.00000E+00     0.0000
   67    0.0002                 1.48360E-04     2.2429
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1.21322E-04	2.1685	0.00000E+00	0.0000	68	0.0000	2.74358E-05	4.7691
2.36965E-05	4.6019	0.00000E+00	0.0000	69	0.0004	3.04601E-04	1.7086
2.38990E-04	1.6547	0.00000E+00	0.0000	70	0.0003	2.10693E-04	1.7243
1.91651E-04	1.6560	0.00000E+00	0.0000	71	0.0006	4.35102E-04	1.4797
3.59951E-04	1.4342	0.00000E+00	0.0000	72	0.0001	4.66082E-05	6.1706
2.75735E-05	6.0144	0.00000E+00	0.0000	73	0.0004	3.14257E-04	1.6228
2.39741E-04	1.5317	0.00000E+00	0.0000	74	0.0014	1.05973E-03	1.0732
7.70614E-04	1.0303	0.00000E+00	0.0000	75	0.0001	1.11372E-04	2.9147
8.55703E-05	2.7796	0.00000E+00	0.0000	76	0.0006	4.54827E-04	2.1115
2.89009E-04	2.0370	0.00000E+00	0.0000	77	0.0005	3.63040E-04	1.9910
2.60481E-04	1.9119	0.00000E+00	0.0000	78	0.0000	7.02026E-06	4.2051
6.87093E-05	4.1593	0.00000E+00	0.0000	79	0.0002	1.79652E-04	2.7163
1.21035E-04	2.6064	0.00000E+00	0.0000	80	0.0001	6.09440E-05	3.2530
8.12613E-05	3.1611	0.00000E+00	0.0000	81	0.0014	1.05875E-03	1.2486
7.78638E-04	1.1971	0.00000E+00	0.0000	82	0.0001	6.35200E-05	4.1984
3.82279E-05	3.9641	0.00000E+00	0.0000	83	0.0002	1.36517E-04	2.9119
1.50870E-04	2.8553	0.00000E+00	0.0000	84	0.0001	8.10543E-05	3.2317
8.21576E-05	3.0081	0.00000E+00	0.0000	85	0.0003	1.94961E-04	2.1013
2.40093E-04	2.0449	0.00000E+00	0.0000	86	0.0004	2.72524E-04	2.2130
2.19000E-04	2.1076	0.00000E+00	0.0000	87	0.0004	3.43403E-04	2.1283
2.13440E-04	2.0371	0.00000E+00	0.0000	88	0.0001	5.43854E-05	4.1927
9.87715E-05	4.0881	0.00000E+00	0.0000	89	0.0001	8.82985E-05	4.0649
6.15862E-05	3.7273	0.00000E+00	0.0000	90	0.0003	2.34894E-04	2.8332
1.38366E-04	2.7221	0.00000E+00	0.0000	91	0.0002	1.89766E-04	3.1879
1.20041E-04	3.0110	0.00000E+00	0.0000	92	0.0000	3.03029E-05	2.8243
1.98367E-04	2.7652	0.00000E+00	0.0000	93	0.0002	1.21176E-04	3.6506

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9.90074E-05     3.3828       0.00000E+00     0.0000
   94    0.0001                 1.11760E-04     4.0499
6.26771E-05     3.8068       0.00000E+00     0.0000
   95    0.0008                 6.16750E-04     2.1138
3.80225E-04     2.0473       0.00000E+00     0.0000
   96    0.0002                 1.37706E-04     4.7703
7.01663E-05     4.5534       0.00000E+00     0.0000
   97    0.0004                 2.74413E-04     3.6894
1.57198E-04     3.6092       0.00000E+00     0.0000
   98    0.0001                 1.11426E-04     3.6816
1.06548E-04     3.5612       0.00000E+00     0.0000
   99    0.0001                 9.88595E-05     4.7840
6.63867E-05     4.6080       0.00000E+00     0.0000
  100    0.0002                 1.16500E-04     4.6660
7.82273E-05     4.4524       0.00000E+00     0.0000
  101    0.0001                 1.07190E-04     3.7393
6.83735E-05     3.4594       0.00000E+00     0.0000
  102    0.0002                 1.63400E-04     3.9254
9.09800E-05     3.7681       0.00000E+00     0.0000
  103    0.0001                 1.00181E-04     3.3452
9.75285E-05     3.1749       0.00000E+00     0.0000
  104    0.0002                 1.71453E-04     3.5499
1.35808E-04     3.4306       0.00000E+00     0.0000
  105    0.0002                 1.22640E-04     3.4461
8.11817E-05     3.2389       0.00000E+00     0.0000
  106    0.0002                 1.86461E-04     4.5473
1.38536E-04     4.4919       0.00000E+00     0.0000
  107    0.0001                 6.61347E-05     3.3914
6.67060E-05     3.1879       0.00000E+00     0.0000
  108    0.0000                 3.42312E-05     2.7214
1.47821E-04     2.6575       0.00000E+00     0.0000
  109    0.0002                 1.30855E-04     2.2962
4.34266E-04     2.2649       0.00000E+00     0.0000
  110    0.0009                 6.58129E-04     2.7032
4.05754E-04     2.6813       0.00000E+00     0.0000
  111    0.0002                 1.53268E-04     4.5641
1.40818E-04     4.4434       0.00000E+00     0.0000
  112    0.0002                 1.24732E-04     4.7625
1.31352E-04     4.6801       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                 1.17621E-04     3.5486
1.03305E-04     3.3041       0.00000E+00     0.0000
  114    0.0000                 1.19185E-05     6.7824
1.60255E-05     5.7239       0.00000E+00     0.0000
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115	0.0001	7.02687E-05	3.9514	8.18804E-05	3.6360
0.00000E+00	0.0000				
116	0.0003	1.95446E-04	2.9675	1.46881E-04	2.6810
0.00000E+00	0.0000				
117	0.0006	4.85952E-04	2.5214	2.59629E-04	2.3611
0.00000E+00	0.0000				
118	0.0008	5.74548E-04	1.9106	4.49010E-04	1.8331
0.00000E+00	0.0000				
119	0.0002	1.42827E-04	2.0673	3.68446E-04	1.9962
0.00000E+00	0.0000				
120	0.0002	1.68955E-04	2.2869	6.42958E-04	2.2549
0.00000E+00	0.0000				
121	0.0006	4.81492E-04	2.5545	3.71088E-04	2.4869
0.00000E+00	0.0000				
122	0.0001	1.02141E-04	4.5310	7.97919E-05	4.2149
0.00000E+00	0.0000				
123	0.0003	2.29263E-04	2.8212	1.61528E-04	2.5210
0.00000E+00	0.0000				
124	0.0003	2.31873E-04	2.9064	1.91282E-04	2.7232
0.00000E+00	0.0000				
125	0.0002	1.36038E-04	3.3504	1.25456E-04	3.0140
0.00000E+00	0.0000				
126	0.0001	9.69539E-05	3.4613	8.74118E-05	3.0203
0.00000E+00	0.0000				
127	0.0005	3.97295E-04	3.1544	1.95166E-04	2.9863
0.00000E+00	0.0000				
128	0.0003	2.10540E-04	2.6314	1.30771E-04	2.3278
0.00000E+00	0.0000				
129	0.0006	4.67350E-04	2.4483	4.29458E-04	2.3389
0.00000E+00	0.0000				
130	0.0001	1.14209E-04	2.8397	2.78772E-04	2.7548
0.00000E+00	0.0000				
131	0.0004	2.90684E-04	2.1195	2.33988E-04	1.7757
0.00000E+00	0.0000				
132	0.0007	5.23606E-04	2.1555	3.21783E-04	1.9846
0.00000E+00	0.0000				
133	0.0014	1.06757E-03	1.8438	6.73749E-04	1.7580
0.00000E+00	0.0000				
134	0.0001	8.91965E-05	1.9708	2.32896E-04	1.6691
0.00000E+00	0.0000				
135	0.0002	1.76031E-04	3.1087	2.61009E-04	3.0299
0.00000E+00	0.0000				
136	0.0001	4.80681E-05	2.2064	7.45336E-04	2.1743
0.00000E+00	0.0000				
137	0.0000	1.93771E-05	0.9148	3.48669E-03	0.9127
0.00000E+00	0.0000				
138	0.0004	3.13838E-04	2.0582	8.17428E-04	2.0274
0.00000E+00	0.0000				
139	0.0002	1.79618E-04	3.3465	2.20608E-04	3.1336
0.00000E+00	0.0000				
140	0.0003	2.09965E-04	2.3028	2.79970E-04	2.0073
0.00000E+00	0.0000				

141	0.0001	8.23715E-05	2.5691	2.59037E-04	2.2971
142	0.0001	6.46870E-05	3.2561	2.23862E-04	2.9808
143	0.0001	7.98117E-05	2.4267	1.72245E-04	1.4858
144	0.0000	3.31134E-05	3.6838	7.30931E-05	2.1768
145	0.0005	3.73906E-04	2.6235	2.94290E-04	2.3745
146	0.0005	3.44480E-04	2.3928	2.52073E-04	1.9497
147	0.0002	1.57624E-04	4.5535	1.02633E-04	3.9032
148	0.0001	5.71044E-05	5.6247	3.84739E-05	4.4973
149	0.0000	2.78818E-05	7.9243	1.96427E-05	6.0495
150	0.0001	8.99783E-05	4.4270	6.49666E-05	3.3250
151	0.0001	6.72785E-05	4.0652	5.69847E-05	2.8214
152	0.0001	4.29540E-05	4.1155	4.79964E-05	2.5674
153	0.0001	4.33283E-05	4.3835	4.75899E-05	2.6046
154	0.0001	5.23271E-05	4.6718	5.26272E-05	2.7711
155	0.0001	4.56542E-05	5.1099	4.70967E-05	2.9364
156	0.0001	4.59568E-05	4.6084	4.55151E-05	2.8008
157	0.0001	6.06423E-05	4.3186	5.82508E-05	2.7086
158	0.0001	6.56083E-05	3.8850	6.72791E-05	2.5184
159	0.0002	1.48031E-04	3.0800	2.06525E-04	2.5679
160	0.0001	5.58147E-05	4.3525	6.80433E-05	3.2152
161	0.0001	7.36393E-05	3.8456	7.27849E-05	2.5101
162	0.0001	8.44660E-05	3.9726	8.05093E-05	2.4799
163	0.0001	9.58650E-05	3.5630	8.84423E-05	2.2393
164	0.0001	1.01989E-04	3.7454	9.45154E-05	2.3257
165	0.0002	1.21625E-04	2.8542	1.09017E-04	1.8843
166	0.0001	6.93758E-05	4.4859	6.35862E-05	2.8876

```
  167    0.0001                 8.35339E-05     4.4962
7.36830E-05     2.9962       0.00000E+00     0.0000
  168    0.0001                 9.22641E-05     3.8462
8.13411E-05     2.6106       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                 1.06959E-04     4.2859
9.36028E-05     3.0140       0.00000E+00     0.0000
  170    0.0002                 1.39604E-04     3.6702
1.18176E-04     2.7605       0.00000E+00     0.0000
  171    0.0001                 9.91400E-05     5.5049
7.62207E-05     4.3801       0.00000E+00     0.0000
  172    0.0002                 1.34785E-04     4.5404
9.62126E-05     3.7744       0.00000E+00     0.0000
  173    0.0002                 1.86695E-04     4.0269
1.23409E-04     3.4858       0.00000E+00     0.0000
  174    0.0003                 2.53453E-04     4.2615
1.57214E-04     3.8192       0.00000E+00     0.0000
  175    0.0002                 1.16391E-04     6.3796
6.99823E-05     5.7761       0.00000E+00     0.0000
  176    0.0001                 1.09214E-04     6.0147
6.53175E-05     5.3959       0.00000E+00     0.0000
  177    0.0002                 1.19321E-04     5.1532
7.02503E-05     4.6420       0.00000E+00     0.0000
  178    0.0002                 1.20637E-04     6.0488
7.03585E-05     5.4515       0.00000E+00     0.0000
  179    0.0001                 1.13369E-04     6.0193
6.59893E-05     5.3917       0.00000E+00     0.0000
  180    0.0002                 1.17668E-04     6.1558
6.80962E-05     5.5357       0.00000E+00     0.0000
  181    0.0001                 1.10916E-04     6.3741
6.42518E-05     5.6120       0.00000E+00     0.0000
  182    0.0001                 1.04662E-04     6.8961
6.07647E-05     6.0560       0.00000E+00     0.0000
  183    0.0001                 1.06203E-04     6.0305
6.11608E-05     5.3003       0.00000E+00     0.0000
  184    0.0001                 9.87587E-05     6.2292
5.74267E-05     5.4116       0.00000E+00     0.0000
  185    0.0001                 8.96677E-05     6.8210
5.28440E-05     5.7766       0.00000E+00     0.0000
  186    0.0001                 9.12467E-05     5.8939
5.37473E-05     5.0326       0.00000E+00     0.0000
  187    0.0001                 9.10541E-05     6.0608
5.31436E-05     5.1329       0.00000E+00     0.0000
  188    0.0001                 8.77116E-05     5.8983
```

5.14748E-05 4.9832 0.00000E+00 0.0000
189 0.0001 8.92227E-05 5.9034
5.24395E-05 5.0314 0.00000E+00 0.0000
190 0.0003 2.07958E-04 4.0939
1.23601E-04 3.3721 0.00000E+00 0.0000
191 0.0003 1.99662E-04 3.7119
1.20187E-04 3.0226 0.00000E+00 0.0000
192 0.0002 1.83698E-04 3.5826
1.12578E-04 2.8705 0.00000E+00 0.0000
193 0.0003 2.02597E-04 3.7619
1.22627E-04 3.0446 0.00000E+00 0.0000
194 0.0005 3.80061E-04 3.0823
2.37495E-04 2.4310 0.00000E+00 0.0000
195 0.0006 4.27008E-04 2.7101
2.63998E-04 2.1120 0.00000E+00 0.0000
196 0.0006 4.72557E-04 2.6762
2.92492E-04 2.0981 0.00000E+00 0.0000
197 0.0007 5.18501E-04 2.4570
3.21895E-04 1.9303 0.00000E+00 0.0000
198 0.0007 5.62659E-04 2.1221
3.50641E-04 1.6492 0.00000E+00 0.0000
199 0.0004 3.05404E-04 3.1829
1.91194E-04 2.4780 0.00000E+00 0.0000
200 0.0005 3.71179E-04 2.8715
2.26747E-04 2.2783 0.00000E+00 0.0000
201 0.0010 7.95159E-04 1.8248
4.86346E-04 1.4568 0.00000E+00 0.0000
202 0.0013 9.92182E-04 2.1260
6.00214E-04 1.7118 0.00000E+00 0.0000
203 0.0016 1.19932E-03 1.8392
7.19453E-04 1.4994 0.00000E+00 0.0000
204 0.0022 1.66286E-03 1.7090
9.77961E-04 1.4327 0.00000E+00 0.0000
205 0.0015 1.13599E-03 1.9315
6.64695E-04 1.6436 0.00000E+00 0.0000
206 0.0018 1.36362E-03 1.7677
7.98232E-04 1.5049 0.00000E+00 0.0000
207 0.0021 1.64208E-03 1.6957
9.55436E-04 1.4751 0.00000E+00 0.0000
208 0.0028 2.17572E-03 1.5550
1.26867E-03 1.3620 0.00000E+00 0.0000
209 0.0031 2.37543E-03 1.4425
1.39705E-03 1.2733 0.00000E+00 0.0000
210 0.0038 2.87539E-03 1.2026
1.71158E-03 1.0617 0.00000E+00 0.0000
211 0.0041 3.12315E-03 1.2237
1.88206E-03 1.0608 0.00000E+00 0.0000
212 0.0047 3.61069E-03 1.2416
2.19025E-03 1.0595 0.00000E+00 0.0000
213 0.0064 4.90984E-03 0.9874
2.97904E-03 0.8411 0.00000E+00 0.0000
214 0.0096 7.35231E-03 0.6702

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4.42795E-03     0.5695       0.00000E+00     0.0000
  215    0.0158                 1.21049E-02     0.6416
7.22299E-03     0.5361       0.00000E+00     0.0000
  216    0.0302                 2.31096E-02     0.4468
1.36225E-02     0.3846       0.00000E+00     0.0000
  217    0.0202                 1.54341E-02     0.5745
9.06919E-03     0.4821       0.00000E+00     0.0000
  218    0.0277                 2.12279E-02     0.4283
1.24229E-02     0.3673       0.00000E+00     0.0000
  219    0.0360                 2.75241E-02     0.3963
1.60385E-02     0.3328       0.00000E+00     0.0000
  220    0.0471                 3.60379E-02     0.3275
2.09721E-02     0.2783       0.00000E+00     0.0000
  221    0.0626                 4.78716E-02     0.3005
2.77627E-02     0.2564       0.00000E+00     0.0000
  222    0.0802                 6.13467E-02     0.2712
3.55479E-02     0.2336       0.00000E+00     0.0000
  223    0.1044                 7.98766E-02     0.2487
4.63286E-02     0.2148       0.00000E+00     0.0000
  224    0.0585                 4.47656E-02     0.2968
2.60645E-02     0.2532       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                 1.76517E-01     0.1554
1.04541E-01     0.1312       0.00000E+00     0.0000
  226    0.0454                 3.47334E-02     0.3320
2.11363E-02     0.2839       0.00000E+00     0.0000
  227    0.0493                 3.76904E-02     0.3767
2.33783E-02     0.3050       0.00000E+00     0.0000
  228    0.0208                 1.58998E-02     0.6362
1.00806E-02     0.5084       0.00000E+00     0.0000
  229    0.0223                 1.70299E-02     0.5459
1.09541E-02     0.4367       0.00000E+00     0.0000
  230    0.0117                 8.91421E-03     0.7852
5.83406E-03     0.6059       0.00000E+00     0.0000
  231    0.0121                 9.27429E-03     0.7636
6.18619E-03     0.5963       0.00000E+00     0.0000
  232    0.0127                 9.75171E-03     0.6891
6.67174E-03     0.5043       0.00000E+00     0.0000
  233    0.0084                 6.43028E-03     0.9919
4.49434E-03     0.7134       0.00000E+00     0.0000
  234    0.0058                 4.41592E-03     0.9707
3.20456E-03     0.6762       0.00000E+00     0.0000
  235    0.0024                 1.81138E-03     1.4534
1.20738E-03     1.1310       0.00000E+00     0.0000
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  236    0.0019                 1.45945E-03     1.8871
9.83169E-04     1.4075       0.00000E+00     0.0000
  237    0.0017                 1.28495E-03     2.0175
9.17348E-04     1.4458       0.00000E+00     0.0000
  238    0.0001                 6.65479E-05     8.4150
6.01628E-05     4.8152       0.00000E+00     0.0000

 system total =                 7.65125E-01     0.0557
4.68542E-01     0.0476       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3129E-01  +
or -  0.0002



 elapsed time   3.11900 minutes

 random number=   A384B6E909A25201
1                                                fuel bundle

                                                     **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.086E-03
0.06         7.651E-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     flux     percent     flux     percent
                 deviation            deviation            deviation
    1   0.000E+00    0.00   0.000E+00    0.00   0.000E+00    0.00
    2   1.576E-08   29.57   1.421E-08   23.54   1.291E-08   24.75
```

3	9.222E-07	3.75	7.442E-07	3.32	8.006E-07	3.41
4	1.489E-06	3.17	1.233E-06	2.79	1.314E-06	2.86
5	2.318E-06	2.40	1.883E-06	2.08	2.022E-06	2.06
6	9.321E-06	1.37	7.506E-06	1.21	8.023E-06	1.23
7	1.243E-05	1.38	9.510E-06	1.16	1.004E-05	1.17
8	3.064E-05	0.68	2.238E-05	0.60	2.347E-05	0.64
9	8.171E-05	0.53	5.868E-05	0.42	6.115E-05	0.44
10	4.632E-05	0.60	3.277E-05	0.52	3.401E-05	0.53
11	2.203E-04	0.30	1.555E-04	0.26	1.611E-04	0.25
12	1.896E-04	0.29	1.379E-04	0.25	1.448E-04	0.24
13	5.657E-05	0.48	4.139E-05	0.43	4.328E-05	0.45
14	2.533E-04	0.23	1.831E-04	0.22	1.911E-04	0.21
15	2.186E-04	0.27	1.587E-04	0.23	1.653E-04	0.21
16	7.111E-05	0.45	5.169E-05	0.41	5.395E-05	0.42
17	3.171E-05	0.68	2.325E-05	0.57	2.422E-05	0.55
18	2.806E-05	0.72	2.037E-05	0.65	2.102E-05	0.59
19	5.029E-05	0.50	3.670E-05	0.40	3.821E-05	0.42
20	3.981E-05	0.61	2.922E-05	0.46	3.044E-05	0.50
21	8.008E-05	0.42	5.886E-05	0.38	6.149E-05	0.36
22	7.337E-05	0.48	5.359E-05	0.36	5.544E-05	0.35
23	7.731E-05	0.42	5.658E-05	0.36	5.871E-05	0.34
24	1.862E-05	0.85	1.384E-05	0.72	1.443E-05	0.66
25	2.327E-05	0.74	1.724E-05	0.63	1.807E-05	0.61
26	1.340E-05	0.93	9.821E-06	0.74	1.038E-05	0.70
27	4.183E-05	0.56	3.119E-05	0.50	3.294E-05	0.48
28	7.721E-05	0.39	5.736E-05	0.34	6.076E-05	0.36
29	7.970E-05	0.39	5.963E-05	0.34	6.243E-05	0.31
30	1.001E-05	1.01	7.458E-06	0.80	7.833E-06	0.79
31	7.870E-05	0.39	5.919E-05	0.34	6.219E-05	0.30
32	3.088E-05	0.61	2.321E-05	0.53	2.442E-05	0.48
33	2.677E-05	0.66	2.023E-05	0.57	2.129E-05	0.56
34	6.108E-05	0.51	4.609E-05	0.43	4.843E-05	0.37
35	3.648E-05	0.52	2.757E-05	0.48	2.898E-05	0.47
36	3.416E-05	0.50	2.567E-05	0.45	2.687E-05	0.42
37	2.214E-05	0.69	1.657E-05	0.56	1.736E-05	0.49
38	2.580E-05	0.69	1.963E-05	0.61	2.069E-05	0.54
39	9.793E-05	0.32	7.512E-05	0.27	7.928E-05	0.26
40	8.944E-05	0.35	6.908E-05	0.28	7.366E-05	0.26
41	1.143E-04	0.30	8.923E-05	0.27	9.499E-05	0.24
42	9.375E-05	0.31	7.407E-05	0.27	7.929E-05	0.24
43	5.104E-05	0.44	4.067E-05	0.38	4.287E-05	0.35
44	6.964E-05	0.34	5.579E-05	0.30	5.985E-05	0.27
45	3.502E-05	0.42	2.799E-05	0.37	3.111E-05	0.34
46	8.274E-06	0.87	6.641E-06	0.77	7.146E-06	0.66
47	2.372E-05	0.60	1.885E-05	0.52	1.966E-05	0.43
48	6.593E-06	1.15	5.312E-06	1.03	5.566E-06	0.87
49	4.377E-05	0.40	3.502E-05	0.36	3.787E-05	0.33
50	2.943E-05	0.48	2.369E-05	0.42	2.577E-05	0.38
51	7.851E-06	0.73	6.390E-06	0.68	6.935E-06	0.60
52	2.067E-05	0.68	1.658E-05	0.53	1.801E-05	0.44
53	7.661E-05	0.29	6.174E-05	0.26	6.701E-05	0.22
54	3.333E-05	0.44	2.705E-05	0.39	2.925E-05	0.30

55	6.648E-05	0.34	5.407E-05	0.30	5.891E-05	0.26
56	4.325E-05	0.32	3.531E-05	0.32	3.843E-05	0.27
57	4.932E-05	0.41	4.015E-05	0.37	4.372E-05	0.31
58	2.604E-05	0.47	2.128E-05	0.37	2.310E-05	0.39
59	4.440E-05	0.35	3.617E-05	0.32	3.938E-05	0.25
60	6.432E-05	0.33	5.275E-05	0.29	5.738E-05	0.26
61	6.173E-06	1.06	5.045E-06	0.91	5.500E-06	0.76
62	3.217E-05	0.44	2.639E-05	0.41	2.876E-05	0.31
63	2.156E-05	0.54	1.778E-05	0.53	1.938E-05	0.41
64	1.739E-05	0.59	1.424E-05	0.51	1.547E-05	0.41
65	5.706E-06	0.96	4.670E-06	0.79	5.066E-06	0.73
66	2.877E-05	0.49	2.369E-05	0.44	2.569E-05	0.34
67	2.148E-05	0.52	1.758E-05	0.45	1.905E-05	0.38
68	4.585E-06	0.96	3.765E-06	0.82	4.099E-06	0.76
69	3.729E-05	0.37	3.068E-05	0.34	3.336E-05	0.29
70	2.671E-05	0.46	2.211E-05	0.43	2.392E-05	0.33
71	4.594E-05	0.37	3.782E-05	0.31	4.102E-05	0.22
72	2.624E-06	1.48	2.182E-06	1.37	2.395E-06	1.08
73	2.720E-05	0.44	2.254E-05	0.41	2.435E-05	0.35
74	7.988E-05	0.29	6.613E-05	0.25	7.178E-05	0.21
75	8.971E-06	0.69	7.478E-06	0.70	8.133E-06	0.53
76	2.301E-05	0.48	1.904E-05	0.43	2.059E-05	0.35
77	1.785E-05	0.51	1.482E-05	0.50	1.602E-05	0.37
78	1.518E-06	1.85	1.272E-06	1.63	1.399E-06	1.20
79	1.003E-05	0.75	8.332E-06	0.61	8.999E-06	0.54
80	4.488E-06	1.10	3.747E-06	0.91	4.052E-06	0.75
81	5.503E-05	0.33	4.591E-05	0.27	4.967E-05	0.22
82	3.243E-06	1.20	2.734E-06	1.09	2.942E-06	0.85
83	4.476E-06	0.99	3.719E-06	0.92	4.030E-06	0.75
84	8.196E-06	0.78	6.799E-06	0.74	7.362E-06	0.58
85	9.872E-06	0.74	8.246E-06	0.67	8.997E-06	0.55
86	1.356E-05	0.65	1.132E-05	0.56	1.231E-05	0.50
87	1.188E-05	0.52	9.948E-06	0.50	1.084E-05	0.45
88	3.171E-06	1.29	2.648E-06	1.10	2.869E-06	0.97
89	6.569E-06	1.04	5.485E-06	0.91	5.924E-06	0.67
90	6.908E-06	0.84	5.743E-06	0.62	6.240E-06	0.59
91	8.231E-06	0.68	6.860E-06	0.66	7.435E-06	0.53
92	4.817E-06	1.00	4.019E-06	0.99	4.373E-06	0.72
93	8.057E-06	0.85	6.786E-06	0.82	7.375E-06	0.62
94	4.207E-06	1.08	3.513E-06	0.92	3.837E-06	0.84
95	1.249E-05	0.62	1.052E-05	0.51	1.137E-05	0.47
96	3.373E-06	1.35	2.823E-06	1.17	3.051E-06	0.94
97	3.330E-06	1.08	2.806E-06	0.87	3.057E-06	0.75
98	3.488E-06	1.22	2.924E-06	1.11	3.172E-06	0.85
99	2.330E-06	1.37	1.950E-06	1.30	2.114E-06	1.04
100	3.428E-06	1.14	2.864E-06	1.10	3.145E-06	0.90
101	4.982E-06	1.07	4.138E-06	0.90	4.498E-06	0.72
102	3.355E-06	1.26	2.815E-06	1.17	3.032E-06	0.93
103	4.694E-06	0.96	3.907E-06	0.86	4.223E-06	0.72
104	4.215E-06	1.14	3.504E-06	1.13	3.812E-06	0.91
105	4.397E-06	1.06	3.675E-06	0.95	3.977E-06	0.76
106	1.521E-06	1.62	1.312E-06	1.67	1.404E-06	1.25

107	3.589E-06	1.36	3.001E-06	1.27	3.238E-06	0.94
108	3.196E-06	1.23	2.670E-06	1.10	2.952E-06	0.89
109	5.076E-06	1.02	4.280E-06	0.94	4.632E-06	0.82
110	2.970E-06	1.17	2.557E-06	1.14	2.791E-06	0.99
111	3.027E-06	1.39	2.544E-06	1.25	2.764E-06	0.95
112	1.845E-06	1.47	1.521E-06	1.35	1.652E-06	1.12
113	5.709E-06	0.90	4.848E-06	0.81	5.219E-06	0.64
114	1.989E-06	1.81	1.668E-06	1.44	1.793E-06	1.25
115	5.042E-06	0.93	4.274E-06	0.86	4.593E-06	0.71
116	1.076E-05	0.68	9.054E-06	0.60	9.765E-06	0.45
117	1.188E-05	0.60	9.940E-06	0.59	1.078E-05	0.46
118	1.291E-05	0.61	1.078E-05	0.56	1.169E-05	0.43
119	8.186E-06	0.69	6.942E-06	0.58	7.492E-06	0.48
120	5.760E-06	0.99	4.858E-06	0.87	5.288E-06	0.67
121	6.057E-06	0.90	5.143E-06	0.89	5.579E-06	0.68
122	3.283E-06	1.18	2.739E-06	1.07	2.962E-06	0.87
123	1.031E-05	0.70	8.666E-06	0.63	9.429E-06	0.56
124	7.305E-06	0.76	6.190E-06	0.69	6.683E-06	0.58
125	7.134E-06	0.88	5.920E-06	0.77	6.452E-06	0.57
126	5.793E-06	1.00	4.872E-06	0.90	5.236E-06	0.67
127	5.620E-06	0.90	4.716E-06	0.79	5.123E-06	0.65
128	7.759E-06	0.83	6.539E-06	0.76	7.056E-06	0.57
129	9.555E-06	0.64	8.044E-06	0.60	8.694E-06	0.49
130	3.990E-06	1.11	3.386E-06	1.12	3.703E-06	0.78
131	1.695E-05	0.53	1.422E-05	0.42	1.524E-05	0.38
132	1.117E-05	0.67	9.431E-06	0.56	1.020E-05	0.44
133	1.359E-05	0.56	1.148E-05	0.54	1.245E-05	0.44
134	1.481E-05	0.62	1.247E-05	0.54	1.343E-05	0.41
135	2.347E-06	1.42	2.034E-06	1.31	2.190E-06	1.03
136	3.945E-06	1.01	3.389E-06	0.94	3.674E-06	0.72
137	2.502E-06	0.89	2.627E-06	0.85	2.989E-06	0.70
138	4.054E-06	0.95	3.529E-06	0.91	3.875E-06	0.72
139	4.609E-06	0.92	3.908E-06	0.82	4.217E-06	0.74
140	1.209E-05	0.67	1.019E-05	0.64	1.101E-05	0.50
141	8.842E-06	0.73	7.498E-06	0.68	8.055E-06	0.53
142	5.839E-06	0.89	4.978E-06	0.74	5.347E-06	0.65
143	1.979E-05	0.58	1.672E-05	0.48	1.802E-05	0.41
144	8.034E-06	0.75	6.767E-06	0.73	7.264E-06	0.57
145	7.232E-06	0.83	6.173E-06	0.77	6.653E-06	0.56
146	1.216E-05	0.59	1.029E-05	0.50	1.103E-05	0.43
147	3.721E-06	1.16	3.125E-06	1.01	3.352E-06	0.85
148	1.933E-06	1.59	1.612E-06	1.33	1.741E-06	1.16
149	1.201E-06	2.08	1.019E-06	1.82	1.093E-06	1.56
150	3.944E-06	1.03	3.323E-06	0.84	3.598E-06	0.76
151	4.038E-06	1.09	3.432E-06	1.04	3.747E-06	0.84
152	4.383E-06	1.22	3.654E-06	1.10	3.914E-06	0.84
153	4.489E-06	1.23	3.765E-06	1.04	4.075E-06	0.81
154	4.604E-06	1.03	3.908E-06	0.95	4.190E-06	0.76
155	4.316E-06	1.18	3.694E-06	0.98	3.984E-06	0.88
156	3.946E-06	1.11	3.361E-06	1.08	3.620E-06	0.79
157	4.685E-06	1.07	3.939E-06	0.94	4.231E-06	0.67
158	4.873E-06	0.90	4.158E-06	0.82	4.433E-06	0.62

159	6.747E-06	0.84	5.714E-06	0.79	6.173E-06	0.60
160	3.513E-06	1.13	2.984E-06	0.92	3.191E-06	0.79
161	4.980E-06	0.93	4.209E-06	0.78	4.530E-06	0.71
162	5.803E-06	1.03	4.898E-06	0.92	5.293E-06	0.79
163	6.228E-06	0.86	5.273E-06	0.73	5.605E-06	0.58
164	6.541E-06	0.75	5.504E-06	0.75	5.892E-06	0.58
165	6.973E-06	0.93	5.862E-06	0.75	6.291E-06	0.64
166	3.953E-06	1.27	3.348E-06	1.06	3.648E-06	0.83
167	4.178E-06	1.18	3.493E-06	1.03	3.744E-06	0.81
168	4.379E-06	1.00	3.690E-06	0.90	3.960E-06	0.72
169	4.491E-06	1.09	3.822E-06	0.93	4.102E-06	0.73
170	4.733E-06	0.97	3.951E-06	0.82	4.278E-06	0.69
171	2.375E-06	1.36	2.010E-06	1.19	2.200E-06	0.91
172	2.369E-06	1.31	2.011E-06	1.10	2.188E-06	0.97
173	2.457E-06	1.42	2.074E-06	1.23	2.254E-06	1.04
174	2.490E-06	1.27	2.096E-06	1.12	2.292E-06	0.93
175	1.035E-06	2.23	8.743E-07	2.01	9.328E-07	1.61
176	1.011E-06	2.31	8.564E-07	1.87	9.283E-07	1.56
177	1.010E-06	2.27	8.797E-07	2.11	9.375E-07	1.76
178	1.026E-06	1.86	8.667E-07	1.69	9.325E-07	1.37
179	1.029E-06	1.93	8.735E-07	1.66	9.512E-07	1.47
180	1.104E-06	1.94	9.255E-07	1.58	9.822E-07	1.21
181	1.092E-06	2.20	9.245E-07	1.87	9.924E-07	1.60
182	1.077E-06	1.91	9.119E-07	1.82	9.875E-07	1.34
183	1.080E-06	1.83	9.130E-07	1.91	9.958E-07	1.47
184	1.079E-06	2.02	9.188E-07	1.72	9.987E-07	1.38
185	1.101E-06	2.00	9.268E-07	1.54	1.024E-06	1.48
186	1.134E-06	1.95	9.689E-07	1.76	1.051E-06	1.43
187	1.112E-06	1.78	9.526E-07	1.79	1.041E-06	1.49
188	1.189E-06	1.98	9.977E-07	1.88	1.076E-06	1.53
189	1.172E-06	1.82	9.741E-07	1.74	1.067E-06	1.54
190	3.003E-06	1.26	2.541E-06	1.01	2.761E-06	0.87
191	3.059E-06	1.24	2.590E-06	1.12	2.816E-06	0.94
192	3.097E-06	1.13	2.629E-06	0.97	2.872E-06	0.77
193	3.209E-06	1.17	2.706E-06	0.97	2.943E-06	0.90
194	6.898E-06	0.84	5.856E-06	0.74	6.306E-06	0.61
195	7.343E-06	0.82	6.221E-06	0.79	6.668E-06	0.58
196	7.745E-06	0.78	6.561E-06	0.71	7.062E-06	0.56
197	8.455E-06	0.79	7.182E-06	0.68	7.728E-06	0.57
198	8.931E-06	0.80	7.589E-06	0.66	8.224E-06	0.58
199	4.849E-06	1.08	4.071E-06	1.00	4.412E-06	0.70
200	5.155E-06	0.98	4.361E-06	0.85	4.693E-06	0.69
201	1.062E-05	0.69	9.004E-06	0.57	9.714E-06	0.47
202	1.195E-05	0.60	1.001E-05	0.53	1.099E-05	0.42
203	1.297E-05	0.63	1.097E-05	0.56	1.186E-05	0.46
204	1.463E-05	0.62	1.245E-05	0.55	1.352E-05	0.45
205	8.625E-06	0.78	7.718E-06	0.66	8.100E-06	0.52
206	9.305E-06	0.62	8.425E-06	0.55	8.864E-06	0.43
207	9.555E-06	0.58	8.683E-06	0.48	9.190E-06	0.43
208	1.127E-05	0.56	1.020E-05	0.44	1.082E-05	0.43
209	1.152E-05	0.60	1.055E-05	0.51	1.116E-05	0.42
210	1.414E-05	0.50	1.279E-05	0.44	1.359E-05	0.34

211	1.610E-05	0.39	1.454E-05	0.36	1.549E-05	0.30
212	1.916E-05	0.46	1.730E-05	0.36	1.843E-05	0.30
213	2.612E-05	0.37	2.354E-05	0.32	2.524E-05	0.25
214	3.705E-05	0.35	3.312E-05	0.29	3.570E-05	0.23
215	5.523E-05	0.26	4.983E-05	0.21	5.383E-05	0.19
216	9.208E-05	0.24	8.388E-05	0.21	9.070E-05	0.17
217	5.549E-05	0.25	5.312E-05	0.20	5.628E-05	0.16
218	7.052E-05	0.20	6.784E-05	0.18	7.215E-05	0.15
219	8.408E-05	0.21	8.143E-05	0.18	8.666E-05	0.15
220	1.014E-04	0.19	9.895E-05	0.15	1.053E-04	0.13
221	1.204E-04	0.15	1.186E-04	0.14	1.265E-04	0.12
222	1.367E-04	0.16	1.366E-04	0.14	1.458E-04	0.11
223	1.534E-04	0.14	1.573E-04	0.13	1.676E-04	0.11
224	7.504E-05	0.20	7.972E-05	0.17	8.449E-05	0.13
225	2.337E-04	0.13	2.724E-04	0.10	2.826E-04	0.09
226	3.174E-05	0.26	4.487E-05	0.17	4.444E-05	0.12
227	2.885E-05	0.24	4.636E-05	0.22	4.438E-05	0.13
228	1.032E-05	0.40	1.901E-05	0.29	1.756E-05	0.17
229	9.576E-06	0.41	1.964E-05	0.30	1.745E-05	0.17
230	4.482E-06	0.51	1.019E-05	0.43	8.696E-06	0.24
231	4.259E-06	0.54	1.064E-05	0.45	8.732E-06	0.22
232	3.918E-06	0.54	1.135E-05	0.40	8.885E-06	0.22
233	2.231E-06	0.73	7.383E-06	0.56	5.506E-06	0.25
234	1.412E-06	0.90	5.307E-06	0.69	3.818E-06	0.29
235	5.206E-07	1.37	1.044E-06	1.03	1.113E-06	0.45
236	3.432E-07	1.59	7.334E-07	1.21	7.981E-07	0.60
237	2.248E-07	2.14	5.484E-07	1.25	6.132E-07	0.55
238	4.853E-09	11.03	2.296E-08	7.58	2.581E-08	1.82

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

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  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
 0.7524 to 0.7552     **
 0.7552 to 0.7581     **
 0.7581 to 0.7609     **********
 0.7609 to 0.7637     **************************
 0.7637 to 0.7665     *********************
 0.7665 to 0.7694     ***********************
 0.7694 to 0.7722     ************
 0.7722 to 0.7750     ****

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7524 to 0.7552     **
 0.7552 to 0.7581     **
 0.7581 to 0.7609     *******
 0.7609 to 0.7637     *****************
 0.7637 to 0.7665     ******************
 0.7665 to 0.7694     ******************
 0.7694 to 0.7722     ********
 0.7722 to 0.7750     ***

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7524 to 0.7552
 0.7552 to 0.7581     *
 0.7581 to 0.7609     **
 0.7609 to 0.7637     ************
 0.7637 to 0.7665     ****************
 0.7665 to 0.7694     ***********
 0.7694 to 0.7722     ******
 0.7722 to 0.7750     **

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7524 to 0.7552
 0.7552 to 0.7581
```

```
 0.7581 to 0.7609     *
 0.7609 to 0.7637     ******
 0.7637 to 0.7665     *********
 0.7665 to 0.7694     *****
 0.7694 to 0.7722     ****
 0.7722 to 0.7750

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

**********************************************************************
*********************************************
        ***
***
        ***                                     ******      final results
table      ******                                   ***
        ***
***
        ***        best estimate system k-eff
0.76512 + or - 0.00043                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.66090E-02 + or -  1.29132E-04            ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  9.86291E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52702E-01 + or -  1.72361E-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     3.12533 minutes


*********************************************************************
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1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99      //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666
```

```
      0000000      5555555555555                          11
11                                11        5555555555555
     000000000     5555555555555                         111
111                               111        5555555555555
    00       00    55                    :::           1111
1111              :::           1111        55
   00         00   55                    :::             11
11              :::             11        55
   00         00   55                    :::             11
11              :::             11        55
   00         00   555555555555                          11
11                                11        555555555555
   00         00   5555555555555                         11
11                                11        5555555555555
   00         00              55         :::             11
11              :::             11                   55
   00         00              55         :::             11
11              :::             11                   55
    00       00    55         55         :::             11
11              :::             11        55         55
     000000000     5555555555555                         11111111
11111111                          11111111     5555555555555
      0000000       55555555555                          11111111
11111111                          11111111      55555555555
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
```

****
****

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

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*********************************************************************
************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
```

```
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:11:15.67
*****
        *****
*****
        *****
*****

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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
```

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

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```

```
*********************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number               data set name
name        unit function                     ***
        ***         ------               -------------
----        -------------                     ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access         ***
        ***
***
```

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

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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  3.54123E-14  1.06832E-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  9.90598E-17  3.26452E-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  3.74027E-13  9.28311E-12   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  1.63621E-08  4.50132E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  3.21449E-12  8.93964E-11   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.65832E-08  4.66149E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  5.30920E-12  1.50832E-10   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.67577E-09  7.68186E-08   40096    95.9083     zr96 4043
```

```
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.29446E-20  3.59994E-19   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  4.20657E-14  1.19505E-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  6.78791E-09  1.96901E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.71749E-08  5.03341E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  4.00418E-12  1.18551E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.86883E-09  2.05420E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  5.52342E-13  1.63529E-11   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  4.30830E-12  1.30132E-10   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  3.35540E-12  1.02353E-10   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  2.37106E-12  7.30377E-11   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  1.54434E-12  4.80333E-11   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  3.22375E-13  1.02200E-11   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  2.92709E-14  9.01648E-13   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  4.92878E-13  1.54775E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  1.62289E-13  5.09622E-12   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  1.25248E-13  4.00802E-12   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  4.46141E-14  1.44102E-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  1.38175E-14  4.50443E-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
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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  2.43628E-09  8.16074E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23379E-09  4.16980E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90072E-09  9.89019E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56235E-10  2.62373E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.40917E-15  4.84684E-14   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  6.50133E-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  1.46854E-09  5.13894E-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  1.64255E-09  5.84621E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22980E-09  2.23596E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85339E-10  3.23063E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10716E-09  4.10640E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  4.45219E-14  1.67798E-12   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  6.34273E-15  2.40943E-13   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                12/17/09
    1053129  3.41712E-13  1.31854E-11   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                12/17/09
    1053135  1.27400E-12  5.14489E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                12/17/09
    1054131  1.36583E-13  5.35198E-12   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.03870E-12  8.11071E-11   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.56993E-12  6.33982E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.46719E-13  5.83701E-12   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  5.76687E-18  2.31156E-16   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  2.31995E-12  9.36853E-11   55135   134.9060     cs135 5531
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endf/b7 rel0 rev7 mod1                12/17/09
    1055137  4.95077E-12  2.02890E-10   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29259E-08  1.35919E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  4.71397E-12  1.97424E-10   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  4.96856E-12  2.06592E-10   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  3.98504E-12  1.68086E-10   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  4.53167E-12  1.92500E-10   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  3.51919E-12  1.50548E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  4.32871E-12  1.86476E-10   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  5.62076E-14  2.37078E-12   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  1.43252E-12  6.12812E-11   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  3.86930E-14  1.65522E-12   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  7.81906E-15  3.36827E-13   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  2.39358E-12  1.03828E-10   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  2.53677E-12  1.10799E-10   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.79245E-12  7.88277E-11   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.33143E-12  5.89518E-11   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  8.50808E-14  3.74162E-12   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.19609E-20  5.29597E-19   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  6.49021E-13  2.89314E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  3.07844E-17  1.35381E-15   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.52683E-13  6.80608E-12   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  2.13332E-17  9.57348E-16   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.00814E-09  1.35896E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  2.16498E-13  9.84530E-12   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  9.93154E-14  4.54620E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.42839E-09  6.45290E-08   63151   150.9198     eu151 6325
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endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.55918E-09  7.13715E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  5.25880E-17  2.42299E-15   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  2.67943E-14  1.24257E-12   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  7.53768E-15  3.51815E-13   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77415E-12  2.62581E-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  4.27273E-10  1.98144E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.90968E-10  2.75825E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51810E-10  2.12230E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17137E-10  3.39010E-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
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  9.22549E-06  6.51849E-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  3.28226E-15  2.32901E-13   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.00920E-20  7.19130E-19   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  7.33174E-13  5.24640E-11   94239   239.0522     pu239 9437
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endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.32892E-20  2.39207E-18   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.99801E-21  7.21431E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.13656E-20  8.23521E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00019E-20  7.21713E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  2.10635E-21  1.52621E-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  1.64384E-20  1.19108E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.99902E-21  7.27504E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.99843E-21  7.30458E-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
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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
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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:
  9694 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

                                          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       ........

                                 ........     0.01667 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

   0.00050 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 15643 independent fission points were generated for generation 1
```

```
          1       7.65832E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15742 independent fission points were generated for generation 2
          2       7.71834E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15683 independent fission points were generated for generation 3
          3       7.63216E-01      7.63216E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.67091E-01      7.65154E-01      1.93787E-03
0.00000E+00      0.00000E+00
          5       7.60109E-01      7.63472E-01      2.01981E-03
0.00000E+00      0.00000E+00
          6       7.59726E-01      7.62535E-01      1.70793E-03
0.00000E+00      0.00000E+00
          7       7.71180E-01      7.64264E-01      2.17701E-03
0.00000E+00      0.00000E+00
          8       7.68165E-01      7.64914E-01      1.89270E-03
0.00000E+00      0.00000E+00
          9       7.64325E-01      7.64830E-01      1.60183E-03
0.00000E+00      0.00000E+00
         10       7.67361E-01      7.65147E-01      1.42285E-03
0.00000E+00      0.00000E+00
         11       7.63232E-01      7.64934E-01      1.27275E-03
0.00000E+00      0.00000E+00
         12       7.67670E-01      7.65208E-01      1.17080E-03
0.00000E+00      0.00000E+00
         13       7.65860E-01      7.65267E-01      1.06069E-03
0.00000E+00      0.00000E+00
         14       7.60645E-01      7.64882E-01      1.04207E-03
0.00000E+00      0.00000E+00
         15       7.65534E-01      7.64932E-01      9.59878E-04
0.00000E+00      0.00000E+00
         16       7.71106E-01      7.65373E-01      9.92092E-04
0.00000E+00      0.00000E+00
         17       7.63766E-01      7.65266E-01      9.29783E-04
0.00000E+00      0.00000E+00
         18       7.65287E-01      7.65267E-01      8.69733E-04
0.00000E+00      0.00000E+00
         19       7.72470E-01      7.65691E-01      9.20296E-04
0.00000E+00      0.00000E+00
         20       7.62043E-01      7.65488E-01      8.91020E-04
0.00000E+00      0.00000E+00
         21       7.66641E-01      7.65549E-01      8.45002E-04
0.00000E+00      0.00000E+00
         22       7.65221E-01      7.65532E-01      8.01806E-04
0.00000E+00      0.00000E+00
         23       7.65915E-01      7.65551E-01      7.62887E-04
0.00000E+00      0.00000E+00
         24       7.67714E-01      7.65649E-01      7.34002E-04
0.00000E+00      0.00000E+00
```

25	7.69486E-01	7.65816E-01	7.20929E-04	0.00000E+00	0.00000E+00
26	7.67584E-01	7.65889E-01	6.94157E-04	0.00000E+00	0.00000E+00
27	7.65308E-01	7.67523E-01	2.22209E-03	0.00000E+00	0.00000E+00
28	7.64902E-01	7.66999E-01	2.22599E-03	0.00000E+00	0.00000E+00
29	7.66269E-01	7.66877E-01	1.65287E-03	0.00000E+00	0.00000E+00
30	7.62167E-01	7.66204E-01	2.27058E-03	0.00000E+00	0.00000E+00
31	7.64282E-01	7.65964E-01	2.00442E-03	0.00000E+00	0.00000E+00
32	7.66923E-01	7.66070E-01	1.55684E-03	0.00000E+00	0.00000E+00
33	7.76719E-01	7.67135E-01	1.86772E-03	0.00000E+00	0.00000E+00
34	7.54041E-01	7.65945E-01	1.81271E-03	0.00000E+00	0.00000E+00
35	7.64165E-01	7.65797E-01	1.64769E-03	0.00000E+00	0.00000E+00
36	7.68586E-01	7.66011E-01	1.52211E-03	0.00000E+00	0.00000E+00
37	7.71866E-01	7.66429E-01	1.47120E-03	0.00000E+00	0.00000E+00
38	7.66754E-01	7.66451E-01	1.36227E-03	0.00000E+00	0.00000E+00
39	7.72447E-01	7.66826E-01	1.32999E-03	0.00000E+00	0.00000E+00
40	7.64730E-01	7.66703E-01	1.25099E-03	0.00000E+00	0.00000E+00
41	7.69264E-01	7.66845E-01	1.18475E-03	0.00000E+00	0.00000E+00
42	7.67104E-01	7.66858E-01	1.11709E-03	0.00000E+00	0.00000E+00
43	7.70015E-01	7.67016E-01	1.06968E-03	0.00000E+00	0.00000E+00
44	7.61633E-01	7.66760E-01	1.04996E-03	0.00000E+00	0.00000E+00
45	7.69715E-01	7.66894E-01	1.00861E-03	0.00000E+00	0.00000E+00
46	7.64142E-01	7.66775E-01	9.69787E-04	0.00000E+00	0.00000E+00
47	7.71190E-01	7.66959E-01	9.92926E-04	0.00000E+00	0.00000E+00
48	7.67146E-01	7.66966E-01	9.47777E-04	0.00000E+00	0.00000E+00
49	7.66679E-01	7.66955E-01	8.69196E-04	0.00000E+00	0.00000E+00
50	7.68281E-01	7.67004E-01	8.36655E-04	0.00000E+00	0.00000E+00

51	7.61661E-01	7.66813E-01	8.62677E-04	0.00000E+00
52	7.63602E-01	7.66703E-01	8.07108E-04	0.00000E+00
53	7.59847E-01	7.66474E-01	8.91468E-04	0.00000E+00
54	7.66179E-01	7.66465E-01	8.61469E-04	0.00000E+00
55	7.64407E-01	7.66400E-01	8.53839E-04	0.00000E+00
56	7.62154E-01	7.66272E-01	8.37864E-04	0.00000E+00
57	7.70530E-01	7.66397E-01	8.11993E-04	0.00000E+00
58	7.68348E-01	7.66453E-01	7.79458E-04	0.00000E+00
59	7.59481E-01	7.66259E-01	7.26532E-04	0.00000E+00
60	7.59172E-01	7.66067E-01	7.33014E-04	0.00000E+00
61	7.67096E-01	7.66094E-01	7.13470E-04	0.00000E+00
62	7.67119E-01	7.66121E-01	6.94964E-04	0.00000E+00
63	7.72000E-01	7.66268E-01	6.93504E-04	0.00000E+00
64	7.66366E-01	7.66270E-01	6.75949E-04	0.00000E+00
65	7.70311E-01	7.66366E-01	6.85157E-04	0.00000E+00
66	7.75431E-01	7.66577E-01	7.05397E-04	0.00000E+00
67	7.61344E-01	7.66458E-01	6.80264E-04	0.00000E+00
68	7.69197E-01	7.66519E-01	6.88912E-04	0.00000E+00
69	7.63753E-01	7.66459E-01	6.87033E-04	0.00000E+00
70	7.60215E-01	7.66326E-01	6.72592E-04	0.00000E+00
71	7.61794E-01	7.66232E-01	6.73848E-04	0.00000E+00
72	7.74254E-01	7.66395E-01	6.56351E-04	0.00000E+00
73	7.61604E-01	7.66300E-01	6.50215E-04	0.00000E+00
74	7.63112E-01	7.66237E-01	6.40260E-04	0.00000E+00
75	7.65940E-01	7.66231E-01	6.27608E-04	0.00000E+00
76	7.53755E-01	7.65996E-01	7.22274E-04	0.00000E+00

77	7.66455E-01	7.66004E-01	7.05643E-04	0.00000E+00	0.00000E+00
78	7.66641E-01	7.66016E-01	6.36020E-04	0.00000E+00	0.00000E+00
79	7.69515E-01	7.66079E-01	6.27583E-04	0.00000E+00	0.00000E+00
80	7.61927E-01	7.66006E-01	6.20718E-04	0.00000E+00	0.00000E+00
81	7.61570E-01	7.65929E-01	6.14679E-04	0.00000E+00	0.00000E+00
82	7.67149E-01	7.65950E-01	6.04354E-04	0.00000E+00	0.00000E+00
83	7.61968E-01	7.65883E-01	5.97846E-04	0.00000E+00	0.00000E+00
84	7.64006E-01	7.65853E-01	5.88630E-04	0.00000E+00	0.00000E+00
85	7.66987E-01	7.65871E-01	5.79198E-04	0.00000E+00	0.00000E+00
86	7.65490E-01	7.65865E-01	5.69813E-04	0.00000E+00	0.00000E+00
87	7.66531E-01	7.65875E-01	5.60795E-04	0.00000E+00	0.00000E+00
88	7.65007E-01	7.65862E-01	5.52130E-04	0.00000E+00	0.00000E+00
89	7.66479E-01	7.65871E-01	5.43652E-04	0.00000E+00	0.00000E+00
90	7.64124E-01	7.65845E-01	5.36006E-04	0.00000E+00	0.00000E+00
91	7.67896E-01	7.65875E-01	5.28831E-04	0.00000E+00	0.00000E+00
92	7.65231E-01	7.65866E-01	5.21082E-04	0.00000E+00	0.00000E+00
93	7.68037E-01	7.65897E-01	5.14438E-04	0.00000E+00	0.00000E+00
94	7.62228E-01	7.65845E-01	5.09739E-04	0.00000E+00	0.00000E+00
95	7.66936E-01	7.65861E-01	5.02743E-04	0.00000E+00	0.00000E+00
96	7.71944E-01	7.65944E-01	5.02862E-04	0.00000E+00	0.00000E+00
97	7.66077E-01	7.65946E-01	4.95929E-04	0.00000E+00	0.00000E+00
98	7.60149E-01	7.65868E-01	4.95414E-04	0.00000E+00	0.00000E+00
99	7.66919E-01	7.65882E-01	4.88965E-04	0.00000E+00	0.00000E+00
100	7.67322E-01	7.65901E-01	4.82860E-04	0.00000E+00	0.00000E+00
101	7.58443E-01	7.65805E-01	4.86293E-04	0.00000E+00	0.00000E+00
102	7.60626E-01	7.65740E-01	4.84590E-04	0.00000E+00	0.00000E+00

```
        103       7.58715E-01      7.65652E-01      4.86611E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=18BF4898E463AD28
        104       7.60485E-01      7.65588E-01      4.84811E-04
0.00000E+00      0.00000E+00
        105       7.65597E-01      7.65588E-01      4.78788E-04
0.00000E+00      0.00000E+00
        106       7.67131E-01      7.65607E-01      4.73287E-04
0.00000E+00      0.00000E+00
        107       7.68680E-01      7.65643E-01      4.69014E-04
0.00000E+00      0.00000E+00
        108       7.67470E-01      7.65665E-01      4.63907E-04
0.00000E+00      0.00000E+00
        109       7.62200E-01      7.65625E-01      4.60225E-04
0.00000E+00      0.00000E+00
        110       7.67342E-01      7.65644E-01      4.55281E-04
0.00000E+00      0.00000E+00
        111       7.65983E-01      7.65648E-01      4.50034E-04
0.00000E+00      0.00000E+00
        112       7.61348E-01      7.65600E-01      4.47567E-04
0.00000E+00      0.00000E+00
        113       7.72526E-01      7.65677E-01      4.49301E-04
0.00000E+00      0.00000E+00
        114       7.65740E-01      7.65678E-01      4.44281E-04
0.00000E+00      0.00000E+00
        115       7.72962E-01      7.65757E-01      4.86973E-04
0.00000E+00      0.00000E+00
        116       7.67302E-01      7.65773E-01      4.82965E-04
0.00000E+00      0.00000E+00
        117       7.64056E-01      7.65755E-01      4.71405E-04
0.00000E+00      0.00000E+00
        118       7.64515E-01      7.65742E-01      4.63428E-04
0.00000E+00      0.00000E+00
        119       7.62976E-01      7.65713E-01      4.54042E-04
0.00000E+00      0.00000E+00
        120       7.66599E-01      7.65722E-01      4.48958E-04
0.00000E+00      0.00000E+00
        121       7.61194E-01      7.65676E-01      4.53100E-04
0.00000E+00      0.00000E+00
        122       7.62372E-01      7.65643E-01      4.52030E-04
0.00000E+00      0.00000E+00
        123       7.64668E-01      7.65633E-01      4.48886E-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=EF6C9CD1B681F052
                                   A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle
```

```
 lifetime =  1.55236E-05 + or -  1.22420E-08             generation time
=  2.99551E-05 + or -  2.39215E-08
 nu bar   =  2.43895E+00 + or -  9.35114E-06       average fission group
=  2.17558E+02 + or -  1.01575E-02
                      energy(ev) of the average lethargy causing fission
=  5.67063E-02 + or -  1.19257E-04
                                                 system mean free path (cm)
=  6.53032E-01 + or -  1.59729E-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          0.76563   + or - 0.00045     0.76518 to 0.76608
0.76474 to 0.76653    0.76429 to 0.76698    2000000      13.5956

      24          0.76561   + or - 0.00045     0.76516 to 0.76606
0.76471 to 0.76652    0.76425 to 0.76697    1980000      13.6287

      25          0.76557   + or - 0.00046     0.76512 to 0.76603
0.76466 to 0.76648    0.76420 to 0.76694    1960000      13.7039

      26          0.76555   + or - 0.00046     0.76509 to 0.76601
0.76463 to 0.76648    0.76417 to 0.76694    1940000      13.5981

      27          0.76555   + or - 0.00047     0.76509 to 0.76602
0.76462 to 0.76649    0.76415 to 0.76696    1920000      13.5759

      28          0.76556   + or - 0.00047     0.76509 to 0.76603
0.76462 to 0.76650    0.76415 to 0.76698    1900000      13.5771

      29          0.76555   + or - 0.00047     0.76508 to 0.76603
0.76460 to 0.76650    0.76413 to 0.76698    1880000      13.6604

      30          0.76559   + or - 0.00048     0.76511 to 0.76607
0.76463 to 0.76655    0.76415 to 0.76703    1860000      13.6445

      31          0.76560   + or - 0.00049     0.76512 to 0.76609
0.76463 to 0.76657    0.76415 to 0.76706    1840000      13.6350

      32          0.76559   + or - 0.00050     0.76509 to 0.76608
0.76460 to 0.76658    0.76410 to 0.76708    1820000      13.3583

      37          0.76550   + or - 0.00050     0.76500 to 0.76601
0.76450 to 0.76651    0.76399 to 0.76702    1720000      11.4423

      42          0.76535   + or - 0.00051     0.76484 to 0.76585
0.76433 to 0.76636    0.76383 to 0.76686    1620000      12.5563
```

```
      47          0.76521   + or - 0.00052     0.76470 to 0.76573
0.76418 to 0.76625    0.76366 to 0.76677    1520000      13.5656

      52          0.76520   + or - 0.00056     0.76464 to 0.76575
0.76408 to 0.76631    0.76352 to 0.76687    1420000      13.3733

      57          0.76524   + or - 0.00060     0.76464 to 0.76584
0.76404 to 0.76644    0.76344 to 0.76704    1320000      13.2651

      62          0.76532   + or - 0.00065     0.76467 to 0.76597
0.76402 to 0.76662    0.76337 to 0.76727    1220000      13.0184

      67          0.76498   + or - 0.00052     0.76447 to 0.76550
0.76395 to 0.76602    0.76344 to 0.76653    1120000      21.4642

      72          0.76490   + or - 0.00063     0.76427 to 0.76553
0.76363 to 0.76617    0.76300 to 0.76680    1020000      15.4330

      77          0.76520   + or - 0.00067     0.76453 to 0.76587
0.76386 to 0.76654    0.76319 to 0.76721     920000      11.2834

      82          0.76518   + or - 0.00074     0.76443 to 0.76592
0.76369 to 0.76667    0.76294 to 0.76741     820000      11.5025

      87          0.76520   + or - 0.00086     0.76434 to 0.76606
0.76349 to 0.76692    0.76263 to 0.76777     720000      11.1070

      92          0.76511   + or - 0.00102     0.76409 to 0.76613
0.76308 to 0.76715    0.76206 to 0.76817     620000      10.4030

      97          0.76474   + or - 0.00134     0.76341 to 0.76608
0.76207 to 0.76742    0.76073 to 0.76875     520000       8.2188

     102          0.76523   + or - 0.00115     0.76408 to 0.76639
0.76292 to 0.76754    0.76177 to 0.76869     420000      15.2367

     107          0.76558   + or - 0.00140     0.76418 to 0.76698
0.76278 to 0.76837    0.76139 to 0.76977     320000      15.3146

     112          0.76590   + or - 0.00289     0.76301 to 0.76879
0.76013 to 0.77168    0.75724 to 0.77456     220000       7.1960
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)

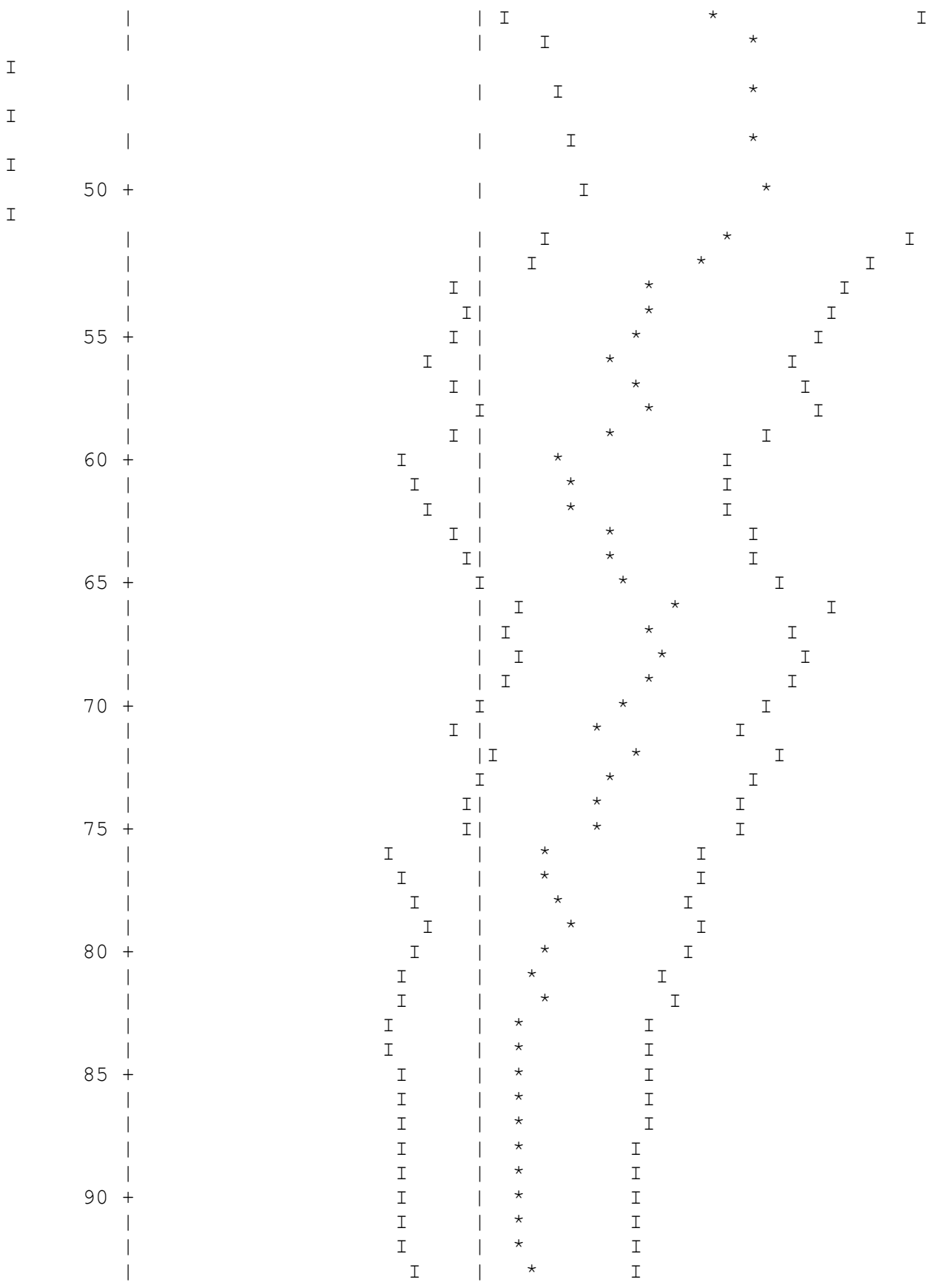
     117          0.76372   + or - 0.00096     0.76276 to 0.76468
```

0.76179 to 0.76565 0.76083 to 0.76661 120000 37.0203
1 fuel bundle

plot of average k-effective by generation run.
the line represents k-eff = 0.76567 + or - 0.00044 which occurs for 114 generations run.

```
                                0.7656                    0.7671
0.7686

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



```
         |                     I     |  *       I
      95 +                      I    |  *       I
         |                       I   |   *        I
         |                       I   |   *        I
         |                      I    |  *       I
         |                      I    |  *        I
     100 +                       I   |   *       I
         |                    I      | *       I
         |                   I       |*       I
         |                 I         *       I
         |                I         *|      I
     105 +                 I        *|     I
         |                 I        *|      I
         |                  I       *|      I
         |                  I        *      I
         |                 I        *|      I
     110 +                  I       *|      I
         |                  I       *|      I
         |                 I        *|     I
         |                   I       *      I
         |                   I       *      I
     115 +                   I       |*       I
         |                    I      | *       I
         |                   I       |*       I
         |                   I       |*       I
         |                   I       |*      I
     120 +                   I       |*      I
         |                  I        *      I
         |                  I       *|      I
         |                  I       *|      I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7656 + or - 0.0004 which occurs for 23 generations skipped.

```
                                 0.7627                   0.7643
0.7659

|-------------------------|------------------------|------------------
------|------------------------
         |
         |
I      *      I
         |
I      *      I
      25 +
I      *|      I
         |
I      *|     I
         |
I      *|     I
```

```
          |
I      *|      I
          |
I       *|       I
      30 +
I       *      I
          |
I       *      I
          |
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I        *        I
      35 +
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I       * |     I
          |                                                                I
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      40 +                                                                I
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*   |   I
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*    |  I
          |                                                             I
*   |   I
      45 +                                                            I
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          |                                                        I
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      50 +                                                        I
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      55 +                                                                 I
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*     |   I
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*    |   I
      60 +                                                                 I
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      65 +                                                              I
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          |                                                          I        *
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*       I |
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          |                                                          I        *
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      70 +                                                           I
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      75 +                                                       I          *
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*      |   I
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      80 +                                                          I
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*      |    I
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*     |     I
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*    |      I
      85 +                                                          I
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*      |      I
      90 +                                                      I
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         |                                               I
*       |          I
      95 +                                            I
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         |                                  I                      *
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     100 +                          I                          *
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*     |            I
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*|              I
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|  *                  I
     105 +                                                       I
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| *                     I
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|*                       I
     110 +                                             I
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|    *
         |                                         I
*     |                    I
         |                                   I
*      |                     I
     115 +                                   I             *
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         |                            I            *           I
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         |                        I              *              I
|
         |                  I                  *                   I
|
         |             I                           *
I  |
     120 +                        *                           I
|

   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
2.28277E-07    48.3739       0.00000E+00     0.0000
    3    0.0000                 1.25980E-05    12.3371
2.00014E-05     4.6822       0.00000E+00     0.0000
    4    0.0000                 1.83123E-05     8.8299
3.27440E-05     4.0283       0.00000E+00     0.0000
    5    0.0000                 2.97848E-05     6.9268
5.56991E-05     3.3103       0.00000E+00     0.0000
    6    0.0001                 9.35516E-05     3.4865
```

2.24468E-04	1.3238	0.00000E+00	0.0000	7	0.0001	1.13761E-04	3.1513
2.05905E-04	1.3128	0.00000E+00	0.0000	8	0.0003	2.40332E-04	2.1777
3.23031E-04	1.0501	0.00000E+00	0.0000	9	0.0005	3.85775E-04	1.1575
4.45011E-04	0.5969	0.00000E+00	0.0000	10	0.0003	2.11119E-04	1.6401
2.11611E-04	0.7735	0.00000E+00	0.0000	11	0.0012	9.13266E-04	0.7677
5.26592E-04	0.5244	0.00000E+00	0.0000	12	0.0010	7.72286E-04	0.7195
3.02690E-04	0.7092	0.00000E+00	0.0000	13	0.0003	2.28520E-04	1.3197
9.07763E-05	1.3085	0.00000E+00	0.0000	14	0.0013	1.00105E-03	0.6389
4.09182E-04	0.6332	0.00000E+00	0.0000	15	0.0010	7.62564E-04	0.7126
3.28796E-04	0.7045	0.00000E+00	0.0000	16	0.0002	1.90133E-04	1.2297
8.73786E-05	1.2086	0.00000E+00	0.0000	17	0.0001	6.84088E-05	1.7166
3.32725E-05	1.6846	0.00000E+00	0.0000	18	0.0001	5.11237E-05	1.8842
2.58241E-05	1.8443	0.00000E+00	0.0000	19	0.0001	8.20970E-05	1.3919
4.33873E-05	1.3612	0.00000E+00	0.0000	20	0.0001	6.02617E-05	1.5653
3.30092E-05	1.5295	0.00000E+00	0.0000	21	0.0002	1.18079E-04	0.9645
6.66903E-05	0.9437	0.00000E+00	0.0000	22	0.0001	1.04541E-04	1.2169
6.19107E-05	1.1890	0.00000E+00	0.0000	23	0.0001	1.06728E-04	1.2523
6.51627E-05	1.2219	0.00000E+00	0.0000	24	0.0000	2.54934E-05	2.3886
1.58219E-05	2.3287	0.00000E+00	0.0000	25	0.0000	3.01607E-05	2.1110
1.88578E-05	2.0565	0.00000E+00	0.0000	26	0.0000	1.79438E-05	2.0336
1.12653E-05	1.9802	0.00000E+00	0.0000	27	0.0001	5.36358E-05	1.3738
3.34694E-05	1.3468	0.00000E+00	0.0000	28	0.0001	9.70783E-05	0.9500
6.05598E-05	0.9327	0.00000E+00	0.0000	29	0.0001	1.00034E-04	0.9680
6.29997E-05	0.9535	0.00000E+00	0.0000	30	0.0000	1.23431E-05	2.9010
7.74364E-06	2.8810	0.00000E+00	0.0000	31	0.0001	9.59016E-05	1.1229
6.05905E-05	1.1087	0.00000E+00	0.0000	32	0.0001	3.88117E-05	1.3616

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2.48026E-05     1.3359       0.00000E+00     0.0000
   33    0.0000                 3.28036E-05     1.4731
2.05401E-05     1.4548       0.00000E+00     0.0000
   34    0.0001                 7.65099E-05     1.1620
4.80454E-05     1.1458       0.00000E+00     0.0000
   35    0.0001                 4.48903E-05     1.3896
2.81707E-05     1.3687       0.00000E+00     0.0000
   36    0.0001                 4.35934E-05     1.5438
2.69811E-05     1.5313       0.00000E+00     0.0000
   37    0.0000                 2.76932E-05     1.8117
1.73857E-05     1.7714       0.00000E+00     0.0000
   38    0.0000                 3.47073E-05     1.9853
2.18557E-05     1.9419       0.00000E+00     0.0000
   39    0.0002                 1.27002E-04     1.0463
8.08582E-05     1.0221       0.00000E+00     0.0000
   40    0.0002                 1.20172E-04     0.9736
7.76804E-05     0.9554       0.00000E+00     0.0000
   41    0.0002                 1.57100E-04     0.7958
1.05079E-04     0.7721       0.00000E+00     0.0000
   42    0.0002                 1.40470E-04     0.7241
9.55201E-05     0.7039       0.00000E+00     0.0000
   43    0.0001                 8.10380E-05     1.1341
5.81537E-05     1.0837       0.00000E+00     0.0000
   44    0.0001                 1.13997E-04     1.0618
8.36527E-05     1.0245       0.00000E+00     0.0000
   45    0.0001                 5.90864E-05     0.9966
4.76993E-05     0.9094       0.00000E+00     0.0000
   46    0.0000                 1.41991E-05     1.7884
1.14576E-05     1.6677       0.00000E+00     0.0000
   47    0.0001                 3.99057E-05     1.7175
3.10213E-05     1.6548       0.00000E+00     0.0000
   48    0.0000                 1.22859E-05     3.4954
9.52411E-06     3.4022       0.00000E+00     0.0000
   49    0.0001                 8.19829E-05     1.5129
6.46233E-05     1.4816       0.00000E+00     0.0000
   50    0.0001                 5.64678E-05     1.7444
4.65099E-05     1.7077       0.00000E+00     0.0000
   51    0.0000                 1.49312E-05     3.3170
1.24100E-05     3.2505       0.00000E+00     0.0000
   52    0.0001                 4.15902E-05     1.8391
3.59442E-05     1.7942       0.00000E+00     0.0000
   53    0.0002                 1.58840E-04     0.8113
1.56037E-04     0.7561       0.00000E+00     0.0000
   54    0.0001                 7.57769E-05     1.6547
7.04540E-05     1.5847       0.00000E+00     0.0000
   55    0.0002                 1.65449E-04     1.2972
1.51578E-04     1.2644       0.00000E+00     0.0000
   56    0.0002                 1.17762E-04     1.6458
1.09203E-04     1.6053       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations
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group	fission fraction	unit absorptions	percent deviation	region leakage	fissions deviation	percent deviation
57	0.0002	1.36267E-04	1.4051	1.50214E-04	0.00000E+00	1.4393 0.0000
58	0.0001	7.59434E-05	1.7120	8.67475E-05	0.00000E+00	1.7643 0.0000
59	0.0002	1.40867E-04	1.3412	1.56854E-04	0.00000E+00	1.3919 0.0000
60	0.0004	2.45601E-04	1.0727	2.70651E-04	0.00000E+00	1.1317 0.0000
61	0.0000	2.33720E-05	3.4858	3.04585E-05	0.00000E+00	3.5891 0.0000
62	0.0002	1.34468E-04	1.7292	1.60196E-04	0.00000E+00	1.7781 0.0000
63	0.0002	9.64288E-05	2.0754	1.16980E-04	0.00000E+00	2.1513 0.0000
64	0.0001	7.76822E-05	2.3056	9.61989E-05	0.00000E+00	2.3874 0.0000
65	0.0000	3.34031E-05	3.6396	3.37417E-05	0.00000E+00	3.7750 0.0000
66	0.0002	1.51627E-04	1.9076	1.70821E-04	0.00000E+00	1.9739 0.0000
67	0.0002	1.17148E-04	2.2062	1.43079E-04	0.00000E+00	2.2814 0.0000
68	0.0000	2.20174E-05	4.2849	2.54250E-05	0.00000E+00	4.4541 0.0000
69	0.0004	2.28934E-04	1.4011	2.91404E-04	0.00000E+00	1.4504 0.0000
70	0.0003	1.85143E-04	1.6874	2.03182E-04	0.00000E+00	1.7563 0.0000
71	0.0006	3.62123E-04	1.3883	4.37847E-04	0.00000E+00	1.4334 0.0000
72	0.0001	2.75459E-05	5.4069	4.65734E-05	0.00000E+00	5.5419 0.0000
73	0.0004	2.47399E-04	1.6421	3.24628E-04	0.00000E+00	1.7327 0.0000
74	0.0014	7.67865E-04	0.8832	1.05574E-03	0.00000E+00	0.9217 0.0000
75	0.0001	8.70905E-05	2.8781	1.13319E-04	0.00000E+00	3.0259 0.0000
76	0.0006	2.88506E-04	1.9004	4.53929E-04	0.00000E+00	1.9692 0.0000
77	0.0005	2.66003E-04	1.9025	3.71147E-04	0.00000E+00	1.9805 0.0000
78	0.0000	6.78418E-05	4.4351	6.92942E-06	0.00000E+00	4.4864 0.0000
79	0.0002	1.25538E-04	2.2831	1.86728E-04	0.00000E+00	2.3764 0.0000

80	0.0001	6.28184E-05	3.3564	8.37147E-05	3.2681
0.00000E+00	0.0000				
81	0.0014	1.05170E-03	1.1439	7.73669E-04	1.0973
0.00000E+00	0.0000				
82	0.0001	6.53969E-05	4.1974	3.92753E-05	3.9716
0.00000E+00	0.0000				
83	0.0002	1.23432E-04	3.3074	1.36651E-04	3.2391
0.00000E+00	0.0000				
84	0.0001	8.12813E-05	2.9989	8.23118E-05	2.7901
0.00000E+00	0.0000				
85	0.0003	1.94352E-04	2.2263	2.39424E-04	2.1638
0.00000E+00	0.0000				
86	0.0003	2.63592E-04	2.4257	2.12239E-04	2.3053
0.00000E+00	0.0000				
87	0.0004	3.31767E-04	2.2263	2.06555E-04	2.1277
0.00000E+00	0.0000				
88	0.0001	5.87995E-05	4.2231	1.06603E-04	4.1260
0.00000E+00	0.0000				
89	0.0001	9.58680E-05	3.4723	6.64258E-05	3.2020
0.00000E+00	0.0000				
90	0.0003	2.27365E-04	2.7957	1.34162E-04	2.6794
0.00000E+00	0.0000				
91	0.0002	1.87668E-04	2.9674	1.18761E-04	2.7981
0.00000E+00	0.0000				
92	0.0000	2.98460E-05	2.7182	1.95437E-04	2.6574
0.00000E+00	0.0000				
93	0.0002	1.31265E-04	3.2559	1.06688E-04	3.0341
0.00000E+00	0.0000				
94	0.0001	1.11550E-04	4.2597	6.26345E-05	3.9949
0.00000E+00	0.0000				
95	0.0008	6.19968E-04	2.0035	3.82059E-04	1.9415
0.00000E+00	0.0000				
96	0.0002	1.48802E-04	4.4794	7.56232E-05	4.2922
0.00000E+00	0.0000				
97	0.0004	2.69082E-04	3.9700	1.54255E-04	3.8790
0.00000E+00	0.0000				
98	0.0001	9.97765E-05	3.9938	9.58621E-05	3.8405
0.00000E+00	0.0000				
99	0.0001	1.04919E-04	5.2736	7.02971E-05	5.0953
0.00000E+00	0.0000				
100	0.0002	1.30808E-04	4.4853	8.73791E-05	4.3027
0.00000E+00	0.0000				
101	0.0001	1.12370E-04	3.6806	7.15051E-05	3.4210
0.00000E+00	0.0000				
102	0.0002	1.61202E-04	4.2347	8.98576E-05	4.0752
0.00000E+00	0.0000				
103	0.0001	1.00200E-04	3.3174	9.75127E-05	3.1481
0.00000E+00	0.0000				
104	0.0002	1.66917E-04	3.4890	1.32388E-04	3.3675
0.00000E+00	0.0000				
105	0.0002	1.27724E-04	3.4340	8.42085E-05	3.2432
0.00000E+00	0.0000				

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  106    0.0002                 1.69410E-04     4.1687
1.25953E-04     4.1108       0.00000E+00     0.0000
  107    0.0001                 6.75730E-05     3.3835
6.80757E-05     3.1859       0.00000E+00     0.0000
  108    0.0000                 3.46302E-05     2.5082
1.49598E-04     2.4464       0.00000E+00     0.0000
  109    0.0002                 1.27172E-04     2.6112
4.22116E-04     2.5741       0.00000E+00     0.0000
  110    0.0009                 6.62182E-04     2.9199
4.08289E-04     2.8940       0.00000E+00     0.0000
  111    0.0002                 1.48607E-04     4.1987
1.36757E-04     4.0843       0.00000E+00     0.0000
  112    0.0002                 1.18156E-04     4.9195
1.24553E-04     4.8285       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                 1.25496E-04     3.5167
1.09802E-04     3.2851       0.00000E+00     0.0000
  114    0.0000                 1.09161E-05     7.1106
1.49272E-05     5.9229       0.00000E+00     0.0000
  115    0.0001                 7.38418E-05     3.8971
8.56828E-05     3.6082       0.00000E+00     0.0000
  116    0.0003                 1.93495E-04     2.6226
1.45507E-04     2.3644       0.00000E+00     0.0000
  117    0.0006                 4.66757E-04     2.5262
2.49839E-04     2.3583       0.00000E+00     0.0000
  118    0.0008                 5.76188E-04     2.0072
4.50426E-04     1.9200       0.00000E+00     0.0000
  119    0.0002                 1.41861E-04     2.2881
3.66125E-04     2.2102       0.00000E+00     0.0000
  120    0.0002                 1.66473E-04     2.1462
6.33670E-04     2.1148       0.00000E+00     0.0000
  121    0.0007                 5.22545E-04     2.6426
4.02024E-04     2.5796       0.00000E+00     0.0000
  122    0.0001                 9.71474E-05     5.0977
7.62596E-05     4.7245       0.00000E+00     0.0000
  123    0.0003                 2.16589E-04     2.9843
1.53346E-04     2.6410       0.00000E+00     0.0000
  124    0.0003                 2.34437E-04     3.0862
1.93419E-04     2.8791       0.00000E+00     0.0000
  125    0.0002                 1.46476E-04     3.7476
1.34131E-04     3.4040       0.00000E+00     0.0000
  126    0.0001                 1.03404E-04     3.7445
9.23979E-05     3.3058       0.00000E+00     0.0000
  127    0.0005                 3.98819E-04     3.4208
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1.95732E-04	3.2377	0.00000E+00	0.0000	128	0.0003	2.25868E-04	2.9795
1.39072E-04	2.6506	0.00000E+00	0.0000	129	0.0006	4.50119E-04	2.1808
4.14565E-04	2.0804	0.00000E+00	0.0000	130	0.0001	1.12418E-04	2.9371
2.74574E-04	2.8498	0.00000E+00	0.0000	131	0.0004	2.88096E-04	2.3800
2.32419E-04	1.9972	0.00000E+00	0.0000	132	0.0007	5.27615E-04	2.2289
3.23986E-04	2.0530	0.00000E+00	0.0000	133	0.0013	1.02351E-03	1.9351
6.47459E-04	1.8332	0.00000E+00	0.0000	134	0.0001	8.94314E-05	2.3318
2.33473E-04	1.9594	0.00000E+00	0.0000	135	0.0002	1.77882E-04	3.0470
2.63891E-04	2.9664	0.00000E+00	0.0000	136	0.0001	4.43790E-05	2.0009
6.89053E-04	1.9672	0.00000E+00	0.0000	137	0.0000	1.96981E-05	0.8699
3.54432E-03	0.8680	0.00000E+00	0.0000	138	0.0004	3.09798E-04	2.0142
8.06968E-04	1.9849	0.00000E+00	0.0000	139	0.0003	1.98555E-04	3.2686
2.42539E-04	3.0893	0.00000E+00	0.0000	140	0.0003	2.08427E-04	2.2834
2.77810E-04	1.9790	0.00000E+00	0.0000	141	0.0001	7.87781E-05	2.9314
2.48896E-04	2.6086	0.00000E+00	0.0000	142	0.0001	6.25016E-05	3.1228
2.16968E-04	2.8630	0.00000E+00	0.0000	143	0.0001	8.25629E-05	2.2463
1.76222E-04	1.3707	0.00000E+00	0.0000	144	0.0000	3.26203E-05	3.1401
7.24567E-05	1.8384	0.00000E+00	0.0000	145	0.0005	3.75229E-04	2.7394
2.95061E-04	2.4836	0.00000E+00	0.0000	146	0.0005	3.53868E-04	2.2961
2.57469E-04	1.8890	0.00000E+00	0.0000	147	0.0002	1.81573E-04	3.9074
1.15744E-04	3.3902	0.00000E+00	0.0000	148	0.0001	6.05566E-05	5.7603
4.03271E-05	4.6300	0.00000E+00	0.0000	149	0.0000	2.56533E-05	9.5590
1.86021E-05	6.9422	0.00000E+00	0.0000	150	0.0001	8.95103E-05	4.2843
6.48327E-05	3.2326	0.00000E+00	0.0000	151	0.0001	7.15629E-05	3.8239
5.95746E-05	2.7483	0.00000E+00	0.0000	152	0.0001	3.99223E-05	4.4001
4.59995E-05	2.6359	0.00000E+00	0.0000	153	0.0001	4.19601E-05	3.9639

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4.71219E-05     2.3381       0.00000E+00     0.0000
  154    0.0001                 5.03023E-05     4.2264
5.16788E-05     2.5437       0.00000E+00     0.0000
  155    0.0001                 5.39935E-05     4.7465
5.18344E-05     2.9867       0.00000E+00     0.0000
  156    0.0001                 4.76376E-05     4.5193
4.67818E-05     2.7502       0.00000E+00     0.0000
  157    0.0001                 5.77839E-05     3.7978
5.66858E-05     2.3563       0.00000E+00     0.0000
  158    0.0001                 6.85087E-05     3.8968
6.84862E-05     2.5515       0.00000E+00     0.0000
  159    0.0002                 1.50920E-04     3.1056
2.09461E-04     2.5964       0.00000E+00     0.0000
  160    0.0001                 6.49161E-05     4.6180
7.62573E-05     3.5279       0.00000E+00     0.0000
  161    0.0001                 7.26901E-05     4.2908
7.18856E-05     2.7584       0.00000E+00     0.0000
  162    0.0001                 8.25238E-05     3.7661
7.92017E-05     2.3359       0.00000E+00     0.0000
  163    0.0001                 8.96790E-05     3.6839
8.48318E-05     2.2520       0.00000E+00     0.0000
  164    0.0001                 1.01575E-04     3.5799
9.42059E-05     2.2197       0.00000E+00     0.0000
  165    0.0001                 1.11086E-04     3.6619
1.02977E-04     2.2496       0.00000E+00     0.0000
  166    0.0001                 6.66119E-05     4.5214
6.19020E-05     2.8443       0.00000E+00     0.0000
  167    0.0001                 7.73575E-05     4.5337
6.98891E-05     2.9536       0.00000E+00     0.0000
  168    0.0001                 9.56311E-05     4.4453
8.29304E-05     3.0722       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                 1.12618E-04     4.2766
9.67784E-05     3.0633       0.00000E+00     0.0000
  170    0.0002                 1.37746E-04     4.0464
1.16934E-04     3.0409       0.00000E+00     0.0000
  171    0.0001                 9.64367E-05     4.5389
7.44542E-05     3.6460       0.00000E+00     0.0000
  172    0.0002                 1.31676E-04     5.1725
9.39092E-05     4.3434       0.00000E+00     0.0000
  173    0.0003                 1.95303E-04     4.8117
1.28839E-04     4.1827       0.00000E+00     0.0000
  174    0.0003                 2.56582E-04     3.5252
1.59049E-04     3.1434       0.00000E+00     0.0000
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175	0.0002	1.18996E-04	5.8481	7.15073E-05	5.2833
0.00000E+00	0.0000				
176	0.0001	1.03593E-04	6.0479	6.24278E-05	5.3714
0.00000E+00	0.0000				
177	0.0002	1.16562E-04	6.2177	6.89123E-05	5.6107
0.00000E+00	0.0000				
178	0.0002	1.19046E-04	6.4076	6.96901E-05	5.7276
0.00000E+00	0.0000				
179	0.0002	1.20300E-04	6.5455	7.00708E-05	5.8488
0.00000E+00	0.0000				
180	0.0001	1.00364E-04	7.1037	5.91655E-05	6.2433
0.00000E+00	0.0000				
181	0.0001	1.03925E-04	6.2650	6.07904E-05	5.4837
0.00000E+00	0.0000				
182	0.0002	1.20182E-04	6.5053	6.86569E-05	5.8074
0.00000E+00	0.0000				
183	0.0001	1.07904E-04	5.9849	6.21786E-05	5.2608
0.00000E+00	0.0000				
184	0.0001	1.07356E-04	5.3944	6.16027E-05	4.7125
0.00000E+00	0.0000				
185	0.0001	1.04460E-04	6.1293	6.01060E-05	5.3289
0.00000E+00	0.0000				
186	0.0001	8.29547E-05	6.4454	4.91735E-05	5.4296
0.00000E+00	0.0000				
187	0.0001	8.52344E-05	7.2884	5.03427E-05	6.0940
0.00000E+00	0.0000				
188	0.0001	8.36032E-05	6.6765	4.95868E-05	5.5865
0.00000E+00	0.0000				
189	0.0001	9.18804E-05	6.4769	5.37235E-05	5.4559
0.00000E+00	0.0000				
190	0.0003	2.12683E-04	3.8206	1.26140E-04	3.1570
0.00000E+00	0.0000				
191	0.0003	1.97452E-04	4.1115	1.18856E-04	3.3612
0.00000E+00	0.0000				
192	0.0003	2.11599E-04	3.5447	1.26204E-04	2.9057
0.00000E+00	0.0000				
193	0.0003	1.98808E-04	4.2121	1.21396E-04	3.3742
0.00000E+00	0.0000				
194	0.0005	3.92987E-04	2.6663	2.43267E-04	2.0932
0.00000E+00	0.0000				
195	0.0006	4.37253E-04	2.4532	2.68854E-04	1.9592
0.00000E+00	0.0000				
196	0.0006	4.56613E-04	2.7557	2.83946E-04	2.1335
0.00000E+00	0.0000				
197	0.0007	5.28133E-04	2.3619	3.27133E-04	1.8521
0.00000E+00	0.0000				
198	0.0007	5.67034E-04	2.5472	3.53421E-04	1.9602
0.00000E+00	0.0000				
199	0.0004	3.38421E-04	3.5613	2.06344E-04	2.8297
0.00000E+00	0.0000				
200	0.0005	3.58803E-04	2.9211	2.20400E-04	2.3022
0.00000E+00	0.0000				

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  201    0.0011                 8.23530E-04     2.1437
4.99855E-04     1.7274       0.00000E+00     0.0000
  202    0.0013                 1.03010E-03     1.8841
6.17295E-04     1.5453       0.00000E+00     0.0000
  203    0.0016                 1.21977E-03     1.9323
7.29701E-04     1.5848       0.00000E+00     0.0000
  204    0.0022                 1.67219E-03     1.3913
9.83261E-04     1.1690       0.00000E+00     0.0000
  205    0.0015                 1.17232E-03     2.0424
6.83942E-04     1.7397       0.00000E+00     0.0000
  206    0.0019                 1.42640E-03     1.6172
8.27373E-04     1.3943       0.00000E+00     0.0000
  207    0.0022                 1.65999E-03     1.5663
9.62484E-04     1.3774       0.00000E+00     0.0000
  208    0.0029                 2.19406E-03     1.7046
1.27763E-03     1.5091       0.00000E+00     0.0000
  209    0.0031                 2.36896E-03     1.3012
1.39430E-03     1.1524       0.00000E+00     0.0000
  210    0.0038                 2.93815E-03     1.0779
1.74226E-03     0.9401       0.00000E+00     0.0000
  211    0.0041                 3.12690E-03     1.1348
1.88387E-03     0.9782       0.00000E+00     0.0000
  212    0.0047                 3.61215E-03     1.0852
2.18729E-03     0.9211       0.00000E+00     0.0000
  213    0.0065                 4.94557E-03     0.8540
2.99748E-03     0.7272       0.00000E+00     0.0000
  214    0.0094                 7.18490E-03     0.8492
4.34223E-03     0.7189       0.00000E+00     0.0000
  215    0.0157                 1.19970E-02     0.6209
7.16470E-03     0.5170       0.00000E+00     0.0000
  216    0.0302                 2.31384E-02     0.4523
1.36425E-02     0.3815       0.00000E+00     0.0000
  217    0.0201                 1.53633E-02     0.5741
9.03589E-03     0.4824       0.00000E+00     0.0000
  218    0.0278                 2.12755E-02     0.4439
1.24465E-02     0.3796       0.00000E+00     0.0000
  219    0.0357                 2.73222E-02     0.3967
1.59461E-02     0.3293       0.00000E+00     0.0000
  220    0.0471                 3.60941E-02     0.3548
2.10056E-02     0.3026       0.00000E+00     0.0000
  221    0.0622                 4.76366E-02     0.3099
2.76336E-02     0.2681       0.00000E+00     0.0000
  222    0.0806                 6.16792E-02     0.2884
3.57026E-02     0.2469       0.00000E+00     0.0000
  223    0.1046                 8.00862E-02     0.2428
4.64487E-02     0.2080       0.00000E+00     0.0000
  224    0.0579                 4.43418E-02     0.3577
2.58486E-02     0.2995       0.00000E+00     0.0000
1                           fuel bundle

skipping 23 generations
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 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                deviation
deviation                    deviation

  225    0.2304                 1.76433E-01     0.1432
1.04527E-01     0.1204       0.00000E+00     0.0000
  226    0.0453                 3.46468E-02     0.3861
2.11017E-02     0.3254       0.00000E+00     0.0000
  227    0.0492                 3.76625E-02     0.3820
2.33636E-02     0.3046       0.00000E+00     0.0000
  228    0.0212                 1.62004E-02     0.5762
1.02309E-02     0.4523       0.00000E+00     0.0000
  229    0.0223                 1.70447E-02     0.5325
1.09589E-02     0.4256       0.00000E+00     0.0000
  230    0.0116                 8.89168E-03     0.8093
5.82852E-03     0.6311       0.00000E+00     0.0000
  231    0.0122                 9.36903E-03     0.6757
6.23001E-03     0.4988       0.00000E+00     0.0000
  232    0.0129                 9.89883E-03     0.6844
6.74845E-03     0.5086       0.00000E+00     0.0000
  233    0.0084                 6.44223E-03     0.8924
4.51922E-03     0.6332       0.00000E+00     0.0000
  234    0.0060                 4.56999E-03     1.1883
3.28307E-03     0.8280       0.00000E+00     0.0000
  235    0.0024                 1.84878E-03     1.6948
1.22479E-03     1.2689       0.00000E+00     0.0000
  236    0.0020                 1.49647E-03     2.0572
1.00508E-03     1.5356       0.00000E+00     0.0000
  237    0.0017                 1.31415E-03     1.9638
9.31248E-04     1.4082       0.00000E+00     0.0000
  238    0.0001                 7.72268E-05     8.5903
6.31894E-05     5.3501       0.00000E+00     0.0000

 system total =                 7.65633E-01     0.0538
4.68815E-01     0.0453       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3136E-01  +
or -  0.0002



 elapsed time   3.09483 minutes

 random number=   AA453159611E3323
1                                                fuel bundle

                                                     **** fission
densities ****
```

unit	region	fission density	percent deviation	total fissions
1	1	3.088E-03	0.05	7.656E-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	1.787E-08	34.78	1.218E-08	34.23	1.388E-08	34.41
3	9.567E-07	4.01	7.738E-07	3.40	8.436E-07	3.56
4	1.402E-06	2.94	1.175E-06	2.68	1.255E-06	2.74
5	2.315E-06	2.60	1.883E-06	2.26	2.019E-06	2.34
6	9.342E-06	1.16	7.477E-06	0.94	7.984E-06	0.97
7	1.249E-05	1.31	9.498E-06	1.00	1.007E-05	0.97
8	3.109E-05	0.76	2.279E-05	0.67	2.392E-05	0.70
9	8.224E-05	0.56	5.887E-05	0.45	6.137E-05	0.47
10	4.624E-05	0.63	3.293E-05	0.58	3.415E-05	0.59
11	2.207E-04	0.31	1.559E-04	0.27	1.616E-04	0.26
12	1.908E-04	0.32	1.386E-04	0.28	1.451E-04	0.27
13	5.663E-05	0.47	4.142E-05	0.40	4.324E-05	0.39
14	2.526E-04	0.26	1.830E-04	0.22	1.913E-04	0.21
15	2.199E-04	0.26	1.593E-04	0.25	1.662E-04	0.24
16	7.108E-05	0.41	5.164E-05	0.37	5.397E-05	0.36
17	3.187E-05	0.61	2.337E-05	0.57	2.433E-05	0.55
18	2.776E-05	0.67	2.030E-05	0.58	2.102E-05	0.54
19	5.054E-05	0.45	3.679E-05	0.41	3.819E-05	0.40
20	3.945E-05	0.59	2.908E-05	0.48	3.043E-05	0.48
21	8.032E-05	0.43	5.884E-05	0.35	6.145E-05	0.35
22	7.287E-05	0.42	5.341E-05	0.34	5.527E-05	0.33
23	7.742E-05	0.37	5.690E-05	0.31	5.885E-05	0.33
24	1.853E-05	1.00	1.387E-05	0.83	1.446E-05	0.75
25	2.345E-05	0.70	1.730E-05	0.60	1.820E-05	0.60
26	1.322E-05	1.00	9.792E-06	0.88	1.027E-05	0.85
27	4.180E-05	0.46	3.103E-05	0.44	3.292E-05	0.42

28	7.756E-05	0.40	5.753E-05	0.37	6.078E-05	0.35
29	7.916E-05	0.39	5.931E-05	0.33	6.213E-05	0.33
30	1.017E-05	1.07	7.515E-06	0.82	7.903E-06	0.77
31	7.857E-05	0.37	5.901E-05	0.34	6.210E-05	0.31
32	3.106E-05	0.59	2.338E-05	0.55	2.466E-05	0.49
33	2.698E-05	0.72	2.022E-05	0.61	2.129E-05	0.58
34	6.071E-05	0.43	4.592E-05	0.37	4.830E-05	0.35
35	3.653E-05	0.58	2.761E-05	0.47	2.891E-05	0.46
36	3.414E-05	0.58	2.568E-05	0.48	2.698E-05	0.46
37	2.197E-05	0.75	1.653E-05	0.58	1.735E-05	0.50
38	2.627E-05	0.63	2.000E-05	0.54	2.093E-05	0.51
39	9.715E-05	0.36	7.450E-05	0.28	7.882E-05	0.27
40	8.983E-05	0.38	6.942E-05	0.31	7.404E-05	0.29
41	1.130E-04	0.29	8.833E-05	0.27	9.438E-05	0.25
42	9.382E-05	0.33	7.407E-05	0.28	7.944E-05	0.25
43	5.163E-05	0.42	4.102E-05	0.35	4.296E-05	0.33
44	6.915E-05	0.33	5.564E-05	0.30	5.981E-05	0.28
45	3.532E-05	0.43	2.804E-05	0.40	3.113E-05	0.35
46	8.377E-06	0.79	6.688E-06	0.73	7.222E-06	0.62
47	2.347E-05	0.65	1.865E-05	0.57	1.944E-05	0.46
48	6.696E-06	1.00	5.373E-06	0.97	5.600E-06	0.82
49	4.334E-05	0.42	3.486E-05	0.39	3.747E-05	0.29
50	2.984E-05	0.47	2.376E-05	0.37	2.588E-05	0.32
51	7.849E-06	0.99	6.283E-06	0.89	6.873E-06	0.81
52	2.074E-05	0.52	1.668E-05	0.52	1.824E-05	0.44
53	7.670E-05	0.31	6.175E-05	0.26	6.694E-05	0.23
54	3.337E-05	0.43	2.704E-05	0.36	2.920E-05	0.35
55	6.623E-05	0.33	5.398E-05	0.27	5.873E-05	0.25
56	4.332E-05	0.38	3.531E-05	0.36	3.847E-05	0.31
57	4.899E-05	0.38	3.995E-05	0.33	4.366E-05	0.27
58	2.582E-05	0.50	2.121E-05	0.46	2.300E-05	0.34
59	4.442E-05	0.36	3.619E-05	0.32	3.944E-05	0.28
60	6.411E-05	0.31	5.240E-05	0.27	5.699E-05	0.23
61	6.182E-06	1.02	5.042E-06	0.80	5.504E-06	0.64
62	3.244E-05	0.48	2.657E-05	0.40	2.887E-05	0.34
63	2.171E-05	0.55	1.788E-05	0.53	1.940E-05	0.40
64	1.721E-05	0.54	1.413E-05	0.50	1.538E-05	0.44
65	5.738E-06	0.95	4.685E-06	0.85	5.083E-06	0.66
66	2.866E-05	0.44	2.346E-05	0.36	2.554E-05	0.29
67	2.123E-05	0.45	1.750E-05	0.43	1.901E-05	0.37
68	4.657E-06	1.08	3.845E-06	0.96	4.168E-06	0.72
69	3.730E-05	0.43	3.091E-05	0.37	3.342E-05	0.31
70	2.677E-05	0.50	2.205E-05	0.43	2.392E-05	0.34
71	4.565E-05	0.37	3.769E-05	0.31	4.114E-05	0.26
72	2.647E-06	1.49	2.200E-06	1.20	2.381E-06	1.01
73	2.698E-05	0.50	2.241E-05	0.44	2.431E-05	0.37
74	7.932E-05	0.28	6.578E-05	0.24	7.140E-05	0.23
75	9.110E-06	0.84	7.535E-06	0.68	8.139E-06	0.59
76	2.282E-05	0.45	1.905E-05	0.42	2.056E-05	0.36
77	1.757E-05	0.52	1.463E-05	0.43	1.584E-05	0.35
78	1.475E-06	1.59	1.252E-06	1.65	1.400E-06	1.21
79	9.913E-06	0.69	8.190E-06	0.60	8.862E-06	0.51

80	4.535E-06	1.11	3.757E-06	0.96	4.085E-06	0.82
81	5.528E-05	0.28	4.607E-05	0.26	4.991E-05	0.19
82	3.237E-06	1.06	2.688E-06	0.93	2.936E-06	0.75
83	4.479E-06	1.15	3.710E-06	1.01	4.016E-06	0.88
84	8.116E-06	0.75	6.780E-06	0.72	7.333E-06	0.56
85	9.930E-06	0.69	8.298E-06	0.71	8.981E-06	0.53
86	1.347E-05	0.65	1.126E-05	0.59	1.215E-05	0.47
87	1.184E-05	0.60	9.917E-06	0.58	1.073E-05	0.48
88	3.169E-06	1.36	2.647E-06	1.09	2.889E-06	0.93
89	6.675E-06	1.01	5.528E-06	0.87	5.927E-06	0.69
90	6.903E-06	0.88	5.818E-06	0.71	6.294E-06	0.56
91	8.257E-06	0.73	6.947E-06	0.71	7.461E-06	0.61
92	4.660E-06	1.03	3.927E-06	0.97	4.274E-06	0.72
93	8.205E-06	0.84	6.818E-06	0.79	7.371E-06	0.68
94	4.151E-06	1.02	3.496E-06	0.90	3.816E-06	0.76
95	1.261E-05	0.52	1.053E-05	0.48	1.139E-05	0.44
96	3.319E-06	1.23	2.791E-06	1.10	3.028E-06	0.91
97	3.331E-06	1.10	2.823E-06	1.05	3.081E-06	0.90
98	3.654E-06	1.14	3.023E-06	0.94	3.244E-06	0.83
99	2.315E-06	1.70	1.915E-06	1.47	2.112E-06	1.16
100	3.483E-06	1.27	2.895E-06	1.06	3.149E-06	0.78
101	4.907E-06	1.01	4.130E-06	0.98	4.421E-06	0.75
102	3.365E-06	1.32	2.826E-06	1.16	3.064E-06	0.91
103	4.526E-06	1.03	3.799E-06	0.93	4.165E-06	0.80
104	4.196E-06	1.05	3.525E-06	0.96	3.813E-06	0.72
105	4.311E-06	1.03	3.604E-06	0.98	3.910E-06	0.77
106	1.516E-06	1.78	1.293E-06	1.59	1.410E-06	1.42
107	3.625E-06	1.23	3.058E-06	1.08	3.304E-06	0.82
108	3.215E-06	1.15	2.734E-06	0.98	2.970E-06	0.82
109	5.081E-06	0.94	4.290E-06	0.91	4.612E-06	0.77
110	2.970E-06	1.18	2.544E-06	1.14	2.776E-06	0.88
111	3.036E-06	1.22	2.574E-06	1.19	2.774E-06	0.95
112	1.798E-06	1.46	1.500E-06	1.35	1.648E-06	1.14
113	5.816E-06	0.88	4.879E-06	0.86	5.283E-06	0.67
114	1.961E-06	1.51	1.647E-06	1.39	1.808E-06	1.11
115	5.077E-06	1.06	4.285E-06	0.97	4.565E-06	0.72
116	1.088E-05	0.72	9.066E-06	0.59	9.816E-06	0.49
117	1.185E-05	0.72	9.923E-06	0.63	1.072E-05	0.49
118	1.288E-05	0.61	1.081E-05	0.51	1.175E-05	0.41
119	8.212E-06	0.81	6.960E-06	0.76	7.593E-06	0.60
120	5.765E-06	0.93	4.902E-06	0.91	5.313E-06	0.73
121	6.102E-06	0.84	5.202E-06	0.78	5.608E-06	0.74
122	3.237E-06	1.10	2.738E-06	0.98	2.953E-06	0.83
123	1.031E-05	0.68	8.670E-06	0.65	9.321E-06	0.50
124	7.408E-06	0.84	6.205E-06	0.81	6.642E-06	0.66
125	7.082E-06	0.88	5.997E-06	0.74	6.429E-06	0.61
126	5.816E-06	0.94	4.911E-06	0.80	5.259E-06	0.66
127	5.472E-06	1.03	4.601E-06	0.89	5.041E-06	0.71
128	7.772E-06	0.75	6.536E-06	0.69	7.014E-06	0.58
129	9.595E-06	0.72	8.115E-06	0.68	8.800E-06	0.56
130	3.983E-06	1.06	3.412E-06	0.97	3.706E-06	0.79
131	1.695E-05	0.48	1.426E-05	0.44	1.531E-05	0.38

132	1.131E-05	0.67	9.475E-06	0.63	1.021E-05	0.51
133	1.349E-05	0.58	1.145E-05	0.52	1.241E-05	0.46
134	1.483E-05	0.59	1.249E-05	0.54	1.342E-05	0.42
135	2.388E-06	1.10	2.041E-06	1.01	2.209E-06	0.85
136	3.842E-06	1.01	3.363E-06	0.96	3.688E-06	0.77
137	2.556E-06	0.89	2.670E-06	0.85	3.008E-06	0.63
138	4.002E-06	0.93	3.488E-06	0.83	3.843E-06	0.70
139	4.612E-06	1.01	3.891E-06	0.86	4.234E-06	0.77
140	1.204E-05	0.62	1.016E-05	0.55	1.097E-05	0.42
141	8.796E-06	0.73	7.421E-06	0.63	8.074E-06	0.52
142	5.866E-06	0.89	4.923E-06	0.75	5.369E-06	0.66
143	1.979E-05	0.46	1.672E-05	0.41	1.797E-05	0.34
144	8.194E-06	0.83	6.873E-06	0.71	7.355E-06	0.60
145	7.228E-06	0.77	6.092E-06	0.66	6.602E-06	0.57
146	1.217E-05	0.66	1.023E-05	0.58	1.100E-05	0.48
147	3.728E-06	1.11	3.131E-06	0.93	3.379E-06	0.85
148	1.953E-06	1.81	1.638E-06	1.47	1.754E-06	1.11
149	1.166E-06	1.90	9.933E-07	1.64	1.069E-06	1.43
150	4.021E-06	1.19	3.379E-06	0.97	3.619E-06	0.91
151	4.152E-06	1.06	3.499E-06	0.97	3.774E-06	0.78
152	4.345E-06	0.99	3.648E-06	0.83	3.917E-06	0.65
153	4.544E-06	0.98	3.767E-06	0.79	4.065E-06	0.76
154	4.649E-06	1.07	3.923E-06	0.95	4.195E-06	0.80
155	4.404E-06	1.18	3.725E-06	1.08	3.979E-06	0.88
156	4.042E-06	1.17	3.381E-06	0.97	3.626E-06	0.86
157	4.641E-06	0.95	3.930E-06	0.93	4.214E-06	0.73
158	4.924E-06	1.05	4.150E-06	0.90	4.436E-06	0.71
159	6.736E-06	0.76	5.686E-06	0.74	6.144E-06	0.60
160	3.613E-06	1.13	3.026E-06	1.09	3.276E-06	0.85
161	4.899E-06	0.97	4.147E-06	0.90	4.499E-06	0.76
162	5.900E-06	0.93	4.958E-06	0.87	5.325E-06	0.61
163	6.093E-06	0.89	5.130E-06	0.85	5.539E-06	0.60
164	6.552E-06	0.81	5.536E-06	0.68	5.962E-06	0.60
165	6.895E-06	0.74	5.856E-06	0.69	6.306E-06	0.61
166	3.979E-06	1.09	3.366E-06	0.94	3.616E-06	0.88
167	4.166E-06	1.14	3.481E-06	0.96	3.784E-06	0.78
168	4.302E-06	0.98	3.623E-06	0.81	3.915E-06	0.71
169	4.513E-06	1.36	3.769E-06	1.10	4.056E-06	0.86
170	4.583E-06	0.93	3.903E-06	0.81	4.210E-06	0.59
171	2.360E-06	1.36	1.999E-06	1.14	2.146E-06	0.92
172	2.396E-06	1.39	2.009E-06	1.21	2.192E-06	0.94
173	2.497E-06	1.39	2.132E-06	1.17	2.314E-06	0.99
174	2.484E-06	1.47	2.125E-06	1.28	2.314E-06	1.01
175	1.055E-06	2.26	8.959E-07	2.08	9.579E-07	1.64
176	1.003E-06	2.00	8.556E-07	1.85	9.334E-07	1.49
177	1.018E-06	1.84	8.733E-07	1.77	9.348E-07	1.38
178	1.058E-06	1.65	8.951E-07	1.75	9.648E-07	1.35
179	1.047E-06	2.13	8.888E-07	1.84	9.746E-07	1.45
180	1.056E-06	2.17	8.981E-07	1.88	9.608E-07	1.51
181	1.067E-06	1.96	9.095E-07	1.70	9.811E-07	1.38
182	1.101E-06	1.84	9.389E-07	1.68	9.980E-07	1.26
183	1.085E-06	2.20	9.171E-07	1.90	9.923E-07	1.54

184	1.110E-06	2.16	9.329E-07	1.88	1.015E-06	1.43
185	1.111E-06	2.08	9.524E-07	1.96	1.034E-06	1.45
186	1.138E-06	1.96	9.603E-07	1.76	1.042E-06	1.42
187	1.118E-06	2.09	9.686E-07	1.90	1.041E-06	1.45
188	1.147E-06	1.99	9.696E-07	1.74	1.056E-06	1.40
189	1.154E-06	1.92	9.807E-07	1.62	1.061E-06	1.35
190	2.985E-06	1.26	2.522E-06	1.22	2.734E-06	0.96
191	3.052E-06	1.33	2.576E-06	1.09	2.801E-06	0.91
192	3.142E-06	1.15	2.660E-06	1.08	2.892E-06	0.89
193	3.305E-06	1.22	2.786E-06	1.02	2.975E-06	0.80
194	6.883E-06	0.82	5.813E-06	0.70	6.243E-06	0.57
195	7.320E-06	0.77	6.154E-06	0.67	6.677E-06	0.53
196	7.767E-06	0.87	6.579E-06	0.72	7.055E-06	0.62
197	8.456E-06	0.80	7.145E-06	0.69	7.729E-06	0.56
198	8.995E-06	0.68	7.592E-06	0.58	8.254E-06	0.52
199	4.759E-06	0.90	4.007E-06	0.82	4.334E-06	0.64
200	5.100E-06	0.94	4.309E-06	0.83	4.634E-06	0.70
201	1.057E-05	0.63	8.969E-06	0.61	9.702E-06	0.47
202	1.202E-05	0.59	1.014E-05	0.59	1.099E-05	0.44
203	1.298E-05	0.57	1.098E-05	0.51	1.191E-05	0.40
204	1.476E-05	0.58	1.254E-05	0.47	1.358E-05	0.40
205	8.606E-06	0.77	7.685E-06	0.62	8.153E-06	0.52
206	9.304E-06	0.66	8.300E-06	0.57	8.832E-06	0.48
207	9.615E-06	0.68	8.744E-06	0.60	9.217E-06	0.46
208	1.119E-05	0.49	1.005E-05	0.49	1.077E-05	0.37
209	1.162E-05	0.59	1.052E-05	0.52	1.114E-05	0.41
210	1.423E-05	0.52	1.281E-05	0.45	1.362E-05	0.40
211	1.615E-05	0.47	1.459E-05	0.42	1.555E-05	0.33
212	1.908E-05	0.47	1.725E-05	0.41	1.846E-05	0.30
213	2.614E-05	0.39	2.346E-05	0.34	2.517E-05	0.29
214	3.678E-05	0.31	3.313E-05	0.30	3.552E-05	0.25
215	5.523E-05	0.26	4.983E-05	0.24	5.381E-05	0.18
216	9.219E-05	0.22	8.412E-05	0.17	9.073E-05	0.16
217	5.548E-05	0.26	5.302E-05	0.20	5.624E-05	0.18
218	7.094E-05	0.21	6.799E-05	0.17	7.234E-05	0.15
219	8.395E-05	0.21	8.108E-05	0.18	8.649E-05	0.15
220	1.015E-04	0.17	9.903E-05	0.16	1.055E-04	0.12
221	1.200E-04	0.15	1.183E-04	0.15	1.261E-04	0.12
222	1.368E-04	0.17	1.367E-04	0.13	1.457E-04	0.12
223	1.538E-04	0.16	1.576E-04	0.13	1.674E-04	0.11
224	7.490E-05	0.19	7.959E-05	0.16	8.438E-05	0.13
225	2.332E-04	0.13	2.721E-04	0.11	2.823E-04	0.09
226	3.179E-05	0.24	4.485E-05	0.21	4.447E-05	0.13
227	2.901E-05	0.24	4.629E-05	0.18	4.440E-05	0.13
228	1.048E-05	0.38	1.907E-05	0.30	1.756E-05	0.18
229	9.667E-06	0.39	1.969E-05	0.30	1.745E-05	0.17
230	4.472E-06	0.54	1.015E-05	0.47	8.684E-06	0.22
231	4.237E-06	0.56	1.061E-05	0.41	8.745E-06	0.23
232	3.970E-06	0.54	1.125E-05	0.39	8.853E-06	0.19
233	2.260E-06	0.65	7.484E-06	0.48	5.526E-06	0.27
234	1.443E-06	0.86	5.436E-06	0.66	3.815E-06	0.27
235	5.149E-07	1.34	1.035E-06	1.09	1.115E-06	0.53

236	3.507E-07	1.56	7.448E-07	1.23	8.056E-07	0.47
237	2.304E-07	2.09	5.510E-07	1.39	6.184E-07	0.52
238	5.778E-09	10.80	2.191E-08	8.37	2.529E-08	1.75

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
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33	0.000E+00	0.00
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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
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68	0.000E+00	0.00
69	0.000E+00	0.00
70	0.000E+00	0.00
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73	0.000E+00	0.00
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81	0.000E+00	0.00
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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
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102	0.000E+00	0.00
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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
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169	0.000E+00	0.00
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175	0.000E+00	0.00
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178	0.000E+00	0.00
179	0.000E+00	0.00
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182	0.000E+00	0.00
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186	0.000E+00	0.00
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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

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  208   0.000E+00    0.00
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  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 0.7557     **
 0.7557 to 0.7586     *
 0.7586 to 0.7614     ***********
 0.7614 to 0.7642     *********************
 0.7642 to 0.7670     ******************************
 0.7670 to 0.7699     ************************
 0.7699 to 0.7727     *********
 0.7727 to 0.7755     ***
```

```
 0.7755 to 0.7784     *

                                 frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7529 to 0.7557     *
 0.7557 to 0.7586     *
 0.7586 to 0.7614     ***********
 0.7614 to 0.7642     *****************
 0.7642 to 0.7670     **********************
 0.7670 to 0.7699     ***************
 0.7699 to 0.7727     *****
 0.7727 to 0.7755     ***
 0.7755 to 0.7784

                                 frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7529 to 0.7557     *
 0.7557 to 0.7586     *
 0.7586 to 0.7614     ******
 0.7614 to 0.7642     ***********
 0.7642 to 0.7670     ******************
 0.7670 to 0.7699     **********
 0.7699 to 0.7727     **
 0.7727 to 0.7755     *
 0.7755 to 0.7784

                                 frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7529 to 0.7557
 0.7557 to 0.7586     *
 0.7586 to 0.7614     *****
 0.7614 to 0.7642     ****
 0.7642 to 0.7670     *******
 0.7670 to 0.7699     ******
 0.7699 to 0.7727     *
 0.7727 to 0.7755     *
 0.7755 to 0.7784

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

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

```
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76563 + or - 0.00044                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.67063E-02 + or -  1.19257E-04            ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  9.35114E-06            ***
        ***
***
        ***        system mean free path (cm)
6.53032E-01 + or -  1.59729E-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     3.09333 minutes


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

```
************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //                22
22             //              11        6666666666666
   00         00              99        //              22
22               //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666


      0000000      5555555555555                          11
44                     33333333333       0000000
     000000000     5555555555555                        111
444                    3333333333333     000000000
    00       00    55                    :::           1111
4444           :::       33         33    00       00
   00         00   55                    :::             11
44 44           :::                  33   00         00
   00         00   55                    :::             11
44  44           :::                  33   00         00
   00         00   555555555555                          11
44   44                                333    00         00
   00         00   5555555555555                         11
44    44                               333    00         00
   00         00              55         :::             11
444444444444         :::                  33   00         00
   00         00              55         :::             11
4444444444444         :::                  33   00         00
    00       00    55         55         :::             11
44           :::       33         33    00       00
     000000000     5555555555555                      11111111
```

```
44                     3333333333333     000000000
      0000000       55555555555                       11111111
44                      33333333333       0000000
1

    SSSSSSSSSS     CCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCC    AAAAAAAAAAA    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   CCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE




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

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```

```
**************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:14:30.81
*****
        *****
*****
        *****
*****

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

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*********************************************
        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access            ***
        ***
***

*********************************************************************
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                                 ........ 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  5.91233E-14  1.78364E-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  1.65247E-16  5.44573E-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  6.83168E-13  1.69558E-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  6.48323E-12  1.80301E-10   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.65868E-08  4.66252E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  8.77921E-12  2.49414E-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  1.50191E-20  4.17687E-19   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.15660E-13  3.28582E-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  6.79059E-09  1.96979E-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  5.94470E-12  1.76004E-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
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    1043099  1.64739E-12  4.87734E-11   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  7.18149E-12  2.16916E-10   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  5.60919E-12  1.71102E-10   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  3.91748E-12  1.20673E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  2.60837E-12  8.11279E-11   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.36738E-13  1.70157E-11   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  8.32849E-14  2.56547E-12   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  7.31268E-13  2.29635E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  4.52876E-13  1.42212E-11   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.11630E-13  6.77233E-12   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  7.44473E-14  2.40463E-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  2.92916E-14  9.54887E-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  8.98586E-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  9.89022E-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  4.13973E-15  1.42386E-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
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    1050117  1.46855E-09  5.13896E-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  7.42044E-14  2.79669E-12   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.30174E-14  8.74370E-13   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  6.33857E-13  2.44581E-11   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30089E-12  5.25345E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  3.81901E-13  1.49647E-11   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  4.44525E-12  1.76849E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.83128E-12  7.39522E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  5.71141E-13  2.27221E-11   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  9.83932E-18  3.94393E-16   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  5.47598E-12  2.21133E-10   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  8.24324E-12  3.37820E-10   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29299E-08  1.35936E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  7.64804E-12  3.20304E-10   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  8.45423E-12  3.51527E-10   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  7.15097E-12  3.01622E-10   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  7.72620E-12  3.28200E-10   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  4.74144E-12  2.02835E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.20474E-12  3.10372E-10   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.76877E-13  7.46048E-12   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  3.38776E-12  1.44924E-10   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
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    1060143  1.59151E-13  6.80822E-12   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                 12/17/09
    1060144  2.17911E-14  9.38713E-13   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                 12/17/09
    1060145  4.46996E-12  1.93897E-10   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                 12/17/09
    1060146  4.26177E-12  1.86143E-10   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                 12/17/09
    1060147  2.88766E-12  1.26992E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                 12/17/09
    1060148  2.21823E-12  9.82168E-11   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                 12/17/09
    1061147  2.31563E-13  1.01835E-11   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                 12/17/09
    1061148  1.42400E-20  6.30511E-19   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                 12/17/09
    1061149  9.67084E-13  4.31096E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                 12/17/09
    1062147  1.40832E-16  6.19340E-15   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                 12/17/09
    1062149  4.07973E-13  1.81860E-11   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                 12/17/09
    1062150  3.80384E-17  1.70701E-15   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                 12/17/09
    1062151  3.00823E-09  1.35900E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                 12/17/09
    1062152  3.61524E-13  1.64404E-11   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                 12/17/09
    1062153  1.41146E-13  6.46099E-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  7.13735E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                 12/17/09
    1063154  8.77103E-17  4.04125E-15   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                 12/17/09
    1063155  4.53898E-14  2.10492E-12   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                 12/17/09
    1063156  1.47074E-14  6.86457E-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
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    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
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  9.22549E-06  6.51849E-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  8.82158E-15  6.25957E-13   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.01799E-20  7.25388E-19   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  1.89512E-12  1.35610E-10   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  8.57262E-20  6.16004E-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  8.40578E-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
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    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
                            3048116    cd116 4855 endf/b7 rel0 rev7
```

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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:
  9605 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

                                            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       ........

                                 ........     0.01650 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

   0.00050 minutes were required for starting.   total elapsed time is
0.01700 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 15720 independent fission points were generated for generation 1
          1       7.65320E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15642 independent fission points were generated for generation 2
          2       7.67945E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15575 independent fission points were generated for generation 3
          3       7.67234E-01      7.67234E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.70901E-01      7.69067E-01      1.83350E-03
0.00000E+00      0.00000E+00
          5       7.68402E-01      7.68845E-01      1.08157E-03
0.00000E+00      0.00000E+00
          6       7.65689E-01      7.68056E-01      1.09889E-03
0.00000E+00      0.00000E+00
          7       7.65657E-01      7.67577E-01      9.77117E-04
0.00000E+00      0.00000E+00
          8       7.65120E-01      7.67167E-01      8.96703E-04
0.00000E+00      0.00000E+00
          9       7.61663E-01      7.66381E-01      1.09202E-03
```

0.00000E+00	0.00000E+00				
10	7.65026E-01	7.66212E-01	9.60761E-04	0.00000E+00	0.00000E+00
11	7.69003E-01	7.66522E-01	9.02302E-04	0.00000E+00	0.00000E+00
12	7.72334E-01	7.67103E-01	9.94551E-04	0.00000E+00	0.00000E+00
13	7.63663E-01	7.66790E-01	9.52397E-04	0.00000E+00	0.00000E+00
14	7.68564E-01	7.66938E-01	8.81890E-04	0.00000E+00	0.00000E+00
15	7.63639E-01	7.66684E-01	8.49980E-04	0.00000E+00	0.00000E+00
16	7.62717E-01	7.66401E-01	8.36394E-04	0.00000E+00	0.00000E+00
17	7.74447E-01	7.66937E-01	9.45516E-04	0.00000E+00	0.00000E+00
18	7.71909E-01	7.67248E-01	9.37454E-04	0.00000E+00	0.00000E+00
19	7.66253E-01	7.67190E-01	8.82530E-04	0.00000E+00	0.00000E+00
20	7.66907E-01	7.67174E-01	8.32205E-04	0.00000E+00	0.00000E+00
21	7.64376E-01	7.67027E-01	8.00844E-04	0.00000E+00	0.00000E+00
22	7.66717E-01	7.67011E-01	7.59905E-04	0.00000E+00	0.00000E+00
23	7.66568E-01	7.66990E-01	7.23121E-04	0.00000E+00	0.00000E+00
24	7.67359E-01	7.67007E-01	6.89673E-04	0.00000E+00	0.00000E+00
25	7.63974E-01	7.66875E-01	6.72070E-04	0.00000E+00	0.00000E+00
26	7.71602E-01	7.67072E-01	6.72933E-04	0.00000E+00	0.00000E+00
27	7.64129E-01	7.66766E-01	6.29990E-03	0.00000E+00	0.00000E+00
28	7.66778E-01	7.66768E-01	3.39881E-03	0.00000E+00	0.00000E+00
29	7.69831E-01	7.67279E-01	3.76532E-03	0.00000E+00	0.00000E+00
30	7.73266E-01	7.68134E-01	1.60243E-03	0.00000E+00	0.00000E+00
31	7.63241E-01	7.67523E-01	1.52739E-03	0.00000E+00	0.00000E+00
32	7.62921E-01	7.67011E-01	1.44420E-03	0.00000E+00	0.00000E+00
33	7.68972E-01	7.67207E-01	1.29240E-03	0.00000E+00	0.00000E+00
34	7.64923E-01	7.67000E-01	1.17854E-03	0.00000E+00	0.00000E+00
35	7.68195E-01	7.67099E-01	1.07161E-03		

0.00000E+00	0.00000E+00				
36	7.64980E-01	7.66936E-01	9.94164E-04	0.00000E+00	0.00000E+00
37	7.62615E-01	7.66628E-01	9.73378E-04	0.00000E+00	0.00000E+00
38	7.67142E-01	7.66662E-01	9.01928E-04	0.00000E+00	0.00000E+00
39	7.65833E-01	7.66610E-01	8.41474E-04	0.00000E+00	0.00000E+00
40	7.61313E-01	7.66299E-01	8.54158E-04	0.00000E+00	0.00000E+00
41	7.70268E-01	7.66519E-01	8.35739E-04	0.00000E+00	0.00000E+00
42	7.64904E-01	7.66434E-01	7.93051E-04	0.00000E+00	0.00000E+00
43	7.67551E-01	7.66490E-01	7.52454E-04	0.00000E+00	0.00000E+00
44	7.61265E-01	7.66241E-01	7.60248E-04	0.00000E+00	0.00000E+00
45	7.70428E-01	7.66431E-01	7.50185E-04	0.00000E+00	0.00000E+00
46	7.56318E-01	7.65992E-01	9.96980E-04	0.00000E+00	0.00000E+00
47	7.65195E-01	7.65959E-01	9.43406E-04	0.00000E+00	0.00000E+00
48	7.63126E-01	7.65845E-01	9.70009E-04	0.00000E+00	0.00000E+00
49	7.66899E-01	7.65886E-01	9.27854E-04	0.00000E+00	0.00000E+00
50	7.64090E-01	7.65819E-01	9.02154E-04	0.00000E+00	0.00000E+00
51	7.66554E-01	7.65845E-01	8.68384E-04	0.00000E+00	0.00000E+00
52	7.67581E-01	7.65905E-01	8.32528E-04	0.00000E+00	0.00000E+00
53	7.57245E-01	7.65617E-01	8.49968E-04	0.00000E+00	0.00000E+00
54	7.58803E-01	7.65397E-01	8.35468E-04	0.00000E+00	0.00000E+00
55	7.65743E-01	7.65408E-01	8.02878E-04	0.00000E+00	0.00000E+00
56	7.54342E-01	7.65072E-01	1.17339E-03	0.00000E+00	0.00000E+00
57	7.65665E-01	7.65090E-01	1.12470E-03	0.00000E+00	0.00000E+00
58	7.64107E-01	7.65062E-01	1.10441E-03	0.00000E+00	0.00000E+00
59	7.61135E-01	7.64953E-01	1.11090E-03	0.00000E+00	0.00000E+00
60	7.64547E-01	7.64942E-01	1.08044E-03	0.00000E+00	0.00000E+00
61	7.66072E-01	7.64971E-01	1.04478E-03		

0.00000E+00	0.00000E+00				
62	7.71955E-01	7.65150E-01	1.00550E-03	0.00000E+00	0.00000E+00
63	7.69984E-01	7.65271E-01	9.74906E-04	0.00000E+00	0.00000E+00
64	7.69474E-01	7.65374E-01	9.80827E-04	0.00000E+00	0.00000E+00
65	7.64310E-01	7.65348E-01	9.44403E-04	0.00000E+00	0.00000E+00
66	7.72431E-01	7.65513E-01	1.01713E-03	0.00000E+00	0.00000E+00
67	7.62703E-01	7.65449E-01	9.78694E-04	0.00000E+00	0.00000E+00
68	7.65323E-01	7.65447E-01	9.53546E-04	0.00000E+00	0.00000E+00
69	7.65481E-01	7.65447E-01	9.30511E-04	0.00000E+00	0.00000E+00
70	7.71569E-01	7.65578E-01	9.35661E-04	0.00000E+00	0.00000E+00
71	7.67033E-01	7.65608E-01	9.12354E-04	0.00000E+00	0.00000E+00
72	7.68437E-01	7.65666E-01	9.03846E-04	0.00000E+00	0.00000E+00
73	7.67279E-01	7.65698E-01	8.91408E-04	0.00000E+00	0.00000E+00
74	7.72566E-01	7.65833E-01	9.21493E-04	0.00000E+00	0.00000E+00
75	7.57989E-01	7.65682E-01	8.93392E-04	0.00000E+00	0.00000E+00
76	7.68099E-01	7.65727E-01	8.89665E-04	0.00000E+00	0.00000E+00
77	7.68612E-01	7.65781E-01	8.74611E-04	0.00000E+00	0.00000E+00
78	7.75846E-01	7.65964E-01	8.86729E-04	0.00000E+00	0.00000E+00
79	7.64357E-01	7.65935E-01	8.71676E-04	0.00000E+00	0.00000E+00
80	7.66607E-01	7.65947E-01	8.59496E-04	0.00000E+00	0.00000E+00
81	7.65977E-01	7.65947E-01	8.43501E-04	0.00000E+00	0.00000E+00
82	7.65428E-01	7.65939E-01	8.26050E-04	0.00000E+00	0.00000E+00
83	7.71268E-01	7.66027E-01	8.15011E-04	0.00000E+00	0.00000E+00
84	7.67574E-01	7.66053E-01	8.01159E-04	0.00000E+00	0.00000E+00
85	7.62780E-01	7.66000E-01	7.82958E-04	0.00000E+00	0.00000E+00
86	7.66902E-01	7.66014E-01	7.71887E-04	0.00000E+00	0.00000E+00
87	7.53962E-01	7.65826E-01	7.68601E-04		

```
0.00000E+00      0.00000E+00
         88       7.71966E-01      7.65920E-01      6.70441E-04
0.00000E+00      0.00000E+00
         89       7.64309E-01      7.65896E-01      6.67600E-04
0.00000E+00      0.00000E+00
         90       7.65514E-01      7.65890E-01      6.56394E-04
0.00000E+00      0.00000E+00
         91       7.64720E-01      7.65873E-01      6.47275E-04
0.00000E+00      0.00000E+00
         92       7.67824E-01      7.65901E-01      6.37915E-04
0.00000E+00      0.00000E+00
         93       7.65011E-01      7.65889E-01      6.28945E-04
0.00000E+00      0.00000E+00
         94       7.67701E-01      7.65914E-01      6.21508E-04
0.00000E+00      0.00000E+00
         95       7.66330E-01      7.65920E-01      6.12448E-04
0.00000E+00      0.00000E+00
         96       7.70020E-01      7.65976E-01      6.08946E-04
0.00000E+00      0.00000E+00
         97       7.66443E-01      7.65982E-01      6.00507E-04
0.00000E+00      0.00000E+00
         98       7.71937E-01      7.66062E-01      6.05499E-04
0.00000E+00      0.00000E+00
         99       7.69687E-01      7.66110E-01      6.88622E-04
0.00000E+00      0.00000E+00
        100       7.64473E-01      7.66088E-01      6.74589E-04
0.00000E+00      0.00000E+00
        101       7.70379E-01      7.66143E-01      6.79833E-04
0.00000E+00      0.00000E+00
        102       7.68550E-01      7.66174E-01      6.76601E-04
0.00000E+00      0.00000E+00
        103       7.62070E-01      7.66122E-01      6.62932E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=EA26995FD01D737F
        104       7.66576E-01      7.66128E-01      6.54876E-04
0.00000E+00      0.00000E+00
        105       7.61559E-01      7.66072E-01      6.45905E-04
0.00000E+00      0.00000E+00
        106       7.61175E-01      7.66013E-01      6.42084E-04
0.00000E+00      0.00000E+00
        107       7.69570E-01      7.66056E-01      6.28307E-04
0.00000E+00      0.00000E+00
        108       7.71244E-01      7.66117E-01      6.12205E-04
0.00000E+00      0.00000E+00
        109       7.70640E-01      7.66169E-01      6.00592E-04
0.00000E+00      0.00000E+00
        110       7.66127E-01      7.66169E-01      5.93254E-04
0.00000E+00      0.00000E+00
        111       7.65586E-01      7.66162E-01      5.84269E-04
0.00000E+00      0.00000E+00
        112       7.63204E-01      7.66129E-01      5.22799E-04
```

```
0.00000E+00      0.00000E+00
        113       7.66531E-01      7.66133E-01      5.16774E-04
0.00000E+00      0.00000E+00
        114       7.70695E-01      7.66184E-01      5.10110E-04
0.00000E+00      0.00000E+00
        115       7.66268E-01      7.66184E-01      5.04411E-04
0.00000E+00      0.00000E+00
        116       7.59627E-01      7.66114E-01      4.96725E-04
0.00000E+00      0.00000E+00
        117       7.63683E-01      7.66088E-01      4.91953E-04
0.00000E+00      0.00000E+00
        118       7.68229E-01      7.66111E-01      4.83788E-04
0.00000E+00      0.00000E+00
        119       7.65028E-01      7.66099E-01      4.79377E-04
0.00000E+00      0.00000E+00
        120       7.61101E-01      7.66048E-01      4.74700E-04
0.00000E+00      0.00000E+00
        121       7.61384E-01      7.66000E-01      4.73408E-04
0.00000E+00      0.00000E+00
        122       7.66869E-01      7.66009E-01      4.67584E-04
0.00000E+00      0.00000E+00
        123       7.68341E-01      7.66032E-01      4.60915E-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=0E8E7B9C444F00B5
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.54887E-05 + or -  1.20627E-08             generation time
=  2.98905E-05 + or -  2.00827E-08
 nu bar   =  2.43896E+00 + or -  9.77332E-06       average fission group
=  2.17544E+02 + or -  1.02353E-02
                       energy(ev) of the average lethargy causing fission
=  5.68293E-02 + or -  1.26773E-04
                                                 system mean free path (cm)
=  6.53068E-01 + or -  1.73620E-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          0.76603   + or - 0.00046     0.76557 to 0.76649
0.76511 to 0.76695    0.76465 to 0.76742    2000000      12.6233

      24          0.76602   + or - 0.00046     0.76556 to 0.76648
```

0.76509 to 0.76695 0.76463 to 0.76741 1980000 12.6914

25 0.76604 + or - 0.00047 0.76557 to 0.76651
0.76511 to 0.76697 0.76464 to 0.76744 1960000 12.7746

26 0.76598 + or - 0.00047 0.76552 to 0.76645
0.76505 to 0.76692 0.76458 to 0.76738 1940000 12.9439

27 0.76600 + or - 0.00047 0.76553 to 0.76648
0.76505 to 0.76695 0.76458 to 0.76742 1920000 12.8742

28 0.76599 + or - 0.00048 0.76552 to 0.76647
0.76504 to 0.76695 0.76456 to 0.76743 1900000 12.9172

29 0.76595 + or - 0.00048 0.76547 to 0.76644
0.76499 to 0.76692 0.76450 to 0.76740 1880000 12.8275

30 0.76587 + or - 0.00049 0.76539 to 0.76636
0.76490 to 0.76685 0.76441 to 0.76734 1860000 12.6551

31 0.76590 + or - 0.00049 0.76541 to 0.76640
0.76491 to 0.76689 0.76442 to 0.76738 1840000 12.6163

32 0.76594 + or - 0.00050 0.76544 to 0.76643
0.76494 to 0.76693 0.76444 to 0.76743 1820000 12.7448

37 0.76594 + or - 0.00052 0.76541 to 0.76646
0.76489 to 0.76698 0.76436 to 0.76751 1720000 12.8263

42 0.76594 + or - 0.00055 0.76539 to 0.76649
0.76484 to 0.76703 0.76429 to 0.76758 1620000 13.1620

47 0.76606 + or - 0.00068 0.76538 to 0.76673
0.76470 to 0.76741 0.76402 to 0.76809 1520000 9.3726

52 0.76608 + or - 0.00072 0.76536 to 0.76681
0.76464 to 0.76753 0.76391 to 0.76825 1420000 9.4224

57 0.76652 + or - 0.00050 0.76601 to 0.76702
0.76551 to 0.76753 0.76501 to 0.76803 1320000 18.5391

62 0.76660 + or - 0.00052 0.76607 to 0.76712
0.76555 to 0.76764 0.76503 to 0.76816 1220000 20.1855

67 0.76649 + or - 0.00053 0.76596 to 0.76702
0.76543 to 0.76755 0.76491 to 0.76807 1120000 23.1578

72 0.76638 + or - 0.00057 0.76582 to 0.76695
0.76525 to 0.76752 0.76468 to 0.76809 1020000 23.5947

77 0.76633 + or - 0.00058 0.76574 to 0.76691
0.76516 to 0.76750 0.76457 to 0.76808 920000 25.9483

```
      82          0.76617   + or - 0.00061     0.76556 to 0.76678
0.76495 to 0.76739    0.76434 to 0.76800     820000      26.3229

      87          0.76640   + or - 0.00070     0.76570 to 0.76710
0.76500 to 0.76780    0.76430 to 0.76850     720000      11.9406

      92          0.76632   + or - 0.00081     0.76551 to 0.76714
0.76470 to 0.76795    0.76389 to 0.76876     620000      11.1192

      97          0.76617   + or - 0.00097     0.76521 to 0.76714
0.76424 to 0.76811    0.76327 to 0.76907     520000      10.4455

     102          0.76550   + or - 0.00108     0.76442 to 0.76659
0.76333 to 0.76767    0.76225 to 0.76875     420000      11.0845

     107          0.76591   + or - 0.00130     0.76461 to 0.76721
0.76331 to 0.76851    0.76201 to 0.76981     320000      13.3438

     112          0.76525   + or - 0.00157     0.76368 to 0.76682
0.76211 to 0.76839    0.76054 to 0.76996     220000      15.4046
1                                                fuel bundle

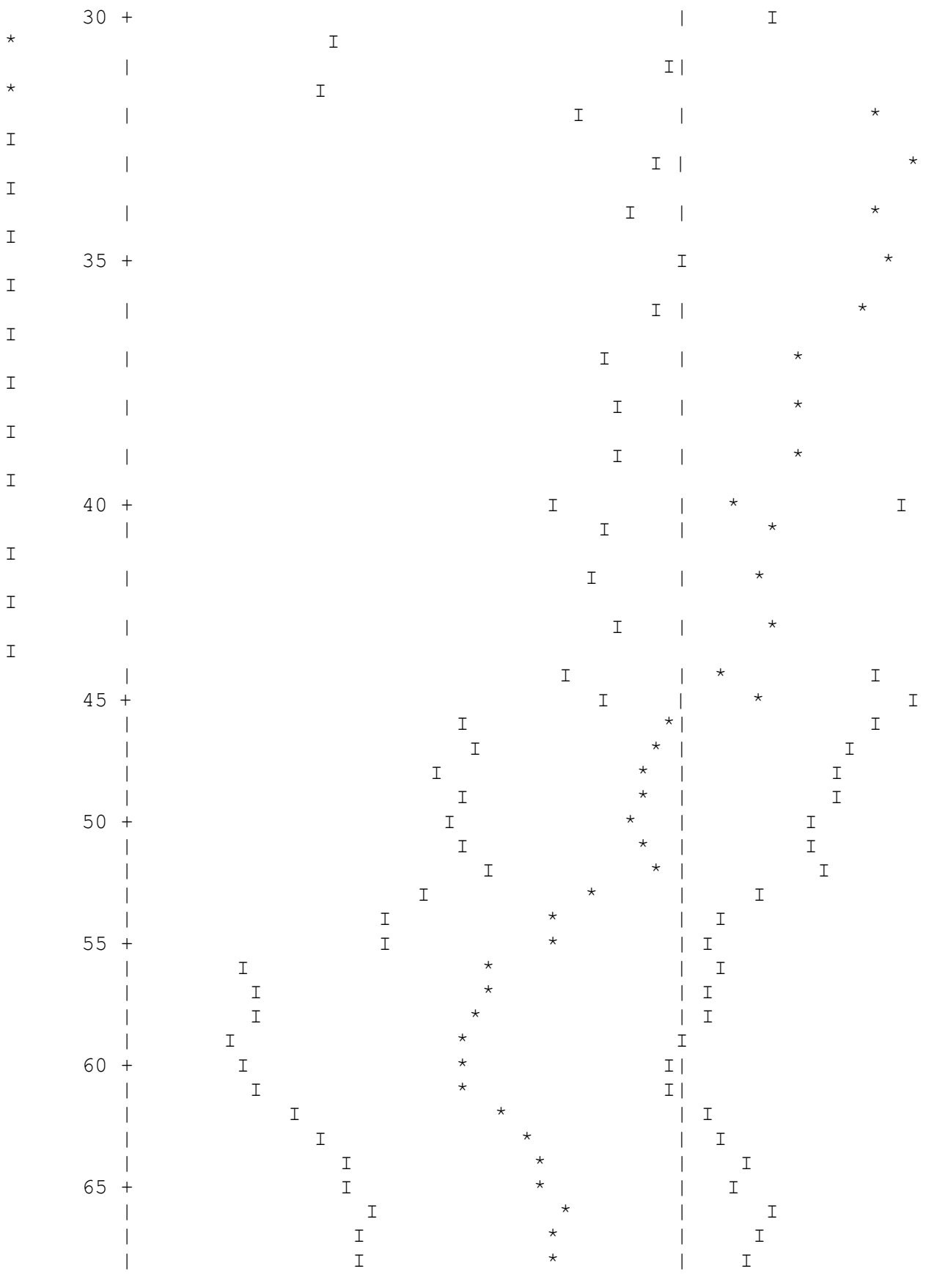
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

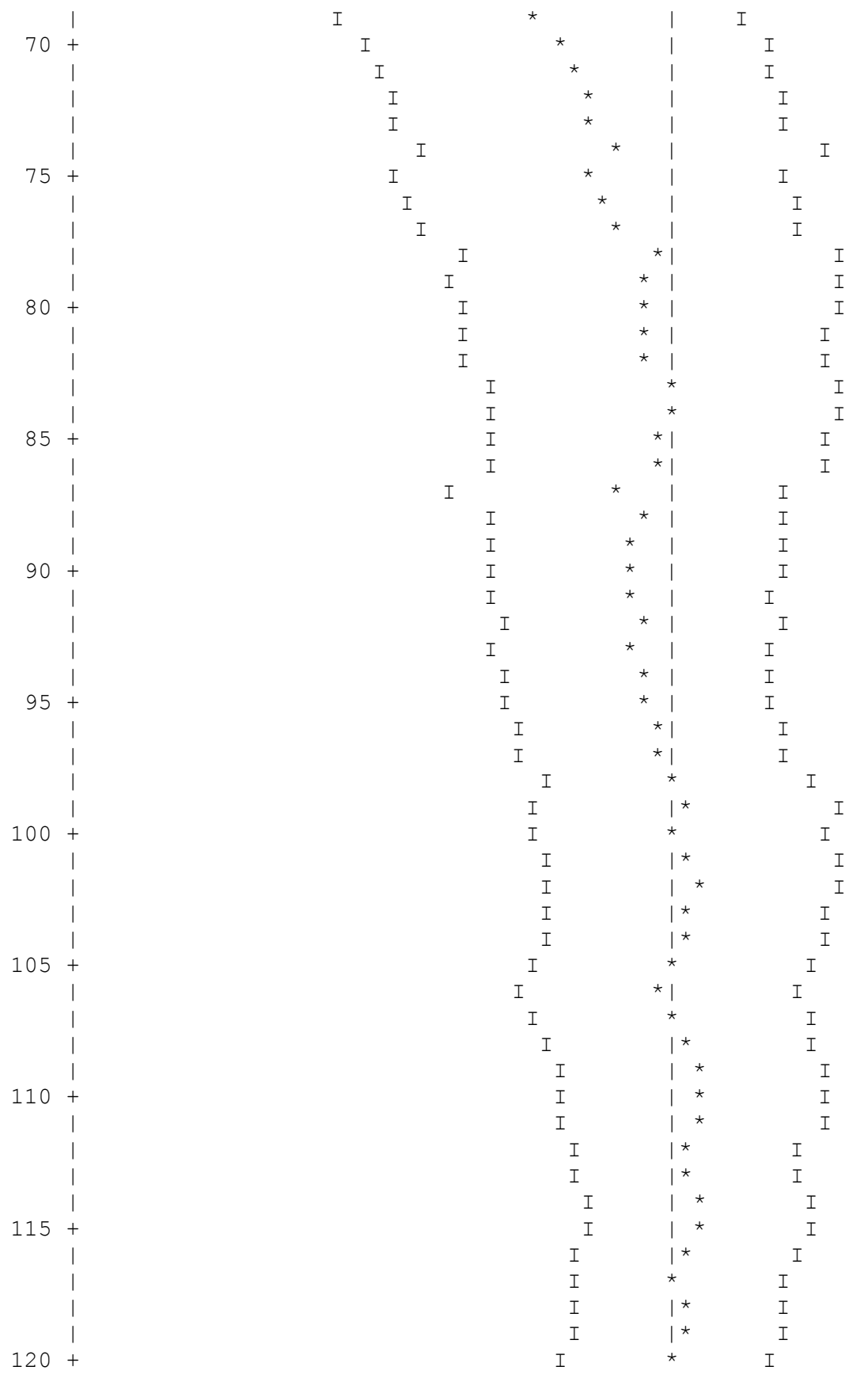
     117          0.76516   + or - 0.00273     0.76243 to 0.76789
0.75970 to 0.77061    0.75698 to 0.77334     120000       8.7234
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76603 + or - 0.00046 which occurs for
123 generations run.

                                0.7649                   0.7665
0.7681

|-------------------------|------------------------|------------------
------|------------------------
         |
      25 +         I                          *     |
I
         |       I                                   |
*
         |                                           |          *
         |                                           |          *
         |  I                                        |
*
```


30
35
40
45
50
55
60
65


70
75
80
85
90
95
100
105
110
115
120

```
         |                                   I      *|     I
         |                                   I      *|      I
         |                                   I       *      I
1                           fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7660 + or - 0.0004 which occurs for 23 generations skipped.

```
                                 0.7643                    0.7659
0.7676

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                                                I      *      I
         |                                                I      *      I
      25 +                                                I      *      I
         |                                              I      *|     I
         |                                              I      *|     I
         |                                              I      *|     I
         |                                            I        *|     I
      30 +                                           I       *  |    I
         |                                           I        * |    I
         |                                            I       * |     I
         |                                           I        * |    I
         |                                           I        * |     I
      35 +                                           I        * |    I
         |                                           I        * |     I
         |                                           I        * |     I
         |                                           I        * |     I
         |                                           I        * |     I
      40 +                                            I        *|      I
         |                                           I        * |     I
         |                                           I        * |      I
         |                                           I        * |     I
         |                                            I        *|      I
      45 +                                        I          * |       I
         |                                         I          *
I
         |                                         I          *
I
         |                                          I         |*
I
         |                                         I          |*
I
      50 +                                          I         |*
I
         |                                         I          |*
I
         |                                         I          |*
I
```

```
         |                                                I     |  *
I
         |                                                  I   |   *
I
      55 +                                                  I   |   *
I
         |                                                     I|      *
I
         |                                                      I      *
I
         |                                                      I       *
I
         |                                                      |I
*       I
      60 +                                                    | I      *
I
         |                                                    | I
*       I
         |                                                      I       *
I
         |                                                     I|      *
I
         |                                                     I|      *
I
      65 +                                                     I|      *
I
         |                                                    I |     *
I
         |                                                     I|      *
I
         |                                                     I|      *
I
         |                                                     I|      *
I
      70 +                                                    I |     *
I
         |                                                   I  |     *
I
         |                                                   I  |    *
I
         |                                                  I   |    *
I
         |                                                I     |  *
I
      75 +                                                   I  |     *
I
         |                                                  I   |    *
I
         |                                                 I    |   *
I
         |                                              I      |*
I
```

```
         |                                          I      | *
I
      80 +                                          I      | *
I
         |                                          I      | *
I
         |                                          I      | *
I
         |                                       I        *
I
         |                                      I        *|
I
      85 +                                       I        |*
I
         |                                      I         *
I
         |                                           I    |    *
I
         |                                        I       |  *
I
         |                                          I     |   *
I
      90 +                                          I     |   *
I
         |                                          I     |    *
I
         |                                        I       |   *
I
         |                                        I       |    *
I
         |                                       I        |   *
I
      95 +                                       I        |   *
I
         |                                     I          | *
I
         |                                   I            | *
I
         |                                I            * |
I
         |                             I             *   |
I
     100 +                             I              *  |
I
         |                         I              *     |
I
         |                     I                *       |        I
         |                       I              *     |
I
         |                     I                *     |
I
     105 +                         I                *  |
```

```
I
         |                                I                   |*
I
         |                             I                   * |
I
         |                         I                 *       |
I
         |                     I                *             |   I
     110 +                  I                  *             |    I
         |                I                   *              |     I
         |               I                       *           |
I
         |            I                         *             |
I
         |     I                       *                     I|
     115 +                         *                          | I
         |     I                             *               |
I
         |                                      *            |
I
         |                            *                      |
I
         |                           *                       |
     120 +                                         *        |
I

   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
2.28277E-07    48.3739       0.00000E+00     0.0000
    3    0.0000                 1.46419E-05    10.9234
2.15267E-05     5.0697       0.00000E+00     0.0000
    4    0.0000                 1.81862E-05    10.3210
3.07564E-05     4.1591       0.00000E+00     0.0000
    5    0.0000                 3.17309E-05     7.3660
5.69853E-05     3.1515       0.00000E+00     0.0000
    6    0.0001                 9.66684E-05     3.7413
2.32044E-04     1.5917       0.00000E+00     0.0000
    7    0.0002                 1.18897E-04     3.4007
2.06589E-04     1.4357       0.00000E+00     0.0000
    8    0.0003                 2.43662E-04     2.1428
3.20546E-04     0.9911       0.00000E+00     0.0000
```

9	0.0005	3.83834E-04	1.2510	4.41480E-04	0.6298
0.00000E+00	0.0000				
10	0.0003	2.04785E-04	1.6373	2.07993E-04	0.7653
0.00000E+00	0.0000				
11	0.0012	9.22186E-04	0.7235	5.28155E-04	0.5051
0.00000E+00	0.0000				
12	0.0010	7.75403E-04	0.6370	3.03849E-04	0.6274
0.00000E+00	0.0000				
13	0.0003	2.28873E-04	1.3502	9.09335E-05	1.3363
0.00000E+00	0.0000				
14	0.0013	1.00409E-03	0.6518	4.10441E-04	0.6449
0.00000E+00	0.0000				
15	0.0010	7.60375E-04	0.7424	3.27861E-04	0.7337
0.00000E+00	0.0000				
16	0.0002	1.88308E-04	1.2511	8.65309E-05	1.2319
0.00000E+00	0.0000				
17	0.0001	6.74589E-05	1.8665	3.28293E-05	1.8295
0.00000E+00	0.0000				
18	0.0001	5.20898E-05	2.0400	2.63090E-05	1.9977
0.00000E+00	0.0000				
19	0.0001	7.98690E-05	1.3642	4.22502E-05	1.3317
0.00000E+00	0.0000				
20	0.0001	6.07644E-05	1.6000	3.32584E-05	1.5639
0.00000E+00	0.0000				
21	0.0002	1.20481E-04	1.1186	6.80263E-05	1.0915
0.00000E+00	0.0000				
22	0.0001	1.05014E-04	1.1258	6.21682E-05	1.1000
0.00000E+00	0.0000				
23	0.0001	1.04722E-04	1.1696	6.39521E-05	1.1431
0.00000E+00	0.0000				
24	0.0000	2.57867E-05	2.4760	1.60094E-05	2.4087
0.00000E+00	0.0000				
25	0.0000	3.04569E-05	1.8982	1.90216E-05	1.8492
0.00000E+00	0.0000				
26	0.0000	1.69651E-05	2.4482	1.06642E-05	2.3753
0.00000E+00	0.0000				
27	0.0001	5.24899E-05	1.2781	3.27608E-05	1.2519
0.00000E+00	0.0000				
28	0.0001	9.69186E-05	0.9214	6.04608E-05	0.9053
0.00000E+00	0.0000				
29	0.0001	9.84761E-05	1.2008	6.20305E-05	1.1843
0.00000E+00	0.0000				
30	0.0000	1.26601E-05	3.0026	7.94097E-06	2.9801
0.00000E+00	0.0000				
31	0.0001	9.79813E-05	1.1631	6.18936E-05	1.1490
0.00000E+00	0.0000				
32	0.0001	3.91852E-05	1.5362	2.50358E-05	1.5050
0.00000E+00	0.0000				
33	0.0000	3.47586E-05	1.5765	2.17484E-05	1.5602
0.00000E+00	0.0000				
34	0.0001	7.48690E-05	1.1784	4.70433E-05	1.1597
0.00000E+00	0.0000				

```
   35    0.0001                 4.56025E-05     1.8039
2.86159E-05     1.7755       0.00000E+00     0.0000
   36    0.0001                 4.34285E-05     1.5271
2.68788E-05     1.5145       0.00000E+00     0.0000
   37    0.0000                 2.85458E-05     1.7051
1.79140E-05     1.6693       0.00000E+00     0.0000
   38    0.0000                 3.37002E-05     1.5253
2.12283E-05     1.4906       0.00000E+00     0.0000
   39    0.0002                 1.29881E-04     0.8265
8.26328E-05     0.8116       0.00000E+00     0.0000
   40    0.0002                 1.18682E-04     0.8254
7.67382E-05     0.8089       0.00000E+00     0.0000
   41    0.0002                 1.58804E-04     0.8105
1.06139E-04     0.7848       0.00000E+00     0.0000
   42    0.0002                 1.40832E-04     0.7948
9.57765E-05     0.7744       0.00000E+00     0.0000
   43    0.0001                 7.94130E-05     1.1502
5.70352E-05     1.0942       0.00000E+00     0.0000
   44    0.0001                 1.12482E-04     1.0870
8.26462E-05     1.0413       0.00000E+00     0.0000
   45    0.0001                 5.97194E-05     0.9504
4.81732E-05     0.8762       0.00000E+00     0.0000
   46    0.0000                 1.43985E-05     1.9382
1.15900E-05     1.7955       0.00000E+00     0.0000
   47    0.0001                 4.10201E-05     1.6279
3.18579E-05     1.5697       0.00000E+00     0.0000
   48    0.0000                 1.19194E-05     3.4628
9.25602E-06     3.3594       0.00000E+00     0.0000
   49    0.0001                 8.19793E-05     1.5322
6.46203E-05     1.4990       0.00000E+00     0.0000
   50    0.0001                 5.66555E-05     1.9236
4.66532E-05     1.8856       0.00000E+00     0.0000
   51    0.0000                 1.53441E-05     3.3946
1.27450E-05     3.3282       0.00000E+00     0.0000
   52    0.0001                 3.99096E-05     2.0515
3.45250E-05     1.9939       0.00000E+00     0.0000
   53    0.0002                 1.59045E-04     0.7252
1.56200E-04     0.6680       0.00000E+00     0.0000
   54    0.0001                 7.58960E-05     1.9702
7.04945E-05     1.8993       0.00000E+00     0.0000
   55    0.0002                 1.64492E-04     1.4430
1.50759E-04     1.4066       0.00000E+00     0.0000
   56    0.0002                 1.19312E-04     1.6299
1.10612E-04     1.5910       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	1.47124E-04	1.5497	1.33594E-04	1.5098	0.00000E+00	0.0000
58	0.0001	8.44383E-05	1.9649	7.39566E-05	1.9091	0.00000E+00	0.0000
59	0.0002	1.61453E-04	1.4331	1.44863E-04	1.3792	0.00000E+00	0.0000
60	0.0004	2.68867E-04	1.2945	2.44116E-04	1.2233	0.00000E+00	0.0000
61	0.0000	2.98285E-05	4.0281	2.29041E-05	3.9009	0.00000E+00	0.0000
62	0.0002	1.66807E-04	1.9006	1.39834E-04	1.8504	0.00000E+00	0.0000
63	0.0002	1.18984E-04	1.8737	9.79767E-05	1.8046	0.00000E+00	0.0000
64	0.0001	1.02808E-04	2.1377	8.27871E-05	2.0713	0.00000E+00	0.0000
65	0.0000	3.34677E-05	3.6099	3.31128E-05	3.4986	0.00000E+00	0.0000
66	0.0002	1.70975E-04	1.7706	1.51748E-04	1.7110	0.00000E+00	0.0000
67	0.0002	1.48995E-04	1.9636	1.21855E-04	1.8972	0.00000E+00	0.0000
68	0.0000	2.47169E-05	4.8852	2.14398E-05	4.7038	0.00000E+00	0.0000
69	0.0004	3.00573E-04	1.3674	2.35922E-04	1.3237	0.00000E+00	0.0000
70	0.0003	2.09920E-04	1.8416	1.91043E-04	1.7710	0.00000E+00	0.0000
71	0.0006	4.43978E-04	1.5646	3.67106E-04	1.5177	0.00000E+00	0.0000
72	0.0001	4.84484E-05	5.3495	2.86199E-05	5.2215	0.00000E+00	0.0000
73	0.0004	3.29898E-04	1.8795	2.51133E-04	1.7771	0.00000E+00	0.0000
74	0.0014	1.05009E-03	1.0648	7.63853E-04	1.0215	0.00000E+00	0.0000
75	0.0001	1.07331E-04	2.6825	8.26855E-05	2.5504	0.00000E+00	0.0000
76	0.0006	4.63175E-04	1.8369	2.94126E-04	1.7711	0.00000E+00	0.0000
77	0.0005	3.81092E-04	1.9991	2.73125E-04	1.9210	0.00000E+00	0.0000
78	0.0000	6.80298E-06	4.2945	6.65971E-05	4.2469	0.00000E+00	0.0000
79	0.0003	1.96796E-04	2.7583	1.32055E-04	2.6544	0.00000E+00	0.0000
80	0.0001	5.98125E-05	3.2221	7.98083E-05	3.1304	0.00000E+00	0.0000
81	0.0014	1.07269E-03	1.1091	7.88570E-04	1.0670	0.00000E+00	0.0000
82	0.0001	6.96627E-05	4.4178				

4.17231E-05	4.1996	0.00000E+00	0.0000	83	0.0002	1.34102E-04	2.9863
1.48253E-04	2.9266	0.00000E+00	0.0000	84	0.0001	7.88013E-05	2.9973
8.00237E-05	2.7703	0.00000E+00	0.0000	85	0.0002	1.88908E-04	2.3282
2.32993E-04	2.2607	0.00000E+00	0.0000	86	0.0004	2.68735E-04	2.4367
2.16134E-04	2.3161	0.00000E+00	0.0000	87	0.0004	3.33711E-04	2.8438
2.07639E-04	2.7216	0.00000E+00	0.0000	88	0.0001	5.27719E-05	4.7328
9.59550E-05	4.6131	0.00000E+00	0.0000	89	0.0001	9.43272E-05	3.2085
6.55424E-05	2.9376	0.00000E+00	0.0000	90	0.0003	2.15963E-04	3.0159
1.27729E-04	2.8838	0.00000E+00	0.0000	91	0.0002	1.83855E-04	2.5024
1.16561E-04	2.3547	0.00000E+00	0.0000	92	0.0000	3.12035E-05	2.6913
2.04161E-04	2.6388	0.00000E+00	0.0000	93	0.0002	1.31358E-04	3.3619
1.06730E-04	3.1325	0.00000E+00	0.0000	94	0.0002	1.17247E-04	3.9600
6.57063E-05	3.7188	0.00000E+00	0.0000	95	0.0008	5.80526E-04	2.0439
3.58625E-04	1.9742	0.00000E+00	0.0000	96	0.0002	1.56598E-04	4.1742
7.93796E-05	4.0070	0.00000E+00	0.0000	97	0.0004	2.93548E-04	3.1348
1.67883E-04	3.0704	0.00000E+00	0.0000	98	0.0001	9.99719E-05	4.2668
9.59700E-05	4.1053	0.00000E+00	0.0000	99	0.0001	8.92978E-05	5.4357
6.01136E-05	5.2333	0.00000E+00	0.0000	100	0.0002	1.27838E-04	3.9404
8.55039E-05	3.7876	0.00000E+00	0.0000	101	0.0001	1.13648E-04	4.0739
7.22800E-05	3.7803	0.00000E+00	0.0000	102	0.0002	1.63833E-04	4.0025
9.12909E-05	3.8412	0.00000E+00	0.0000	103	0.0001	9.71695E-05	3.4780
9.48197E-05	3.2904	0.00000E+00	0.0000	104	0.0002	1.78517E-04	3.4908
1.41229E-04	3.3802	0.00000E+00	0.0000	105	0.0002	1.18644E-04	3.2415
7.86750E-05	3.0405	0.00000E+00	0.0000	106	0.0002	1.75060E-04	4.1702
1.30201E-04	4.1152	0.00000E+00	0.0000	107	0.0001	6.75566E-05	3.0655
6.80687E-05	2.8728	0.00000E+00	0.0000	108	0.0000	3.32569E-05	2.4960

```
1.43853E-04     2.4302       0.00000E+00     0.0000
  109    0.0002                1.33375E-04     2.0814
4.42411E-04     2.0525       0.00000E+00     0.0000
  110    0.0009                6.55004E-04     3.3922
4.03974E-04     3.3607       0.00000E+00     0.0000
  111    0.0002                1.46536E-04     4.1910
1.34843E-04     4.0727       0.00000E+00     0.0000
  112    0.0002                1.28109E-04     4.3643
1.34775E-04     4.2938       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                1.22206E-04     4.0359
1.07078E-04     3.7740       0.00000E+00     0.0000
  114    0.0000                1.12604E-05     6.9279
1.52754E-05     5.8003       0.00000E+00     0.0000
  115    0.0001                7.55982E-05     4.1628
8.76157E-05     3.8566       0.00000E+00     0.0000
  116    0.0002                1.86598E-04     2.9625
1.40768E-04     2.6590       0.00000E+00     0.0000
  117    0.0006                4.71052E-04     2.3914
2.52011E-04     2.2381       0.00000E+00     0.0000
  118    0.0007                5.66022E-04     2.0222
4.42696E-04     1.9385       0.00000E+00     0.0000
  119    0.0002                1.38766E-04     2.1204
3.58466E-04     2.0447       0.00000E+00     0.0000
  120    0.0002                1.63504E-04     1.9497
6.22450E-04     1.9236       0.00000E+00     0.0000
  121    0.0007                5.05425E-04     2.8624
3.89140E-04     2.7910       0.00000E+00     0.0000
  122    0.0001                1.00538E-04     4.2729
7.86514E-05     3.9848       0.00000E+00     0.0000
  123    0.0003                2.09743E-04     2.9659
1.48910E-04     2.6150       0.00000E+00     0.0000
  124    0.0003                2.43666E-04     2.9669
2.00483E-04     2.7778       0.00000E+00     0.0000
  125    0.0002                1.38198E-04     3.2037
1.27200E-04     2.8852       0.00000E+00     0.0000
  126    0.0001                1.01955E-04     3.6982
9.13713E-05     3.2633       0.00000E+00     0.0000
  127    0.0006                4.32343E-04     3.2225
2.11261E-04     3.0604       0.00000E+00     0.0000
  128    0.0003                2.11371E-04     3.1201
1.31166E-04     2.7716       0.00000E+00     0.0000
  129    0.0006                4.65060E-04     2.2634
4.27695E-04     2.1556       0.00000E+00     0.0000
```

130	0.0001	1.14795E-04	2.8309	2.80140E-04	2.7482
0.00000E+00	0.0000				
131	0.0004	2.99482E-04	2.2491	2.40197E-04	1.9054
0.00000E+00	0.0000				
132	0.0007	5.34048E-04	2.2728	3.27494E-04	2.0957
0.00000E+00	0.0000				
133	0.0014	1.03705E-03	1.9221	6.55551E-04	1.8288
0.00000E+00	0.0000				
134	0.0001	9.50581E-05	2.3683	2.45714E-04	2.0110
0.00000E+00	0.0000				
135	0.0002	1.71429E-04	3.3193	2.54384E-04	3.2309
0.00000E+00	0.0000				
136	0.0001	4.58038E-05	2.1125	7.10807E-04	2.0801
0.00000E+00	0.0000				
137	0.0000	1.98103E-05	0.8525	3.56438E-03	0.8504
0.00000E+00	0.0000				
138	0.0004	3.12401E-04	2.0659	8.13814E-04	2.0342
0.00000E+00	0.0000				
139	0.0002	1.82740E-04	3.1038	2.24281E-04	2.9143
0.00000E+00	0.0000				
140	0.0003	2.14616E-04	2.3313	2.84920E-04	2.0427
0.00000E+00	0.0000				
141	0.0001	8.39661E-05	2.6281	2.63542E-04	2.3539
0.00000E+00	0.0000				
142	0.0001	6.54099E-05	3.0353	2.26065E-04	2.7726
0.00000E+00	0.0000				
143	0.0001	8.29939E-05	2.1835	1.76864E-04	1.3436
0.00000E+00	0.0000				
144	0.0000	3.31657E-05	3.7004	7.31108E-05	2.2234
0.00000E+00	0.0000				
145	0.0005	4.02207E-04	2.6170	3.14082E-04	2.3929
0.00000E+00	0.0000				
146	0.0005	3.47730E-04	2.5607	2.53686E-04	2.0791
0.00000E+00	0.0000				
147	0.0002	1.68602E-04	4.6345	1.08519E-04	4.0006
0.00000E+00	0.0000				
148	0.0001	5.84362E-05	5.5943	3.91304E-05	4.4772
0.00000E+00	0.0000				
149	0.0000	2.81142E-05	9.7437	1.98920E-05	7.3798
0.00000E+00	0.0000				
150	0.0001	8.63064E-05	4.3300	6.27253E-05	3.2413
0.00000E+00	0.0000				
151	0.0001	6.89655E-05	4.8736	5.79115E-05	3.3847
0.00000E+00	0.0000				
152	0.0001	4.13698E-05	4.7838	4.70304E-05	2.9220
0.00000E+00	0.0000				
153	0.0001	4.19096E-05	4.6605	4.72158E-05	2.7169
0.00000E+00	0.0000				
154	0.0001	4.94827E-05	4.3625	5.09591E-05	2.6583
0.00000E+00	0.0000				
155	0.0001	4.91878E-05	5.3751	4.92277E-05	3.2349
0.00000E+00	0.0000				

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  156    0.0001                 4.92462E-05     5.0696
4.77295E-05     3.1384       0.00000E+00     0.0000
  157    0.0001                 6.01304E-05     3.4851
5.78861E-05     2.1810       0.00000E+00     0.0000
  158    0.0001                 6.60431E-05     4.1819
6.74126E-05     2.7103       0.00000E+00     0.0000
  159    0.0002                 1.53375E-04     2.9192
2.12299E-04     2.4612       0.00000E+00     0.0000
  160    0.0001                 6.37689E-05     4.4644
7.51798E-05     3.4301       0.00000E+00     0.0000
  161    0.0001                 7.56240E-05     3.7947
7.38273E-05     2.4469       0.00000E+00     0.0000
  162    0.0001                 8.90555E-05     4.0073
8.30829E-05     2.4929       0.00000E+00     0.0000
  163    0.0001                 9.48133E-05     3.4203
8.74437E-05     2.1512       0.00000E+00     0.0000
  164    0.0001                 1.00816E-04     3.6749
9.38785E-05     2.2364       0.00000E+00     0.0000
  165    0.0001                 1.14638E-04     3.5640
1.04945E-04     2.2476       0.00000E+00     0.0000
  166    0.0001                 7.12443E-05     3.6911
6.52615E-05     2.3712       0.00000E+00     0.0000
  167    0.0001                 7.49670E-05     3.7233
6.90464E-05     2.3251       0.00000E+00     0.0000
  168    0.0001                 8.96188E-05     3.6128
7.91496E-05     2.4260       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                 1.06566E-04     4.2423
9.31677E-05     2.9709       0.00000E+00     0.0000
  170    0.0002                 1.41635E-04     3.4341
1.19210E-04     2.5902       0.00000E+00     0.0000
  171    0.0001                 9.90677E-05     4.6881
7.61723E-05     3.7621       0.00000E+00     0.0000
  172    0.0002                 1.47601E-04     4.8274
1.03777E-04     4.1068       0.00000E+00     0.0000
  173    0.0003                 1.97627E-04     3.8600
1.29969E-04     3.3798       0.00000E+00     0.0000
  174    0.0003                 2.55317E-04     4.3497
1.58561E-04     3.9113       0.00000E+00     0.0000
  175    0.0002                 1.16692E-04     5.7887
7.01519E-05     5.1958       0.00000E+00     0.0000
  176    0.0002                 1.25137E-04     5.6675
7.43574E-05     5.1347       0.00000E+00     0.0000
  177    0.0001                 1.06368E-04     6.7722
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6.33003E-05	6.0209	0.00000E+00	0.0000	178	0.0002	1.16621E-04	5.8568
6.82672E-05	5.2707	0.00000E+00	0.0000	179	0.0002	1.18695E-04	5.8427
6.90360E-05	5.2445	0.00000E+00	0.0000	180	0.0002	1.27969E-04	5.3204
7.33669E-05	4.7957	0.00000E+00	0.0000	181	0.0002	1.22872E-04	4.9639
7.02907E-05	4.4393	0.00000E+00	0.0000	182	0.0001	1.00958E-04	5.6709
5.91402E-05	4.9098	0.00000E+00	0.0000	183	0.0001	8.87627E-05	7.0138
5.24265E-05	6.0450	0.00000E+00	0.0000	184	0.0001	8.83322E-05	5.7681
5.20975E-05	4.9124	0.00000E+00	0.0000	185	0.0001	9.89186E-05	5.6533
5.71730E-05	4.8567	0.00000E+00	0.0000	186	0.0001	8.86785E-05	7.0591
5.21345E-05	5.9811	0.00000E+00	0.0000	187	0.0001	9.93776E-05	6.4775
5.71958E-05	5.5432	0.00000E+00	0.0000	188	0.0001	9.04159E-05	5.6728
5.30235E-05	4.7958	0.00000E+00	0.0000	189	0.0001	8.26994E-05	6.1507
4.89009E-05	5.1025	0.00000E+00	0.0000	190	0.0003	2.16068E-04	3.8556
1.27713E-04	3.1816	0.00000E+00	0.0000	191	0.0003	2.01887E-04	4.3607
1.21213E-04	3.5505	0.00000E+00	0.0000	192	0.0003	1.98587E-04	4.0291
1.19796E-04	3.2688	0.00000E+00	0.0000	193	0.0003	2.15082E-04	3.7061
1.28900E-04	3.0365	0.00000E+00	0.0000	194	0.0005	4.11116E-04	2.4134
2.52193E-04	1.9116	0.00000E+00	0.0000	195	0.0005	4.18555E-04	2.8148
2.59432E-04	2.2067	0.00000E+00	0.0000	196	0.0006	4.62952E-04	2.5777
2.87397E-04	2.0394	0.00000E+00	0.0000	197	0.0007	5.08511E-04	2.8009
3.16737E-04	2.2034	0.00000E+00	0.0000	198	0.0008	5.84049E-04	2.5282
3.61106E-04	1.9934	0.00000E+00	0.0000	199	0.0004	3.21365E-04	3.3584
1.98300E-04	2.6343	0.00000E+00	0.0000	200	0.0005	3.78026E-04	3.0741
2.29653E-04	2.4676	0.00000E+00	0.0000	201	0.0010	7.84608E-04	2.3227
4.81728E-04	1.8555	0.00000E+00	0.0000	202	0.0013	9.89302E-04	1.7999
5.99514E-04	1.4495	0.00000E+00	0.0000	203	0.0016	1.21594E-03	1.7652

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7.27004E-04     1.4601       0.00000E+00     0.0000
  204    0.0022                 1.66428E-03     1.6940
9.79093E-04     1.4181       0.00000E+00     0.0000
  205    0.0015                 1.11882E-03     2.2448
6.56978E-04     1.8804       0.00000E+00     0.0000
  206    0.0018                 1.41241E-03     1.9048
8.21634E-04     1.6294       0.00000E+00     0.0000
  207    0.0021                 1.63957E-03     1.6658
9.53823E-04     1.4537       0.00000E+00     0.0000
  208    0.0028                 2.14371E-03     1.5422
1.25267E-03     1.3579       0.00000E+00     0.0000
  209    0.0031                 2.39477E-03     1.5174
1.40836E-03     1.3431       0.00000E+00     0.0000
  210    0.0037                 2.84365E-03     1.4026
1.69576E-03     1.2416       0.00000E+00     0.0000
  211    0.0041                 3.14646E-03     1.1732
1.89370E-03     1.0240       0.00000E+00     0.0000
  212    0.0048                 3.65553E-03     1.1442
2.21009E-03     0.9714       0.00000E+00     0.0000
  213    0.0065                 4.96187E-03     0.9061
3.00562E-03     0.7675       0.00000E+00     0.0000
  214    0.0094                 7.21542E-03     0.6815
4.36161E-03     0.5717       0.00000E+00     0.0000
  215    0.0157                 1.20013E-02     0.6187
7.16782E-03     0.5263       0.00000E+00     0.0000
  216    0.0300                 2.29526E-02     0.4417
1.35439E-02     0.3765       0.00000E+00     0.0000
  217    0.0201                 1.54127E-02     0.5446
9.06136E-03     0.4572       0.00000E+00     0.0000
  218    0.0278                 2.12832E-02     0.4773
1.24484E-02     0.4021       0.00000E+00     0.0000
  219    0.0356                 2.72744E-02     0.4350
1.59126E-02     0.3630       0.00000E+00     0.0000
  220    0.0474                 3.63395E-02     0.3553
2.11122E-02     0.3055       0.00000E+00     0.0000
  221    0.0626                 4.79553E-02     0.2773
2.77960E-02     0.2372       0.00000E+00     0.0000
  222    0.0799                 6.11736E-02     0.2887
3.54509E-02     0.2480       0.00000E+00     0.0000
  223    0.1049                 8.03623E-02     0.2360
4.65711E-02     0.2030       0.00000E+00     0.0000
  224    0.0585                 4.48047E-02     0.3201
2.60730E-02     0.2777       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
```

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  225    0.2302                 1.76313E-01     0.1618
1.04413E-01     0.1383       0.00000E+00     0.0000
  226    0.0454                 3.47899E-02     0.3724
2.11676E-02     0.3080       0.00000E+00     0.0000
  227    0.0493                 3.77452E-02     0.3872
2.33874E-02     0.3152       0.00000E+00     0.0000
  228    0.0209                 1.60211E-02     0.5436
1.01312E-02     0.4376       0.00000E+00     0.0000
  229    0.0221                 1.69019E-02     0.4966
1.08807E-02     0.3901       0.00000E+00     0.0000
  230    0.0119                 9.08130E-03     0.8216
5.91333E-03     0.6448       0.00000E+00     0.0000
  231    0.0122                 9.36500E-03     0.7986
6.22651E-03     0.6136       0.00000E+00     0.0000
  232    0.0130                 9.95571E-03     0.7782
6.77154E-03     0.5765       0.00000E+00     0.0000
  233    0.0082                 6.29242E-03     0.8704
4.43051E-03     0.5993       0.00000E+00     0.0000
  234    0.0059                 4.50616E-03     1.2727
3.25738E-03     0.8925       0.00000E+00     0.0000
  235    0.0025                 1.91440E-03     1.5833
1.25815E-03     1.2281       0.00000E+00     0.0000
  236    0.0019                 1.43259E-03     2.0671
9.70027E-04     1.5404       0.00000E+00     0.0000
  237    0.0017                 1.29500E-03     2.0979
9.22769E-04     1.4998       0.00000E+00     0.0000
  238    0.0001                 7.28626E-05     8.2038
6.22924E-05     4.9582       0.00000E+00     0.0000

 system total =                 7.66032E-01     0.0525
4.68941E-01     0.0452       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3111E-01  +
or -  0.0002



 elapsed time   3.09017 minutes

 random number=   BECBA3DC4F82690C
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                             unit  region   density
```

deviation fissions

1 1 3.090E-03
0.05 7.660E-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	1.683E-08	25.24	1.335E-08	25.69	1.294E-08	26.90
3	9.556E-07	4.22	7.924E-07	3.89	8.466E-07	4.00
4	1.381E-06	3.11	1.144E-06	2.75	1.221E-06	2.86
5	2.247E-06	2.57	1.827E-06	2.23	1.972E-06	2.33
6	9.557E-06	1.30	7.664E-06	1.12	8.184E-06	1.14
7	1.258E-05	1.32	9.478E-06	1.07	1.002E-05	1.05
8	3.061E-05	0.75	2.250E-05	0.67	2.362E-05	0.69
9	8.252E-05	0.48	5.893E-05	0.43	6.149E-05	0.45
10	4.641E-05	0.66	3.294E-05	0.52	3.435E-05	0.53
11	2.193E-04	0.28	1.551E-04	0.25	1.607E-04	0.24
12	1.897E-04	0.25	1.379E-04	0.22	1.445E-04	0.24
13	5.660E-05	0.59	4.128E-05	0.50	4.331E-05	0.47
14	2.529E-04	0.24	1.835E-04	0.21	1.913E-04	0.21
15	2.206E-04	0.27	1.600E-04	0.23	1.668E-04	0.22
16	7.102E-05	0.44	5.154E-05	0.37	5.384E-05	0.36
17	3.213E-05	0.61	2.353E-05	0.58	2.448E-05	0.56
18	2.835E-05	0.82	2.039E-05	0.64	2.104E-05	0.55
19	5.015E-05	0.46	3.667E-05	0.39	3.826E-05	0.41
20	3.953E-05	0.60	2.893E-05	0.52	3.024E-05	0.48
21	8.065E-05	0.43	5.897E-05	0.33	6.168E-05	0.33
22	7.330E-05	0.42	5.352E-05	0.34	5.545E-05	0.36
23	7.679E-05	0.43	5.647E-05	0.36	5.853E-05	0.33
24	1.846E-05	0.87	1.369E-05	0.83	1.439E-05	0.75
25	2.326E-05	0.70	1.716E-05	0.61	1.804E-05	0.53
26	1.345E-05	0.91	9.850E-06	0.74	1.036E-05	0.73
27	4.198E-05	0.53	3.110E-05	0.52	3.300E-05	0.49
28	7.730E-05	0.42	5.749E-05	0.32	6.076E-05	0.34
29	7.947E-05	0.36	5.942E-05	0.32	6.213E-05	0.32
30	1.004E-05	1.17	7.498E-06	0.95	7.868E-06	0.92
31	7.858E-05	0.42	5.911E-05	0.34	6.214E-05	0.31
32	3.130E-05	0.55	2.332E-05	0.49	2.461E-05	0.48

33	2.706E-05	0.69	2.028E-05	0.64	2.140E-05	0.62
34	6.112E-05	0.46	4.637E-05	0.39	4.881E-05	0.36
35	3.631E-05	0.49	2.746E-05	0.46	2.884E-05	0.44
36	3.401E-05	0.53	2.558E-05	0.46	2.668E-05	0.42
37	2.193E-05	0.69	1.653E-05	0.51	1.725E-05	0.47
38	2.594E-05	0.65	1.971E-05	0.59	2.081E-05	0.48
39	9.716E-05	0.37	7.439E-05	0.32	7.857E-05	0.27
40	9.018E-05	0.33	6.943E-05	0.28	7.407E-05	0.24
41	1.132E-04	0.30	8.846E-05	0.25	9.443E-05	0.24
42	9.372E-05	0.30	7.407E-05	0.26	7.947E-05	0.24
43	5.104E-05	0.41	4.072E-05	0.35	4.270E-05	0.32
44	6.967E-05	0.36	5.589E-05	0.34	6.011E-05	0.29
45	3.523E-05	0.42	2.800E-05	0.36	3.113E-05	0.30
46	8.455E-06	0.80	6.702E-06	0.74	7.262E-06	0.72
47	2.374E-05	0.57	1.885E-05	0.51	1.963E-05	0.40
48	6.738E-06	1.06	5.388E-06	0.97	5.692E-06	0.84
49	4.414E-05	0.46	3.525E-05	0.40	3.791E-05	0.33
50	2.954E-05	0.45	2.375E-05	0.42	2.577E-05	0.36
51	7.922E-06	0.91	6.346E-06	0.80	6.906E-06	0.71
52	2.097E-05	0.51	1.685E-05	0.45	1.831E-05	0.43
53	7.640E-05	0.32	6.168E-05	0.28	6.679E-05	0.23
54	3.378E-05	0.45	2.724E-05	0.41	2.945E-05	0.34
55	6.648E-05	0.35	5.409E-05	0.29	5.899E-05	0.24
56	4.368E-05	0.35	3.552E-05	0.28	3.870E-05	0.26
57	4.919E-05	0.39	4.013E-05	0.33	4.373E-05	0.29
58	2.587E-05	0.50	2.112E-05	0.45	2.299E-05	0.37
59	4.407E-05	0.35	3.610E-05	0.33	3.936E-05	0.26
60	6.440E-05	0.36	5.267E-05	0.29	5.713E-05	0.25
61	6.206E-06	1.07	5.084E-06	0.82	5.500E-06	0.70
62	3.246E-05	0.41	2.655E-05	0.37	2.889E-05	0.33
63	2.180E-05	0.54	1.785E-05	0.47	1.933E-05	0.38
64	1.719E-05	0.67	1.407E-05	0.55	1.532E-05	0.44
65	5.733E-06	0.98	4.693E-06	0.85	5.128E-06	0.72
66	2.865E-05	0.43	2.360E-05	0.39	2.564E-05	0.29
67	2.118E-05	0.51	1.746E-05	0.45	1.896E-05	0.40
68	4.683E-06	1.10	3.837E-06	0.92	4.145E-06	0.76
69	3.730E-05	0.40	3.078E-05	0.33	3.339E-05	0.31
70	2.647E-05	0.48	2.184E-05	0.44	2.376E-05	0.36
71	4.580E-05	0.35	3.768E-05	0.33	4.102E-05	0.27
72	2.614E-06	1.41	2.143E-06	1.33	2.355E-06	0.92
73	2.718E-05	0.37	2.246E-05	0.37	2.428E-05	0.27
74	7.957E-05	0.28	6.601E-05	0.25	7.148E-05	0.22
75	9.142E-06	0.81	7.555E-06	0.69	8.183E-06	0.60
76	2.283E-05	0.47	1.896E-05	0.39	2.055E-05	0.36
77	1.776E-05	0.55	1.471E-05	0.48	1.602E-05	0.41
78	1.502E-06	1.77	1.291E-06	2.03	1.388E-06	1.19
79	9.925E-06	0.67	8.210E-06	0.57	8.873E-06	0.48
80	4.578E-06	1.09	3.839E-06	1.00	4.132E-06	0.78
81	5.548E-05	0.34	4.609E-05	0.29	4.989E-05	0.25
82	3.256E-06	1.33	2.731E-06	1.11	2.953E-06	0.95
83	4.452E-06	0.91	3.734E-06	0.80	4.057E-06	0.69
84	8.270E-06	0.83	6.870E-06	0.68	7.379E-06	0.55

85	9.980E-06	0.68	8.348E-06	0.64	9.010E-06	0.50
86	1.350E-05	0.59	1.127E-05	0.51	1.223E-05	0.42
87	1.194E-05	0.77	1.002E-05	0.72	1.077E-05	0.55
88	3.170E-06	1.26	2.639E-06	1.08	2.852E-06	0.95
89	6.584E-06	0.95	5.485E-06	0.86	5.941E-06	0.69
90	6.874E-06	0.91	5.714E-06	0.73	6.245E-06	0.58
91	8.208E-06	0.70	6.866E-06	0.63	7.438E-06	0.54
92	4.737E-06	0.97	3.971E-06	0.86	4.338E-06	0.66
93	8.167E-06	0.75	6.776E-06	0.72	7.356E-06	0.64
94	4.186E-06	1.15	3.512E-06	1.03	3.822E-06	0.84
95	1.252E-05	0.65	1.049E-05	0.57	1.135E-05	0.47
96	3.321E-06	1.29	2.799E-06	1.14	3.017E-06	0.79
97	3.365E-06	1.08	2.805E-06	0.93	3.086E-06	0.87
98	3.586E-06	1.45	2.983E-06	1.30	3.191E-06	0.89
99	2.285E-06	1.59	1.948E-06	1.53	2.088E-06	1.19
100	3.448E-06	1.10	2.880E-06	1.05	3.077E-06	0.83
101	4.964E-06	1.03	4.133E-06	0.99	4.485E-06	0.74
102	3.359E-06	1.06	2.811E-06	0.90	3.067E-06	0.76
103	4.654E-06	1.02	3.875E-06	0.96	4.186E-06	0.78
104	4.244E-06	1.04	3.516E-06	0.87	3.817E-06	0.71
105	4.356E-06	1.09	3.627E-06	0.91	3.953E-06	0.73
106	1.586E-06	1.79	1.311E-06	1.57	1.440E-06	1.19
107	3.637E-06	1.22	3.070E-06	1.11	3.292E-06	0.83
108	3.247E-06	1.17	2.774E-06	1.05	2.981E-06	0.85
109	5.162E-06	0.90	4.335E-06	0.89	4.681E-06	0.64
110	3.067E-06	1.36	2.587E-06	1.21	2.812E-06	0.95
111	3.023E-06	1.20	2.531E-06	1.05	2.780E-06	0.85
112	1.782E-06	1.64	1.543E-06	1.37	1.664E-06	1.11
113	5.811E-06	0.96	4.898E-06	0.82	5.238E-06	0.63
114	1.983E-06	1.57	1.668E-06	1.38	1.811E-06	1.16
115	5.074E-06	1.07	4.241E-06	0.90	4.607E-06	0.66
116	1.083E-05	0.67	9.067E-06	0.60	9.768E-06	0.52
117	1.199E-05	0.60	1.000E-05	0.54	1.079E-05	0.43
118	1.278E-05	0.59	1.080E-05	0.56	1.169E-05	0.46
119	8.199E-06	0.81	6.964E-06	0.74	7.584E-06	0.58
120	5.742E-06	0.90	4.882E-06	0.82	5.309E-06	0.69
121	6.101E-06	0.91	5.116E-06	0.70	5.559E-06	0.62
122	3.187E-06	1.29	2.694E-06	1.22	2.888E-06	0.97
123	1.032E-05	0.63	8.617E-06	0.59	9.362E-06	0.49
124	7.387E-06	0.85	6.238E-06	0.76	6.683E-06	0.64
125	6.932E-06	0.95	5.865E-06	0.88	6.311E-06	0.62
126	5.785E-06	0.91	4.903E-06	0.81	5.249E-06	0.63
127	5.587E-06	0.94	4.686E-06	0.83	5.075E-06	0.69
128	7.694E-06	0.92	6.473E-06	0.72	7.008E-06	0.59
129	9.634E-06	0.71	8.131E-06	0.64	8.813E-06	0.49
130	3.935E-06	1.01	3.348E-06	0.93	3.653E-06	0.78
131	1.692E-05	0.49	1.425E-05	0.48	1.538E-05	0.38
132	1.122E-05	0.64	9.455E-06	0.60	1.019E-05	0.43
133	1.362E-05	0.60	1.151E-05	0.51	1.246E-05	0.44
134	1.484E-05	0.53	1.244E-05	0.49	1.346E-05	0.38
135	2.340E-06	1.35	2.018E-06	1.18	2.194E-06	0.97
136	3.898E-06	1.00	3.339E-06	1.01	3.718E-06	0.81

137	2.560E-06	0.97	2.662E-06	0.92	2.989E-06	0.61
138	4.093E-06	1.00	3.559E-06	0.82	3.862E-06	0.70
139	4.592E-06	1.17	3.921E-06	1.05	4.237E-06	0.76
140	1.206E-05	0.62	1.022E-05	0.61	1.104E-05	0.50
141	8.818E-06	0.75	7.460E-06	0.69	8.045E-06	0.51
142	5.819E-06	0.89	4.927E-06	0.77	5.301E-06	0.65
143	2.008E-05	0.49	1.692E-05	0.42	1.815E-05	0.34
144	8.109E-06	0.81	6.839E-06	0.65	7.373E-06	0.53
145	7.255E-06	0.70	6.160E-06	0.62	6.604E-06	0.52
146	1.208E-05	0.65	1.020E-05	0.54	1.094E-05	0.43
147	3.702E-06	1.19	3.119E-06	0.81	3.371E-06	0.77
148	1.887E-06	1.57	1.599E-06	1.54	1.703E-06	1.12
149	1.165E-06	1.77	9.945E-07	1.45	1.051E-06	1.16
150	3.882E-06	1.08	3.284E-06	0.91	3.575E-06	0.72
151	4.190E-06	0.99	3.524E-06	0.91	3.839E-06	0.80
152	4.391E-06	1.03	3.680E-06	0.94	3.944E-06	0.72
153	4.538E-06	1.27	3.801E-06	0.93	4.104E-06	0.73
154	4.647E-06	1.11	3.926E-06	0.93	4.189E-06	0.77
155	4.368E-06	1.10	3.670E-06	1.00	3.996E-06	0.80
156	4.034E-06	1.17	3.358E-06	1.09	3.647E-06	0.85
157	4.687E-06	0.91	3.922E-06	0.87	4.275E-06	0.70
158	4.824E-06	0.90	4.087E-06	0.90	4.375E-06	0.64
159	6.759E-06	0.82	5.704E-06	0.79	6.143E-06	0.63
160	3.503E-06	1.00	2.957E-06	0.88	3.187E-06	0.72
161	4.952E-06	1.00	4.138E-06	0.91	4.492E-06	0.78
162	5.885E-06	0.88	4.908E-06	0.72	5.322E-06	0.60
163	6.152E-06	0.95	5.209E-06	0.86	5.590E-06	0.67
164	6.564E-06	0.71	5.507E-06	0.72	5.908E-06	0.64
165	6.828E-06	0.84	5.778E-06	0.73	6.258E-06	0.62
166	4.057E-06	1.00	3.430E-06	0.98	3.693E-06	0.73
167	4.127E-06	1.09	3.530E-06	0.86	3.790E-06	0.75
168	4.326E-06	1.39	3.609E-06	1.04	3.908E-06	0.82
169	4.523E-06	1.10	3.764E-06	1.00	4.071E-06	0.84
170	4.571E-06	1.07	3.883E-06	0.99	4.156E-06	0.81
171	2.413E-06	1.38	2.022E-06	1.13	2.176E-06	0.90
172	2.399E-06	1.37	2.043E-06	1.25	2.217E-06	1.02
173	2.485E-06	1.36	2.109E-06	1.13	2.287E-06	1.09
174	2.501E-06	1.42	2.139E-06	1.29	2.321E-06	1.03
175	9.929E-07	1.79	8.530E-07	1.91	9.236E-07	1.44
176	1.038E-06	1.96	8.768E-07	1.65	9.563E-07	1.41
177	1.026E-06	2.29	8.575E-07	1.93	9.245E-07	1.38
178	1.032E-06	1.81	8.786E-07	1.53	9.472E-07	1.35
179	1.054E-06	1.97	8.785E-07	1.87	9.816E-07	1.52
180	1.083E-06	2.24	9.228E-07	1.87	9.907E-07	1.47
181	1.075E-06	1.86	9.131E-07	1.73	9.827E-07	1.35
182	1.077E-06	1.82	9.191E-07	1.78	9.998E-07	1.50
183	1.055E-06	2.04	9.133E-07	1.96	9.765E-07	1.45
184	1.112E-06	1.88	9.380E-07	1.69	1.002E-06	1.40
185	1.097E-06	2.11	9.169E-07	1.85	9.997E-07	1.32
186	1.105E-06	2.11	9.535E-07	1.75	1.034E-06	1.49
187	1.139E-06	1.76	9.748E-07	1.73	1.045E-06	1.39
188	1.172E-06	1.91	9.867E-07	1.46	1.056E-06	1.34

189	1.132E-06	1.79	9.575E-07	1.61	1.066E-06	1.31
190	3.034E-06	1.12	2.534E-06	1.11	2.751E-06	0.86
191	3.018E-06	1.05	2.575E-06	0.98	2.807E-06	0.76
192	3.102E-06	1.27	2.640E-06	1.10	2.844E-06	0.85
193	3.248E-06	1.24	2.763E-06	1.04	2.965E-06	0.87
194	6.869E-06	0.83	5.796E-06	0.67	6.272E-06	0.54
195	7.250E-06	0.77	6.122E-06	0.64	6.627E-06	0.55
196	7.677E-06	0.79	6.488E-06	0.75	7.065E-06	0.57
197	8.538E-06	0.76	7.158E-06	0.67	7.683E-06	0.50
198	9.030E-06	0.77	7.657E-06	0.67	8.239E-06	0.53
199	4.829E-06	1.03	4.055E-06	0.88	4.392E-06	0.75
200	5.154E-06	1.05	4.326E-06	0.93	4.694E-06	0.69
201	1.067E-05	0.69	8.985E-06	0.60	9.771E-06	0.52
202	1.193E-05	0.62	1.012E-05	0.56	1.097E-05	0.46
203	1.301E-05	0.63	1.096E-05	0.54	1.183E-05	0.47
204	1.472E-05	0.56	1.248E-05	0.48	1.351E-05	0.40
205	8.624E-06	0.77	7.676E-06	0.61	8.118E-06	0.48
206	9.432E-06	0.65	8.452E-06	0.57	8.923E-06	0.44
207	9.561E-06	0.68	8.619E-06	0.55	9.128E-06	0.46
208	1.120E-05	0.62	1.015E-05	0.56	1.083E-05	0.44
209	1.165E-05	0.58	1.057E-05	0.54	1.119E-05	0.41
210	1.416E-05	0.50	1.278E-05	0.46	1.359E-05	0.39
211	1.615E-05	0.44	1.457E-05	0.39	1.552E-05	0.32
212	1.917E-05	0.44	1.733E-05	0.37	1.850E-05	0.30
213	2.628E-05	0.40	2.366E-05	0.37	2.524E-05	0.27
214	3.686E-05	0.35	3.312E-05	0.28	3.564E-05	0.23
215	5.545E-05	0.27	4.995E-05	0.26	5.387E-05	0.22
216	9.224E-05	0.21	8.386E-05	0.18	9.070E-05	0.15
217	5.530E-05	0.22	5.287E-05	0.21	5.620E-05	0.17
218	7.059E-05	0.17	6.767E-05	0.18	7.219E-05	0.15
219	8.388E-05	0.21	8.110E-05	0.17	8.643E-05	0.14
220	1.013E-04	0.18	9.874E-05	0.16	1.053E-04	0.13
221	1.202E-04	0.16	1.185E-04	0.14	1.263E-04	0.13
222	1.366E-04	0.15	1.367E-04	0.14	1.455E-04	0.12
223	1.534E-04	0.14	1.573E-04	0.13	1.673E-04	0.11
224	7.492E-05	0.22	7.963E-05	0.19	8.431E-05	0.14
225	2.331E-04	0.13	2.720E-04	0.11	2.819E-04	0.10
226	3.176E-05	0.25	4.471E-05	0.21	4.441E-05	0.13
227	2.882E-05	0.25	4.635E-05	0.18	4.439E-05	0.13
228	1.042E-05	0.38	1.898E-05	0.30	1.750E-05	0.17
229	9.647E-06	0.39	1.955E-05	0.31	1.743E-05	0.18
230	4.527E-06	0.61	1.012E-05	0.43	8.683E-06	0.22
231	4.223E-06	0.57	1.053E-05	0.40	8.723E-06	0.24
232	3.948E-06	0.62	1.134E-05	0.39	8.860E-06	0.22
233	2.228E-06	0.76	7.437E-06	0.52	5.493E-06	0.29
234	1.427E-06	0.81	5.284E-06	0.73	3.812E-06	0.33
235	5.285E-07	1.53	1.057E-06	1.03	1.117E-06	0.59
236	3.564E-07	1.58	7.448E-07	1.22	8.073E-07	0.53
237	2.204E-07	1.94	5.475E-07	1.50	6.125E-07	0.54
238	5.752E-09	9.73	2.532E-08	7.19	2.594E-08	2.13

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
 0.7533 to 0.7561     **
 0.7561 to 0.7590     ****
 0.7590 to 0.7618     ********
 0.7618 to 0.7646     ******************
 0.7646 to 0.7674     ********************************
 0.7674 to 0.7703     ********************
 0.7703 to 0.7731     *************
 0.7731 to 0.7759     **

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7533 to 0.7561     **
 0.7561 to 0.7590     ***
```

```
 0.7590 to 0.7618     ******
 0.7618 to 0.7646     ************
 0.7646 to 0.7674     *************************
 0.7674 to 0.7703     ***************
 0.7703 to 0.7731     ***********
 0.7731 to 0.7759     *

                                 frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7533 to 0.7561     *
 0.7561 to 0.7590     *
 0.7590 to 0.7618     *****
 0.7618 to 0.7646     *******
 0.7646 to 0.7674     ****************
 0.7674 to 0.7703     ***********
 0.7703 to 0.7731     ********
 0.7731 to 0.7759     *

                                 frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7533 to 0.7561
 0.7561 to 0.7590
 0.7590 to 0.7618     *****
 0.7618 to 0.7646     ****
 0.7646 to 0.7674     *******
 0.7674 to 0.7703     *****
 0.7703 to 0.7731     ****
 0.7731 to 0.7759

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76603 + or - 0.00046                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
```

```
5.68293E-02 + or -  1.26773E-04           ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.77332E-06           ***
        ***
***
        ***        system mean free path (cm)
6.53068E-01 + or -  1.73620E-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     3.09333 minutes


*********************************************************************
*************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII


   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
```

22 // 1111 66
00 00 99 99 // 22
22 // 11 66
00 00 99 99 // 22
22 // 11 66
00 00 9999999999999 // 22
22 // 11 666666666666
00 00 999999999999 // 22
22 // 11 6666666666666
00 00 99 // 22
22 // 11 66 66
00 00 99 // 22
22 // 11 66 66
00 00 99 // 22 22
// 11 66 66
000000000 9999999999999 // 2222222222222
2222222222222 // 11111111 6666666666666
0000000 999999999999 // 2222222222222
2222222222222 // 11111111 66666666666

0000000 5555555555555 11
7777777777777 44 5555555555555
000000000 5555555555555 111
777777777777 444 5555555555555
00 00 55 ::: 1111 77
77 ::: 4444 55
00 00 55 ::: 11
77 ::: 44 44 55
00 00 55 ::: 11
77 ::: 44 44 55
00 00 555555555555 11
77 44 44 555555555555
00 00 5555555555555 11
77 44 44 5555555555555
00 00 55 ::: 11
77 ::: 444444444444 55
00 00 55 ::: 11
77 ::: 4444444444444 55
00 00 55 55 ::: 11
77 ::: 44 55 55
000000000 5555555555555 11111111
77 44 5555555555555
0000000 55555555555 11111111
77 44 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
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
```

```
*********************************************************************
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*********************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:17:45.73
*****
        *****
*****
        *****
*****

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

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*********************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number                data set name
name        unit function                      ***
        ***         ------                -------------
----        -------------                      ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
```

```
data                   ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                  ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  9.46451E-14  2.85527E-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  2.64268E-16  8.70897E-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
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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  1.15519E-12  2.86712E-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  1.07024E-08  2.91229E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.63700E-08  4.50349E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.15585E-11  3.21446E-10   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.65924E-08  4.66408E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  1.38455E-11  3.93345E-10   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.68408E-09  7.70572E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.83272E-20  5.09686E-19   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  2.91728E-13  8.28775E-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  6.79512E-09  1.97110E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.71824E-08  5.03562E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  8.07283E-12  2.39011E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.87708E-09  2.05667E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  4.13681E-12  1.22476E-10   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.14139E-11  3.44755E-10   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.98941E-12  2.74212E-10   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  6.18362E-12  1.90479E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  4.23698E-12  1.31782E-10   44104   103.9054     ru104 4449
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endf/b7 rel0 rev7 mod1                12/17/09
    1044106  8.57275E-13  2.71774E-11   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  2.14940E-13  6.62091E-12   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  9.28635E-13  2.91612E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.04540E-12  3.28276E-11   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.43457E-13  1.09909E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.19178E-13  3.84942E-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  5.43277E-14  1.77105E-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  8.98586E-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  1.29235E-09  4.29033E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43629E-09  8.16079E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23381E-09  4.16985E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90075E-09  9.89026E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56253E-10  2.62379E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.01280E-14  3.48354E-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  6.50137E-11  2.23614E-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  1.46856E-09  5.13900E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63126E-09  1.63448E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64257E-09  5.84628E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22982E-09  2.23596E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85360E-10  3.23071E-08   50122   121.9034     sn122 5055
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endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10719E-09  4.10653E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.18726E-13  4.47467E-12   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  6.63860E-14  2.52183E-12   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.07168E-12  4.13520E-11   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30253E-12  5.26008E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  9.61524E-13  3.76772E-11   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  8.15051E-12  3.24258E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88524E-12  7.61315E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.82279E-12  7.25171E-11   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.59449E-17  6.39125E-16   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.05828E-11  4.27359E-10   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.31570E-11  5.39191E-10   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29360E-08  1.35961E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  1.17544E-11  4.92279E-10   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.36289E-11  5.66691E-10   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.18581E-11  5.00166E-10   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.24637E-11  5.29445E-10   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  5.65274E-12  2.41819E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  1.15018E-11  4.95482E-10   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  4.83154E-13  2.03790E-11   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.94266E-12  2.96998E-10   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  5.51518E-13  2.35930E-11   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  5.58447E-14  2.40566E-12   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  7.59439E-12  3.29428E-10   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.84049E-12  2.98774E-10   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  4.37496E-12  1.92400E-10   60147   146.9161     nd147 6040
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endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.54441E-12  1.56936E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  5.74897E-13  2.52824E-11   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  2.04893E-20  9.07213E-19   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.28917E-12  5.74674E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.65133E-16  2.48530E-14   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  9.43771E-13  4.20701E-11   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  6.51559E-17  2.92393E-15   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.00842E-09  1.35909E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.77897E-13  2.62800E-11   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  1.80646E-13  8.26912E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.42855E-09  6.45361E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.55931E-09  7.13775E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.40335E-16  6.46593E-15   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  7.39861E-14  3.43105E-12   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  2.51940E-14  1.17591E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77457E-12  2.62601E-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  4.27270E-10  1.98143E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.90973E-10  2.75827E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51806E-10  2.12228E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17153E-10  3.39017E-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
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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  1.76388E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22551E-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  2.15296E-14  1.52768E-12   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.03768E-20  7.39419E-19   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  4.32768E-12  3.09677E-10   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  2.37408E-19  1.70594E-17   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.99470E-21  7.21192E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17028E-20  8.47956E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.00051E-20  7.21945E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  1.57067E-22  1.13807E-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  1.78645E-20  1.29442E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.99739E-21  7.27385E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.99581E-21  7.30266E-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
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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

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
```

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                                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

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                              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:
  9703 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       ........

                               ........     0.01400 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
0.01483 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 15799 independent fission points were generated for generation 1
          1       7.72110E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15569 independent fission points were generated for generation 2
          2       7.66099E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15635 independent fission points were generated for generation 3
          3       7.70147E-01      7.70147E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.69686E-01      7.69917E-01      2.30372E-04
0.00000E+00      0.00000E+00
          5       7.72153E-01      7.70662E-01      7.57169E-04
0.00000E+00      0.00000E+00
          6       7.63993E-01      7.68995E-01      1.75116E-03
0.00000E+00      0.00000E+00
          7       7.66125E-01      7.68421E-01      1.47291E-03
0.00000E+00      0.00000E+00
          8       7.70453E-01      7.68759E-01      1.24939E-03
0.00000E+00      0.00000E+00
          9       7.67118E-01      7.68525E-01      1.08164E-03
0.00000E+00      0.00000E+00
         10       7.64850E-01      7.68066E-01      1.04332E-03
0.00000E+00      0.00000E+00
         11       7.73170E-01      7.68633E-01      1.08086E-03
0.00000E+00      0.00000E+00
         12       7.72344E-01      7.69004E-01      1.03553E-03
0.00000E+00      0.00000E+00
         13       7.75381E-01      7.69584E-01      1.10159E-03
0.00000E+00      0.00000E+00
```

```
         14       7.66567E-01      7.69332E-01      1.03654E-03
0.00000E+00      0.00000E+00
         15       7.66400E-01      7.69107E-01      9.79798E-04
0.00000E+00      0.00000E+00
         16       7.68075E-01      7.69033E-01      9.10104E-04
0.00000E+00      0.00000E+00
         17       7.64444E-01      7.68727E-01      9.00796E-04
0.00000E+00      0.00000E+00
         18       7.65280E-01      7.68512E-01      8.69731E-04
0.00000E+00      0.00000E+00
         19       7.68402E-01      7.68505E-01      8.16995E-04
0.00000E+00      0.00000E+00
         20       7.63010E-01      7.68200E-01      8.28559E-04
0.00000E+00      0.00000E+00
         21       7.72981E-01      7.68452E-01      8.23146E-04
0.00000E+00      0.00000E+00
         22       7.62839E-01      7.68171E-01      8.29799E-04
0.00000E+00      0.00000E+00
         23       7.63889E-01      7.67967E-01      8.15212E-04
0.00000E+00      0.00000E+00
         24       7.76305E-01      7.68346E-01      8.64746E-04
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 19977 independent fission points were generated for generation 25
         25       7.52309E-01      7.67649E-01      1.08117E-03
0.00000E+00      0.00000E+00
         26       7.77157E-01      7.68045E-01      1.10837E-03
0.00000E+00      0.00000E+00
         27       7.62320E-01      7.67023E-01      2.32378E-02
0.00000E+00      0.00000E+00
         28       7.57209E-01      7.65060E-01      2.24167E-02
0.00000E+00      0.00000E+00
         29       7.68626E-01      7.65654E-01      1.29666E-02
0.00000E+00      0.00000E+00
         30       7.69139E-01      7.66152E-01      8.51088E-03
0.00000E+00      0.00000E+00
         31       7.66149E-01      7.66152E-01      6.51739E-03
0.00000E+00      0.00000E+00
         32       7.69008E-01      7.66469E-01      5.43294E-03
0.00000E+00      0.00000E+00
         33       7.62322E-01      7.66054E-01      4.52623E-03
0.00000E+00      0.00000E+00
         34       7.70394E-01      7.66449E-01      4.00747E-03
0.00000E+00      0.00000E+00
         35       7.69563E-01      7.66708E-01      3.52662E-03
0.00000E+00      0.00000E+00
         36       7.70610E-01      7.67008E-01      3.17144E-03
0.00000E+00      0.00000E+00
         37       7.67876E-01      7.67070E-01      2.88481E-03
0.00000E+00      0.00000E+00
         38       7.63003E-01      7.66799E-01      2.56980E-03
0.00000E+00      0.00000E+00
```

39	7.65265E-01	7.66703E-01	2.34398E-03	0.00000E+00
40	7.71694E-01	7.66997E-01	2.15808E-03	0.00000E+00
41	7.60994E-01	7.66663E-01	2.12458E-03	0.00000E+00
42	7.65817E-01	7.66619E-01	1.98045E-03	0.00000E+00
43	7.70018E-01	7.66789E-01	1.86390E-03	0.00000E+00
44	7.65991E-01	7.66751E-01	1.76713E-03	0.00000E+00
45	7.63003E-01	7.66580E-01	1.28155E-03	0.00000E+00
46	7.66028E-01	7.66556E-01	1.22217E-03	0.00000E+00
47	7.67259E-01	7.66586E-01	1.16822E-03	0.00000E+00
48	7.67629E-01	7.66627E-01	1.11934E-03	0.00000E+00
49	7.58960E-01	7.66333E-01	1.11664E-03	0.00000E+00
50	7.66267E-01	7.66330E-01	1.07284E-03	0.00000E+00
51	7.68945E-01	7.66424E-01	1.03688E-03	0.00000E+00
52	7.66427E-01	7.66424E-01	9.99160E-04	0.00000E+00
53	7.69765E-01	7.66535E-01	9.70961E-04	0.00000E+00
54	7.63126E-01	7.66425E-01	9.44901E-04	0.00000E+00
55	7.60484E-01	7.66239E-01	9.33812E-04	0.00000E+00
56	7.62597E-01	7.66129E-01	9.11302E-04	0.00000E+00
57	7.66556E-01	7.66142E-01	8.83350E-04	0.00000E+00
58	7.59526E-01	7.65953E-01	8.78805E-04	0.00000E+00
59	7.66029E-01	7.65955E-01	8.53330E-04	0.00000E+00
60	7.66611E-01	7.65972E-01	8.29488E-04	0.00000E+00
61	7.61409E-01	7.65852E-01	8.16138E-04	0.00000E+00
62	7.66532E-01	7.65870E-01	7.94571E-04	0.00000E+00
63	7.64558E-01	7.65837E-01	7.74660E-04	0.00000E+00
64	7.62185E-01	7.65748E-01	7.60548E-04	0.00000E+00

65	7.63704E-01	7.65699E-01	7.43440E-04	0.00000E+00	0.00000E+00
66	7.63685E-01	7.65652E-01	7.27105E-04	0.00000E+00	0.00000E+00
67	7.62172E-01	7.65573E-01	9.03995E-04	0.00000E+00	0.00000E+00
68	7.67425E-01	7.65614E-01	8.78467E-04	0.00000E+00	0.00000E+00
69	7.62869E-01	7.65555E-01	8.69496E-04	0.00000E+00	0.00000E+00
70	7.68431E-01	7.65616E-01	8.49289E-04	0.00000E+00	0.00000E+00
71	7.65687E-01	7.65617E-01	8.30104E-04	0.00000E+00	0.00000E+00
72	7.60694E-01	7.65517E-01	8.18049E-04	0.00000E+00	0.00000E+00
73	7.66870E-01	7.65544E-01	8.03328E-04	0.00000E+00	0.00000E+00
74	7.64527E-01	7.65524E-01	7.89343E-04	0.00000E+00	0.00000E+00
75	7.61432E-01	7.65445E-01	7.85156E-04	0.00000E+00	0.00000E+00
76	7.64267E-01	7.65423E-01	7.69300E-04	0.00000E+00	0.00000E+00
77	7.67226E-01	7.65457E-01	5.98920E-04	0.00000E+00	0.00000E+00
78	7.64442E-01	7.65438E-01	5.88025E-04	0.00000E+00	0.00000E+00
79	7.71426E-01	7.65545E-01	7.35356E-04	0.00000E+00	0.00000E+00
80	7.59682E-01	7.65442E-01	7.27146E-04	0.00000E+00	0.00000E+00
81	7.55931E-01	7.65278E-01	5.99574E-04	0.00000E+00	0.00000E+00
82	7.66133E-01	7.65293E-01	5.89330E-04	0.00000E+00	0.00000E+00
83	7.64189E-01	7.65274E-01	5.79558E-04	0.00000E+00	0.00000E+00
84	7.65571E-01	7.65279E-01	5.69838E-04	0.00000E+00	0.00000E+00
85	7.53964E-01	7.65097E-01	5.90326E-04	0.00000E+00	0.00000E+00
86	7.63437E-01	7.65070E-01	5.81343E-04	0.00000E+00	0.00000E+00
87	7.62271E-01	7.65027E-01	6.88835E-04	0.00000E+00	0.00000E+00
88	7.60644E-01	7.64959E-01	7.02756E-04	0.00000E+00	0.00000E+00
89	7.71392E-01	7.65057E-01	5.68724E-04	0.00000E+00	0.00000E+00
90	7.64639E-01	7.65050E-01	5.60076E-04	0.00000E+00	0.00000E+00

```
         91       7.59413E-01      7.64967E-01      5.58035E-04
0.00000E+00      0.00000E+00
         92       7.69660E-01      7.65035E-01      5.54082E-04
0.00000E+00      0.00000E+00
         93       7.60102E-01      7.64965E-01      5.50655E-04
0.00000E+00      0.00000E+00
         94       7.67181E-01      7.64996E-01      5.43654E-04
0.00000E+00      0.00000E+00
         95       7.67467E-01      7.65031E-01      5.37072E-04
0.00000E+00      0.00000E+00
         96       7.66432E-01      7.65050E-01      5.29917E-04
0.00000E+00      0.00000E+00
         97       7.66045E-01      7.65063E-01      5.22786E-04
0.00000E+00      0.00000E+00
         98       7.67067E-01      7.65090E-01      5.16383E-04
0.00000E+00      0.00000E+00
         99       7.71517E-01      7.65174E-01      6.36765E-04
0.00000E+00      0.00000E+00
        100       7.67229E-01      7.65201E-01      6.30571E-04
0.00000E+00      0.00000E+00
        101       7.63195E-01      7.65175E-01      5.04484E-04
0.00000E+00      0.00000E+00
        102       7.67407E-01      7.65204E-01      4.98795E-04
0.00000E+00      0.00000E+00
        103       7.62969E-01      7.65176E-01      6.08215E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=5A83132017D904C2
        104       7.67962E-01      7.65210E-01      6.01668E-04
0.00000E+00      0.00000E+00
        105       7.67171E-01      7.65234E-01      5.94559E-04
0.00000E+00      0.00000E+00
        106       7.62235E-01      7.65198E-01      4.78309E-04
0.00000E+00      0.00000E+00
        107       7.61125E-01      7.65149E-01      4.75052E-04
0.00000E+00      0.00000E+00
        108       7.64127E-01      7.65137E-01      4.69520E-04
0.00000E+00      0.00000E+00
        109       7.69139E-01      7.65184E-01      4.66346E-04
0.00000E+00      0.00000E+00
        110       7.61435E-01      7.65141E-01      4.62948E-04
0.00000E+00      0.00000E+00
        111       7.65910E-01      7.65150E-01      4.57682E-04
0.00000E+00      0.00000E+00
        112       7.71986E-01      7.65226E-01      4.59072E-04
0.00000E+00      0.00000E+00
        113       7.71511E-01      7.65296E-01      4.59346E-04
0.00000E+00      0.00000E+00
        114       7.68082E-01      7.65327E-01      4.55267E-04
0.00000E+00      0.00000E+00
        115       7.65206E-01      7.65326E-01      4.50239E-04
0.00000E+00      0.00000E+00
```

```
        116       7.59634E-01      7.65264E-01      4.49594E-04
0.00000E+00      0.00000E+00
        117       7.59733E-01      7.65205E-01      4.48694E-04
0.00000E+00      0.00000E+00
        118       7.73241E-01      7.65290E-01      4.52053E-04
0.00000E+00      0.00000E+00
        119       7.66473E-01      7.65302E-01      4.47442E-04
0.00000E+00      0.00000E+00
        120       7.69523E-01      7.65346E-01      4.44935E-04
0.00000E+00      0.00000E+00
        121       7.65307E-01      7.65346E-01      4.40324E-04
0.00000E+00      0.00000E+00
        122       7.63372E-01      7.65326E-01      4.36273E-04
0.00000E+00      0.00000E+00
        123       7.71443E-01      7.65387E-01      4.36242E-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=90261BDB6328DB50
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55198E-05 + or -  1.12800E-08             generation time
=  2.99427E-05 + or -  2.05705E-08
 nu bar   =  2.43895E+00 + or -  9.56721E-06       average fission group
=  2.17560E+02 + or -  9.24958E-03
                      energy(ev) of the average lethargy causing fission
=  5.65454E-02 + or -  1.14727E-04
                                                 system mean free path (cm)
=  6.52968E-01 + or -  1.80345E-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          0.76539   + or - 0.00044     0.76495 to 0.76582
0.76451 to 0.76626    0.76408 to 0.76670    2000000      16.0307

      24          0.76528   + or - 0.00043     0.76485 to 0.76570
0.76442 to 0.76613    0.76400 to 0.76655    1980000      16.0207

      25          0.76541   + or - 0.00041     0.76500 to 0.76582
0.76459 to 0.76623    0.76418 to 0.76664    1960000      14.9198

      26          0.76529   + or - 0.00045     0.76484 to 0.76573
0.76439 to 0.76618    0.76395 to 0.76663    1940000      10.7057
```

27	0.76532	+ or - 0.00040	0.76492 to 0.76572	0.76452 to 0.76611	0.76413 to 0.76651	1920000	13.8988
28	0.76540	+ or - 0.00045	0.76495 to 0.76586	0.76450 to 0.76631	0.76405 to 0.76676	1900000	10.6122
29	0.76537	+ or - 0.00039	0.76498 to 0.76576	0.76458 to 0.76616	0.76419 to 0.76655	1880000	14.2435
30	0.76533	+ or - 0.00040	0.76493 to 0.76573	0.76454 to 0.76612	0.76414 to 0.76652	1860000	14.3534
31	0.76532	+ or - 0.00040	0.76492 to 0.76572	0.76452 to 0.76612	0.76412 to 0.76652	1840000	14.3140
32	0.76528	+ or - 0.00046	0.76482 to 0.76574	0.76436 to 0.76620	0.76390 to 0.76666	1820000	11.1030
37	0.76511	+ or - 0.00041	0.76470 to 0.76552	0.76429 to 0.76594	0.76388 to 0.76635	1720000	15.2349
42	0.76510	+ or - 0.00043	0.76467 to 0.76552	0.76425 to 0.76595	0.76382 to 0.76638	1620000	15.7652
47	0.76501	+ or - 0.00045	0.76456 to 0.76546	0.76411 to 0.76590	0.76367 to 0.76635	1520000	16.0098
52	0.76496	+ or - 0.00047	0.76450 to 0.76543	0.76403 to 0.76589	0.76357 to 0.76636	1420000	16.6939
57	0.76500	+ or - 0.00049	0.76451 to 0.76549	0.76402 to 0.76597	0.76353 to 0.76646	1320000	17.4998
62	0.76508	+ or - 0.00058	0.76450 to 0.76566	0.76392 to 0.76623	0.76334 to 0.76681	1220000	14.5701
67	0.76524	+ or - 0.00056	0.76468 to 0.76580	0.76413 to 0.76635	0.76357 to 0.76691	1120000	18.6416
72	0.76526	+ or - 0.00067	0.76459 to 0.76593	0.76393 to 0.76660	0.76326 to 0.76726	1020000	15.5868
77	0.76530	+ or - 0.00075	0.76456 to 0.76605	0.76381 to 0.76680	0.76306 to 0.76755	920000	15.0700
82	0.76552	+ or - 0.00076	0.76476 to 0.76629	0.76399 to 0.76705	0.76323 to 0.76781	820000	16.5630
87	0.76603	+ or - 0.00067	0.76536 to 0.76670	0.76468 to 0.76737	0.76401 to 0.76804	720000	16.9994

```
      92          0.76617   + or - 0.00077     0.76540 to 0.76693
0.76464 to 0.76770    0.76387 to 0.76847     620000      16.2897

      97          0.76631   + or - 0.00090     0.76541 to 0.76721
0.76451 to 0.76811    0.76361 to 0.76901     520000      15.4793

     102          0.76608   + or - 0.00109     0.76499 to 0.76717
0.76390 to 0.76826    0.76281 to 0.76934     420000      15.4641

     107          0.76663   + or - 0.00128     0.76535 to 0.76791
0.76408 to 0.76919    0.76280 to 0.77047     320000      19.0816

     112          0.76668   + or - 0.00173     0.76496 to 0.76841
0.76323 to 0.77014    0.76150 to 0.77187     220000      21.8977
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          0.76823   + or - 0.00190     0.76632 to 0.77013
0.76442 to 0.77203    0.76252 to 0.77393     120000      28.4331
1                           fuel bundle

                      plot of average k-effective by generation run.
      the line represents k-eff = 0.76538 + or - 0.00043 which occurs for
123 generations run.

                                0.7643                   0.7703
0.7763

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

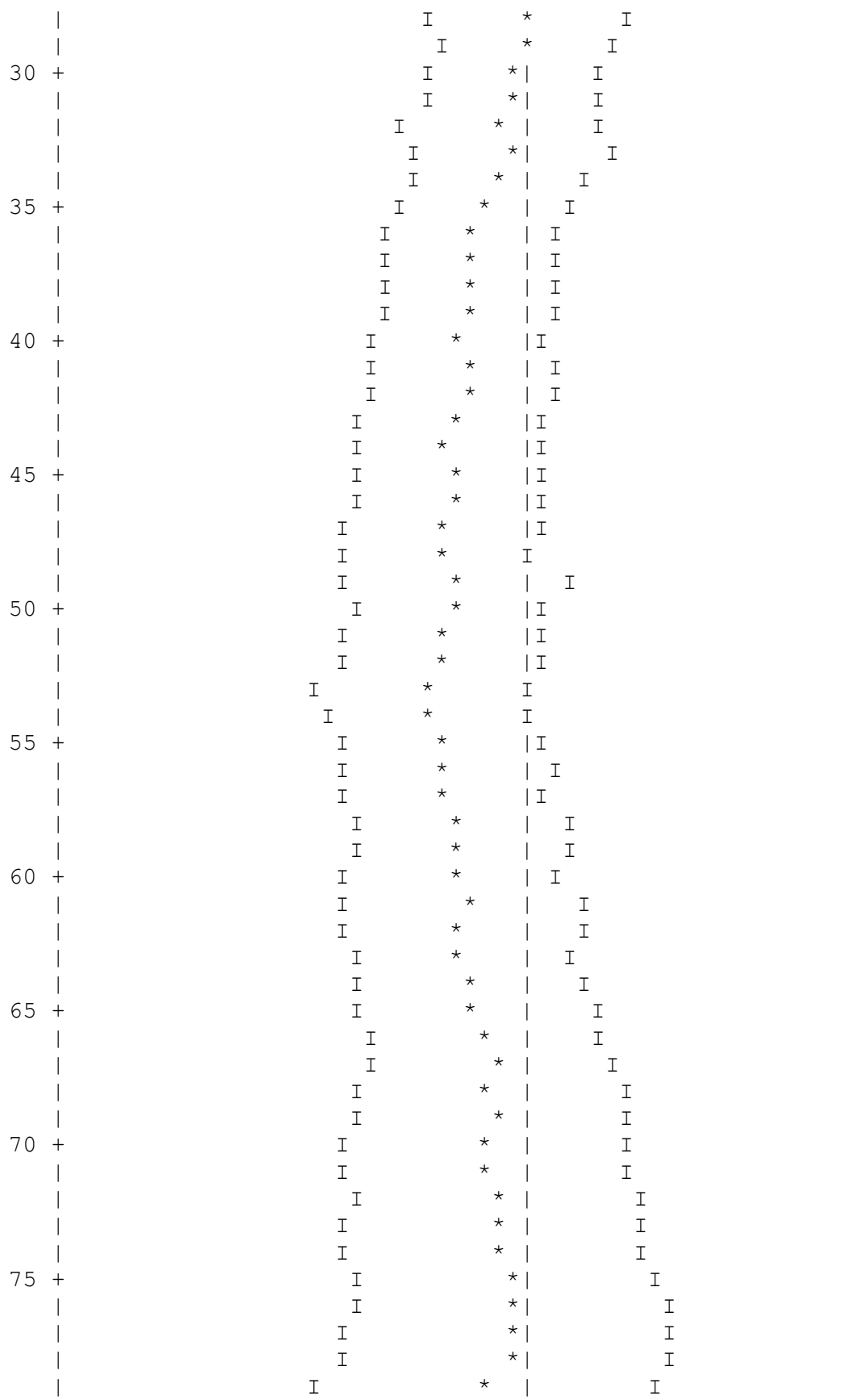
```
   |                          I    |       *            I
   |                          I    |      *           I
   |                           I   |    *          I
40 +                             I |       *         I
   |                           I   |    *         I
   |                            I  |    *        I
   |                             I |      *        I
   |                             I |      *       I
45 +                               I    *    I
   |                               I    *    I
   |                               I    *    I
   |                               |I   *    I
   |                              I|   *    I
50 +                              I|   *   I
   |                               I   *    I
   |                               I   *   I
   |                               |I   *   I
   |                               I   *   I
55 +                               I   *  I
   |                              I|  *   I
   |                              I|  *   I
   |                              I| *   I
   |                              I| *   I
60 +                              I| *   I
   |                              I| *  I
   |                              I| *  I
   |                              I| *  I
   |                             I | *  I
65 +                             I |*  I
   |                             I |*  I
   |                            I  |*   I
   |                            I  |*   I
   |                            I  |*  I
70 +                            I  |*  I
   |                             I |*  I
   |                            I  |*  I
   |                            I  |*  I
   |                            I  |*  I
75 +                            I  *   I
   |                            I  *  I
   |                             I *  I
   |                             I *  I
   |                             I |*  I
80 +                            I  *  I
   |                            I  * I
   |                            I  * I
   |                            I  * I
   |                            I  * I
85 +                           I  *|I
   |                           I  *|I
   |                           I * |I
   |                          I  * |I
```

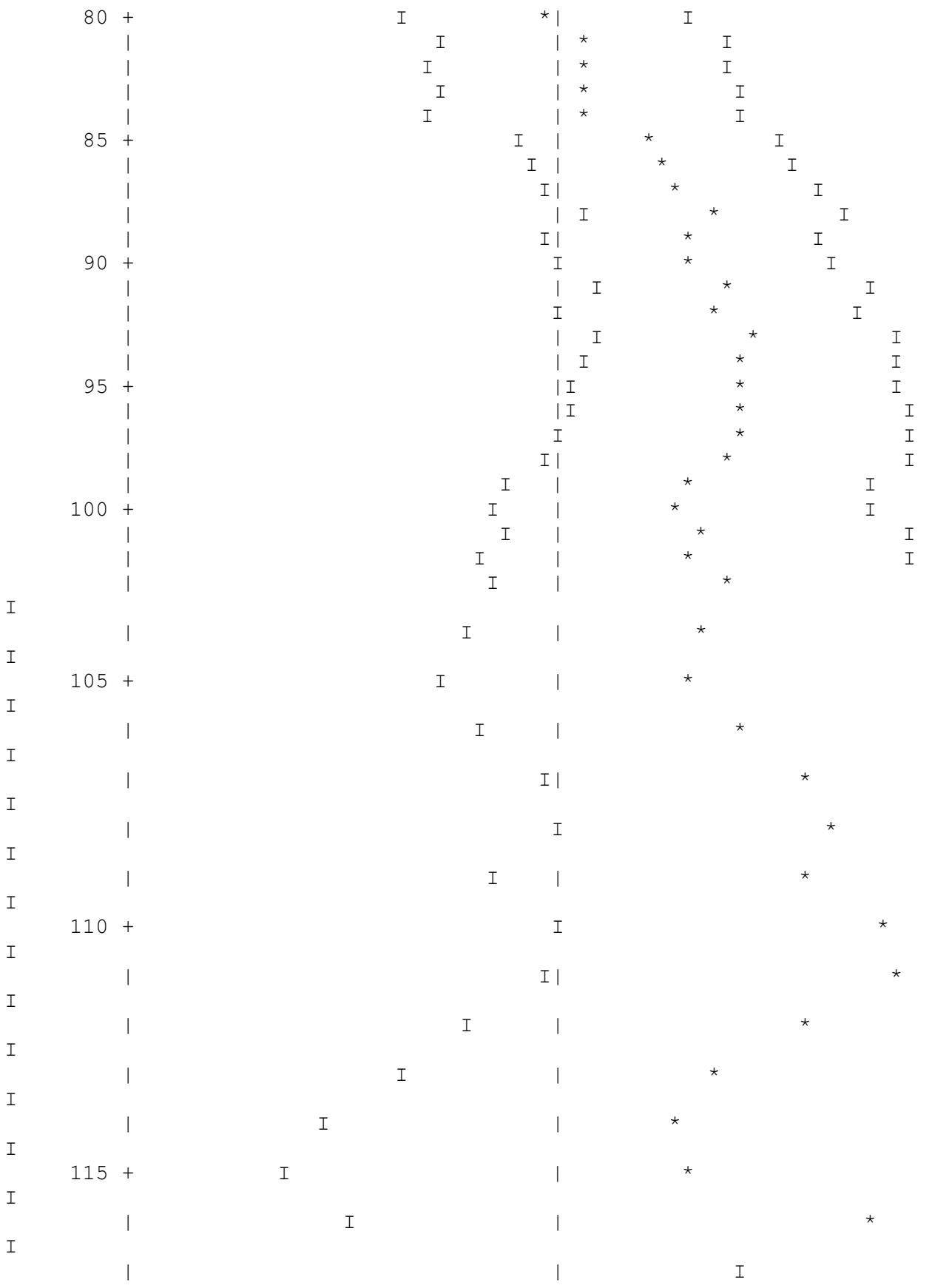
```
         |                          I  *|I
      90 +                          I  *|I
         |                          I * |I
         |                          I  *|I
         |                          I * |I
         |                          I * |I
      95 +                          I  *|I
         |                          I  *|I
         |                          I  *|I
         |                           I *|I
         |                          I  *| I
     100 +                           I *| I
         |                           I *|I
         |                           I *|I
         |                           I *| I
         |                           I *| I
     105 +                           I *| I
         |                           I *|I
         |                           I *|I
         |                           I *|I
         |                           I *|I
     110 +                           I *|I
         |                           I *|I
         |                           I *|I
         |                            I * I
         |                            I * I
     115 +                            I * I
         |                            I*|I
         |                           I *|I
         |                            I *I
         |                            I * I
     120 +                            I * I
         |                            I * I
         |                            I * I
         |                            I * I
1                           fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7653 + or - 0.0003 which occurs for 29 generations skipped.

```
                                 0.7649                    0.7666
0.7682

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                          I      *     I
         |                         I     * |    I
      25 +                           I     *     I
         |                         I     * |    I
         |                          I     *|    I
```


30
35
40
45
50
55
60
65
70
75


80
85
90
95
100
105
110
115

```
*
         |                                I|                           *
I
         |                       I        |
*
     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 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			2.20964E-07	100.0000	4.19520E-07	33.7975	0.00000E+00	0.0000
3	0.0000			1.30663E-05	11.6453	2.06279E-05	4.6014	0.00000E+00	0.0000
4	0.0000			2.12700E-05	7.9380	3.34546E-05	3.6657	0.00000E+00	0.0000
5	0.0000			2.56896E-05	8.8620	5.24053E-05	3.3281	0.00000E+00	0.0000
6	0.0001			9.20436E-05	4.0327	2.25244E-04	1.4311	0.00000E+00	0.0000
7	0.0002			1.19570E-04	3.4078	2.08289E-04	1.4784	0.00000E+00	0.0000
8	0.0003			2.48976E-04	1.9552	3.27825E-04	0.9474	0.00000E+00	0.0000
9	0.0005			3.81287E-04	1.3165	4.40617E-04	0.6307	0.00000E+00	0.0000
10	0.0003			2.02243E-04	1.7712	2.05547E-04	0.8425	0.00000E+00	0.0000
11	0.0012			9.05522E-04	0.7053	5.22413E-04	0.4793	0.00000E+00	0.0000
12	0.0010			7.64626E-04	0.6244	2.99723E-04	0.6150	0.00000E+00	0.0000
13	0.0003			2.34593E-04	1.4469	9.31718E-05	1.4314	0.00000E+00	0.0000
14	0.0013			1.01540E-03	0.7064	4.14975E-04	0.6991	0.00000E+00	0.0000
15	0.0010			7.71066E-04	0.6712	3.32413E-04	0.6637	0.00000E+00	0.0000
16	0.0003			1.91964E-04	1.1161	8.81916E-05	1.0984	0.00000E+00	0.0000
17	0.0001			6.96607E-05	1.7399	3.38761E-05	1.7061	0.00000E+00	0.0000
18	0.0001			5.05373E-05	2.0056				

2.55411E-05	1.9604	0.00000E+00	0.0000	19	0.0001	8.09603E-05	1.4027
4.28174E-05	1.3696	0.00000E+00	0.0000	20	0.0001	6.02919E-05	1.6468
3.30324E-05	1.6087	0.00000E+00	0.0000	21	0.0002	1.18766E-04	0.9651
6.70492E-05	0.9426	0.00000E+00	0.0000	22	0.0001	1.05414E-04	1.1628
6.24113E-05	1.1342	0.00000E+00	0.0000	23	0.0001	1.07231E-04	1.2423
6.54421E-05	1.2153	0.00000E+00	0.0000	24	0.0000	2.43717E-05	2.3370
1.51437E-05	2.2766	0.00000E+00	0.0000	25	0.0000	3.14879E-05	2.0547
1.96624E-05	1.9990	0.00000E+00	0.0000	26	0.0000	1.76523E-05	2.5478
1.10827E-05	2.4824	0.00000E+00	0.0000	27	0.0001	5.32613E-05	1.2265
3.32402E-05	1.2021	0.00000E+00	0.0000	28	0.0001	9.60532E-05	1.0550
5.99336E-05	1.0373	0.00000E+00	0.0000	29	0.0001	9.86301E-05	1.1217
6.21199E-05	1.1071	0.00000E+00	0.0000	30	0.0000	1.27221E-05	3.0437
7.97925E-06	3.0213	0.00000E+00	0.0000	31	0.0001	9.51118E-05	1.1293
6.01004E-05	1.1154	0.00000E+00	0.0000	32	0.0001	3.86779E-05	1.5328
2.47193E-05	1.4985	0.00000E+00	0.0000	33	0.0000	3.39951E-05	1.6033
2.12732E-05	1.5841	0.00000E+00	0.0000	34	0.0001	7.54252E-05	1.1989
4.73767E-05	1.1813	0.00000E+00	0.0000	35	0.0001	4.50941E-05	1.6422
2.82992E-05	1.6167	0.00000E+00	0.0000	36	0.0001	4.32782E-05	1.6193
2.67857E-05	1.6042	0.00000E+00	0.0000	37	0.0000	2.82796E-05	1.7591
1.77471E-05	1.7195	0.00000E+00	0.0000	38	0.0000	3.43119E-05	1.5824
2.15977E-05	1.5461	0.00000E+00	0.0000	39	0.0002	1.29721E-04	0.9893
8.25493E-05	0.9670	0.00000E+00	0.0000	40	0.0002	1.21350E-04	0.9391
7.84304E-05	0.9209	0.00000E+00	0.0000	41	0.0002	1.59884E-04	0.7351
1.06855E-04	0.7156	0.00000E+00	0.0000	42	0.0002	1.39463E-04	0.7082
9.48572E-05	0.6929	0.00000E+00	0.0000	43	0.0001	8.11548E-05	1.2753
5.82325E-05	1.2111	0.00000E+00	0.0000	44	0.0002	1.15469E-04	1.2584

```
8.47690E-05     1.2084       0.00000E+00     0.0000
   45    0.0001                 6.02027E-05     1.0108
4.85380E-05     0.9339       0.00000E+00     0.0000
   46    0.0000                 1.40298E-05     1.9202
1.13214E-05     1.7836       0.00000E+00     0.0000
   47    0.0001                 4.03070E-05     1.6518
3.13322E-05     1.5811       0.00000E+00     0.0000
   48    0.0000                 1.21583E-05     3.3629
9.42741E-06     3.2661       0.00000E+00     0.0000
   49    0.0001                 8.01272E-05     1.4043
6.32103E-05     1.3694       0.00000E+00     0.0000
   50    0.0001                 5.75303E-05     1.6453
4.73593E-05     1.6156       0.00000E+00     0.0000
   51    0.0000                 1.53371E-05     3.1858
1.27410E-05     3.1243       0.00000E+00     0.0000
   52    0.0001                 4.03073E-05     2.0512
3.48456E-05     2.0000       0.00000E+00     0.0000
   53    0.0002                 1.59478E-04     0.8955
1.56733E-04     0.8322       0.00000E+00     0.0000
   54    0.0001                 7.32200E-05     1.8622
6.81595E-05     1.7823       0.00000E+00     0.0000
   55    0.0002                 1.68049E-04     1.3358
1.53988E-04     1.3004       0.00000E+00     0.0000
   56    0.0002                 1.16619E-04     1.6328
1.08174E-04     1.5946       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                 1.46289E-04     1.6294
1.32833E-04     1.5882       0.00000E+00     0.0000
   58    0.0001                 8.64081E-05     1.8281
7.56230E-05     1.7791       0.00000E+00     0.0000
   59    0.0002                 1.60960E-04     1.3134
1.44513E-04     1.2575       0.00000E+00     0.0000
   60    0.0004                 2.71219E-04     1.1535
2.45958E-04     1.0939       0.00000E+00     0.0000
   61    0.0000                 3.00209E-05     3.7520
2.30399E-05     3.6420       0.00000E+00     0.0000
   62    0.0002                 1.58947E-04     1.7914
1.33443E-04     1.7401       0.00000E+00     0.0000
   63    0.0002                 1.21001E-04     2.2090
9.96066E-05     2.1284       0.00000E+00     0.0000
   64    0.0001                 1.04028E-04     2.1149
8.37604E-05     2.0490       0.00000E+00     0.0000
   65    0.0000                 3.12428E-05     3.5292
3.10163E-05     3.3973       0.00000E+00     0.0000
```

66	0.0002	1.73010E-04	1.8581	1.53474E-04	1.8000	0.00000E+00	0.0000
67	0.0002	1.43258E-04	2.3904	1.17281E-04	2.3113	0.00000E+00	0.0000
68	0.0000	2.59485E-05	4.7543	2.24761E-05	4.5751	0.00000E+00	0.0000
69	0.0004	2.97583E-04	1.4728	2.33650E-04	1.4274	0.00000E+00	0.0000
70	0.0003	2.04759E-04	1.8106	1.86436E-04	1.7425	0.00000E+00	0.0000
71	0.0006	4.24797E-04	1.4457	3.51664E-04	1.4001	0.00000E+00	0.0000
72	0.0001	4.79533E-05	5.3920	2.83479E-05	5.2618	0.00000E+00	0.0000
73	0.0004	3.14082E-04	1.9867	2.39881E-04	1.8771	0.00000E+00	0.0000
74	0.0014	1.05993E-03	1.1058	7.70834E-04	1.0568	0.00000E+00	0.0000
75	0.0001	1.08922E-04	2.7714	8.38207E-05	2.6367	0.00000E+00	0.0000
76	0.0006	4.55452E-04	1.9409	2.89387E-04	1.8729	0.00000E+00	0.0000
77	0.0005	3.66895E-04	2.0645	2.63110E-04	1.9854	0.00000E+00	0.0000
78	0.0000	7.66421E-06	3.4734	7.49522E-05	3.4366	0.00000E+00	0.0000
79	0.0002	1.88783E-04	2.3864	1.26855E-04	2.2961	0.00000E+00	0.0000
80	0.0001	6.28686E-05	2.9927	8.37681E-05	2.9129	0.00000E+00	0.0000
81	0.0014	1.05801E-03	1.3019	7.78158E-04	1.2473	0.00000E+00	0.0000
82	0.0001	6.76735E-05	3.9048	4.05654E-05	3.7134	0.00000E+00	0.0000
83	0.0002	1.28233E-04	3.1620	1.41864E-04	3.0953	0.00000E+00	0.0000
84	0.0001	8.20183E-05	3.1584	8.30763E-05	2.9371	0.00000E+00	0.0000
85	0.0003	1.93111E-04	1.9310	2.37997E-04	1.8725	0.00000E+00	0.0000
86	0.0003	2.62001E-04	2.4073	2.11072E-04	2.2892	0.00000E+00	0.0000
87	0.0004	3.35704E-04	2.4562	2.08851E-04	2.3519	0.00000E+00	0.0000
88	0.0001	5.66316E-05	4.1342	1.02789E-04	4.0342	0.00000E+00	0.0000
89	0.0001	9.07511E-05	3.4398	6.31841E-05	3.1505	0.00000E+00	0.0000
90	0.0003	2.21925E-04	3.4214	1.31068E-04	3.2731	0.00000E+00	0.0000
91	0.0002	1.86604E-04	2.5665	1.18160E-04	2.4147	0.00000E+00	0.0000

```
   92    0.0000                 3.07627E-05     3.1275
2.01267E-04     3.0622       0.00000E+00     0.0000
   93    0.0002                 1.31776E-04     3.1208
1.07029E-04     2.9053       0.00000E+00     0.0000
   94    0.0001                 1.12995E-04     3.6385
6.33874E-05     3.4056       0.00000E+00     0.0000
   95    0.0008                 6.32477E-04     2.1942
3.89622E-04     2.1284       0.00000E+00     0.0000
   96    0.0002                 1.54182E-04     4.2570
7.81703E-05     4.0709       0.00000E+00     0.0000
   97    0.0004                 2.79480E-04     3.6684
1.60072E-04     3.5948       0.00000E+00     0.0000
   98    0.0001                 9.46173E-05     4.1315
9.10983E-05     3.9653       0.00000E+00     0.0000
   99    0.0001                 9.73478E-05     4.7151
6.53548E-05     4.5441       0.00000E+00     0.0000
  100    0.0002                 1.25318E-04     4.3728
8.38985E-05     4.1916       0.00000E+00     0.0000
  101    0.0001                 1.10504E-04     3.6673
7.03765E-05     3.3915       0.00000E+00     0.0000
  102    0.0002                 1.52865E-04     4.6458
8.53199E-05     4.4530       0.00000E+00     0.0000
  103    0.0001                 9.73980E-05     3.2236
9.50048E-05     3.0446       0.00000E+00     0.0000
  104    0.0002                 1.70947E-04     3.3295
1.35408E-04     3.2210       0.00000E+00     0.0000
  105    0.0002                 1.22480E-04     3.2017
8.10268E-05     3.0027       0.00000E+00     0.0000
  106    0.0002                 1.78313E-04     4.4795
1.32501E-04     4.4241       0.00000E+00     0.0000
  107    0.0001                 6.35224E-05     3.6650
6.42586E-05     3.4297       0.00000E+00     0.0000
  108    0.0000                 3.57380E-05     2.2759
1.54246E-04     2.2210       0.00000E+00     0.0000
  109    0.0002                 1.28532E-04     2.2138
4.26528E-04     2.1828       0.00000E+00     0.0000
  110    0.0008                 6.25116E-04     3.2453
3.85588E-04     3.2128       0.00000E+00     0.0000
  111    0.0002                 1.52959E-04     4.8242
1.40643E-04     4.6957       0.00000E+00     0.0000
  112    0.0001                 1.07834E-04     4.2401
1.13867E-04     4.1602       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                 1.25490E-04     3.7173
```

1.09795E-04 3.4612 0.00000E+00 0.0000
114 0.0000 1.20032E-05 6.0812
1.60782E-05 5.1720 0.00000E+00 0.0000
115 0.0001 7.01583E-05 3.7426
8.19816E-05 3.4153 0.00000E+00 0.0000
116 0.0002 1.89892E-04 2.9596
1.43161E-04 2.6670 0.00000E+00 0.0000
117 0.0006 4.58068E-04 2.2506
2.45462E-04 2.1040 0.00000E+00 0.0000
118 0.0008 5.86795E-04 1.7937
4.58181E-04 1.7195 0.00000E+00 0.0000
119 0.0002 1.33322E-04 2.2195
3.44758E-04 2.1417 0.00000E+00 0.0000
120 0.0002 1.62578E-04 2.2516
6.19035E-04 2.2146 0.00000E+00 0.0000
121 0.0007 5.36516E-04 2.8665
4.12390E-04 2.8016 0.00000E+00 0.0000
122 0.0001 1.03426E-04 4.5090
8.08243E-05 4.2136 0.00000E+00 0.0000
123 0.0003 2.10685E-04 3.2095
1.49718E-04 2.8360 0.00000E+00 0.0000
124 0.0003 2.37319E-04 2.9765
1.95707E-04 2.7822 0.00000E+00 0.0000
125 0.0002 1.40793E-04 3.0871
1.29412E-04 2.7846 0.00000E+00 0.0000
126 0.0001 9.66978E-05 3.8236
8.72444E-05 3.3625 0.00000E+00 0.0000
127 0.0005 3.73158E-04 3.0854
1.83836E-04 2.9168 0.00000E+00 0.0000
128 0.0003 2.18606E-04 2.9913
1.35072E-04 2.6575 0.00000E+00 0.0000
129 0.0006 4.52814E-04 2.2424
4.16906E-04 2.1406 0.00000E+00 0.0000
130 0.0002 1.16316E-04 3.2487
2.83730E-04 3.1498 0.00000E+00 0.0000
131 0.0004 2.92543E-04 2.2088
2.35325E-04 1.8567 0.00000E+00 0.0000
132 0.0007 5.32811E-04 2.3420
3.27008E-04 2.1500 0.00000E+00 0.0000
133 0.0014 1.03955E-03 1.9017
6.56667E-04 1.8046 0.00000E+00 0.0000
134 0.0001 8.93193E-05 1.9138
2.33194E-04 1.5880 0.00000E+00 0.0000
135 0.0002 1.70901E-04 3.1844
2.53672E-04 3.1022 0.00000E+00 0.0000
136 0.0001 4.57127E-05 2.1220
7.09214E-04 2.0913 0.00000E+00 0.0000
137 0.0000 1.94764E-05 0.9771
3.50443E-03 0.9749 0.00000E+00 0.0000
138 0.0004 3.16401E-04 2.0846
8.24035E-04 2.0540 0.00000E+00 0.0000
139 0.0002 1.81800E-04 3.4890

2.23328E-04	3.2748	0.00000E+00	0.0000	140	0.0003	2.22340E-04	2.4831
2.94009E-04	2.1763	0.00000E+00	0.0000	141	0.0001	8.08063E-05	2.4450
2.54182E-04	2.1839	0.00000E+00	0.0000	142	0.0001	6.61043E-05	3.0161
2.28219E-04	2.7699	0.00000E+00	0.0000	143	0.0001	8.18680E-05	2.3468
1.75245E-04	1.4898	0.00000E+00	0.0000	144	0.0000	3.54266E-05	3.2154
7.62123E-05	1.9943	0.00000E+00	0.0000	145	0.0005	3.88211E-04	2.9930
3.04054E-04	2.7276	0.00000E+00	0.0000	146	0.0005	3.46337E-04	2.3342
2.51989E-04	1.9164	0.00000E+00	0.0000	147	0.0002	1.73376E-04	4.0975
1.11161E-04	3.5374	0.00000E+00	0.0000	148	0.0001	5.88279E-05	6.0857
3.92978E-05	4.9319	0.00000E+00	0.0000	149	0.0000	2.56095E-05	8.9677
1.85057E-05	6.7315	0.00000E+00	0.0000	150	0.0001	9.07146E-05	4.5149
6.56146E-05	3.4034	0.00000E+00	0.0000	151	0.0001	6.52564E-05	4.2545
5.58287E-05	2.8825	0.00000E+00	0.0000	152	0.0001	3.89612E-05	4.3717
4.54235E-05	2.5847	0.00000E+00	0.0000	153	0.0001	3.97491E-05	4.4638
4.57098E-05	2.5321	0.00000E+00	0.0000	154	0.0001	4.54614E-05	4.3923
4.83461E-05	2.5827	0.00000E+00	0.0000	155	0.0001	4.90955E-05	3.6611
4.87856E-05	2.2223	0.00000E+00	0.0000	156	0.0001	4.87845E-05	4.5159
4.73147E-05	2.7766	0.00000E+00	0.0000	157	0.0001	5.87511E-05	4.2605
5.71298E-05	2.5769	0.00000E+00	0.0000	158	0.0001	6.47547E-05	4.1795
6.59628E-05	2.7345	0.00000E+00	0.0000	159	0.0002	1.44669E-04	2.9698
2.02512E-04	2.4506	0.00000E+00	0.0000	160	0.0001	6.69583E-05	4.4905
7.78295E-05	3.4409	0.00000E+00	0.0000	161	0.0001	7.92871E-05	3.6353
7.61217E-05	2.4116	0.00000E+00	0.0000	162	0.0001	8.77665E-05	3.4551
8.20910E-05	2.2396	0.00000E+00	0.0000	163	0.0001	9.59388E-05	3.9303
8.76667E-05	2.4278	0.00000E+00	0.0000	164	0.0001	1.03024E-04	3.5232
9.48143E-05	2.2418	0.00000E+00	0.0000	165	0.0002	1.15254E-04	3.4986

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1.05593E-04     2.2471       0.00000E+00     0.0000
  166    0.0001                 7.25680E-05     4.4502
6.54795E-05     2.8911       0.00000E+00     0.0000
  167    0.0001                 7.87166E-05     4.0699
7.07737E-05     2.6687       0.00000E+00     0.0000
  168    0.0001                 7.94252E-05     4.5239
7.26982E-05     2.9503       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                 1.02683E-04     3.7473
9.09564E-05     2.6610       0.00000E+00     0.0000
  170    0.0002                 1.27039E-04     3.7610
1.10107E-04     2.7789       0.00000E+00     0.0000
  171    0.0001                 9.93180E-05     5.1527
7.64075E-05     4.0888       0.00000E+00     0.0000
  172    0.0002                 1.34559E-04     5.0227
9.58423E-05     4.1928       0.00000E+00     0.0000
  173    0.0003                 2.01057E-04     4.2942
1.31738E-04     3.7579       0.00000E+00     0.0000
  174    0.0003                 2.52602E-04     3.6223
1.57234E-04     3.2215       0.00000E+00     0.0000
  175    0.0001                 1.09998E-04     5.9155
6.67231E-05     5.3086       0.00000E+00     0.0000
  176    0.0001                 1.11799E-04     6.0347
6.69759E-05     5.4323       0.00000E+00     0.0000
  177    0.0002                 1.27477E-04     5.6422
7.45495E-05     5.0891       0.00000E+00     0.0000
  178    0.0002                 1.21783E-04     5.4501
7.11338E-05     4.9020       0.00000E+00     0.0000
  179    0.0002                 1.17774E-04     5.8101
6.85646E-05     5.1951       0.00000E+00     0.0000
  180    0.0002                 1.17924E-04     5.8163
6.82844E-05     5.1836       0.00000E+00     0.0000
  181    0.0001                 1.02271E-04     6.3940
5.98612E-05     5.5818       0.00000E+00     0.0000
  182    0.0001                 1.10819E-04     5.8885
6.36649E-05     5.1825       0.00000E+00     0.0000
  183    0.0001                 9.82899E-05     5.5933
5.72868E-05     4.7957       0.00000E+00     0.0000
  184    0.0001                 1.00851E-04     6.5477
5.85610E-05     5.6963       0.00000E+00     0.0000
  185    0.0001                 1.02380E-04     6.1652
5.89856E-05     5.3827       0.00000E+00     0.0000
  186    0.0001                 8.21605E-05     6.9892
4.90262E-05     5.8435       0.00000E+00     0.0000
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187	0.0001	9.47216E-05	6.1628	5.53080E-05	5.2968
188	0.0001	9.10461E-05	6.4159	5.32927E-05	5.3998
189	0.0001	9.06102E-05	6.4474	5.29935E-05	5.3961
190	0.0003	2.29118E-04	3.4943	1.34309E-04	2.9109
191	0.0003	2.07339E-04	3.8667	1.23895E-04	3.1771
192	0.0003	2.06369E-04	3.9499	1.23910E-04	3.1809
193	0.0003	2.01884E-04	4.2421	1.22366E-04	3.3973
194	0.0005	3.86922E-04	2.9780	2.40841E-04	2.3615
195	0.0006	4.26826E-04	2.7906	2.64492E-04	2.1722
196	0.0006	4.54896E-04	2.9480	2.83618E-04	2.3138
197	0.0007	5.22607E-04	2.5096	3.23247E-04	1.9654
198	0.0008	5.77956E-04	2.6588	3.58750E-04	2.1003
199	0.0004	3.22360E-04	3.5728	1.98853E-04	2.8167
200	0.0005	3.62045E-04	3.2782	2.21795E-04	2.5915
201	0.0010	7.67167E-04	1.9894	4.73074E-04	1.5673
202	0.0013	9.92295E-04	2.3970	6.00269E-04	1.9180
203	0.0016	1.21420E-03	1.8730	7.25992E-04	1.5287
204	0.0022	1.64982E-03	1.6573	9.73203E-04	1.3738
205	0.0015	1.11157E-03	2.0206	6.52157E-04	1.6887
206	0.0019	1.42701E-03	1.7327	8.29060E-04	1.5034
207	0.0022	1.69532E-03	1.4832	9.83160E-04	1.2953
208	0.0028	2.14091E-03	1.5700	1.25012E-03	1.3852
209	0.0032	2.44672E-03	1.3288	1.43300E-03	1.1801
210	0.0037	2.81801E-03	1.4110	1.68139E-03	1.2364
211	0.0041	3.10881E-03	1.1953	1.87317E-03	1.0399
212	0.0047	3.60929E-03	1.2235	2.18722E-03	1.0499
		0.00000E+00	0.0000		

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  213    0.0063                 4.80476E-03     0.9353
2.92800E-03     0.7783       0.00000E+00     0.0000
  214    0.0096                 7.33416E-03     0.8171
4.41652E-03     0.6874       0.00000E+00     0.0000
  215    0.0158                 1.20796E-02     0.5388
7.20074E-03     0.4516       0.00000E+00     0.0000
  216    0.0305                 2.33103E-02     0.4264
1.37254E-02     0.3650       0.00000E+00     0.0000
  217    0.0201                 1.53651E-02     0.5362
9.03822E-03     0.4537       0.00000E+00     0.0000
  218    0.0277                 2.11956E-02     0.5032
1.24124E-02     0.4226       0.00000E+00     0.0000
  219    0.0357                 2.73471E-02     0.3978
1.59569E-02     0.3402       0.00000E+00     0.0000
  220    0.0474                 3.62900E-02     0.2929
2.11060E-02     0.2508       0.00000E+00     0.0000
  221    0.0625                 4.78578E-02     0.3587
2.77551E-02     0.3076       0.00000E+00     0.0000
  222    0.0805                 6.16401E-02     0.2268
3.56807E-02     0.1924       0.00000E+00     0.0000
  223    0.1049                 8.02593E-02     0.2485
4.65322E-02     0.2123       0.00000E+00     0.0000
  224    0.0582                 4.45723E-02     0.3641
2.59624E-02     0.3065       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    0.2301                 1.76104E-01     0.1693
1.04355E-01     0.1447       0.00000E+00     0.0000
  226    0.0457                 3.49720E-02     0.4370
2.12583E-02     0.3534       0.00000E+00     0.0000
  227    0.0486                 3.72059E-02     0.3938
2.31319E-02     0.3203       0.00000E+00     0.0000
  228    0.0210                 1.60807E-02     0.4988
1.01706E-02     0.3912       0.00000E+00     0.0000
  229    0.0221                 1.69332E-02     0.5843
1.08945E-02     0.4548       0.00000E+00     0.0000
  230    0.0118                 9.01608E-03     0.7508
5.89372E-03     0.5719       0.00000E+00     0.0000
  231    0.0122                 9.30016E-03     0.7892
6.18964E-03     0.5915       0.00000E+00     0.0000
  232    0.0129                 9.84418E-03     0.8253
6.72544E-03     0.6343       0.00000E+00     0.0000
  233    0.0083                 6.36946E-03     0.9446
4.47037E-03     0.6890       0.00000E+00     0.0000
  234    0.0059                 4.51351E-03     1.1019
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3.25691E-03     0.7863       0.00000E+00     0.0000
  235    0.0024                 1.81990E-03     1.7176
1.20839E-03     1.3086       0.00000E+00     0.0000
  236    0.0019                 1.42924E-03     1.8929
9.71647E-04     1.3834       0.00000E+00     0.0000
  237    0.0017                 1.31440E-03     2.0897
9.30163E-04     1.5384       0.00000E+00     0.0000
  238    0.0001                 6.15825E-05     8.6886
5.66208E-05     4.9509       0.00000E+00     0.0000

 system total =                 7.65387E-01     0.0564
4.68643E-01     0.0485       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3152E-01  +
or -  0.0002



 elapsed time   3.11433 minutes

 random number=   419AFEA66ED63C36
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                              fission
percent         total
                                                unit  region   density
deviation      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

      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     flux     percent     flux     percent
```

		deviation		deviation		deviation
1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	3.303E-08	21.88	2.286E-08	20.06	2.576E-08	20.65
3	9.067E-07	3.59	7.573E-07	3.31	8.100E-07	3.39
4	1.437E-06	3.12	1.188E-06	2.89	1.277E-06	2.83
5	2.241E-06	2.75	1.845E-06	2.62	1.974E-06	2.63
6	9.195E-06	1.34	7.413E-06	1.16	7.901E-06	1.20
7	1.247E-05	1.15	9.485E-06	1.01	1.012E-05	1.01
8	3.141E-05	0.72	2.298E-05	0.64	2.416E-05	0.66
9	8.156E-05	0.51	5.866E-05	0.46	6.119E-05	0.45
10	4.604E-05	0.60	3.277E-05	0.60	3.398E-05	0.57
11	2.197E-04	0.27	1.555E-04	0.22	1.612E-04	0.22
12	1.899E-04	0.31	1.380E-04	0.26	1.444E-04	0.26
13	5.676E-05	0.50	4.153E-05	0.42	4.345E-05	0.41
14	2.526E-04	0.28	1.832E-04	0.24	1.915E-04	0.24
15	2.213E-04	0.23	1.603E-04	0.22	1.672E-04	0.22
16	7.077E-05	0.40	5.152E-05	0.40	5.394E-05	0.35
17	3.242E-05	0.69	2.362E-05	0.50	2.455E-05	0.50
18	2.798E-05	0.65	2.038E-05	0.57	2.109E-05	0.54
19	5.022E-05	0.51	3.687E-05	0.47	3.846E-05	0.42
20	3.986E-05	0.57	2.927E-05	0.50	3.047E-05	0.46
21	7.945E-05	0.38	5.833E-05	0.36	6.113E-05	0.32
22	7.313E-05	0.42	5.353E-05	0.34	5.534E-05	0.34
23	7.641E-05	0.41	5.616E-05	0.36	5.833E-05	0.33
24	1.855E-05	0.83	1.367E-05	0.71	1.421E-05	0.74
25	2.371E-05	0.73	1.731E-05	0.64	1.820E-05	0.60
26	1.330E-05	0.92	9.792E-06	0.78	1.032E-05	0.77
27	4.185E-05	0.49	3.104E-05	0.42	3.285E-05	0.41
28	7.721E-05	0.40	5.729E-05	0.37	6.065E-05	0.34
29	7.956E-05	0.38	5.951E-05	0.30	6.220E-05	0.29
30	9.906E-06	1.12	7.382E-06	0.89	7.827E-06	0.85
31	7.836E-05	0.43	5.890E-05	0.36	6.203E-05	0.36
32	3.102E-05	0.61	2.335E-05	0.53	2.465E-05	0.49
33	2.657E-05	0.61	2.012E-05	0.53	2.120E-05	0.49
34	6.104E-05	0.46	4.619E-05	0.40	4.862E-05	0.37
35	3.604E-05	0.53	2.731E-05	0.45	2.878E-05	0.42
36	3.393E-05	0.65	2.559E-05	0.46	2.680E-05	0.40
37	2.202E-05	0.65	1.665E-05	0.54	1.745E-05	0.46
38	2.575E-05	0.58	1.960E-05	0.48	2.066E-05	0.45
39	9.750E-05	0.35	7.479E-05	0.29	7.898E-05	0.27
40	8.974E-05	0.30	6.943E-05	0.27	7.388E-05	0.28
41	1.131E-04	0.32	8.837E-05	0.26	9.420E-05	0.24
42	9.358E-05	0.31	7.386E-05	0.27	7.927E-05	0.24
43	5.124E-05	0.46	4.068E-05	0.41	4.286E-05	0.37
44	6.947E-05	0.35	5.571E-05	0.30	5.990E-05	0.27
45	3.546E-05	0.38	2.823E-05	0.33	3.132E-05	0.30
46	8.352E-06	0.80	6.622E-06	0.71	7.184E-06	0.62
47	2.352E-05	0.55	1.875E-05	0.46	1.950E-05	0.44
48	6.847E-06	1.08	5.425E-06	0.94	5.699E-06	0.72
49	4.365E-05	0.39	3.499E-05	0.33	3.774E-05	0.27
50	2.930E-05	0.44	2.357E-05	0.41	2.570E-05	0.37
51	7.952E-06	0.87	6.386E-06	0.75	6.938E-06	0.62

52	2.057E-05	0.59	1.659E-05	0.43	1.805E-05	0.44
53	7.654E-05	0.32	6.174E-05	0.29	6.702E-05	0.24
54	3.345E-05	0.43	2.711E-05	0.38	2.919E-05	0.34
55	6.651E-05	0.29	5.415E-05	0.28	5.906E-05	0.20
56	4.337E-05	0.36	3.523E-05	0.32	3.840E-05	0.24
57	4.926E-05	0.36	4.026E-05	0.32	4.383E-05	0.25
58	2.586E-05	0.53	2.113E-05	0.43	2.305E-05	0.35
59	4.421E-05	0.35	3.621E-05	0.30	3.949E-05	0.28
60	6.450E-05	0.31	5.280E-05	0.29	5.736E-05	0.24
61	6.201E-06	0.81	5.065E-06	0.79	5.480E-06	0.62
62	3.231E-05	0.43	2.657E-05	0.39	2.890E-05	0.34
63	2.171E-05	0.54	1.786E-05	0.44	1.943E-05	0.35
64	1.724E-05	0.57	1.413E-05	0.53	1.534E-05	0.43
65	5.606E-06	1.04	4.673E-06	0.92	5.081E-06	0.68
66	2.871E-05	0.41	2.354E-05	0.39	2.560E-05	0.31
67	2.097E-05	0.53	1.728E-05	0.49	1.882E-05	0.39
68	4.594E-06	1.04	3.826E-06	0.96	4.156E-06	0.81
69	3.735E-05	0.39	3.078E-05	0.34	3.347E-05	0.27
70	2.652E-05	0.46	2.192E-05	0.44	2.386E-05	0.36
71	4.564E-05	0.37	3.764E-05	0.34	4.094E-05	0.30
72	2.651E-06	1.31	2.160E-06	1.21	2.375E-06	0.98
73	2.729E-05	0.45	2.239E-05	0.39	2.426E-05	0.32
74	7.980E-05	0.28	6.616E-05	0.25	7.174E-05	0.20
75	9.132E-06	0.85	7.556E-06	0.68	8.151E-06	0.58
76	2.292E-05	0.52	1.902E-05	0.46	2.058E-05	0.37
77	1.768E-05	0.67	1.472E-05	0.59	1.590E-05	0.42
78	1.570E-06	1.62	1.308E-06	1.53	1.425E-06	1.18
79	9.880E-06	0.76	8.220E-06	0.61	8.884E-06	0.52
80	4.602E-06	1.10	3.795E-06	0.96	4.095E-06	0.75
81	5.529E-05	0.35	4.605E-05	0.32	4.986E-05	0.27
82	3.318E-06	1.45	2.719E-06	1.15	2.926E-06	0.87
83	4.399E-06	1.01	3.665E-06	0.93	3.970E-06	0.71
84	8.241E-06	0.84	6.799E-06	0.72	7.369E-06	0.62
85	9.977E-06	0.68	8.325E-06	0.57	9.009E-06	0.50
86	1.351E-05	0.62	1.131E-05	0.57	1.226E-05	0.48
87	1.191E-05	0.65	9.985E-06	0.56	1.080E-05	0.46
88	3.151E-06	1.23	2.640E-06	1.18	2.856E-06	0.91
89	6.592E-06	0.88	5.457E-06	0.75	5.947E-06	0.63
90	6.873E-06	0.89	5.754E-06	0.86	6.241E-06	0.66
91	8.293E-06	0.81	6.939E-06	0.71	7.474E-06	0.54
92	4.741E-06	0.91	3.959E-06	0.94	4.328E-06	0.78
93	8.070E-06	0.85	6.681E-06	0.71	7.268E-06	0.62
94	4.207E-06	1.10	3.525E-06	0.98	3.837E-06	0.80
95	1.256E-05	0.61	1.051E-05	0.55	1.144E-05	0.50
96	3.342E-06	1.24	2.821E-06	1.24	3.017E-06	0.90
97	3.419E-06	1.18	2.871E-06	1.02	3.102E-06	0.87
98	3.512E-06	1.06	2.970E-06	0.99	3.186E-06	0.79
99	2.308E-06	1.66	1.937E-06	1.44	2.114E-06	1.21
100	3.458E-06	1.28	2.889E-06	1.17	3.131E-06	0.89
101	4.879E-06	1.01	4.087E-06	0.91	4.441E-06	0.67
102	3.386E-06	1.25	2.837E-06	1.10	3.073E-06	0.86
103	4.670E-06	0.91	3.923E-06	0.83	4.213E-06	0.74

104	4.214E-06	1.16	3.553E-06	1.15	3.811E-06	0.90
105	4.376E-06	1.03	3.656E-06	0.88	4.001E-06	0.77
106	1.579E-06	1.89	1.332E-06	1.61	1.410E-06	1.35
107	3.657E-06	1.13	3.058E-06	0.96	3.282E-06	0.76
108	3.249E-06	1.26	2.725E-06	1.03	2.964E-06	0.87
109	5.102E-06	0.89	4.295E-06	1.09	4.633E-06	0.71
110	2.993E-06	1.21	2.558E-06	1.11	2.798E-06	1.00
111	3.043E-06	1.39	2.565E-06	1.20	2.782E-06	1.09
112	1.803E-06	1.38	1.514E-06	1.49	1.667E-06	1.11
113	5.803E-06	0.88	4.831E-06	0.81	5.191E-06	0.72
114	1.971E-06	1.41	1.655E-06	1.26	1.774E-06	1.09
115	5.206E-06	0.98	4.419E-06	0.95	4.739E-06	0.74
116	1.093E-05	0.63	9.152E-06	0.61	9.825E-06	0.50
117	1.168E-05	0.60	9.767E-06	0.58	1.064E-05	0.45
118	1.276E-05	0.60	1.077E-05	0.49	1.162E-05	0.43
119	8.203E-06	0.76	7.000E-06	0.74	7.572E-06	0.54
120	5.785E-06	0.83	4.933E-06	0.81	5.336E-06	0.59
121	6.047E-06	0.87	5.136E-06	0.74	5.549E-06	0.58
122	3.228E-06	1.28	2.708E-06	1.08	2.926E-06	0.93
123	1.016E-05	0.68	8.601E-06	0.60	9.304E-06	0.51
124	7.385E-06	0.90	6.168E-06	0.81	6.669E-06	0.60
125	7.088E-06	0.79	5.953E-06	0.67	6.415E-06	0.54
126	5.770E-06	0.98	4.892E-06	0.85	5.234E-06	0.67
127	5.553E-06	0.89	4.675E-06	0.76	5.052E-06	0.67
128	7.715E-06	0.71	6.518E-06	0.64	6.999E-06	0.51
129	9.558E-06	0.67	8.089E-06	0.61	8.764E-06	0.51
130	3.979E-06	1.14	3.418E-06	0.98	3.713E-06	0.83
131	1.695E-05	0.63	1.426E-05	0.49	1.534E-05	0.41
132	1.127E-05	0.63	9.460E-06	0.57	1.025E-05	0.51
133	1.363E-05	0.53	1.154E-05	0.51	1.245E-05	0.41
134	1.468E-05	0.58	1.242E-05	0.57	1.341E-05	0.42
135	2.377E-06	1.26	2.025E-06	1.12	2.216E-06	0.92
136	3.883E-06	1.01	3.336E-06	0.91	3.672E-06	0.74
137	2.495E-06	0.92	2.654E-06	0.98	2.996E-06	0.72
138	4.141E-06	1.01	3.580E-06	0.96	3.953E-06	0.84
139	4.615E-06	0.91	3.914E-06	0.78	4.253E-06	0.62
140	1.211E-05	0.65	1.022E-05	0.58	1.103E-05	0.44
141	8.809E-06	0.62	7.497E-06	0.57	8.036E-06	0.49
142	5.831E-06	0.97	4.913E-06	0.80	5.322E-06	0.71
143	1.979E-05	0.54	1.674E-05	0.48	1.804E-05	0.36
144	8.133E-06	0.97	6.807E-06	0.77	7.301E-06	0.64
145	7.243E-06	0.90	6.129E-06	0.74	6.629E-06	0.69
146	1.188E-05	0.63	1.009E-05	0.56	1.084E-05	0.43
147	3.645E-06	1.18	3.103E-06	0.97	3.305E-06	0.81
148	1.881E-06	1.51	1.596E-06	1.31	1.727E-06	1.19
149	1.169E-06	2.12	9.935E-07	1.77	1.069E-06	1.53
150	3.996E-06	1.06	3.376E-06	0.99	3.626E-06	0.82
151	4.133E-06	1.11	3.497E-06	1.00	3.795E-06	0.77
152	4.344E-06	1.19	3.639E-06	0.99	3.962E-06	0.74
153	4.587E-06	1.00	3.847E-06	0.79	4.098E-06	0.73
154	4.665E-06	1.04	3.908E-06	0.92	4.224E-06	0.73
155	4.352E-06	1.08	3.641E-06	0.90	3.923E-06	0.72

156	3.986E-06	1.08	3.361E-06	0.97	3.620E-06	0.73
157	4.640E-06	0.93	3.961E-06	0.92	4.237E-06	0.74
158	4.907E-06	0.99	4.130E-06	0.80	4.426E-06	0.69
159	6.716E-06	0.95	5.692E-06	0.84	6.122E-06	0.64
160	3.592E-06	1.05	2.980E-06	0.96	3.236E-06	0.82
161	4.812E-06	0.98	4.099E-06	0.85	4.442E-06	0.75
162	5.781E-06	0.78	4.934E-06	0.79	5.291E-06	0.59
163	6.206E-06	0.85	5.209E-06	0.63	5.617E-06	0.62
164	6.392E-06	0.90	5.422E-06	0.87	5.888E-06	0.65
165	7.043E-06	0.71	5.895E-06	0.67	6.311E-06	0.51
166	4.024E-06	1.07	3.370E-06	0.94	3.643E-06	0.81
167	4.162E-06	1.08	3.525E-06	0.92	3.756E-06	0.71
168	4.249E-06	1.06	3.606E-06	0.97	3.880E-06	0.78
169	4.485E-06	0.97	3.799E-06	0.90	4.059E-06	0.67
170	4.598E-06	0.96	3.896E-06	0.84	4.192E-06	0.64
171	2.401E-06	1.20	2.038E-06	1.14	2.181E-06	0.84
172	2.444E-06	1.32	2.063E-06	1.22	2.212E-06	1.00
173	2.450E-06	1.26	2.083E-06	1.16	2.263E-06	1.00
174	2.507E-06	1.36	2.158E-06	1.31	2.331E-06	1.01
175	9.877E-07	2.04	8.528E-07	1.90	9.225E-07	1.49
176	1.016E-06	1.97	8.587E-07	1.85	9.310E-07	1.47
177	1.005E-06	1.94	8.577E-07	1.86	9.342E-07	1.55
178	1.027E-06	1.83	8.703E-07	1.64	9.518E-07	1.47
179	1.029E-06	1.90	8.780E-07	1.65	9.681E-07	1.41
180	1.080E-06	2.13	9.015E-07	1.84	9.885E-07	1.54
181	1.087E-06	1.99	9.189E-07	1.82	1.010E-06	1.41
182	1.065E-06	2.07	9.083E-07	1.84	9.941E-07	1.67
183	1.087E-06	1.83	9.130E-07	1.65	9.964E-07	1.42
184	1.092E-06	1.80	9.386E-07	1.88	1.023E-06	1.41
185	1.140E-06	1.69	9.657E-07	1.53	1.038E-06	1.35
186	1.156E-06	1.98	9.732E-07	1.86	1.046E-06	1.48
187	1.159E-06	1.79	9.740E-07	1.64	1.050E-06	1.28
188	1.140E-06	1.93	9.833E-07	1.77	1.062E-06	1.49
189	1.151E-06	1.99	9.707E-07	1.69	1.056E-06	1.45
190	3.049E-06	1.22	2.579E-06	1.04	2.753E-06	0.92
191	3.157E-06	1.10	2.657E-06	1.03	2.850E-06	0.88
192	3.167E-06	1.22	2.679E-06	1.06	2.894E-06	0.79
193	3.274E-06	1.25	2.761E-06	0.96	2.965E-06	0.84
194	6.797E-06	0.83	5.811E-06	0.71	6.225E-06	0.70
195	7.365E-06	0.80	6.188E-06	0.70	6.687E-06	0.54
196	7.733E-06	0.84	6.503E-06	0.73	7.094E-06	0.59
197	8.338E-06	0.79	7.085E-06	0.71	7.690E-06	0.59
198	8.907E-06	0.75	7.575E-06	0.74	8.196E-06	0.54
199	4.780E-06	1.01	4.065E-06	0.97	4.387E-06	0.77
200	5.087E-06	0.89	4.258E-06	0.83	4.637E-06	0.71
201	1.071E-05	0.68	9.031E-06	0.58	9.742E-06	0.49
202	1.198E-05	0.55	1.013E-05	0.50	1.095E-05	0.44
203	1.297E-05	0.61	1.096E-05	0.51	1.186E-05	0.41
204	1.473E-05	0.51	1.252E-05	0.42	1.359E-05	0.32
205	8.492E-06	0.72	7.638E-06	0.60	8.115E-06	0.50
206	9.349E-06	0.71	8.408E-06	0.62	8.942E-06	0.47
207	9.592E-06	0.63	8.744E-06	0.52	9.245E-06	0.43

208	1.127E-05	0.65	1.015E-05	0.57	1.081E-05	0.47
209	1.158E-05	0.57	1.051E-05	0.50	1.117E-05	0.40
210	1.393E-05	0.58	1.271E-05	0.46	1.352E-05	0.40
211	1.613E-05	0.46	1.461E-05	0.43	1.556E-05	0.30
212	1.920E-05	0.38	1.732E-05	0.37	1.848E-05	0.33
213	2.619E-05	0.35	2.353E-05	0.30	2.514E-05	0.26
214	3.691E-05	0.29	3.317E-05	0.24	3.562E-05	0.21
215	5.519E-05	0.26	4.978E-05	0.22	5.372E-05	0.19
216	9.218E-05	0.20	8.380E-05	0.18	9.067E-05	0.15
217	5.537E-05	0.25	5.297E-05	0.22	5.621E-05	0.17
218	7.072E-05	0.22	6.781E-05	0.19	7.218E-05	0.17
219	8.405E-05	0.20	8.152E-05	0.17	8.672E-05	0.15
220	1.015E-04	0.18	9.916E-05	0.15	1.056E-04	0.13
221	1.203E-04	0.17	1.185E-04	0.14	1.264E-04	0.11
222	1.365E-04	0.16	1.369E-04	0.12	1.456E-04	0.10
223	1.535E-04	0.14	1.576E-04	0.13	1.676E-04	0.11
224	7.511E-05	0.18	7.981E-05	0.16	8.445E-05	0.11
225	2.336E-04	0.13	2.726E-04	0.11	2.825E-04	0.09
226	3.177E-05	0.23	4.484E-05	0.18	4.452E-05	0.14
227	2.881E-05	0.26	4.638E-05	0.23	4.443E-05	0.13
228	1.030E-05	0.38	1.889E-05	0.31	1.745E-05	0.15
229	9.636E-06	0.39	1.961E-05	0.30	1.745E-05	0.16
230	4.498E-06	0.53	1.020E-05	0.40	8.706E-06	0.22
231	4.219E-06	0.55	1.063E-05	0.41	8.728E-06	0.22
232	3.974E-06	0.58	1.133E-05	0.47	8.893E-06	0.23
233	2.203E-06	0.68	7.396E-06	0.50	5.484E-06	0.26
234	1.426E-06	0.79	5.388E-06	0.61	3.816E-06	0.29
235	5.067E-07	1.36	1.026E-06	1.01	1.115E-06	0.54
236	3.480E-07	1.74	7.504E-07	1.06	8.039E-07	0.53
237	2.234E-07	2.04	5.375E-07	1.30	6.104E-07	0.67
238	4.799E-09	11.37	2.151E-08	6.25	2.456E-08	1.78

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
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53	0.000E+00	0.00
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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
 0.7498 to 0.7526     *
 0.7526 to 0.7555     *
 0.7555 to 0.7583     **
 0.7583 to 0.7611     ************
 0.7611 to 0.7640     ********************
 0.7640 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
 0.7498 to 0.7526
 0.7526 to 0.7555     *
 0.7555 to 0.7583     *
 0.7583 to 0.7611     ***********
 0.7611 to 0.7640     ****************
 0.7640 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
 0.7498 to 0.7526
 0.7526 to 0.7555     *
 0.7555 to 0.7583     *
 0.7583 to 0.7611     *******
 0.7611 to 0.7640     ********
 0.7640 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
 0.7498 to 0.7526
 0.7526 to 0.7555
 0.7555 to 0.7583
 0.7583 to 0.7611     ***
 0.7611 to 0.7640     *****
 0.7640 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
0.76536 + or - 0.00039                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65454E-02 + or -  1.14727E-04           ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  9.56721E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52968E-01 + or -  1.80345E-04           ***
        ***
***
```

```
        ***        number of warning messages
8                                       ***
        ***
***
        ***        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     3.11433 minutes


*********************************************************************
*************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999             //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22            //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22            //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
```

```
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                  11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                 11111111      66666666666



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

    SSSSSSSSSS     CCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCC    AAAAAAAAAAA    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
   SSSSSSSSSSSS   CCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
```

```
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE




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

*********************************************************************
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*********************************************************************
************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
```

```
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:21:02.41
*****
        *****
*****
        *****
*****

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

*********************************************************************
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*********************************************************************
*********************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number               data set name
name        unit function                     ***
        ***         ------               -------------
----        -------------                     ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
```

```
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  1.77077E-13  5.34208E-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  4.95285E-16  1.63221E-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  7.99733E-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
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    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  2.18233E-12  5.41640E-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
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    1040091  1.07031E-08  2.91246E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.63810E-08  4.50653E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  2.33097E-11  6.48252E-10   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.66045E-08  4.66749E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.51712E-11  7.15102E-10   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.69572E-09  7.73912E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  2.69777E-20  7.50260E-19   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  9.84652E-13  2.79732E-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  3.20625E-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  6.80638E-09  1.97437E-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  1.07814E-11  3.19203E-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  1.23949E-11  3.66968E-10   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  2.10828E-11  6.36804E-10   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  1.68755E-11  5.14768E-10   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  1.12362E-11  3.46117E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  7.77938E-12  2.41961E-10   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  1.60106E-12  5.07569E-11   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  7.53229E-13  2.32021E-11   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.07022E-12  3.36072E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  2.71988E-12  8.54099E-11   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  6.28505E-13  2.01126E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
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    1046108  2.23503E-13  7.21907E-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  1.13800E-13  3.70982E-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  2.85402E-14  9.81643E-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  6.50147E-11  2.23618E-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  1.46858E-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  6.22984E-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  2.22608E-13  8.38986E-12   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.29570E-13  8.72074E-12   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  2.18951E-12  8.44848E-11   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30210E-12  5.25835E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
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    1054131  3.09052E-12  1.21102E-10   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  1.53238E-11  6.09639E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88660E-12  7.61862E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  7.38011E-12  2.93608E-10   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  3.01973E-17  1.21041E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  2.26141E-11  9.13214E-10   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  2.45551E-11  1.00630E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29489E-08  1.36014E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  2.01131E-11  8.42349E-10   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  2.65166E-11  1.10256E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  2.15845E-11  9.10416E-10   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  2.33269E-11  9.90897E-10   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.19646E-12  2.65079E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  2.14571E-11  9.24348E-10   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.73307E-12  7.30992E-11   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  1.54889E-11  6.62596E-10   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  2.56268E-12  1.09627E-10   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  1.96039E-13  8.44494E-12   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  1.48427E-11  6.43843E-10   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  1.24975E-11  5.45857E-10   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  7.26712E-12  3.19590E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  6.62814E-12  2.93475E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  1.86789E-12  8.21448E-11   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  5.43210E-20  2.40519E-18   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.64173E-12  7.31834E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  3.52095E-15  1.54841E-13   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
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    1062149  2.58527E-12  1.15243E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.41427E-16  6.34668E-15   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.00895E-09  1.35933E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  1.07966E-12  4.90980E-11   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.18773E-13  1.00144E-11   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  7.13892E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  2.63199E-16  1.21269E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  1.35159E-13  6.26789E-12   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  4.71280E-14  2.19966E-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
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
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    1092235  1.76388E-03  1.24102E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22554E-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  6.79488E-14  4.82148E-12   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.14919E-20  8.18878E-19   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  1.15226E-11  8.24530E-10   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  9.86322E-19  7.08743E-17   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.99017E-21  7.20865E-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  1.00000E-20  7.27575E-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
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
```

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    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
```

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    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
```

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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:
  9524 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       ........

                                 ........     0.01400 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
0.01450 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 15834 independent fission points were generated for generation 1
          1       7.70951E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15784 independent fission points were generated for generation 2
          2       7.68376E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15695 independent fission points were generated for generation 3
          3       7.69058E-01      7.69058E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.65006E-01      7.67032E-01      2.02596E-03
0.00000E+00      0.00000E+00
          5       7.60881E-01      7.64982E-01      2.36061E-03
0.00000E+00      0.00000E+00
          6       7.66659E-01      7.65401E-01      1.72108E-03
0.00000E+00      0.00000E+00
          7       7.61797E-01      7.64680E-01      1.51556E-03
0.00000E+00      0.00000E+00
          8       7.65642E-01      7.64841E-01      1.24780E-03
0.00000E+00      0.00000E+00
          9       7.68288E-01      7.65333E-01      1.16393E-03
0.00000E+00      0.00000E+00
         10       7.70149E-01      7.65935E-01      1.17408E-03
0.00000E+00      0.00000E+00
         11       7.66044E-01      7.65947E-01      1.03551E-03
0.00000E+00      0.00000E+00
         12       7.66354E-01      7.65988E-01      9.27082E-04
0.00000E+00      0.00000E+00
         13       7.61875E-01      7.65614E-01      9.18148E-04
0.00000E+00      0.00000E+00
         14       7.63104E-01      7.65405E-01      8.63860E-04
0.00000E+00      0.00000E+00
         15       7.63172E-01      7.65233E-01      8.12993E-04
0.00000E+00      0.00000E+00
         16       7.58023E-01      7.64718E-01      9.11996E-04
0.00000E+00      0.00000E+00
         17       7.64337E-01      7.64693E-01      8.49402E-04
0.00000E+00      0.00000E+00
         18       7.68360E-01      7.64922E-01      8.26942E-04
0.00000E+00      0.00000E+00
         19       7.62469E-01      7.64778E-01      7.90060E-04
```

0.00000E+00	0.00000E+00				
20	7.68555E-01	7.64988E-01	7.73870E-04	0.00000E+00	0.00000E+00
21	7.68816E-01	7.65189E-01	7.59238E-04	0.00000E+00	0.00000E+00
22	7.65920E-01	7.65226E-01	7.21201E-04	0.00000E+00	0.00000E+00
23	7.66356E-01	7.65279E-01	6.88109E-04	0.00000E+00	0.00000E+00
24	7.69310E-01	7.65463E-01	6.81188E-04	0.00000E+00	0.00000E+00
25	7.65654E-01	7.65471E-01	6.50950E-04	0.00000E+00	0.00000E+00
26	7.62990E-01	7.65368E-01	6.31752E-04	0.00000E+00	0.00000E+00
27	7.63972E-01	7.65482E-01	4.19098E-03	0.00000E+00	0.00000E+00
28	7.63651E-01	7.65116E-01	2.57417E-03	0.00000E+00	0.00000E+00
29	7.76693E-01	7.67045E-01	2.62240E-03	0.00000E+00	0.00000E+00
30	7.70934E-01	7.67601E-01	3.35528E-03	0.00000E+00	0.00000E+00
31	7.69993E-01	7.67900E-01	2.87337E-03	0.00000E+00	0.00000E+00
32	7.67393E-01	7.67843E-01	2.40742E-03	0.00000E+00	0.00000E+00
33	7.71050E-01	7.68164E-01	2.10815E-03	0.00000E+00	0.00000E+00
34	7.64254E-01	7.67809E-01	2.05697E-03	0.00000E+00	0.00000E+00
35	7.61825E-01	7.67310E-01	1.86293E-03	0.00000E+00	0.00000E+00
36	7.65619E-01	7.67180E-01	1.74197E-03	0.00000E+00	0.00000E+00
37	7.59621E-01	7.66640E-01	2.07120E-03	0.00000E+00	0.00000E+00
38	7.67260E-01	7.66681E-01	1.86671E-03	0.00000E+00	0.00000E+00
39	7.63581E-01	7.66487E-01	1.80635E-03	0.00000E+00	0.00000E+00
40	7.64597E-01	7.66376E-01	1.68921E-03	0.00000E+00	0.00000E+00
41	7.71873E-01	7.66682E-01	1.53516E-03	0.00000E+00	0.00000E+00
42	7.64512E-01	7.66567E-01	1.41730E-03	0.00000E+00	0.00000E+00
43	7.65917E-01	7.66535E-01	1.32466E-03	0.00000E+00	0.00000E+00
44	7.74389E-01	7.66909E-01	1.43206E-03	0.00000E+00	0.00000E+00
45	7.65482E-01	7.66844E-01	1.33452E-03		

0.00000E+00	0.00000E+00				
46	7.65561E-01	7.66788E-01	1.24629E-03	0.00000E+00	0.00000E+00
47	7.64888E-01	7.66709E-01	1.16344E-03	0.00000E+00	0.00000E+00
48	7.62440E-01	7.66538E-01	1.16465E-03	0.00000E+00	0.00000E+00
49	7.70246E-01	7.66681E-01	1.06933E-03	0.00000E+00	0.00000E+00
50	7.58814E-01	7.66390E-01	1.06884E-03	0.00000E+00	0.00000E+00
51	7.59566E-01	7.66146E-01	1.18915E-03	0.00000E+00	0.00000E+00
52	7.72542E-01	7.66366E-01	1.07285E-03	0.00000E+00	0.00000E+00
53	7.65119E-01	7.66325E-01	8.27088E-04	0.00000E+00	0.00000E+00
54	7.59622E-01	7.66109E-01	1.09304E-03	0.00000E+00	0.00000E+00
55	7.68661E-01	7.66188E-01	8.06731E-04	0.00000E+00	0.00000E+00
56	7.61431E-01	7.66044E-01	7.95150E-04	0.00000E+00	0.00000E+00
57	7.66046E-01	7.66044E-01	7.70678E-04	0.00000E+00	0.00000E+00
58	7.68896E-01	7.66126E-01	7.52360E-04	0.00000E+00	0.00000E+00
59	7.62965E-01	7.66038E-01	7.36112E-04	0.00000E+00	0.00000E+00
60	7.73849E-01	7.66249E-01	7.47574E-04	0.00000E+00	0.00000E+00
61	7.62742E-01	7.66157E-01	7.33246E-04	0.00000E+00	0.00000E+00
62	7.61682E-01	7.66042E-01	7.23346E-04	0.00000E+00	0.00000E+00
63	7.64470E-01	7.66003E-01	7.05707E-04	0.00000E+00	0.00000E+00
64	7.59410E-01	7.65842E-01	7.07319E-04	0.00000E+00	0.00000E+00
65	7.65347E-01	7.65830E-01	6.89958E-04	0.00000E+00	0.00000E+00
66	7.64616E-01	7.65802E-01	6.73949E-04	0.00000E+00	0.00000E+00
67	7.64965E-01	7.65783E-01	6.58377E-04	0.00000E+00	0.00000E+00
68	7.66836E-01	7.65806E-01	6.43686E-04	0.00000E+00	0.00000E+00
69	7.63290E-01	7.65752E-01	6.31699E-04	0.00000E+00	0.00000E+00
70	7.70102E-01	7.65844E-01	6.25015E-04	0.00000E+00	0.00000E+00
71	7.68286E-01	7.65895E-01	6.13777E-04		

0.00000E+00	0.00000E+00				
72	7.61922E-01	7.65814E-01	6.06529E-04	0.00000E+00	0.00000E+00
73	7.62169E-01	7.65741E-01	5.98664E-04	0.00000E+00	0.00000E+00
74	7.63147E-01	7.65690E-01	5.88859E-04	0.00000E+00	0.00000E+00
75	7.62084E-01	7.65621E-01	5.81515E-04	0.00000E+00	0.00000E+00
76	7.65825E-01	7.65625E-01	5.70236E-04	0.00000E+00	0.00000E+00
77	7.62238E-01	7.65562E-01	5.63013E-04	0.00000E+00	0.00000E+00
78	7.64042E-01	7.65534E-01	5.53205E-04	0.00000E+00	0.00000E+00
79	7.68655E-01	7.65590E-01	5.46010E-04	0.00000E+00	0.00000E+00
80	7.64268E-01	7.65567E-01	5.36691E-04	0.00000E+00	0.00000E+00
81	7.61392E-01	7.65495E-01	5.32255E-04	0.00000E+00	0.00000E+00
82	7.65362E-01	7.65493E-01	5.23003E-04	0.00000E+00	0.00000E+00
83	7.64823E-01	7.65481E-01	5.14187E-04	0.00000E+00	0.00000E+00
84	7.72430E-01	7.65595E-01	5.18643E-04	0.00000E+00	0.00000E+00
85	7.67504E-01	7.65626E-01	5.11028E-04	0.00000E+00	0.00000E+00
86	7.70087E-01	7.65697E-01	6.29925E-04	0.00000E+00	0.00000E+00
87	7.58019E-01	7.65577E-01	5.14368E-04	0.00000E+00	0.00000E+00
88	7.68553E-01	7.65623E-01	6.02419E-04	0.00000E+00	0.00000E+00
89	7.64738E-01	7.65609E-01	5.94126E-04	0.00000E+00	0.00000E+00
90	7.71255E-01	7.65694E-01	5.80292E-04	0.00000E+00	0.00000E+00
91	7.70575E-01	7.65765E-01	5.80555E-04	0.00000E+00	0.00000E+00
92	7.62789E-01	7.65722E-01	5.67598E-04	0.00000E+00	0.00000E+00
93	7.56277E-01	7.65587E-01	5.04553E-04	0.00000E+00	0.00000E+00
94	7.67779E-01	7.65618E-01	4.98278E-04	0.00000E+00	0.00000E+00
95	7.58139E-01	7.65514E-01	5.69723E-04	0.00000E+00	0.00000E+00
96	7.70292E-01	7.65580E-01	5.52956E-04	0.00000E+00	0.00000E+00
97	7.68397E-01	7.65618E-01	5.41107E-04		

```
0.00000E+00      0.00000E+00
         98       7.68627E-01      7.65658E-01      5.32251E-04
0.00000E+00      0.00000E+00
         99       7.64033E-01      7.65637E-01      5.20853E-04
0.00000E+00      0.00000E+00
        100       7.68228E-01      7.65670E-01      5.20408E-04
0.00000E+00      0.00000E+00
        101       7.61907E-01      7.65622E-01      5.13961E-04
0.00000E+00      0.00000E+00
        102       7.69320E-01      7.65669E-01      5.10785E-04
0.00000E+00      0.00000E+00
        103       7.67486E-01      7.65692E-01      5.03968E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=1E81E9575525282E
        104       7.74088E-01      7.65795E-01      5.08928E-04
0.00000E+00      0.00000E+00
        105       7.72727E-01      7.65880E-01      5.22149E-04
0.00000E+00      0.00000E+00
        106       7.67770E-01      7.65903E-01      5.22021E-04
0.00000E+00      0.00000E+00
        107       7.73921E-01      7.65998E-01      5.59988E-04
0.00000E+00      0.00000E+00
        108       7.70386E-01      7.66050E-01      6.38570E-04
0.00000E+00      0.00000E+00
        109       7.66214E-01      7.66052E-01      6.31535E-04
0.00000E+00      0.00000E+00
        110       7.63981E-01      7.66028E-01      6.09716E-04
0.00000E+00      0.00000E+00
        111       7.66518E-01      7.66033E-01      6.03643E-04
0.00000E+00      0.00000E+00
        112       7.65382E-01      7.66026E-01      5.94985E-04
0.00000E+00      0.00000E+00
        113       7.72027E-01      7.66093E-01      6.06886E-04
0.00000E+00      0.00000E+00
        114       7.72412E-01      7.66162E-01      6.19389E-04
0.00000E+00      0.00000E+00
        115       7.65699E-01      7.66157E-01      6.11137E-04
0.00000E+00      0.00000E+00
        116       7.59876E-01      7.66090E-01      5.93930E-04
0.00000E+00      0.00000E+00
        117       7.69112E-01      7.66122E-01      5.87780E-04
0.00000E+00      0.00000E+00
        118       7.67632E-01      7.66138E-01      5.81930E-04
0.00000E+00      0.00000E+00
        119       7.70118E-01      7.66179E-01      5.86188E-04
0.00000E+00      0.00000E+00
        120       7.68113E-01      7.66199E-01      5.85923E-04
0.00000E+00      0.00000E+00
        121       7.64788E-01      7.66185E-01      5.79500E-04
0.00000E+00      0.00000E+00
        122       7.64545E-01      7.66168E-01      5.73062E-04
```

```
0.00000E+00      0.00000E+00
        123       7.71105E-01      7.66217E-01      5.72768E-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=9E70C00AD909C1BA
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.54950E-05 + or -  1.11183E-08             generation time
=  2.99122E-05 + or -  2.06776E-08
 nu bar   =  2.43896E+00 + or -  9.37983E-06       average fission group
=  2.17569E+02 + or -  9.37595E-03
                      energy(ev) of the average lethargy causing fission
=  5.64040E-02 + or -  1.11250E-04
                                                system mean free path (cm)
=  6.53229E-01 + or -  1.73359E-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          0.76622   + or - 0.00057     0.76564 to 0.76679
0.76507 to 0.76736    0.76450 to 0.76794    2000000       6.7609

      24          0.76619   + or - 0.00057     0.76561 to 0.76676
0.76504 to 0.76733    0.76447 to 0.76790    1980000       6.9225

      25          0.76619   + or - 0.00058     0.76561 to 0.76677
0.76504 to 0.76735    0.76446 to 0.76793    1960000       6.8898

      26          0.76622   + or - 0.00059     0.76563 to 0.76682
0.76504 to 0.76741    0.76445 to 0.76800    1940000       6.7229

      27          0.76625   + or - 0.00061     0.76564 to 0.76685
0.76504 to 0.76746    0.76443 to 0.76807    1920000       6.5108

      28          0.76628   + or - 0.00062     0.76565 to 0.76690
0.76503 to 0.76752    0.76440 to 0.76815    1900000       6.2515

      29          0.76616   + or - 0.00061     0.76555 to 0.76678
0.76494 to 0.76739    0.76433 to 0.76800    1880000       6.0305

      30          0.76611   + or - 0.00049     0.76562 to 0.76660
0.76513 to 0.76709    0.76464 to 0.76758    1860000       9.5819
```

31	0.76607	+ or - 0.00049	0.76558 to 0.76656	0.76509 to 0.76705	0.76460 to 0.76754	1840000	9.7856
32	0.76606	+ or - 0.00050	0.76556 to 0.76655	0.76506 to 0.76705	0.76456 to 0.76755	1820000	9.6778
37	0.76615	+ or - 0.00050	0.76564 to 0.76665	0.76514 to 0.76716	0.76464 to 0.76766	1720000	10.4121
42	0.76614	+ or - 0.00068	0.76545 to 0.76682	0.76477 to 0.76750	0.76408 to 0.76819	1620000	6.2698
47	0.76606	+ or - 0.00073	0.76533 to 0.76680	0.76460 to 0.76753	0.76386 to 0.76826	1520000	5.8718
52	0.76616	+ or - 0.00059	0.76556 to 0.76675	0.76497 to 0.76735	0.76437 to 0.76794	1420000	9.8371
57	0.76631	+ or - 0.00063	0.76568 to 0.76694	0.76505 to 0.76757	0.76442 to 0.76820	1320000	10.0003
62	0.76633	+ or - 0.00088	0.76545 to 0.76721	0.76457 to 0.76809	0.76369 to 0.76897	1220000	5.8247
67	0.76656	+ or - 0.00093	0.76563 to 0.76749	0.76469 to 0.76842	0.76376 to 0.76935	1120000	6.0735
72	0.76660	+ or - 0.00102	0.76559 to 0.76762	0.76457 to 0.76864	0.76356 to 0.76965	1020000	6.1580
77	0.76699	+ or - 0.00074	0.76625 to 0.76772	0.76552 to 0.76846	0.76478 to 0.76919	920000	15.0761
82	0.76726	+ or - 0.00078	0.76648 to 0.76804	0.76569 to 0.76883	0.76491 to 0.76961	820000	17.2981
87	0.76736	+ or - 0.00085	0.76651 to 0.76820	0.76566 to 0.76905	0.76482 to 0.76990	720000	17.7302
92	0.76732	+ or - 0.00100	0.76632 to 0.76832	0.76532 to 0.76932	0.76432 to 0.77031	620000	17.1374
97	0.76792	+ or - 0.00087	0.76706 to 0.76879	0.76619 to 0.76966	0.76532 to 0.77053	520000	17.1620
102	0.76828	+ or - 0.00106	0.76722 to 0.76935	0.76615 to 0.77041	0.76509 to 0.77147	420000	16.6908
107	0.76737	+ or - 0.00102	0.76635 to 0.76839	0.76532 to 0.76941	0.76430 to 0.77044	320000	24.2403
112	0.76777	+ or - 0.00156	0.76621 to 0.76933				

```
0.76465 to 0.77089    0.76309 to 0.77245     220000      24.4072
1                                                fuel bundle

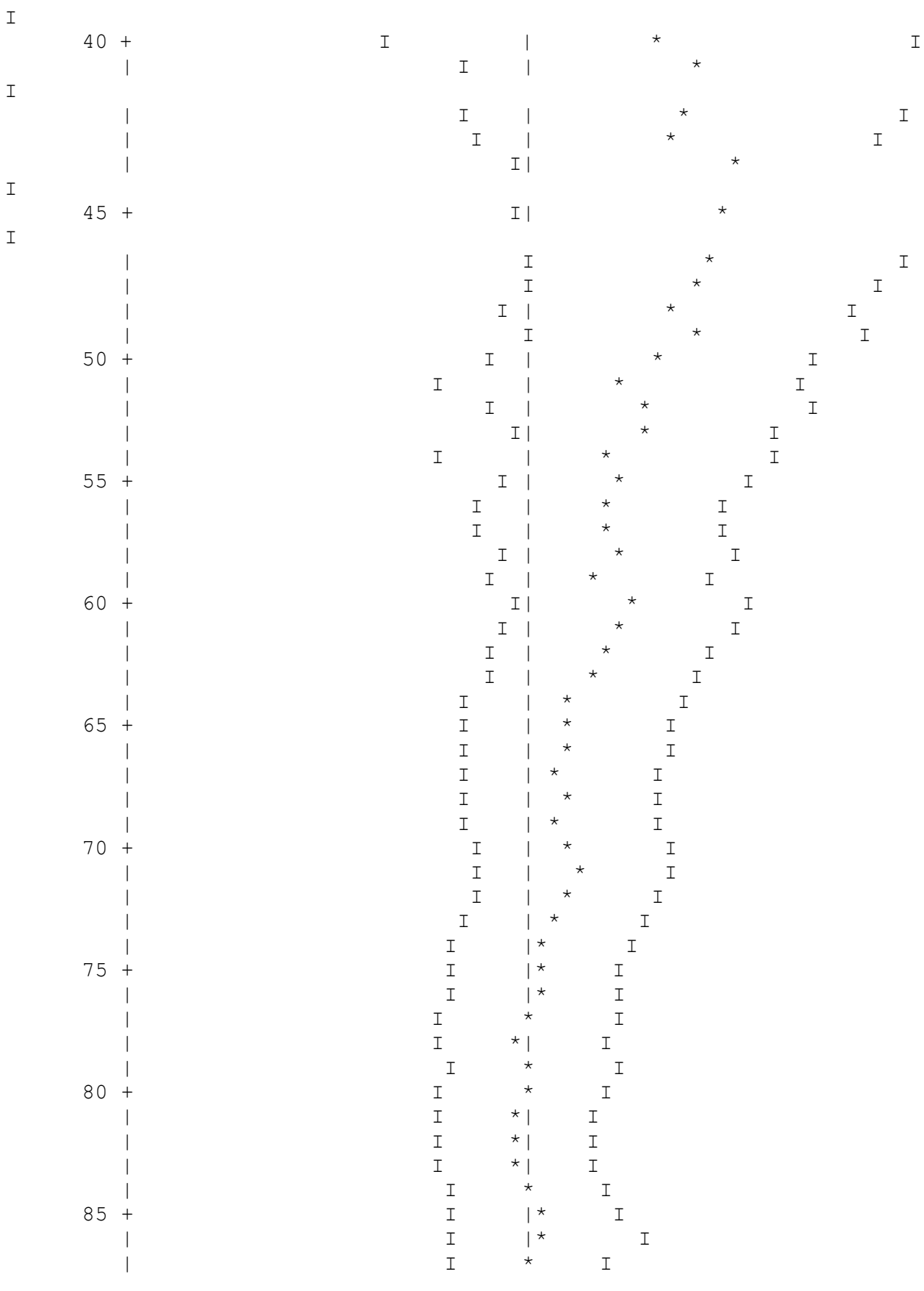
 no. of initial
deviation of
  generations      average                         67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76772   + or - 0.00134     0.76637 to 0.76906
0.76503 to 0.77040    0.76369 to 0.77174     120000      28.1164
1                          fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76561 + or - 0.00049 which occurs for
94 generations run.

                                0.7651                   0.7672
0.7693

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

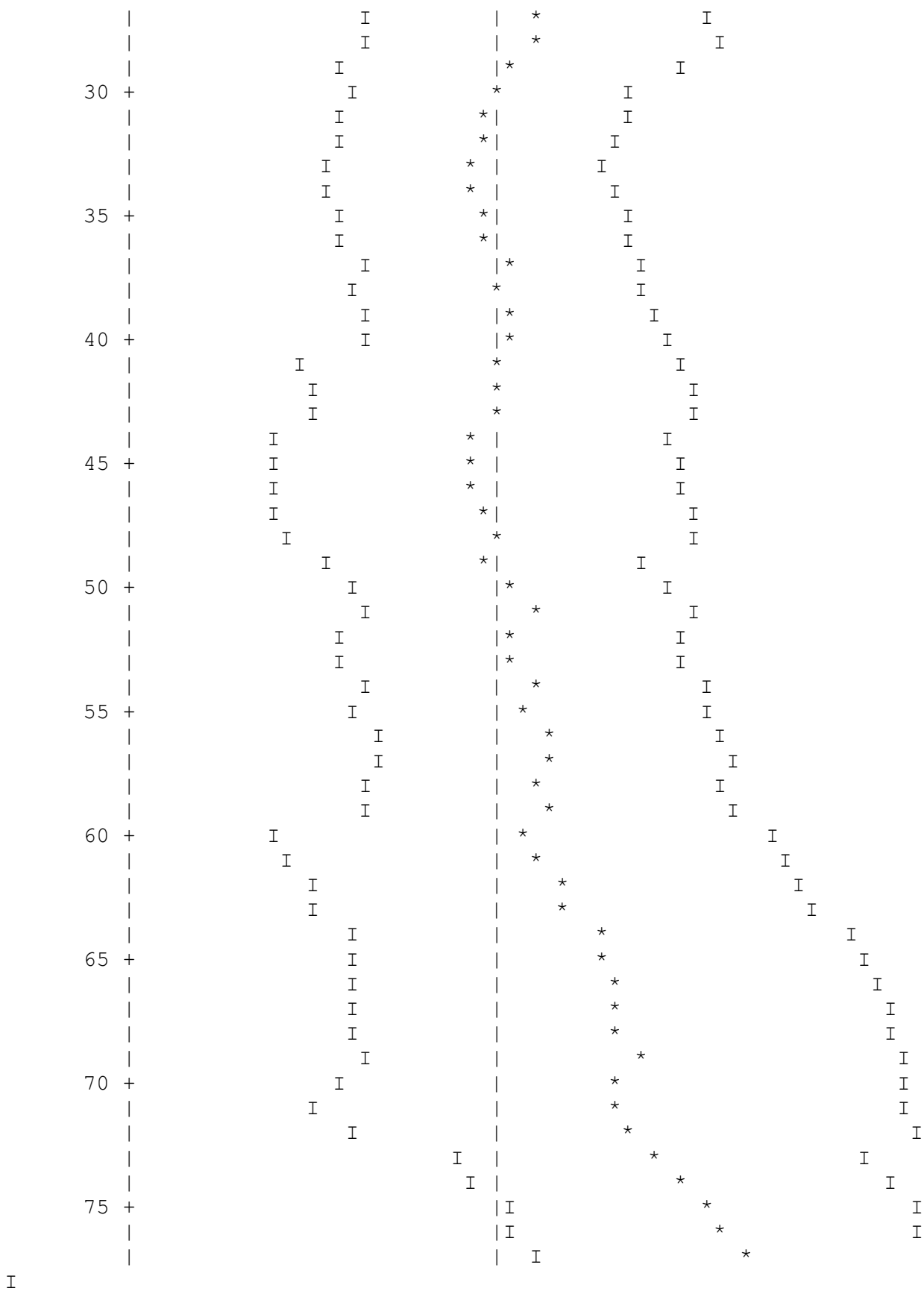


```
         |                        I      |*      I
         |                        I      *      I
      90 +                         I     |*      I
         |                          I    | *      I
         |                          I    | *     I
         |                         I     *     I
         |                          I    *     I
      95 +                       I      *|     I
         |                        I      *      I
         |                         I     *      I
         |                          I    |*     I
         |                          I    |*     I
     100 +                          I    |*     I
         |                         I     |*     I
         |                          I    |*     I
         |                          I    |*     I
         |                            I  |  *     I
     105 +                            I  |   *     I
         |                             I |   *     I
         |                             I |    *      I
         |                             I |     *      I
         |                             I |     *      I
     110 +                             I |    *       I
         |                             I |    *       I
         |                             I |    *      I
         |                              I|     *      I
         |                               I      *      I
     115 +                               I      *      I
         |                              I|     *      I
         |                              I|     *      I
         |                               I      *      I
         |                               I      *      I
     120 +                               I      *      I
         |                               I      *      I
         |                               I      *      I
         |                               |I      *     I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7661 + or - 0.0004 which occurs for 30 generations skipped.

```
                                0.7660                    0.7672
0.7683

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                  I          | *            I
         |                 I           |*             I
      25 +                 I           | *            I
         |                  I          | *             I
```


30
35
40
45
50
55
60
65
70
75

```
         |                            |   I               *
I
         |                            |  I               *
I
      80 +                            |   I                *
I
         |                            |      I                *
I
         |                            |       I                *
I
         |                            |       I                 *
I
         |                            |     I                 *
I
      85 +                            |    I                  *
I
         |                            | I                   *
I
         |                            |       I                  *
I
         |                            |      I                  *
I
         |                            |       I                   *
I
      90 +                            |    I                   *
I
         |                            I                       *
I
         |                            |   I                      *
I
         |                            |                I
*               I
         |                            |               I
*               I
      95 +                            |                       I
*               I
         |                            |                     I
*                I
         |                            |                    I
*                I
         |                            |                   I
*                  I
         |                            |                     I
*                  I
     100 +                            |                    I
*                   I
         |                            |                         I
*                   I
         |                            |                       I
*                     I
         |                            |                      I
*                       I
```

```
         |                           |                 I
*                      I
     105 +                           |           I
*                       I
         |                           |          I
*                         I
         |                           |    I                     *
I
         |                          I|                      *
I
         |                          I|                       *
I
     110 +                           |  I                         *
I
         |                           |  I                            *
I
         |                           | I
*                              I
         |                           I |                         *
I
         |             I             |             *
I
     115 +            I               |                *
I
         |                           |              I
*                        I
         |                           |     I
*                             I
         |                        I  |
*                                 I
         |  I                        |                     *
I
     120 +                           |              *

   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                 0.00000E+00     0.0000
9.92973E-08    60.9509       0.00000E+00     0.0000
    3    0.0000                 1.15920E-05    12.9576
1.88544E-05     4.7636       0.00000E+00     0.0000
    4    0.0000                 1.98133E-05     8.7035
3.35401E-05     3.9283       0.00000E+00     0.0000
```

5	0.0000	2.53917E-05	7.6728	5.25780E-05	2.9569
0.00000E+00	0.0000				
6	0.0001	9.24035E-05	4.1389	2.27351E-04	1.5897
0.00000E+00	0.0000				
7	0.0002	1.20762E-04	3.0299	2.08690E-04	1.3331
0.00000E+00	0.0000				
8	0.0003	2.53894E-04	2.2114	3.28026E-04	1.0670
0.00000E+00	0.0000				
9	0.0005	3.84234E-04	1.3757	4.44229E-04	0.6261
0.00000E+00	0.0000				
10	0.0003	2.02661E-04	1.7268	2.08419E-04	0.8063
0.00000E+00	0.0000				
11	0.0012	9.08796E-04	0.7228	5.24562E-04	0.5073
0.00000E+00	0.0000				
12	0.0010	7.55512E-04	0.6911	2.96229E-04	0.6804
0.00000E+00	0.0000				
13	0.0003	2.28518E-04	1.3947	9.07792E-05	1.3796
0.00000E+00	0.0000				
14	0.0013	1.01016E-03	0.6549	4.12885E-04	0.6477
0.00000E+00	0.0000				
15	0.0010	7.69997E-04	0.6587	3.31966E-04	0.6511
0.00000E+00	0.0000				
16	0.0002	1.91429E-04	1.1909	8.79299E-05	1.1740
0.00000E+00	0.0000				
17	0.0001	6.97814E-05	1.5260	3.39199E-05	1.4983
0.00000E+00	0.0000				
18	0.0001	5.21234E-05	1.6634	2.63254E-05	1.6259
0.00000E+00	0.0000				
19	0.0001	8.12409E-05	1.4332	4.29557E-05	1.3988
0.00000E+00	0.0000				
20	0.0001	5.85790E-05	1.4991	3.21237E-05	1.4603
0.00000E+00	0.0000				
21	0.0002	1.18722E-04	1.0811	6.70499E-05	1.0558
0.00000E+00	0.0000				
22	0.0001	1.05026E-04	1.2779	6.21724E-05	1.2472
0.00000E+00	0.0000				
23	0.0001	1.06874E-04	1.3002	6.52395E-05	1.2642
0.00000E+00	0.0000				
24	0.0000	2.38358E-05	2.4064	1.48186E-05	2.3364
0.00000E+00	0.0000				
25	0.0000	3.11986E-05	1.9236	1.94883E-05	1.8735
0.00000E+00	0.0000				
26	0.0000	1.76335E-05	2.4398	1.10689E-05	2.3706
0.00000E+00	0.0000				
27	0.0001	5.31763E-05	1.3690	3.31977E-05	1.3373
0.00000E+00	0.0000				
28	0.0001	9.62406E-05	0.9608	6.00489E-05	0.9456
0.00000E+00	0.0000				
29	0.0001	9.83236E-05	1.0861	6.19388E-05	1.0709
0.00000E+00	0.0000				
30	0.0000	1.20156E-05	3.0517	7.53914E-06	3.0292
0.00000E+00	0.0000				

31	0.0001	9.88609E-05	0.9878	6.24357E-05	0.9759	0.00000E+00	0.0000
32	0.0000	3.69963E-05	1.7343	2.36607E-05	1.7000	0.00000E+00	0.0000
33	0.0000	3.30628E-05	1.6720	2.06974E-05	1.6529	0.00000E+00	0.0000
34	0.0001	7.63761E-05	1.0859	4.79680E-05	1.0711	0.00000E+00	0.0000
35	0.0001	4.41633E-05	1.4989	2.77194E-05	1.4772	0.00000E+00	0.0000
36	0.0001	4.31426E-05	1.4377	2.67055E-05	1.4230	0.00000E+00	0.0000
37	0.0000	2.84736E-05	1.8000	1.78669E-05	1.7634	0.00000E+00	0.0000
38	0.0000	3.36671E-05	1.6207	2.12044E-05	1.5807	0.00000E+00	0.0000
39	0.0002	1.30202E-04	0.9976	8.28271E-05	0.9755	0.00000E+00	0.0000
40	0.0002	1.19731E-04	0.8684	7.74269E-05	0.8504	0.00000E+00	0.0000
41	0.0002	1.60409E-04	0.8258	1.07152E-04	0.8005	0.00000E+00	0.0000
42	0.0002	1.39385E-04	0.7600	9.48047E-05	0.7416	0.00000E+00	0.0000
43	0.0001	8.04624E-05	1.0720	5.77650E-05	1.0256	0.00000E+00	0.0000
44	0.0001	1.11983E-04	1.1037	8.23209E-05	1.0526	0.00000E+00	0.0000
45	0.0001	6.02915E-05	0.9282	4.85612E-05	0.8589	0.00000E+00	0.0000
46	0.0000	1.42995E-05	2.0760	1.15078E-05	1.9221	0.00000E+00	0.0000
47	0.0001	4.13477E-05	1.7234	3.21048E-05	1.6590	0.00000E+00	0.0000
48	0.0000	1.30508E-05	3.3665	1.01099E-05	3.2829	0.00000E+00	0.0000
49	0.0001	7.92210E-05	1.7441	6.24974E-05	1.7055	0.00000E+00	0.0000
50	0.0001	5.78205E-05	1.7109	4.75964E-05	1.6772	0.00000E+00	0.0000
51	0.0000	1.52553E-05	3.2590	1.26725E-05	3.1935	0.00000E+00	0.0000
52	0.0001	4.09409E-05	2.0520	3.54066E-05	2.0050	0.00000E+00	0.0000
53	0.0002	1.59196E-04	0.7526	1.56414E-04	0.7037	0.00000E+00	0.0000
54	0.0001	7.44485E-05	1.6262	6.92118E-05	1.5598	0.00000E+00	0.0000
55	0.0002	1.60880E-04	1.5046	1.47571E-04	1.4652	0.00000E+00	0.0000
56	0.0002	1.16945E-04	1.6412	1.08461E-04	1.6025	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                 1.51476E-04     1.1913
1.37421E-04     1.1631       0.00000E+00     0.0000
   58    0.0001                 8.64575E-05     2.0057
7.56832E-05     1.9520       0.00000E+00     0.0000
   59    0.0002                 1.63219E-04     1.4541
1.46364E-04     1.3985       0.00000E+00     0.0000
   60    0.0004                 2.75095E-04     1.3093
2.49383E-04     1.2408       0.00000E+00     0.0000
   61    0.0000                 2.95478E-05     4.1641
2.26931E-05     4.0353       0.00000E+00     0.0000
   62    0.0002                 1.61606E-04     1.6631
1.35610E-04     1.6179       0.00000E+00     0.0000
   63    0.0002                 1.21440E-04     2.0629
9.99753E-05     1.9936       0.00000E+00     0.0000
   64    0.0001                 1.01116E-04     2.2626
8.14994E-05     2.1875       0.00000E+00     0.0000
   65    0.0000                 3.54143E-05     3.6483
3.49712E-05     3.5246       0.00000E+00     0.0000
   66    0.0002                 1.69775E-04     1.7624
1.50733E-04     1.7052       0.00000E+00     0.0000
   67    0.0002                 1.45142E-04     2.1305
1.18779E-04     2.0602       0.00000E+00     0.0000
   68    0.0000                 2.67335E-05     4.4460
2.31137E-05     4.2844       0.00000E+00     0.0000
   69    0.0004                 3.00070E-04     1.5260
2.35534E-04     1.4788       0.00000E+00     0.0000
   70    0.0003                 2.12129E-04     1.6787
1.93036E-04     1.6189       0.00000E+00     0.0000
   71    0.0006                 4.37115E-04     1.2720
3.61562E-04     1.2325       0.00000E+00     0.0000
   72    0.0001                 4.91677E-05     5.2770
2.90426E-05     5.1490       0.00000E+00     0.0000
   73    0.0004                 3.17415E-04     1.7079
2.42179E-04     1.6146       0.00000E+00     0.0000
   74    0.0014                 1.05218E-03     0.8756
7.65100E-04     0.8387       0.00000E+00     0.0000
   75    0.0001                 1.09885E-04     2.7943
8.45610E-05     2.6540       0.00000E+00     0.0000
   76    0.0006                 4.65062E-04     1.7983
2.95335E-04     1.7341       0.00000E+00     0.0000
   77    0.0005                 3.76371E-04     1.6646
2.69972E-04     1.6007       0.00000E+00     0.0000
   78    0.0000                 7.02161E-06     4.1896
```

6.87222E-05	4.1414	0.00000E+00	0.0000	79	0.0002	1.91246E-04	2.5966
1.28478E-04	2.4960	0.00000E+00	0.0000	80	0.0001	6.28506E-05	3.1519
8.37749E-05	3.0625	0.00000E+00	0.0000	81	0.0014	1.06346E-03	1.3230
7.82029E-04	1.2675	0.00000E+00	0.0000	82	0.0001	6.66274E-05	4.2878
4.00034E-05	4.0553	0.00000E+00	0.0000	83	0.0002	1.35301E-04	3.2452
1.49558E-04	3.1829	0.00000E+00	0.0000	84	0.0001	7.77223E-05	3.3427
7.90086E-05	3.1001	0.00000E+00	0.0000	85	0.0003	2.04750E-04	2.5126
2.51879E-04	2.4427	0.00000E+00	0.0000	86	0.0004	2.68708E-04	2.5043
2.16120E-04	2.3808	0.00000E+00	0.0000	87	0.0005	3.47815E-04	2.6923
2.16126E-04	2.5759	0.00000E+00	0.0000	88	0.0001	5.62442E-05	4.1182
1.02096E-04	4.0130	0.00000E+00	0.0000	89	0.0001	8.93223E-05	3.6782
6.22759E-05	3.3735	0.00000E+00	0.0000	90	0.0003	2.19612E-04	3.2026
1.29759E-04	3.0625	0.00000E+00	0.0000	91	0.0002	1.88648E-04	2.5973
1.19382E-04	2.4483	0.00000E+00	0.0000	92	0.0000	3.11814E-05	3.0328
2.04013E-04	2.9701	0.00000E+00	0.0000	93	0.0002	1.37598E-04	3.3677
1.11398E-04	3.1529	0.00000E+00	0.0000	94	0.0001	1.06365E-04	4.1923
5.99265E-05	3.9255	0.00000E+00	0.0000	95	0.0008	6.05486E-04	2.3840
3.73496E-04	2.3045	0.00000E+00	0.0000	96	0.0002	1.44605E-04	4.1498
7.35407E-05	3.9613	0.00000E+00	0.0000	97	0.0004	2.89343E-04	3.4934
1.65554E-04	3.4173	0.00000E+00	0.0000	98	0.0001	1.00389E-04	4.0115
9.63835E-05	3.8662	0.00000E+00	0.0000	99	0.0001	9.94981E-05	4.9212
6.67588E-05	4.7456	0.00000E+00	0.0000	100	0.0002	1.25222E-04	3.7908
8.38120E-05	3.6330	0.00000E+00	0.0000	101	0.0001	1.13021E-04	3.8432
7.18620E-05	3.5728	0.00000E+00	0.0000	102	0.0002	1.63528E-04	4.0532
9.11633E-05	3.8934	0.00000E+00	0.0000	103	0.0001	9.58313E-05	3.7750
9.35146E-05	3.5739	0.00000E+00	0.0000	104	0.0002	1.68404E-04	3.5694

```
1.33466E-04     3.4459       0.00000E+00     0.0000
  105    0.0001                1.14145E-04     3.3148
7.58167E-05     3.0988       0.00000E+00     0.0000
  106    0.0002                1.67531E-04     3.9488
1.24635E-04     3.8919       0.00000E+00     0.0000
  107    0.0001                6.80631E-05     3.3922
6.84641E-05     3.1930       0.00000E+00     0.0000
  108    0.0000                3.36260E-05     2.4045
1.45397E-04     2.3437       0.00000E+00     0.0000
  109    0.0002                1.32636E-04     2.0195
4.39987E-04     1.9912       0.00000E+00     0.0000
  110    0.0008                6.31277E-04     2.9190
3.89392E-04     2.8918       0.00000E+00     0.0000
  111    0.0002                1.39449E-04     4.2670
1.28597E-04     4.1403       0.00000E+00     0.0000
  112    0.0002                1.17170E-04     4.6281
1.23558E-04     4.5415       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                1.30807E-04     3.4995
1.14104E-04     3.2820       0.00000E+00     0.0000
  114    0.0000                1.08560E-05     5.6163
1.48437E-05     4.6718       0.00000E+00     0.0000
  115    0.0001                7.21512E-05     4.0606
8.39031E-05     3.7442       0.00000E+00     0.0000
  116    0.0002                1.86725E-04     2.7839
1.41023E-04     2.5023       0.00000E+00     0.0000
  117    0.0006                4.73155E-04     2.5747
2.53025E-04     2.4118       0.00000E+00     0.0000
  118    0.0007                5.70746E-04     1.8117
4.46109E-04     1.7397       0.00000E+00     0.0000
  119    0.0002                1.39383E-04     2.1897
3.60092E-04     2.1116       0.00000E+00     0.0000
  120    0.0002                1.70158E-04     2.0617
6.47507E-04     2.0346       0.00000E+00     0.0000
  121    0.0007                5.07039E-04     2.5689
3.90479E-04     2.4984       0.00000E+00     0.0000
  122    0.0001                1.09878E-04     4.0036
8.54167E-05     3.7490       0.00000E+00     0.0000
  123    0.0003                2.19513E-04     2.6103
1.55274E-04     2.3246       0.00000E+00     0.0000
  124    0.0003                2.40741E-04     2.5599
1.98367E-04     2.3964       0.00000E+00     0.0000
  125    0.0002                1.46184E-04     3.4705
1.33851E-04     3.1476       0.00000E+00     0.0000
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126	0.0001	9.89512E-05	3.2626	8.89420E-05	2.8597
0.00000E+00	0.0000				
127	0.0005	3.84433E-04	2.8272	1.89061E-04	2.6685
0.00000E+00	0.0000				
128	0.0003	2.23037E-04	3.1721	1.37527E-04	2.8254
0.00000E+00	0.0000				
129	0.0006	4.56146E-04	2.2726	4.19844E-04	2.1695
0.00000E+00	0.0000				
130	0.0002	1.17324E-04	3.5321	2.86130E-04	3.4281
0.00000E+00	0.0000				
131	0.0004	2.83162E-04	2.0751	2.29104E-04	1.7338
0.00000E+00	0.0000				
132	0.0007	5.10076E-04	2.2237	3.14098E-04	2.0409
0.00000E+00	0.0000				
133	0.0013	1.01514E-03	1.9966	6.42513E-04	1.8950
0.00000E+00	0.0000				
134	0.0001	9.20193E-05	2.2094	2.39433E-04	1.8674
0.00000E+00	0.0000				
135	0.0002	1.71235E-04	3.0178	2.54050E-04	2.9373
0.00000E+00	0.0000				
136	0.0001	4.51392E-05	2.1428	7.00423E-04	2.1106
0.00000E+00	0.0000				
137	0.0000	1.97146E-05	0.9303	3.54723E-03	0.9279
0.00000E+00	0.0000				
138	0.0004	3.06714E-04	2.0325	7.99292E-04	2.0006
0.00000E+00	0.0000				
139	0.0002	1.85307E-04	2.9960	2.27073E-04	2.8231
0.00000E+00	0.0000				
140	0.0003	2.17067E-04	2.4119	2.87768E-04	2.1045
0.00000E+00	0.0000				
141	0.0001	8.16323E-05	2.4922	2.56541E-04	2.2326
0.00000E+00	0.0000				
142	0.0001	6.53394E-05	2.8557	2.25700E-04	2.6313
0.00000E+00	0.0000				
143	0.0001	8.06677E-05	2.1182	1.73887E-04	1.3329
0.00000E+00	0.0000				
144	0.0000	3.33177E-05	3.3728	7.33342E-05	2.0572
0.00000E+00	0.0000				
145	0.0005	3.84981E-04	2.6286	3.01833E-04	2.3960
0.00000E+00	0.0000				
146	0.0004	3.39127E-04	2.6821	2.49050E-04	2.1720
0.00000E+00	0.0000				
147	0.0002	1.68211E-04	3.6673	1.08381E-04	3.1748
0.00000E+00	0.0000				
148	0.0001	5.93452E-05	6.2243	3.95492E-05	5.0385
0.00000E+00	0.0000				
149	0.0000	3.18492E-05	8.4771	2.19405E-05	6.5875
0.00000E+00	0.0000				
150	0.0001	8.63866E-05	4.5694	6.29800E-05	3.3664
0.00000E+00	0.0000				
151	0.0001	6.67747E-05	4.8090	5.69599E-05	3.2814
0.00000E+00	0.0000				

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  152    0.0001                 4.41058E-05     4.8818
4.88097E-05     2.9549       0.00000E+00     0.0000
  153    0.0001                 4.18535E-05     4.3280
4.67352E-05     2.5200       0.00000E+00     0.0000
  154    0.0001                 4.96446E-05     4.1820
5.09679E-05     2.4084       0.00000E+00     0.0000
  155    0.0001                 4.83316E-05     5.1033
4.85564E-05     3.1085       0.00000E+00     0.0000
  156    0.0001                 4.84799E-05     4.3097
4.71015E-05     2.6826       0.00000E+00     0.0000
  157    0.0001                 5.60628E-05     4.4782
5.58998E-05     2.6970       0.00000E+00     0.0000
  158    0.0001                 6.79686E-05     4.4421
6.84494E-05     2.9017       0.00000E+00     0.0000
  159    0.0002                 1.54542E-04     2.9794
2.13935E-04     2.5277       0.00000E+00     0.0000
  160    0.0001                 5.78224E-05     4.2452
6.96483E-05     3.1718       0.00000E+00     0.0000
  161    0.0001                 7.40725E-05     3.6768
7.27990E-05     2.3808       0.00000E+00     0.0000
  162    0.0001                 8.58504E-05     3.8351
8.11984E-05     2.3796       0.00000E+00     0.0000
  163    0.0001                 9.43035E-05     3.5582
8.71599E-05     2.2194       0.00000E+00     0.0000
  164    0.0001                 9.79091E-05     4.0427
9.23067E-05     2.4727       0.00000E+00     0.0000
  165    0.0002                 1.15058E-04     3.8130
1.05244E-04     2.4148       0.00000E+00     0.0000
  166    0.0001                 6.93170E-05     4.6686
6.39210E-05     2.9572       0.00000E+00     0.0000
  167    0.0001                 7.11306E-05     4.1226
6.63107E-05     2.5569       0.00000E+00     0.0000
  168    0.0001                 8.83894E-05     4.3786
7.88252E-05     2.9272       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                 9.56892E-05     3.8060
8.66266E-05     2.5797       0.00000E+00     0.0000
  170    0.0002                 1.34877E-04     3.1616
1.15656E-04     2.3353       0.00000E+00     0.0000
  171    0.0001                 9.64218E-05     4.6691
7.44434E-05     3.7217       0.00000E+00     0.0000
  172    0.0002                 1.46222E-04     4.8484
1.02880E-04     4.0974       0.00000E+00     0.0000
  173    0.0002                 1.88986E-04     4.2025
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1.24809E-04	3.6698	0.00000E+00	0.0000	174	0.0003	2.50254E-04	4.0211
1.55645E-04	3.5963	0.00000E+00	0.0000	175	0.0001	1.13295E-04	5.9200
6.82846E-05	5.3596	0.00000E+00	0.0000	176	0.0001	1.14756E-04	6.8679
6.83885E-05	6.1787	0.00000E+00	0.0000	177	0.0002	1.15485E-04	6.6467
6.82992E-05	5.9556	0.00000E+00	0.0000	178	0.0002	1.20693E-04	4.7526
7.08008E-05	4.2401	0.00000E+00	0.0000	179	0.0001	1.09382E-04	5.5916
6.41809E-05	4.9472	0.00000E+00	0.0000	180	0.0001	1.03684E-04	6.8208
6.10161E-05	5.9992	0.00000E+00	0.0000	181	0.0001	1.13055E-04	6.4170
6.53475E-05	5.6702	0.00000E+00	0.0000	182	0.0001	1.05014E-04	6.0720
6.08054E-05	5.3066	0.00000E+00	0.0000	183	0.0001	1.04884E-04	6.5421
6.03154E-05	5.7496	0.00000E+00	0.0000	184	0.0001	1.01966E-04	5.7074
5.88378E-05	4.9679	0.00000E+00	0.0000	185	0.0001	9.85329E-05	6.0982
5.74144E-05	5.2101	0.00000E+00	0.0000	186	0.0001	9.15402E-05	6.8476
5.36648E-05	5.8531	0.00000E+00	0.0000	187	0.0001	9.06510E-05	6.2912
5.30592E-05	5.3373	0.00000E+00	0.0000	188	0.0001	7.92181E-05	6.4462
4.74421E-05	5.3055	0.00000E+00	0.0000	189	0.0001	7.34216E-05	6.5760
4.47334E-05	5.2737	0.00000E+00	0.0000	190	0.0003	2.21382E-04	4.1363
1.30745E-04	3.4151	0.00000E+00	0.0000	191	0.0003	1.96982E-04	4.2528
1.18810E-04	3.4583	0.00000E+00	0.0000	192	0.0003	1.95411E-04	3.6714
1.18872E-04	2.9230	0.00000E+00	0.0000	193	0.0003	1.92747E-04	3.9501
1.18217E-04	3.1454	0.00000E+00	0.0000	194	0.0005	3.85116E-04	3.0620
2.39204E-04	2.4037	0.00000E+00	0.0000	195	0.0006	4.31884E-04	2.7061
2.66505E-04	2.1121	0.00000E+00	0.0000	196	0.0006	4.67014E-04	2.4445
2.89406E-04	1.8941	0.00000E+00	0.0000	197	0.0007	5.16077E-04	2.5506
3.20262E-04	2.0104	0.00000E+00	0.0000	198	0.0007	5.73764E-04	2.1914
3.55378E-04	1.6932	0.00000E+00	0.0000	199	0.0004	3.33001E-04	3.3399

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2.05116E-04     2.6324       0.00000E+00     0.0000
  200    0.0005                 3.53885E-04     3.1974
2.17762E-04     2.5251       0.00000E+00     0.0000
  201    0.0010                 7.78458E-04     1.9998
4.78329E-04     1.5886       0.00000E+00     0.0000
  202    0.0013                 9.99294E-04     1.9964
6.02614E-04     1.6146       0.00000E+00     0.0000
  203    0.0016                 1.19641E-03     1.9423
7.17188E-04     1.5708       0.00000E+00     0.0000
  204    0.0022                 1.65536E-03     1.6883
9.76579E-04     1.3860       0.00000E+00     0.0000
  205    0.0015                 1.12551E-03     1.9608
6.60954E-04     1.6491       0.00000E+00     0.0000
  206    0.0018                 1.35324E-03     1.6738
7.92854E-04     1.4176       0.00000E+00     0.0000
  207    0.0022                 1.68383E-03     1.6134
9.77461E-04     1.4025       0.00000E+00     0.0000
  208    0.0028                 2.18291E-03     1.4383
1.27329E-03     1.2650       0.00000E+00     0.0000
  209    0.0031                 2.38862E-03     1.2780
1.40494E-03     1.1261       0.00000E+00     0.0000
  210    0.0037                 2.84703E-03     1.2820
1.69670E-03     1.1111       0.00000E+00     0.0000
  211    0.0041                 3.14335E-03     1.1914
1.89148E-03     1.0387       0.00000E+00     0.0000
  212    0.0047                 3.62250E-03     1.1977
2.19338E-03     1.0247       0.00000E+00     0.0000
  213    0.0064                 4.89202E-03     0.9741
2.96661E-03     0.8177       0.00000E+00     0.0000
  214    0.0095                 7.31606E-03     0.8758
4.40828E-03     0.7357       0.00000E+00     0.0000
  215    0.0159                 1.22002E-02     0.6445
7.25924E-03     0.5364       0.00000E+00     0.0000
  216    0.0299                 2.29253E-02     0.4224
1.35298E-02     0.3571       0.00000E+00     0.0000
  217    0.0201                 1.53939E-02     0.5355
9.05273E-03     0.4527       0.00000E+00     0.0000
  218    0.0278                 2.13102E-02     0.4825
1.24655E-02     0.4095       0.00000E+00     0.0000
  219    0.0359                 2.75220E-02     0.3705
1.60347E-02     0.3112       0.00000E+00     0.0000
  220    0.0474                 3.62907E-02     0.3477
2.10977E-02     0.2976       0.00000E+00     0.0000
  221    0.0626                 4.79425E-02     0.3144
2.77953E-02     0.2689       0.00000E+00     0.0000
  222    0.0804                 6.15705E-02     0.2714
3.56428E-02     0.2348       0.00000E+00     0.0000
  223    0.1042                 7.98765E-02     0.2416
4.63251E-02     0.2084       0.00000E+00     0.0000
  224    0.0580                 4.44709E-02     0.3032
2.59058E-02     0.2556       0.00000E+00     0.0000
1                            fuel bundle
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skipping 23 generations

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

  225    0.2309                 1.76885E-01     0.1681
1.04691E-01     0.1430       0.00000E+00     0.0000
  226    0.0454                 3.47877E-02     0.4013
2.11800E-02     0.3307       0.00000E+00     0.0000
  227    0.0489                 3.74831E-02     0.3430
2.32738E-02     0.2729       0.00000E+00     0.0000
  228    0.0212                 1.62511E-02     0.5531
1.02624E-02     0.4456       0.00000E+00     0.0000
  229    0.0224                 1.71788E-02     0.4633
1.10235E-02     0.3603       0.00000E+00     0.0000
  230    0.0117                 8.95870E-03     0.8444
5.85963E-03     0.6694       0.00000E+00     0.0000
  231    0.0122                 9.31921E-03     0.7493
6.20581E-03     0.5815       0.00000E+00     0.0000
  232    0.0129                 9.85307E-03     0.7378
6.72666E-03     0.5511       0.00000E+00     0.0000
  233    0.0083                 6.39364E-03     0.9313
4.48904E-03     0.6894       0.00000E+00     0.0000
  234    0.0059                 4.50407E-03     1.1518
3.25180E-03     0.8373       0.00000E+00     0.0000
  235    0.0024                 1.84097E-03     1.8090
1.22115E-03     1.3796       0.00000E+00     0.0000
  236    0.0019                 1.45975E-03     1.9751
9.80360E-04     1.5307       0.00000E+00     0.0000
  237    0.0016                 1.24501E-03     1.8982
8.97150E-04     1.3873       0.00000E+00     0.0000
  238    0.0001                 6.81994E-05     8.9933
5.97144E-05     5.1722       0.00000E+00     0.0000

 system total =                  7.66217E-01     0.0543
4.69068E-01     0.0445       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3093E-01  +
or -  0.0002



 elapsed time   3.11250 minutes

 random number=   7701E9CF996C839B
1                                                 fuel bundle
```

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.091E-03	0.05	7.662E-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

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	1.664E-08	31.89	1.223E-08	30.06	1.335E-08	30.97
3	8.854E-07	3.56	7.421E-07	3.28	7.831E-07	3.31
4	1.435E-06	3.16	1.184E-06	2.98	1.279E-06	2.99
5	2.277E-06	2.44	1.861E-06	2.26	2.012E-06	2.25
6	9.185E-06	1.28	7.362E-06	1.15	7.836E-06	1.12
7	1.236E-05	1.04	9.416E-06	0.90	1.004E-05	0.92
8	3.091E-05	0.83	2.264E-05	0.73	2.378E-05	0.70
9	8.173E-05	0.52	5.877E-05	0.44	6.140E-05	0.43
10	4.638E-05	0.68	3.305E-05	0.54	3.426E-05	0.52
11	2.205E-04	0.30	1.559E-04	0.23	1.616E-04	0.22
12	1.901E-04	0.28	1.379E-04	0.25	1.447E-04	0.26
13	5.677E-05	0.53	4.155E-05	0.45	4.332E-05	0.44
14	2.527E-04	0.21	1.834E-04	0.18	1.915E-04	0.18
15	2.201E-04	0.23	1.595E-04	0.20	1.663E-04	0.20
16	7.098E-05	0.52	5.166E-05	0.40	5.402E-05	0.39
17	3.212E-05	0.60	2.345E-05	0.58	2.437E-05	0.54
18	2.800E-05	0.63	2.028E-05	0.56	2.100E-05	0.59
19	5.032E-05	0.58	3.678E-05	0.47	3.831E-05	0.45
20	3.972E-05	0.54	2.927E-05	0.47	3.067E-05	0.45
21	8.004E-05	0.45	5.865E-05	0.37	6.119E-05	0.33
22	7.273E-05	0.44	5.302E-05	0.38	5.494E-05	0.36
23	7.724E-05	0.38	5.670E-05	0.32	5.889E-05	0.30
24	1.885E-05	0.82	1.381E-05	0.67	1.444E-05	0.63

25	2.345E-05	0.62	1.734E-05	0.61	1.820E-05	0.57
26	1.338E-05	1.02	9.841E-06	0.84	1.040E-05	0.80
27	4.212E-05	0.55	3.124E-05	0.42	3.307E-05	0.40
28	7.757E-05	0.45	5.769E-05	0.38	6.101E-05	0.35
29	7.940E-05	0.45	5.932E-05	0.38	6.216E-05	0.32
30	9.949E-06	1.06	7.408E-06	0.87	7.774E-06	0.81
31	7.865E-05	0.42	5.901E-05	0.36	6.211E-05	0.32
32	3.042E-05	0.64	2.306E-05	0.54	2.435E-05	0.53
33	2.678E-05	0.68	2.018E-05	0.52	2.126E-05	0.53
34	6.141E-05	0.43	4.646E-05	0.35	4.883E-05	0.32
35	3.608E-05	0.57	2.738E-05	0.51	2.886E-05	0.49
36	3.429E-05	0.55	2.588E-05	0.47	2.709E-05	0.44
37	2.195E-05	0.57	1.661E-05	0.48	1.744E-05	0.46
38	2.568E-05	0.61	1.960E-05	0.51	2.064E-05	0.47
39	9.790E-05	0.38	7.502E-05	0.31	7.926E-05	0.28
40	8.975E-05	0.33	6.918E-05	0.30	7.383E-05	0.26
41	1.134E-04	0.32	8.851E-05	0.29	9.440E-05	0.25
42	9.371E-05	0.30	7.407E-05	0.26	7.966E-05	0.21
43	5.139E-05	0.45	4.092E-05	0.35	4.303E-05	0.31
44	6.947E-05	0.34	5.585E-05	0.26	5.998E-05	0.26
45	3.533E-05	0.44	2.812E-05	0.39	3.116E-05	0.35
46	8.216E-06	0.79	6.559E-06	0.66	7.101E-06	0.65
47	2.340E-05	0.61	1.869E-05	0.51	1.943E-05	0.49
48	6.877E-06	1.19	5.468E-06	1.03	5.683E-06	0.88
49	4.371E-05	0.41	3.501E-05	0.33	3.773E-05	0.28
50	2.964E-05	0.43	2.381E-05	0.40	2.592E-05	0.36
51	7.935E-06	0.96	6.380E-06	0.83	6.910E-06	0.69
52	2.057E-05	0.56	1.668E-05	0.50	1.808E-05	0.44
53	7.673E-05	0.28	6.192E-05	0.26	6.705E-05	0.22
54	3.340E-05	0.47	2.701E-05	0.41	2.922E-05	0.35
55	6.649E-05	0.31	5.405E-05	0.27	5.901E-05	0.25
56	4.314E-05	0.39	3.511E-05	0.36	3.841E-05	0.30
57	4.910E-05	0.33	4.015E-05	0.31	4.369E-05	0.25
58	2.572E-05	0.44	2.104E-05	0.40	2.302E-05	0.37
59	4.422E-05	0.38	3.608E-05	0.34	3.938E-05	0.28
60	6.442E-05	0.31	5.275E-05	0.29	5.736E-05	0.23
61	6.110E-06	0.89	5.053E-06	0.85	5.481E-06	0.65
62	3.219E-05	0.44	2.647E-05	0.40	2.882E-05	0.30
63	2.159E-05	0.44	1.781E-05	0.40	1.940E-05	0.34
64	1.714E-05	0.56	1.405E-05	0.56	1.528E-05	0.41
65	5.711E-06	0.95	4.679E-06	0.87	5.093E-06	0.66
66	2.870E-05	0.44	2.356E-05	0.39	2.558E-05	0.34
67	2.123E-05	0.52	1.748E-05	0.47	1.899E-05	0.36
68	4.658E-06	0.97	3.815E-06	0.90	4.143E-06	0.72
69	3.778E-05	0.42	3.094E-05	0.38	3.349E-05	0.30
70	2.673E-05	0.47	2.204E-05	0.41	2.389E-05	0.32
71	4.554E-05	0.36	3.757E-05	0.35	4.088E-05	0.26
72	2.700E-06	1.39	2.216E-06	1.27	2.366E-06	1.06
73	2.705E-05	0.48	2.234E-05	0.40	2.429E-05	0.33
74	7.920E-05	0.26	6.561E-05	0.26	7.128E-05	0.22
75	9.041E-06	0.76	7.531E-06	0.72	8.161E-06	0.54
76	2.291E-05	0.43	1.900E-05	0.38	2.066E-05	0.34

77	1.775E-05	0.49	1.470E-05	0.48	1.602E-05	0.39
78	1.547E-06	1.52	1.298E-06	1.30	1.423E-06	1.22
79	1.000E-05	0.69	8.265E-06	0.65	8.983E-06	0.55
80	4.444E-06	1.06	3.695E-06	0.88	4.046E-06	0.79
81	5.560E-05	0.34	4.619E-05	0.33	4.998E-05	0.26
82	3.296E-06	1.42	2.751E-06	1.18	2.951E-06	0.92
83	4.451E-06	0.99	3.709E-06	0.96	4.019E-06	0.81
84	8.385E-06	0.77	6.920E-06	0.68	7.459E-06	0.57
85	9.924E-06	0.69	8.311E-06	0.64	8.962E-06	0.52
86	1.360E-05	0.55	1.134E-05	0.53	1.230E-05	0.44
87	1.190E-05	0.66	1.001E-05	0.58	1.082E-05	0.47
88	3.115E-06	1.20	2.619E-06	1.15	2.841E-06	0.94
89	6.696E-06	0.88	5.550E-06	0.75	5.994E-06	0.66
90	7.008E-06	0.98	5.838E-06	0.83	6.244E-06	0.64
91	8.212E-06	0.89	6.948E-06	0.79	7.470E-06	0.56
92	4.799E-06	1.07	4.023E-06	0.98	4.323E-06	0.88
93	8.155E-06	0.77	6.816E-06	0.65	7.339E-06	0.57
94	4.238E-06	1.10	3.517E-06	0.97	3.808E-06	0.81
95	1.247E-05	0.58	1.047E-05	0.54	1.139E-05	0.44
96	3.396E-06	1.16	2.837E-06	1.05	3.055E-06	0.88
97	3.381E-06	1.21	2.835E-06	0.97	3.093E-06	0.78
98	3.567E-06	1.25	2.981E-06	1.03	3.219E-06	0.88
99	2.302E-06	1.43	1.954E-06	1.23	2.105E-06	1.05
100	3.403E-06	1.23	2.872E-06	1.09	3.130E-06	0.92
101	4.974E-06	1.02	4.119E-06	0.82	4.515E-06	0.70
102	3.426E-06	1.24	2.857E-06	1.10	3.097E-06	0.97
103	4.740E-06	1.08	3.988E-06	0.94	4.272E-06	0.69
104	4.062E-06	0.96	3.463E-06	1.00	3.746E-06	0.81
105	4.341E-06	0.97	3.646E-06	0.88	3.922E-06	0.72
106	1.518E-06	1.65	1.291E-06	1.48	1.393E-06	1.31
107	3.570E-06	1.22	2.973E-06	1.14	3.214E-06	0.95
108	3.196E-06	1.18	2.719E-06	1.03	2.967E-06	0.88
109	5.144E-06	0.90	4.349E-06	0.82	4.698E-06	0.75
110	2.986E-06	1.35	2.527E-06	1.16	2.781E-06	0.97
111	3.045E-06	1.35	2.556E-06	1.18	2.811E-06	1.00
112	1.789E-06	1.55	1.499E-06	1.37	1.669E-06	1.20
113	5.711E-06	1.05	4.815E-06	0.85	5.184E-06	0.76
114	1.997E-06	1.52	1.677E-06	1.46	1.814E-06	1.14
115	5.067E-06	0.95	4.275E-06	0.88	4.588E-06	0.64
116	1.082E-05	0.71	9.069E-06	0.60	9.825E-06	0.48
117	1.179E-05	0.64	9.913E-06	0.56	1.077E-05	0.44
118	1.293E-05	0.74	1.088E-05	0.61	1.181E-05	0.51
119	8.236E-06	0.86	6.984E-06	0.74	7.554E-06	0.61
120	5.773E-06	0.84	4.918E-06	0.76	5.364E-06	0.64
121	6.131E-06	0.93	5.201E-06	0.91	5.632E-06	0.69
122	3.244E-06	1.20	2.718E-06	1.08	2.950E-06	0.90
123	1.046E-05	0.72	8.757E-06	0.64	9.470E-06	0.52
124	7.251E-06	0.87	6.089E-06	0.65	6.636E-06	0.59
125	6.981E-06	0.92	5.890E-06	0.76	6.336E-06	0.61
126	5.815E-06	1.03	4.870E-06	0.84	5.280E-06	0.75
127	5.497E-06	0.99	4.674E-06	0.79	5.063E-06	0.66
128	7.709E-06	0.72	6.475E-06	0.66	7.025E-06	0.58

129	9.699E-06	0.71	8.157E-06	0.67	8.833E-06	0.57
130	3.959E-06	0.97	3.386E-06	0.88	3.686E-06	0.72
131	1.680E-05	0.53	1.413E-05	0.50	1.532E-05	0.42
132	1.113E-05	0.62	9.367E-06	0.58	1.017E-05	0.49
133	1.353E-05	0.60	1.146E-05	0.51	1.246E-05	0.46
134	1.488E-05	0.56	1.248E-05	0.48	1.344E-05	0.38
135	2.403E-06	1.45	2.041E-06	1.31	2.219E-06	0.99
136	3.859E-06	0.92	3.329E-06	0.73	3.680E-06	0.76
137	2.538E-06	0.88	2.631E-06	1.08	2.950E-06	0.77
138	4.088E-06	0.92	3.557E-06	0.87	3.891E-06	0.76
139	4.625E-06	0.94	3.904E-06	0.85	4.230E-06	0.77
140	1.201E-05	0.64	1.013E-05	0.53	1.101E-05	0.47
141	8.815E-06	0.76	7.472E-06	0.65	8.048E-06	0.54
142	5.811E-06	0.95	4.939E-06	0.88	5.329E-06	0.72
143	2.006E-05	0.51	1.690E-05	0.44	1.811E-05	0.33
144	8.108E-06	0.80	6.777E-06	0.66	7.352E-06	0.53
145	7.133E-06	0.77	6.045E-06	0.75	6.543E-06	0.56
146	1.204E-05	0.61	1.017E-05	0.52	1.096E-05	0.42
147	3.605E-06	1.20	3.067E-06	1.03	3.322E-06	0.84
148	1.908E-06	1.69	1.604E-06	1.50	1.719E-06	1.17
149	1.220E-06	1.83	1.018E-06	1.57	1.107E-06	1.29
150	3.936E-06	0.93	3.343E-06	0.87	3.611E-06	0.73
151	4.112E-06	1.09	3.472E-06	1.00	3.754E-06	0.73
152	4.289E-06	1.06	3.639E-06	0.87	3.928E-06	0.75
153	4.524E-06	0.96	3.797E-06	0.91	4.106E-06	0.73
154	4.638E-06	1.00	3.914E-06	0.93	4.204E-06	0.66
155	4.292E-06	1.15	3.643E-06	0.96	3.935E-06	0.82
156	4.011E-06	1.29	3.368E-06	1.15	3.614E-06	0.90
157	4.741E-06	0.94	3.964E-06	0.79	4.275E-06	0.71
158	4.820E-06	0.97	4.037E-06	0.83	4.372E-06	0.76
159	6.747E-06	0.89	5.705E-06	0.81	6.133E-06	0.66
160	3.482E-06	1.20	2.983E-06	1.00	3.208E-06	0.86
161	4.972E-06	1.00	4.196E-06	0.86	4.491E-06	0.66
162	5.857E-06	0.95	4.940E-06	0.86	5.314E-06	0.66
163	6.190E-06	1.01	5.222E-06	0.88	5.605E-06	0.69
164	6.444E-06	0.87	5.479E-06	0.73	5.936E-06	0.66
165	7.033E-06	0.79	5.877E-06	0.64	6.302E-06	0.54
166	3.974E-06	0.97	3.349E-06	0.97	3.629E-06	0.80
167	4.140E-06	0.90	3.476E-06	0.79	3.772E-06	0.74
168	4.322E-06	1.10	3.613E-06	0.93	3.936E-06	0.80
169	4.521E-06	1.01	3.753E-06	0.82	4.052E-06	0.67
170	4.607E-06	0.99	3.848E-06	0.82	4.172E-06	0.70
171	2.415E-06	1.41	2.039E-06	1.34	2.179E-06	1.08
172	2.464E-06	1.37	2.061E-06	1.16	2.211E-06	1.10
173	2.448E-06	1.32	2.082E-06	1.20	2.278E-06	0.96
174	2.509E-06	1.24	2.137E-06	1.15	2.312E-06	0.98
175	1.019E-06	2.58	8.662E-07	2.01	9.295E-07	1.76
176	1.039E-06	1.97	8.652E-07	1.71	9.389E-07	1.51
177	1.050E-06	2.08	8.895E-07	1.73	9.547E-07	1.44
178	1.054E-06	2.02	8.938E-07	1.81	9.586E-07	1.56
179	1.068E-06	1.85	8.865E-07	1.72	9.709E-07	1.33
180	1.060E-06	1.96	8.993E-07	1.88	9.713E-07	1.41

181	1.049E-06	1.57	8.947E-07	1.63	9.749E-07	1.36
182	1.055E-06	1.96	9.153E-07	1.93	9.941E-07	1.47
183	1.074E-06	1.89	8.969E-07	1.85	9.882E-07	1.57
184	1.114E-06	1.92	9.443E-07	1.65	1.028E-06	1.37
185	1.106E-06	2.18	9.442E-07	1.91	1.032E-06	1.51
186	1.145E-06	1.99	9.717E-07	1.90	1.038E-06	1.46
187	1.121E-06	2.06	9.383E-07	1.67	1.031E-06	1.46
188	1.136E-06	1.86	9.751E-07	1.78	1.059E-06	1.46
189	1.194E-06	1.95	1.016E-06	1.63	1.086E-06	1.32
190	3.077E-06	1.18	2.582E-06	1.04	2.779E-06	0.80
191	3.078E-06	1.12	2.612E-06	1.04	2.814E-06	0.89
192	3.142E-06	1.10	2.687E-06	1.01	2.883E-06	0.82
193	3.187E-06	1.08	2.717E-06	1.02	2.955E-06	0.81
194	6.921E-06	0.93	5.869E-06	0.86	6.306E-06	0.67
195	7.381E-06	0.81	6.259E-06	0.75	6.644E-06	0.54
196	7.761E-06	0.76	6.536E-06	0.64	7.057E-06	0.52
197	8.362E-06	0.75	7.112E-06	0.68	7.659E-06	0.57
198	8.878E-06	0.60	7.543E-06	0.62	8.161E-06	0.47
199	4.833E-06	0.94	4.096E-06	0.89	4.406E-06	0.67
200	5.089E-06	0.95	4.312E-06	0.79	4.665E-06	0.65
201	1.064E-05	0.60	9.009E-06	0.55	9.734E-06	0.44
202	1.190E-05	0.66	1.009E-05	0.58	1.097E-05	0.44
203	1.282E-05	0.59	1.090E-05	0.54	1.182E-05	0.41
204	1.471E-05	0.57	1.252E-05	0.49	1.359E-05	0.40
205	8.554E-06	0.65	7.679E-06	0.59	8.188E-06	0.51
206	9.409E-06	0.64	8.442E-06	0.57	8.936E-06	0.50
207	9.702E-06	0.52	8.770E-06	0.49	9.246E-06	0.38
208	1.129E-05	0.62	1.017E-05	0.58	1.085E-05	0.43
209	1.158E-05	0.59	1.054E-05	0.51	1.117E-05	0.41
210	1.399E-05	0.50	1.274E-05	0.46	1.362E-05	0.37
211	1.614E-05	0.51	1.456E-05	0.44	1.549E-05	0.37
212	1.923E-05	0.43	1.739E-05	0.41	1.847E-05	0.32
213	2.630E-05	0.38	2.352E-05	0.32	2.526E-05	0.26
214	3.674E-05	0.34	3.300E-05	0.30	3.552E-05	0.27
215	5.521E-05	0.25	4.983E-05	0.23	5.373E-05	0.19
216	9.191E-05	0.21	8.368E-05	0.18	9.043E-05	0.15
217	5.544E-05	0.21	5.299E-05	0.22	5.612E-05	0.16
218	7.087E-05	0.21	6.792E-05	0.18	7.218E-05	0.16
219	8.405E-05	0.20	8.124E-05	0.18	8.653E-05	0.14
220	1.015E-04	0.19	9.917E-05	0.15	1.054E-04	0.14
221	1.203E-04	0.17	1.184E-04	0.14	1.263E-04	0.13
222	1.366E-04	0.16	1.366E-04	0.13	1.456E-04	0.11
223	1.532E-04	0.15	1.570E-04	0.13	1.673E-04	0.11
224	7.501E-05	0.20	7.963E-05	0.17	8.427E-05	0.12
225	2.328E-04	0.13	2.713E-04	0.09	2.816E-04	0.09
226	3.175E-05	0.21	4.475E-05	0.20	4.440E-05	0.11
227	2.878E-05	0.24	4.626E-05	0.20	4.439E-05	0.12
228	1.046E-05	0.38	1.901E-05	0.30	1.752E-05	0.18
229	9.718E-06	0.40	1.957E-05	0.27	1.746E-05	0.16
230	4.505E-06	0.57	1.021E-05	0.44	8.699E-06	0.23
231	4.235E-06	0.54	1.053E-05	0.40	8.725E-06	0.18
232	3.953E-06	0.58	1.130E-05	0.44	8.885E-06	0.20

233	2.261E-06	0.71	7.426E-06	0.52	5.515E-06	0.26
234	1.441E-06	0.94	5.355E-06	0.63	3.820E-06	0.30
235	5.183E-07	1.68	1.041E-06	0.97	1.114E-06	0.56
236	3.472E-07	1.76	7.483E-07	1.38	7.964E-07	0.59
237	2.267E-07	2.09	5.421E-07	1.42	6.185E-07	0.58
238	4.907E-09	10.95	2.163E-08	5.06	2.529E-08	1.87

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
 0.7562 to 0.7590     ****
 0.7590 to 0.7619     *********
 0.7619 to 0.7647     *************************
 0.7647 to 0.7675     ************************
 0.7675 to 0.7704     *********************
```

```
 0.7704 to 0.7732     ************
 0.7732 to 0.7760     ****
 0.7760 to 0.7788     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7562 to 0.7590     ****
 0.7590 to 0.7619     *******
 0.7619 to 0.7647     *****************
 0.7647 to 0.7675     ****************
 0.7675 to 0.7704     *******************
 0.7704 to 0.7732     *********
 0.7732 to 0.7760     ***
 0.7760 to 0.7788

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7562 to 0.7590     ***
 0.7590 to 0.7619     **
 0.7619 to 0.7647     **********
 0.7647 to 0.7675     ***********
 0.7675 to 0.7704     **************
 0.7704 to 0.7732     ********
 0.7732 to 0.7760     **
 0.7760 to 0.7788

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7562 to 0.7590
 0.7590 to 0.7619     *
 0.7619 to 0.7647     ****
 0.7647 to 0.7675     ******
 0.7675 to 0.7704     *******
 0.7704 to 0.7732     *****
 0.7732 to 0.7760     **
 0.7760 to 0.7788

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

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        ***
***
        ***                                     ******      final results
```

```
table      ******                                   ***
        ***
***
        ***        best estimate system k-eff
0.76611 + or - 0.00048                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.64040E-02 + or -  1.11250E-04            ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.37983E-06            ***
        ***
***
        ***        system mean free path (cm)
6.53229E-01 + or -  1.73359E-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     3.11433 minutes


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```

1

```
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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 99999999999 // 22222222222
22222222222 // 11 666666666666
000000000 9999999999999 // 2222222222222
2222222222222 // 111 6666666666666
00 00 99 99 // 22 22 22
22 // 1111 66
00 00 99 99 // 22
22 // 11 66
00 00 99 99 // 22
22 // 11 66
00 00 9999999999999 // 22
22 // 11 666666666666
00 00 999999999999 // 22
22 // 11 6666666666666
00 00 99 // 22
22 // 11 66 66
00 00 99 // 22
22 // 11 66 66
00 00 99 // 22 22
// 11 66 66
000000000 9999999999999 // 2222222222222
2222222222222 // 11111111 6666666666666
0000000 999999999999 // 2222222222222
2222222222222 // 11111111 66666666666

0000000 5555555555555 22222222222
44 11 88888888888
000000000 5555555555555 2222222222222
444 111 8888888888888
00 00 55 ::: 22 22
4444 ::: 1111 88 88
00 00 55 ::: 22
44 44 ::: 11 88 88
00 00 55 ::: 22
44 44 ::: 11 88 88
00 00 555555555555 22
44 44 11 88888888888
00 00 5555555555555 22
44 44 11 88888888888
00 00 55 ::: 22
444444444444 ::: 11 88 88
00 00 55 ::: 22
4444444444444 ::: 11 88 88
00 00 55 55 ::: 22
44 ::: 11 88 88
000000000 5555555555555 2222222222222
44 11111111 8888888888888

```
      0000000       55555555555                    2222222222222
44                        11111111      88888888888
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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
EEEEEEEE
    SSSSSSSSSSSS   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     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

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

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```

```
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:24:18.72
*****
        *****
*****
        *****
*****

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

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*********************************************
        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                ------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                   ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                  ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

*********************************************************************
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                                 ........ 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  2.94383E-13  8.88098E-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  8.26118E-16  2.72247E-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
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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
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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  3.73863E-12  9.27903E-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  2.91290E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.63988E-08  4.51143E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  4.00151E-11  1.11284E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.66218E-08  4.67233E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  4.05680E-11  1.15252E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.71233E-09  7.78684E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  4.16107E-20  1.15721E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  2.58502E-12  7.34384E-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  1.12862E-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  6.82265E-09  1.97909E-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  1.21496E-11  3.59711E-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  2.69117E-11  7.96759E-10   43099    98.9062     tc99 4325
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endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  3.48291E-11  1.05201E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  2.81409E-11  8.58406E-10   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  1.79311E-11  5.52346E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  1.28087E-11  3.98388E-10   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  2.65503E-12  8.41700E-11   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  2.04219E-12  6.29066E-11   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.09919E-12  3.45170E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  5.27529E-12  1.65655E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  1.03275E-12  3.30487E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  3.72519E-13  1.20323E-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  1.98807E-13  6.48098E-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
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  5.86955E-14  2.01884E-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  6.50163E-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
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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  3.71006E-13  1.39828E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  5.68916E-13  2.16116E-11   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  3.71113E-12  1.43198E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30209E-12  5.25833E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  7.53752E-12  2.95356E-10   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.10945E-11  8.39220E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88657E-12  7.61852E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.95659E-11  7.78401E-10   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  5.20536E-17  2.08648E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  3.97937E-11  1.60697E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  4.08126E-11  1.67256E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29671E-08  1.36089E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  2.96017E-11  1.23973E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  4.44463E-11  1.84807E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  3.41558E-11  1.44067E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  3.97784E-11  1.68974E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.29077E-12  2.69113E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  3.55294E-11  1.53056E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  4.70698E-12  1.98536E-10   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  2.58551E-11  1.10605E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  7.88520E-12  3.37316E-10   60143   142.9098     nd143 6028
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endf/b7 rel0 rev7 mod1                12/17/09
    1060144  5.42532E-13  2.33711E-11   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  2.51797E-11  1.09224E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  2.05136E-11  8.95980E-10   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.04132E-11  4.57949E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.10300E-11  4.88376E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  4.66611E-12  2.05203E-10   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.60868E-19  7.12279E-18   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.82578E-12  8.13876E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.50339E-14  6.61148E-13   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  5.47844E-12  2.44210E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  3.00686E-16  1.34936E-14   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.00974E-09  1.35968E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  1.79547E-12  8.16495E-11   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.31247E-13  1.05854E-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  1.55997E-09  7.14078E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  4.38392E-16  2.01989E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  2.21746E-13  1.02833E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  7.29628E-14  3.40548E-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  1.98140E-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  4.51796E-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
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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  1.76388E-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  1.63084E-13  1.15721E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.61619E-20  1.15165E-18   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  2.32208E-11  1.66162E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.12773E-18  2.24750E-16   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.98408E-21  7.20426E-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  1.00160E-20  7.22731E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  2.34393E-26  1.69836E-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
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							
		3048116	cd116	4855	endf/b7	rel0	rev7	
mod1	12/17/09							

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                                        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
```

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                                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
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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:
  9523 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

                                            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       ........

                                ........     0.01517 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
0.01583 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 15535 independent fission points were generated for generation 1
          1       7.60546E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15675 independent fission points were generated for generation 2
          2       7.70060E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15474 independent fission points were generated for generation 3
          3       7.56250E-01      7.56250E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.74677E-01      7.65464E-01      9.21375E-03
0.00000E+00      0.00000E+00
          5       7.55833E-01      7.62253E-01      6.21310E-03
0.00000E+00      0.00000E+00
          6       7.58992E-01      7.61438E-01      4.46835E-03
0.00000E+00      0.00000E+00
          7       7.68067E-01      7.62764E-01      3.70638E-03
0.00000E+00      0.00000E+00
          8       7.68454E-01      7.63712E-01      3.17136E-03
0.00000E+00      0.00000E+00
          9       7.56629E-01      7.62700E-01      2.86492E-03
0.00000E+00      0.00000E+00
```

10	7.65739E-01	7.63080E-01	2.50999E-03	0.00000E+00	0.00000E+00
11	7.58508E-01	7.62572E-01	2.27115E-03	0.00000E+00	0.00000E+00
12	7.65864E-01	7.62901E-01	2.05789E-03	0.00000E+00	0.00000E+00
13	7.65002E-01	7.63092E-01	1.87120E-03	0.00000E+00	0.00000E+00
14	7.63998E-01	7.63168E-01	1.70983E-03	0.00000E+00	0.00000E+00
15	7.65367E-01	7.63337E-01	1.58188E-03	0.00000E+00	0.00000E+00
16	7.66875E-01	7.63590E-01	1.48619E-03	0.00000E+00	0.00000E+00
17	7.60792E-01	7.63403E-01	1.39607E-03	0.00000E+00	0.00000E+00
18	7.67076E-01	7.63633E-01	1.32593E-03	0.00000E+00	0.00000E+00
19	7.68383E-01	7.63912E-01	1.27646E-03	0.00000E+00	0.00000E+00
20	7.64071E-01	7.63921E-01	1.20349E-03	0.00000E+00	0.00000E+00
21	7.68306E-01	7.64152E-01	1.16154E-03	0.00000E+00	0.00000E+00
22	7.65838E-01	7.64236E-01	1.10516E-03	0.00000E+00	0.00000E+00
23	7.63322E-01	7.64192E-01	1.05212E-03	0.00000E+00	0.00000E+00
24	7.63536E-01	7.64163E-01	1.00360E-03	0.00000E+00	0.00000E+00
25	7.68732E-01	7.64361E-01	9.79335E-04	0.00000E+00	0.00000E+00
26	7.69866E-01	7.64591E-01	9.65286E-04	0.00000E+00	0.00000E+00
27	7.68074E-01	7.67552E-01	1.96417E-03	0.00000E+00	0.00000E+00
28	7.69286E-01	7.67899E-01	1.45926E-03	0.00000E+00	0.00000E+00
29	7.64734E-01	7.67371E-01	1.30195E-03	0.00000E+00	0.00000E+00
30	7.65863E-01	7.67156E-01	1.38202E-03	0.00000E+00	0.00000E+00
31	7.73922E-01	7.68001E-01	1.34435E-03	0.00000E+00	0.00000E+00
32	7.67222E-01	7.67915E-01	1.16837E-03	0.00000E+00	0.00000E+00
33	7.67260E-01	7.67849E-01	1.03300E-03	0.00000E+00	0.00000E+00
34	7.66934E-01	7.67766E-01	9.28518E-04	0.00000E+00	0.00000E+00
35	7.67610E-01	7.67753E-01	8.39998E-04	0.00000E+00	0.00000E+00

36	7.71161E-01	7.68015E-01	8.18047E-04	0.00000E+00
37	7.67486E-01	7.67977E-01	7.53604E-04	0.00000E+00
38	7.71592E-01	7.68218E-01	7.44163E-04	0.00000E+00
39	7.62739E-01	7.67876E-01	7.83579E-04	0.00000E+00
40	7.60230E-01	7.67426E-01	9.57445E-04	0.00000E+00
41	7.66264E-01	7.67362E-01	9.39971E-04	0.00000E+00
42	7.63106E-01	7.67138E-01	1.00785E-03	0.00000E+00
43	7.67013E-01	7.67131E-01	9.52300E-04	0.00000E+00
44	7.67227E-01	7.67136E-01	8.97129E-04	0.00000E+00
45	7.73298E-01	7.67416E-01	8.53190E-04	0.00000E+00
46	7.68007E-01	7.67442E-01	8.22218E-04	0.00000E+00
47	7.69244E-01	7.67517E-01	8.35683E-04	0.00000E+00
48	7.66998E-01	7.67496E-01	7.94035E-04	0.00000E+00
49	7.56314E-01	7.67066E-01	8.74216E-04	0.00000E+00
50	7.65366E-01	7.67003E-01	8.78477E-04	0.00000E+00
51	7.58448E-01	7.66697E-01	1.09864E-03	0.00000E+00
52	7.63195E-01	7.66577E-01	1.16807E-03	0.00000E+00
53	7.64825E-01	7.66518E-01	1.15644E-03	0.00000E+00
54	7.61401E-01	7.66353E-01	1.28758E-03	0.00000E+00
55	7.61796E-01	7.66211E-01	1.30912E-03	0.00000E+00
56	7.63252E-01	7.66121E-01	1.32462E-03	0.00000E+00
57	7.64629E-01	7.66077E-01	1.30112E-03	0.00000E+00
58	7.63394E-01	7.66001E-01	1.28488E-03	0.00000E+00
59	7.64272E-01	7.65953E-01	1.26120E-03	0.00000E+00
60	7.61108E-01	7.65822E-01	1.42069E-03	0.00000E+00
61	7.67450E-01	7.65864E-01	1.21612E-03	0.00000E+00

62	7.66527E-01	7.65881E-01	1.17663E-03	0.00000E+00
63	7.64607E-01	7.65850E-01	1.14739E-03	0.00000E+00
64	7.60151E-01	7.65711E-01	1.72490E-03	0.00000E+00
65	7.59077E-01	7.65553E-01	1.79842E-03	0.00000E+00
66	7.69010E-01	7.65633E-01	1.67523E-03	0.00000E+00
67	7.65895E-01	7.65639E-01	1.61823E-03	0.00000E+00
68	7.70402E-01	7.65745E-01	1.16259E-03	0.00000E+00
69	7.63847E-01	7.65704E-01	1.12987E-03	0.00000E+00
70	7.60348E-01	7.65590E-01	1.13868E-03	0.00000E+00
71	7.63116E-01	7.65538E-01	1.12617E-03	0.00000E+00
72	7.72076E-01	7.65672E-01	1.06851E-03	0.00000E+00
73	7.63522E-01	7.65629E-01	1.03533E-03	0.00000E+00
74	7.66011E-01	7.65636E-01	1.01258E-03	0.00000E+00
75	7.67429E-01	7.65671E-01	9.93231E-04	0.00000E+00
76	7.69735E-01	7.65747E-01	9.56859E-04	0.00000E+00
77	7.67673E-01	7.65783E-01	9.42290E-04	0.00000E+00
78	7.57378E-01	7.65630E-01	8.28473E-04	0.00000E+00
79	7.66870E-01	7.65652E-01	8.11312E-04	0.00000E+00
80	7.65355E-01	7.65647E-01	7.95952E-04	0.00000E+00
81	7.69399E-01	7.65712E-01	6.69658E-04	0.00000E+00
82	7.74007E-01	7.65852E-01	1.12154E-03	0.00000E+00
83	7.75515E-01	7.66013E-01	7.46704E-04	0.00000E+00
84	7.61860E-01	7.65945E-01	7.05961E-04	0.00000E+00
85	7.68848E-01	7.65992E-01	1.11997E-03	0.00000E+00
86	7.65947E-01	7.65991E-01	1.09789E-03	0.00000E+00
87	7.59710E-01	7.65893E-01	1.06062E-03	0.00000E+00

```
         88       7.68526E-01      7.65934E-01      1.05433E-03
0.00000E+00      0.00000E+00
         89       7.66119E-01      7.65937E-01      1.03536E-03
0.00000E+00      0.00000E+00
         90       7.71089E-01      7.66013E-01      1.05193E-03
0.00000E+00      0.00000E+00
         91       7.62126E-01      7.65956E-01      6.37484E-04
0.00000E+00      0.00000E+00
         92       7.59874E-01      7.65868E-01      6.31683E-04
0.00000E+00      0.00000E+00
         93       7.68094E-01      7.65900E-01      9.47045E-04
0.00000E+00      0.00000E+00
         94       7.70929E-01      7.65971E-01      6.03219E-04
0.00000E+00      0.00000E+00
         95       7.60852E-01      7.65900E-01      9.16522E-04
0.00000E+00      0.00000E+00
         96       7.61730E-01      7.65843E-01      8.98726E-04
0.00000E+00      0.00000E+00
         97       7.69699E-01      7.65895E-01      5.77058E-04
0.00000E+00      0.00000E+00
         98       7.69128E-01      7.65938E-01      5.69372E-04
0.00000E+00      0.00000E+00
         99       7.60086E-01      7.65861E-01      6.19441E-04
0.00000E+00      0.00000E+00
        100       7.68093E-01      7.65890E-01      6.03615E-04
0.00000E+00      0.00000E+00
        101       7.64650E-01      7.65874E-01      8.16267E-04
0.00000E+00      0.00000E+00
        102       7.68923E-01      7.65912E-01      5.86964E-04
0.00000E+00      0.00000E+00
        103       7.66133E-01      7.65915E-01      5.79276E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=65CE20B8B28FFECC
        104       7.72484E-01      7.65996E-01      7.82235E-04
0.00000E+00      0.00000E+00
        105       7.71476E-01      7.66063E-01      5.83826E-04
0.00000E+00      0.00000E+00
        106       7.60916E-01      7.66001E-01      5.68562E-04
0.00000E+00      0.00000E+00
        107       7.64428E-01      7.65982E-01      5.59431E-04
0.00000E+00      0.00000E+00
        108       7.66696E-01      7.65991E-01      5.54678E-04
0.00000E+00      0.00000E+00
        109       7.72542E-01      7.66067E-01      5.06731E-04
0.00000E+00      0.00000E+00
        110       7.66539E-01      7.66072E-01      5.01618E-04
0.00000E+00      0.00000E+00
        111       7.70319E-01      7.66121E-01      4.98713E-04
0.00000E+00      0.00000E+00
        112       7.73347E-01      7.66202E-01      5.69855E-04
0.00000E+00      0.00000E+00
```

```
        113       7.72917E-01      7.66276E-01      5.93060E-04
0.00000E+00      0.00000E+00
        114       7.70545E-01      7.66323E-01      6.12049E-04
0.00000E+00      0.00000E+00
        115       7.63651E-01      7.66294E-01      5.91994E-04
0.00000E+00      0.00000E+00
        116       7.62168E-01      7.66250E-01      5.70394E-04
0.00000E+00      0.00000E+00
        117       7.67299E-01      7.66261E-01      5.67432E-04
0.00000E+00      0.00000E+00
        118       7.66833E-01      7.66267E-01      5.62325E-04
0.00000E+00      0.00000E+00
        119       7.65868E-01      7.66263E-01      5.56272E-04
0.00000E+00      0.00000E+00
        120       7.61632E-01      7.66215E-01      5.58450E-04
0.00000E+00      0.00000E+00
        121       7.67258E-01      7.66226E-01      5.50973E-04
0.00000E+00      0.00000E+00
        122       7.66648E-01      7.66230E-01      5.45301E-04
0.00000E+00      0.00000E+00
        123       7.60872E-01      7.66177E-01      5.46738E-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=ECCE03D238295B9B
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55160E-05 + or -  1.02612E-08             generation time
=  2.99467E-05 + or -  1.90506E-08
 nu bar   =  2.43895E+00 + or -  8.41757E-06       average fission group
=  2.17559E+02 + or -  1.00138E-02
                      energy(ev) of the average lethargy causing fission
=  5.65730E-02 + or -  1.31029E-04
                                                 system mean free path (cm)
=  6.52713E-01 + or -  1.75033E-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          0.76618   + or - 0.00055     0.76563 to 0.76672
0.76508 to 0.76727    0.76454 to 0.76782    2000000       6.9668

      24          0.76620   + or - 0.00056     0.76565 to 0.76676
0.76509 to 0.76731    0.76454 to 0.76787    1980000       6.8918
```

25	0.76618	+ or - 0.00056	0.76562 to 0.76674	0.76506 to 0.76729	0.76450 to 0.76785	1960000	6.9549
26	0.76614	+ or - 0.00056	0.76558 to 0.76670	0.76503 to 0.76725	0.76447 to 0.76781	1940000	7.1383
27	0.76612	+ or - 0.00056	0.76556 to 0.76668	0.76501 to 0.76723	0.76445 to 0.76779	1920000	7.2541
28	0.76609	+ or - 0.00056	0.76553 to 0.76664	0.76497 to 0.76720	0.76442 to 0.76775	1900000	7.4338
29	0.76610	+ or - 0.00056	0.76554 to 0.76666	0.76497 to 0.76723	0.76441 to 0.76779	1880000	7.3872
30	0.76610	+ or - 0.00057	0.76553 to 0.76667	0.76496 to 0.76724	0.76439 to 0.76781	1860000	7.3364
31	0.76602	+ or - 0.00055	0.76547 to 0.76657	0.76491 to 0.76712	0.76436 to 0.76768	1840000	7.7636
32	0.76600	+ or - 0.00056	0.76545 to 0.76656	0.76489 to 0.76712	0.76434 to 0.76767	1820000	7.8133
37	0.76588	+ or - 0.00059	0.76529 to 0.76647	0.76470 to 0.76706	0.76411 to 0.76765	1720000	7.6665
42	0.76595	+ or - 0.00065	0.76531 to 0.76660	0.76466 to 0.76724	0.76401 to 0.76789	1620000	7.1411
47	0.76575	+ or - 0.00091	0.76484 to 0.76666	0.76393 to 0.76757	0.76302 to 0.76849	1520000	3.9701
52	0.76601	+ or - 0.00057	0.76544 to 0.76659	0.76487 to 0.76716	0.76429 to 0.76773	1420000	10.0336
57	0.76623	+ or - 0.00059	0.76564 to 0.76682	0.76505 to 0.76740	0.76446 to 0.76799	1320000	10.9097
62	0.76637	+ or - 0.00062	0.76574 to 0.76699	0.76512 to 0.76761	0.76450 to 0.76823	1220000	11.1870
67	0.76660	+ or - 0.00063	0.76597 to 0.76723	0.76533 to 0.76787	0.76470 to 0.76850	1120000	12.2793
72	0.76666	+ or - 0.00067	0.76599 to 0.76733	0.76532 to 0.76800	0.76465 to 0.76867	1020000	13.0513
77	0.76664	+ or - 0.00074	0.76590 to 0.76738	0.76515 to 0.76812	0.76441 to 0.76887	920000	12.8189

```
      82          0.76664   + or - 0.00092     0.76572 to 0.76756
0.76480 to 0.76848    0.76388 to 0.76940     820000       8.6804

      87          0.76668   + or - 0.00103     0.76565 to 0.76772
0.76461 to 0.76875    0.76358 to 0.76979     720000       7.0195

      92          0.76686   + or - 0.00087     0.76599 to 0.76773
0.76512 to 0.76860    0.76425 to 0.76947     620000      12.4807

      97          0.76698   + or - 0.00097     0.76601 to 0.76795
0.76504 to 0.76892    0.76407 to 0.76989     520000      13.7192

     102          0.76717   + or - 0.00123     0.76594 to 0.76840
0.76471 to 0.76963    0.76348 to 0.77086     420000      11.4674

     107          0.76720   + or - 0.00235     0.76484 to 0.76955
0.76249 to 0.77190    0.76014 to 0.77425     320000       4.9608

     112          0.76597   + or - 0.00158     0.76439 to 0.76755
0.76282 to 0.76913    0.76124 to 0.77070     220000      20.4145
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          0.76485   + or - 0.00142     0.76343 to 0.76627
0.76202 to 0.76769    0.76060 to 0.76910     120000      27.7989
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76612 + or - 0.00049 which occurs for
111 generations run.

                                0.7635                   0.7659
0.7682

|-------------------------|------------------------|------------------
------|------------------------
         |
      25 +                          I                          *
I
         |                               I                     |
*
         |                                                I     |
*                    I
         |                                                      |   I
*                I
         |                                                      I
```

```
*             I
      30 +                                                  I   |
*              I
         |                                                      |     I
*              I
         |                                                      |      I
*            I
         |                                                      |
I          *           I
         |                                                      |
I         *          I
      35 +                                                      |
I        *         I
         |                                                      |
I       *         I
         |                                                      |
I       *        I
         |                                                      |
I       *      I
         |                                                      |
I        *       I
      40 +                                                      |   I
*         I
         |                                                      |  I
*         I
         |                                                     I
*          I
         |                                                     |I
*         I
         |                                                     |I
*         I
      45 +                                                      |    I
*        I
         |                                                      |    I
*        I
         |                                                      |     I
*        I
         |                                                      |     I
*       I
         |                                                     |I
*         I
      50 +                                                     I
*        I
         |                                                 I    |     *
I
         |                                              I       |    *
I
         |                                              I       |   *
I
         |                                            I         |  *
I
      55 +                                         I            |*
```

```
I
         |                                        I             *
I
         |                                        I             *
I
         |                                       I             *|
I
         |                                       I            * |
I
      60 +                                   I               *  |
I
         |                                     I             *  |
I
         |                                       I            * |
I
         |                                       I            *  |
I
         |                                 I                   *   |
I
      65 +                              I                   *     |
I
         |                                 I                  *    |
I
         |                                  I                 *    |
I
         |                                     I            *   |
I
         |                                     I            *   |
I
      70 +                                   I            *      |       I
         |                                   I            *      |      I
         |                                     I           *    |       I
         |                                     I           *    |      I
         |                                     I           *    |      I
      75 +                                      I          *    |      I
         |                                       I          *   |      I
         |                                       I          *   |       I
         |                                       I         *    |   I
         |                                       I         *    |   I
      80 +                                        I        *    |   I
         |                                          I       *   |  I
         |                                       I           *  |
I
         |                                              I       *|       I
         |                                              I      * |      I
      85 +                                        I           *|
I
         |                                        I           *|
I
         |                                       I           * |
I
         |                                        I          * |
```

```
I
         |                                          I           * |
I
      90 +                                           I           *|
I
         |                                               I     * |    I
         |                                              I     *  |   I
         |                                           I         * |        I
         |                                               I      *|    I
      95 +                                           I         * |        I
         |                                           I        *  |       I
         |                                               I     * |   I
         |                                               I     * |   I
         |                                              I     *  |   I
     100 +                                              I      * |   I
         |                                            I        *  |     I
         |                                               I     * |   I
         |                                               I     * |   I
         |                                             I         *|       I
     105 +                                                 I     *|      I
         |                                                 I     *|    I
         |                                                 I     *|    I
         |                                                 I     *|    I
         |                                                  I     *    I
     110 +                                                  I     *    I
         |                                                   I    *    I
         |                                                   I    |*     I
         |                                                   I    | *     I
         |                                                    I   | *
I
     115 +                                                    I   | *     I
         |                                                   I    |*
I
         |                                                    I   | *     I
         |                                                    I   | *     I
         |                                                    I   | *     I
     120 +                                                   I    |*     I
         |                                                   I    |*     I
         |                                                   I    |*     I
         |                                                   I    |*     I
1                           fuel bundle
```

plot of average k-effective by generation skipped.

the line represents k-eff = 0.7659 + or - 0.0005 which occurs for 35 generations skipped.

```
                                 0.7638                    0.7655
0.7672

|-------------------------|------------------------|------------------
------|------------------------
         |
```

```
         |                                                   I    |  *
I
         |                                                    I   |
*      I
      25 +                                                   I    |  *
I
         |                                                   I    |  *
I
         |                                                  I     | *
I
         |                                                  I     | *
I
         |                                                  I     | *
I
      30 +                                                  I     | *
I
         |                                                 I      |*
I
         |                                                 I      |*
I
         |                                               I       *
I
         |                                               I       *
I
      35 +                                               I       *
I
         |                                              I       *|
I
         |                                             I        *|
I
         |                                            I        * |
I
         |                                             I       * |
I
      40 +                                              I       *|
I
         |                                             I        *|
I
         |                                              I        *
I
         |                                             I         *
I
         |                                             I        *|
I
      45 +                                           I         * |
I
         |                                           I         * |
I
         |                                        I            *  |
I
         |                                       I             *  |
I
```

```
          |                                                I          *|
I
      50 +                                                 I          *|
I
          |                                                   I        *
I
          |                                                    I      |*
I
          |                                                    I      |*
I
          |                                                     I     | *
I
      55 +                                                      I    |  *
I
          |                                                     I    |
*       I
          |                                                     I    |
*       I
          |                                                      I   |
*        I
          |                                                      I   |
*       I
      60 +                                                       I  |
*        I
          |                                                      I  |
*        I
          |                                                      I  |
*        I
          |                                                      I  |
*        I
          |                                                        I|
*       I
      65 +                                                        |I
*       I
          |                                                        I
*        I
          |                                                        I
*        I
          |                                                       I|
*        I
          |                                                        I
*        I
      70 +                                                        |I
*        I
          |                                                        | I
*        I
          |                                                        I
*         I
          |                                                        |I
*         I
          |                                                        |I
*         I
```

```
      75 +                                                            |I
*         I
         |                                                             I
*         I
         |                                                           I|
*         I
         |                                                             I
*           I
         |                                                             I
*           I
      80 +                                                             I
*            I
         |                                                           I|
*             I
         |                                                        I  |
*            I
         |                                                 I        |
*             I
         |                                                         I |
*          I
      85 +                                                       I   |
*          I
         |                                                       I   |
*          I
         |                                                       I   |
*              I
         |                                                    I      |
*              I
         |                                                    I      |
*                I
      90 +                                                 I         |
*                I
         |                                                    I      |
*                I
         |                                                             I
*           I
         |                                                        I  |
*                I
         |                                                        I  |
*             I
      95 +                                                         I |
*                I
         |                                                             |  I
*             I
         |                                                             |I
*            I
         |                                                           I|
*              I
         |                                                             | I
*              I
     100 +                                                             |I
*                I
```

```
         |                                                          | I
*               I
         |                                                          I
*                 I
         |                                                         I|
*                  I
         |                                                     I   |
*                  I
     105 +                                        I               |
*                       I
         |                                         I              |
*                           I
         |                                       I                |
*
         |                                    I                   |
*
         |                                         I              |
*                          I
     110 +                                       I                |
*                             I
         |                                     I                  |
*                            I
         |                                    I                   *
I
         |                              I              *          |
I
         |                        I             *             I   |
     115 +                        I               *               I
         |                            I                *          |
I
         |                    I                   *               |
I
         |          I                       *                      |  I
         |                              *                          |
I
     120 +                                        *               |
I

   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                 0.00000E+00     0.0000
2.45408E-07    36.2355       0.00000E+00     0.0000
```

```
    3    0.0000                 1.31420E-05    11.8354
1.90880E-05     5.2180       0.00000E+00     0.0000
    4    0.0000                 2.06342E-05     8.5818
3.36616E-05     3.8767       0.00000E+00     0.0000
    5    0.0000                 2.53309E-05     8.5180
5.21877E-05     3.3558       0.00000E+00     0.0000
    6    0.0001                 9.22090E-05     3.8280
2.29232E-04     1.4843       0.00000E+00     0.0000
    7    0.0002                 1.19931E-04     3.2395
2.11158E-04     1.2883       0.00000E+00     0.0000
    8    0.0003                 2.52436E-04     2.0157
3.26886E-04     0.9553       0.00000E+00     0.0000
    9    0.0005                 3.82519E-04     1.1892
4.43929E-04     0.5829       0.00000E+00     0.0000
   10    0.0003                 1.97141E-04     1.6729
2.05093E-04     0.8047       0.00000E+00     0.0000
   11    0.0012                 9.16500E-04     0.7637
5.26533E-04     0.5342       0.00000E+00     0.0000
   12    0.0010                 7.68945E-04     0.6979
3.01407E-04     0.6877       0.00000E+00     0.0000
   13    0.0003                 2.27120E-04     1.1829
9.02528E-05     1.1708       0.00000E+00     0.0000
   14    0.0013                 1.01598E-03     0.6664
4.15215E-04     0.6598       0.00000E+00     0.0000
   15    0.0010                 7.60386E-04     0.7154
3.27852E-04     0.7068       0.00000E+00     0.0000
   16    0.0003                 1.92184E-04     1.2728
8.82780E-05     1.2565       0.00000E+00     0.0000
   17    0.0001                 6.63125E-05     1.6841
3.22646E-05     1.6557       0.00000E+00     0.0000
   18    0.0001                 5.10212E-05     1.8459
2.57798E-05     1.8086       0.00000E+00     0.0000
   19    0.0001                 8.13814E-05     1.3382
4.30055E-05     1.3103       0.00000E+00     0.0000
   20    0.0001                 5.93923E-05     1.6075
3.25420E-05     1.5695       0.00000E+00     0.0000
   21    0.0002                 1.18938E-04     1.1613
6.71467E-05     1.1379       0.00000E+00     0.0000
   22    0.0001                 1.04285E-04     1.1935
6.17439E-05     1.1658       0.00000E+00     0.0000
   23    0.0001                 1.08666E-04     1.1511
6.63126E-05     1.1264       0.00000E+00     0.0000
   24    0.0000                 2.59274E-05     2.3533
1.60687E-05     2.2983       0.00000E+00     0.0000
   25    0.0000                 3.09701E-05     2.1318
1.93453E-05     2.0768       0.00000E+00     0.0000
   26    0.0000                 1.71108E-05     2.3284
1.07528E-05     2.2600       0.00000E+00     0.0000
   27    0.0001                 5.25559E-05     1.3003
3.28043E-05     1.2755       0.00000E+00     0.0000
   28    0.0001                 9.57996E-05     1.0183
5.97740E-05     1.0031       0.00000E+00     0.0000
```

29	0.0001	9.64453E-05	1.0838	6.07663E-05	1.0694
30	0.0000	1.24191E-05	3.0084	7.79070E-06	2.9863
31	0.0001	9.44408E-05	1.1187	5.96846E-05	1.1041
32	0.0000	3.72489E-05	1.4556	2.38208E-05	1.4250
33	0.0000	3.25007E-05	1.8038	2.03469E-05	1.7826
34	0.0001	7.27494E-05	1.2662	4.57176E-05	1.2491
35	0.0001	4.51314E-05	1.4307	2.83204E-05	1.4075
36	0.0001	4.23669E-05	1.4098	2.62301E-05	1.3963
37	0.0000	2.77182E-05	1.8989	1.74052E-05	1.8566
38	0.0000	3.40542E-05	1.7245	2.14362E-05	1.6905
39	0.0002	1.27661E-04	0.9545	8.12095E-05	0.9309
40	0.0002	1.18884E-04	1.0083	7.68644E-05	0.9904
41	0.0002	1.59554E-04	0.7584	1.06586E-04	0.7373
42	0.0002	1.41143E-04	0.7618	9.59634E-05	0.7419
43	0.0001	7.91586E-05	1.1972	5.68861E-05	1.1463
44	0.0001	1.13535E-04	1.0273	8.33671E-05	0.9865
45	0.0001	5.91295E-05	0.9074	4.77165E-05	0.8407
46	0.0000	1.42477E-05	1.9850	1.14808E-05	1.8346
47	0.0001	4.18528E-05	1.7793	3.24789E-05	1.7052
48	0.0000	1.19567E-05	4.0928	9.27787E-06	3.9815
49	0.0001	8.12534E-05	1.5495	6.40452E-05	1.5160
50	0.0001	5.68590E-05	1.8221	4.68290E-05	1.7858
51	0.0000	1.49263E-05	3.6290	1.24047E-05	3.5518
52	0.0001	4.02729E-05	1.9799	3.48278E-05	1.9297
53	0.0002	1.60714E-04	0.8131	1.57773E-04	0.7591
54	0.0001	7.42403E-05	1.7302	6.90636E-05	1.6681

```
   55    0.0002                 1.66321E-04     1.2569
1.52381E-04     1.2270       0.00000E+00     0.0000
   56    0.0002                 1.16464E-04     1.6274
1.08039E-04     1.5858       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                 1.46546E-04     1.5610
1.33056E-04     1.5224       0.00000E+00     0.0000
   58    0.0001                 8.50187E-05     1.9976
7.44662E-05     1.9445       0.00000E+00     0.0000
   59    0.0002                 1.56989E-04     1.3939
1.40980E-04     1.3407       0.00000E+00     0.0000
   60    0.0004                 2.76826E-04     1.2197
2.51098E-04     1.1517       0.00000E+00     0.0000
   61    0.0000                 3.01296E-05     3.9797
2.31324E-05     3.8623       0.00000E+00     0.0000
   62    0.0002                 1.65198E-04     1.6709
1.38522E-04     1.6269       0.00000E+00     0.0000
   63    0.0002                 1.21374E-04     2.0100
9.98983E-05     1.9437       0.00000E+00     0.0000
   64    0.0001                 9.98534E-05     2.1641
8.05062E-05     2.0941       0.00000E+00     0.0000
   65    0.0000                 3.52298E-05     3.8515
3.47953E-05     3.7322       0.00000E+00     0.0000
   66    0.0002                 1.70476E-04     1.6220
1.51315E-04     1.5684       0.00000E+00     0.0000
   67    0.0002                 1.47815E-04     2.2024
1.20837E-04     2.1338       0.00000E+00     0.0000
   68    0.0000                 2.73692E-05     4.4331
2.36655E-05     4.2752       0.00000E+00     0.0000
   69    0.0004                 2.98269E-04     1.3699
2.34139E-04     1.3277       0.00000E+00     0.0000
   70    0.0003                 2.16963E-04     2.0455
1.97163E-04     1.9698       0.00000E+00     0.0000
   71    0.0006                 4.34410E-04     1.2901
3.59334E-04     1.2519       0.00000E+00     0.0000
   72    0.0001                 5.02761E-05     5.3479
2.96676E-05     5.2259       0.00000E+00     0.0000
   73    0.0004                 3.14475E-04     1.6250
2.39808E-04     1.5392       0.00000E+00     0.0000
   74    0.0014                 1.04933E-03     1.0948
7.63274E-04     1.0490       0.00000E+00     0.0000
   75    0.0001                 1.08361E-04     2.8870
8.34026E-05     2.7442       0.00000E+00     0.0000
   76    0.0006                 4.59132E-04     1.8683
```

2.91706E-04	1.8043	0.00000E+00	0.0000	77	0.0005	3.80491E-04	1.7074
2.72546E-04	1.6381	0.00000E+00	0.0000	78	0.0000	6.95032E-06	3.6703
6.80178E-05	3.6269	0.00000E+00	0.0000	79	0.0002	1.81213E-04	2.5370
1.22059E-04	2.4398	0.00000E+00	0.0000	80	0.0001	6.37028E-05	3.6817
8.48844E-05	3.5827	0.00000E+00	0.0000	81	0.0014	1.06226E-03	1.2378
7.81028E-04	1.1848	0.00000E+00	0.0000	82	0.0001	6.60394E-05	4.2639
3.96589E-05	4.0447	0.00000E+00	0.0000	83	0.0002	1.33455E-04	3.5018
1.47538E-04	3.4342	0.00000E+00	0.0000	84	0.0001	7.79076E-05	2.9885
7.93476E-05	2.7680	0.00000E+00	0.0000	85	0.0003	1.99538E-04	1.9916
2.45616E-04	1.9375	0.00000E+00	0.0000	86	0.0004	2.74975E-04	2.2509
2.20955E-04	2.1478	0.00000E+00	0.0000	87	0.0004	3.37362E-04	2.4727
2.09813E-04	2.3682	0.00000E+00	0.0000	88	0.0001	5.62757E-05	3.6890
1.02148E-04	3.5994	0.00000E+00	0.0000	89	0.0001	9.62269E-05	3.7501
6.66857E-05	3.4420	0.00000E+00	0.0000	90	0.0003	2.09648E-04	3.3215
1.24195E-04	3.1727	0.00000E+00	0.0000	91	0.0002	1.86327E-04	2.8628
1.17918E-04	2.6966	0.00000E+00	0.0000	92	0.0000	3.11281E-05	2.9065
2.03596E-04	2.8443	0.00000E+00	0.0000	93	0.0002	1.26423E-04	3.4592
1.02969E-04	3.2123	0.00000E+00	0.0000	94	0.0002	1.17292E-04	4.3695
6.56643E-05	4.1130	0.00000E+00	0.0000	95	0.0008	6.14366E-04	2.1666
3.78809E-04	2.1007	0.00000E+00	0.0000	96	0.0002	1.61771E-04	3.6963
8.18979E-05	3.5516	0.00000E+00	0.0000	97	0.0004	3.03029E-04	3.2387
1.73225E-04	3.1742	0.00000E+00	0.0000	98	0.0001	1.07552E-04	3.7932
1.03000E-04	3.6651	0.00000E+00	0.0000	99	0.0001	1.10294E-04	4.8436
7.37506E-05	4.6883	0.00000E+00	0.0000	100	0.0002	1.21842E-04	4.0664
8.16420E-05	3.8927	0.00000E+00	0.0000	101	0.0001	1.11958E-04	3.3802
7.12705E-05	3.1251	0.00000E+00	0.0000	102	0.0002	1.63921E-04	4.4671

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9.12252E-05     4.2986       0.00000E+00     0.0000
  103    0.0001                 1.00942E-04     3.5266
9.82337E-05     3.3484       0.00000E+00     0.0000
  104    0.0002                 1.65805E-04     3.3417
1.31494E-04     3.2263       0.00000E+00     0.0000
  105    0.0002                 1.17011E-04     3.1495
7.76767E-05     2.9520       0.00000E+00     0.0000
  106    0.0002                 1.81173E-04     4.3474
1.34643E-04     4.2924       0.00000E+00     0.0000
  107    0.0001                 6.38597E-05     3.4480
6.45614E-05     3.2375       0.00000E+00     0.0000
  108    0.0000                 3.44105E-05     2.5935
1.48617E-04     2.5333       0.00000E+00     0.0000
  109    0.0002                 1.30567E-04     2.3348
4.33251E-04     2.3033       0.00000E+00     0.0000
  110    0.0008                 6.36395E-04     2.9633
3.92486E-04     2.9364       0.00000E+00     0.0000
  111    0.0002                 1.48143E-04     5.1475
1.36288E-04     5.0087       0.00000E+00     0.0000
  112    0.0002                 1.20571E-04     5.6122
1.27002E-04     5.5168       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                 1.30734E-04     3.8709
1.14066E-04     3.6246       0.00000E+00     0.0000
  114    0.0000                 1.10993E-05     7.3139
1.50317E-05     6.1074       0.00000E+00     0.0000
  115    0.0001                 7.35351E-05     3.6843
8.54199E-05     3.3989       0.00000E+00     0.0000
  116    0.0003                 1.93740E-04     2.7488
1.45640E-04     2.4735       0.00000E+00     0.0000
  117    0.0006                 4.65339E-04     2.2629
2.48981E-04     2.1106       0.00000E+00     0.0000
  118    0.0008                 5.83290E-04     2.0626
4.55549E-04     1.9785       0.00000E+00     0.0000
  119    0.0002                 1.42807E-04     2.0491
3.68499E-04     1.9810       0.00000E+00     0.0000
  120    0.0002                 1.70643E-04     1.8195
6.49329E-04     1.7923       0.00000E+00     0.0000
  121    0.0007                 5.08268E-04     2.6894
3.91298E-04     2.6214       0.00000E+00     0.0000
  122    0.0001                 9.94828E-05     4.7490
7.79240E-05     4.4239       0.00000E+00     0.0000
  123    0.0003                 2.00896E-04     3.1118
1.43631E-04     2.7407       0.00000E+00     0.0000
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124	0.0003	2.31405E-04	2.8715	1.90962E-04	2.6804
0.00000E+00	0.0000				
125	0.0002	1.34214E-04	3.2347	1.23896E-04	2.8955
0.00000E+00	0.0000				
126	0.0001	9.94425E-05	3.7511	8.91707E-05	3.3031
0.00000E+00	0.0000				
127	0.0005	3.67861E-04	3.4505	1.81520E-04	3.2381
0.00000E+00	0.0000				
128	0.0003	2.12514E-04	3.0491	1.31358E-04	2.7048
0.00000E+00	0.0000				
129	0.0006	4.76572E-04	2.2950	4.37956E-04	2.1933
0.00000E+00	0.0000				
130	0.0002	1.22488E-04	3.0016	2.98110E-04	2.9155
0.00000E+00	0.0000				
131	0.0004	3.00408E-04	2.3018	2.40621E-04	1.9642
0.00000E+00	0.0000				
132	0.0007	5.18741E-04	2.1810	3.19005E-04	2.0095
0.00000E+00	0.0000				
133	0.0014	1.05209E-03	1.5574	6.64573E-04	1.4808
0.00000E+00	0.0000				
134	0.0001	8.81850E-05	2.2243	2.30469E-04	1.8475
0.00000E+00	0.0000				
135	0.0002	1.81345E-04	3.1977	2.68768E-04	3.1146
0.00000E+00	0.0000				
136	0.0001	4.60027E-05	1.9908	7.13778E-04	1.9607
0.00000E+00	0.0000				
137	0.0000	1.93454E-05	1.1040	3.48087E-03	1.1010
0.00000E+00	0.0000				
138	0.0004	3.11782E-04	1.9323	8.12481E-04	1.9010
0.00000E+00	0.0000				
139	0.0002	1.88492E-04	3.0665	2.31004E-04	2.8849
0.00000E+00	0.0000				
140	0.0003	2.18627E-04	2.6518	2.89459E-04	2.3152
0.00000E+00	0.0000				
141	0.0001	8.30735E-05	2.7252	2.60915E-04	2.4477
0.00000E+00	0.0000				
142	0.0001	6.97492E-05	2.9837	2.40040E-04	2.7430
0.00000E+00	0.0000				
143	0.0001	8.00793E-05	2.1163	1.73457E-04	1.2619
0.00000E+00	0.0000				
144	0.0000	3.29464E-05	3.3317	7.26732E-05	2.0343
0.00000E+00	0.0000				
145	0.0005	3.81041E-04	2.5499	2.99421E-04	2.3100
0.00000E+00	0.0000				
146	0.0004	3.41051E-04	2.6904	2.49860E-04	2.1764
0.00000E+00	0.0000				
147	0.0002	1.72780E-04	4.1998	1.10939E-04	3.6441
0.00000E+00	0.0000				
148	0.0001	4.88721E-05	6.7124	3.40039E-05	5.1937
0.00000E+00	0.0000				
149	0.0000	3.34994E-05	7.3699	2.26323E-05	5.8498
0.00000E+00	0.0000				

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  150    0.0001                 8.73303E-05     4.4699
6.36493E-05     3.2900       0.00000E+00     0.0000
  151    0.0001                 6.69188E-05     4.6117
5.65556E-05     3.1930       0.00000E+00     0.0000
  152    0.0001                 3.89805E-05     4.0772
4.51608E-05     2.4522       0.00000E+00     0.0000
  153    0.0001                 4.33799E-05     3.9386
4.78525E-05     2.3401       0.00000E+00     0.0000
  154    0.0001                 5.03808E-05     4.8523
5.13185E-05     2.9338       0.00000E+00     0.0000
  155    0.0001                 4.44853E-05     4.4098
4.60051E-05     2.5900       0.00000E+00     0.0000
  156    0.0001                 4.86478E-05     4.6701
4.71297E-05     2.9318       0.00000E+00     0.0000
  157    0.0001                 5.87934E-05     4.3652
5.73846E-05     2.6261       0.00000E+00     0.0000
  158    0.0001                 6.23587E-05     4.1497
6.48281E-05     2.6799       0.00000E+00     0.0000
  159    0.0002                 1.51980E-04     2.9202
2.10902E-04     2.4546       0.00000E+00     0.0000
  160    0.0001                 5.97481E-05     4.2895
7.17078E-05     3.2374       0.00000E+00     0.0000
  161    0.0001                 7.16562E-05     4.3468
7.12616E-05     2.8408       0.00000E+00     0.0000
  162    0.0001                 8.66565E-05     3.7370
8.14717E-05     2.3259       0.00000E+00     0.0000
  163    0.0001                 9.75880E-05     3.6198
8.86589E-05     2.2962       0.00000E+00     0.0000
  164    0.0001                 1.03010E-04     3.3411
9.45288E-05     2.0956       0.00000E+00     0.0000
  165    0.0001                 1.11600E-04     3.3955
1.03427E-04     2.1154       0.00000E+00     0.0000
  166    0.0001                 6.96816E-05     3.9298
6.35992E-05     2.5630       0.00000E+00     0.0000
  167    0.0001                 7.70920E-05     3.7629
7.01075E-05     2.4591       0.00000E+00     0.0000
  168    0.0001                 9.10463E-05     4.3663
8.00180E-05     2.8899       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                 1.12180E-04     3.7500
9.67449E-05     2.6761       0.00000E+00     0.0000
  170    0.0002                 1.31832E-04     4.0910
1.13310E-04     3.0484       0.00000E+00     0.0000
  171    0.0001                 1.01251E-04     5.2623
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7.79141E-05	4.2088	0.00000E+00	0.0000	172	0.0002	1.29139E-04	4.8126
9.27855E-05	3.9757	0.00000E+00	0.0000	173	0.0003	1.91902E-04	4.1096
1.26838E-04	3.5814	0.00000E+00	0.0000	174	0.0003	2.59712E-04	3.8098
1.60505E-04	3.4164	0.00000E+00	0.0000	175	0.0001	1.05930E-04	6.5110
6.43263E-05	5.8368	0.00000E+00	0.0000	176	0.0002	1.17928E-04	5.0049
7.03739E-05	4.5018	0.00000E+00	0.0000	177	0.0002	1.26354E-04	7.2597
7.41191E-05	6.5884	0.00000E+00	0.0000	178	0.0002	1.21776E-04	6.0282
7.12656E-05	5.4149	0.00000E+00	0.0000	179	0.0002	1.20560E-04	6.1164
6.99132E-05	5.5045	0.00000E+00	0.0000	180	0.0002	1.18703E-04	6.1165
6.86644E-05	5.4472	0.00000E+00	0.0000	181	0.0001	1.11953E-04	5.7538
6.46004E-05	5.1231	0.00000E+00	0.0000	182	0.0002	1.17302E-04	6.7514
6.71229E-05	5.9801	0.00000E+00	0.0000	183	0.0001	1.12335E-04	5.9806
6.44533E-05	5.2677	0.00000E+00	0.0000	184	0.0001	8.95023E-05	6.1841
5.30247E-05	5.2240	0.00000E+00	0.0000	185	0.0001	8.84253E-05	7.4382
5.18212E-05	6.3198	0.00000E+00	0.0000	186	0.0001	1.05277E-04	6.3094
6.04672E-05	5.4581	0.00000E+00	0.0000	187	0.0001	9.00477E-05	6.6718
5.30103E-05	5.6611	0.00000E+00	0.0000	188	0.0001	9.36249E-05	5.3917
5.44079E-05	4.5707	0.00000E+00	0.0000	189	0.0001	8.11235E-05	5.3203
4.82686E-05	4.3858	0.00000E+00	0.0000	190	0.0003	2.11180E-04	4.0923
1.25509E-04	3.3972	0.00000E+00	0.0000	191	0.0003	2.03384E-04	4.2295
1.21671E-04	3.4578	0.00000E+00	0.0000	192	0.0003	1.94922E-04	4.0832
1.18516E-04	3.2543	0.00000E+00	0.0000	193	0.0003	2.05687E-04	3.7400
1.24222E-04	3.0170	0.00000E+00	0.0000	194	0.0005	3.99657E-04	3.0220
2.46252E-04	2.4039	0.00000E+00	0.0000	195	0.0005	4.19479E-04	3.0688
2.60287E-04	2.4337	0.00000E+00	0.0000	196	0.0006	4.65369E-04	2.7769
2.88043E-04	2.1679	0.00000E+00	0.0000	197	0.0007	5.27061E-04	2.5074

3.25837E-04	1.9696	0.00000E+00	0.0000	198	0.0008	5.82222E-04	2.0794
3.59458E-04	1.6469	0.00000E+00	0.0000	199	0.0004	3.24309E-04	3.2681
1.99796E-04	2.5902	0.00000E+00	0.0000	200	0.0004	3.36907E-04	3.5977
2.09836E-04	2.7987	0.00000E+00	0.0000	201	0.0010	7.91399E-04	2.1703
4.83649E-04	1.7233	0.00000E+00	0.0000	202	0.0013	1.02083E-03	1.8445
6.14225E-04	1.4831	0.00000E+00	0.0000	203	0.0016	1.24821E-03	1.6603
7.41968E-04	1.3654	0.00000E+00	0.0000	204	0.0021	1.62778E-03	1.6879
9.61069E-04	1.4156	0.00000E+00	0.0000	205	0.0015	1.16511E-03	2.1734
6.78948E-04	1.8604	0.00000E+00	0.0000	206	0.0018	1.40192E-03	1.9308
8.16819E-04	1.6656	0.00000E+00	0.0000	207	0.0022	1.67884E-03	1.8853
9.73348E-04	1.6403	0.00000E+00	0.0000	208	0.0028	2.14163E-03	1.6067
1.25000E-03	1.4146	0.00000E+00	0.0000	209	0.0030	2.32774E-03	1.3556
1.37242E-03	1.1975	0.00000E+00	0.0000	210	0.0037	2.82529E-03	1.2146
1.68484E-03	1.0690	0.00000E+00	0.0000	211	0.0040	3.08002E-03	1.2664
1.85985E-03	1.1108	0.00000E+00	0.0000	212	0.0047	3.59914E-03	1.2707
2.18196E-03	1.0888	0.00000E+00	0.0000	213	0.0065	4.94643E-03	1.1130
3.00219E-03	0.9423	0.00000E+00	0.0000	214	0.0096	7.31960E-03	0.7898
4.41340E-03	0.6612	0.00000E+00	0.0000	215	0.0158	1.20756E-02	0.5368
7.20148E-03	0.4543	0.00000E+00	0.0000	216	0.0300	2.30090E-02	0.3874
1.35790E-02	0.3270	0.00000E+00	0.0000	217	0.0199	1.52834E-02	0.5277
8.99719E-03	0.4406	0.00000E+00	0.0000	218	0.0275	2.10664E-02	0.5220
1.23455E-02	0.4419	0.00000E+00	0.0000	219	0.0356	2.72611E-02	0.4053
1.59137E-02	0.3445	0.00000E+00	0.0000	220	0.0473	3.62028E-02	0.3571
2.10557E-02	0.3015	0.00000E+00	0.0000	221	0.0621	4.75898E-02	0.3119
2.76189E-02	0.2660	0.00000E+00	0.0000	222	0.0804	6.16196E-02	0.2705
3.56674E-02	0.2331	0.00000E+00	0.0000	223	0.1045	8.00905E-02	0.2405

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4.64313E-02     0.2081       0.00000E+00     0.0000
  224    0.0582                4.45638E-02     0.3363
2.59652E-02     0.2816       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    0.2309                1.76926E-01     0.1481
1.04764E-01     0.1275       0.00000E+00     0.0000
  226    0.0457                3.50495E-02     0.4216
2.13111E-02     0.3483       0.00000E+00     0.0000
  227    0.0491                3.75961E-02     0.3587
2.33343E-02     0.2916       0.00000E+00     0.0000
  228    0.0211                1.61361E-02     0.5898
1.02034E-02     0.4782       0.00000E+00     0.0000
  229    0.0221                1.69181E-02     0.5171
1.09006E-02     0.4123       0.00000E+00     0.0000
  230    0.0118                9.05386E-03     0.7144
5.90119E-03     0.5414       0.00000E+00     0.0000
  231    0.0122                9.35666E-03     0.7592
6.22816E-03     0.5684       0.00000E+00     0.0000
  232    0.0130                9.95869E-03     0.7563
6.77960E-03     0.5694       0.00000E+00     0.0000
  233    0.0085                6.48584E-03     0.8892
4.53713E-03     0.6469       0.00000E+00     0.0000
  234    0.0060                4.57875E-03     1.0821
3.28321E-03     0.7553       0.00000E+00     0.0000
  235    0.0024                1.85949E-03     1.6972
1.22902E-03     1.3209       0.00000E+00     0.0000
  236    0.0019                1.48311E-03     1.8692
9.92694E-04     1.4299       0.00000E+00     0.0000
  237    0.0017                1.29381E-03     2.1121
9.16701E-04     1.5257       0.00000E+00     0.0000
  238    0.0001                6.91325E-05     9.1299
6.01631E-05     5.2973       0.00000E+00     0.0000

 system total =                7.66177E-01     0.0533
4.69135E-01     0.0438       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3123E-01  +
or -  0.0002
```

elapsed time 3.10917 minutes

random number= 2687373F42C55CC6

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.090E-03	0.05	7.662E-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

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	2.490E-08	30.65	1.653E-08	29.14	1.644E-08	30.77
3	8.822E-07	4.18	7.252E-07	3.50	7.780E-07	3.69
4	1.467E-06	3.27	1.195E-06	2.74	1.295E-06	2.87
5	2.286E-06	2.45	1.858E-06	2.03	2.009E-06	2.11
6	9.451E-06	1.19	7.566E-06	1.06	8.036E-06	1.13
7	1.268E-05	1.21	9.648E-06	0.96	1.018E-05	0.96
8	3.118E-05	0.71	2.277E-05	0.67	2.390E-05	0.67
9	8.165E-05	0.46	5.853E-05	0.40	6.123E-05	0.40
10	4.671E-05	0.64	3.305E-05	0.52	3.443E-05	0.54
11	2.204E-04	0.28	1.553E-04	0.25	1.614E-04	0.26
12	1.898E-04	0.32	1.378E-04	0.25	1.444E-04	0.26
13	5.669E-05	0.49	4.126E-05	0.43	4.322E-05	0.42
14	2.543E-04	0.30	1.836E-04	0.23	1.918E-04	0.22
15	2.201E-04	0.27	1.598E-04	0.24	1.666E-04	0.24
16	7.102E-05	0.48	5.164E-05	0.42	5.412E-05	0.40
17	3.202E-05	0.56	2.346E-05	0.55	2.435E-05	0.57
18	2.804E-05	0.77	2.037E-05	0.57	2.105E-05	0.55
19	5.038E-05	0.52	3.677E-05	0.44	3.833E-05	0.42
20	3.993E-05	0.64	2.913E-05	0.55	3.050E-05	0.52

21	7.979E-05	0.48	5.861E-05	0.37	6.119E-05	0.34
22	7.279E-05	0.42	5.331E-05	0.35	5.524E-05	0.34
23	7.699E-05	0.39	5.624E-05	0.37	5.841E-05	0.35
24	1.858E-05	0.81	1.386E-05	0.65	1.446E-05	0.61
25	2.345E-05	0.80	1.733E-05	0.59	1.827E-05	0.56
26	1.309E-05	0.84	9.787E-06	0.75	1.035E-05	0.67
27	4.181E-05	0.49	3.107E-05	0.46	3.286E-05	0.45
28	7.763E-05	0.42	5.734E-05	0.37	6.056E-05	0.35
29	7.889E-05	0.37	5.892E-05	0.34	6.199E-05	0.31
30	1.024E-05	1.13	7.542E-06	0.85	7.926E-06	0.83
31	7.862E-05	0.41	5.890E-05	0.33	6.195E-05	0.33
32	3.120E-05	0.62	2.347E-05	0.52	2.473E-05	0.50
33	2.664E-05	0.65	2.018E-05	0.52	2.132E-05	0.48
34	6.064E-05	0.43	4.591E-05	0.39	4.833E-05	0.37
35	3.611E-05	0.54	2.736E-05	0.46	2.875E-05	0.43
36	3.379E-05	0.53	2.564E-05	0.45	2.695E-05	0.45
37	2.207E-05	0.65	1.668E-05	0.54	1.751E-05	0.48
38	2.573E-05	0.57	1.960E-05	0.53	2.058E-05	0.45
39	9.752E-05	0.34	7.459E-05	0.24	7.896E-05	0.23
40	8.934E-05	0.36	6.899E-05	0.31	7.366E-05	0.28
41	1.127E-04	0.27	8.827E-05	0.26	9.426E-05	0.23
42	9.362E-05	0.31	7.396E-05	0.25	7.933E-05	0.24
43	5.095E-05	0.47	4.062E-05	0.36	4.266E-05	0.34
44	6.954E-05	0.37	5.573E-05	0.33	5.999E-05	0.29
45	3.524E-05	0.45	2.803E-05	0.40	3.114E-05	0.36
46	8.303E-06	0.78	6.599E-06	0.75	7.179E-06	0.64
47	2.379E-05	0.59	1.881E-05	0.50	1.961E-05	0.43
48	6.722E-06	1.06	5.348E-06	0.93	5.634E-06	0.81
49	4.373E-05	0.38	3.506E-05	0.30	3.759E-05	0.27
50	2.936E-05	0.47	2.363E-05	0.43	2.568E-05	0.36
51	7.822E-06	0.87	6.320E-06	0.74	6.904E-06	0.68
52	2.063E-05	0.60	1.659E-05	0.49	1.811E-05	0.42
53	7.684E-05	0.34	6.181E-05	0.25	6.704E-05	0.22
54	3.357E-05	0.47	2.718E-05	0.38	2.922E-05	0.33
55	6.659E-05	0.34	5.405E-05	0.28	5.906E-05	0.26
56	4.314E-05	0.41	3.511E-05	0.35	3.829E-05	0.30
57	4.929E-05	0.35	4.019E-05	0.33	4.385E-05	0.29
58	2.588E-05	0.45	2.109E-05	0.40	2.299E-05	0.31
59	4.420E-05	0.33	3.600E-05	0.32	3.925E-05	0.26
60	6.482E-05	0.32	5.305E-05	0.28	5.749E-05	0.24
61	6.115E-06	0.96	4.996E-06	0.80	5.451E-06	0.71
62	3.258E-05	0.39	2.667E-05	0.34	2.903E-05	0.32
63	2.171E-05	0.51	1.778E-05	0.46	1.938E-05	0.37
64	1.718E-05	0.56	1.409E-05	0.50	1.527E-05	0.40
65	5.637E-06	1.04	4.638E-06	0.89	5.042E-06	0.75
66	2.849E-05	0.44	2.338E-05	0.36	2.542E-05	0.34
67	2.134E-05	0.52	1.749E-05	0.48	1.895E-05	0.41
68	4.721E-06	1.08	3.879E-06	1.01	4.210E-06	0.83
69	3.725E-05	0.35	3.068E-05	0.34	3.339E-05	0.29
70	2.681E-05	0.48	2.203E-05	0.39	2.394E-05	0.35
71	4.554E-05	0.36	3.755E-05	0.31	4.082E-05	0.27
72	2.594E-06	1.54	2.151E-06	1.24	2.352E-06	0.95

73	2.716E-05	0.46	2.239E-05	0.41	2.428E-05	0.33
74	7.939E-05	0.29	6.597E-05	0.25	7.144E-05	0.21
75	9.056E-06	0.83	7.502E-06	0.69	8.138E-06	0.53
76	2.284E-05	0.53	1.897E-05	0.43	2.059E-05	0.35
77	1.774E-05	0.61	1.470E-05	0.51	1.595E-05	0.39
78	1.473E-06	1.55	1.261E-06	1.43	1.368E-06	1.33
79	9.911E-06	0.86	8.262E-06	0.75	8.946E-06	0.58
80	4.633E-06	0.98	3.804E-06	0.88	4.109E-06	0.79
81	5.514E-05	0.34	4.593E-05	0.31	4.971E-05	0.25
82	3.220E-06	1.23	2.716E-06	1.01	2.926E-06	0.76
83	4.500E-06	1.07	3.711E-06	0.92	4.034E-06	0.77
84	8.247E-06	0.84	6.841E-06	0.70	7.399E-06	0.62
85	9.898E-06	0.72	8.258E-06	0.67	8.939E-06	0.55
86	1.366E-05	0.58	1.141E-05	0.54	1.233E-05	0.44
87	1.186E-05	0.74	9.949E-06	0.61	1.077E-05	0.47
88	3.208E-06	1.27	2.689E-06	1.24	2.862E-06	0.88
89	6.617E-06	0.86	5.525E-06	0.82	5.958E-06	0.67
90	6.905E-06	0.80	5.752E-06	0.68	6.226E-06	0.64
91	8.307E-06	0.77	6.874E-06	0.65	7.434E-06	0.57
92	4.726E-06	0.94	3.968E-06	0.92	4.291E-06	0.74
93	8.228E-06	0.81	6.837E-06	0.72	7.414E-06	0.55
94	4.306E-06	1.18	3.561E-06	1.02	3.854E-06	0.78
95	1.254E-05	0.67	1.053E-05	0.54	1.141E-05	0.45
96	3.354E-06	1.18	2.817E-06	1.00	3.057E-06	0.91
97	3.404E-06	1.20	2.885E-06	1.24	3.092E-06	0.84
98	3.560E-06	1.27	2.956E-06	1.05	3.212E-06	0.83
99	2.344E-06	1.36	1.980E-06	1.30	2.134E-06	1.15
100	3.416E-06	1.15	2.861E-06	1.09	3.117E-06	0.82
101	5.018E-06	1.06	4.153E-06	0.88	4.513E-06	0.77
102	3.309E-06	1.13	2.763E-06	1.01	3.012E-06	0.85
103	4.696E-06	1.11	3.879E-06	0.96	4.215E-06	0.79
104	4.177E-06	1.02	3.486E-06	0.95	3.785E-06	0.74
105	4.445E-06	1.13	3.681E-06	1.01	3.968E-06	0.79
106	1.539E-06	1.80	1.298E-06	1.67	1.408E-06	1.40
107	3.629E-06	1.16	3.053E-06	0.94	3.267E-06	0.86
108	3.157E-06	1.14	2.659E-06	1.03	2.919E-06	0.90
109	5.118E-06	0.93	4.313E-06	0.85	4.626E-06	0.71
110	3.019E-06	1.08	2.553E-06	0.99	2.816E-06	0.79
111	3.016E-06	1.20	2.552E-06	1.02	2.777E-06	0.97
112	1.738E-06	1.50	1.474E-06	1.46	1.629E-06	1.31
113	5.742E-06	0.99	4.799E-06	0.86	5.211E-06	0.70
114	1.935E-06	1.72	1.641E-06	1.55	1.777E-06	1.09
115	5.120E-06	1.16	4.263E-06	0.91	4.595E-06	0.77
116	1.085E-05	0.67	9.075E-06	0.55	9.774E-06	0.46
117	1.173E-05	0.62	9.822E-06	0.55	1.059E-05	0.48
118	1.284E-05	0.61	1.078E-05	0.53	1.168E-05	0.41
119	8.216E-06	0.78	6.931E-06	0.70	7.538E-06	0.57
120	5.768E-06	0.77	4.869E-06	0.69	5.300E-06	0.55
121	6.116E-06	0.95	5.140E-06	0.79	5.612E-06	0.66
122	3.230E-06	1.24	2.740E-06	1.04	2.962E-06	0.87
123	1.037E-05	0.68	8.736E-06	0.67	9.392E-06	0.55
124	7.221E-06	0.76	6.099E-06	0.68	6.626E-06	0.55

125	7.002E-06	0.83	5.893E-06	0.74	6.408E-06	0.60
126	5.798E-06	0.87	4.878E-06	0.78	5.226E-06	0.67
127	5.570E-06	0.94	4.706E-06	0.80	5.086E-06	0.65
128	7.762E-06	0.76	6.491E-06	0.64	6.992E-06	0.58
129	9.839E-06	0.62	8.263E-06	0.58	8.917E-06	0.50
130	3.945E-06	0.93	3.375E-06	0.94	3.649E-06	0.77
131	1.660E-05	0.54	1.397E-05	0.51	1.515E-05	0.43
132	1.126E-05	0.72	9.480E-06	0.66	1.020E-05	0.52
133	1.362E-05	0.50	1.147E-05	0.44	1.245E-05	0.41
134	1.480E-05	0.51	1.242E-05	0.49	1.343E-05	0.37
135	2.404E-06	1.07	2.069E-06	1.17	2.233E-06	0.89
136	3.870E-06	1.11	3.364E-06	1.05	3.706E-06	0.87
137	2.472E-06	1.02	2.603E-06	1.00	2.980E-06	0.83
138	4.081E-06	0.97	3.575E-06	0.85	3.924E-06	0.69
139	4.624E-06	1.03	3.982E-06	0.97	4.260E-06	0.83
140	1.215E-05	0.63	1.026E-05	0.64	1.104E-05	0.45
141	8.857E-06	0.68	7.508E-06	0.62	8.024E-06	0.48
142	5.850E-06	0.81	4.960E-06	0.68	5.376E-06	0.50
143	1.997E-05	0.49	1.681E-05	0.43	1.812E-05	0.36
144	8.085E-06	0.82	6.776E-06	0.66	7.286E-06	0.53
145	7.261E-06	0.76	6.191E-06	0.66	6.669E-06	0.61
146	1.213E-05	0.62	1.023E-05	0.59	1.101E-05	0.43
147	3.635E-06	1.26	3.105E-06	0.97	3.345E-06	0.81
148	1.869E-06	1.54	1.590E-06	1.34	1.697E-06	1.08
149	1.161E-06	1.75	9.808E-07	1.45	1.056E-06	1.25
150	4.013E-06	1.04	3.398E-06	0.91	3.637E-06	0.74
151	4.155E-06	1.08	3.495E-06	0.90	3.790E-06	0.70
152	4.353E-06	1.16	3.678E-06	1.01	3.925E-06	0.78
153	4.481E-06	0.94	3.783E-06	0.77	4.074E-06	0.65
154	4.552E-06	1.13	3.866E-06	0.83	4.165E-06	0.69
155	4.242E-06	1.14	3.586E-06	0.91	3.865E-06	0.77
156	4.093E-06	1.02	3.430E-06	0.88	3.628E-06	0.73
157	4.675E-06	1.05	3.932E-06	0.99	4.232E-06	0.79
158	4.879E-06	0.97	4.112E-06	0.77	4.427E-06	0.68
159	6.753E-06	0.84	5.737E-06	0.74	6.171E-06	0.66
160	3.560E-06	1.21	2.997E-06	1.17	3.241E-06	0.96
161	4.950E-06	0.98	4.163E-06	0.97	4.470E-06	0.78
162	5.836E-06	1.01	4.897E-06	0.82	5.317E-06	0.69
163	6.049E-06	0.93	5.100E-06	0.82	5.511E-06	0.68
164	6.475E-06	0.86	5.476E-06	0.72	5.901E-06	0.64
165	6.878E-06	0.88	5.768E-06	0.71	6.271E-06	0.56
166	3.996E-06	1.05	3.355E-06	0.96	3.603E-06	0.70
167	4.183E-06	1.08	3.510E-06	0.97	3.785E-06	0.75
168	4.400E-06	1.02	3.710E-06	0.98	3.952E-06	0.78
169	4.473E-06	1.10	3.750E-06	0.93	4.034E-06	0.79
170	4.646E-06	1.02	3.942E-06	0.95	4.224E-06	0.76
171	2.383E-06	1.51	2.058E-06	1.30	2.180E-06	1.05
172	2.341E-06	1.26	1.970E-06	1.14	2.145E-06	1.00
173	2.466E-06	1.17	2.093E-06	1.02	2.286E-06	0.91
174	2.440E-06	1.40	2.069E-06	1.27	2.245E-06	0.98
175	1.008E-06	1.87	8.594E-07	1.77	9.326E-07	1.56
176	1.037E-06	2.13	8.897E-07	1.81	9.541E-07	1.53

177	1.059E-06	1.71	8.920E-07	1.68	9.586E-07	1.41
178	1.041E-06	1.69	9.115E-07	1.58	9.624E-07	1.37
179	1.058E-06	2.28	8.895E-07	1.87	9.652E-07	1.48
180	1.062E-06	2.04	9.077E-07	1.72	9.785E-07	1.54
181	1.066E-06	2.03	8.921E-07	1.68	9.646E-07	1.47
182	1.071E-06	1.83	8.985E-07	1.70	9.894E-07	1.42
183	1.102E-06	2.00	9.416E-07	1.81	1.016E-06	1.38
184	1.119E-06	1.60	9.559E-07	1.63	1.032E-06	1.28
185	1.106E-06	2.03	9.314E-07	1.82	1.011E-06	1.50
186	1.128E-06	1.96	9.489E-07	1.64	1.046E-06	1.48
187	1.133E-06	2.09	9.720E-07	1.90	1.037E-06	1.44
188	1.144E-06	1.79	9.781E-07	1.72	1.062E-06	1.31
189	1.170E-06	1.97	1.008E-06	1.81	1.092E-06	1.57
190	3.042E-06	1.22	2.599E-06	1.13	2.764E-06	0.90
191	3.081E-06	1.13	2.617E-06	0.97	2.832E-06	0.84
192	3.099E-06	1.22	2.657E-06	0.93	2.903E-06	0.85
193	3.241E-06	1.19	2.742E-06	1.09	2.970E-06	0.90
194	6.854E-06	0.82	5.797E-06	0.73	6.233E-06	0.55
195	7.218E-06	0.87	6.147E-06	0.74	6.623E-06	0.62
196	7.757E-06	0.74	6.534E-06	0.66	7.081E-06	0.54
197	8.294E-06	0.71	7.053E-06	0.65	7.633E-06	0.55
198	8.966E-06	0.64	7.567E-06	0.59	8.178E-06	0.48
199	4.713E-06	0.91	4.012E-06	0.87	4.363E-06	0.80
200	5.114E-06	0.89	4.283E-06	0.78	4.666E-06	0.67
201	1.067E-05	0.68	9.029E-06	0.61	9.724E-06	0.49
202	1.193E-05	0.59	1.007E-05	0.57	1.093E-05	0.45
203	1.298E-05	0.67	1.097E-05	0.60	1.194E-05	0.48
204	1.478E-05	0.53	1.257E-05	0.47	1.359E-05	0.38
205	8.567E-06	0.74	7.659E-06	0.66	8.143E-06	0.53
206	9.396E-06	0.71	8.434E-06	0.61	8.939E-06	0.52
207	9.567E-06	0.61	8.673E-06	0.55	9.124E-06	0.43
208	1.128E-05	0.59	1.024E-05	0.56	1.088E-05	0.43
209	1.160E-05	0.59	1.050E-05	0.51	1.114E-05	0.46
210	1.403E-05	0.54	1.276E-05	0.46	1.353E-05	0.39
211	1.605E-05	0.57	1.451E-05	0.47	1.554E-05	0.40
212	1.909E-05	0.52	1.727E-05	0.40	1.844E-05	0.32
213	2.638E-05	0.39	2.370E-05	0.35	2.530E-05	0.29
214	3.720E-05	0.31	3.337E-05	0.30	3.582E-05	0.24
215	5.507E-05	0.25	4.963E-05	0.24	5.368E-05	0.19
216	9.207E-05	0.19	8.395E-05	0.15	9.079E-05	0.14
217	5.542E-05	0.22	5.302E-05	0.20	5.618E-05	0.16
218	7.034E-05	0.22	6.768E-05	0.21	7.202E-05	0.15
219	8.416E-05	0.20	8.128E-05	0.16	8.654E-05	0.13
220	1.014E-04	0.15	9.888E-05	0.13	1.054E-04	0.11
221	1.202E-04	0.17	1.186E-04	0.15	1.264E-04	0.12
222	1.366E-04	0.16	1.367E-04	0.15	1.456E-04	0.12
223	1.537E-04	0.14	1.575E-04	0.13	1.675E-04	0.10
224	7.516E-05	0.18	7.973E-05	0.15	8.451E-05	0.11
225	2.341E-04	0.14	2.728E-04	0.11	2.827E-04	0.09
226	3.180E-05	0.23	4.491E-05	0.19	4.457E-05	0.14
227	2.890E-05	0.25	4.652E-05	0.23	4.444E-05	0.13
228	1.041E-05	0.39	1.906E-05	0.29	1.759E-05	0.21

229	9.634E-06	0.36	1.962E-05	0.30	1.747E-05	0.15
230	4.498E-06	0.51	1.014E-05	0.40	8.701E-06	0.23
231	4.225E-06	0.53	1.062E-05	0.42	8.754E-06	0.20
232	3.962E-06	0.53	1.129E-05	0.37	8.874E-06	0.22
233	2.232E-06	0.67	7.440E-06	0.48	5.518E-06	0.25
234	1.421E-06	0.88	5.343E-06	0.63	3.823E-06	0.25
235	5.242E-07	1.44	1.056E-06	0.98	1.126E-06	0.49
236	3.468E-07	1.64	7.301E-07	1.22	7.985E-07	0.63
237	2.265E-07	1.81	5.604E-07	1.60	6.177E-07	0.55
238	5.594E-09	9.56	2.078E-08	7.33	2.475E-08	2.06

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
 0.7561 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 0.7759     *****

                                 frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7561 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 0.7759     ***

                                 frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7561 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 0.7759     ***

                                 frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7561 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 0.7759     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                     ******      final results
```

```
table      ******                                   ***
        ***
***
        ***        best estimate system k-eff
0.76596 + or - 0.00052                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65730E-02 + or -  1.31029E-04            ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  8.41757E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52713E-01 + or -  1.75033E-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     3.11433 minutes


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

1

```
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999             //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


      0000000      5555555555555                    22222222222
7777777777777                    33333333333            44
     000000000     5555555555555                   2222222222222
777777777777                    3333333333333          444
    00       00    55                    :::       22         22   77
77          :::       33         33          4444
   00         00   55                    :::                 22
77           :::                  33         44 44
   00         00   55                    :::                 22
77            :::                  33        44  44
   00         00   555555555555                            22
77                                 333        44   44
   00         00   5555555555555                         22
77                                 333       44    44
   00         00              55         :::            22
77              :::                  33    444444444444
   00         00              55         :::          22
77              :::                  33   4444444444444
    00       00    55         55         :::        22
77               :::       33         33            44
     000000000     5555555555555                   2222222222222
77                        3333333333333            44
```

```
      0000000       55555555555                     2222222222222
77                          33333333333             44
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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
EEEEEEEE
    SSSSSSSSSSSS   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     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE


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

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```

```
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:27:34.97
*****
        *****
*****
        *****
*****

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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)                      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
***
        ***
***

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        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                   ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                  ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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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  4.13445E-13  1.24729E-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  1.15677E-15  3.81215E-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
```

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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  5.29495E-12  1.31417E-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  2.91356E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.64166E-08  4.51632E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  5.67206E-11  1.57742E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.66390E-08  4.67717E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  5.51538E-11  1.56690E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.72895E-09  7.83455E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  5.89831E-20  1.64034E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  4.80558E-12  1.36523E-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  3.20640E-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  6.83892E-09  1.98381E-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  1.25372E-11  3.71188E-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  4.24959E-11  1.25815E-09   43099    98.9062     tc99 4325
```

```
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  4.85756E-11  1.46722E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  3.94065E-11  1.20205E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  2.40605E-11  7.41155E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  1.78382E-11  5.54820E-10   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  3.69933E-12  1.17276E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  3.89739E-12  1.20053E-10   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.10197E-12  3.46043E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  7.85698E-12  2.46726E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  1.43703E-12  4.59861E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  5.21558E-13  1.68462E-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  2.83830E-13  9.25265E-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  4.17011E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90086E-09  9.89065E-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  9.01237E-14  3.09981E-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  6.50179E-11  2.23629E-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  5.13934E-08   50117   116.9029     sn117 5040
```

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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  6.22991E-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
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  5.19422E-13  1.95765E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  9.63395E-13  3.65968E-11   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  5.23280E-12  2.01914E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30210E-12  5.25838E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  1.31204E-11  5.14121E-10   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.40777E-11  9.57901E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88659E-12  7.61858E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  3.45440E-11  1.37428E-09   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  7.40586E-17  2.96852E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  5.69734E-11  2.30073E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  5.70652E-11  2.33861E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.29853E-08  1.36164E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  3.68323E-11  1.54256E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  6.23761E-11  2.59359E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  4.54561E-11  1.91730E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  5.62301E-11  2.38859E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.29841E-12  2.69440E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  4.94317E-11  2.12946E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  8.95219E-12  3.77595E-10   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  3.39577E-11  1.45267E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.55581E-11  6.65547E-10   60143   142.9098     nd143 6028
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  1.05918E-12  4.56271E-11   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  3.55169E-11  1.54065E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  2.85298E-11  1.24611E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.27078E-11  5.58860E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.54319E-11  6.83280E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  8.30422E-12  3.65197E-10   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  3.39162E-19  1.50172E-17   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.86420E-12  8.31003E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  3.82688E-14  1.68295E-12   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  8.51723E-12  3.79669E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  5.11199E-16  2.29405E-14   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.01052E-09  1.36003E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  2.51130E-12  1.14202E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.33319E-13  1.06802E-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  1.56039E-09  7.14269E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  6.13171E-16  2.82518E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  3.08164E-13  1.42909E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  9.35290E-14  4.36539E-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  4.27258E-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  4.51790E-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
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  6.51859E-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  2.80590E-13  1.99100E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.63979E-20  1.88104E-18   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  3.52965E-11  2.52573E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  6.58140E-18  4.72921E-16   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.97879E-21  7.20044E-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  5.12945E-28  3.71668E-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  9.98859E-21  7.26744E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.98167E-21  7.29234E-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							
		3048116	cd116	4855	endf/b7	rel0	rev7	
mod1	12/17/09							

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                                        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:
  9535 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

                                            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       ........

                                ........     0.01517 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
0.01583 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 15629 independent fission points were generated for generation 1
          1       7.66506E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15549 independent fission points were generated for generation 2
          2       7.59714E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15540 independent fission points were generated for generation 3
          3       7.63611E-01      7.63611E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.68598E-01      7.66105E-01      2.49338E-03
0.00000E+00      0.00000E+00
          5       7.62975E-01      7.65061E-01      1.77790E-03
0.00000E+00      0.00000E+00
          6       7.62777E-01      7.64490E-01      1.38079E-03
0.00000E+00      0.00000E+00
          7       7.64938E-01      7.64580E-01      1.07330E-03
0.00000E+00      0.00000E+00
          8       7.61768E-01      7.64111E-01      9.93766E-04
0.00000E+00      0.00000E+00
          9       7.71448E-01      7.65159E-01      1.34311E-03
0.00000E+00      0.00000E+00
```

10	7.65735E-01	7.65231E-01	1.16539E-03	0.00000E+00
11	7.64362E-01	7.65135E-01	1.03230E-03	0.00000E+00
12	7.60102E-01	7.64631E-01	1.05157E-03	0.00000E+00
13	7.65374E-01	7.64699E-01	9.53571E-04	0.00000E+00
14	7.74020E-01	7.65476E-01	1.16664E-03	0.00000E+00
15	7.69173E-01	7.65760E-01	1.11019E-03	0.00000E+00
16	7.63771E-01	7.65618E-01	1.03761E-03	0.00000E+00
17	7.68048E-01	7.65780E-01	9.79456E-04	0.00000E+00
18	7.66046E-01	7.65797E-01	9.16348E-04	0.00000E+00
19	7.64944E-01	7.65747E-01	8.62218E-04	0.00000E+00
20	7.66409E-01	7.65783E-01	8.13738E-04	0.00000E+00
21	7.71847E-01	7.66102E-01	8.33256E-04	0.00000E+00
22	7.64629E-01	7.66029E-01	7.93922E-04	0.00000E+00
23	7.64156E-01	7.65940E-01	7.60417E-04	0.00000E+00
24	7.58832E-01	7.65617E-01	7.93762E-04	0.00000E+00
25	7.66331E-01	7.65648E-01	7.59102E-04	0.00000E+00
26	7.62425E-01	7.65513E-01	7.39081E-04	0.00000E+00
27	7.65445E-01	7.63258E-01	6.16868E-03	0.00000E+00
28	7.66261E-01	7.63859E-01	3.28556E-03	0.00000E+00
29	7.66667E-01	7.64327E-01	2.57074E-03	0.00000E+00
30	7.66119E-01	7.64583E-01	2.09433E-03	0.00000E+00
31	7.60054E-01	7.64017E-01	1.66700E-03	0.00000E+00
32	7.64546E-01	7.64076E-01	1.42141E-03	0.00000E+00
33	7.66855E-01	7.64354E-01	1.02875E-03	0.00000E+00
34	7.64933E-01	7.64406E-01	9.21984E-04	0.00000E+00
35	7.72018E-01	7.65041E-01	1.30422E-03	0.00000E+00

36	7.66469E-01	7.65150E-01	1.18646E-03	0.00000E+00
37	7.70941E-01	7.65564E-01	1.56918E-03	0.00000E+00
38	7.69010E-01	7.65794E-01	2.01215E-03	0.00000E+00
39	7.62749E-01	7.65603E-01	1.70561E-03	0.00000E+00
40	7.66389E-01	7.65650E-01	1.60048E-03	0.00000E+00
41	7.61775E-01	7.65434E-01	1.48843E-03	0.00000E+00
42	7.61899E-01	7.65248E-01	1.34780E-03	0.00000E+00
43	7.62790E-01	7.65125E-01	1.32880E-03	0.00000E+00
44	7.65781E-01	7.65157E-01	1.22687E-03	0.00000E+00
45	7.57022E-01	7.64787E-01	1.36732E-03	0.00000E+00
46	7.66645E-01	7.64868E-01	1.25074E-03	0.00000E+00
47	7.64318E-01	7.64845E-01	1.19395E-03	0.00000E+00
48	7.73221E-01	7.65180E-01	1.09347E-03	0.00000E+00
49	7.64648E-01	7.65159E-01	9.97576E-04	0.00000E+00
50	7.65875E-01	7.65186E-01	9.67101E-04	0.00000E+00
51	7.65118E-01	7.65183E-01	9.28967E-04	0.00000E+00
52	7.71966E-01	7.65417E-01	9.33697E-04	0.00000E+00
53	7.63829E-01	7.65364E-01	9.01949E-04	0.00000E+00
54	7.72492E-01	7.65594E-01	9.66033E-04	0.00000E+00
55	7.63610E-01	7.65532E-01	9.39757E-04	0.00000E+00
56	7.76628E-01	7.65869E-01	1.05803E-03	0.00000E+00
57	7.66604E-01	7.65890E-01	1.02285E-03	0.00000E+00
58	7.63994E-01	7.65836E-01	9.72901E-04	0.00000E+00
59	7.69396E-01	7.65935E-01	9.51297E-04	0.00000E+00
60	7.67319E-01	7.65972E-01	9.21762E-04	0.00000E+00
61	7.64838E-01	7.65942E-01	8.92795E-04	0.00000E+00

62	7.68721E-01	7.66014E-01	8.74311E-04	0.00000E+00
63	7.65944E-01	7.66012E-01	8.50943E-04	0.00000E+00
64	7.66339E-01	7.66020E-01	8.29455E-04	0.00000E+00
65	7.60667E-01	7.65892E-01	8.20328E-04	0.00000E+00
66	7.59275E-01	7.65739E-01	8.15204E-04	0.00000E+00
67	7.71635E-01	7.65873E-01	7.84118E-04	0.00000E+00
68	7.59155E-01	7.65723E-01	9.00412E-04	0.00000E+00
69	7.66277E-01	7.65735E-01	8.76276E-04	0.00000E+00
70	7.65234E-01	7.65725E-01	7.80738E-04	0.00000E+00
71	7.71497E-01	7.65845E-01	7.75251E-04	0.00000E+00
72	7.63246E-01	7.65792E-01	7.61536E-04	0.00000E+00
73	7.70425E-01	7.65885E-01	7.66922E-04	0.00000E+00
74	7.70737E-01	7.65980E-01	7.50055E-04	0.00000E+00
75	7.68393E-01	7.66026E-01	7.42414E-04	0.00000E+00
76	7.69032E-01	7.66083E-01	7.37616E-04	0.00000E+00
77	7.64279E-01	7.66049E-01	7.21925E-04	0.00000E+00
78	7.61608E-01	7.65969E-01	7.06525E-04	0.00000E+00
79	7.72644E-01	7.66088E-01	6.97796E-04	0.00000E+00
80	7.68973E-01	7.66138E-01	6.80461E-04	0.00000E+00
81	7.71809E-01	7.66236E-01	6.93396E-04	0.00000E+00
82	7.66488E-01	7.66241E-01	6.81416E-04	0.00000E+00
83	7.69786E-01	7.66300E-01	6.81101E-04	0.00000E+00
84	7.74457E-01	7.66433E-01	7.73605E-04	0.00000E+00
85	7.68801E-01	7.66472E-01	7.69532E-04	0.00000E+00
86	7.74028E-01	7.66591E-01	8.16892E-04	0.00000E+00
87	7.63971E-01	7.66551E-01	7.91118E-04	0.00000E+00

```
         88       7.64686E-01      7.66522E-01      7.64133E-04
0.00000E+00      0.00000E+00
         89       7.61178E-01      7.66441E-01      6.73208E-04
0.00000E+00      0.00000E+00
         90       7.67112E-01      7.66451E-01      6.62337E-04
0.00000E+00      0.00000E+00
         91       7.63082E-01      7.66401E-01      6.60710E-04
0.00000E+00      0.00000E+00
         92       7.57699E-01      7.66275E-01      7.42610E-04
0.00000E+00      0.00000E+00
         93       7.67563E-01      7.66294E-01      7.28011E-04
0.00000E+00      0.00000E+00
         94       7.67062E-01      7.66304E-01      7.14245E-04
0.00000E+00      0.00000E+00
         95       7.64619E-01      7.66281E-01      7.09930E-04
0.00000E+00      0.00000E+00
         96       7.64829E-01      7.66261E-01      7.02968E-04
0.00000E+00      0.00000E+00
         97       7.63301E-01      7.66221E-01      6.94144E-04
0.00000E+00      0.00000E+00
         98       7.66661E-01      7.66227E-01      6.83936E-04
0.00000E+00      0.00000E+00
         99       7.59614E-01      7.66140E-01      6.92789E-04
0.00000E+00      0.00000E+00
        100       7.63047E-01      7.66100E-01      6.88971E-04
0.00000E+00      0.00000E+00
        101       7.62558E-01      7.66054E-01      6.93349E-04
0.00000E+00      0.00000E+00
        102       7.60567E-01      7.65985E-01      7.19066E-04
0.00000E+00      0.00000E+00
        103       7.64306E-01      7.65964E-01      7.17720E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=A098BB1453BF158D
        104       7.63806E-01      7.65937E-01      7.19857E-04
0.00000E+00      0.00000E+00
        105       7.64871E-01      7.65924E-01      7.14766E-04
0.00000E+00      0.00000E+00
        106       7.61597E-01      7.65872E-01      7.22261E-04
0.00000E+00      0.00000E+00
        107       7.60743E-01      7.65811E-01      7.33464E-04
0.00000E+00      0.00000E+00
        108       7.69128E-01      7.65850E-01      7.14561E-04
0.00000E+00      0.00000E+00
        109       7.64699E-01      7.65837E-01      7.08277E-04
0.00000E+00      0.00000E+00
        110       7.71138E-01      7.65898E-01      6.92392E-04
0.00000E+00      0.00000E+00
        111       7.64876E-01      7.65886E-01      6.84633E-04
0.00000E+00      0.00000E+00
        112       7.70201E-01      7.65935E-01      6.79083E-04
0.00000E+00      0.00000E+00
```

```
        113       7.65608E-01      7.65931E-01      6.70334E-04
0.00000E+00      0.00000E+00
        114       7.65997E-01      7.65932E-01      6.62560E-04
0.00000E+00      0.00000E+00
        115       7.66179E-01      7.65934E-01      6.55279E-04
0.00000E+00      0.00000E+00
        116       7.64229E-01      7.65916E-01      6.47098E-04
0.00000E+00      0.00000E+00
        117       7.66475E-01      7.65922E-01      6.40031E-04
0.00000E+00      0.00000E+00
        118       7.66945E-01      7.65933E-01      6.32630E-04
0.00000E+00      0.00000E+00
        119       7.64533E-01      7.65918E-01      6.25883E-04
0.00000E+00      0.00000E+00
        120       7.59207E-01      7.65849E-01      6.25530E-04
0.00000E+00      0.00000E+00
        121       7.69732E-01      7.65889E-01      6.13771E-04
0.00000E+00      0.00000E+00
        122       7.74676E-01      7.65977E-01      6.09238E-04
0.00000E+00      0.00000E+00
        123       7.67252E-01      7.65990E-01      6.04132E-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=9F59E77F8C83D188
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55306E-05 + or -  1.17244E-08             generation time
=  2.99733E-05 + or -  2.13975E-08
 nu bar   =  2.43896E+00 + or -  1.04365E-05       average fission group
=  2.17528E+02 + or -  1.07503E-02
                      energy(ev) of the average lethargy causing fission
=  5.64625E-02 + or -  1.18143E-04
                                                 system mean free path (cm)
=  6.52807E-01 + or -  1.83255E-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          0.76599   + or - 0.00060     0.76539 to 0.76659
0.76478 to 0.76720    0.76418 to 0.76780    2000000       6.0809

      24          0.76606   + or - 0.00060     0.76546 to 0.76666
0.76486 to 0.76727    0.76426 to 0.76787    1980000       6.1388
```

25	0.76606	+ or - 0.00061	0.76545 to 0.76667	0.76484 to 0.76728	0.76423 to 0.76788	1960000	6.1143
26	0.76610	+ or - 0.00061	0.76549 to 0.76671	0.76488 to 0.76732	0.76427 to 0.76793	1940000	6.1999
27	0.76610	+ or - 0.00062	0.76549 to 0.76672	0.76487 to 0.76734	0.76426 to 0.76795	1920000	6.1928
28	0.76610	+ or - 0.00062	0.76548 to 0.76672	0.76486 to 0.76735	0.76423 to 0.76797	1900000	6.1655
29	0.76610	+ or - 0.00063	0.76547 to 0.76673	0.76484 to 0.76736	0.76420 to 0.76799	1880000	6.1268
30	0.76610	+ or - 0.00064	0.76546 to 0.76673	0.76482 to 0.76737	0.76418 to 0.76801	1860000	6.1016
31	0.76616	+ or - 0.00065	0.76551 to 0.76681	0.76487 to 0.76746	0.76422 to 0.76810	1840000	6.0057
32	0.76618	+ or - 0.00066	0.76552 to 0.76684	0.76486 to 0.76750	0.76421 to 0.76815	1820000	5.9169
37	0.76606	+ or - 0.00069	0.76536 to 0.76675	0.76467 to 0.76745	0.76397 to 0.76814	1720000	5.9176
42	0.76616	+ or - 0.00070	0.76546 to 0.76687	0.76475 to 0.76757	0.76405 to 0.76828	1620000	6.4259
47	0.76635	+ or - 0.00075	0.76560 to 0.76710	0.76485 to 0.76785	0.76410 to 0.76861	1520000	5.9162
52	0.76622	+ or - 0.00078	0.76544 to 0.76701	0.76465 to 0.76779	0.76387 to 0.76858	1420000	6.1107
57	0.76604	+ or - 0.00082	0.76523 to 0.76686	0.76441 to 0.76767	0.76360 to 0.76849	1320000	5.5910
62	0.76598	+ or - 0.00089	0.76509 to 0.76686	0.76420 to 0.76775	0.76331 to 0.76864	1220000	5.4760
67	0.76608	+ or - 0.00096	0.76512 to 0.76704	0.76416 to 0.76800	0.76321 to 0.76896	1120000	5.3457
72	0.76618	+ or - 0.00106	0.76512 to 0.76724	0.76406 to 0.76830	0.76300 to 0.76936	1020000	5.0429
77	0.76592	+ or - 0.00113	0.76479 to 0.76705	0.76366 to 0.76818	0.76252 to 0.76932	920000	5.5327

```
      82          0.76563   + or - 0.00102     0.76461 to 0.76665
0.76359 to 0.76767    0.76257 to 0.76869     820000       8.5209

      87          0.76499   + or - 0.00092     0.76408 to 0.76591
0.76316 to 0.76683    0.76224 to 0.76775     720000      11.0992

      92          0.76536   + or - 0.00106     0.76429 to 0.76642
0.76323 to 0.76748    0.76217 to 0.76854     620000       9.9157

      97          0.76533   + or - 0.00125     0.76408 to 0.76659
0.76282 to 0.76784    0.76157 to 0.76910     520000      10.0222

     102          0.76601   + or - 0.00094     0.76507 to 0.76695
0.76414 to 0.76788    0.76320 to 0.76882     420000      24.7588

     107          0.76693   + or - 0.00094     0.76599 to 0.76787
0.76505 to 0.76881    0.76410 to 0.76976     320000      38.9661

     112          0.76644   + or - 0.00164     0.76480 to 0.76808
0.76315 to 0.76973    0.76151 to 0.77137     220000      29.5763
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          0.76706   + or - 0.00393     0.76312 to 0.77099
0.75919 to 0.77492    0.75526 to 0.77886     120000      19.3464
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76599 + or - 0.00060 which occurs for
123 generations run.

                                0.7588                   0.7627
0.7666

|-------------------------|------------------------|------------------
------|------------------------
         |
      25 +                          I                        *
| I
         |                         I                        *
|I
         |             I                                        *
|                     I
         |                                     I                    *
|      I
         |                                            I
```

```
*          |    I
      30 +                                                  I
*        |   I
         |                                                I           *
I |
         |                                                  I         *
I   |
         |                                                       I
*      I   |
         |                                                        I
*     I    |
      35 +                                                        I
*     | I
         |                                                          I
*     | I
         |                                                          I
*  |      I
         |                                                        I
* |          I
         |                                                         I
*  |        I
      40 +                                                         I
*  |       I
         |                                                         I
*   |     I
         |                                                         I
*    |   I
         |                                                        I
*     |  I
         |                                                         I
*     | I
      45 +                                                       I
*       |I
         |                                                      I
*       I
         |                                                        I
*       I
         |                                                          I
*     |I
         |                                                           I
*     |I
      50 +                                                           I
*     |I
         |                                                           I
*     I
         |
I     *   | I
         |
I     *   |I
         |
I     *  |  I
      55 +
```

```
I     *  |  I
         |
I      *|     I
         |
I      *|     I
         |
I      *|    I
         |
I     *|    I
      60 +
I     *    I
         |
I    *|    I
         |
I     *    I
         |
I     *    I
         |
I     *    I
      65 +
I    *|   I
         |
I    * |  I
         |
I    *|   I
         |
I     * |   I
         |
I     * |   I
      70 +
I    * |  I
         |
I    *|   I
         |
I    * |  I
         |
I    *|   I
         |
I    *   I
      75 +
I    *    I
         |
I    *    I
         |
I    *    I
         |
I   *|   I
         |
I   *    I
      80 +
I   |*   I
         |
```

```
I  |*    I
         |
I  |*    I
         |
I  | *   I
         |
I  | *    I
      85 +
I |  *    I
         |
I |   *    I
         |
I |  *    I
         |
I |  *    I
         |
I |  *   I
      90 +
I |  *   I
         |
I | *    I
         |
I  |*    I
         |
I  | *   I
         |
I  | *   I
      95 +
I  |*    I
         |
I  |*    I
         |
I  |*    I
         |
I  |*    I
         |
I   |*   I
     100 +
I   *    I
         |
I   *    I
         |
I    *   I
         |
I   *|   I
         |
I   *|   I
     105 +
I   *|   I
         |
I    *|   I
         |
```

```
I   * |  I
         |
I    *|  I
         |
I    *|  I
     110 +
I   *|  I
         |
I   *|  I
         |
I   *|   I
         |
I   *|   I
         |
I   *|   I
     115 +
I   *|  I
         |
I   *|  I
         |
I   *|  I
         |
I   *|  I
         |
I   *|  I
     120 +
I   *|  I
         |
I   *|  I
         |
I   *  I
         |
I   *   I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7660 + or - 0.0006 which occurs for 24 generations skipped.

```
                                0.7650                   0.7680
0.7710

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                            I    *|   I
         |                             I    *    I
      25 +                             I    *    I
         |                             I    *    I
         |                             I    *    I
         |                             I    *    I
         |                             I    *    I
```

```
30 +                                I    *    I
   |                                I    *     I
   |                                I    |*    I
   |                                I    |*    I
   |                                I    |*    I
35 +                                I    *     I
   |                              I      *     I
   |                              I      *    I
   |                            I      *|    I
   |                              I      *     I
40 +                              I      *     I
   |                              I      *     I
   |                                I    *     I
   |                                I    |*     I
   |                                I    |*     I
45 +                                 I   | *     I
   |                                 I   | *     I
   |                                 I   | *     I
   |                                I    |*      I
   |                                I    |*      I
50 +                                I    | *     I
   |                                I    | *     I
   |                              I      |*      I
   |                                I    |*      I
   |                              I      |*     I
55 +                              I      |*      I
   |                            I       *     I
   |                            I      *|     I
   |                            I       *      I
   |                          I       *|     I
60 +                          I       *|     I
   |                          I       *|      I
   |                          I       *|     I
   |                         I        *|     I
   |                         I        *|      I
65 +                          I        *      I
   |                           I       |*      I
   |                          I        *       I
   |                           I       |*       I
   |                          I        |*       I
70 +                          I        |*        I
   |                          I        *        I
   |                          I        |*       I
   |                         I         *        I
   |                        I         *|       I
75 +                        I         *|       I
   |                      I         * |      I
   |                      I         * |       I
   |                      I          *|        I
   |                      I         * |      I
80 +                    I         *  |      I
   |                    I        *   |    I
```

```
         |                      I       *   |    I
         |                     I       *    |  I
         |                    I      *      |I
      85 +                   I      *       I
         |                 I       *      I |
         |                 I       *      I |
         |                 I       *       I|
         |                  I       *       I
      90 +                 I       *        I
         |                 I        *       I
         |                   I        *     |  I
         |                  I        *      | I
         |                 I         *      | I
      95 +                 I         *      |  I
         |                 I         *      |  I
         |                 I          *     |   I
         |                I           *     |   I
         |                  I           *   |     I
     100 +                     I       *   |   I
         |                      I       *  |    I
         |                        I       *|      I
         |                         I       *       I
         |                          I      |*       I
     105 +                          I      | *       I
         |                             I   |   *       I
         |                                I|      *       I
         |                              I  |     *       I
         |                              I  |      *         I
     110 +                          I      |   *          I
         |                          I      |    *            I
         |                      I          |  *             I
         |                     I           |  *               I
         |                   I             |   *                 I
     115 +                 I               |   *                    I
         |                I                |      *
I
         |         I                       |       *
I
         |                                 |       *
I
         |         I                       |            *
I
     120 +                                 |     I
*

   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  unit   region    fissions     percent
```

	absorptions fraction	percent deviation	leakage	percent deviation
1	0.0000	0.00000E+00	0.00000E+00	0.0000
2	0.0000	37.9655	4.64691E-07	70.3526
3	0.0000	5.4722	1.10584E-05	12.8553
4	0.0000	4.2709	1.83199E-05	5.4722
5	0.0000	3.0676	3.26864E-05	4.2709
6	0.0001	1.6335	5.39723E-05	3.0676
7	0.0002	1.4177	2.23365E-04	1.6335
8	0.0003	0.9359	2.09899E-04	1.4177
9	0.0005	0.6488	3.24870E-04	0.9359
10	0.0003	0.6905	4.43332E-04	0.6488
11	0.0012	0.4898	2.07229E-04	0.6905
12	0.0010	0.7688	5.23966E-04	0.4898
13	0.0003	1.2504	3.00041E-04	0.7688
14	0.0013	0.6592	9.29335E-05	1.2504
15	0.0010	0.6814	4.10928E-04	0.6592
16	0.0002	1.1777	3.33492E-04	0.6814
17	0.0001	1.8971	8.73130E-05	1.1777
18	0.0001	2.1807	3.32071E-05	1.8971
19	0.0001	1.2607	2.55861E-05	2.1807
20	0.0001	1.5874	4.34879E-05	1.2607
21	0.0002	0.9907	3.27840E-05	1.5874
22	0.0001	1.1769	6.78745E-05	0.9907
23	0.0001	1.0366	6.37414E-05	1.1769
24	0.0000	2.2425	6.71191E-05	1.0366
		0.00000E+00	1.58843E-05	2.2425

25	0.0000	3.19024E-05	1.8486	1.99106E-05	1.8009	0.00000E+00	0.0000
26	0.0000	1.79483E-05	2.5727	1.12772E-05	2.5039	0.00000E+00	0.0000
27	0.0001	5.34535E-05	1.4166	3.33586E-05	1.3854	0.00000E+00	0.0000
28	0.0001	9.66592E-05	0.9601	6.03053E-05	0.9440	0.00000E+00	0.0000
29	0.0001	9.68409E-05	1.1269	6.10104E-05	1.1122	0.00000E+00	0.0000
30	0.0000	1.18689E-05	3.2621	7.44855E-06	3.2369	0.00000E+00	0.0000
31	0.0001	9.70870E-05	0.9508	6.13297E-05	0.9388	0.00000E+00	0.0000
32	0.0001	3.87488E-05	1.5932	2.47507E-05	1.5580	0.00000E+00	0.0000
33	0.0000	3.28086E-05	1.7025	2.05402E-05	1.6832	0.00000E+00	0.0000
34	0.0001	7.53705E-05	1.2310	4.73455E-05	1.2122	0.00000E+00	0.0000
35	0.0001	4.61955E-05	1.4768	2.89834E-05	1.4535	0.00000E+00	0.0000
36	0.0001	4.22219E-05	1.4669	2.61398E-05	1.4527	0.00000E+00	0.0000
37	0.0000	2.92152E-05	1.7092	1.83289E-05	1.6774	0.00000E+00	0.0000
38	0.0000	3.44143E-05	1.6252	2.16671E-05	1.5881	0.00000E+00	0.0000
39	0.0002	1.28113E-04	0.9584	8.15517E-05	0.9342	0.00000E+00	0.0000
40	0.0002	1.19742E-04	0.7992	7.74057E-05	0.7834	0.00000E+00	0.0000
41	0.0002	1.60478E-04	0.8282	1.07220E-04	0.8055	0.00000E+00	0.0000
42	0.0002	1.38325E-04	0.7470	9.40965E-05	0.7267	0.00000E+00	0.0000
43	0.0001	7.94327E-05	1.1557	5.70292E-05	1.1106	0.00000E+00	0.0000
44	0.0002	1.15963E-04	1.0430	8.50808E-05	1.0000	0.00000E+00	0.0000
45	0.0001	6.05649E-05	1.0090	4.87664E-05	0.9284	0.00000E+00	0.0000
46	0.0000	1.43250E-05	1.8219	1.15375E-05	1.7024	0.00000E+00	0.0000
47	0.0001	3.97186E-05	1.7816	3.08755E-05	1.7101	0.00000E+00	0.0000
48	0.0000	1.20627E-05	3.6019	9.36622E-06	3.5045	0.00000E+00	0.0000
49	0.0001	7.97520E-05	1.4365	6.28975E-05	1.4041	0.00000E+00	0.0000
50	0.0001	5.56916E-05	1.7203	4.58811E-05	1.6852	0.00000E+00	0.0000

```
   51    0.0000                 1.60932E-05     3.1838
1.33554E-05     3.1241       0.00000E+00     0.0000
   52    0.0001                 4.07187E-05     1.9127
3.52056E-05     1.8697       0.00000E+00     0.0000
   53    0.0002                 1.60135E-04     0.8156
1.57139E-04     0.7542       0.00000E+00     0.0000
   54    0.0001                 7.18099E-05     2.0233
6.68679E-05     1.9458       0.00000E+00     0.0000
   55    0.0002                 1.64026E-04     1.2805
1.50437E-04     1.2466       0.00000E+00     0.0000
   56    0.0002                 1.16436E-04     1.4713
1.08022E-04     1.4343       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                 1.49711E-04     1.4318
1.35846E-04     1.3965       0.00000E+00     0.0000
   58    0.0001                 8.71092E-05     1.8383
7.62284E-05     1.7895       0.00000E+00     0.0000
   59    0.0002                 1.61727E-04     1.3734
1.45111E-04     1.3179       0.00000E+00     0.0000
   60    0.0004                 2.76938E-04     1.2462
2.50907E-04     1.1795       0.00000E+00     0.0000
   61    0.0000                 2.78898E-05     3.8823
2.14508E-05     3.7545       0.00000E+00     0.0000
   62    0.0002                 1.65820E-04     1.5672
1.39054E-04     1.5239       0.00000E+00     0.0000
   63    0.0002                 1.22299E-04     1.8233
1.00689E-04     1.7612       0.00000E+00     0.0000
   64    0.0001                 9.80533E-05     2.4114
7.91151E-05     2.3315       0.00000E+00     0.0000
   65    0.0000                 3.47222E-05     4.0220
3.43503E-05     3.8942       0.00000E+00     0.0000
   66    0.0002                 1.73536E-04     1.7507
1.53940E-04     1.6963       0.00000E+00     0.0000
   67    0.0002                 1.52706E-04     2.0265
1.24732E-04     1.9649       0.00000E+00     0.0000
   68    0.0000                 2.40050E-05     4.3586
2.08427E-05     4.1911       0.00000E+00     0.0000
   69    0.0004                 3.09772E-04     1.6389
2.42878E-04     1.5903       0.00000E+00     0.0000
   70    0.0003                 2.05383E-04     1.7816
1.87103E-04     1.7167       0.00000E+00     0.0000
   71    0.0006                 4.33452E-04     1.4986
3.58580E-04     1.4532       0.00000E+00     0.0000
   72    0.0001                 4.78932E-05     5.6089
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2.83051E-05	5.4669	0.00000E+00	0.0000	73	0.0004	3.18278E-04	1.7919
2.43007E-04	1.6922	0.00000E+00	0.0000	74	0.0014	1.07927E-03	0.9447
7.84004E-04	0.9049	0.00000E+00	0.0000	75	0.0002	1.17988E-04	2.6652
9.04866E-05	2.5485	0.00000E+00	0.0000	76	0.0006	4.74250E-04	1.9683
3.00920E-04	1.8999	0.00000E+00	0.0000	77	0.0005	3.78029E-04	1.8021
2.70845E-04	1.7339	0.00000E+00	0.0000	78	0.0000	6.79002E-06	4.0237
6.64978E-05	3.9745	0.00000E+00	0.0000	79	0.0002	1.78900E-04	2.6218
1.20527E-04	2.5145	0.00000E+00	0.0000	80	0.0001	6.39810E-05	3.1923
8.52053E-05	3.1031	0.00000E+00	0.0000	81	0.0014	1.06943E-03	1.2323
7.86159E-04	1.1828	0.00000E+00	0.0000	82	0.0001	6.41516E-05	3.7660
3.86317E-05	3.5580	0.00000E+00	0.0000	83	0.0002	1.25982E-04	2.9724
1.39455E-04	2.9095	0.00000E+00	0.0000	84	0.0001	7.85059E-05	3.0289
7.98051E-05	2.8105	0.00000E+00	0.0000	85	0.0003	1.99381E-04	2.0731
2.45476E-04	2.0161	0.00000E+00	0.0000	86	0.0003	2.61260E-04	2.5823
2.10357E-04	2.4505	0.00000E+00	0.0000	87	0.0004	3.14238E-04	2.5395
1.96086E-04	2.4239	0.00000E+00	0.0000	88	0.0001	5.41975E-05	4.1689
9.84605E-05	4.0638	0.00000E+00	0.0000	89	0.0001	9.30641E-05	3.0222
6.46823E-05	2.7802	0.00000E+00	0.0000	90	0.0003	2.35586E-04	3.0285
1.38871E-04	2.9024	0.00000E+00	0.0000	91	0.0002	1.91342E-04	3.2089
1.20997E-04	3.0291	0.00000E+00	0.0000	92	0.0000	3.01499E-05	2.9678
1.97395E-04	2.9050	0.00000E+00	0.0000	93	0.0002	1.32163E-04	2.9898
1.07336E-04	2.7960	0.00000E+00	0.0000	94	0.0002	1.16327E-04	3.7250
6.51175E-05	3.5064	0.00000E+00	0.0000	95	0.0008	6.32366E-04	2.1304
3.89542E-04	2.0637	0.00000E+00	0.0000	96	0.0002	1.45136E-04	5.0846
7.38216E-05	4.8588	0.00000E+00	0.0000	97	0.0004	2.92865E-04	3.0548
1.67558E-04	2.9974	0.00000E+00	0.0000	98	0.0001	1.00702E-04	3.5768

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9.66109E-05     3.4418       0.00000E+00     0.0000
   99    0.0001                 1.05996E-04     4.7833
7.09018E-05     4.6294       0.00000E+00     0.0000
  100    0.0002                 1.24425E-04     4.0225
8.33289E-05     3.8485       0.00000E+00     0.0000
  101    0.0001                 1.11514E-04     4.1149
7.08880E-05     3.8187       0.00000E+00     0.0000
  102    0.0002                 1.62983E-04     4.1668
9.08178E-05     4.0057       0.00000E+00     0.0000
  103    0.0001                 9.88019E-05     3.1968
9.62313E-05     3.0280       0.00000E+00     0.0000
  104    0.0002                 1.72592E-04     3.5152
1.36857E-04     3.3927       0.00000E+00     0.0000
  105    0.0002                 1.24745E-04     3.8227
8.24961E-05     3.5917       0.00000E+00     0.0000
  106    0.0002                 1.75569E-04     4.5462
1.30465E-04     4.4856       0.00000E+00     0.0000
  107    0.0001                 6.78825E-05     3.4111
6.84026E-05     3.2123       0.00000E+00     0.0000
  108    0.0000                 3.48314E-05     2.3893
1.50386E-04     2.3357       0.00000E+00     0.0000
  109    0.0002                 1.33392E-04     2.2196
4.42451E-04     2.1886       0.00000E+00     0.0000
  110    0.0008                 6.48965E-04     2.9014
4.00280E-04     2.8744       0.00000E+00     0.0000
  111    0.0002                 1.42509E-04     4.6695
1.31291E-04     4.5320       0.00000E+00     0.0000
  112    0.0001                 1.10081E-04     5.2835
1.16190E-04     5.1805       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                 1.27432E-04     3.4507
1.11364E-04     3.2201       0.00000E+00     0.0000
  114    0.0000                 9.15803E-06     7.7905
1.29158E-05     6.2932       0.00000E+00     0.0000
  115    0.0001                 7.34028E-05     3.7727
8.53173E-05     3.4798       0.00000E+00     0.0000
  116    0.0003                 1.97807E-04     2.7370
1.48453E-04     2.4840       0.00000E+00     0.0000
  117    0.0006                 4.83542E-04     1.9182
2.58235E-04     1.7957       0.00000E+00     0.0000
  118    0.0008                 5.87456E-04     2.0008
4.58824E-04     1.9179       0.00000E+00     0.0000
  119    0.0002                 1.44870E-04     2.0888
3.73764E-04     2.0201       0.00000E+00     0.0000
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120	0.0002	1.69402E-04	2.2661	6.44530E-04	2.2337
0.00000E+00	0.0000				
121	0.0007	5.05329E-04	2.7260	3.89187E-04	2.6557
0.00000E+00	0.0000				
122	0.0001	1.14417E-04	3.9546	8.88156E-05	3.7158
0.00000E+00	0.0000				
123	0.0003	2.12718E-04	2.9721	1.51087E-04	2.6295
0.00000E+00	0.0000				
124	0.0003	2.39544E-04	2.8979	1.97290E-04	2.7137
0.00000E+00	0.0000				
125	0.0002	1.42054E-04	3.4845	1.30522E-04	3.1468
0.00000E+00	0.0000				
126	0.0001	1.01851E-04	3.4880	9.12238E-05	3.0731
0.00000E+00	0.0000				
127	0.0005	4.05650E-04	3.4207	1.98862E-04	3.2427
0.00000E+00	0.0000				
128	0.0003	2.11318E-04	2.9313	1.31128E-04	2.6022
0.00000E+00	0.0000				
129	0.0006	4.51121E-04	2.3714	4.15448E-04	2.2557
0.00000E+00	0.0000				
130	0.0001	1.12115E-04	3.0834	2.73715E-04	2.9849
0.00000E+00	0.0000				
131	0.0004	2.97153E-04	2.0975	2.38351E-04	1.7755
0.00000E+00	0.0000				
132	0.0007	5.26479E-04	2.1175	3.23428E-04	1.9486
0.00000E+00	0.0000				
133	0.0013	1.02443E-03	1.9213	6.47859E-04	1.8258
0.00000E+00	0.0000				
134	0.0001	9.07743E-05	2.3109	2.36024E-04	1.9397
0.00000E+00	0.0000				
135	0.0002	1.71372E-04	3.0437	2.54225E-04	2.9675
0.00000E+00	0.0000				
136	0.0001	4.52389E-05	2.0766	7.02145E-04	2.0437
0.00000E+00	0.0000				
137	0.0000	1.89857E-05	0.9977	3.41617E-03	0.9954
0.00000E+00	0.0000				
138	0.0004	3.02338E-04	2.1659	7.88239E-04	2.1320
0.00000E+00	0.0000				
139	0.0002	1.85538E-04	3.2153	2.27567E-04	3.0263
0.00000E+00	0.0000				
140	0.0003	2.17590E-04	2.5211	2.88469E-04	2.1894
0.00000E+00	0.0000				
141	0.0001	8.30421E-05	2.7029	2.60704E-04	2.4179
0.00000E+00	0.0000				
142	0.0001	6.86597E-05	3.0126	2.36301E-04	2.7806
0.00000E+00	0.0000				
143	0.0001	8.19937E-05	2.1679	1.75107E-04	1.3311
0.00000E+00	0.0000				
144	0.0000	3.35314E-05	3.2938	7.39607E-05	1.9763
0.00000E+00	0.0000				
145	0.0005	3.80976E-04	2.6947	2.98970E-04	2.4602
0.00000E+00	0.0000				

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  146    0.0005                 3.44723E-04     2.5474
2.52088E-04     2.0780       0.00000E+00     0.0000
  147    0.0002                 1.75968E-04     3.5998
1.12540E-04     3.1059       0.00000E+00     0.0000
  148    0.0001                 5.89959E-05     5.9100
3.93519E-05     4.7559       0.00000E+00     0.0000
  149    0.0000                 3.16953E-05     8.5664
2.18301E-05     6.6453       0.00000E+00     0.0000
  150    0.0001                 9.15894E-05     4.5309
6.59243E-05     3.3926       0.00000E+00     0.0000
  151    0.0001                 6.81939E-05     4.7070
5.76008E-05     3.2447       0.00000E+00     0.0000
  152    0.0001                 4.02387E-05     4.3332
4.62255E-05     2.6351       0.00000E+00     0.0000
  153    0.0001                 4.34919E-05     4.3331
4.78376E-05     2.5809       0.00000E+00     0.0000
  154    0.0001                 4.62367E-05     4.8749
4.90935E-05     2.7465       0.00000E+00     0.0000
  155    0.0001                 4.96521E-05     4.2673
4.91883E-05     2.5315       0.00000E+00     0.0000
  156    0.0001                 4.89000E-05     4.7395
4.74412E-05     2.8776       0.00000E+00     0.0000
  157    0.0001                 6.18220E-05     3.7206
5.88354E-05     2.3299       0.00000E+00     0.0000
  158    0.0001                 6.67593E-05     4.2678
6.77650E-05     2.7829       0.00000E+00     0.0000
  159    0.0002                 1.51502E-04     3.0247
2.10501E-04     2.5284       0.00000E+00     0.0000
  160    0.0001                 6.47242E-05     3.8890
7.60150E-05     2.9642       0.00000E+00     0.0000
  161    0.0001                 7.15887E-05     4.2949
7.13673E-05     2.7205       0.00000E+00     0.0000
  162    0.0001                 8.87383E-05     4.0057
8.28484E-05     2.5452       0.00000E+00     0.0000
  163    0.0001                 9.83438E-05     3.6232
8.98066E-05     2.2462       0.00000E+00     0.0000
  164    0.0001                 1.00706E-04     3.5173
9.39034E-05     2.1558       0.00000E+00     0.0000
  165    0.0001                 1.10647E-04     3.5029
1.02936E-04     2.1497       0.00000E+00     0.0000
  166    0.0001                 7.59776E-05     4.2994
6.74215E-05     2.8662       0.00000E+00     0.0000
  167    0.0001                 8.06800E-05     3.9648
7.21762E-05     2.6334       0.00000E+00     0.0000
  168    0.0001                 9.49934E-05     3.9141
8.20454E-05     2.6739       0.00000E+00     0.0000
1                           fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
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	fraction			deviation		deviation
169	0.0001	9.73633E-05	3.0024	1.14150E-04	0.00000E+00	4.1733 0.0000
170	0.0002	1.14849E-04	2.6764	1.34309E-04	0.00000E+00	3.5923 0.0000
171	0.0001	7.99753E-05	4.1099	1.04499E-04	0.00000E+00	5.0598 0.0000
172	0.0002	1.04488E-04	4.1649	1.49262E-04	0.00000E+00	4.8988 0.0000
173	0.0003	1.33920E-04	3.4307	2.04633E-04	0.00000E+00	3.9231 0.0000
174	0.0003	1.57001E-04	3.6356	2.52478E-04	0.00000E+00	4.0702 0.0000
175	0.0001	6.50230E-05	5.0760	1.07213E-04	0.00000E+00	5.6594 0.0000
176	0.0002	6.99131E-05	5.8940	1.17009E-04	0.00000E+00	6.5581 0.0000
177	0.0001	6.59490E-05	5.1923	1.11021E-04	0.00000E+00	5.8082 0.0000
178	0.0002	7.25412E-05	5.1551	1.24351E-04	0.00000E+00	5.7180 0.0000
179	0.0002	7.30389E-05	5.5510	1.27064E-04	0.00000E+00	6.1407 0.0000
180	0.0001	6.54914E-05	5.4079	1.13012E-04	0.00000E+00	6.0657 0.0000
181	0.0001	6.40704E-05	5.3495	1.11025E-04	0.00000E+00	6.0110 0.0000
182	0.0001	5.88062E-05	5.3788	1.01044E-04	0.00000E+00	6.1139 0.0000
183	0.0001	6.53392E-05	5.4161	1.14255E-04	0.00000E+00	6.1355 0.0000
184	0.0001	5.77905E-05	5.1199	9.92246E-05	0.00000E+00	5.9354 0.0000
185	0.0001	5.35151E-05	5.3693	9.10297E-05	0.00000E+00	6.3359 0.0000
186	0.0001	5.30168E-05	4.9918	9.09803E-05	0.00000E+00	5.8288 0.0000
187	0.0001	5.48235E-05	5.4025	9.41759E-05	0.00000E+00	6.3809 0.0000
188	0.0001	5.32932E-05	4.8032	9.13765E-05	0.00000E+00	5.6419 0.0000
189	0.0001	5.08186E-05	5.0845	8.61235E-05	0.00000E+00	6.0295 0.0000
190	0.0003	1.24077E-04	3.4136	2.08192E-04	0.00000E+00	4.1339 0.0000
191	0.0003	1.18137E-04	3.1373	1.95816E-04	0.00000E+00	3.8071 0.0000
192	0.0003	1.21263E-04	3.5936	2.01107E-04	0.00000E+00	4.4890 0.0000
193	0.0003			1.94122E-04		4.3881

1.18334E-04	3.5032	0.00000E+00	0.0000	194	0.0005	4.09048E-04	2.6188
2.51687E-04	2.0695	0.00000E+00	0.0000	195	0.0006	4.37802E-04	2.5910
2.69588E-04	2.0141	0.00000E+00	0.0000	196	0.0006	4.66902E-04	2.5976
2.89237E-04	2.0567	0.00000E+00	0.0000	197	0.0007	5.21917E-04	2.4780
3.24361E-04	1.9637	0.00000E+00	0.0000	198	0.0008	5.85504E-04	2.4828
3.61723E-04	1.9588	0.00000E+00	0.0000	199	0.0004	3.03299E-04	3.2972
1.89748E-04	2.5962	0.00000E+00	0.0000	200	0.0005	3.82745E-04	3.2673
2.31919E-04	2.5955	0.00000E+00	0.0000	201	0.0010	8.02292E-04	1.9425
4.89434E-04	1.5624	0.00000E+00	0.0000	202	0.0013	9.90959E-04	2.0729
5.99972E-04	1.6653	0.00000E+00	0.0000	203	0.0016	1.22883E-03	1.7687
7.33852E-04	1.4580	0.00000E+00	0.0000	204	0.0022	1.69353E-03	1.5582
9.95479E-04	1.3158	0.00000E+00	0.0000	205	0.0015	1.13692E-03	1.6936
6.65471E-04	1.4300	0.00000E+00	0.0000	206	0.0018	1.38782E-03	1.9195
8.09706E-04	1.6407	0.00000E+00	0.0000	207	0.0022	1.66457E-03	1.7520
9.65103E-04	1.5316	0.00000E+00	0.0000	208	0.0029	2.19331E-03	1.6037
1.27729E-03	1.4198	0.00000E+00	0.0000	209	0.0031	2.39558E-03	1.2469
1.40711E-03	1.1202	0.00000E+00	0.0000	210	0.0037	2.80427E-03	1.3981
1.67476E-03	1.2170	0.00000E+00	0.0000	211	0.0040	3.08913E-03	1.2571
1.86558E-03	1.0888	0.00000E+00	0.0000	212	0.0047	3.60734E-03	1.1080
2.18521E-03	0.9676	0.00000E+00	0.0000	213	0.0065	4.94482E-03	0.8703
2.99394E-03	0.7352	0.00000E+00	0.0000	214	0.0096	7.36921E-03	0.8017
4.43691E-03	0.6713	0.00000E+00	0.0000	215	0.0157	1.20499E-02	0.5970
7.18855E-03	0.5062	0.00000E+00	0.0000	216	0.0301	2.30382E-02	0.4037
1.35912E-02	0.3452	0.00000E+00	0.0000	217	0.0201	1.53905E-02	0.5008
9.05305E-03	0.4234	0.00000E+00	0.0000	218	0.0275	2.10437E-02	0.4612
1.23379E-02	0.3901	0.00000E+00	0.0000	219	0.0356	2.73012E-02	0.4673

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1.59327E-02     0.3920       0.00000E+00     0.0000
  220    0.0473                 3.62435E-02     0.4001
2.10796E-02     0.3353       0.00000E+00     0.0000
  221    0.0624                 4.77794E-02     0.3066
2.77211E-02     0.2610       0.00000E+00     0.0000
  222    0.0805                 6.16601E-02     0.2824
3.57047E-02     0.2407       0.00000E+00     0.0000
  223    0.1043                 7.98881E-02     0.2240
4.63400E-02     0.1914       0.00000E+00     0.0000
  224    0.0584                 4.46997E-02     0.3305
2.60363E-02     0.2817       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    0.2308                 1.76793E-01     0.1394
1.04735E-01     0.1196       0.00000E+00     0.0000
  226    0.0454                 3.48049E-02     0.3724
2.11797E-02     0.3102       0.00000E+00     0.0000
  227    0.0491                 3.76182E-02     0.3483
2.33439E-02     0.2853       0.00000E+00     0.0000
  228    0.0209                 1.60317E-02     0.5441
1.01436E-02     0.4369       0.00000E+00     0.0000
  229    0.0224                 1.71420E-02     0.5875
1.10222E-02     0.4592       0.00000E+00     0.0000
  230    0.0116                 8.86925E-03     0.8031
5.81987E-03     0.6238       0.00000E+00     0.0000
  231    0.0120                 9.21125E-03     0.7443
6.14859E-03     0.5651       0.00000E+00     0.0000
  232    0.0129                 9.90613E-03     0.6402
6.74573E-03     0.4782       0.00000E+00     0.0000
  233    0.0083                 6.38050E-03     0.9450
4.47644E-03     0.6794       0.00000E+00     0.0000
  234    0.0059                 4.49179E-03     1.0796
3.24869E-03     0.7226       0.00000E+00     0.0000
  235    0.0023                 1.78938E-03     1.7125
1.19879E-03     1.2661       0.00000E+00     0.0000
  236    0.0020                 1.51768E-03     1.7440
1.01273E-03     1.3312       0.00000E+00     0.0000
  237    0.0017                 1.30752E-03     1.9906
9.24734E-04     1.4370       0.00000E+00     0.0000
  238    0.0001                 6.80516E-05     9.0712
6.07398E-05     5.4022       0.00000E+00     0.0000

 system total =                  7.65990E-01     0.0522
4.68995E-01     0.0420       0.00000E+00     0.0000
```

the weight lost in the albedo portion of the problem = 5.3121E-01 + or - 0.0002

elapsed time 3.12783 minutes

random number= 8D4DCA1D0542A750

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.090E-03	0.05	7.660E-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

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	2.582E-08	22.86	1.701E-08	23.61	1.783E-08	23.04
3	8.512E-07	3.52	7.063E-07	3.27	7.589E-07	3.32
4	1.488E-06	2.90	1.213E-06	2.79	1.303E-06	2.81
5	2.401E-06	2.25	1.945E-06	1.99	2.087E-06	1.99
6	9.280E-06	1.20	7.495E-06	1.18	7.951E-06	1.09
7	1.227E-05	1.19	9.479E-06	1.12	1.004E-05	1.13
8	3.127E-05	0.77	2.291E-05	0.67	2.401E-05	0.62
9	8.107E-05	0.54	5.831E-05	0.48	6.094E-05	0.46
10	4.652E-05	0.59	3.305E-05	0.51	3.451E-05	0.51
11	2.193E-04	0.28	1.552E-04	0.25	1.609E-04	0.25
12	1.900E-04	0.30	1.379E-04	0.23	1.447E-04	0.24

13	5.684E-05	0.50	4.150E-05	0.43	4.337E-05	0.43
14	2.527E-04	0.22	1.834E-04	0.20	1.916E-04	0.19
15	2.210E-04	0.26	1.603E-04	0.23	1.671E-04	0.22
16	7.176E-05	0.49	5.211E-05	0.43	5.427E-05	0.44
17	3.198E-05	0.66	2.344E-05	0.51	2.449E-05	0.54
18	2.784E-05	0.65	2.020E-05	0.57	2.089E-05	0.57
19	5.063E-05	0.48	3.683E-05	0.41	3.833E-05	0.43
20	3.986E-05	0.63	2.930E-05	0.50	3.056E-05	0.44
21	8.006E-05	0.47	5.873E-05	0.40	6.123E-05	0.39
22	7.324E-05	0.38	5.365E-05	0.33	5.551E-05	0.32
23	7.733E-05	0.42	5.649E-05	0.33	5.860E-05	0.31
24	1.879E-05	0.77	1.371E-05	0.66	1.436E-05	0.61
25	2.367E-05	0.70	1.738E-05	0.54	1.833E-05	0.51
26	1.353E-05	0.98	1.006E-05	0.83	1.063E-05	0.83
27	4.196E-05	0.50	3.113E-05	0.43	3.299E-05	0.43
28	7.755E-05	0.40	5.754E-05	0.39	6.083E-05	0.36
29	7.939E-05	0.42	5.914E-05	0.31	6.207E-05	0.31
30	1.003E-05	1.06	7.451E-06	0.91	7.851E-06	0.82
31	7.852E-05	0.38	5.884E-05	0.35	6.192E-05	0.31
32	3.084E-05	0.59	2.318E-05	0.51	2.446E-05	0.45
33	2.656E-05	0.59	2.003E-05	0.50	2.106E-05	0.49
34	6.093E-05	0.46	4.599E-05	0.35	4.837E-05	0.34
35	3.674E-05	0.50	2.761E-05	0.45	2.898E-05	0.39
36	3.368E-05	0.56	2.558E-05	0.46	2.687E-05	0.41
37	2.213E-05	0.74	1.662E-05	0.57	1.734E-05	0.48
38	2.626E-05	0.59	1.987E-05	0.54	2.090E-05	0.45
39	9.808E-05	0.29	7.530E-05	0.26	7.964E-05	0.25
40	9.026E-05	0.35	6.947E-05	0.30	7.408E-05	0.28
41	1.133E-04	0.34	8.853E-05	0.29	9.455E-05	0.26
42	9.374E-05	0.31	7.376E-05	0.24	7.925E-05	0.22
43	5.106E-05	0.39	4.049E-05	0.34	4.275E-05	0.29
44	6.968E-05	0.36	5.584E-05	0.31	6.002E-05	0.27
45	3.558E-05	0.45	2.832E-05	0.38	3.129E-05	0.32
46	8.329E-06	0.76	6.562E-06	0.65	7.158E-06	0.59
47	2.355E-05	0.60	1.876E-05	0.52	1.960E-05	0.44
48	6.736E-06	1.18	5.380E-06	0.97	5.643E-06	0.79
49	4.394E-05	0.43	3.515E-05	0.38	3.792E-05	0.30
50	2.946E-05	0.49	2.371E-05	0.43	2.576E-05	0.38
51	7.869E-06	0.99	6.308E-06	0.86	6.909E-06	0.76
52	2.058E-05	0.57	1.658E-05	0.51	1.812E-05	0.43
53	7.642E-05	0.33	6.162E-05	0.26	6.691E-05	0.23
54	3.326E-05	0.47	2.703E-05	0.41	2.915E-05	0.33
55	6.692E-05	0.33	5.430E-05	0.30	5.904E-05	0.25
56	4.339E-05	0.39	3.530E-05	0.34	3.847E-05	0.30
57	4.932E-05	0.34	4.015E-05	0.31	4.377E-05	0.29
58	2.603E-05	0.50	2.123E-05	0.46	2.309E-05	0.32
59	4.444E-05	0.35	3.625E-05	0.32	3.949E-05	0.25
60	6.424E-05	0.32	5.253E-05	0.30	5.713E-05	0.24
61	6.073E-06	0.91	4.935E-06	0.87	5.385E-06	0.70
62	3.238E-05	0.44	2.649E-05	0.39	2.890E-05	0.32
63	2.177E-05	0.51	1.792E-05	0.46	1.951E-05	0.41
64	1.716E-05	0.54	1.410E-05	0.51	1.537E-05	0.40

65	5.724E-06	1.14	4.686E-06	0.96	5.142E-06	0.78
66	2.874E-05	0.45	2.374E-05	0.44	2.572E-05	0.33
67	2.131E-05	0.51	1.748E-05	0.48	1.900E-05	0.39
68	4.608E-06	0.99	3.860E-06	0.93	4.146E-06	0.77
69	3.765E-05	0.38	3.091E-05	0.31	3.347E-05	0.24
70	2.673E-05	0.42	2.202E-05	0.39	2.389E-05	0.31
71	4.575E-05	0.38	3.781E-05	0.32	4.093E-05	0.25
72	2.583E-06	1.34	2.152E-06	1.22	2.365E-06	1.03
73	2.716E-05	0.39	2.243E-05	0.35	2.435E-05	0.27
74	7.956E-05	0.25	6.590E-05	0.24	7.139E-05	0.23
75	9.083E-06	0.83	7.521E-06	0.69	8.170E-06	0.56
76	2.289E-05	0.48	1.899E-05	0.41	2.062E-05	0.33
77	1.761E-05	0.61	1.464E-05	0.49	1.584E-05	0.40
78	1.534E-06	1.71	1.289E-06	1.52	1.417E-06	1.22
79	9.804E-06	0.72	8.216E-06	0.67	8.823E-06	0.49
80	4.529E-06	1.05	3.747E-06	0.89	4.058E-06	0.71
81	5.527E-05	0.30	4.588E-05	0.27	4.963E-05	0.24
82	3.271E-06	1.16	2.710E-06	1.04	2.952E-06	0.83
83	4.413E-06	1.01	3.672E-06	0.96	4.012E-06	0.80
84	8.102E-06	0.78	6.787E-06	0.74	7.325E-06	0.61
85	9.888E-06	0.66	8.264E-06	0.66	8.927E-06	0.51
86	1.372E-05	0.55	1.150E-05	0.53	1.240E-05	0.42
87	1.199E-05	0.68	1.004E-05	0.62	1.081E-05	0.48
88	3.131E-06	1.20	2.650E-06	1.12	2.850E-06	0.90
89	6.622E-06	0.94	5.528E-06	0.78	5.953E-06	0.66
90	6.951E-06	0.82	5.801E-06	0.76	6.250E-06	0.64
91	8.267E-06	0.80	6.868E-06	0.71	7.437E-06	0.59
92	4.725E-06	1.06	3.968E-06	0.96	4.330E-06	0.78
93	8.189E-06	0.83	6.839E-06	0.69	7.370E-06	0.56
94	4.211E-06	1.12	3.506E-06	1.00	3.791E-06	0.78
95	1.263E-05	0.64	1.058E-05	0.60	1.149E-05	0.52
96	3.428E-06	1.27	2.868E-06	1.09	3.087E-06	0.92
97	3.407E-06	1.16	2.871E-06	1.07	3.088E-06	0.82
98	3.493E-06	1.12	2.929E-06	1.04	3.164E-06	0.86
99	2.297E-06	1.42	1.914E-06	1.27	2.063E-06	0.94
100	3.488E-06	1.24	2.888E-06	1.08	3.123E-06	0.95
101	4.921E-06	0.95	4.100E-06	0.86	4.463E-06	0.71
102	3.347E-06	1.27	2.784E-06	1.04	3.048E-06	0.87
103	4.670E-06	1.06	3.879E-06	0.93	4.215E-06	0.78
104	4.213E-06	1.15	3.512E-06	0.96	3.797E-06	0.78
105	4.378E-06	1.23	3.699E-06	1.03	3.928E-06	0.84
106	1.523E-06	1.71	1.297E-06	1.63	1.409E-06	1.37
107	3.628E-06	1.26	3.010E-06	1.02	3.267E-06	0.88
108	3.150E-06	1.09	2.682E-06	0.96	2.931E-06	0.84
109	5.023E-06	0.94	4.251E-06	0.91	4.624E-06	0.79
110	3.021E-06	1.10	2.590E-06	1.03	2.836E-06	0.84
111	3.060E-06	1.18	2.572E-06	1.02	2.798E-06	0.78
112	1.843E-06	1.74	1.552E-06	1.54	1.695E-06	1.25
113	5.755E-06	0.98	4.813E-06	0.77	5.215E-06	0.66
114	1.979E-06	1.49	1.652E-06	1.27	1.767E-06	1.11
115	5.157E-06	1.09	4.287E-06	0.94	4.647E-06	0.81
116	1.081E-05	0.67	9.021E-06	0.59	9.742E-06	0.45

117	1.175E-05	0.66	9.857E-06	0.59	1.067E-05	0.51
118	1.291E-05	0.67	1.090E-05	0.62	1.181E-05	0.46
119	8.222E-06	0.69	6.965E-06	0.66	7.550E-06	0.54
120	5.776E-06	0.78	4.928E-06	0.80	5.334E-06	0.65
121	6.115E-06	0.82	5.209E-06	0.73	5.676E-06	0.57
122	3.214E-06	1.14	2.714E-06	1.11	2.929E-06	0.88
123	1.044E-05	0.72	8.714E-06	0.55	9.380E-06	0.51
124	7.357E-06	0.72	6.211E-06	0.65	6.708E-06	0.52
125	7.032E-06	0.88	5.909E-06	0.79	6.355E-06	0.68
126	5.823E-06	0.95	4.903E-06	0.81	5.269E-06	0.65
127	5.554E-06	0.76	4.688E-06	0.71	5.058E-06	0.59
128	7.732E-06	0.72	6.518E-06	0.67	7.036E-06	0.57
129	9.659E-06	0.71	8.119E-06	0.62	8.791E-06	0.45
130	3.939E-06	1.29	3.358E-06	1.12	3.657E-06	0.90
131	1.683E-05	0.58	1.420E-05	0.51	1.528E-05	0.38
132	1.121E-05	0.70	9.443E-06	0.64	1.018E-05	0.53
133	1.358E-05	0.60	1.150E-05	0.51	1.244E-05	0.43
134	1.476E-05	0.56	1.238E-05	0.50	1.340E-05	0.40
135	2.305E-06	1.32	2.011E-06	1.15	2.188E-06	0.98
136	3.923E-06	1.05	3.402E-06	0.96	3.675E-06	0.76
137	2.463E-06	0.99	2.605E-06	0.90	2.931E-06	0.83
138	4.116E-06	0.97	3.575E-06	0.80	3.946E-06	0.72
139	4.621E-06	1.07	3.908E-06	0.91	4.249E-06	0.77
140	1.209E-05	0.59	1.022E-05	0.56	1.101E-05	0.49
141	8.806E-06	0.75	7.439E-06	0.74	8.034E-06	0.54
142	5.862E-06	0.89	4.927E-06	0.74	5.331E-06	0.63
143	1.968E-05	0.53	1.660E-05	0.44	1.788E-05	0.39
144	8.223E-06	0.80	6.890E-06	0.68	7.377E-06	0.57
145	7.211E-06	0.89	6.096E-06	0.81	6.597E-06	0.64
146	1.213E-05	0.59	1.021E-05	0.50	1.098E-05	0.44
147	3.643E-06	1.06	3.108E-06	0.98	3.355E-06	0.84
148	1.900E-06	1.60	1.600E-06	1.41	1.724E-06	1.08
149	1.140E-06	1.82	9.895E-07	1.73	1.053E-06	1.44
150	4.051E-06	1.12	3.395E-06	0.99	3.637E-06	0.78
151	4.167E-06	1.03	3.511E-06	0.92	3.767E-06	0.69
152	4.297E-06	0.95	3.644E-06	0.89	3.902E-06	0.66
153	4.400E-06	1.07	3.713E-06	0.89	4.035E-06	0.71
154	4.725E-06	0.92	3.958E-06	0.87	4.262E-06	0.71
155	4.396E-06	1.02	3.657E-06	0.93	3.980E-06	0.72
156	3.976E-06	0.99	3.362E-06	0.91	3.613E-06	0.79
157	4.632E-06	1.19	3.876E-06	1.00	4.187E-06	0.83
158	4.876E-06	0.97	4.113E-06	0.89	4.427E-06	0.74
159	6.803E-06	0.81	5.771E-06	0.77	6.210E-06	0.61
160	3.568E-06	1.27	3.043E-06	1.04	3.275E-06	0.84
161	4.850E-06	1.02	4.089E-06	0.95	4.451E-06	0.82
162	5.808E-06	0.94	4.918E-06	0.88	5.276E-06	0.69
163	6.198E-06	0.91	5.220E-06	0.76	5.618E-06	0.71
164	6.569E-06	0.96	5.518E-06	0.88	5.912E-06	0.64
165	6.983E-06	0.99	5.874E-06	0.85	6.296E-06	0.67
166	3.954E-06	1.11	3.349E-06	0.95	3.628E-06	0.84
167	4.266E-06	1.06	3.579E-06	0.87	3.832E-06	0.79
168	4.233E-06	1.08	3.595E-06	0.94	3.846E-06	0.76

169	4.407E-06	1.05	3.713E-06	0.99	4.043E-06	0.84
170	4.617E-06	1.01	3.885E-06	0.86	4.208E-06	0.75
171	2.424E-06	1.43	2.031E-06	1.27	2.180E-06	1.06
172	2.433E-06	1.48	2.057E-06	1.22	2.228E-06	0.94
173	2.494E-06	1.57	2.103E-06	1.45	2.273E-06	1.06
174	2.492E-06	1.39	2.123E-06	1.21	2.298E-06	1.10
175	1.024E-06	2.11	8.641E-07	1.76	9.421E-07	1.38
176	1.040E-06	1.96	8.791E-07	1.67	9.552E-07	1.44
177	1.028E-06	1.88	8.778E-07	1.65	9.552E-07	1.34
178	1.001E-06	2.09	8.605E-07	1.79	9.384E-07	1.38
179	1.052E-06	1.93	8.784E-07	1.80	9.586E-07	1.51
180	1.038E-06	1.86	8.776E-07	1.68	9.629E-07	1.41
181	1.042E-06	1.77	8.975E-07	1.73	9.773E-07	1.44
182	1.092E-06	1.91	9.265E-07	1.72	1.008E-06	1.38
183	1.066E-06	1.87	9.239E-07	1.62	9.938E-07	1.48
184	1.152E-06	2.20	9.486E-07	1.89	1.014E-06	1.42
185	1.128E-06	1.92	9.597E-07	1.63	1.037E-06	1.12
186	1.127E-06	2.00	9.427E-07	2.08	1.018E-06	1.53
187	1.147E-06	1.88	9.662E-07	1.73	1.065E-06	1.58
188	1.138E-06	1.69	9.681E-07	1.56	1.044E-06	1.27
189	1.201E-06	2.15	1.025E-06	1.68	1.086E-06	1.27
190	3.036E-06	1.10	2.559E-06	0.95	2.782E-06	0.91
191	3.080E-06	1.16	2.617E-06	1.04	2.787E-06	0.77
192	3.201E-06	1.37	2.705E-06	1.22	2.896E-06	0.85
193	3.264E-06	1.19	2.736E-06	1.03	2.973E-06	0.89
194	6.907E-06	0.83	5.832E-06	0.64	6.309E-06	0.58
195	7.328E-06	0.79	6.166E-06	0.73	6.704E-06	0.63
196	7.715E-06	0.83	6.546E-06	0.75	7.076E-06	0.61
197	8.541E-06	0.79	7.207E-06	0.74	7.778E-06	0.58
198	9.071E-06	0.84	7.660E-06	0.79	8.245E-06	0.57
199	4.738E-06	0.95	3.996E-06	0.83	4.343E-06	0.75
200	5.103E-06	0.89	4.322E-06	0.84	4.664E-06	0.66
201	1.069E-05	0.73	9.021E-06	0.66	9.757E-06	0.56
202	1.195E-05	0.68	1.011E-05	0.64	1.092E-05	0.44
203	1.293E-05	0.62	1.094E-05	0.57	1.186E-05	0.48
204	1.478E-05	0.51	1.248E-05	0.50	1.358E-05	0.43
205	8.609E-06	0.63	7.724E-06	0.54	8.180E-06	0.43
206	9.320E-06	0.66	8.431E-06	0.59	8.871E-06	0.47
207	9.592E-06	0.66	8.699E-06	0.55	9.173E-06	0.45
208	1.129E-05	0.51	1.017E-05	0.45	1.080E-05	0.40
209	1.159E-05	0.60	1.061E-05	0.53	1.116E-05	0.47
210	1.395E-05	0.54	1.268E-05	0.50	1.354E-05	0.38
211	1.617E-05	0.46	1.463E-05	0.44	1.552E-05	0.33
212	1.914E-05	0.45	1.734E-05	0.39	1.851E-05	0.33
213	2.624E-05	0.35	2.354E-05	0.36	2.521E-05	0.29
214	3.691E-05	0.31	3.312E-05	0.28	3.566E-05	0.24
215	5.524E-05	0.25	4.972E-05	0.22	5.375E-05	0.19
216	9.200E-05	0.22	8.380E-05	0.21	9.069E-05	0.17
217	5.549E-05	0.21	5.300E-05	0.20	5.624E-05	0.16
218	7.068E-05	0.21	6.791E-05	0.18	7.226E-05	0.14
219	8.411E-05	0.19	8.141E-05	0.16	8.664E-05	0.13
220	1.016E-04	0.18	9.906E-05	0.15	1.056E-04	0.11

221	1.208E-04	0.16	1.190E-04	0.14	1.267E-04	0.12
222	1.368E-04	0.18	1.367E-04	0.15	1.459E-04	0.12
223	1.534E-04	0.16	1.574E-04	0.14	1.673E-04	0.11
224	7.515E-05	0.19	7.982E-05	0.17	8.466E-05	0.13
225	2.341E-04	0.13	2.728E-04	0.11	2.830E-04	0.09
226	3.180E-05	0.24	4.471E-05	0.21	4.449E-05	0.15
227	2.896E-05	0.22	4.628E-05	0.22	4.446E-05	0.14
228	1.043E-05	0.42	1.900E-05	0.31	1.754E-05	0.19
229	9.708E-06	0.38	1.970E-05	0.30	1.748E-05	0.20
230	4.460E-06	0.52	1.022E-05	0.37	8.730E-06	0.23
231	4.249E-06	0.56	1.061E-05	0.39	8.723E-06	0.20
232	3.951E-06	0.53	1.139E-05	0.39	8.892E-06	0.17
233	2.253E-06	0.72	7.415E-06	0.51	5.522E-06	0.25
234	1.433E-06	0.79	5.384E-06	0.60	3.829E-06	0.30
235	5.197E-07	1.45	1.050E-06	1.01	1.121E-06	0.54
236	3.577E-07	1.55	7.512E-07	1.14	8.032E-07	0.62
237	2.303E-07	1.73	5.513E-07	1.39	6.160E-07	0.65
238	5.239E-09	11.18	2.040E-08	6.78	2.537E-08	2.35

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
 0.7562 to 0.7590     ***
 0.7590 to 0.7618     ************
 0.7618 to 0.7646     **********************
 0.7646 to 0.7675     ************************************
 0.7675 to 0.7703     ************
 0.7703 to 0.7731     ***********
 0.7731 to 0.7760     ****
 0.7760 to 0.7788     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7562 to 0.7590     *
 0.7590 to 0.7618     **********
 0.7618 to 0.7646     ****************
 0.7646 to 0.7675     ************************
 0.7675 to 0.7703     ***********
 0.7703 to 0.7731     *********
 0.7731 to 0.7760     ***
 0.7760 to 0.7788     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7562 to 0.7590     *
 0.7590 to 0.7618     *******
 0.7618 to 0.7646     ***********
 0.7646 to 0.7675     ***************
 0.7675 to 0.7703     *********
 0.7703 to 0.7731     ****
 0.7731 to 0.7760     ***
 0.7760 to 0.7788

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7562 to 0.7590
 0.7590 to 0.7618     *****
 0.7618 to 0.7646     ******
 0.7646 to 0.7675     *********
 0.7675 to 0.7703     ***
 0.7703 to 0.7731     *
 0.7731 to 0.7760     *
 0.7760 to 0.7788

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

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

*********************************************************************
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        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76606 + or - 0.00060                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.64625E-02 + or -  1.18143E-04            ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  1.04365E-05            ***
        ***
***
        ***        system mean free path (cm)
6.52807E-01 + or -  1.83255E-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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```

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           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.12500 minutes


*********************************************************************
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1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //                22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666


      0000000      5555555555555                     33333333333
0000000                     5555555555555         11
     000000000     5555555555555                    3333333333333
000000000                   5555555555555        111
    00       00    55                   :::       33         33    00
00          :::       55                 1111
   00         00   55                   :::                  33   00
00         :::       55                   11
   00         00   55                   :::                  33   00
00         :::       55                   11
```

```
   00         00   555555555555                              333    00
00                  555555555555          11
   00         00   5555555555555                             333    00
00                  5555555555555         11
   00         00              55         :::                  33   00
00         :::                  55         11
   00         00              55         :::                  33   00
00         :::                  55         11
    00       00    55         55         :::       33         33    00
00          :::       55         55         11
     000000000     5555555555555                   3333333333333
000000000                     5555555555555      11111111
      0000000       55555555555                     33333333333
0000000                       55555555555       11111111
1

    SSSSSSSSSS     CCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCC    AAAAAAAAAAA    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   CCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

```
**********************************************************************
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        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:30:51.77
*****
        *****
*****
        *****
```

```
*****

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1

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

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

```
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

**********************************************************************
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                                 ........ 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  5.89869E-13  1.77953E-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  1.65003E-15  5.43769E-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
    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  7.66968E-12  1.90356E-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  1.07121E-08  2.91494E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.64443E-08  4.52393E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  8.17421E-11  2.27328E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.66647E-08  4.68439E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  7.55364E-11  2.14596E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.75388E-09  7.90612E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  9.02915E-20  2.51104E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  9.08575E-12  2.58119E-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  1.12876E-08  3.20669E-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  6.86331E-09  1.99088E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.72459E-08  5.05422E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26655E-11  3.74984E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.94642E-09  2.07740E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  6.63627E-11  1.96476E-09   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  6.91178E-11  2.08769E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  5.63043E-11  1.71750E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  3.22944E-11  9.94789E-10   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  2.53459E-11  7.88330E-10   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.24731E-12  1.66351E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  7.63826E-12  2.35285E-10   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.09737E-12  3.44599E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.17305E-11  3.68362E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.03989E-12  6.52780E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  7.45043E-13  2.40647E-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  4.11296E-13  1.34080E-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  1.29249E-09  4.29079E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43644E-09  8.16129E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23393E-09  4.17025E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90092E-09  9.89087E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56404E-10  2.62432E-08   48116   115.9048     cd116 4855
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.37791E-13  4.73935E-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  6.50204E-11  2.23637E-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  1.46871E-09  5.13954E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63139E-09  1.63453E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64272E-09  5.84680E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.22997E-09  2.23601E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85537E-10  3.23135E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10750E-09  4.10765E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  7.42015E-13  2.79658E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  1.59685E-12  6.06602E-11   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  7.49556E-12  2.89225E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30199E-12  5.25790E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  2.27941E-11  8.93184E-10   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.59832E-11  1.03371E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88549E-12  7.61416E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  5.94727E-11  2.36604E-09   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.08117E-16  4.33370E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  8.27372E-11  3.34113E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  8.14098E-11  3.33630E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.30124E-08  1.36276E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  4.45780E-11  1.86695E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  8.87115E-11  3.68862E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  6.01951E-11  2.53898E-09   58141   140.9083     ce141 5840
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  8.13394E-11  3.45520E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.24932E-12  2.67340E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  6.99669E-11  3.01409E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.74237E-11  7.34914E-10   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  4.27916E-11  1.83057E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  3.03597E-11  1.29874E-09   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  2.14869E-12  9.25606E-11   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  5.10113E-11  2.21276E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  4.04781E-11  1.76797E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.50103E-11  6.60118E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  2.20307E-11  9.75457E-10   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  1.48417E-11  6.52696E-10   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  7.20859E-19  3.19177E-17   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.93887E-12  8.64289E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.00570E-13  4.42277E-12   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.31712E-11  5.87126E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  9.31102E-16  4.17841E-14   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.01170E-09  1.36057E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  3.58386E-12  1.62977E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.33123E-13  1.06713E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.42987E-09  6.45957E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.56101E-09  7.14557E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  8.75835E-16  4.03541E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  4.36696E-13  2.02515E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.16778E-13  5.45053E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77819E-12  2.62765E-10   64152   151.9198     gd152 6425
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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  4.27251E-10  1.98134E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91069E-10  2.75872E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51781E-10  2.12216E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17287E-10  3.39081E-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  4.68184E-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  9.22571E-06  6.51865E-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  4.79036E-13  3.39912E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  5.52303E-20  3.93556E-18   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  5.35204E-11  3.82978E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  1.42578E-17  1.02453E-15   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.97317E-21  7.19639E-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  1.00320E-20  7.23887E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.85075E-28  2.79016E-26   95242   242.0596     am242 9546
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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  1.64558E-20  1.19235E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.98370E-21  7.26389E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.97383E-21  7.28660E-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
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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
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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:
  9520 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

                                            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       ........

                                 ........     0.01433 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

   0.00117 minutes were required for starting.   total elapsed time is
0.01550 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 15582 independent fission points were generated for generation 1
          1       7.61169E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15652 independent fission points were generated for generation 2
          2       7.69772E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15562 independent fission points were generated for generation 3
          3       7.62329E-01      7.62329E-01      0.00000E+00
0.00000E+00      0.00000E+00
```

4	7.67902E-01	7.65116E-01	2.78634E-03	0.00000E+00	0.00000E+00
5	7.66069E-01	7.65434E-01	1.63980E-03	0.00000E+00	0.00000E+00
6	7.66116E-01	7.65604E-01	1.17201E-03	0.00000E+00	0.00000E+00
7	7.67120E-01	7.65907E-01	9.57078E-04	0.00000E+00	0.00000E+00
8	7.59463E-01	7.64833E-01	1.32827E-03	0.00000E+00	0.00000E+00
9	7.67391E-01	7.65199E-01	1.18058E-03	0.00000E+00	0.00000E+00
10	7.64252E-01	7.65080E-01	1.02923E-03	0.00000E+00	0.00000E+00
11	7.66575E-01	7.65246E-01	9.22751E-04	0.00000E+00	0.00000E+00
12	7.62565E-01	7.64978E-01	8.67794E-04	0.00000E+00	0.00000E+00
13	7.61895E-01	7.64698E-01	8.33495E-04	0.00000E+00	0.00000E+00
14	7.65230E-01	7.64742E-01	7.62164E-04	0.00000E+00	0.00000E+00
15	7.62933E-01	7.64603E-01	7.14775E-04	0.00000E+00	0.00000E+00
16	7.62322E-01	7.64440E-01	6.81516E-04	0.00000E+00	0.00000E+00
17	7.63565E-01	7.64382E-01	6.37137E-04	0.00000E+00	0.00000E+00
18	7.61146E-01	7.64180E-01	6.29370E-04	0.00000E+00	0.00000E+00
19	7.76292E-01	7.64892E-01	9.25828E-04	0.00000E+00	0.00000E+00
20	7.63434E-01	7.64811E-01	8.76632E-04	0.00000E+00	0.00000E+00
21	7.64153E-01	7.64776E-01	8.29933E-04	0.00000E+00	0.00000E+00
22	7.62834E-01	7.64679E-01	7.93310E-04	0.00000E+00	0.00000E+00
23	7.69789E-01	7.64923E-01	7.92849E-04	0.00000E+00	0.00000E+00
24	7.69146E-01	7.65115E-01	7.79945E-04	0.00000E+00	0.00000E+00
25	7.66218E-01	7.65163E-01	7.46806E-04	0.00000E+00	0.00000E+00
26	7.64036E-01	7.65116E-01	7.16551E-04	0.00000E+00	0.00000E+00
27	7.66751E-01	7.66538E-01	1.48367E-03	0.00000E+00	0.00000E+00
28	7.60207E-01	7.65272E-01	5.35554E-03	0.00000E+00	0.00000E+00
29	7.69256E-01	7.65936E-01	2.56699E-03	0.00000E+00	0.00000E+00

30	7.65444E-01	7.65865E-01	2.04714E-03	0.00000E+00	0.00000E+00
31	7.72297E-01	7.66669E-01	2.41129E-03	0.00000E+00	0.00000E+00
32	7.68545E-01	7.66878E-01	2.03248E-03	0.00000E+00	0.00000E+00
33	7.65893E-01	7.66779E-01	1.68951E-03	0.00000E+00	0.00000E+00
34	7.65262E-01	7.66641E-01	1.46532E-03	0.00000E+00	0.00000E+00
35	7.61862E-01	7.66243E-01	1.42007E-03	0.00000E+00	0.00000E+00
36	7.70346E-01	7.66559E-01	1.30071E-03	0.00000E+00	0.00000E+00
37	7.64336E-01	7.66400E-01	1.26388E-03	0.00000E+00	0.00000E+00
38	7.70990E-01	7.66706E-01	1.31367E-03	0.00000E+00	0.00000E+00
39	7.68652E-01	7.66827E-01	1.20386E-03	0.00000E+00	0.00000E+00
40	7.67388E-01	7.66860E-01	1.13139E-03	0.00000E+00	0.00000E+00
41	7.59619E-01	7.66458E-01	1.09477E-03	0.00000E+00	0.00000E+00
42	7.71004E-01	7.66697E-01	1.07349E-03	0.00000E+00	0.00000E+00
43	7.75400E-01	7.67133E-01	9.46862E-04	0.00000E+00	0.00000E+00
44	7.65097E-01	7.67036E-01	9.04034E-04	0.00000E+00	0.00000E+00
45	7.62917E-01	7.66848E-01	8.82042E-04	0.00000E+00	0.00000E+00
46	7.64223E-01	7.66734E-01	8.49439E-04	0.00000E+00	0.00000E+00
47	7.66654E-01	7.66731E-01	8.11675E-04	0.00000E+00	0.00000E+00
48	7.65617E-01	7.66686E-01	7.78508E-04	0.00000E+00	0.00000E+00
49	7.66111E-01	7.66664E-01	7.47074E-04	0.00000E+00	0.00000E+00
50	7.71382E-01	7.66839E-01	7.40381E-04	0.00000E+00	0.00000E+00
51	7.65907E-01	7.66806E-01	7.13270E-04	0.00000E+00	0.00000E+00
52	7.70826E-01	7.66944E-01	7.02177E-04	0.00000E+00	0.00000E+00
53	7.65637E-01	7.66901E-01	6.79032E-04	0.00000E+00	0.00000E+00
54	7.78077E-01	7.67261E-01	7.83420E-04	0.00000E+00	0.00000E+00
55	7.59336E-01	7.67014E-01	8.16227E-04	0.00000E+00	0.00000E+00

56	7.64726E-01	7.66944E-01	7.52144E-04	0.00000E+00	0.00000E+00
57	7.65016E-01	7.66887E-01	7.56195E-04	0.00000E+00	0.00000E+00
58	7.73501E-01	7.67076E-01	7.35708E-04	0.00000E+00	0.00000E+00
59	7.58945E-01	7.66851E-01	7.75671E-04	0.00000E+00	0.00000E+00
60	7.60093E-01	7.66668E-01	7.53832E-04	0.00000E+00	0.00000E+00
61	7.63148E-01	7.66575E-01	7.39325E-04	0.00000E+00	0.00000E+00
62	7.66148E-01	7.66564E-01	7.19694E-04	0.00000E+00	0.00000E+00
63	7.73627E-01	7.66741E-01	7.24023E-04	0.00000E+00	0.00000E+00
64	7.69137E-01	7.66799E-01	7.08231E-04	0.00000E+00	0.00000E+00
65	7.74532E-01	7.66983E-01	7.49144E-04	0.00000E+00	0.00000E+00
66	7.68575E-01	7.67020E-01	7.34868E-04	0.00000E+00	0.00000E+00
67	7.68871E-01	7.67063E-01	7.30019E-04	0.00000E+00	0.00000E+00
68	7.64036E-01	7.66995E-01	7.12492E-04	0.00000E+00	0.00000E+00
69	7.71600E-01	7.67095E-01	7.10398E-04	0.00000E+00	0.00000E+00
70	7.65327E-01	7.67058E-01	6.99375E-04	0.00000E+00	0.00000E+00
71	7.57551E-01	7.66860E-01	6.84075E-04	0.00000E+00	0.00000E+00
72	7.64318E-01	7.66808E-01	6.74554E-04	0.00000E+00	0.00000E+00
73	7.70724E-01	7.66886E-01	6.48546E-04	0.00000E+00	0.00000E+00
74	7.62594E-01	7.66802E-01	6.41216E-04	0.00000E+00	0.00000E+00
75	7.61889E-01	7.66708E-01	6.35861E-04	0.00000E+00	0.00000E+00
76	7.62995E-01	7.66637E-01	6.27588E-04	0.00000E+00	0.00000E+00
77	7.67109E-01	7.66646E-01	6.15697E-04	0.00000E+00	0.00000E+00
78	7.67626E-01	7.66664E-01	6.04461E-04	0.00000E+00	0.00000E+00
79	7.60721E-01	7.66558E-01	6.03130E-04	0.00000E+00	0.00000E+00
80	7.63454E-01	7.66503E-01	5.94850E-04	0.00000E+00	0.00000E+00
81	7.67446E-01	7.66520E-01	5.84555E-04	0.00000E+00	0.00000E+00

```
         82       7.63276E-01      7.66465E-01      5.77106E-04
0.00000E+00      0.00000E+00
         83       7.60488E-01      7.66365E-01      5.76218E-04
0.00000E+00      0.00000E+00
         84       7.61643E-01      7.66288E-01      5.86805E-04
0.00000E+00      0.00000E+00
         85       7.73480E-01      7.66404E-01      5.74745E-04
0.00000E+00      0.00000E+00
         86       7.74902E-01      7.66539E-01      6.08674E-04
0.00000E+00      0.00000E+00
         87       7.61944E-01      7.66467E-01      5.77098E-04
0.00000E+00      0.00000E+00
         88       7.64930E-01      7.66443E-01      5.80132E-04
0.00000E+00      0.00000E+00
         89       7.67090E-01      7.66453E-01      5.70664E-04
0.00000E+00      0.00000E+00
         90       7.61296E-01      7.66376E-01      5.65884E-04
0.00000E+00      0.00000E+00
         91       7.61086E-01      7.66298E-01      5.74073E-04
0.00000E+00      0.00000E+00
         92       7.65989E-01      7.66294E-01      5.66105E-04
0.00000E+00      0.00000E+00
         93       7.65586E-01      7.66284E-01      5.57887E-04
0.00000E+00      0.00000E+00
         94       7.52744E-01      7.66093E-01      5.87000E-04
0.00000E+00      0.00000E+00
         95       7.64588E-01      7.66072E-01      5.86169E-04
0.00000E+00      0.00000E+00
         96       7.67720E-01      7.66095E-01      5.77477E-04
0.00000E+00      0.00000E+00
         97       7.72042E-01      7.66175E-01      5.78763E-04
0.00000E+00      0.00000E+00
         98       7.73899E-01      7.66278E-01      5.95463E-04
0.00000E+00      0.00000E+00
         99       7.73094E-01      7.66368E-01      6.10785E-04
0.00000E+00      0.00000E+00
        100       7.61898E-01      7.66310E-01      5.96334E-04
0.00000E+00      0.00000E+00
        101       7.60561E-01      7.66236E-01      6.00757E-04
0.00000E+00      0.00000E+00
        102       7.77311E-01      7.66376E-01      5.92112E-04
0.00000E+00      0.00000E+00
        103       7.65739E-01      7.66368E-01      5.82505E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=E4CA32257271EACA
        104       7.61426E-01      7.66307E-01      5.79307E-04
0.00000E+00      0.00000E+00
        105       7.61889E-01      7.66253E-01      5.80613E-04
0.00000E+00      0.00000E+00
        106       7.68350E-01      7.66278E-01      5.71503E-04
0.00000E+00      0.00000E+00
```

```
        107       7.69675E-01      7.66319E-01      5.67926E-04
0.00000E+00      0.00000E+00
        108       7.72063E-01      7.66386E-01      5.70386E-04
0.00000E+00      0.00000E+00
        109       7.56167E-01      7.66268E-01      5.61655E-04
0.00000E+00      0.00000E+00
        110       7.59058E-01      7.66185E-01      5.79478E-04
0.00000E+00      0.00000E+00
        111       7.64694E-01      7.66168E-01      5.75505E-04
0.00000E+00      0.00000E+00
        112       7.65412E-01      7.66159E-01      5.69172E-04
0.00000E+00      0.00000E+00
        113       7.67075E-01      7.66170E-01      5.62605E-04
0.00000E+00      0.00000E+00
        114       7.65278E-01      7.66160E-01      5.56139E-04
0.00000E+00      0.00000E+00
        115       7.68081E-01      7.66181E-01      5.49960E-04
0.00000E+00      0.00000E+00
        116       7.67741E-01      7.66197E-01      5.44833E-04
0.00000E+00      0.00000E+00
        117       7.62438E-01      7.66157E-01      5.39096E-04
0.00000E+00      0.00000E+00
        118       7.71233E-01      7.66211E-01      5.31909E-04
0.00000E+00      0.00000E+00
        119       7.65368E-01      7.66202E-01      5.25357E-04
0.00000E+00      0.00000E+00
        120       7.57175E-01      7.66109E-01      5.29960E-04
0.00000E+00      0.00000E+00
        121       7.70874E-01      7.66158E-01      5.17752E-04
0.00000E+00      0.00000E+00
        122       7.68950E-01      7.66186E-01      5.15987E-04
0.00000E+00      0.00000E+00
        123       7.71806E-01      7.66242E-01      5.17139E-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=60FADB2BA7982FC5
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55214E-05 + or -  1.23300E-08             generation time
=  2.99534E-05 + or -  2.15725E-08
 nu bar   =  2.43896E+00 + or -  9.14728E-06       average fission group
=  2.17565E+02 + or -  1.00173E-02
                      energy(ev) of the average lethargy causing fission
=  5.64397E-02 + or -  1.34675E-04
                                                 system mean free path (cm)
=  6.52703E-01 + or -  1.79342E-04
```

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories	variance deviation of (per cent)
23	0.76624	+ or - 0.00052	0.76572 to 0.76676	0.76521 to 0.76728	0.76469 to 0.76779	2000000	12.1202
24	0.76621	+ or - 0.00052	0.76569 to 0.76673	0.76517 to 0.76726	0.76465 to 0.76778	1980000	12.1506
25	0.76621	+ or - 0.00053	0.76569 to 0.76674	0.76516 to 0.76727	0.76463 to 0.76779	1960000	12.1143
26	0.76624	+ or - 0.00053	0.76570 to 0.76677	0.76517 to 0.76730	0.76464 to 0.76783	1940000	12.0971
27	0.76623	+ or - 0.00054	0.76569 to 0.76677	0.76515 to 0.76731	0.76461 to 0.76785	1920000	12.0322
28	0.76629	+ or - 0.00054	0.76575 to 0.76684	0.76520 to 0.76738	0.76466 to 0.76793	1900000	12.0091
29	0.76626	+ or - 0.00055	0.76571 to 0.76681	0.76516 to 0.76736	0.76461 to 0.76791	1880000	12.0155
30	0.76627	+ or - 0.00056	0.76571 to 0.76683	0.76516 to 0.76738	0.76460 to 0.76794	1860000	11.9328
31	0.76620	+ or - 0.00056	0.76565 to 0.76676	0.76509 to 0.76732	0.76454 to 0.76787	1840000	12.2474
32	0.76618	+ or - 0.00056	0.76562 to 0.76674	0.76506 to 0.76730	0.76449 to 0.76786	1820000	12.2489
37	0.76622	+ or - 0.00060	0.76562 to 0.76681	0.76502 to 0.76741	0.76442 to 0.76801	1720000	12.0095
42	0.76614	+ or - 0.00062	0.76552 to 0.76675	0.76490 to 0.76737	0.76428 to 0.76799	1620000	12.6306
47	0.76609	+ or - 0.00065	0.76544 to 0.76673	0.76480 to 0.76738	0.76415 to 0.76803	1520000	12.7703
52	0.76596	+ or - 0.00069	0.76527 to 0.76664	0.76458 to 0.76733	0.76390 to 0.76801	1420000	12.8994
57	0.76591	+ or - 0.00074	0.76517 to 0.76664	0.76444 to 0.76738	0.76370 to 0.76812	1320000	11.7054

```
      62          0.76604   + or - 0.00077     0.76527 to 0.76680
0.76450 to 0.76757    0.76373 to 0.76834    1220000      12.3516

      67          0.76560   + or - 0.00077     0.76483 to 0.76636
0.76406 to 0.76713    0.76330 to 0.76790    1120000      14.2331

      72          0.76570   + or - 0.00082     0.76488 to 0.76652
0.76405 to 0.76734    0.76323 to 0.76817    1020000      14.5776

      77          0.76577   + or - 0.00090     0.76487 to 0.76666
0.76397 to 0.76756    0.76308 to 0.76846     920000      14.9810

      82          0.76592   + or - 0.00099     0.76493 to 0.76691
0.76393 to 0.76791    0.76294 to 0.76890     820000      15.2254

      87          0.76584   + or - 0.00104     0.76481 to 0.76688
0.76377 to 0.76792    0.76273 to 0.76895     720000      17.6051

      92          0.76613   + or - 0.00118     0.76495 to 0.76730
0.76377 to 0.76848    0.76259 to 0.76966     620000      18.4670

      97          0.76643   + or - 0.00116     0.76527 to 0.76759
0.76412 to 0.76875    0.76296 to 0.76991     520000      19.8537

     102          0.76574   + or - 0.00119     0.76455 to 0.76692
0.76336 to 0.76811    0.76218 to 0.76930     420000      20.4019

     107          0.76584   + or - 0.00134     0.76450 to 0.76718
0.76316 to 0.76852    0.76182 to 0.76986     320000      28.3230

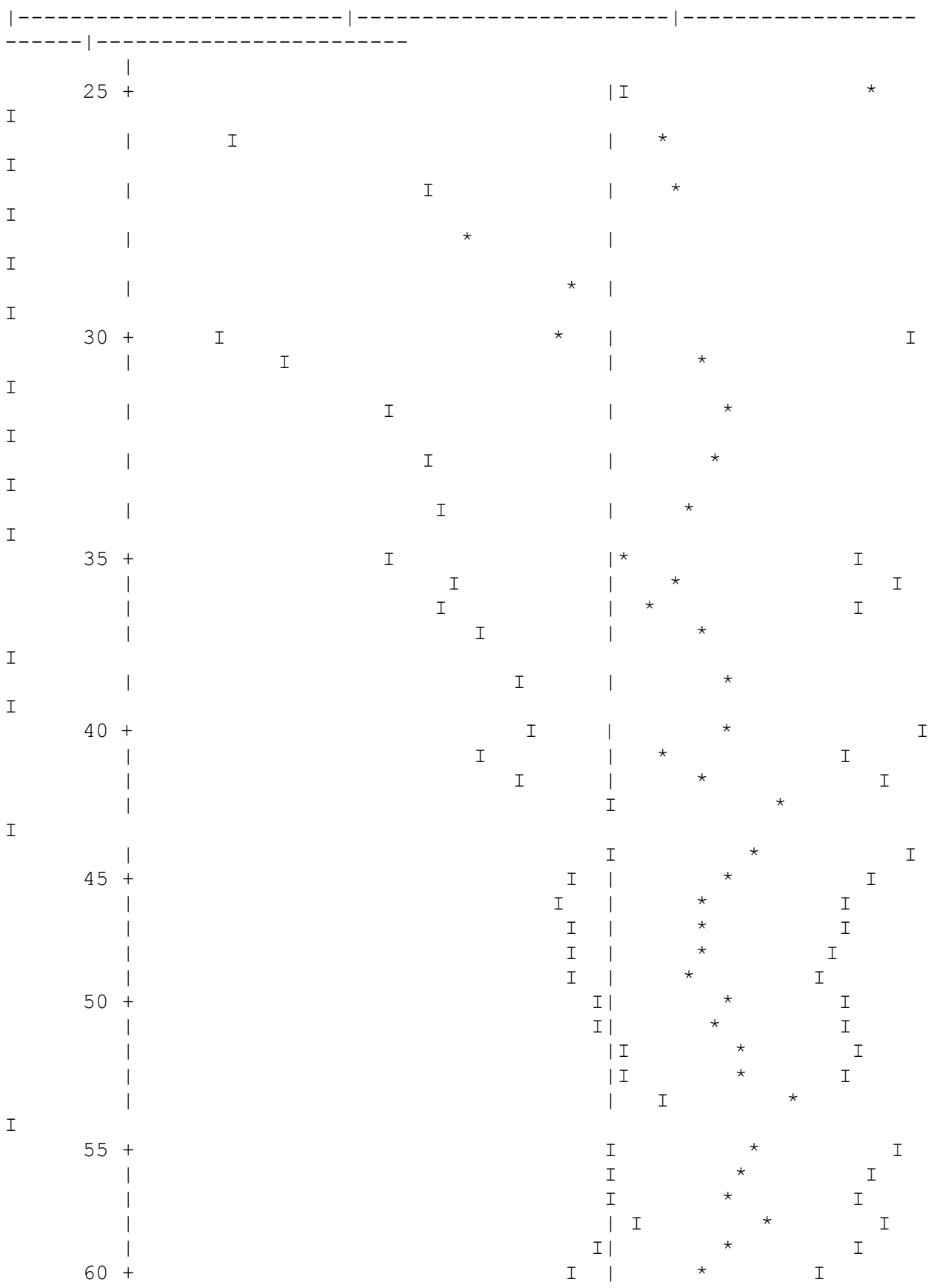
     112          0.76691   + or - 0.00143     0.76548 to 0.76834
0.76405 to 0.76977    0.76262 to 0.77121     220000      44.7582
1                                                fuel bundle

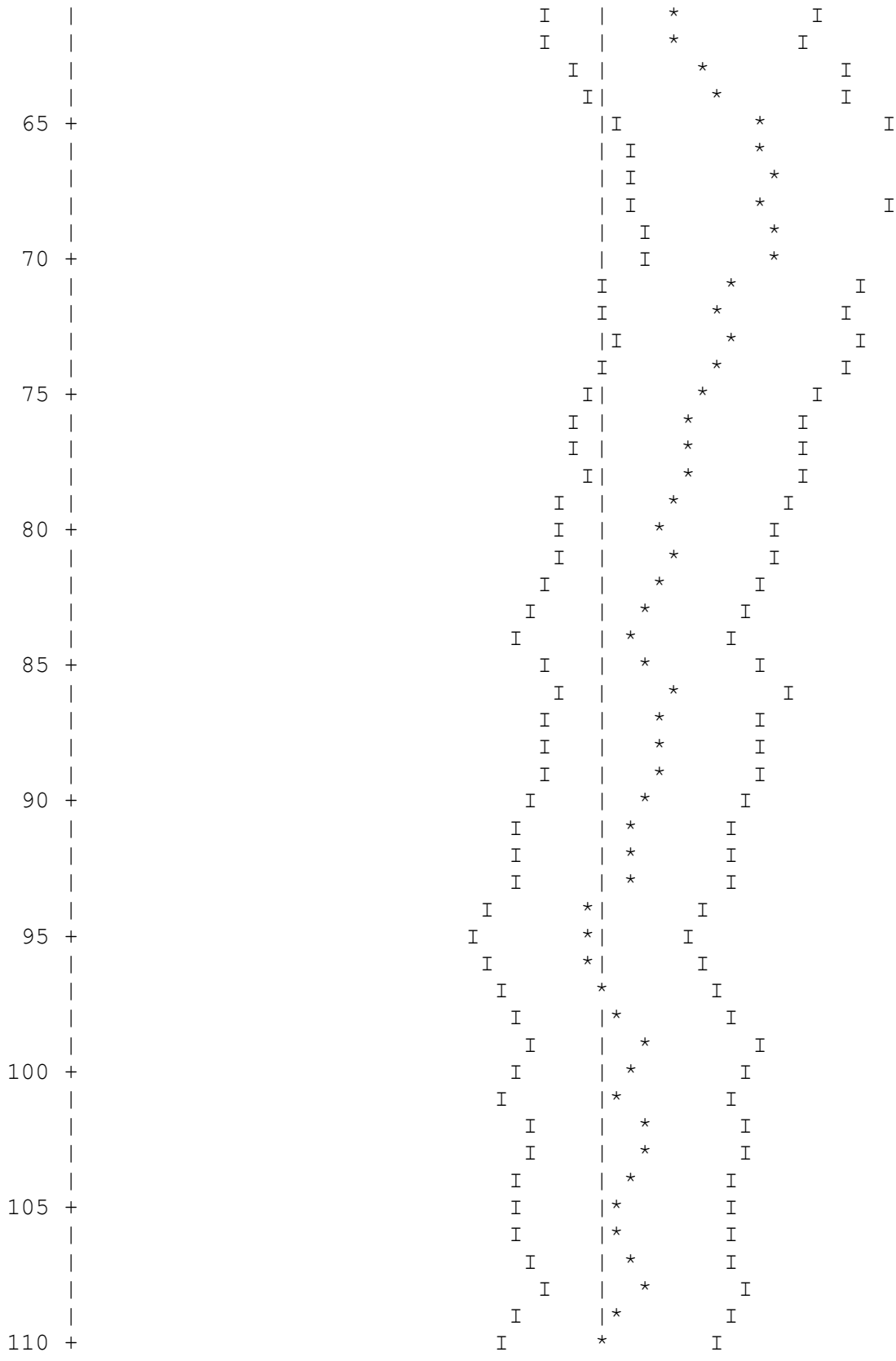
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76757   + or - 0.00280     0.76477 to 0.77037
0.76196 to 0.77317    0.75916 to 0.77598     120000      52.6346
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76618 + or - 0.00051 which occurs for
122 generations run.

                                0.7653                   0.7672
0.7691
```



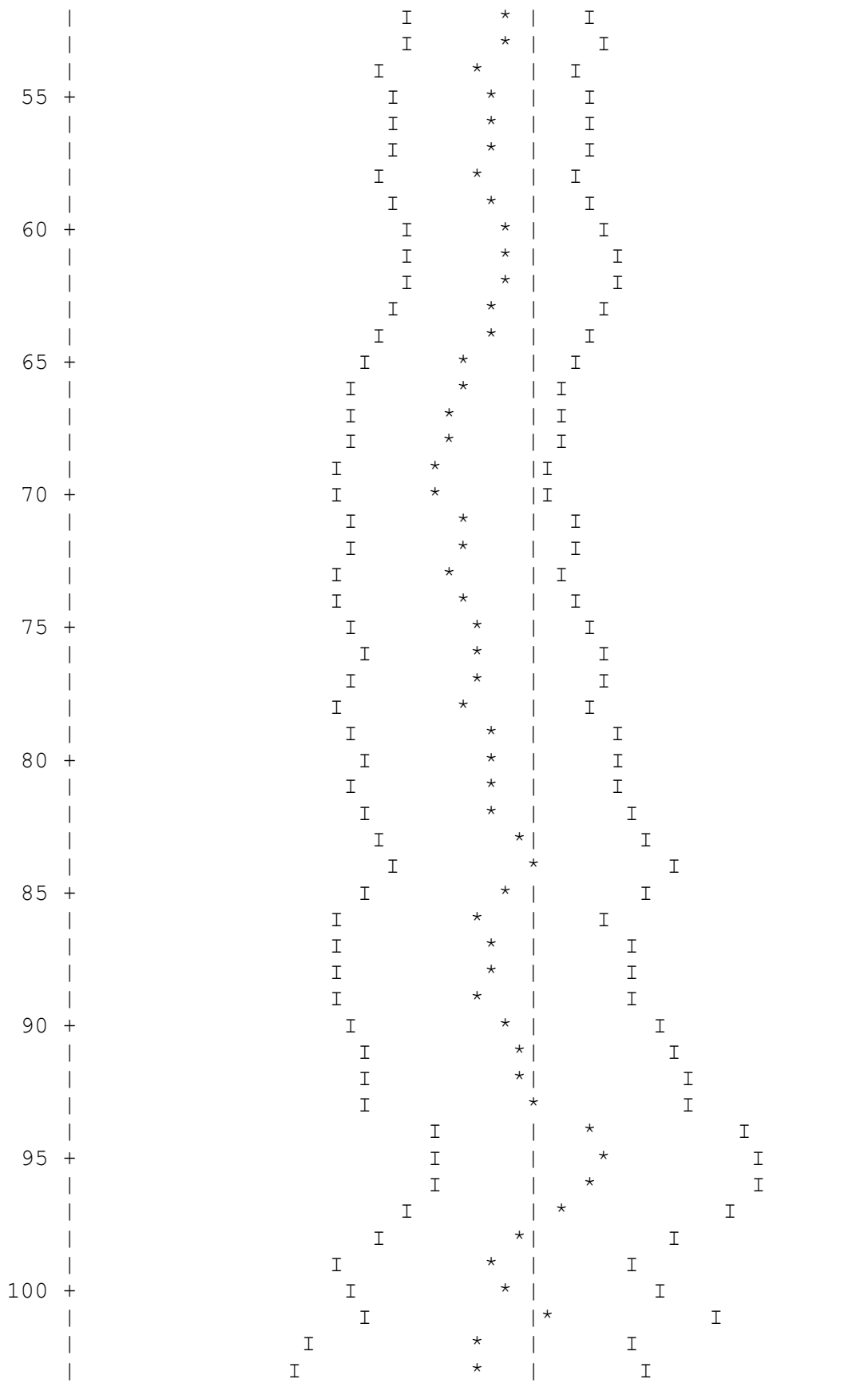

65
70
75
80
85
90
95
100
105
110

```
         |                              I      *      I
         |                              I      *      I
     115 +                              I      *      I
         |                              I      *      I
         |                              I      *      I
         |                               I     |*     I
         |                               I     |*     I
     120 +                             I      *|     I
         |                              I      *      I
         |                               I     *      I
         |                               I     |*      I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7662 + or - 0.0005 which occurs for 23 generations skipped.

```
                                0.7654                    0.7680
0.7705

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                              I    *     I
         |                              I    *    I
      25 +                              I    *    I
         |                              I    *     I
         |                              I    *     I
         |                               I   |*    I
         |                              I    |*    I
      30 +                              I    |*    I
         |                              I    *     I
         |                             I     *    I
         |                             I     *    I
         |                             I     *     I
      35 +                              I    *     I
         |                             I     *     I
         |                             I     *     I
         |                             I     *     I
         |                            I     *|    I
      40 +                            I     *|    I
         |                             I     *     I
         |                            I     *|    I
         |                           I     * |   I
         |                           I     * |    I
      45 +                            I     *|    I
         |                            I     *|    I
         |                            I     *|    I
         |                            I     *|    I
         |                            I     *|     I
      50 +                           I     * |    I
         |                           I     * |    I
```


55
60
65
70
75
80
85
90
95
100

```
         |                  I           * |         I
     105 +                   I            *            I
         |                 I             *|           I
         |               I             *  |         I
         |      I                  *      |          I
         |                   I           *|          I
     110 +                         I      |   *           I
         |                         I      |     *            I
         |                         I      |      *             I
         |                       I        |      *              I
         |                       I        |        *                I
     115 +                   I            |      *                    I
         |              I                 |     *
I
         |                  I             |            *
I
         |     I                          |     *
I
         |                                |         *
I
     120 +                                |                           I
*             I

   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                 6.97037E-07    57.1489
3.88342E-07    44.1121       0.00000E+00     0.0000
    3    0.0000                 1.03032E-05    14.5378
1.85799E-05     5.0915       0.00000E+00     0.0000
    4    0.0000                 1.73510E-05     9.9425
3.30886E-05     3.5700       0.00000E+00     0.0000
    5    0.0000                 2.78106E-05     6.9758
5.61376E-05     2.7369       0.00000E+00     0.0000
    6    0.0001                 1.02993E-04     3.5481
2.36501E-04     1.6015       0.00000E+00     0.0000
    7    0.0002                 1.20340E-04     3.1878
2.11613E-04     1.6258       0.00000E+00     0.0000
    8    0.0003                 2.38329E-04     2.2429
3.21366E-04     1.0197       0.00000E+00     0.0000
    9    0.0005                 3.98860E-04     1.2540
4.50674E-04     0.6228       0.00000E+00     0.0000
   10    0.0003                 2.03733E-04     1.4639
```

2.06818E-04	0.6395	0.00000E+00	0.0000	11	0.0012	9.10598E-04	0.6816
5.24297E-04	0.4705	0.00000E+00	0.0000	12	0.0010	7.57798E-04	0.7080
2.97115E-04	0.6979	0.00000E+00	0.0000	13	0.0003	2.31368E-04	1.3938
9.19007E-05	1.3789	0.00000E+00	0.0000	14	0.0013	1.00031E-03	0.6168
4.08882E-04	0.6106	0.00000E+00	0.0000	15	0.0010	7.63490E-04	0.7812
3.29183E-04	0.7717	0.00000E+00	0.0000	16	0.0002	1.90031E-04	1.0566
8.73070E-05	1.0406	0.00000E+00	0.0000	17	0.0001	6.96119E-05	1.6577
3.38266E-05	1.6292	0.00000E+00	0.0000	18	0.0001	5.04318E-05	1.9214
2.54989E-05	1.8788	0.00000E+00	0.0000	19	0.0001	8.11957E-05	1.6171
4.29177E-05	1.5786	0.00000E+00	0.0000	20	0.0001	6.07663E-05	1.5546
3.32839E-05	1.5176	0.00000E+00	0.0000	21	0.0002	1.19522E-04	1.0080
6.74788E-05	0.9819	0.00000E+00	0.0000	22	0.0001	1.04614E-04	1.3728
6.19315E-05	1.3446	0.00000E+00	0.0000	23	0.0001	1.06977E-04	1.1643
6.53236E-05	1.1370	0.00000E+00	0.0000	24	0.0000	2.46075E-05	2.7096
1.52770E-05	2.6390	0.00000E+00	0.0000	25	0.0000	3.01800E-05	1.9795
1.88570E-05	1.9183	0.00000E+00	0.0000	26	0.0000	1.78325E-05	2.2688
1.11952E-05	2.2109	0.00000E+00	0.0000	27	0.0001	5.33156E-05	1.2324
3.32765E-05	1.2065	0.00000E+00	0.0000	28	0.0001	9.52943E-05	0.9552
5.94627E-05	0.9391	0.00000E+00	0.0000	29	0.0001	9.85224E-05	1.0767
6.20577E-05	1.0643	0.00000E+00	0.0000	30	0.0000	1.28418E-05	2.6238
8.05396E-06	2.6055	0.00000E+00	0.0000	31	0.0001	9.59267E-05	1.0710
6.06030E-05	1.0589	0.00000E+00	0.0000	32	0.0000	3.74268E-05	1.7442
2.39274E-05	1.7095	0.00000E+00	0.0000	33	0.0000	3.30228E-05	1.5809
2.06741E-05	1.5618	0.00000E+00	0.0000	34	0.0001	7.53973E-05	1.1144
4.73619E-05	1.0979	0.00000E+00	0.0000	35	0.0001	4.53643E-05	1.3329
2.84604E-05	1.3133	0.00000E+00	0.0000	36	0.0001	4.35687E-05	1.5157

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2.69653E-05     1.5021       0.00000E+00     0.0000
   37    0.0000                 2.80255E-05     1.6315
1.75962E-05     1.5954       0.00000E+00     0.0000
   38    0.0000                 3.37270E-05     1.7163
2.12505E-05     1.6791       0.00000E+00     0.0000
   39    0.0002                 1.28056E-04     1.0614
8.14868E-05     1.0359       0.00000E+00     0.0000
   40    0.0002                 1.19088E-04     0.8387
7.69931E-05     0.8217       0.00000E+00     0.0000
   41    0.0002                 1.58377E-04     0.7378
1.05874E-04     0.7149       0.00000E+00     0.0000
   42    0.0002                 1.38832E-04     0.8544
9.44237E-05     0.8342       0.00000E+00     0.0000
   43    0.0001                 7.92399E-05     1.1178
5.68892E-05     1.0686       0.00000E+00     0.0000
   44    0.0001                 1.13720E-04     1.1094
8.35156E-05     1.0682       0.00000E+00     0.0000
   45    0.0001                 5.89525E-05     0.9987
4.75877E-05     0.9284       0.00000E+00     0.0000
   46    0.0000                 1.39091E-05     1.9894
1.12103E-05     1.8381       0.00000E+00     0.0000
   47    0.0001                 4.15371E-05     1.7055
3.22292E-05     1.6405       0.00000E+00     0.0000
   48    0.0000                 1.15053E-05     3.5912
8.93336E-06     3.4965       0.00000E+00     0.0000
   49    0.0001                 8.07430E-05     1.6499
6.36646E-05     1.6135       0.00000E+00     0.0000
   50    0.0001                 5.52087E-05     1.8162
4.54922E-05     1.7802       0.00000E+00     0.0000
   51    0.0000                 1.55456E-05     3.1055
1.29118E-05     3.0446       0.00000E+00     0.0000
   52    0.0001                 4.03483E-05     1.8773
3.49072E-05     1.8334       0.00000E+00     0.0000
   53    0.0002                 1.59363E-04     0.8658
1.56458E-04     0.8052       0.00000E+00     0.0000
   54    0.0001                 7.30136E-05     2.0053
6.78331E-05     1.9256       0.00000E+00     0.0000
   55    0.0002                 1.64485E-04     1.4013
1.50787E-04     1.3658       0.00000E+00     0.0000
   56    0.0002                 1.17119E-04     1.6172
1.08623E-04     1.5766       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                 1.52512E-04     1.5267
1.38337E-04     1.4897       0.00000E+00     0.0000
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58	0.0001	8.55999E-05	1.7387	7.49451E-05	1.6937	0.00000E+00	0.0000
59	0.0002	1.61622E-04	1.6159	1.44995E-04	1.5543	0.00000E+00	0.0000
60	0.0004	2.74012E-04	1.3196	2.48374E-04	1.2476	0.00000E+00	0.0000
61	0.0000	2.92820E-05	3.2019	2.25039E-05	3.1005	0.00000E+00	0.0000
62	0.0002	1.61650E-04	1.6623	1.35635E-04	1.6183	0.00000E+00	0.0000
63	0.0002	1.20468E-04	1.7036	9.91445E-05	1.6412	0.00000E+00	0.0000
64	0.0001	1.02465E-04	2.5465	8.25625E-05	2.4674	0.00000E+00	0.0000
65	0.0000	3.40960E-05	3.9666	3.37486E-05	3.8320	0.00000E+00	0.0000
66	0.0002	1.71872E-04	1.9144	1.52534E-04	1.8520	0.00000E+00	0.0000
67	0.0002	1.42539E-04	2.0814	1.16696E-04	2.0122	0.00000E+00	0.0000
68	0.0000	2.73620E-05	4.2646	2.36302E-05	4.1172	0.00000E+00	0.0000
69	0.0004	2.99376E-04	1.5078	2.34993E-04	1.4587	0.00000E+00	0.0000
70	0.0003	2.07052E-04	1.8923	1.88489E-04	1.8191	0.00000E+00	0.0000
71	0.0006	4.31993E-04	1.4252	3.57445E-04	1.3796	0.00000E+00	0.0000
72	0.0001	4.73863E-05	5.7887	2.80083E-05	5.6514	0.00000E+00	0.0000
73	0.0004	3.15581E-04	1.7641	2.41048E-04	1.6650	0.00000E+00	0.0000
74	0.0014	1.04521E-03	0.9289	7.60417E-04	0.8881	0.00000E+00	0.0000
75	0.0001	1.13526E-04	2.9926	8.71913E-05	2.8573	0.00000E+00	0.0000
76	0.0006	4.54364E-04	2.0104	2.88767E-04	1.9388	0.00000E+00	0.0000
77	0.0005	3.68532E-04	1.8471	2.64271E-04	1.7798	0.00000E+00	0.0000
78	0.0000	7.06715E-06	3.8092	6.91687E-05	3.7648	0.00000E+00	0.0000
79	0.0002	1.80957E-04	3.0693	1.21866E-04	2.9414	0.00000E+00	0.0000
80	0.0001	6.29633E-05	3.4700	8.38916E-05	3.3715	0.00000E+00	0.0000
81	0.0014	1.06785E-03	1.0791	7.85192E-04	1.0340	0.00000E+00	0.0000
82	0.0001	7.00124E-05	4.5664	4.18966E-05	4.3262	0.00000E+00	0.0000
83	0.0002	1.29773E-04	3.5429	1.43572E-04	3.4767	0.00000E+00	0.0000

84	0.0001	8.20413E-05	2.7209	8.30222E-05	2.5251	0.00000E+00	0.0000
85	0.0003	1.98084E-04	2.0292	2.43809E-04	1.9746	0.00000E+00	0.0000
86	0.0004	2.76262E-04	2.2729	2.21940E-04	2.1619	0.00000E+00	0.0000
87	0.0004	3.43956E-04	2.1320	2.13694E-04	2.0409	0.00000E+00	0.0000
88	0.0001	5.55098E-05	3.9544	1.00735E-04	3.8614	0.00000E+00	0.0000
89	0.0001	9.17327E-05	3.4567	6.38158E-05	3.1702	0.00000E+00	0.0000
90	0.0003	2.27614E-04	3.2473	1.34386E-04	3.1099	0.00000E+00	0.0000
91	0.0002	1.76340E-04	2.5900	1.12035E-04	2.4311	0.00000E+00	0.0000
92	0.0000	3.04441E-05	3.2044	1.99189E-04	3.1365	0.00000E+00	0.0000
93	0.0002	1.24705E-04	3.7810	1.01697E-04	3.5023	0.00000E+00	0.0000
94	0.0001	1.14802E-04	4.1276	6.43880E-05	3.8749	0.00000E+00	0.0000
95	0.0008	6.14271E-04	2.1796	3.78781E-04	2.1097	0.00000E+00	0.0000
96	0.0002	1.45274E-04	4.6282	7.38742E-05	4.4294	0.00000E+00	0.0000
97	0.0004	2.89047E-04	3.5419	1.65487E-04	3.4663	0.00000E+00	0.0000
98	0.0001	1.07304E-04	4.3132	1.02828E-04	4.1673	0.00000E+00	0.0000
99	0.0001	1.05123E-04	4.3855	7.03905E-05	4.2392	0.00000E+00	0.0000
100	0.0002	1.35679E-04	4.5445	9.04856E-05	4.3837	0.00000E+00	0.0000
101	0.0001	1.11326E-04	3.8289	7.08651E-05	3.5405	0.00000E+00	0.0000
102	0.0002	1.50636E-04	4.5335	8.42779E-05	4.3361	0.00000E+00	0.0000
103	0.0001	9.47858E-05	3.5266	9.26179E-05	3.3361	0.00000E+00	0.0000
104	0.0002	1.71859E-04	3.5364	1.36209E-04	3.4186	0.00000E+00	0.0000
105	0.0002	1.25515E-04	3.4224	8.29577E-05	3.2251	0.00000E+00	0.0000
106	0.0003	1.92358E-04	3.4275	1.42820E-04	3.3860	0.00000E+00	0.0000
107	0.0001	6.65715E-05	3.3594	6.71892E-05	3.1576	0.00000E+00	0.0000
108	0.0000	3.57159E-05	2.3706	1.54159E-04	2.3075	0.00000E+00	0.0000
109	0.0002	1.33511E-04	2.4839	4.42885E-04	2.4519	0.00000E+00	0.0000

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  110    0.0008                 6.14157E-04     2.7495
3.78991E-04     2.7216       0.00000E+00     0.0000
  111    0.0002                 1.53974E-04     4.0334
1.41439E-04     3.9302       0.00000E+00     0.0000
  112    0.0002                 1.22559E-04     4.8207
1.29140E-04     4.7337       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                 1.22719E-04     3.8242
1.07464E-04     3.5711       0.00000E+00     0.0000
  114    0.0000                 1.11208E-05     7.6222
1.51923E-05     6.2698       0.00000E+00     0.0000
  115    0.0001                 7.77994E-05     4.0128
9.00192E-05     3.7161       0.00000E+00     0.0000
  116    0.0002                 1.88625E-04     3.1432
1.42170E-04     2.8278       0.00000E+00     0.0000
  117    0.0006                 4.71077E-04     2.1607
2.52216E-04     2.0156       0.00000E+00     0.0000
  118    0.0008                 5.77357E-04     2.1156
4.51217E-04     2.0275       0.00000E+00     0.0000
  119    0.0002                 1.39992E-04     2.1584
3.61305E-04     2.0834       0.00000E+00     0.0000
  120    0.0002                 1.69964E-04     2.2314
6.46769E-04     2.2002       0.00000E+00     0.0000
  121    0.0007                 5.11740E-04     2.4746
3.93845E-04     2.4123       0.00000E+00     0.0000
  122    0.0001                 9.19472E-05     4.5682
7.23646E-05     4.2484       0.00000E+00     0.0000
  123    0.0003                 2.12999E-04     3.0224
1.51230E-04     2.6755       0.00000E+00     0.0000
  124    0.0003                 2.31674E-04     2.9740
1.91287E-04     2.7673       0.00000E+00     0.0000
  125    0.0002                 1.40993E-04     3.1184
1.29437E-04     2.8024       0.00000E+00     0.0000
  126    0.0001                 9.57630E-05     4.0084
8.64165E-05     3.5067       0.00000E+00     0.0000
  127    0.0005                 4.04326E-04     3.4021
1.98374E-04     3.2243       0.00000E+00     0.0000
  128    0.0003                 2.17027E-04     3.4359
1.34073E-04     3.0574       0.00000E+00     0.0000
  129    0.0006                 4.39589E-04     2.0317
4.05465E-04     1.9344       0.00000E+00     0.0000
  130    0.0002                 1.18219E-04     2.8759
2.88122E-04     2.7883       0.00000E+00     0.0000
  131    0.0004                 2.97665E-04     1.9235
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2.38986E-04	1.6424	0.00000E+00	0.0000	132	0.0007	5.27854E-04	2.1184
3.23993E-04	1.9555	0.00000E+00	0.0000	133	0.0014	1.03820E-03	1.9404
6.56361E-04	1.8428	0.00000E+00	0.0000	134	0.0001	9.27376E-05	2.3048
2.40627E-04	1.9278	0.00000E+00	0.0000	135	0.0002	1.70795E-04	3.5496
2.53567E-04	3.4570	0.00000E+00	0.0000	136	0.0001	4.56638E-05	1.9854
7.08750E-04	1.9563	0.00000E+00	0.0000	137	0.0000	1.95338E-05	1.2027
3.51463E-03	1.1998	0.00000E+00	0.0000	138	0.0004	3.12475E-04	2.1356
8.13833E-04	2.1060	0.00000E+00	0.0000	139	0.0002	1.89002E-04	3.3359
2.31613E-04	3.1443	0.00000E+00	0.0000	140	0.0003	2.12099E-04	2.2836
2.82059E-04	1.9966	0.00000E+00	0.0000	141	0.0001	8.12396E-05	2.6843
2.55453E-04	2.4030	0.00000E+00	0.0000	142	0.0001	6.67343E-05	2.9061
2.30663E-04	2.6685	0.00000E+00	0.0000	143	0.0001	8.39246E-05	1.9422
1.77441E-04	1.2540	0.00000E+00	0.0000	144	0.0000	3.16383E-05	3.4572
7.10197E-05	2.0486	0.00000E+00	0.0000	145	0.0005	3.73894E-04	2.6333
2.94073E-04	2.3727	0.00000E+00	0.0000	146	0.0004	3.38975E-04	2.6451
2.48710E-04	2.1517	0.00000E+00	0.0000	147	0.0002	1.82039E-04	3.7825
1.15895E-04	3.2927	0.00000E+00	0.0000	148	0.0001	6.06287E-05	5.4494
4.01599E-05	4.4056	0.00000E+00	0.0000	149	0.0000	2.77116E-05	8.9310
1.96858E-05	6.7784	0.00000E+00	0.0000	150	0.0001	8.81120E-05	4.1138
6.40960E-05	3.0398	0.00000E+00	0.0000	151	0.0001	6.81590E-05	3.9080
5.75271E-05	2.7478	0.00000E+00	0.0000	152	0.0001	4.02296E-05	4.9873
4.61969E-05	2.9950	0.00000E+00	0.0000	153	0.0001	4.27374E-05	3.9571
4.75049E-05	2.3157	0.00000E+00	0.0000	154	0.0001	4.85452E-05	4.6450
5.02243E-05	2.7366	0.00000E+00	0.0000	155	0.0001	4.99870E-05	4.9214
4.91097E-05	3.0429	0.00000E+00	0.0000	156	0.0001	4.84504E-05	5.1185
4.70840E-05	3.0676	0.00000E+00	0.0000	157	0.0001	6.07469E-05	3.8784

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5.86018E-05     2.4070       0.00000E+00     0.0000
  158    0.0001                 6.46631E-05     3.8067
6.58678E-05     2.4865       0.00000E+00     0.0000
  159    0.0002                 1.43479E-04     3.0055
2.00516E-04     2.5249       0.00000E+00     0.0000
  160    0.0001                 6.64328E-05     4.6303
7.75610E-05     3.5418       0.00000E+00     0.0000
  161    0.0001                 7.50997E-05     4.3686
7.33337E-05     2.9213       0.00000E+00     0.0000
  162    0.0001                 8.87268E-05     3.4745
8.27235E-05     2.2038       0.00000E+00     0.0000
  163    0.0001                 9.02975E-05     3.4265
8.51655E-05     2.1415       0.00000E+00     0.0000
  164    0.0001                 1.07143E-04     3.4478
9.72736E-05     2.1795       0.00000E+00     0.0000
  165    0.0001                 1.11192E-04     3.7645
1.02416E-04     2.3501       0.00000E+00     0.0000
  166    0.0001                 6.88797E-05     4.0109
6.31898E-05     2.5601       0.00000E+00     0.0000
  167    0.0001                 7.41908E-05     4.4884
6.79350E-05     2.8321       0.00000E+00     0.0000
  168    0.0001                 8.82458E-05     4.4003
7.82784E-05     2.9299       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                 1.01649E-04     3.8003
9.03937E-05     2.5972       0.00000E+00     0.0000
  170    0.0002                 1.35016E-04     4.2917
1.14717E-04     3.2030       0.00000E+00     0.0000
  171    0.0001                 9.63130E-05     4.7942
7.45876E-05     3.8675       0.00000E+00     0.0000
  172    0.0002                 1.41318E-04     4.3052
9.97456E-05     3.6316       0.00000E+00     0.0000
  173    0.0002                 1.85268E-04     4.2941
1.22909E-04     3.7116       0.00000E+00     0.0000
  174    0.0003                 2.48769E-04     4.1425
1.54995E-04     3.6957       0.00000E+00     0.0000
  175    0.0001                 1.09225E-04     5.6974
6.61360E-05     5.1307       0.00000E+00     0.0000
  176    0.0002                 1.19913E-04     5.2929
7.14729E-05     4.7804       0.00000E+00     0.0000
  177    0.0001                 1.09675E-04     6.0464
6.52128E-05     5.4023       0.00000E+00     0.0000
  178    0.0001                 1.12911E-04     5.7288
6.65134E-05     5.1269       0.00000E+00     0.0000
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179	0.0001	1.11582E-04	5.9567	6.52990E-05	5.2892
0.00000E+00	0.0000				
180	0.0002	1.18200E-04	5.2151	6.82473E-05	4.6364
0.00000E+00	0.0000				
181	0.0001	1.00699E-04	6.7403	5.89626E-05	5.8771
0.00000E+00	0.0000				
182	0.0002	1.17925E-04	6.6382	6.74078E-05	5.8904
0.00000E+00	0.0000				
183	0.0001	9.69048E-05	6.3666	5.65867E-05	5.4938
0.00000E+00	0.0000				
184	0.0001	1.08701E-04	5.9676	6.23843E-05	5.2231
0.00000E+00	0.0000				
185	0.0001	8.90439E-05	5.6806	5.23781E-05	4.8434
0.00000E+00	0.0000				
186	0.0001	9.17387E-05	5.7740	5.37310E-05	4.9342
0.00000E+00	0.0000				
187	0.0001	9.78930E-05	5.5407	5.67513E-05	4.7285
0.00000E+00	0.0000				
188	0.0001	8.15950E-05	6.1449	4.87732E-05	5.0655
0.00000E+00	0.0000				
189	0.0001	8.67909E-05	5.6167	5.10285E-05	4.7024
0.00000E+00	0.0000				
190	0.0003	2.11278E-04	4.3256	1.25325E-04	3.5668
0.00000E+00	0.0000				
191	0.0002	1.89353E-04	4.1566	1.14752E-04	3.3628
0.00000E+00	0.0000				
192	0.0003	2.02047E-04	3.6982	1.21773E-04	2.9987
0.00000E+00	0.0000				
193	0.0003	1.92815E-04	3.7649	1.17902E-04	3.0317
0.00000E+00	0.0000				
194	0.0005	4.04506E-04	2.9539	2.49220E-04	2.3398
0.00000E+00	0.0000				
195	0.0006	4.25773E-04	2.8463	2.64222E-04	2.2046
0.00000E+00	0.0000				
196	0.0006	4.48538E-04	2.9194	2.80277E-04	2.2519
0.00000E+00	0.0000				
197	0.0007	5.11715E-04	2.7438	3.18881E-04	2.1470
0.00000E+00	0.0000				
198	0.0007	5.51943E-04	2.5646	3.45315E-04	1.9745
0.00000E+00	0.0000				
199	0.0004	3.27241E-04	3.0512	2.01613E-04	2.4266
0.00000E+00	0.0000				
200	0.0005	3.76557E-04	2.5843	2.29510E-04	2.0837
0.00000E+00	0.0000				
201	0.0010	7.56580E-04	2.2767	4.68045E-04	1.7956
0.00000E+00	0.0000				
202	0.0013	9.83985E-04	2.0494	5.96883E-04	1.6490
0.00000E+00	0.0000				
203	0.0015	1.18253E-03	1.8023	7.10648E-04	1.4733
0.00000E+00	0.0000				
204	0.0021	1.63291E-03	1.4436	9.63229E-04	1.2075
0.00000E+00	0.0000				

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  205    0.0015                 1.15367E-03     1.9398
6.74539E-04     1.6510       0.00000E+00     0.0000
  206    0.0018                 1.38599E-03     1.6421
8.08083E-04     1.3903       0.00000E+00     0.0000
  207    0.0022                 1.69692E-03     1.7333
9.82835E-04     1.5224       0.00000E+00     0.0000
  208    0.0029                 2.19413E-03     1.4044
1.27771E-03     1.2430       0.00000E+00     0.0000
  209    0.0031                 2.37017E-03     1.4478
1.39383E-03     1.2779       0.00000E+00     0.0000
  210    0.0038                 2.91951E-03     1.4209
1.73454E-03     1.2471       0.00000E+00     0.0000
  211    0.0040                 3.08803E-03     1.2715
1.86425E-03     1.0891       0.00000E+00     0.0000
  212    0.0047                 3.62693E-03     1.0761
2.19704E-03     0.9281       0.00000E+00     0.0000
  213    0.0065                 4.94630E-03     0.8816
2.99753E-03     0.7520       0.00000E+00     0.0000
  214    0.0096                 7.32962E-03     0.7226
4.41595E-03     0.6122       0.00000E+00     0.0000
  215    0.0156                 1.19799E-02     0.6995
7.15147E-03     0.5922       0.00000E+00     0.0000
  216    0.0299                 2.28777E-02     0.4974
1.35096E-02     0.4235       0.00000E+00     0.0000
  217    0.0202                 1.54449E-02     0.5603
9.07431E-03     0.4690       0.00000E+00     0.0000
  218    0.0277                 2.12194E-02     0.4894
1.24188E-02     0.4121       0.00000E+00     0.0000
  219    0.0358                 2.74015E-02     0.3944
1.59901E-02     0.3325       0.00000E+00     0.0000
  220    0.0474                 3.63250E-02     0.3400
2.11273E-02     0.2875       0.00000E+00     0.0000
  221    0.0626                 4.79849E-02     0.3034
2.78209E-02     0.2570       0.00000E+00     0.0000
  222    0.0801                 6.14107E-02     0.2729
3.55658E-02     0.2309       0.00000E+00     0.0000
  223    0.1040                 7.96908E-02     0.2573
4.62514E-02     0.2227       0.00000E+00     0.0000
  224    0.0584                 4.47377E-02     0.3171
2.60491E-02     0.2700       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    0.2308                 1.76835E-01     0.1550
1.04705E-01     0.1337       0.00000E+00     0.0000
  226    0.0455                 3.48504E-02     0.3828
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2.12077E-02     0.3157       0.00000E+00     0.0000
  227    0.0489                 3.74713E-02     0.3515
2.32934E-02     0.2850       0.00000E+00     0.0000
  228    0.0212                 1.62641E-02     0.6419
1.02722E-02     0.5205       0.00000E+00     0.0000
  229    0.0223                 1.71203E-02     0.5629
1.09868E-02     0.4436       0.00000E+00     0.0000
  230    0.0118                 9.05958E-03     0.7728
5.90718E-03     0.6159       0.00000E+00     0.0000
  231    0.0123                 9.46167E-03     0.6295
6.26735E-03     0.4811       0.00000E+00     0.0000
  232    0.0131                 1.00030E-02     0.7689
6.81225E-03     0.5877       0.00000E+00     0.0000
  233    0.0083                 6.36263E-03     0.8588
4.46742E-03     0.6290       0.00000E+00     0.0000
  234    0.0058                 4.47500E-03     1.1446
3.24557E-03     0.7922       0.00000E+00     0.0000
  235    0.0024                 1.87661E-03     1.5662
1.24202E-03     1.2245       0.00000E+00     0.0000
  236    0.0019                 1.46595E-03     2.2210
9.88028E-04     1.6560       0.00000E+00     0.0000
  237    0.0016                 1.26292E-03     1.8208
9.04471E-04     1.3086       0.00000E+00     0.0000
  238    0.0001                 7.24282E-05     7.9322
6.28927E-05     4.6451       0.00000E+00     0.0000

 system total =                 7.66242E-01     0.0629
4.69204E-01     0.0550       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3098E-01  +
or -  0.0002



 elapsed time   3.11000 minutes

 random number=   4D1B114F4ED65221
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.091E-03
```

0.06 7.662E-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	2.140E-08	37.75	1.164E-08	30.10	1.249E-08	28.72
3	8.814E-07	3.93	7.430E-07	3.95	7.875E-07	3.75
4	1.521E-06	2.52	1.253E-06	2.50	1.347E-06	2.54
5	2.370E-06	2.50	1.926E-06	2.03	2.066E-06	2.08
6	9.609E-06	1.54	7.673E-06	1.37	8.181E-06	1.37
7	1.241E-05	1.20	9.437E-06	1.04	9.995E-06	1.06
8	3.099E-05	0.80	2.274E-05	0.65	2.388E-05	0.64
9	8.252E-05	0.47	5.894E-05	0.41	6.148E-05	0.40
10	4.621E-05	0.57	3.279E-05	0.51	3.414E-05	0.52
11	2.208E-04	0.26	1.555E-04	0.23	1.611E-04	0.21
12	1.886E-04	0.27	1.375E-04	0.26	1.442E-04	0.27
13	5.704E-05	0.53	4.154E-05	0.49	4.337E-05	0.48
14	2.523E-04	0.24	1.828E-04	0.21	1.907E-04	0.19
15	2.209E-04	0.24	1.605E-04	0.23	1.673E-04	0.21
16	7.135E-05	0.47	5.162E-05	0.41	5.399E-05	0.38
17	3.221E-05	0.65	2.350E-05	0.53	2.447E-05	0.50
18	2.770E-05	0.61	2.021E-05	0.49	2.092E-05	0.55
19	5.011E-05	0.50	3.672E-05	0.42	3.809E-05	0.41
20	3.982E-05	0.65	2.929E-05	0.53	3.058E-05	0.54
21	8.011E-05	0.43	5.874E-05	0.35	6.130E-05	0.34
22	7.319E-05	0.45	5.357E-05	0.39	5.528E-05	0.37
23	7.671E-05	0.39	5.633E-05	0.33	5.851E-05	0.32
24	1.831E-05	0.78	1.356E-05	0.69	1.415E-05	0.66
25	2.337E-05	0.63	1.722E-05	0.55	1.813E-05	0.57
26	1.355E-05	0.88	1.002E-05	0.76	1.059E-05	0.70
27	4.223E-05	0.56	3.107E-05	0.48	3.288E-05	0.48
28	7.694E-05	0.37	5.734E-05	0.33	6.066E-05	0.35
29	7.912E-05	0.38	5.899E-05	0.31	6.190E-05	0.30
30	1.005E-05	1.00	7.467E-06	0.81	7.814E-06	0.81
31	7.802E-05	0.42	5.869E-05	0.37	6.174E-05	0.36
32	3.115E-05	0.57	2.349E-05	0.51	2.481E-05	0.47
33	2.650E-05	0.56	2.004E-05	0.52	2.116E-05	0.52
34	6.082E-05	0.41	4.607E-05	0.36	4.834E-05	0.34
35	3.631E-05	0.56	2.755E-05	0.46	2.897E-05	0.46

36	3.412E-05	0.55	2.567E-05	0.44	2.685E-05	0.42
37	2.185E-05	0.65	1.657E-05	0.51	1.730E-05	0.47
38	2.580E-05	0.71	1.968E-05	0.54	2.073E-05	0.49
39	9.728E-05	0.32	7.471E-05	0.29	7.894E-05	0.28
40	8.952E-05	0.29	6.933E-05	0.27	7.388E-05	0.24
41	1.135E-04	0.31	8.859E-05	0.23	9.445E-05	0.24
42	9.407E-05	0.31	7.413E-05	0.24	7.955E-05	0.24
43	5.136E-05	0.40	4.070E-05	0.34	4.281E-05	0.31
44	6.972E-05	0.35	5.581E-05	0.28	6.006E-05	0.26
45	3.530E-05	0.42	2.823E-05	0.38	3.113E-05	0.32
46	8.203E-06	0.83	6.500E-06	0.74	7.005E-06	0.67
47	2.368E-05	0.55	1.880E-05	0.49	1.954E-05	0.40
48	6.674E-06	1.08	5.296E-06	0.97	5.598E-06	0.88
49	4.373E-05	0.48	3.491E-05	0.43	3.769E-05	0.37
50	2.961E-05	0.47	2.381E-05	0.45	2.583E-05	0.34
51	7.768E-06	0.92	6.286E-06	0.83	6.801E-06	0.65
52	2.081E-05	0.56	1.665E-05	0.49	1.818E-05	0.42
53	7.676E-05	0.31	6.177E-05	0.26	6.693E-05	0.24
54	3.340E-05	0.42	2.701E-05	0.37	2.919E-05	0.30
55	6.641E-05	0.29	5.382E-05	0.24	5.881E-05	0.25
56	4.313E-05	0.38	3.514E-05	0.36	3.841E-05	0.29
57	4.933E-05	0.43	4.016E-05	0.37	4.383E-05	0.29
58	2.582E-05	0.46	2.106E-05	0.41	2.306E-05	0.35
59	4.419E-05	0.39	3.616E-05	0.34	3.945E-05	0.30
60	6.433E-05	0.29	5.264E-05	0.26	5.725E-05	0.22
61	6.211E-06	0.96	5.063E-06	0.81	5.510E-06	0.68
62	3.226E-05	0.46	2.644E-05	0.41	2.879E-05	0.36
63	2.169E-05	0.54	1.778E-05	0.43	1.943E-05	0.39
64	1.708E-05	0.53	1.401E-05	0.47	1.523E-05	0.39
65	5.677E-06	0.89	4.670E-06	0.80	5.095E-06	0.70
66	2.838E-05	0.48	2.341E-05	0.40	2.540E-05	0.31
67	2.120E-05	0.52	1.741E-05	0.44	1.885E-05	0.39
68	4.634E-06	1.21	3.809E-06	1.01	4.126E-06	0.83
69	3.716E-05	0.37	3.069E-05	0.34	3.337E-05	0.28
70	2.666E-05	0.44	2.189E-05	0.41	2.382E-05	0.32
71	4.574E-05	0.38	3.767E-05	0.30	4.088E-05	0.28
72	2.690E-06	1.37	2.202E-06	1.17	2.396E-06	1.09
73	2.711E-05	0.50	2.242E-05	0.42	2.439E-05	0.38
74	7.942E-05	0.28	6.577E-05	0.28	7.111E-05	0.22
75	9.172E-06	0.77	7.630E-06	0.70	8.227E-06	0.58
76	2.293E-05	0.49	1.901E-05	0.44	2.053E-05	0.34
77	1.767E-05	0.55	1.466E-05	0.44	1.588E-05	0.39
78	1.505E-06	1.63	1.290E-06	1.73	1.389E-06	1.12
79	1.000E-05	0.63	8.319E-06	0.57	9.014E-06	0.49
80	4.550E-06	1.06	3.774E-06	0.93	4.055E-06	0.72
81	5.540E-05	0.32	4.592E-05	0.28	4.980E-05	0.22
82	3.296E-06	1.30	2.724E-06	1.06	2.925E-06	0.86
83	4.381E-06	1.01	3.655E-06	0.82	3.967E-06	0.75
84	8.215E-06	0.78	6.783E-06	0.75	7.364E-06	0.66
85	1.003E-05	0.62	8.358E-06	0.60	8.999E-06	0.47
86	1.362E-05	0.61	1.133E-05	0.49	1.230E-05	0.39
87	1.196E-05	0.61	9.991E-06	0.60	1.084E-05	0.43

88	3.103E-06	1.38	2.591E-06	1.13	2.800E-06	0.96
89	6.613E-06	0.93	5.467E-06	0.78	5.944E-06	0.63
90	6.873E-06	0.80	5.735E-06	0.73	6.230E-06	0.59
91	8.313E-06	0.80	6.929E-06	0.66	7.530E-06	0.62
92	4.665E-06	0.95	3.926E-06	0.87	4.248E-06	0.73
93	8.147E-06	0.73	6.796E-06	0.63	7.327E-06	0.50
94	4.262E-06	1.05	3.559E-06	0.89	3.863E-06	0.71
95	1.257E-05	0.66	1.047E-05	0.59	1.141E-05	0.49
96	3.350E-06	1.13	2.801E-06	1.10	3.019E-06	0.76
97	3.364E-06	1.16	2.839E-06	1.05	3.068E-06	0.84
98	3.559E-06	1.16	2.974E-06	1.02	3.195E-06	0.89
99	2.309E-06	1.37	1.931E-06	1.23	2.109E-06	0.96
100	3.442E-06	1.26	2.880E-06	1.10	3.120E-06	0.89
101	4.942E-06	1.09	4.171E-06	0.89	4.484E-06	0.78
102	3.436E-06	1.10	2.866E-06	1.04	3.085E-06	0.96
103	4.662E-06	1.03	3.910E-06	0.89	4.218E-06	0.66
104	4.271E-06	1.05	3.591E-06	1.03	3.830E-06	0.76
105	4.360E-06	1.08	3.691E-06	0.95	3.977E-06	0.76
106	1.543E-06	1.65	1.311E-06	1.55	1.410E-06	1.26
107	3.651E-06	1.08	3.049E-06	0.96	3.279E-06	0.87
108	3.174E-06	1.01	2.678E-06	1.02	2.936E-06	0.91
109	5.142E-06	0.89	4.336E-06	0.86	4.687E-06	0.71
110	2.987E-06	1.29	2.576E-06	1.18	2.809E-06	0.95
111	3.078E-06	1.27	2.571E-06	1.05	2.790E-06	0.90
112	1.791E-06	1.46	1.540E-06	1.26	1.663E-06	1.00
113	5.690E-06	0.83	4.769E-06	0.79	5.142E-06	0.65
114	2.040E-06	1.70	1.681E-06	1.40	1.852E-06	1.11
115	5.116E-06	0.98	4.293E-06	0.82	4.637E-06	0.66
116	1.077E-05	0.72	9.038E-06	0.71	9.792E-06	0.50
117	1.186E-05	0.68	9.946E-06	0.65	1.080E-05	0.50
118	1.287E-05	0.58	1.083E-05	0.49	1.170E-05	0.40
119	8.288E-06	0.78	6.995E-06	0.66	7.545E-06	0.55
120	5.819E-06	0.82	4.938E-06	0.77	5.372E-06	0.58
121	5.958E-06	0.83	5.046E-06	0.73	5.503E-06	0.66
122	3.243E-06	1.21	2.717E-06	1.13	2.974E-06	0.97
123	1.035E-05	0.77	8.668E-06	0.69	9.314E-06	0.56
124	7.392E-06	0.90	6.225E-06	0.80	6.705E-06	0.66
125	7.034E-06	0.81	5.880E-06	0.69	6.322E-06	0.54
126	5.777E-06	0.89	4.842E-06	0.87	5.244E-06	0.63
127	5.526E-06	0.93	4.668E-06	0.77	5.056E-06	0.66
128	7.587E-06	0.88	6.375E-06	0.74	6.936E-06	0.64
129	9.490E-06	0.73	8.002E-06	0.63	8.688E-06	0.56
130	4.034E-06	1.08	3.401E-06	0.98	3.697E-06	0.82
131	1.686E-05	0.50	1.417E-05	0.46	1.536E-05	0.40
132	1.120E-05	0.74	9.425E-06	0.65	1.021E-05	0.53
133	1.377E-05	0.56	1.163E-05	0.53	1.260E-05	0.40
134	1.479E-05	0.59	1.248E-05	0.51	1.346E-05	0.42
135	2.396E-06	1.35	2.054E-06	1.35	2.221E-06	1.02
136	3.857E-06	0.96	3.359E-06	0.89	3.671E-06	0.67
137	2.505E-06	0.89	2.614E-06	0.96	2.970E-06	0.76
138	4.034E-06	1.11	3.524E-06	0.97	3.842E-06	0.75
139	4.613E-06	0.94	3.908E-06	0.89	4.242E-06	0.74

140	1.212E-05	0.68	1.017E-05	0.60	1.099E-05	0.48
141	8.717E-06	0.81	7.401E-06	0.75	8.007E-06	0.60
142	5.892E-06	0.86	5.018E-06	0.78	5.408E-06	0.66
143	1.996E-05	0.51	1.686E-05	0.44	1.808E-05	0.36
144	8.050E-06	0.77	6.779E-06	0.69	7.315E-06	0.62
145	7.132E-06	0.78	6.026E-06	0.64	6.550E-06	0.51
146	1.194E-05	0.69	1.009E-05	0.63	1.091E-05	0.50
147	3.617E-06	1.19	3.075E-06	1.06	3.290E-06	0.84
148	1.889E-06	1.72	1.566E-06	1.54	1.693E-06	1.12
149	1.195E-06	2.00	9.972E-07	1.68	1.072E-06	1.38
150	3.999E-06	1.14	3.356E-06	0.91	3.615E-06	0.80
151	4.176E-06	1.11	3.485E-06	0.98	3.768E-06	0.77
152	4.260E-06	1.13	3.636E-06	1.02	3.848E-06	0.82
153	4.453E-06	1.07	3.766E-06	0.88	4.029E-06	0.77
154	4.727E-06	0.96	3.921E-06	0.88	4.199E-06	0.75
155	4.263E-06	1.14	3.599E-06	0.93	3.892E-06	0.81
156	4.013E-06	1.22	3.362E-06	0.97	3.591E-06	0.70
157	4.681E-06	1.07	3.940E-06	0.85	4.221E-06	0.71
158	4.836E-06	0.96	4.102E-06	0.99	4.351E-06	0.73
159	6.723E-06	0.78	5.647E-06	0.70	6.090E-06	0.59
160	3.558E-06	1.10	2.999E-06	0.94	3.229E-06	0.82
161	4.961E-06	0.98	4.198E-06	0.92	4.514E-06	0.71
162	5.844E-06	0.87	4.931E-06	0.80	5.323E-06	0.70
163	6.201E-06	0.94	5.230E-06	0.80	5.631E-06	0.62
164	6.491E-06	0.81	5.468E-06	0.75	5.870E-06	0.62
165	6.705E-06	0.76	5.710E-06	0.62	6.152E-06	0.60
166	3.993E-06	1.14	3.344E-06	1.02	3.606E-06	0.78
167	4.153E-06	1.15	3.509E-06	1.01	3.778E-06	0.88
168	4.307E-06	1.05	3.632E-06	1.01	3.927E-06	0.76
169	4.489E-06	0.94	3.782E-06	0.83	4.074E-06	0.66
170	4.567E-06	1.17	3.870E-06	0.87	4.175E-06	0.74
171	2.388E-06	1.41	2.006E-06	1.21	2.169E-06	1.04
172	2.408E-06	1.32	2.058E-06	1.26	2.200E-06	0.91
173	2.466E-06	1.29	2.089E-06	1.20	2.269E-06	1.00
174	2.524E-06	1.28	2.112E-06	1.24	2.312E-06	0.96
175	1.054E-06	2.28	9.150E-07	2.13	9.618E-07	1.68
176	1.014E-06	1.94	8.778E-07	1.89	9.362E-07	1.37
177	1.017E-06	1.84	8.812E-07	1.80	9.549E-07	1.40
178	1.060E-06	2.12	8.878E-07	1.88	9.602E-07	1.49
179	1.059E-06	2.18	8.988E-07	1.88	9.566E-07	1.46
180	1.046E-06	2.03	8.982E-07	1.74	9.801E-07	1.61
181	1.074E-06	2.04	9.093E-07	1.75	9.936E-07	1.45
182	1.052E-06	1.87	9.206E-07	2.04	9.672E-07	1.28
183	1.072E-06	1.70	9.308E-07	2.17	1.010E-06	1.24
184	1.090E-06	1.73	9.319E-07	1.54	1.011E-06	1.39
185	1.128E-06	1.79	9.525E-07	1.67	1.034E-06	1.59
186	1.131E-06	1.88	9.445E-07	1.74	1.042E-06	1.44
187	1.150E-06	2.11	9.752E-07	1.88	1.063E-06	1.43
188	1.177E-06	1.92	9.763E-07	1.74	1.064E-06	1.26
189	1.166E-06	1.95	9.955E-07	1.63	1.086E-06	1.47
190	3.008E-06	1.25	2.540E-06	1.07	2.712E-06	0.83
191	3.006E-06	1.17	2.580E-06	1.02	2.789E-06	0.80

192	3.149E-06	1.13	2.668E-06	1.01	2.886E-06	0.81
193	3.232E-06	1.30	2.753E-06	1.11	2.957E-06	0.90
194	6.840E-06	0.86	5.796E-06	0.70	6.235E-06	0.65
195	7.244E-06	0.82	6.125E-06	0.78	6.633E-06	0.62
196	7.614E-06	0.78	6.455E-06	0.69	6.993E-06	0.61
197	8.420E-06	0.79	7.132E-06	0.68	7.727E-06	0.55
198	8.962E-06	0.79	7.595E-06	0.61	8.241E-06	0.52
199	4.864E-06	0.93	4.166E-06	0.84	4.429E-06	0.64
200	5.173E-06	0.91	4.349E-06	0.76	4.737E-06	0.67
201	1.058E-05	0.77	8.934E-06	0.67	9.750E-06	0.59
202	1.192E-05	0.65	1.013E-05	0.55	1.095E-05	0.45
203	1.299E-05	0.58	1.098E-05	0.53	1.187E-05	0.42
204	1.462E-05	0.57	1.234E-05	0.48	1.350E-05	0.38
205	8.624E-06	0.77	7.724E-06	0.61	8.210E-06	0.54
206	9.362E-06	0.70	8.421E-06	0.63	8.862E-06	0.48
207	9.625E-06	0.73	8.711E-06	0.62	9.211E-06	0.50
208	1.125E-05	0.64	1.019E-05	0.57	1.086E-05	0.46
209	1.155E-05	0.59	1.052E-05	0.51	1.118E-05	0.42
210	1.412E-05	0.54	1.282E-05	0.46	1.360E-05	0.41
211	1.614E-05	0.50	1.459E-05	0.45	1.549E-05	0.36
212	1.924E-05	0.40	1.734E-05	0.38	1.855E-05	0.32
213	2.639E-05	0.33	2.361E-05	0.28	2.533E-05	0.26
214	3.675E-05	0.37	3.310E-05	0.34	3.549E-05	0.25
215	5.531E-05	0.25	4.986E-05	0.23	5.378E-05	0.18
216	9.224E-05	0.19	8.403E-05	0.18	9.070E-05	0.15
217	5.554E-05	0.24	5.315E-05	0.21	5.634E-05	0.17
218	7.075E-05	0.22	6.794E-05	0.19	7.234E-05	0.16
219	8.454E-05	0.24	8.156E-05	0.20	8.681E-05	0.16
220	1.016E-04	0.22	9.893E-05	0.17	1.055E-04	0.14
221	1.207E-04	0.16	1.189E-04	0.14	1.267E-04	0.13
222	1.369E-04	0.16	1.366E-04	0.15	1.458E-04	0.11
223	1.536E-04	0.14	1.574E-04	0.13	1.676E-04	0.11
224	7.519E-05	0.20	7.993E-05	0.18	8.456E-05	0.14
225	2.335E-04	0.13	2.718E-04	0.11	2.822E-04	0.09
226	3.176E-05	0.23	4.481E-05	0.20	4.450E-05	0.12
227	2.898E-05	0.24	4.646E-05	0.23	4.449E-05	0.13
228	1.045E-05	0.38	1.902E-05	0.31	1.757E-05	0.18
229	9.676E-06	0.40	1.957E-05	0.32	1.749E-05	0.19
230	4.499E-06	0.54	1.010E-05	0.42	8.700E-06	0.21
231	4.236E-06	0.52	1.061E-05	0.38	8.764E-06	0.22
232	3.995E-06	0.59	1.131E-05	0.41	8.897E-06	0.23
233	2.251E-06	0.70	7.432E-06	0.51	5.517E-06	0.25
234	1.398E-06	0.74	5.368E-06	0.62	3.801E-06	0.29
235	5.116E-07	1.53	1.037E-06	1.15	1.121E-06	0.51
236	3.481E-07	2.09	7.453E-07	1.25	7.976E-07	0.53
237	2.260E-07	2.06	5.479E-07	1.42	6.131E-07	0.61
238	4.797E-09	10.25	2.012E-08	5.84	2.551E-08	2.17

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
 0.7507 to 0.7535     *
 0.7535 to 0.7563     *
 0.7563 to 0.7592     ****
 0.7592 to 0.7620     ****************
 0.7620 to 0.7648     ***************
 0.7648 to 0.7677     ***************************
 0.7677 to 0.7705     **************
 0.7705 to 0.7733     *************
 0.7733 to 0.7761     *******
 0.7761 to 0.7790     **

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7507 to 0.7535     *
 0.7535 to 0.7563     *
 0.7563 to 0.7592     ****
```

```
 0.7592 to 0.7620     *************
 0.7620 to 0.7648     ***********
 0.7648 to 0.7677     ******************
 0.7677 to 0.7705     *********
 0.7705 to 0.7733     **********
 0.7733 to 0.7761     ******
 0.7761 to 0.7790     **

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7507 to 0.7535     *
 0.7535 to 0.7563     *
 0.7563 to 0.7592     **
 0.7592 to 0.7620     ***********
 0.7620 to 0.7648     *******
 0.7648 to 0.7677     ************
 0.7677 to 0.7705     ******
 0.7705 to 0.7733     ******
 0.7733 to 0.7761     ***
 0.7761 to 0.7790     *

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7507 to 0.7535
 0.7535 to 0.7563     *
 0.7563 to 0.7592     **
 0.7592 to 0.7620     ****
 0.7620 to 0.7648     **
 0.7648 to 0.7677     *****
 0.7677 to 0.7705     *****
 0.7705 to 0.7733     *****
 0.7733 to 0.7761
 0.7761 to 0.7790     *

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

**********************************************************************
*********************************************
        ***
***
        ***                                     ******      final results
table      ******                                   ***
        ***
***
```

```
        ***        best estimate system k-eff
0.76624 + or - 0.00051                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.64397E-02 + or -  1.34675E-04           ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.14728E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52703E-01 + or -  1.79342E-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     3.11467 minutes


*********************************************************************
*********************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
```

```
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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 99999999999 // 22222222222
22222222222 // 11 666666666666
000000000 9999999999999 // 2222222222222
2222222222222 // 111 6666666666666
00 00 99 99 // 22 22 22
22 // 1111 66
00 00 99 99 // 22
22 // 11 66
00 00 99 99 // 22
22 // 11 66
00 00 9999999999999 // 22
22 // 11 666666666666
00 00 999999999999 // 22
22 // 11 6666666666666
00 00 99 // 22
22 // 11 66 66
00 00 99 // 22
22 // 11 66 66
00 00 99 // 22 22
// 11 66 66
000000000 9999999999999 // 2222222222222
2222222222222 // 11111111 6666666666666
0000000 999999999999 // 2222222222222
2222222222222 // 11111111 66666666666

0000000 5555555555555 33333333333
44 0000000 7777777777777
000000000 5555555555555 3333333333333
444 000000000 777777777777
00 00 55 ::: 33 33
4444 ::: 00 00 77 77
00 00 55 ::: 33
44 44 ::: 00 00 77
00 00 55 ::: 33
44 44 ::: 00 00 77
00 00 555555555555 333
44 44 00 00 77
00 00 5555555555555 333
44 44 00 00 77
00 00 55 ::: 33
444444444444 ::: 00 00 77
00 00 55 ::: 33
4444444444444 ::: 00 00 77
00 00 55 55 ::: 33 33
44 ::: 00 00 77
000000000 5555555555555 3333333333333
44 000000000 77
0000000 55555555555 33333333333
44 0000000 77
1

```
    SSSSSSSSSS     CCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCC    AAAAAAAAAAA    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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCC    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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:34:07.46
*****
        *****
*****
        *****
*****

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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
***
        ***
***

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

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                                                parameter input completed


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


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

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        ***
***
        ***          unit
volume                                           ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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                                 ........ finished preparing input data
........
1
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                 ***
***
                 ***          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  ***
                 ***
***

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                                 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  8.29176E-13  2.50147E-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  6.04525E-08  1.81191E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.31139E-15  7.61721E-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
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    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  1.06559E-11  2.64473E-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  1.07212E-08  2.91741E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.64785E-08  4.53335E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.15061E-10  3.19989E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.66988E-08  4.69400E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  1.00221E-10  2.84723E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.78712E-09  8.00154E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.42142E-19  3.95304E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.61220E-11  4.58013E-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  1.12901E-08  3.20739E-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  6.89567E-09  2.00027E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.72761E-08  5.06308E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75596E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  6.97944E-09  2.08728E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  9.83468E-11  2.91169E-09   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  9.64556E-11  2.91343E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
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```
    1044102  7.88343E-11  2.40475E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  4.17051E-11  1.28468E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  3.53320E-11  1.09893E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  7.27802E-12  2.30728E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  1.41935E-11  4.37209E-10   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.10023E-12  3.45498E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  1.72586E-11  5.41956E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  2.84149E-12  9.09300E-11   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  1.04307E-12  3.36909E-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  5.81232E-13  1.89478E-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  8.98601E-11  2.90247E-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  1.29258E-09  4.29109E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                 12/17/09
    1048112  2.43652E-09  8.16154E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                 12/17/09
    1048113  1.23399E-09  4.17046E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                 12/17/09
    1048114  2.90101E-09  9.89115E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                 12/17/09
    1048116  7.56475E-10  2.62457E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                 12/17/09
    1049115  2.03580E-13  7.00215E-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  6.50238E-11  2.23649E-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  1.46878E-09  5.13979E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                 12/17/09
    1050118  4.63145E-09  1.63455E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                 12/17/09
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    1050119  1.64279E-09  5.84705E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23004E-09  2.23604E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85621E-10  3.23166E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10764E-09  4.10819E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.03885E-12  3.91531E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.43030E-12  9.23206E-11   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.04587E-11  4.03562E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30198E-12  5.25788E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  3.69391E-11  1.44745E-09   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67163E-11  1.06288E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88549E-12  7.61413E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  9.42750E-11  3.75060E-09   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.51860E-16  6.08705E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.17074E-10  4.72774E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.13835E-10  4.66512E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.30483E-08  1.36424E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.10284E-11  2.13710E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.23452E-10  5.13312E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  7.85572E-11  3.31348E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.13123E-10  4.80534E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.24664E-12  2.67226E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  9.67677E-11  4.16864E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  3.25933E-11  1.37476E-09   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  5.02765E-11  2.15076E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  5.42669E-11  2.32145E-09   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  4.17773E-12  1.79967E-10   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
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    1060145  7.16606E-11  3.10848E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  5.63581E-11  2.46157E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.67785E-11  7.37880E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.08264E-11  1.36491E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  2.47793E-11  1.08972E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.38449E-18  6.13016E-17   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.92464E-12  8.57944E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  2.43223E-13  1.06963E-11   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.91034E-11  8.51562E-10   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.65403E-15  7.42260E-14   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.01325E-09  1.36127E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.01318E-12  2.27976E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.33075E-13  1.06691E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.43049E-09  6.46241E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.56185E-09  7.14940E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.22456E-15  5.64214E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.06974E-13  2.81480E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.37651E-13  6.42476E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.77992E-12  2.62844E-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  4.27243E-10  1.98131E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91138E-10  2.75904E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51768E-10  2.12210E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17350E-10  3.39111E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31102E-10  3.02123E-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
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    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  9.22581E-06  6.51871E-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  7.64827E-13  5.42703E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.22701E-19  8.74334E-18   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  7.77957E-11  5.56686E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  2.91606E-17  2.09540E-15   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.97190E-21  7.19547E-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  1.00448E-20  7.24810E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.85427E-28  2.79271E-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  1.57699E-20  1.14265E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.97719E-21  7.25915E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.96338E-21  7.27897E-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
```

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    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
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    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
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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

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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:
  9525 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       ........

                                ........     0.01550 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

   0.00100 minutes were required for starting.   total elapsed time is
0.01650 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 15553 independent fission points were generated for generation 1
          1       7.65158E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15715 independent fission points were generated for generation 2
          2       7.67768E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15580 independent fission points were generated for generation 3
          3       7.68598E-01      7.68598E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.62800E-01      7.65699E-01      2.89887E-03
0.00000E+00      0.00000E+00
          5       7.66227E-01      7.65875E-01      1.68290E-03
0.00000E+00      0.00000E+00
          6       7.67700E-01      7.66331E-01      1.27448E-03
0.00000E+00      0.00000E+00
          7       7.63643E-01      7.65794E-01      1.12413E-03
0.00000E+00      0.00000E+00
          8       7.72899E-01      7.66978E-01      1.49827E-03
0.00000E+00      0.00000E+00
          9       7.74223E-01      7.68013E-01      1.63542E-03
0.00000E+00      0.00000E+00
         10       7.71505E-01      7.68449E-01      1.48207E-03
0.00000E+00      0.00000E+00
         11       7.68830E-01      7.68492E-01      1.30775E-03
```

0.00000E+00	0.00000E+00				
12	7.74419E-01	7.69084E-01	1.31129E-03	0.00000E+00	0.00000E+00
13	7.63002E-01	7.68531E-01	1.30865E-03	0.00000E+00	0.00000E+00
14	7.64296E-01	7.68178E-01	1.24567E-03	0.00000E+00	0.00000E+00
15	7.59702E-01	7.67526E-01	1.31837E-03	0.00000E+00	0.00000E+00
16	7.67271E-01	7.67508E-01	1.22071E-03	0.00000E+00	0.00000E+00
17	7.68824E-01	7.67596E-01	1.13980E-03	0.00000E+00	0.00000E+00
18	7.63249E-01	7.67324E-01	1.10026E-03	0.00000E+00	0.00000E+00
19	7.64708E-01	7.67170E-01	1.04490E-03	0.00000E+00	0.00000E+00
20	7.66953E-01	7.67158E-01	9.85217E-04	0.00000E+00	0.00000E+00
21	7.69184E-01	7.67265E-01	9.38000E-04	0.00000E+00	0.00000E+00
22	7.67084E-01	7.67256E-01	8.89912E-04	0.00000E+00	0.00000E+00
23	7.65114E-01	7.67154E-01	8.52595E-04	0.00000E+00	0.00000E+00
24	7.62403E-01	7.66938E-01	8.41111E-04	0.00000E+00	0.00000E+00
25	7.71091E-01	7.67118E-01	8.23742E-04	0.00000E+00	0.00000E+00
26	7.60763E-01	7.66854E-01	8.31945E-04	0.00000E+00	0.00000E+00
27	7.69638E-01	7.65974E-01	1.06965E-02	0.00000E+00	0.00000E+00
28	7.67628E-01	7.66304E-01	5.36026E-03	0.00000E+00	0.00000E+00
29	7.69275E-01	7.66800E-01	4.05894E-03	0.00000E+00	0.00000E+00
30	7.61747E-01	7.66078E-01	3.12614E-03	0.00000E+00	0.00000E+00
31	7.70401E-01	7.66618E-01	2.80669E-03	0.00000E+00	0.00000E+00
32	7.67512E-01	7.66718E-01	2.31317E-03	0.00000E+00	0.00000E+00
33	7.65380E-01	7.66584E-01	1.94919E-03	0.00000E+00	0.00000E+00
34	7.67977E-01	7.66710E-01	1.73135E-03	0.00000E+00	0.00000E+00
35	7.65281E-01	7.66591E-01	1.56512E-03	0.00000E+00	0.00000E+00
36	7.66694E-01	7.66599E-01	1.41389E-03	0.00000E+00	0.00000E+00
37	7.66090E-01	7.66563E-01	1.29348E-03		

0.00000E+00	0.00000E+00				
38	7.60253E-01	7.66142E-01	1.27838E-03	0.00000E+00	0.00000E+00
39	7.68252E-01	7.66274E-01	1.18826E-03	0.00000E+00	0.00000E+00
40	7.69118E-01	7.66441E-01	1.04290E-03	0.00000E+00	0.00000E+00
41	7.67501E-01	7.66500E-01	9.86889E-04	0.00000E+00	0.00000E+00
42	7.69472E-01	7.66657E-01	9.75511E-04	0.00000E+00	0.00000E+00
43	7.68617E-01	7.66755E-01	9.32957E-04	0.00000E+00	0.00000E+00
44	7.63121E-01	7.66582E-01	8.66970E-04	0.00000E+00	0.00000E+00
45	7.68566E-01	7.66672E-01	8.40666E-04	0.00000E+00	0.00000E+00
46	7.64653E-01	7.66584E-01	8.26579E-04	0.00000E+00	0.00000E+00
47	7.66756E-01	7.66591E-01	7.88869E-04	0.00000E+00	0.00000E+00
48	7.62826E-01	7.66441E-01	7.90237E-04	0.00000E+00	0.00000E+00
49	7.66696E-01	7.66450E-01	7.56601E-04	0.00000E+00	0.00000E+00
50	7.71764E-01	7.66647E-01	7.10743E-04	0.00000E+00	0.00000E+00
51	7.66531E-01	7.66643E-01	6.82726E-04	0.00000E+00	0.00000E+00
52	7.64123E-01	7.66556E-01	6.34012E-04	0.00000E+00	0.00000E+00
53	7.64081E-01	7.66474E-01	6.17784E-04	0.00000E+00	0.00000E+00
54	7.66753E-01	7.66483E-01	5.94711E-04	0.00000E+00	0.00000E+00
55	7.68460E-01	7.66544E-01	5.68539E-04	0.00000E+00	0.00000E+00
56	7.71590E-01	7.66697E-01	5.76146E-04	0.00000E+00	0.00000E+00
57	7.67229E-01	7.66713E-01	5.59978E-04	0.00000E+00	0.00000E+00
58	7.69044E-01	7.66780E-01	5.67291E-04	0.00000E+00	0.00000E+00
59	7.66754E-01	7.66779E-01	5.50304E-04	0.00000E+00	0.00000E+00
60	7.65842E-01	7.66754E-01	5.31555E-04	0.00000E+00	0.00000E+00
61	7.63060E-01	7.66656E-01	5.26768E-04	0.00000E+00	0.00000E+00
62	7.63594E-01	7.66578E-01	5.23037E-04	0.00000E+00	0.00000E+00
63	7.63391E-01	7.66498E-01	5.31845E-04		

0.00000E+00	0.00000E+00				
64	7.68681E-01	7.66551E-01	5.12329E-04	0.00000E+00	0.00000E+00
65	7.70064E-01	7.66635E-01	4.92665E-04	0.00000E+00	0.00000E+00
66	7.67133E-01	7.66647E-01	4.82019E-04	0.00000E+00	0.00000E+00
67	7.70136E-01	7.66726E-01	4.92354E-04	0.00000E+00	0.00000E+00
68	7.68551E-01	7.66766E-01	4.83653E-04	0.00000E+00	0.00000E+00
69	7.63128E-01	7.66687E-01	4.65505E-04	0.00000E+00	0.00000E+00
70	7.64567E-01	7.66642E-01	4.53160E-04	0.00000E+00	0.00000E+00
71	7.73335E-01	7.66782E-01	4.45607E-04	0.00000E+00	0.00000E+00
72	7.68855E-01	7.66824E-01	4.38360E-04	0.00000E+00	0.00000E+00
73	7.61638E-01	7.66720E-01	4.42181E-04	0.00000E+00	0.00000E+00
74	7.62376E-01	7.66635E-01	4.41876E-04	0.00000E+00	0.00000E+00
75	7.68036E-01	7.66662E-01	4.33996E-04	0.00000E+00	0.00000E+00
76	7.63542E-01	7.66603E-01	4.29780E-04	0.00000E+00	0.00000E+00
77	7.65449E-01	7.66582E-01	4.22155E-04	0.00000E+00	0.00000E+00
78	7.72321E-01	7.66686E-01	4.27683E-04	0.00000E+00	0.00000E+00
79	7.60696E-01	7.66579E-01	4.33737E-04	0.00000E+00	0.00000E+00
80	7.67259E-01	7.66591E-01	4.26094E-04	0.00000E+00	0.00000E+00
81	7.65511E-01	7.66572E-01	4.18981E-04	0.00000E+00	0.00000E+00
82	7.71596E-01	7.66658E-01	4.20707E-04	0.00000E+00	0.00000E+00
83	7.61582E-01	7.66573E-01	4.22370E-04	0.00000E+00	0.00000E+00
84	7.64078E-01	7.66532E-01	4.17348E-04	0.00000E+00	0.00000E+00
85	7.67292E-01	7.66544E-01	4.10638E-04	0.00000E+00	0.00000E+00
86	7.57735E-01	7.66405E-01	4.28225E-04	0.00000E+00	0.00000E+00
87	7.62048E-01	7.66337E-01	4.27012E-04	0.00000E+00	0.00000E+00
88	7.68967E-01	7.66377E-01	4.22292E-04	0.00000E+00	0.00000E+00
89	7.63776E-01	7.66338E-01	4.17666E-04		

```
0.00000E+00      0.00000E+00
         90       7.63845E-01      7.66300E-01      4.13020E-04
0.00000E+00      0.00000E+00
         91       7.61424E-01      7.66229E-01      4.13270E-04
0.00000E+00      0.00000E+00
         92       7.67615E-01      7.66249E-01      4.07658E-04
0.00000E+00      0.00000E+00
         93       7.65611E-01      7.66240E-01      4.01812E-04
0.00000E+00      0.00000E+00
         94       7.58770E-01      7.66134E-01      4.10157E-04
0.00000E+00      0.00000E+00
         95       7.69642E-01      7.66183E-01      4.07345E-04
0.00000E+00      0.00000E+00
         96       7.65109E-01      7.66168E-01      4.01925E-04
0.00000E+00      0.00000E+00
         97       7.72139E-01      7.66249E-01      4.04732E-04
0.00000E+00      0.00000E+00
         98       7.60728E-01      7.66175E-01      4.06139E-04
0.00000E+00      0.00000E+00
         99       7.62913E-01      7.66133E-01      4.03042E-04
0.00000E+00      0.00000E+00
        100       7.63001E-01      7.66092E-01      3.99833E-04
0.00000E+00      0.00000E+00
        101       7.67817E-01      7.66114E-01      3.95242E-04
0.00000E+00      0.00000E+00
        102       7.68869E-01      7.66149E-01      3.91737E-04
0.00000E+00      0.00000E+00
        103       7.72194E-01      7.66224E-01      3.94246E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=F5D3CBEDDF5490F6
        104       7.68048E-01      7.66247E-01      3.89953E-04
0.00000E+00      0.00000E+00
        105       7.62017E-01      7.66195E-01      3.88634E-04
0.00000E+00      0.00000E+00
        106       7.66230E-01      7.66196E-01      3.83866E-04
0.00000E+00      0.00000E+00
        107       7.74017E-01      7.66289E-01      3.90746E-04
0.00000E+00      0.00000E+00
        108       7.70587E-01      7.66339E-01      3.89442E-04
0.00000E+00      0.00000E+00
        109       7.67656E-01      7.66355E-01      3.85145E-04
0.00000E+00      0.00000E+00
        110       7.63240E-01      7.66319E-01      3.82360E-04
0.00000E+00      0.00000E+00
        111       7.72196E-01      7.66386E-01      3.83930E-04
0.00000E+00      0.00000E+00
        112       7.70242E-01      7.66429E-01      3.82064E-04
0.00000E+00      0.00000E+00
        113       7.68036E-01      7.66447E-01      3.78178E-04
0.00000E+00      0.00000E+00
        114       7.57367E-01      7.66347E-01      3.87324E-04
```

```
0.00000E+00      0.00000E+00
        115       7.63166E-01      7.66313E-01      3.84637E-04
0.00000E+00      0.00000E+00
        116       7.68349E-01      7.66334E-01      3.81076E-04
0.00000E+00      0.00000E+00
        117       7.68386E-01      7.66356E-01      3.77602E-04
0.00000E+00      0.00000E+00
        118       7.66660E-01      7.66359E-01      3.73577E-04
0.00000E+00      0.00000E+00
        119       7.67169E-01      7.66368E-01      3.69722E-04
0.00000E+00      0.00000E+00
        120       7.69020E-01      7.66395E-01      3.66892E-04
0.00000E+00      0.00000E+00
        121       7.63583E-01      7.66367E-01      3.64245E-04
0.00000E+00      0.00000E+00
        122       7.67346E-01      7.66376E-01      3.60648E-04
0.00000E+00      0.00000E+00
        123       7.61462E-01      7.66327E-01      3.60422E-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=CCACBAE941DF705F
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55261E-05 + or -  1.13619E-08             generation time
=  2.99517E-05 + or -  2.06765E-08
 nu bar   =  2.43894E+00 + or -  1.04990E-05       average fission group
=  2.17550E+02 + or -  1.20981E-02
                      energy(ev) of the average lethargy causing fission
=  5.65645E-02 + or -  1.18427E-04
                                                 system mean free path (cm)
=  6.52810E-01 + or -  1.51065E-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          0.76633   + or - 0.00036     0.76597 to 0.76669
0.76561 to 0.76705    0.76525 to 0.76741    2000000      12.3540

      24          0.76637   + or - 0.00036     0.76601 to 0.76673
0.76564 to 0.76709    0.76528 to 0.76745    1980000      12.5459

      25          0.76632   + or - 0.00036     0.76596 to 0.76668
0.76559 to 0.76704    0.76523 to 0.76741    1960000      12.7000
```

26	0.76638	+ or - 0.00037	0.76601 to 0.76674	0.76564 to 0.76711	0.76527 to 0.76748	1940000	12.5051
27	0.76634	+ or - 0.00037	0.76597 to 0.76671	0.76560 to 0.76708	0.76523 to 0.76745	1920000	12.6654
28	0.76633	+ or - 0.00037	0.76596 to 0.76670	0.76558 to 0.76707	0.76521 to 0.76744	1900000	12.7178
29	0.76630	+ or - 0.00038	0.76592 to 0.76668	0.76554 to 0.76706	0.76516 to 0.76743	1880000	12.4832
30	0.76635	+ or - 0.00039	0.76596 to 0.76673	0.76557 to 0.76712	0.76519 to 0.76750	1860000	12.3357
31	0.76630	+ or - 0.00039	0.76592 to 0.76669	0.76553 to 0.76707	0.76514 to 0.76746	1840000	12.5596
32	0.76629	+ or - 0.00039	0.76590 to 0.76668	0.76551 to 0.76707	0.76512 to 0.76746	1820000	12.5041
37	0.76629	+ or - 0.00041	0.76588 to 0.76670	0.76546 to 0.76712	0.76505 to 0.76753	1720000	12.2946
42	0.76625	+ or - 0.00043	0.76582 to 0.76668	0.76540 to 0.76710	0.76497 to 0.76753	1620000	12.8633
47	0.76624	+ or - 0.00046	0.76579 to 0.76670	0.76533 to 0.76716	0.76487 to 0.76762	1520000	12.4946
52	0.76623	+ or - 0.00048	0.76575 to 0.76671	0.76528 to 0.76719	0.76480 to 0.76767	1420000	12.9225
57	0.76613	+ or - 0.00050	0.76563 to 0.76663	0.76514 to 0.76712	0.76464 to 0.76762	1320000	13.6246
62	0.76617	+ or - 0.00052	0.76564 to 0.76669	0.76512 to 0.76721	0.76460 to 0.76773	1220000	14.2785
67	0.76601	+ or - 0.00055	0.76547 to 0.76656	0.76492 to 0.76710	0.76438 to 0.76765	1120000	15.3771
72	0.76585	+ or - 0.00057	0.76528 to 0.76642	0.76470 to 0.76700	0.76413 to 0.76757	1020000	15.9532
77	0.76603	+ or - 0.00062	0.76541 to 0.76665	0.76479 to 0.76727	0.76417 to 0.76789	920000	16.6644
82	0.76585	+ or - 0.00072	0.76513 to 0.76657	0.76441 to 0.76729	0.76369 to 0.76801	820000	14.8080

```
      87          0.76631   + or - 0.00074     0.76557 to 0.76705
0.76483 to 0.76779    0.76409 to 0.76853     720000      16.7504

      92          0.76650   + or - 0.00083     0.76567 to 0.76733
0.76485 to 0.76816    0.76402 to 0.76898     620000      18.2410

      97          0.76655   + or - 0.00103     0.76552 to 0.76758
0.76450 to 0.76860    0.76347 to 0.76963     520000      15.2566

     102          0.76700   + or - 0.00109     0.76591 to 0.76809
0.76482 to 0.76918    0.76373 to 0.77027     420000      21.4170

     107          0.76653   + or - 0.00116     0.76537 to 0.76769
0.76421 to 0.76885    0.76305 to 0.77001     320000      27.7979

     112          0.76550   + or - 0.00122     0.76428 to 0.76673
0.76306 to 0.76795    0.76184 to 0.76917     220000      41.3831
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          0.76587   + or - 0.00253     0.76334 to 0.76841
0.76081 to 0.77094    0.75827 to 0.77347     120000      11.4136
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76632 + or - 0.00036 which occurs for
123 generations run.

                                 0.7624                   0.7646
0.7668

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

```
          |                                                I
|  *
          |                                                        I
|   *                          I
          |                                                           I
|  *                      I
          |                                                               I
|   *                    I
      35 +                                                               I
|  *                  I
          |                                                                 I
|  *                I
          |                                                                   I
|  *              I
          |                                                                 I
* |           I
          |                                                               I
*|            I
      40 +                                                                   I
|*           I
          |
I         | *           I
          |
I      |   *           I
          |
I     |    *          I
          |
I      |  *          I
      45 +
I     |   *         I
          |
I      |  *         I
          |
I     |  *         I
          |
I       |*         I
          |
I      |*         I
      50 +
I    |  *         I
          |
I   |  *       I
          |
I    | *       I
          |
I    | *      I
          |
I    | *     I
      55 +
I   | *      I
          |
I |   *      I
```

```
          |
I |   *      I
          |
I|    *     I
          |
I|    *     I
      60 +
I|    *     I
          |
I |   *     I
          |
I  |  *     I
          |
I   | *     I
          |
I  | *     I
      65 +
I |  *     I
          |
I |  *     I
          |
I|   *     I
          |
I|    *    I
          |
I|   *    I
      70 +
I |  *     I
          |
I    *    I
          |
|I    *   I
          |
I|   *    I
          |
I |  *    I
      75 +
I|   *    I
          |
I |  *    I
          |
I |  *    I
          |
I|   *    I
          |
I |  *    I
      80 +
I |  *    I
          |
I |  *   I
          |
I|   *   I
```

```
          |
I |  *   I
          |
I  | *    I
      85 +
I | *    I
          |
I   |*    I
          |
I    *    I
          |
I   *    I
          |
I    *    I
      90 +
I    *   I
          |
I    *|  I
          |
I    *|   I
          |
I    *|  I
          |
I    * | I
      95 +
I   * |  I
          |
I   * |  I
          |
I    *|   I
          |
I   * |  I
          |
I    * | I
     100 +
I   *  | I
          |
I   *  | I
          |
I    * | I
          |
I    *|  I
          |
I   *|  I
     105 +
I   * |  I
          |
I   * |  I
          |
I   *|   I
          |
I   *   I
```

```
          |
I   *    I
     110 +
I    *   I
          |
I   |*   I
          |
I  |*   I
          |
I  |*    I
          |
I   *   I
     115 +
I    *   I
          |
I   *   I
          |
I   *   I
          |
I   *   I
          |
I   *    I
     120 +
I  |*   I
          |
I   *   I
          |
I   *    I
          |
I   *   I
1                           fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7663 + or - 0.0003 which occurs for 23 generations skipped.

```
                                 0.7641                   0.7656
0.7671

|-------------------------|------------------------|------------------
------|------------------------
          |
          |                                                        I
*     I
          |                                                         I
|*     I
      25 +                                                         I
*     I
          |                                                         I
|*     I
          |                                                        I
|*     I
```

```
         |                                                          I
*      I
         |                                                        I
*     I
      30 +                                                         I
|*     I
         |                                                        I
*     I
         |                                                        I
*     I
         |                                                        I
*     I
         |                                                        I
*     I
      35 +                                                        I
*     I
         |                                                        I
*     I
         |                                                        I
*      I
         |                                                         I
|*      I
         |                                                        I
*      I
      40 +                                                        I
*      I
         |                                                        I
*      I
         |                                                       I
*|     I
         |                                                      I
*|     I
         |                                                       I
*|      I
      45 +                                                      I
*|     I
         |                                                      I
*|      I
         |                                                      I
*|      I
         |                                                       I
*      I
         |                                                       I
*      I
      50 +                                                    I       *
|     I
         |                                                    I       *
|     I
         |                                                      I
*|      I
         |                                                      I
*|      I
```

```
          |                                                          I
*|       I
      55 +                                                         I
*|       I
          |                                                       I        *
|    I
          |                                                       I        *
|    I
          |                                                     I        *
|    I
          |                                                     I        *
|    I
      60 +                                                    I         *
|    I
          |                                                     I         *
|     I
          |                                                      I         *
|     I
          |                                                      I         *
|      I
          |                                                      I         *
|      I
      65 +                                                     I         *
|    I
          |                                                    I         *
|    I
          |                                                  I         *
|   I
          |                                                 I         *
|   I
          |                                                  I         *
|    I
      70 +                                                   I          *
|    I
          |                                                I         *
|  I
          |                                              I         *
| I
          |                                                I          *
|  I
          |                                                 I          *
|    I
      75 +                                                I          *
|   I
          |                                                 I          *
|    I
          |                                                 I          *
|     I
          |                                              I           *
|   I
          |                                                I           *
|     I
```

```
      80 +                                                  I           *
|     I
         |                                                  I            *
|     I
         |                                            I            *
|   I
         |                                              I            *
|     I
         |                                                  I            *
|      I
      85 +                                             I             *
|      I
         |                                                  I            *
|         I
         |                                                     I
*           I
         |                                                  I
*|           I
         |                                                   I
*            I
      90 +                                                     I
|*            I
         |                                                       I
|   *            I
         |                                                      I
|  *             I
         |                                                       I
|   *             I
         |                                                           I
|       *              I
      95 +                                                         I
|      *              I
         |                                                          I
|      *               I
         |                                                   I
|   *                I
         |                                                         I
|       *               I
         |                                                           I
|          *               I
     100 +                                                              I
|             *               I
         |                                                               I
|            *                 I
         |                                                             I
|           *                  I
         |                                                      I
|      *                   I
         |                                                  I
|     *                    I
     105 +                                                       I
|         *                   I
```

```
         |                                                        I
|          *                     I
         |                                                I
|   *                  I
         |                                           I
*|                  I
         |                                     I                    *
|                  I
     110 +                                     I
|*                         I
         |                                I                     *
|                I
         |                           I                    *
|      I
         |                I                            *
|          I
         |                                   I                      *
|                     I
     115 +                                   I
|  *                           I
         |                        I
*|                              I
         |           I                                          *
|                                I
         |                                                   *
|
         |                                                *
|
     120 +                        *
|            I
```

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			0.00000E+00	0.0000	9.77639E-08	78.7443	0.00000E+00	0.0000				
3	0.0000			1.38418E-05	10.2609	2.00389E-05	4.5403	0.00000E+00	0.0000				
4	0.0000			2.03717E-05	9.0541	3.40567E-05	3.8217	0.00000E+00	0.0000				
5	0.0000			2.33129E-05	7.6359	5.18363E-05	3.1505	0.00000E+00	0.0000				
6	0.0001			9.70072E-05	3.9731								

2.29198E-04	1.6233	0.00000E+00	0.0000	7	0.0002	1.15330E-04	3.4597
2.10026E-04	1.5988	0.00000E+00	0.0000	8	0.0003	2.39329E-04	2.2863
3.26860E-04	0.9402	0.00000E+00	0.0000	9	0.0005	3.80369E-04	1.3309
4.43376E-04	0.5931	0.00000E+00	0.0000	10	0.0003	2.05624E-04	1.7469
2.08811E-04	0.8059	0.00000E+00	0.0000	11	0.0012	9.18481E-04	0.7600
5.27904E-04	0.5136	0.00000E+00	0.0000	12	0.0010	7.63550E-04	0.7845
2.99311E-04	0.7745	0.00000E+00	0.0000	13	0.0003	2.36592E-04	1.5619
9.39517E-05	1.5447	0.00000E+00	0.0000	14	0.0013	1.01408E-03	0.6313
4.14470E-04	0.6252	0.00000E+00	0.0000	15	0.0010	7.53151E-04	0.7332
3.24737E-04	0.7243	0.00000E+00	0.0000	16	0.0002	1.90349E-04	1.1331
8.74719E-05	1.1184	0.00000E+00	0.0000	17	0.0001	6.84851E-05	1.7271
3.32859E-05	1.6987	0.00000E+00	0.0000	18	0.0001	5.13058E-05	1.9728
2.59119E-05	1.9342	0.00000E+00	0.0000	19	0.0001	8.14132E-05	1.3485
4.30351E-05	1.3138	0.00000E+00	0.0000	20	0.0001	6.02242E-05	1.4746
3.29831E-05	1.4414	0.00000E+00	0.0000	21	0.0002	1.21436E-04	1.0379
6.85256E-05	1.0150	0.00000E+00	0.0000	22	0.0001	1.05117E-04	1.0727
6.22375E-05	1.0448	0.00000E+00	0.0000	23	0.0001	1.06440E-04	1.0901
6.49822E-05	1.0621	0.00000E+00	0.0000	24	0.0000	2.50512E-05	2.3164
1.55566E-05	2.2586	0.00000E+00	0.0000	25	0.0000	2.94786E-05	1.9292
1.84378E-05	1.8696	0.00000E+00	0.0000	26	0.0000	1.76383E-05	2.1679
1.10785E-05	2.0988	0.00000E+00	0.0000	27	0.0001	5.39469E-05	1.2448
3.36522E-05	1.2180	0.00000E+00	0.0000	28	0.0001	9.52944E-05	0.9224
5.94672E-05	0.9054	0.00000E+00	0.0000	29	0.0001	9.92264E-05	1.1949
6.25073E-05	1.1779	0.00000E+00	0.0000	30	0.0000	1.20381E-05	3.0314
7.55260E-06	3.0094	0.00000E+00	0.0000	31	0.0001	9.50038E-05	0.9906
6.00394E-05	0.9776	0.00000E+00	0.0000	32	0.0000	3.80401E-05	1.7148

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2.43134E-05     1.6793       0.00000E+00     0.0000
   33    0.0000                 3.25919E-05     1.6563
2.04109E-05     1.6355       0.00000E+00     0.0000
   34    0.0001                 7.56306E-05     1.1257
4.75062E-05     1.1085       0.00000E+00     0.0000
   35    0.0001                 4.52139E-05     1.6492
2.83770E-05     1.6230       0.00000E+00     0.0000
   36    0.0001                 4.36873E-05     1.2962
2.70393E-05     1.2849       0.00000E+00     0.0000
   37    0.0000                 2.79090E-05     1.9544
1.75219E-05     1.9106       0.00000E+00     0.0000
   38    0.0000                 3.32256E-05     1.6452
2.09369E-05     1.6085       0.00000E+00     0.0000
   39    0.0002                 1.29694E-04     0.9711
8.25260E-05     0.9487       0.00000E+00     0.0000
   40    0.0002                 1.18779E-04     0.8578
7.67907E-05     0.8407       0.00000E+00     0.0000
   41    0.0002                 1.58912E-04     0.7194
1.06182E-04     0.6956       0.00000E+00     0.0000
   42    0.0002                 1.41222E-04     0.7624
9.60013E-05     0.7462       0.00000E+00     0.0000
   43    0.0001                 7.85561E-05     1.2081
5.64639E-05     1.1563       0.00000E+00     0.0000
   44    0.0001                 1.11864E-04     0.9974
8.22449E-05     0.9556       0.00000E+00     0.0000
   45    0.0001                 5.88244E-05     0.9861
4.74893E-05     0.9077       0.00000E+00     0.0000
   46    0.0000                 1.43534E-05     1.7732
1.15382E-05     1.6484       0.00000E+00     0.0000
   47    0.0001                 4.13455E-05     1.5629
3.20776E-05     1.5116       0.00000E+00     0.0000
   48    0.0000                 1.23021E-05     3.7568
9.52269E-06     3.6624       0.00000E+00     0.0000
   49    0.0001                 8.06790E-05     1.4320
6.36146E-05     1.3973       0.00000E+00     0.0000
   50    0.0001                 5.69877E-05     1.7136
4.69348E-05     1.6762       0.00000E+00     0.0000
   51    0.0000                 1.54986E-05     2.9382
1.28679E-05     2.8779       0.00000E+00     0.0000
   52    0.0001                 4.04615E-05     1.9285
3.49822E-05     1.8762       0.00000E+00     0.0000
   53    0.0002                 1.58451E-04     0.8446
1.55724E-04     0.7839       0.00000E+00     0.0000
   54    0.0001                 7.43982E-05     2.1835
6.91018E-05     2.0995       0.00000E+00     0.0000
   55    0.0002                 1.62813E-04     1.5279
1.49300E-04     1.4878       0.00000E+00     0.0000
   56    0.0002                 1.19247E-04     1.7836
1.10524E-04     1.7419       0.00000E+00     0.0000
1                            fuel bundle

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group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
57	0.0002			1.46649E-04	1.3840	1.33134E-04	1.3508	0.00000E+00	0.0000
58	0.0001			8.71380E-05	1.9284	7.62747E-05	1.8779	0.00000E+00	0.0000
59	0.0002			1.57701E-04	1.4216	1.41630E-04	1.3679	0.00000E+00	0.0000
60	0.0004			2.74276E-04	1.1728	2.48586E-04	1.1136	0.00000E+00	0.0000
61	0.0000			3.03137E-05	3.3555	2.32682E-05	3.2519	0.00000E+00	0.0000
62	0.0002			1.59510E-04	1.7707	1.33899E-04	1.7206	0.00000E+00	0.0000
63	0.0002			1.20843E-04	2.0248	9.94569E-05	1.9627	0.00000E+00	0.0000
64	0.0001			1.00138E-04	2.3183	8.07277E-05	2.2353	0.00000E+00	0.0000
65	0.0000			3.22123E-05	3.7748	3.19360E-05	3.6446	0.00000E+00	0.0000
66	0.0002			1.68521E-04	1.7817	1.49648E-04	1.7236	0.00000E+00	0.0000
67	0.0002			1.44191E-04	2.1250	1.18023E-04	2.0576	0.00000E+00	0.0000
68	0.0000			2.79575E-05	4.5711	2.41296E-05	4.4137	0.00000E+00	0.0000
69	0.0004			3.03902E-04	1.5655	2.38408E-04	1.5171	0.00000E+00	0.0000
70	0.0003			2.14119E-04	1.9421	1.94625E-04	1.8735	0.00000E+00	0.0000
71	0.0006			4.42844E-04	1.4725	3.66151E-04	1.4286	0.00000E+00	0.0000
72	0.0001			4.97195E-05	5.0901	2.93844E-05	4.9646	0.00000E+00	0.0000
73	0.0004			3.12635E-04	1.7130	2.38729E-04	1.6200	0.00000E+00	0.0000
74	0.0014			1.03887E-03	1.0290	7.55933E-04	0.9864	0.00000E+00	0.0000
75	0.0001			1.10473E-04	3.3319	8.50085E-05	3.1749	0.00000E+00	0.0000
76	0.0006			4.57903E-04	1.7657	2.90935E-04	1.7061	0.00000E+00	0.0000
77	0.0005			3.63147E-04	2.2526	2.60708E-04	2.1591	0.00000E+00	0.0000
78	0.0000			7.00357E-06	4.0111	6.85473E-05	3.9699	0.00000E+00	0.0000
79	0.0002			1.85912E-04	2.6671	1.25081E-04	2.5599	0.00000E+00	0.0000

80	0.0001	6.40841E-05	3.3343	8.53855E-05	3.2444	0.00000E+00	0.0000
81	0.0014	1.06821E-03	1.1909	7.85522E-04	1.1400	0.00000E+00	0.0000
82	0.0001	6.79620E-05	4.6134	4.07139E-05	4.3860	0.00000E+00	0.0000
83	0.0002	1.32486E-04	3.1630	1.46515E-04	3.0980	0.00000E+00	0.0000
84	0.0001	8.05477E-05	2.7901	8.16847E-05	2.5893	0.00000E+00	0.0000
85	0.0003	1.96562E-04	2.0637	2.42072E-04	2.0056	0.00000E+00	0.0000
86	0.0003	2.62282E-04	2.5706	2.11160E-04	2.4477	0.00000E+00	0.0000
87	0.0004	3.43656E-04	2.3276	2.13507E-04	2.2325	0.00000E+00	0.0000
88	0.0001	5.56742E-05	4.3223	1.01083E-04	4.2198	0.00000E+00	0.0000
89	0.0001	9.29730E-05	3.3987	6.46793E-05	3.1098	0.00000E+00	0.0000
90	0.0003	2.28112E-04	3.0914	1.34597E-04	2.9643	0.00000E+00	0.0000
91	0.0002	1.85518E-04	2.9702	1.17524E-04	2.7905	0.00000E+00	0.0000
92	0.0000	3.07455E-05	3.0469	2.01240E-04	2.9836	0.00000E+00	0.0000
93	0.0002	1.28746E-04	3.0966	1.04769E-04	2.8721	0.00000E+00	0.0000
94	0.0002	1.17829E-04	3.9559	6.59629E-05	3.7240	0.00000E+00	0.0000
95	0.0008	6.12772E-04	1.9443	3.77852E-04	1.8823	0.00000E+00	0.0000
96	0.0002	1.55708E-04	4.7388	7.89396E-05	4.5408	0.00000E+00	0.0000
97	0.0004	3.00791E-04	3.6259	1.71921E-04	3.5595	0.00000E+00	0.0000
98	0.0001	1.08178E-04	4.7827	1.03550E-04	4.6229	0.00000E+00	0.0000
99	0.0001	9.74806E-05	5.1215	6.54144E-05	4.9330	0.00000E+00	0.0000
100	0.0002	1.29551E-04	4.2175	8.66605E-05	4.0379	0.00000E+00	0.0000
101	0.0001	1.11967E-04	3.9433	7.11508E-05	3.6681	0.00000E+00	0.0000
102	0.0002	1.65841E-04	3.3343	9.23659E-05	3.2097	0.00000E+00	0.0000
103	0.0001	9.84613E-05	3.7073	9.60095E-05	3.5066	0.00000E+00	0.0000
104	0.0002	1.63430E-04	3.8144	1.29744E-04	3.6786	0.00000E+00	0.0000
105	0.0001	1.14714E-04	3.6918	7.61746E-05	3.4631	0.00000E+00	0.0000

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  106    0.0002                 1.79599E-04     4.2236
1.33515E-04     4.1635       0.00000E+00     0.0000
  107    0.0001                 6.31812E-05     3.2145
6.39369E-05     3.0240       0.00000E+00     0.0000
  108    0.0000                 3.37216E-05     2.8901
1.45790E-04     2.8192       0.00000E+00     0.0000
  109    0.0002                 1.33856E-04     2.2998
4.44076E-04     2.2676       0.00000E+00     0.0000
  110    0.0008                 6.27951E-04     2.8092
3.87388E-04     2.7830       0.00000E+00     0.0000
  111    0.0002                 1.58483E-04     3.8452
1.45594E-04     3.7450       0.00000E+00     0.0000
  112    0.0002                 1.20243E-04     4.7958
1.26774E-04     4.7069       0.00000E+00     0.0000
1                             fuel bundle

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

  113    0.0002                 1.26583E-04     3.9089
1.10692E-04     3.6534       0.00000E+00     0.0000
  114    0.0000                 1.17303E-05     7.0016
1.57948E-05     5.8719       0.00000E+00     0.0000
  115    0.0001                 7.18590E-05     4.0687
8.36496E-05     3.7532       0.00000E+00     0.0000
  116    0.0003                 2.03373E-04     2.6784
1.52178E-04     2.4233       0.00000E+00     0.0000
  117    0.0006                 4.79155E-04     2.3178
2.56065E-04     2.1725       0.00000E+00     0.0000
  118    0.0008                 5.90927E-04     1.9919
4.61315E-04     1.9118       0.00000E+00     0.0000
  119    0.0002                 1.41719E-04     1.7989
3.65817E-04     1.7366       0.00000E+00     0.0000
  120    0.0002                 1.69590E-04     2.2275
6.45272E-04     2.1956       0.00000E+00     0.0000
  121    0.0007                 5.20499E-04     2.5880
4.00210E-04     2.5278       0.00000E+00     0.0000
  122    0.0001                 1.06795E-04     4.8121
8.32630E-05     4.5135       0.00000E+00     0.0000
  123    0.0003                 2.18314E-04     2.8134
1.54592E-04     2.5026       0.00000E+00     0.0000
  124    0.0003                 2.33880E-04     3.1616
1.92898E-04     2.9478       0.00000E+00     0.0000
  125    0.0002                 1.38429E-04     3.2203
1.27304E-04     2.9094       0.00000E+00     0.0000
  126    0.0001                 9.78867E-05     4.1235
8.81217E-05     3.6120       0.00000E+00     0.0000
  127    0.0005                 3.98381E-04     3.2826
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1.95494E-04	3.1006	0.00000E+00	0.0000	128	0.0003	2.23929E-04	3.5928
1.37955E-04	3.2183	0.00000E+00	0.0000	129	0.0006	4.61617E-04	2.2058
4.24670E-04	2.1034	0.00000E+00	0.0000	130	0.0002	1.17976E-04	2.8231
2.87733E-04	2.7372	0.00000E+00	0.0000	131	0.0004	2.89734E-04	1.9218
2.33107E-04	1.6278	0.00000E+00	0.0000	132	0.0007	5.25096E-04	2.3019
3.22566E-04	2.1216	0.00000E+00	0.0000	133	0.0014	1.05439E-03	1.8468
6.65914E-04	1.7533	0.00000E+00	0.0000	134	0.0001	9.11375E-05	2.2469
2.36775E-04	1.8994	0.00000E+00	0.0000	135	0.0002	1.72162E-04	3.3204
2.55561E-04	3.2383	0.00000E+00	0.0000	136	0.0001	4.50912E-05	2.1222
6.99824E-04	2.0912	0.00000E+00	0.0000	137	0.0000	1.93408E-05	1.0460
3.48010E-03	1.0431	0.00000E+00	0.0000	138	0.0004	3.03906E-04	2.6618
7.91935E-04	2.6222	0.00000E+00	0.0000	139	0.0002	1.87044E-04	2.9565
2.29207E-04	2.7893	0.00000E+00	0.0000	140	0.0003	2.09425E-04	2.4033
2.78665E-04	2.0985	0.00000E+00	0.0000	141	0.0001	7.91019E-05	2.5313
2.49839E-04	2.2661	0.00000E+00	0.0000	142	0.0001	6.34284E-05	2.8303
2.20138E-04	2.5772	0.00000E+00	0.0000	143	0.0001	8.15290E-05	1.9886
1.74318E-04	1.2149	0.00000E+00	0.0000	144	0.0000	3.39022E-05	3.3724
7.42810E-05	2.0882	0.00000E+00	0.0000	145	0.0005	3.82775E-04	2.9501
3.00230E-04	2.6852	0.00000E+00	0.0000	146	0.0004	3.38866E-04	2.4863
2.48091E-04	2.0170	0.00000E+00	0.0000	147	0.0002	1.71099E-04	4.2191
1.10025E-04	3.6513	0.00000E+00	0.0000	148	0.0001	5.43708E-05	6.4970
3.69141E-05	5.1462	0.00000E+00	0.0000	149	0.0000	3.11138E-05	7.7560
2.15739E-05	5.9258	0.00000E+00	0.0000	150	0.0001	9.27712E-05	4.2264
6.66544E-05	3.1345	0.00000E+00	0.0000	151	0.0001	6.72473E-05	4.5203
5.72583E-05	3.1633	0.00000E+00	0.0000	152	0.0001	4.07716E-05	4.3290
4.65422E-05	2.6616	0.00000E+00	0.0000	153	0.0001	4.38422E-05	4.4754

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4.80553E-05     2.6237       0.00000E+00     0.0000
  154    0.0001                 4.96348E-05     4.4961
5.10704E-05     2.6547       0.00000E+00     0.0000
  155    0.0001                 4.93615E-05     4.5970
4.89721E-05     2.7716       0.00000E+00     0.0000
  156    0.0001                 4.79388E-05     5.0912
4.70071E-05     3.0591       0.00000E+00     0.0000
  157    0.0001                 5.93125E-05     4.1946
5.75563E-05     2.6318       0.00000E+00     0.0000
  158    0.0001                 6.48317E-05     4.2410
6.63124E-05     2.7340       0.00000E+00     0.0000
  159    0.0002                 1.43308E-04     3.0200
2.00760E-04     2.5097       0.00000E+00     0.0000
  160    0.0001                 6.52241E-05     4.3413
7.65311E-05     3.2829       0.00000E+00     0.0000
  161    0.0001                 7.35240E-05     3.9431
7.26612E-05     2.5576       0.00000E+00     0.0000
  162    0.0001                 8.29768E-05     3.7721
7.92316E-05     2.3289       0.00000E+00     0.0000
  163    0.0001                 8.26239E-05     3.1277
8.05984E-05     1.8285       0.00000E+00     0.0000
  164    0.0001                 1.01440E-04     3.1185
9.40676E-05     1.9368       0.00000E+00     0.0000
  165    0.0001                 1.14000E-04     3.4215
1.04683E-04     2.1315       0.00000E+00     0.0000
  166    0.0001                 6.88186E-05     4.9185
6.35453E-05     3.0931       0.00000E+00     0.0000
  167    0.0001                 7.43415E-05     3.9150
6.82570E-05     2.5010       0.00000E+00     0.0000
  168    0.0001                 8.83538E-05     4.0701
7.89341E-05     2.7433       0.00000E+00     0.0000
1                            fuel bundle

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

  169    0.0001                 1.08738E-04     3.6290
9.42483E-05     2.6053       0.00000E+00     0.0000
  170    0.0002                 1.33978E-04     3.8596
1.14755E-04     2.8794       0.00000E+00     0.0000
  171    0.0001                 9.97620E-05     4.7318
7.67495E-05     3.8009       0.00000E+00     0.0000
  172    0.0002                 1.29320E-04     4.8945
9.26395E-05     4.0778       0.00000E+00     0.0000
  173    0.0003                 1.92798E-04     4.3831
1.27027E-04     3.8397       0.00000E+00     0.0000
  174    0.0003                 2.33134E-04     3.9955
1.45863E-04     3.5386       0.00000E+00     0.0000
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175	0.0002	1.21931E-04	6.0438	7.29890E-05	5.4757
0.00000E+00	0.0000				
176	0.0002	1.16879E-04	6.6196	6.97335E-05	5.9329
0.00000E+00	0.0000				
177	0.0002	1.17562E-04	6.0833	6.93295E-05	5.4456
0.00000E+00	0.0000				
178	0.0001	1.04924E-04	6.9449	6.20770E-05	6.1845
0.00000E+00	0.0000				
179	0.0001	1.14576E-04	6.9315	6.67909E-05	6.2116
0.00000E+00	0.0000				
180	0.0001	1.08185E-04	6.9552	6.32274E-05	6.1459
0.00000E+00	0.0000				
181	0.0001	1.11236E-04	5.5097	6.45634E-05	4.8406
0.00000E+00	0.0000				
182	0.0001	9.62855E-05	6.7185	5.66496E-05	5.8289
0.00000E+00	0.0000				
183	0.0001	1.12481E-04	6.1714	6.45499E-05	5.4226
0.00000E+00	0.0000				
184	0.0001	9.74883E-05	6.4712	5.66786E-05	5.6037
0.00000E+00	0.0000				
185	0.0001	1.00294E-04	6.3963	5.81020E-05	5.5083
0.00000E+00	0.0000				
186	0.0001	8.82376E-05	6.5057	5.21782E-05	5.4757
0.00000E+00	0.0000				
187	0.0001	8.76218E-05	6.5627	5.15931E-05	5.5411
0.00000E+00	0.0000				
188	0.0001	8.99429E-05	5.8625	5.27011E-05	4.9215
0.00000E+00	0.0000				
189	0.0001	8.68141E-05	7.2008	5.10274E-05	6.0291
0.00000E+00	0.0000				
190	0.0003	2.19663E-04	3.8233	1.29563E-04	3.1612
0.00000E+00	0.0000				
191	0.0003	1.95154E-04	4.1249	1.18397E-04	3.2877
0.00000E+00	0.0000				
192	0.0003	1.99953E-04	4.0773	1.20711E-04	3.2835
0.00000E+00	0.0000				
193	0.0003	2.01071E-04	3.9204	1.22261E-04	3.1429
0.00000E+00	0.0000				
194	0.0005	3.90214E-04	3.2090	2.41804E-04	2.5183
0.00000E+00	0.0000				
195	0.0006	4.37249E-04	2.8395	2.69015E-04	2.2317
0.00000E+00	0.0000				
196	0.0006	4.42847E-04	2.8742	2.77049E-04	2.2445
0.00000E+00	0.0000				
197	0.0007	5.26015E-04	2.5386	3.25650E-04	1.9859
0.00000E+00	0.0000				
198	0.0007	5.71907E-04	2.2021	3.55525E-04	1.7112
0.00000E+00	0.0000				
199	0.0004	3.03601E-04	3.1635	1.90033E-04	2.4378
0.00000E+00	0.0000				
200	0.0005	3.47568E-04	3.4236	2.14379E-04	2.6826
0.00000E+00	0.0000				

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  201    0.0011                 8.09270E-04     2.1508
4.93614E-04     1.7136       0.00000E+00     0.0000
  202    0.0013                 9.61166E-04     1.5675
5.86840E-04     1.2465       0.00000E+00     0.0000
  203    0.0016                 1.22442E-03     1.9012
7.31330E-04     1.5565       0.00000E+00     0.0000
  204    0.0022                 1.65615E-03     1.4963
9.76104E-04     1.2538       0.00000E+00     0.0000
  205    0.0014                 1.11088E-03     2.0296
6.53384E-04     1.7059       0.00000E+00     0.0000
  206    0.0019                 1.41972E-03     1.6660
8.24955E-04     1.4360       0.00000E+00     0.0000
  207    0.0021                 1.64752E-03     1.8362
9.56840E-04     1.6110       0.00000E+00     0.0000
  208    0.0029                 2.18475E-03     1.6451
1.27174E-03     1.4485       0.00000E+00     0.0000
  209    0.0031                 2.39776E-03     1.3989
1.40778E-03     1.2341       0.00000E+00     0.0000
  210    0.0037                 2.81732E-03     1.3476
1.68028E-03     1.1782       0.00000E+00     0.0000
  211    0.0040                 3.08649E-03     1.2693
1.86507E-03     1.1077       0.00000E+00     0.0000
  212    0.0047                 3.58272E-03     1.2021
2.17084E-03     1.0302       0.00000E+00     0.0000
  213    0.0064                 4.92897E-03     1.0256
2.98908E-03     0.8529       0.00000E+00     0.0000
  214    0.0096                 7.36895E-03     0.7170
4.43311E-03     0.6015       0.00000E+00     0.0000
  215    0.0158                 1.20759E-02     0.5838
7.20239E-03     0.4929       0.00000E+00     0.0000
  216    0.0299                 2.29443E-02     0.4073
1.35474E-02     0.3456       0.00000E+00     0.0000
  217    0.0203                 1.55945E-02     0.6026
9.14699E-03     0.5054       0.00000E+00     0.0000
  218    0.0277                 2.12221E-02     0.4292
1.24211E-02     0.3617       0.00000E+00     0.0000
  219    0.0362                 2.77058E-02     0.4667
1.61347E-02     0.3965       0.00000E+00     0.0000
  220    0.0476                 3.64782E-02     0.3782
2.11926E-02     0.3182       0.00000E+00     0.0000
  221    0.0628                 4.80970E-02     0.2926
2.78695E-02     0.2509       0.00000E+00     0.0000
  222    0.0802                 6.14622E-02     0.2845
3.55971E-02     0.2453       0.00000E+00     0.0000
  223    0.1040                 7.96679E-02     0.2264
4.62319E-02     0.1948       0.00000E+00     0.0000
  224    0.0581                 4.45563E-02     0.2732
2.59419E-02     0.2341       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations
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 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                deviation
deviation                    deviation

  225    0.2306                 1.76685E-01     0.1715
1.04644E-01     0.1460       0.00000E+00     0.0000
  226    0.0456                 3.49563E-02     0.3519
2.12562E-02     0.2932       0.00000E+00     0.0000
  227    0.0489                 3.74360E-02     0.3624
2.32422E-02     0.2941       0.00000E+00     0.0000
  228    0.0211                 1.61826E-02     0.5219
1.02296E-02     0.4254       0.00000E+00     0.0000
  229    0.0223                 1.71065E-02     0.5930
1.09891E-02     0.4758       0.00000E+00     0.0000
  230    0.0117                 8.94208E-03     0.8113
5.84729E-03     0.6311       0.00000E+00     0.0000
  231    0.0122                 9.35653E-03     0.7471
6.22454E-03     0.5791       0.00000E+00     0.0000
  232    0.0128                 9.81663E-03     0.7755
6.70226E-03     0.5852       0.00000E+00     0.0000
  233    0.0082                 6.24731E-03     1.0700
4.41054E-03     0.7632       0.00000E+00     0.0000
  234    0.0059                 4.53994E-03     1.1342
3.26985E-03     0.8041       0.00000E+00     0.0000
  235    0.0024                 1.86569E-03     1.7962
1.23396E-03     1.3712       0.00000E+00     0.0000
  236    0.0019                 1.42654E-03     1.8385
9.65621E-04     1.3635       0.00000E+00     0.0000
  237    0.0017                 1.31387E-03     2.0523
9.33581E-04     1.4830       0.00000E+00     0.0000
  238    0.0001                 7.65588E-05     9.1138
6.40112E-05     5.4198       0.00000E+00     0.0000

 system total =                  7.66327E-01     0.0466
4.69097E-01     0.0415       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3117E-01  +
or -  0.0002



 elapsed time   3.11233 minutes

 random number=   4730EEC490F2F57D
1                                                   fuel bundle

                                                        **** fission
densities ****
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unit	region	fission density	percent deviation	total fissions
1	1	3.091E-03	0.05	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

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	1.180E-08	35.31	8.751E-09	29.87	9.102E-09	28.82
3	9.258E-07	4.13	7.601E-07	3.78	8.083E-07	3.84
4	1.468E-06	3.14	1.230E-06	2.95	1.313E-06	2.99
5	2.335E-06	2.59	1.901E-06	2.26	2.042E-06	2.27
6	9.385E-06	1.34	7.535E-06	1.15	8.024E-06	1.16
7	1.253E-05	1.12	9.543E-06	1.05	1.009E-05	1.10
8	3.095E-05	0.81	2.262E-05	0.71	2.378E-05	0.68
9	8.250E-05	0.46	5.905E-05	0.45	6.161E-05	0.44
10	4.655E-05	0.64	3.299E-05	0.53	3.421E-05	0.53
11	2.206E-04	0.31	1.558E-04	0.27	1.613E-04	0.25
12	1.902E-04	0.33	1.382E-04	0.27	1.452E-04	0.28
13	5.710E-05	0.55	4.167E-05	0.48	4.360E-05	0.46
14	2.543E-04	0.29	1.841E-04	0.25	1.924E-04	0.23
15	2.204E-04	0.27	1.595E-04	0.22	1.664E-04	0.21
16	7.121E-05	0.47	5.150E-05	0.41	5.388E-05	0.42
17	3.185E-05	0.66	2.323E-05	0.58	2.418E-05	0.57
18	2.817E-05	0.72	2.047E-05	0.61	2.115E-05	0.56
19	5.044E-05	0.59	3.680E-05	0.47	3.827E-05	0.45
20	3.973E-05	0.67	2.916E-05	0.52	3.045E-05	0.54
21	8.002E-05	0.39	5.862E-05	0.34	6.127E-05	0.33
22	7.312E-05	0.43	5.341E-05	0.36	5.526E-05	0.35
23	7.676E-05	0.45	5.638E-05	0.40	5.858E-05	0.36
24	1.857E-05	0.84	1.366E-05	0.73	1.424E-05	0.68
25	2.350E-05	0.78	1.733E-05	0.70	1.819E-05	0.61
26	1.356E-05	0.88	9.987E-06	0.77	1.055E-05	0.77
27	4.182E-05	0.58	3.107E-05	0.46	3.287E-05	0.43

28	7.716E-05	0.37	5.736E-05	0.33	6.071E-05	0.33
29	7.961E-05	0.40	5.940E-05	0.34	6.234E-05	0.33
30	1.001E-05	1.16	7.520E-06	0.91	7.843E-06	0.89
31	7.901E-05	0.42	5.924E-05	0.32	6.250E-05	0.33
32	3.089E-05	0.60	2.322E-05	0.51	2.454E-05	0.47
33	2.677E-05	0.59	2.024E-05	0.54	2.127E-05	0.50
34	6.076E-05	0.45	4.596E-05	0.41	4.831E-05	0.39
35	3.615E-05	0.61	2.740E-05	0.51	2.880E-05	0.44
36	3.407E-05	0.56	2.573E-05	0.46	2.701E-05	0.46
37	2.192E-05	0.64	1.661E-05	0.53	1.744E-05	0.50
38	2.600E-05	0.65	1.977E-05	0.53	2.079E-05	0.47
39	9.705E-05	0.35	7.468E-05	0.30	7.888E-05	0.26
40	8.980E-05	0.33	6.941E-05	0.29	7.422E-05	0.29
41	1.136E-04	0.27	8.835E-05	0.25	9.440E-05	0.22
42	9.323E-05	0.30	7.355E-05	0.27	7.905E-05	0.23
43	5.120E-05	0.41	4.059E-05	0.36	4.268E-05	0.33
44	6.957E-05	0.38	5.581E-05	0.30	5.991E-05	0.29
45	3.490E-05	0.40	2.795E-05	0.39	3.109E-05	0.33
46	8.267E-06	0.99	6.593E-06	0.80	7.175E-06	0.73
47	2.347E-05	0.54	1.862E-05	0.41	1.948E-05	0.39
48	6.789E-06	1.07	5.382E-06	0.85	5.656E-06	0.70
49	4.368E-05	0.45	3.509E-05	0.38	3.767E-05	0.32
50	2.954E-05	0.48	2.374E-05	0.41	2.583E-05	0.32
51	7.836E-06	0.88	6.343E-06	0.84	6.933E-06	0.67
52	2.053E-05	0.60	1.654E-05	0.52	1.803E-05	0.46
53	7.647E-05	0.29	6.167E-05	0.26	6.691E-05	0.22
54	3.355E-05	0.47	2.712E-05	0.43	2.922E-05	0.34
55	6.652E-05	0.33	5.407E-05	0.30	5.884E-05	0.24
56	4.346E-05	0.36	3.540E-05	0.35	3.851E-05	0.28
57	4.911E-05	0.38	4.017E-05	0.33	4.367E-05	0.27
58	2.597E-05	0.47	2.125E-05	0.46	2.308E-05	0.35
59	4.416E-05	0.38	3.595E-05	0.33	3.925E-05	0.28
60	6.437E-05	0.34	5.261E-05	0.29	5.712E-05	0.24
61	6.189E-06	0.80	5.064E-06	0.80	5.502E-06	0.66
62	3.233E-05	0.44	2.649E-05	0.38	2.889E-05	0.31
63	2.170E-05	0.48	1.780E-05	0.41	1.937E-05	0.36
64	1.708E-05	0.54	1.403E-05	0.54	1.523E-05	0.41
65	5.754E-06	0.95	4.698E-06	0.76	5.106E-06	0.63
66	2.850E-05	0.45	2.350E-05	0.36	2.555E-05	0.29
67	2.129E-05	0.53	1.740E-05	0.47	1.899E-05	0.39
68	4.606E-06	0.96	3.827E-06	0.90	4.116E-06	0.67
69	3.748E-05	0.38	3.084E-05	0.36	3.342E-05	0.30
70	2.664E-05	0.47	2.186E-05	0.40	2.380E-05	0.30
71	4.591E-05	0.37	3.780E-05	0.33	4.106E-05	0.29
72	2.563E-06	1.44	2.132E-06	1.18	2.334E-06	1.01
73	2.731E-05	0.41	2.260E-05	0.36	2.440E-05	0.34
74	7.931E-05	0.29	6.577E-05	0.26	7.119E-05	0.23
75	9.051E-06	0.76	7.507E-06	0.71	8.228E-06	0.60
76	2.287E-05	0.49	1.905E-05	0.43	2.060E-05	0.36
77	1.761E-05	0.49	1.468E-05	0.45	1.589E-05	0.40
78	1.471E-06	1.93	1.245E-06	1.60	1.369E-06	1.28
79	1.006E-05	0.72	8.308E-06	0.56	8.943E-06	0.53

80	4.534E-06	1.03	3.758E-06	0.95	4.053E-06	0.79
81	5.542E-05	0.28	4.607E-05	0.24	4.986E-05	0.21
82	3.196E-06	1.27	2.663E-06	1.11	2.870E-06	0.89
83	4.390E-06	0.99	3.666E-06	0.81	3.981E-06	0.70
84	8.154E-06	0.65	6.823E-06	0.62	7.366E-06	0.49
85	9.971E-06	0.77	8.313E-06	0.71	9.023E-06	0.52
86	1.353E-05	0.69	1.125E-05	0.57	1.227E-05	0.43
87	1.191E-05	0.64	9.998E-06	0.59	1.081E-05	0.45
88	3.110E-06	1.27	2.615E-06	1.18	2.833E-06	0.91
89	6.610E-06	0.82	5.495E-06	0.66	5.972E-06	0.58
90	6.933E-06	0.81	5.805E-06	0.73	6.280E-06	0.61
91	8.255E-06	0.79	6.894E-06	0.68	7.466E-06	0.56
92	4.805E-06	0.99	4.038E-06	0.82	4.353E-06	0.74
93	8.102E-06	0.80	6.728E-06	0.67	7.285E-06	0.56
94	4.192E-06	1.25	3.518E-06	1.13	3.796E-06	0.85
95	1.272E-05	0.67	1.062E-05	0.56	1.149E-05	0.47
96	3.363E-06	1.34	2.808E-06	1.13	3.020E-06	0.92
97	3.393E-06	1.18	2.845E-06	1.01	3.083E-06	0.84
98	3.576E-06	1.25	2.969E-06	1.13	3.227E-06	0.84
99	2.285E-06	1.44	1.938E-06	1.34	2.107E-06	1.08
100	3.415E-06	1.12	2.873E-06	0.92	3.103E-06	0.81
101	4.941E-06	1.14	4.113E-06	0.92	4.433E-06	0.77
102	3.366E-06	1.15	2.810E-06	1.06	3.057E-06	0.88
103	4.768E-06	1.09	3.975E-06	0.94	4.293E-06	0.71
104	4.150E-06	1.08	3.477E-06	1.01	3.807E-06	0.80
105	4.313E-06	1.08	3.619E-06	0.98	3.927E-06	0.82
106	1.531E-06	1.68	1.296E-06	1.40	1.432E-06	1.32
107	3.626E-06	1.14	3.036E-06	1.04	3.230E-06	0.84
108	3.189E-06	1.13	2.721E-06	1.11	2.963E-06	0.82
109	5.092E-06	0.86	4.276E-06	0.82	4.666E-06	0.67
110	2.988E-06	1.03	2.584E-06	1.02	2.833E-06	0.81
111	3.153E-06	1.03	2.649E-06	0.88	2.857E-06	0.73
112	1.809E-06	1.84	1.519E-06	1.57	1.681E-06	1.24
113	5.783E-06	0.88	4.833E-06	0.77	5.189E-06	0.76
114	1.974E-06	1.55	1.658E-06	1.38	1.776E-06	1.15
115	5.120E-06	1.05	4.283E-06	0.92	4.613E-06	0.74
116	1.087E-05	0.74	9.103E-06	0.68	9.796E-06	0.57
117	1.183E-05	0.61	9.977E-06	0.61	1.068E-05	0.45
118	1.291E-05	0.63	1.082E-05	0.55	1.170E-05	0.45
119	8.246E-06	0.77	6.920E-06	0.71	7.552E-06	0.54
120	5.889E-06	0.81	4.984E-06	0.77	5.395E-06	0.69
121	6.076E-06	0.74	5.144E-06	0.73	5.584E-06	0.66
122	3.203E-06	1.28	2.677E-06	1.15	2.909E-06	0.95
123	1.030E-05	0.73	8.622E-06	0.61	9.348E-06	0.50
124	7.285E-06	0.81	6.142E-06	0.77	6.663E-06	0.63
125	6.901E-06	0.80	5.828E-06	0.80	6.319E-06	0.66
126	5.804E-06	0.86	4.830E-06	0.80	5.219E-06	0.63
127	5.495E-06	0.90	4.674E-06	0.80	5.040E-06	0.68
128	7.739E-06	0.89	6.459E-06	0.79	7.007E-06	0.62
129	9.544E-06	0.64	8.121E-06	0.65	8.767E-06	0.47
130	4.117E-06	0.94	3.461E-06	0.95	3.767E-06	0.79
131	1.683E-05	0.62	1.410E-05	0.52	1.525E-05	0.42

132	1.126E-05	0.64	9.484E-06	0.57	1.027E-05	0.46
133	1.363E-05	0.62	1.159E-05	0.52	1.248E-05	0.39
134	1.468E-05	0.64	1.239E-05	0.54	1.329E-05	0.46
135	2.359E-06	1.48	2.028E-06	1.25	2.221E-06	1.00
136	3.914E-06	1.10	3.386E-06	1.00	3.685E-06	0.80
137	2.418E-06	1.03	2.558E-06	1.07	2.932E-06	0.77
138	4.104E-06	0.91	3.553E-06	0.86	3.900E-06	0.71
139	4.634E-06	1.05	3.909E-06	0.88	4.257E-06	0.75
140	1.208E-05	0.51	1.024E-05	0.47	1.106E-05	0.43
141	8.792E-06	0.85	7.410E-06	0.76	8.060E-06	0.60
142	5.831E-06	1.09	4.913E-06	0.90	5.325E-06	0.77
143	1.992E-05	0.56	1.677E-05	0.49	1.794E-05	0.39
144	8.108E-06	0.77	6.865E-06	0.68	7.387E-06	0.52
145	7.154E-06	0.80	6.077E-06	0.73	6.568E-06	0.58
146	1.191E-05	0.56	1.012E-05	0.53	1.092E-05	0.44
147	3.668E-06	1.18	3.096E-06	1.06	3.354E-06	0.83
148	1.919E-06	1.51	1.631E-06	1.33	1.738E-06	1.17
149	1.223E-06	1.83	1.036E-06	1.67	1.097E-06	1.45
150	4.025E-06	1.22	3.374E-06	0.97	3.656E-06	0.77
151	4.236E-06	1.03	3.556E-06	0.95	3.862E-06	0.82
152	4.332E-06	1.16	3.681E-06	0.95	3.911E-06	0.82
153	4.410E-06	1.01	3.737E-06	0.92	4.060E-06	0.70
154	4.562E-06	0.85	3.876E-06	0.76	4.179E-06	0.69
155	4.306E-06	1.07	3.617E-06	0.90	3.921E-06	0.74
156	4.015E-06	1.00	3.404E-06	0.93	3.653E-06	0.83
157	4.680E-06	0.99	3.977E-06	0.95	4.251E-06	0.80
158	4.815E-06	0.99	4.065E-06	0.87	4.395E-06	0.72
159	6.686E-06	0.75	5.653E-06	0.72	6.073E-06	0.57
160	3.571E-06	1.10	3.021E-06	1.04	3.244E-06	0.87
161	5.020E-06	1.00	4.221E-06	0.87	4.582E-06	0.76
162	5.798E-06	0.97	4.855E-06	0.78	5.273E-06	0.65
163	5.996E-06	0.88	5.088E-06	0.79	5.522E-06	0.63
164	6.568E-06	0.86	5.530E-06	0.72	5.944E-06	0.61
165	6.909E-06	0.92	5.828E-06	0.82	6.251E-06	0.64
166	4.005E-06	1.03	3.364E-06	0.85	3.612E-06	0.77
167	4.133E-06	1.10	3.508E-06	1.07	3.754E-06	0.84
168	4.400E-06	0.92	3.703E-06	0.88	3.967E-06	0.73
169	4.512E-06	1.03	3.839E-06	0.95	4.097E-06	0.67
170	4.659E-06	1.00	3.933E-06	0.92	4.235E-06	0.72
171	2.354E-06	1.43	2.014E-06	1.22	2.173E-06	0.94
172	2.443E-06	1.28	2.060E-06	1.14	2.239E-06	1.02
173	2.469E-06	1.39	2.109E-06	1.23	2.263E-06	1.00
174	2.477E-06	1.17	2.111E-06	1.12	2.297E-06	0.99
175	1.035E-06	2.04	8.685E-07	1.87	9.346E-07	1.54
176	1.023E-06	1.66	8.538E-07	1.56	9.392E-07	1.32
177	1.006E-06	1.94	8.673E-07	1.63	9.503E-07	1.50
178	1.032E-06	2.08	8.791E-07	1.77	9.402E-07	1.57
179	1.046E-06	2.06	8.956E-07	1.93	9.574E-07	1.40
180	1.062E-06	2.05	9.044E-07	1.69	9.842E-07	1.44
181	1.047E-06	1.71	8.926E-07	1.58	9.672E-07	1.37
182	1.090E-06	2.04	9.271E-07	1.93	1.009E-06	1.55
183	1.104E-06	1.83	9.474E-07	1.62	1.030E-06	1.35

184	1.098E-06	1.91	9.217E-07	1.78	1.012E-06	1.47
185	1.119E-06	2.10	9.628E-07	1.79	1.032E-06	1.40
186	1.175E-06	2.11	1.001E-06	2.19	1.049E-06	1.54
187	1.159E-06	1.97	9.815E-07	1.76	1.059E-06	1.29
188	1.172E-06	1.69	1.008E-06	1.78	1.071E-06	1.48
189	1.170E-06	1.91	9.824E-07	1.86	1.050E-06	1.43
190	2.987E-06	0.97	2.590E-06	1.09	2.766E-06	0.79
191	3.124E-06	1.33	2.620E-06	1.27	2.826E-06	0.88
192	3.075E-06	1.14	2.638E-06	1.07	2.875E-06	0.84
193	3.233E-06	1.30	2.769E-06	1.12	2.978E-06	0.89
194	6.768E-06	0.81	5.716E-06	0.79	6.203E-06	0.60
195	7.241E-06	0.81	6.148E-06	0.71	6.611E-06	0.57
196	7.752E-06	0.78	6.525E-06	0.69	7.055E-06	0.58
197	8.534E-06	0.76	7.225E-06	0.63	7.747E-06	0.52
198	8.917E-06	0.68	7.550E-06	0.62	8.187E-06	0.50
199	4.733E-06	0.91	3.993E-06	0.89	4.357E-06	0.70
200	5.086E-06	1.11	4.273E-06	0.91	4.658E-06	0.79
201	1.074E-05	0.73	9.113E-06	0.65	9.813E-06	0.52
202	1.205E-05	0.56	1.020E-05	0.52	1.103E-05	0.43
203	1.290E-05	0.58	1.092E-05	0.48	1.184E-05	0.43
204	1.473E-05	0.57	1.256E-05	0.46	1.364E-05	0.37
205	8.665E-06	0.67	7.794E-06	0.60	8.226E-06	0.45
206	9.329E-06	0.66	8.383E-06	0.61	8.867E-06	0.49
207	9.569E-06	0.61	8.670E-06	0.55	9.177E-06	0.44
208	1.117E-05	0.63	1.006E-05	0.53	1.075E-05	0.47
209	1.147E-05	0.62	1.045E-05	0.52	1.114E-05	0.42
210	1.409E-05	0.52	1.279E-05	0.47	1.357E-05	0.39
211	1.628E-05	0.47	1.469E-05	0.42	1.563E-05	0.30
212	1.915E-05	0.48	1.728E-05	0.42	1.846E-05	0.34
213	2.633E-05	0.33	2.356E-05	0.32	2.523E-05	0.26
214	3.698E-05	0.33	3.321E-05	0.29	3.575E-05	0.25
215	5.551E-05	0.27	4.997E-05	0.23	5.387E-05	0.19
216	9.196E-05	0.20	8.385E-05	0.18	9.079E-05	0.14
217	5.553E-05	0.25	5.317E-05	0.21	5.630E-05	0.18
218	7.079E-05	0.21	6.798E-05	0.20	7.227E-05	0.15
219	8.401E-05	0.23	8.137E-05	0.20	8.654E-05	0.15
220	1.016E-04	0.17	9.911E-05	0.15	1.057E-04	0.13
221	1.206E-04	0.15	1.188E-04	0.15	1.267E-04	0.12
222	1.369E-04	0.16	1.367E-04	0.14	1.458E-04	0.12
223	1.530E-04	0.15	1.572E-04	0.14	1.673E-04	0.12
224	7.485E-05	0.19	7.967E-05	0.15	8.433E-05	0.12
225	2.335E-04	0.11	2.723E-04	0.10	2.824E-04	0.09
226	3.172E-05	0.25	4.480E-05	0.19	4.447E-05	0.13
227	2.884E-05	0.27	4.622E-05	0.23	4.432E-05	0.13
228	1.041E-05	0.43	1.903E-05	0.31	1.754E-05	0.18
229	9.673E-06	0.42	1.962E-05	0.35	1.747E-05	0.17
230	4.519E-06	0.56	1.024E-05	0.46	8.750E-06	0.24
231	4.234E-06	0.62	1.053E-05	0.48	8.730E-06	0.21
232	3.927E-06	0.55	1.134E-05	0.42	8.870E-06	0.19
233	2.255E-06	0.70	7.440E-06	0.53	5.499E-06	0.26
234	1.434E-06	0.73	5.405E-06	0.54	3.825E-06	0.27
235	5.172E-07	1.58	1.064E-06	1.11	1.125E-06	0.54

236	3.452E-07	1.86	7.416E-07	1.37	8.008E-07	0.62
237	2.303E-07	1.89	5.629E-07	1.41	6.157E-07	0.63
238	6.124E-09	10.96	2.097E-08	5.38	2.550E-08	1.86

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
 0.7564 to 0.7593     ***
 0.7593 to 0.7621     ***********
 0.7621 to 0.7649     *********************
 0.7649 to 0.7677     ***************************
 0.7677 to 0.7706     ***************************
 0.7706 to 0.7734     **********
 0.7734 to 0.7762     *
```

```
                                 frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7564 to 0.7593     ***
 0.7593 to 0.7621     ********
 0.7621 to 0.7649     *****************
 0.7649 to 0.7677     *******************
 0.7677 to 0.7706     *****************
 0.7706 to 0.7734     *********
 0.7734 to 0.7762     *

                                 frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7564 to 0.7593     ***
 0.7593 to 0.7621     *******
 0.7621 to 0.7649     **********
 0.7649 to 0.7677     ************
 0.7677 to 0.7706     ***********
 0.7706 to 0.7734     ******
 0.7734 to 0.7762     *

                                 frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7564 to 0.7593     *
 0.7593 to 0.7621     **
 0.7621 to 0.7649     *****
 0.7649 to 0.7677     *****
 0.7677 to 0.7706     ********
 0.7706 to 0.7734     ***
 0.7734 to 0.7762     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                  ******      final results
table      ******                                ***
        ***
***
        ***        best estimate system k-eff
0.76632 + or - 0.00036                     ***
        ***
***
```

```
        ***        Energy of average lethargy of Fission (eV)
5.65645E-02 + or -  1.18427E-04           ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  1.04990E-05           ***
        ***
***
        ***        system mean free path (cm)
6.52810E-01 + or -  1.51065E-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     3.11467 minutes


**********************************************************************
************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
```

```
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


      0000000      5555555555555                    33333333333
7777777777777                    22222222222     33333333333
     000000000     5555555555555                    3333333333333
777777777777                    2222222222222   3333333333333
    00       00    55                    :::       33         33   77
77          :::       22         22   33         33
   00         00   55                    :::                 33
77           :::                  22              33
   00         00   55                    :::                 33
77            :::                  22              33
   00         00   555555555555                            333
77                                 22              333
   00         00   5555555555555                           333
77                                22                333
   00         00              55         :::                 33
77              :::            22                    33
   00         00              55         :::                 33
77              :::          22                      33
    00       00    55         55         :::       33         33
77               :::        22             33         33
     000000000     5555555555555                    3333333333333
77                        2222222222222   3333333333333
      0000000       55555555555                     33333333333
77                        2222222222222    33333333333
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCC    AAAAAAAAAAA    LL
```

```
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:37:23.95
*****
        *****
*****
        *****
*****

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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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```

```
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1
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```

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

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*********************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number                data set name
name        unit function                     ***
        ***         ------                -------------
----        -------------                     ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  1.06630E-12  3.21685E-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  6.04524E-08  1.81191E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.97502E-15  9.80420E-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  1.36422E-11  3.38590E-10   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90758E-08  1.32072E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.07327E-08  2.92054E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.65128E-08  4.54278E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.48380E-10  4.12650E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.67330E-08  4.70361E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  1.22373E-10  3.47656E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.82036E-09  8.09696E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  2.05959E-19  5.72779E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  2.41871E-11  6.87138E-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  1.12941E-08  3.20852E-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  6.92804E-09  2.00966E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.73063E-08  5.07193E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26879E-11  3.75647E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.01246E-09  2.09715E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.30352E-10  3.85925E-09   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.23794E-10  3.73918E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  1.01365E-10  3.09202E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  4.95932E-11  1.52766E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
```

```
    1044104  4.53185E-11  1.40954E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  9.27161E-12  2.93929E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  2.22733E-11  6.86096E-10   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.10031E-12  3.45523E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  2.27898E-11  7.15648E-10   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  3.64323E-12  1.16586E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  1.34115E-12  4.33187E-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  7.51185E-13  2.44881E-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  8.98606E-11  2.90248E-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  1.29267E-09  4.29139E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                 12/17/09
    1048112  2.43659E-09  8.16180E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                 12/17/09
    1048113  1.23405E-09  4.17068E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                 12/17/09
    1048114  2.90109E-09  9.89144E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                 12/17/09
    1048116  7.56547E-10  2.62482E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                 12/17/09
    1049115  2.69679E-13  9.27564E-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  6.50272E-11  2.23661E-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  1.46886E-09  5.14004E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                 12/17/09
    1050118  4.63152E-09  1.63457E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                 12/17/09
    1050119  1.64286E-09  5.84730E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                 12/17/09
    1050120  6.23010E-09  2.23606E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                 12/17/09
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    1050122  8.85705E-10  3.23197E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10778E-09  4.10872E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.33567E-12  5.03402E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.26425E-12  1.24000E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.34220E-11  5.17904E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30199E-12  5.25791E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.17498E-11  2.02781E-09   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.69115E-11  1.07064E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88550E-12  7.61418E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.29614E-10  5.15654E-09   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.96431E-16  7.87361E-15   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.51411E-10  6.11436E-09   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.46240E-10  5.99312E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.30843E-08  1.36573E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.47742E-11  2.29398E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.58192E-10  6.57763E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  9.33934E-11  3.93926E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.44907E-10  6.15548E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.24664E-12  2.67226E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  1.22925E-10  5.29545E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  5.12890E-11  2.16332E-09   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  5.47659E-11  2.34281E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  8.11671E-11  3.47219E-09   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  6.85098E-12  2.95125E-10   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  9.23101E-11  4.00421E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  7.22384E-11  3.15518E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
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    1060147  1.77192E-11  7.79246E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.96223E-11  1.75436E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.54697E-11  1.55986E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  2.16469E-18  9.58467E-17   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.92404E-12  8.57677E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  4.60804E-13  2.02649E-11   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.50218E-11  1.11539E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  2.58048E-15  1.15801E-13   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.01481E-09  1.36197E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  6.44254E-12  2.92977E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.33080E-13  1.06693E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.43112E-09  6.46525E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.56269E-09  7.15323E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.57284E-15  7.24688E-14   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  7.76585E-13  3.60136E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.50882E-13  7.04228E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.78165E-12  2.62923E-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  4.27235E-10  1.98127E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91214E-10  2.75940E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51756E-10  2.12205E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17414E-10  3.39141E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31104E-10  3.02124E-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
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    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  9.22590E-06  6.51878E-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  1.05959E-12  7.51857E-11   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.25954E-19  1.61009E-17   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  1.01867E-10  7.28933E-09   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  4.93403E-17  3.54545E-15   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  9.98073E-21  7.20184E-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  1.00576E-20  7.25734E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.86125E-28  2.79777E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99997E-21  7.27573E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.51126E-20  1.09502E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.97068E-21  7.25442E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.95294E-21  7.27134E-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
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    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
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    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
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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:
  9538 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       ........
```

```
                                ........     0.01617 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
0.01700 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 15678 independent fission points were generated for generation 1
          1       7.63738E-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       7.67130E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15734 independent fission points were generated for generation 3
          3       7.64714E-01      7.64714E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.66134E-01      7.65424E-01      7.09951E-04
0.00000E+00      0.00000E+00
          5       7.70192E-01      7.67013E-01      1.64138E-03
0.00000E+00      0.00000E+00
          6       7.69923E-01      7.67741E-01      1.36979E-03
0.00000E+00      0.00000E+00
          7       7.64166E-01      7.67026E-01      1.27945E-03
0.00000E+00      0.00000E+00
          8       7.69252E-01      7.67397E-01      1.10860E-03
0.00000E+00      0.00000E+00
          9       7.64720E-01      7.67014E-01      1.01195E-03
0.00000E+00      0.00000E+00
         10       7.61261E-01      7.66295E-01      1.13364E-03
0.00000E+00      0.00000E+00
         11       7.63610E-01      7.65997E-01      1.04334E-03
0.00000E+00      0.00000E+00
         12       7.71379E-01      7.66535E-01      1.07725E-03
0.00000E+00      0.00000E+00
         13       7.67489E-01      7.66622E-01      9.78269E-04
```

0.00000E+00	0.00000E+00				
14	7.70577E-01	7.66951E-01	9.51929E-04	0.00000E+00	0.00000E+00
15	7.67823E-01	7.67018E-01	8.78212E-04	0.00000E+00	0.00000E+00
16	7.64194E-01	7.66817E-01	8.37727E-04	0.00000E+00	0.00000E+00
17	7.67910E-01	7.66890E-01	7.83277E-04	0.00000E+00	0.00000E+00
18	7.58348E-01	7.66356E-01	9.06548E-04	0.00000E+00	0.00000E+00
19	7.63147E-01	7.66167E-01	8.72220E-04	0.00000E+00	0.00000E+00
20	7.64464E-01	7.66072E-01	8.27764E-04	0.00000E+00	0.00000E+00
21	7.57897E-01	7.65642E-01	8.93433E-04	0.00000E+00	0.00000E+00
22	7.65583E-01	7.65639E-01	8.47590E-04	0.00000E+00	0.00000E+00
23	7.70303E-01	7.65861E-01	8.36254E-04	0.00000E+00	0.00000E+00
24	7.73557E-01	7.66211E-01	8.70695E-04	0.00000E+00	0.00000E+00
25	7.69453E-01	7.66352E-01	8.43832E-04	0.00000E+00	0.00000E+00
26	7.63300E-01	7.66225E-01	8.17857E-04	0.00000E+00	0.00000E+00
27	7.60362E-01	7.66668E-01	9.98398E-03	0.00000E+00	0.00000E+00
28	7.64280E-01	7.66190E-01	6.11539E-03	0.00000E+00	0.00000E+00
29	7.66965E-01	7.66320E-01	4.24705E-03	0.00000E+00	0.00000E+00
30	7.64954E-01	7.66124E-01	3.22689E-03	0.00000E+00	0.00000E+00
31	7.64340E-01	7.65901E-01	2.64127E-03	0.00000E+00	0.00000E+00
32	7.67672E-01	7.66098E-01	2.22110E-03	0.00000E+00	0.00000E+00
33	7.63742E-01	7.65862E-01	1.88220E-03	0.00000E+00	0.00000E+00
34	7.66203E-01	7.65893E-01	1.65202E-03	0.00000E+00	0.00000E+00
35	7.65254E-01	7.65840E-01	1.47123E-03	0.00000E+00	0.00000E+00
36	7.66213E-01	7.65869E-01	1.32924E-03	0.00000E+00	0.00000E+00
37	7.66264E-01	7.65897E-01	1.21473E-03	0.00000E+00	0.00000E+00
38	7.68406E-01	7.66064E-01	1.14612E-03	0.00000E+00	0.00000E+00
39	7.61389E-01	7.65772E-01	1.03959E-03		

0.00000E+00	0.00000E+00				
40	7.64336E-01	7.65688E-01	1.00105E-03	0.00000E+00	0.00000E+00
41	7.63085E-01	7.65543E-01	9.60949E-04	0.00000E+00	0.00000E+00
42	7.62332E-01	7.65374E-01	9.48984E-04	0.00000E+00	0.00000E+00
43	7.65376E-01	7.65374E-01	8.94261E-04	0.00000E+00	0.00000E+00
44	7.73914E-01	7.65781E-01	9.68273E-04	0.00000E+00	0.00000E+00
45	7.68620E-01	7.65910E-01	9.98294E-04	0.00000E+00	0.00000E+00
46	7.61688E-01	7.65726E-01	9.36641E-04	0.00000E+00	0.00000E+00
47	7.65860E-01	7.65732E-01	8.91543E-04	0.00000E+00	0.00000E+00
48	7.65278E-01	7.65714E-01	8.51415E-04	0.00000E+00	0.00000E+00
49	7.65871E-01	7.65720E-01	8.14947E-04	0.00000E+00	0.00000E+00
50	7.69062E-01	7.65844E-01	7.96062E-04	0.00000E+00	0.00000E+00
51	7.66356E-01	7.65862E-01	7.68659E-04	0.00000E+00	0.00000E+00
52	7.68880E-01	7.65966E-01	7.52415E-04	0.00000E+00	0.00000E+00
53	7.64519E-01	7.65918E-01	7.18062E-04	0.00000E+00	0.00000E+00
54	7.66249E-01	7.65928E-01	6.92141E-04	0.00000E+00	0.00000E+00
55	7.65491E-01	7.65915E-01	6.68297E-04	0.00000E+00	0.00000E+00
56	7.68490E-01	7.65993E-01	6.50765E-04	0.00000E+00	0.00000E+00
57	7.69317E-01	7.66091E-01	6.53086E-04	0.00000E+00	0.00000E+00
58	7.60906E-01	7.65942E-01	6.24859E-04	0.00000E+00	0.00000E+00
59	7.60816E-01	7.65800E-01	6.59960E-04	0.00000E+00	0.00000E+00
60	7.60174E-01	7.65648E-01	6.94867E-04	0.00000E+00	0.00000E+00
61	7.64920E-01	7.65629E-01	6.80121E-04	0.00000E+00	0.00000E+00
62	7.59786E-01	7.65479E-01	6.83332E-04	0.00000E+00	0.00000E+00
63	7.65625E-01	7.65483E-01	6.64161E-04	0.00000E+00	0.00000E+00
64	7.65500E-01	7.65483E-01	6.46845E-04	0.00000E+00	0.00000E+00
65	7.69190E-01	7.65571E-01	6.37979E-04		

0.00000E+00	0.00000E+00				
66	7.56519E-01	7.65361E-01	6.26746E-04	0.00000E+00	0.00000E+00
67	7.68898E-01	7.65441E-01	5.87154E-04	0.00000E+00	0.00000E+00
68	7.71333E-01	7.65572E-01	6.09713E-04	0.00000E+00	0.00000E+00
69	7.60915E-01	7.65471E-01	5.79782E-04	0.00000E+00	0.00000E+00
70	7.66936E-01	7.65502E-01	5.61801E-04	0.00000E+00	0.00000E+00
71	7.63041E-01	7.65451E-01	5.48505E-04	0.00000E+00	0.00000E+00
72	7.67504E-01	7.65493E-01	5.34418E-04	0.00000E+00	0.00000E+00
73	7.68273E-01	7.65548E-01	5.31525E-04	0.00000E+00	0.00000E+00
74	7.65644E-01	7.65550E-01	5.20791E-04	0.00000E+00	0.00000E+00
75	7.63119E-01	7.65503E-01	5.12085E-04	0.00000E+00	0.00000E+00
76	7.65702E-01	7.65507E-01	5.01600E-04	0.00000E+00	0.00000E+00
77	7.63734E-01	7.65474E-01	4.92559E-04	0.00000E+00	0.00000E+00
78	7.73293E-01	7.65616E-01	4.95993E-04	0.00000E+00	0.00000E+00
79	7.60518E-01	7.65525E-01	4.83328E-04	0.00000E+00	0.00000E+00
80	7.68356E-01	7.65575E-01	4.77305E-04	0.00000E+00	0.00000E+00
81	7.58247E-01	7.65449E-01	4.86169E-04	0.00000E+00	0.00000E+00
82	7.63696E-01	7.65419E-01	4.78669E-04	0.00000E+00	0.00000E+00
83	7.54900E-01	7.65244E-01	5.40128E-04	0.00000E+00	0.00000E+00
84	7.62957E-01	7.65206E-01	5.34226E-04	0.00000E+00	0.00000E+00
85	7.67902E-01	7.65250E-01	5.12042E-04	0.00000E+00	0.00000E+00
86	7.58957E-01	7.65150E-01	5.20957E-04	0.00000E+00	0.00000E+00
87	7.62295E-01	7.65105E-01	5.10270E-04	0.00000E+00	0.00000E+00
88	7.58507E-01	7.65004E-01	5.32588E-04	0.00000E+00	0.00000E+00
89	7.60094E-01	7.64929E-01	7.40009E-04	0.00000E+00	0.00000E+00
90	7.69390E-01	7.64996E-01	6.83123E-04	0.00000E+00	0.00000E+00
91	7.63389E-01	7.64972E-01	5.15000E-04		

```
0.00000E+00      0.00000E+00
         92       7.63220E-01      7.64947E-01      5.04279E-04
0.00000E+00      0.00000E+00
         93       7.68049E-01      7.64991E-01      4.96954E-04
0.00000E+00      0.00000E+00
         94       7.62488E-01      7.64956E-01      4.92736E-04
0.00000E+00      0.00000E+00
         95       7.71319E-01      7.65044E-01      5.02761E-04
0.00000E+00      0.00000E+00
         96       7.59353E-01      7.64966E-01      5.07338E-04
0.00000E+00      0.00000E+00
         97       7.61271E-01      7.64916E-01      4.93363E-04
0.00000E+00      0.00000E+00
         98       7.65178E-01      7.64920E-01      4.86001E-04
0.00000E+00      0.00000E+00
         99       7.57223E-01      7.64819E-01      5.00653E-04
0.00000E+00      0.00000E+00
        100       7.61925E-01      7.64781E-01      4.94967E-04
0.00000E+00      0.00000E+00
        101       7.68707E-01      7.64831E-01      4.80465E-04
0.00000E+00      0.00000E+00
        102       7.66126E-01      7.64848E-01      4.73207E-04
0.00000E+00      0.00000E+00
        103       7.62860E-01      7.64823E-01      4.64886E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=2B9494D600FC1917
        104       7.62648E-01      7.64796E-01      4.58662E-04
0.00000E+00      0.00000E+00
        105       7.61839E-01      7.64760E-01      4.56268E-04
0.00000E+00      0.00000E+00
        106       7.63505E-01      7.64745E-01      4.51725E-04
0.00000E+00      0.00000E+00
        107       7.72402E-01      7.64836E-01      4.48722E-04
0.00000E+00      0.00000E+00
        108       7.64238E-01      7.64829E-01      4.43557E-04
0.00000E+00      0.00000E+00
        109       7.64892E-01      7.64830E-01      4.38406E-04
0.00000E+00      0.00000E+00
        110       7.63821E-01      7.64818E-01      4.33523E-04
0.00000E+00      0.00000E+00
        111       7.68658E-01      7.64862E-01      4.31036E-04
0.00000E+00      0.00000E+00
        112       7.62007E-01      7.64830E-01      4.28079E-04
0.00000E+00      0.00000E+00
        113       7.70377E-01      7.64891E-01      4.34557E-04
0.00000E+00      0.00000E+00
        114       7.59679E-01      7.64834E-01      4.37755E-04
0.00000E+00      0.00000E+00
        115       7.68464E-01      7.64873E-01      4.40631E-04
0.00000E+00      0.00000E+00
        116       7.69433E-01      7.64923E-01      4.32148E-04
```

```
0.00000E+00      0.00000E+00
        117       7.65805E-01      7.64932E-01      4.28459E-04
0.00000E+00      0.00000E+00
        118       7.64525E-01      7.64928E-01      4.23319E-04
0.00000E+00      0.00000E+00
        119       7.62697E-01      7.64904E-01      4.18840E-04
0.00000E+00      0.00000E+00
        120       7.62818E-01      7.64883E-01      4.15138E-04
0.00000E+00      0.00000E+00
        121       7.71414E-01      7.64950E-01      4.12766E-04
0.00000E+00      0.00000E+00
        122       7.65934E-01      7.64959E-01      4.08107E-04
0.00000E+00      0.00000E+00
        123       7.66386E-01      7.64974E-01      4.06648E-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=8FA56B72D44B0AA4
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55067E-05 + or -  1.09904E-08             generation time
=  2.99468E-05 + or -  1.86671E-08
 nu bar   =  2.43896E+00 + or -  9.14242E-06       average fission group
=  2.17555E+02 + or -  9.75994E-03
                      energy(ev) of the average lethargy causing fission
=  5.65811E-02 + or -  1.07857E-04
                                                system mean free path (cm)
=  6.52676E-01 + or -  1.75691E-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          0.76497   + or - 0.00041     0.76457 to 0.76538
0.76416 to 0.76579    0.76375 to 0.76619    2000000      12.2658

      24          0.76489   + or - 0.00040     0.76448 to 0.76529
0.76408 to 0.76570    0.76367 to 0.76610    1980000      12.0396

      25          0.76484   + or - 0.00041     0.76443 to 0.76525
0.76402 to 0.76566    0.76361 to 0.76608    1960000      11.8605

      26          0.76486   + or - 0.00042     0.76444 to 0.76527
0.76403 to 0.76569    0.76361 to 0.76610    1940000      11.8699
```

27	0.76490	+ or - 0.00042	0.76448 to 0.76532	0.76406 to 0.76574	0.76364 to 0.76616	1920000	11.8778
28	0.76491	+ or - 0.00042	0.76449 to 0.76533	0.76406 to 0.76576	0.76364 to 0.76618	1900000	11.8469
29	0.76489	+ or - 0.00043	0.76446 to 0.76532	0.76403 to 0.76574	0.76360 to 0.76617	1880000	11.8386
30	0.76489	+ or - 0.00043	0.76445 to 0.76532	0.76402 to 0.76575	0.76359 to 0.76619	1860000	11.8036
31	0.76489	+ or - 0.00044	0.76446 to 0.76533	0.76402 to 0.76577	0.76358 to 0.76621	1840000	11.7792
32	0.76486	+ or - 0.00044	0.76442 to 0.76530	0.76398 to 0.76574	0.76354 to 0.76618	1820000	11.8829
37	0.76482	+ or - 0.00047	0.76436 to 0.76529	0.76389 to 0.76575	0.76343 to 0.76622	1720000	11.7903
42	0.76488	+ or - 0.00050	0.76438 to 0.76538	0.76389 to 0.76587	0.76339 to 0.76637	1620000	11.6609
47	0.76473	+ or - 0.00052	0.76422 to 0.76525	0.76370 to 0.76577	0.76318 to 0.76629	1520000	11.1586
52	0.76457	+ or - 0.00053	0.76403 to 0.76510	0.76350 to 0.76564	0.76296 to 0.76617	1420000	11.8217
57	0.76440	+ or - 0.00058	0.76382 to 0.76497	0.76325 to 0.76555	0.76267 to 0.76613	1320000	11.6711
62	0.76465	+ or - 0.00059	0.76406 to 0.76525	0.76346 to 0.76584	0.76287 to 0.76643	1220000	12.7935
67	0.76461	+ or - 0.00065	0.76396 to 0.76526	0.76331 to 0.76591	0.76265 to 0.76656	1120000	11.9872
72	0.76448	+ or - 0.00068	0.76380 to 0.76515	0.76312 to 0.76583	0.76244 to 0.76651	1020000	13.0572
77	0.76439	+ or - 0.00074	0.76365 to 0.76513	0.76291 to 0.76587	0.76217 to 0.76661	920000	13.2764
82	0.76433	+ or - 0.00065	0.76368 to 0.76498	0.76303 to 0.76564	0.76238 to 0.76629	820000	19.1935
87	0.76474	+ or - 0.00066	0.76408 to 0.76540	0.76342 to 0.76606	0.76276 to 0.76672	720000	18.6203
92	0.76503	+ or - 0.00074	0.76429 to 0.76578				

```
0.76355 to 0.76652    0.76280 to 0.76726     620000      18.4788

      97          0.76514   + or - 0.00074     0.76440 to 0.76588
0.76365 to 0.76662    0.76291 to 0.76736     520000      24.8234

     102          0.76545   + or - 0.00087     0.76458 to 0.76632
0.76371 to 0.76719    0.76284 to 0.76806     420000      20.1826

     107          0.76570   + or - 0.00105     0.76465 to 0.76675
0.76360 to 0.76780    0.76254 to 0.76885     320000      18.3849

     112          0.76614   + or - 0.00120     0.76494 to 0.76734
0.76374 to 0.76854    0.76254 to 0.76974     220000      30.6325
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          0.76563   + or - 0.00161     0.76402 to 0.76724
0.76241 to 0.76885    0.76080 to 0.77046     120000      50.1084
1                          fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76497 + or - 0.00040 which occurs for
123 generations run.

                                0.7647                   0.7692
0.7736

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

```
   |                          I |    *       I
   |                           I|      *      I
   |                          I |   *      I
40 +                          I |   *      I
   |                          I |  *    I
   |                         I  | *    I
   |                         I  | *    I
   |                           I|   *      I
45 +                           I|    *      I
   |                           I|   *    I
   |                           I|   *    I
   |                           I|   *    I
   |                           I|   *    I
50 +                            I    *   I
   |                            I    *   I
   |                            |I   *    I
   |                            |I   *   I
   |                            |I   *   I
55 +                            |I   *   I
   |                            | I   *  I
   |                            | I   *   I
   |                            | I  *   I
   |                            |I  *   I
60 +                            I   *   I
   |                            I   *  I
   |                           I|  *   I
   |                           I|  *  I
   |                           I|  *  I
65 +                            I  *   I
   |                          I | *   I
   |                           I| *   I
   |                            I  *   I
   |                           I|  *  I
70 +                            I  *  I
   |                           I|  *  I
   |                            I  *  I
   |                            I  *  I
   |                            I  *  I
75 +                            I  *  I
   |                            I  *  I
   |                            I  * I
   |                            |I *  I
   |                            I  *  I
80 +                            |I *  I
   |                            I *  I
   |                            I *  I
   |                          I |*  I
   |                          I |*  I
85 +                          I |*  I
   |                          I |*  I
   |                          I |* I
   |                         I  *  I
```

```
         |                      I    *   I
      90 +                       I   *   I
         |                        I  *  I
         |                        I  *  I
         |                        I  *  I
         |                        I  * I
      95 +                        I  *  I
         |                        I  *  I
         |                        I *| I
         |                        I *| I
         |                       I  *| I
     100 +                       I  *| I
         |                       I  *| I
         |                       I  *| I
         |                       I  *| I
         |                       I  *|I
     105 +                       I  *|I
         |                       I  *|I
         |                       I  *| I
         |                       I  *|I
         |                       I  *|I
     110 +                       I  *|I
         |                        I *| I
         |                        I *|I
         |                        I *| I
         |                        I *|I
     115 +                        I *| I
         |                        I  * I
         |                        I  * I
         |                        I  * I
         |                        I *| I
     120 +                        I *| I
         |                        I  * I
         |                        I  * I
         |                        I  * I
1                           fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7648 + or - 0.0004 which occurs for 24 generations skipped.

```
                                 0.7642                   0.7660
0.7679

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                                I   |*     I
         |                               I    *    I
      25 +                              I    *|    I
         |                              I     *    I
         |                               I    *     I
```

```
    |                                I    *     I
    |                               I     *     I
 30 +                               I     *     I
    |                               I     *     I
    |                               I     *     I
    |                               I     *     I
    |                               I     *     I
 35 +                               I     *     I
    |                             I     *|     I
    |                             I     *|    I
    |                            I      *|    I
    |                             I     *|    I
 40 +                             I     *|     I
    |                             I     *|     I
    |                             I      *      I
    |                             I      *      I
    |                            I     * |    I
 45 +                           I      * |   I
    |                           I      * |    I
    |                           I      * |    I
    |                           I      * |    I
    |                           I      * |    I
 50 +                         I      *  |   I
    |                        I       *  |   I
    |                        I      *   |  I
    |                       I       *   |  I
    |                       I      *    |  I
 55 +                       I      *    |  I
    |                      I      *     | I
    |                     I      *      |I
    |                     I       *     | I
    |                      I       *    |  I
 60 +                       I       *   |   I
    |                       I       *   |   I
    |                        I       *  |    I
    |                       I        *  |    I
    |                       I       *   |    I
 65 +                      I       *    |   I
    |                        I       *  |     I
    |                       I       *   |    I
    |                     I        *    |  I
    |                      I        *   |   I
 70 +                     I        *    |   I
    |                     I        *    |   I
    |                    I        *     |   I
    |                   I        *      |  I
    |                   I        *      |  I
 75 +                   I        *      |  I
    |                  I         *      |  I
    |                  I         *      |  I
    |                I         *        I
    |                 I         *       |I
```

```
     80 +               I           *         |I
        |                  I       *        |I
        |                  I        *       |I
        |                     I         *   |    I
        |                     I         *   |    I
     85 +                  I          *    |    I
        |                     I       *  |     I
        |                     I        * |      I
        |                       I         *          I
        |                         I       | *         I
     90 +                       I         |*         I
        |                       I         |*          I
        |                        I        | *          I
        |                       I         |*         I
        |                        I        | *          I
     95 +                     I          *|         I
        |                        I        |*          I
        |                         I       |  *          I
        |                         I       |  *           I
        |                               I |        *         I
    100 +                                 I         *          I
        |                              I  |        *           I
        |                            I    |        *           I
        |                              I |         *           I
        |                                I           *            I
    105 +                                 |I            *
I
        |                                 | I             *
I
        |                              I  |           *              I
        |                              I  |            *
I
        |                              I  |             *
I
    110 +                               I |               *
I
        |                              I  |            *
I
        |                                 |I               *
I
        |                            I    |           *
I
        |                                 |I                  *
I
    115 +                                 I                 *
I
        |                         I       |          *
I
        |                     I           |          *
I
        |                  I              |             *
I
```

```
         |                                   |                       *
     120 +                                   I
*

   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                 6.97037E-07    57.1489
5.37165E-07    35.2011       0.00000E+00     0.0000
    3    0.0000                 1.34233E-05    12.2968
2.16400E-05     4.8062       0.00000E+00     0.0000
    4    0.0000                 1.66996E-05     9.6630
3.33614E-05     4.1313       0.00000E+00     0.0000
    5    0.0000                 2.90874E-05     6.8227
5.49228E-05     2.9462       0.00000E+00     0.0000
    6    0.0001                 9.69384E-05     3.9431
2.34851E-04     1.6089       0.00000E+00     0.0000
    7    0.0002                 1.18149E-04     3.4838
2.11885E-04     1.5349       0.00000E+00     0.0000
    8    0.0003                 2.51398E-04     2.0390
3.29957E-04     0.9747       0.00000E+00     0.0000
    9    0.0005                 3.85399E-04     1.2311
4.43930E-04     0.5634       0.00000E+00     0.0000
   10    0.0003                 2.02367E-04     1.6174
2.07461E-04     0.7488       0.00000E+00     0.0000
   11    0.0012                 9.08925E-04     0.6830
5.23655E-04     0.4491       0.00000E+00     0.0000
   12    0.0010                 7.58390E-04     0.6963
2.97321E-04     0.6855       0.00000E+00     0.0000
   13    0.0003                 2.31920E-04     1.4368
9.21312E-05     1.4194       0.00000E+00     0.0000
   14    0.0013                 1.00788E-03     0.6403
4.11945E-04     0.6332       0.00000E+00     0.0000
   15    0.0010                 7.72791E-04     0.6753
3.33142E-04     0.6677       0.00000E+00     0.0000
   16    0.0002                 1.88872E-04     1.1591
8.68078E-05     1.1421       0.00000E+00     0.0000
   17    0.0001                 6.68457E-05     1.6699
3.25159E-05     1.6411       0.00000E+00     0.0000
   18    0.0001                 4.95709E-05     1.9961
2.50666E-05     1.9546       0.00000E+00     0.0000
   19    0.0001                 8.07236E-05     1.3421
4.26799E-05     1.3118       0.00000E+00     0.0000
```

20	0.0001	5.92221E-05	1.5354	3.24591E-05	1.4981	0.00000E+00	0.0000
21	0.0002	1.21659E-04	1.0811	6.86778E-05	1.0565	0.00000E+00	0.0000
22	0.0001	1.07357E-04	1.2957	6.35457E-05	1.2653	0.00000E+00	0.0000
23	0.0001	1.10422E-04	1.1608	6.73460E-05	1.1312	0.00000E+00	0.0000
24	0.0000	2.46034E-05	2.3707	1.52800E-05	2.3115	0.00000E+00	0.0000
25	0.0000	3.10709E-05	1.7915	1.93958E-05	1.7458	0.00000E+00	0.0000
26	0.0000	1.70479E-05	2.5649	1.07174E-05	2.4962	0.00000E+00	0.0000
27	0.0001	5.36921E-05	1.3227	3.34983E-05	1.2942	0.00000E+00	0.0000
28	0.0001	9.67481E-05	0.9337	6.03638E-05	0.9176	0.00000E+00	0.0000
29	0.0001	9.53733E-05	1.2051	6.01103E-05	1.1881	0.00000E+00	0.0000
30	0.0000	1.17655E-05	2.9184	7.38413E-06	2.8953	0.00000E+00	0.0000
31	0.0001	9.60261E-05	1.0044	6.06642E-05	0.9929	0.00000E+00	0.0000
32	0.0000	3.70609E-05	1.6042	2.37135E-05	1.5700	0.00000E+00	0.0000
33	0.0000	3.29372E-05	1.7462	2.06211E-05	1.7242	0.00000E+00	0.0000
34	0.0001	7.43185E-05	1.1694	4.66853E-05	1.1540	0.00000E+00	0.0000
35	0.0001	4.55043E-05	1.2764	2.85560E-05	1.2584	0.00000E+00	0.0000
36	0.0001	4.26566E-05	1.5757	2.64075E-05	1.5608	0.00000E+00	0.0000
37	0.0000	2.83493E-05	1.8206	1.77923E-05	1.7808	0.00000E+00	0.0000
38	0.0000	3.38386E-05	1.9802	2.13160E-05	1.9360	0.00000E+00	0.0000
39	0.0002	1.25544E-04	0.9759	7.99323E-05	0.9515	0.00000E+00	0.0000
40	0.0002	1.19494E-04	0.9221	7.72431E-05	0.9024	0.00000E+00	0.0000
41	0.0002	1.59255E-04	0.9010	1.06421E-04	0.8732	0.00000E+00	0.0000
42	0.0002	1.39548E-04	0.7285	9.49145E-05	0.7116	0.00000E+00	0.0000
43	0.0001	7.91640E-05	1.2931	5.68333E-05	1.2347	0.00000E+00	0.0000
44	0.0001	1.14014E-04	1.0160	8.37274E-05	0.9715	0.00000E+00	0.0000
45	0.0001	5.86612E-05	0.9346	4.73619E-05	0.8610	0.00000E+00	0.0000

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   46    0.0000                 1.43206E-05     2.0259
1.15357E-05     1.8639       0.00000E+00     0.0000
   47    0.0001                 4.07731E-05     1.3438
3.16493E-05     1.2891       0.00000E+00     0.0000
   48    0.0000                 1.21263E-05     3.5703
9.40410E-06     3.4776       0.00000E+00     0.0000
   49    0.0001                 7.95728E-05     1.6055
6.27729E-05     1.5720       0.00000E+00     0.0000
   50    0.0001                 5.67973E-05     1.6152
4.67667E-05     1.5856       0.00000E+00     0.0000
   51    0.0000                 1.55449E-05     2.9621
1.29068E-05     2.9054       0.00000E+00     0.0000
   52    0.0001                 4.13856E-05     2.0357
3.57644E-05     1.9862       0.00000E+00     0.0000
   53    0.0002                 1.57414E-04     0.8013
1.54757E-04     0.7492       0.00000E+00     0.0000
   54    0.0001                 7.44876E-05     1.9473
6.92861E-05     1.8714       0.00000E+00     0.0000
   55    0.0002                 1.63182E-04     1.4290
1.49593E-04     1.3929       0.00000E+00     0.0000
   56    0.0002                 1.16838E-04     1.5511
1.08371E-04     1.5133       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                 1.49901E-04     1.4955
1.36023E-04     1.4571       0.00000E+00     0.0000
   58    0.0001                 8.46860E-05     1.9668
7.41823E-05     1.9106       0.00000E+00     0.0000
   59    0.0002                 1.63361E-04     1.6149
1.46497E-04     1.5555       0.00000E+00     0.0000
   60    0.0004                 2.69241E-04     1.2605
2.44611E-04     1.1919       0.00000E+00     0.0000
   61    0.0000                 2.99888E-05     3.5287
2.30264E-05     3.4219       0.00000E+00     0.0000
   62    0.0002                 1.63610E-04     1.8263
1.37220E-04     1.7762       0.00000E+00     0.0000
   63    0.0002                 1.21187E-04     2.0073
9.97338E-05     1.9314       0.00000E+00     0.0000
   64    0.0001                 9.85251E-05     2.2789
7.94610E-05     2.2032       0.00000E+00     0.0000
   65    0.0000                 3.57198E-05     3.6146
3.52764E-05     3.4990       0.00000E+00     0.0000
   66    0.0002                 1.79737E-04     1.7359
1.59240E-04     1.6837       0.00000E+00     0.0000
   67    0.0002                 1.46321E-04     2.2137
```

1.19670E-04	2.1405	0.00000E+00	0.0000	68	0.0000	2.36079E-05	4.7271
2.05150E-05	4.5409	0.00000E+00	0.0000	69	0.0004	3.03549E-04	1.4707
2.38132E-04	1.4238	0.00000E+00	0.0000	70	0.0003	2.02595E-04	1.8874
1.84486E-04	1.8197	0.00000E+00	0.0000	71	0.0006	4.37361E-04	1.2879
3.61788E-04	1.2501	0.00000E+00	0.0000	72	0.0001	4.60079E-05	5.6114
2.72457E-05	5.4609	0.00000E+00	0.0000	73	0.0004	3.25645E-04	1.6380
2.48156E-04	1.5541	0.00000E+00	0.0000	74	0.0014	1.06522E-03	1.0387
7.74486E-04	0.9962	0.00000E+00	0.0000	75	0.0001	1.05042E-04	3.1703
8.10275E-05	3.0058	0.00000E+00	0.0000	76	0.0006	4.67783E-04	1.6776
2.96987E-04	1.6171	0.00000E+00	0.0000	77	0.0005	3.66508E-04	1.9680
2.62923E-04	1.8924	0.00000E+00	0.0000	78	0.0000	7.30532E-06	4.4042
7.14554E-05	4.3588	0.00000E+00	0.0000	79	0.0003	1.92297E-04	2.7245
1.29158E-04	2.6240	0.00000E+00	0.0000	80	0.0001	6.09007E-05	3.4220
8.12583E-05	3.3208	0.00000E+00	0.0000	81	0.0014	1.07056E-03	1.2651
7.87025E-04	1.2157	0.00000E+00	0.0000	82	0.0001	6.48123E-05	4.8112
3.89251E-05	4.5468	0.00000E+00	0.0000	83	0.0002	1.25471E-04	2.8390
1.38917E-04	2.7818	0.00000E+00	0.0000	84	0.0001	7.95393E-05	2.8193
8.07433E-05	2.6049	0.00000E+00	0.0000	85	0.0003	1.92370E-04	2.3055
2.37005E-04	2.2423	0.00000E+00	0.0000	86	0.0004	2.73587E-04	2.4742
2.19857E-04	2.3538	0.00000E+00	0.0000	87	0.0004	3.43677E-04	2.4848
2.13617E-04	2.3750	0.00000E+00	0.0000	88	0.0001	5.63404E-05	3.7817
1.02275E-04	3.6935	0.00000E+00	0.0000	89	0.0001	9.43826E-05	3.7991
6.54792E-05	3.4927	0.00000E+00	0.0000	90	0.0003	2.25885E-04	3.0334
1.33275E-04	2.9038	0.00000E+00	0.0000	91	0.0003	1.91310E-04	2.4805
1.20906E-04	2.3383	0.00000E+00	0.0000	92	0.0000	3.14934E-05	2.7345
2.05981E-04	2.6800	0.00000E+00	0.0000	93	0.0002	1.25440E-04	3.4196

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1.02283E-04     3.1817       0.00000E+00     0.0000
   94    0.0001                 1.12828E-04     4.6800
6.33291E-05     4.3838       0.00000E+00     0.0000
   95    0.0008                 6.13069E-04     2.0543
3.77843E-04     1.9953       0.00000E+00     0.0000
   96    0.0002                 1.55386E-04     4.0110
7.88261E-05     3.8398       0.00000E+00     0.0000
   97    0.0003                 2.62221E-04     3.6639
1.50415E-04     3.5796       0.00000E+00     0.0000
   98    0.0001                 1.00654E-04     4.3002
9.65922E-05     4.1373       0.00000E+00     0.0000
   99    0.0001                 9.67111E-05     4.6863
6.49495E-05     4.5192       0.00000E+00     0.0000
  100    0.0002                 1.25738E-04     4.2200
8.41367E-05     4.0360       0.00000E+00     0.0000
  101    0.0002                 1.20527E-04     3.1112
7.62289E-05     2.9059       0.00000E+00     0.0000
  102    0.0002                 1.58737E-04     4.3113
8.85388E-05     4.1373       0.00000E+00     0.0000
  103    0.0001                 9.25819E-05     3.7630
9.05548E-05     3.5612       0.00000E+00     0.0000
  104    0.0002                 1.70953E-04     3.4005
1.35545E-04     3.2847       0.00000E+00     0.0000
  105    0.0002                 1.22035E-04     3.1129
8.07645E-05     2.9181       0.00000E+00     0.0000
  106    0.0002                 1.85013E-04     3.9396
1.37432E-04     3.8910       0.00000E+00     0.0000
  107    0.0001                 6.41614E-05     3.5745
6.48314E-05     3.3566       0.00000E+00     0.0000
  108    0.0000                 3.47929E-05     2.6189
1.50264E-04     2.5547       0.00000E+00     0.0000
  109    0.0002                 1.30552E-04     2.2022
4.33220E-04     2.1718       0.00000E+00     0.0000
  110    0.0008                 6.14955E-04     2.9026
3.79521E-04     2.8740       0.00000E+00     0.0000
  111    0.0002                 1.49512E-04     3.7844
1.37480E-04     3.6794       0.00000E+00     0.0000
  112    0.0002                 1.21004E-04     4.7662
1.27531E-04     4.6805       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                 1.28987E-04     4.2477
1.12488E-04     3.9838       0.00000E+00     0.0000
  114    0.0000                 1.07717E-05     7.1031
1.47900E-05     5.8717       0.00000E+00     0.0000
```

115	0.0001	6.44990E-05	4.2288	7.56832E-05	3.8636
0.00000E+00	0.0000				
116	0.0003	1.92288E-04	2.7495	1.44676E-04	2.4765
0.00000E+00	0.0000				
117	0.0006	4.70741E-04	2.4759	2.51640E-04	2.3176
0.00000E+00	0.0000				
118	0.0007	5.64485E-04	2.0522	4.41442E-04	1.9632
0.00000E+00	0.0000				
119	0.0002	1.41812E-04	2.2000	3.65993E-04	2.1228
0.00000E+00	0.0000				
120	0.0002	1.74155E-04	2.1443	6.62358E-04	2.1176
0.00000E+00	0.0000				
121	0.0007	5.11385E-04	2.3598	3.93639E-04	2.3014
0.00000E+00	0.0000				
122	0.0001	9.76451E-05	5.0513	7.66558E-05	4.6775
0.00000E+00	0.0000				
123	0.0003	2.12173E-04	2.7158	1.50541E-04	2.4097
0.00000E+00	0.0000				
124	0.0003	2.21444E-04	2.8727	1.83488E-04	2.6782
0.00000E+00	0.0000				
125	0.0002	1.47397E-04	3.2500	1.34674E-04	2.9533
0.00000E+00	0.0000				
126	0.0001	9.66227E-05	3.6512	8.69926E-05	3.2011
0.00000E+00	0.0000				
127	0.0005	3.99878E-04	3.0273	1.96135E-04	2.8672
0.00000E+00	0.0000				
128	0.0003	2.25082E-04	2.9322	1.38627E-04	2.6101
0.00000E+00	0.0000				
129	0.0006	4.51835E-04	2.2274	4.15910E-04	2.1239
0.00000E+00	0.0000				
130	0.0002	1.20057E-04	3.0647	2.92563E-04	2.9776
0.00000E+00	0.0000				
131	0.0004	2.89691E-04	2.1303	2.33329E-04	1.8049
0.00000E+00	0.0000				
132	0.0007	5.14347E-04	2.4039	3.16599E-04	2.1997
0.00000E+00	0.0000				
133	0.0013	1.02503E-03	1.8105	6.48207E-04	1.7164
0.00000E+00	0.0000				
134	0.0001	9.17127E-05	2.0138	2.38337E-04	1.6799
0.00000E+00	0.0000				
135	0.0002	1.63200E-04	3.5748	2.42390E-04	3.4742
0.00000E+00	0.0000				
136	0.0001	4.50671E-05	1.9213	6.99871E-04	1.8891
0.00000E+00	0.0000				
137	0.0000	1.96293E-05	1.1408	3.53196E-03	1.1374
0.00000E+00	0.0000				
138	0.0004	3.10187E-04	2.3850	8.08095E-04	2.3496
0.00000E+00	0.0000				
139	0.0002	1.85712E-04	3.3117	2.27738E-04	3.1110
0.00000E+00	0.0000				
140	0.0003	2.22002E-04	2.5648	2.93229E-04	2.2545
0.00000E+00	0.0000				

141	0.0001	8.12839E-05	2.7967	2.55400E-04	2.5100
142	0.0001	6.76953E-05	3.1254	2.33478E-04	2.8808
143	0.0001	8.21447E-05	2.1320	1.75637E-04	1.3009
144	0.0000	3.26493E-05	3.3844	7.22001E-05	2.0812
145	0.0005	3.93960E-04	2.7266	3.08585E-04	2.5028
146	0.0005	3.57680E-04	2.6672	2.59487E-04	2.2001
147	0.0002	1.80791E-04	4.1323	1.15515E-04	3.6048
148	0.0001	5.57384E-05	5.7777	3.75832E-05	4.6460
149	0.0000	3.10131E-05	8.5281	2.13846E-05	6.6064
150	0.0001	7.85443E-05	4.9308	5.89139E-05	3.5571
151	0.0001	6.59693E-05	3.9018	5.58579E-05	2.6750
152	0.0001	3.86057E-05	4.8290	4.50984E-05	2.7901
153	0.0001	3.90952E-05	4.5238	4.50856E-05	2.6389
154	0.0001	4.79314E-05	4.4643	5.02138E-05	2.5446
155	0.0001	4.58271E-05	4.7317	4.73298E-05	2.7220
156	0.0001	4.96581E-05	4.3272	4.77787E-05	2.7323
157	0.0001	6.00092E-05	3.8795	5.78284E-05	2.4528
158	0.0001	6.81497E-05	4.2059	6.85392E-05	2.8133
159	0.0002	1.44864E-04	2.7903	2.02390E-04	2.3475
160	0.0001	6.15294E-05	4.5057	7.31320E-05	3.4032
161	0.0001	7.56329E-05	4.0023	7.42030E-05	2.6316
162	0.0001	8.61740E-05	3.5242	8.09357E-05	2.1932
163	0.0001	9.04562E-05	3.8466	8.50667E-05	2.3622
164	0.0001	1.01364E-04	3.3968	9.37295E-05	2.1230
165	0.0001	1.06566E-04	3.4647	1.00545E-04	2.1405
166	0.0001	7.20136E-05	3.8472	6.52310E-05	2.4316

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  167    0.0001                 7.52716E-05     4.7498
6.89626E-05     3.0033       0.00000E+00     0.0000
  168    0.0001                 9.56849E-05     4.0446
8.30228E-05     2.7778       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                 1.07333E-04     3.8869
9.34019E-05     2.7666       0.00000E+00     0.0000
  170    0.0002                 1.37984E-04     4.0810
1.16881E-04     3.0533       0.00000E+00     0.0000
  171    0.0001                 1.06336E-04     4.9168
8.04932E-05     4.0050       0.00000E+00     0.0000
  172    0.0002                 1.38186E-04     4.8485
9.81462E-05     4.0837       0.00000E+00     0.0000
  173    0.0002                 1.87304E-04     4.6095
1.23795E-04     4.0443       0.00000E+00     0.0000
  174    0.0003                 2.48019E-04     4.0687
1.54526E-04     3.6169       0.00000E+00     0.0000
  175    0.0002                 1.21393E-04     6.1774
7.25517E-05     5.5965       0.00000E+00     0.0000
  176    0.0002                 1.16962E-04     5.1343
6.94289E-05     4.6734       0.00000E+00     0.0000
  177    0.0002                 1.23260E-04     5.9425
7.26964E-05     5.3208       0.00000E+00     0.0000
  178    0.0001                 1.10046E-04     5.5843
6.49501E-05     4.9830       0.00000E+00     0.0000
  179    0.0001                 1.08752E-04     6.6315
6.39685E-05     5.8928       0.00000E+00     0.0000
  180    0.0002                 1.17895E-04     6.5735
6.80231E-05     5.8637       0.00000E+00     0.0000
  181    0.0001                 1.02131E-04     5.8489
5.95463E-05     5.1363       0.00000E+00     0.0000
  182    0.0001                 1.05082E-04     6.3870
6.11729E-05     5.5958       0.00000E+00     0.0000
  183    0.0001                 1.13970E-04     6.5873
6.52519E-05     5.8288       0.00000E+00     0.0000
  184    0.0001                 9.85989E-05     6.8187
5.73032E-05     5.8430       0.00000E+00     0.0000
  185    0.0001                 1.01612E-04     6.0267
5.87575E-05     5.2041       0.00000E+00     0.0000
  186    0.0001                 1.00262E-04     5.5453
5.79961E-05     4.7797       0.00000E+00     0.0000
  187    0.0001                 8.39820E-05     6.1320
4.99279E-05     5.1084       0.00000E+00     0.0000
  188    0.0001                 8.66514E-05     5.9110
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5.11472E-05	4.9809	0.00000E+00	0.0000	189	0.0001	8.42477E-05	6.3379
4.99799E-05	5.2614	0.00000E+00	0.0000	190	0.0003	2.09024E-04	4.9691
1.24352E-04	4.0851	0.00000E+00	0.0000	191	0.0003	2.06735E-04	3.7742
1.23648E-04	3.0978	0.00000E+00	0.0000	192	0.0003	1.96772E-04	3.8673
1.19361E-04	3.0765	0.00000E+00	0.0000	193	0.0003	1.97488E-04	4.1657
1.20338E-04	3.3752	0.00000E+00	0.0000	194	0.0005	4.03985E-04	3.0179
2.48340E-04	2.3936	0.00000E+00	0.0000	195	0.0006	4.23352E-04	2.7140
2.62220E-04	2.1476	0.00000E+00	0.0000	196	0.0006	4.70535E-04	2.5081
2.90739E-04	1.9639	0.00000E+00	0.0000	197	0.0007	5.09375E-04	2.6301
3.18225E-04	2.0538	0.00000E+00	0.0000	198	0.0008	5.74485E-04	2.2609
3.56132E-04	1.7613	0.00000E+00	0.0000	199	0.0004	3.38065E-04	2.7361
2.06961E-04	2.1646	0.00000E+00	0.0000	200	0.0005	3.75913E-04	3.2292
2.28940E-04	2.5609	0.00000E+00	0.0000	201	0.0010	7.61793E-04	2.3531
4.70931E-04	1.8708	0.00000E+00	0.0000	202	0.0013	1.00926E-03	1.9905
6.08923E-04	1.6112	0.00000E+00	0.0000	203	0.0016	1.21822E-03	1.6193
7.28318E-04	1.3137	0.00000E+00	0.0000	204	0.0022	1.65900E-03	1.7194
9.76699E-04	1.4263	0.00000E+00	0.0000	205	0.0015	1.11673E-03	1.9967
6.56028E-04	1.6865	0.00000E+00	0.0000	206	0.0019	1.42261E-03	1.9028
8.26804E-04	1.6220	0.00000E+00	0.0000	207	0.0022	1.66457E-03	1.8165
9.66311E-04	1.5780	0.00000E+00	0.0000	208	0.0029	2.20052E-03	1.5396
1.28153E-03	1.3513	0.00000E+00	0.0000	209	0.0031	2.38557E-03	1.6355
1.40347E-03	1.4381	0.00000E+00	0.0000	210	0.0037	2.83383E-03	1.2145
1.68962E-03	1.0541	0.00000E+00	0.0000	211	0.0042	3.18205E-03	1.2201
1.91300E-03	1.0679	0.00000E+00	0.0000	212	0.0047	3.62405E-03	1.2330
2.19392E-03	1.0503	0.00000E+00	0.0000	213	0.0065	4.98885E-03	0.8662
3.01968E-03	0.7289	0.00000E+00	0.0000	214	0.0096	7.32352E-03	0.7765

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4.41423E-03     0.6519       0.00000E+00     0.0000
  215    0.0156                 1.19429E-02     0.6209
7.13288E-03     0.5189       0.00000E+00     0.0000
  216    0.0303                 2.31432E-02     0.4366
1.36397E-02     0.3594       0.00000E+00     0.0000
  217    0.0203                 1.55375E-02     0.4775
9.11552E-03     0.4046       0.00000E+00     0.0000
  218    0.0274                 2.09517E-02     0.4961
1.22857E-02     0.4239       0.00000E+00     0.0000
  219    0.0356                 2.72594E-02     0.3757
1.59073E-02     0.3174       0.00000E+00     0.0000
  220    0.0471                 3.59991E-02     0.3433
2.09634E-02     0.2902       0.00000E+00     0.0000
  221    0.0627                 4.79714E-02     0.3151
2.78014E-02     0.2652       0.00000E+00     0.0000
  222    0.0802                 6.13192E-02     0.2778
3.55192E-02     0.2376       0.00000E+00     0.0000
  223    0.1039                 7.95109E-02     0.2422
4.61605E-02     0.2045       0.00000E+00     0.0000
  224    0.0585                 4.47441E-02     0.3729
2.60494E-02     0.3159       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    0.2306                 1.76440E-01     0.1560
1.04504E-01     0.1316       0.00000E+00     0.0000
  226    0.0454                 3.47431E-02     0.3789
2.11598E-02     0.3143       0.00000E+00     0.0000
  227    0.0490                 3.74826E-02     0.3900
2.32722E-02     0.3148       0.00000E+00     0.0000
  228    0.0213                 1.63057E-02     0.5378
1.02935E-02     0.4311       0.00000E+00     0.0000
  229    0.0223                 1.70777E-02     0.5430
1.09769E-02     0.4323       0.00000E+00     0.0000
  230    0.0118                 9.02253E-03     0.8005
5.88658E-03     0.6186       0.00000E+00     0.0000
  231    0.0122                 9.35644E-03     0.7558
6.21542E-03     0.5870       0.00000E+00     0.0000
  232    0.0129                 9.83309E-03     0.8229
6.71255E-03     0.6052       0.00000E+00     0.0000
  233    0.0083                 6.31901E-03     0.9069
4.45495E-03     0.6628       0.00000E+00     0.0000
  234    0.0059                 4.53934E-03     1.0822
3.26548E-03     0.7734       0.00000E+00     0.0000
  235    0.0025                 1.90611E-03     1.6614
1.25211E-03     1.2892       0.00000E+00     0.0000
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  236    0.0018                 1.39613E-03     1.8620
9.54529E-04     1.3386       0.00000E+00     0.0000
  237    0.0017                 1.30028E-03     1.7852
9.26707E-04     1.2967       0.00000E+00     0.0000
  238    0.0001                 7.18165E-05     8.7585
6.14173E-05     5.3840       0.00000E+00     0.0000

 system total =                 7.64974E-01     0.0500
4.68515E-01     0.0426       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3154E-01  +
or -  0.0002



 elapsed time   3.10833 minutes

 random number=   C0EBC18A85438DCC
1                                                fuel bundle

                                                     **** fission
densities ****


                                                          fission
percent         total
                                             unit  region   density
deviation      fissions

                                                1      1    3.085E-03
0.05         7.650E-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     flux     percent     flux     percent
                 deviation            deviation            deviation
    1   0.000E+00    0.00   0.000E+00    0.00   0.000E+00    0.00
    2   2.369E-08   26.29   1.642E-08   25.44   1.801E-08   25.65
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3	9.466E-07	3.75	7.774E-07	3.60	8.283E-07	3.58
4	1.491E-06	3.00	1.209E-06	2.69	1.308E-06	2.69
5	2.333E-06	2.00	1.877E-06	1.93	2.034E-06	1.98
6	9.707E-06	1.15	7.758E-06	1.04	8.246E-06	1.06
7	1.246E-05	1.30	9.481E-06	1.10	1.001E-05	1.10
8	3.120E-05	0.80	2.288E-05	0.66	2.402E-05	0.65
9	8.169E-05	0.47	5.875E-05	0.40	6.117E-05	0.41
10	4.669E-05	0.61	3.315E-05	0.54	3.432E-05	0.54
11	2.199E-04	0.31	1.556E-04	0.25	1.613E-04	0.25
12	1.898E-04	0.29	1.380E-04	0.24	1.445E-04	0.24
13	5.720E-05	0.55	4.159E-05	0.46	4.351E-05	0.44
14	2.521E-04	0.23	1.831E-04	0.20	1.912E-04	0.19
15	2.202E-04	0.32	1.597E-04	0.27	1.666E-04	0.25
16	7.068E-05	0.43	5.142E-05	0.37	5.364E-05	0.37
17	3.209E-05	0.60	2.333E-05	0.54	2.429E-05	0.53
18	2.801E-05	0.64	2.044E-05	0.60	2.117E-05	0.57
19	4.995E-05	0.47	3.644E-05	0.45	3.811E-05	0.41
20	3.985E-05	0.57	2.923E-05	0.50	3.052E-05	0.45
21	8.085E-05	0.43	5.891E-05	0.34	6.152E-05	0.33
22	7.362E-05	0.40	5.381E-05	0.36	5.550E-05	0.33
23	7.710E-05	0.39	5.635E-05	0.30	5.850E-05	0.31
24	1.875E-05	0.92	1.387E-05	0.80	1.452E-05	0.75
25	2.326E-05	0.73	1.710E-05	0.59	1.803E-05	0.58
26	1.350E-05	0.97	9.852E-06	0.75	1.041E-05	0.73
27	4.212E-05	0.44	3.115E-05	0.40	3.312E-05	0.38
28	7.735E-05	0.39	5.762E-05	0.33	6.095E-05	0.31
29	7.898E-05	0.37	5.916E-05	0.34	6.202E-05	0.30
30	1.010E-05	1.16	7.509E-06	0.97	7.897E-06	0.96
31	7.854E-05	0.37	5.894E-05	0.36	6.192E-05	0.36
32	3.109E-05	0.62	2.335E-05	0.53	2.461E-05	0.51
33	2.668E-05	0.59	2.008E-05	0.52	2.123E-05	0.49
34	6.057E-05	0.48	4.576E-05	0.38	4.831E-05	0.35
35	3.629E-05	0.57	2.739E-05	0.48	2.876E-05	0.44
36	3.375E-05	0.52	2.558E-05	0.42	2.685E-05	0.39
37	2.207E-05	0.68	1.670E-05	0.56	1.745E-05	0.55
38	2.606E-05	0.56	1.974E-05	0.49	2.080E-05	0.46
39	9.665E-05	0.31	7.441E-05	0.28	7.875E-05	0.24
40	8.991E-05	0.38	6.942E-05	0.30	7.408E-05	0.28
41	1.130E-04	0.30	8.833E-05	0.24	9.427E-05	0.23
42	9.362E-05	0.30	7.389E-05	0.26	7.926E-05	0.24
43	5.089E-05	0.41	4.064E-05	0.36	4.273E-05	0.33
44	6.956E-05	0.36	5.578E-05	0.30	6.009E-05	0.27
45	3.509E-05	0.42	2.801E-05	0.35	3.100E-05	0.33
46	8.248E-06	0.84	6.577E-06	0.73	7.142E-06	0.64
47	2.337E-05	0.51	1.866E-05	0.48	1.943E-05	0.40
48	6.740E-06	1.07	5.420E-06	0.95	5.649E-06	0.76
49	4.339E-05	0.39	3.491E-05	0.36	3.765E-05	0.31
50	2.963E-05	0.48	2.376E-05	0.41	2.582E-05	0.35
51	7.816E-06	0.90	6.300E-06	0.84	6.866E-06	0.76
52	2.062E-05	0.58	1.667E-05	0.53	1.817E-05	0.42
53	7.660E-05	0.30	6.173E-05	0.25	6.691E-05	0.22
54	3.331E-05	0.51	2.713E-05	0.41	2.919E-05	0.34

55	6.647E-05	0.34	5.405E-05	0.31	5.893E-05	0.25
56	4.334E-05	0.39	3.532E-05	0.35	3.836E-05	0.29
57	4.933E-05	0.33	4.038E-05	0.29	4.392E-05	0.24
58	2.592E-05	0.54	2.119E-05	0.46	2.301E-05	0.38
59	4.420E-05	0.38	3.610E-05	0.36	3.941E-05	0.28
60	6.441E-05	0.33	5.270E-05	0.29	5.719E-05	0.23
61	6.121E-06	0.95	4.975E-06	0.82	5.423E-06	0.67
62	3.218E-05	0.48	2.649E-05	0.40	2.886E-05	0.36
63	2.160E-05	0.53	1.777E-05	0.49	1.937E-05	0.40
64	1.712E-05	0.57	1.409E-05	0.50	1.537E-05	0.44
65	5.623E-06	0.92	4.639E-06	0.87	5.075E-06	0.74
66	2.861E-05	0.43	2.353E-05	0.37	2.545E-05	0.30
67	2.104E-05	0.48	1.729E-05	0.42	1.889E-05	0.35
68	4.613E-06	1.00	3.769E-06	0.85	4.142E-06	0.77
69	3.727E-05	0.43	3.058E-05	0.35	3.334E-05	0.29
70	2.632E-05	0.50	2.181E-05	0.43	2.372E-05	0.36
71	4.578E-05	0.39	3.778E-05	0.34	4.110E-05	0.27
72	2.677E-06	1.32	2.226E-06	1.17	2.413E-06	1.00
73	2.722E-05	0.44	2.260E-05	0.42	2.447E-05	0.32
74	7.958E-05	0.31	6.595E-05	0.23	7.143E-05	0.20
75	9.006E-06	0.66	7.502E-06	0.58	8.116E-06	0.46
76	2.292E-05	0.46	1.892E-05	0.39	2.053E-05	0.36
77	1.755E-05	0.54	1.463E-05	0.44	1.583E-05	0.38
78	1.531E-06	1.84	1.243E-06	1.50	1.374E-06	1.24
79	9.929E-06	0.80	8.270E-06	0.71	8.962E-06	0.52
80	4.568E-06	1.22	3.790E-06	1.05	4.079E-06	0.85
81	5.505E-05	0.34	4.581E-05	0.32	4.963E-05	0.28
82	3.234E-06	1.25	2.679E-06	1.05	2.922E-06	0.96
83	4.498E-06	1.09	3.708E-06	0.92	3.994E-06	0.81
84	8.287E-06	0.90	6.839E-06	0.76	7.387E-06	0.60
85	9.874E-06	0.72	8.237E-06	0.63	8.933E-06	0.56
86	1.358E-05	0.58	1.135E-05	0.48	1.229E-05	0.45
87	1.182E-05	0.67	9.892E-06	0.58	1.077E-05	0.49
88	3.165E-06	1.27	2.627E-06	1.20	2.854E-06	1.03
89	6.618E-06	1.02	5.522E-06	0.85	5.948E-06	0.71
90	6.888E-06	0.82	5.753E-06	0.73	6.248E-06	0.57
91	8.265E-06	0.73	6.939E-06	0.73	7.412E-06	0.60
92	4.723E-06	1.02	3.935E-06	0.92	4.277E-06	0.74
93	8.157E-06	0.74	6.789E-06	0.64	7.339E-06	0.51
94	4.248E-06	0.99	3.535E-06	0.94	3.823E-06	0.80
95	1.242E-05	0.66	1.042E-05	0.63	1.128E-05	0.46
96	3.354E-06	1.14	2.796E-06	1.07	3.016E-06	0.83
97	3.420E-06	1.03	2.857E-06	0.98	3.118E-06	0.78
98	3.452E-06	1.17	2.891E-06	1.00	3.155E-06	0.88
99	2.276E-06	1.40	1.932E-06	1.29	2.083E-06	1.01
100	3.401E-06	1.20	2.822E-06	1.13	3.060E-06	0.89
101	4.835E-06	1.07	4.043E-06	0.96	4.416E-06	0.72
102	3.348E-06	1.24	2.805E-06	1.14	3.048E-06	0.87
103	4.653E-06	1.11	3.902E-06	0.97	4.208E-06	0.72
104	4.146E-06	1.01	3.496E-06	0.98	3.784E-06	0.76
105	4.385E-06	1.07	3.631E-06	0.92	3.943E-06	0.82
106	1.507E-06	1.80	1.280E-06	1.55	1.384E-06	1.22

107	3.629E-06	1.27	3.046E-06	1.11	3.250E-06	0.93
108	3.214E-06	1.18	2.706E-06	0.99	2.967E-06	0.86
109	5.158E-06	1.02	4.295E-06	0.92	4.654E-06	0.67
110	3.038E-06	1.29	2.599E-06	1.01	2.861E-06	0.91
111	3.034E-06	1.29	2.552E-06	1.13	2.780E-06	0.96
112	1.874E-06	1.59	1.588E-06	1.39	1.693E-06	0.98
113	5.711E-06	0.97	4.757E-06	0.84	5.158E-06	0.66
114	1.978E-06	1.59	1.630E-06	1.33	1.782E-06	1.11
115	5.085E-06	0.96	4.291E-06	0.92	4.617E-06	0.64
116	1.073E-05	0.66	9.013E-06	0.62	9.760E-06	0.48
117	1.174E-05	0.59	9.813E-06	0.55	1.061E-05	0.47
118	1.290E-05	0.60	1.079E-05	0.52	1.176E-05	0.47
119	8.192E-06	0.68	6.908E-06	0.68	7.525E-06	0.58
120	5.810E-06	1.02	4.927E-06	0.96	5.316E-06	0.75
121	6.059E-06	0.83	5.107E-06	0.75	5.591E-06	0.64
122	3.256E-06	1.23	2.739E-06	1.13	2.935E-06	0.87
123	1.037E-05	0.70	8.702E-06	0.60	9.356E-06	0.45
124	7.390E-06	0.80	6.179E-06	0.66	6.681E-06	0.54
125	6.947E-06	0.89	5.879E-06	0.76	6.319E-06	0.64
126	5.700E-06	0.97	4.782E-06	0.81	5.195E-06	0.75
127	5.524E-06	0.89	4.689E-06	0.80	5.070E-06	0.66
128	7.752E-06	0.81	6.474E-06	0.75	6.973E-06	0.59
129	9.627E-06	0.66	8.120E-06	0.63	8.776E-06	0.53
130	3.965E-06	0.93	3.343E-06	0.86	3.655E-06	0.75
131	1.669E-05	0.49	1.404E-05	0.42	1.517E-05	0.36
132	1.115E-05	0.63	9.443E-06	0.55	1.023E-05	0.46
133	1.369E-05	0.56	1.156E-05	0.51	1.251E-05	0.46
134	1.482E-05	0.55	1.249E-05	0.51	1.342E-05	0.42
135	2.352E-06	1.30	2.001E-06	1.22	2.176E-06	1.02
136	3.903E-06	0.92	3.399E-06	0.92	3.712E-06	0.77
137	2.504E-06	1.01	2.633E-06	0.99	2.966E-06	0.85
138	4.037E-06	0.96	3.541E-06	0.94	3.906E-06	0.73
139	4.571E-06	0.92	3.873E-06	0.84	4.227E-06	0.67
140	1.208E-05	0.65	1.022E-05	0.61	1.103E-05	0.53
141	8.792E-06	0.80	7.382E-06	0.74	8.017E-06	0.53
142	5.795E-06	0.85	4.912E-06	0.77	5.311E-06	0.68
143	1.998E-05	0.50	1.681E-05	0.44	1.802E-05	0.34
144	8.152E-06	0.68	6.864E-06	0.65	7.382E-06	0.48
145	7.167E-06	0.77	6.097E-06	0.75	6.567E-06	0.57
146	1.203E-05	0.64	1.016E-05	0.56	1.098E-05	0.47
147	3.616E-06	1.03	3.097E-06	0.96	3.349E-06	0.80
148	1.858E-06	1.45	1.578E-06	1.39	1.689E-06	1.15
149	1.209E-06	2.21	1.013E-06	1.67	1.061E-06	1.25
150	4.034E-06	1.07	3.427E-06	1.08	3.638E-06	0.82
151	4.071E-06	1.00	3.433E-06	0.87	3.727E-06	0.78
152	4.322E-06	1.13	3.630E-06	1.00	3.912E-06	0.75
153	4.417E-06	0.93	3.732E-06	0.92	4.044E-06	0.77
154	4.594E-06	0.99	3.912E-06	0.91	4.230E-06	0.72
155	4.297E-06	1.02	3.610E-06	0.95	3.914E-06	0.80
156	3.967E-06	1.26	3.342E-06	1.01	3.613E-06	0.87
157	4.689E-06	0.97	3.947E-06	1.01	4.194E-06	0.75
158	4.924E-06	1.02	4.125E-06	0.90	4.436E-06	0.75

159	6.808E-06	0.76	5.697E-06	0.71	6.137E-06	0.61
160	3.546E-06	1.04	2.994E-06	0.91	3.252E-06	0.78
161	4.877E-06	0.92	4.135E-06	0.77	4.447E-06	0.64
162	5.791E-06	1.03	4.880E-06	0.91	5.292E-06	0.74
163	6.179E-06	0.84	5.257E-06	0.75	5.638E-06	0.57
164	6.400E-06	0.76	5.387E-06	0.69	5.864E-06	0.58
165	6.848E-06	0.93	5.773E-06	0.76	6.209E-06	0.62
166	4.044E-06	1.14	3.429E-06	0.99	3.678E-06	0.83
167	4.144E-06	1.02	3.517E-06	0.94	3.810E-06	0.78
168	4.411E-06	1.07	3.688E-06	1.00	3.978E-06	0.80
169	4.439E-06	1.14	3.763E-06	1.00	4.051E-06	0.79
170	4.611E-06	1.02	3.905E-06	0.90	4.205E-06	0.72
171	2.383E-06	1.42	1.990E-06	1.21	2.165E-06	0.98
172	2.460E-06	1.25	2.069E-06	1.19	2.224E-06	0.99
173	2.445E-06	1.50	2.092E-06	1.28	2.253E-06	1.15
174	2.520E-06	1.09	2.132E-06	1.03	2.316E-06	0.91
175	1.018E-06	1.80	8.632E-07	1.65	9.402E-07	1.51
176	9.849E-07	2.05	8.364E-07	1.78	9.032E-07	1.52
177	1.070E-06	2.14	9.080E-07	1.85	9.691E-07	1.49
178	1.054E-06	2.39	9.040E-07	1.99	9.517E-07	1.55
179	1.053E-06	2.02	9.070E-07	1.86	9.632E-07	1.34
180	1.050E-06	2.32	8.956E-07	2.01	9.621E-07	1.44
181	1.089E-06	2.02	9.249E-07	1.84	9.824E-07	1.32
182	1.097E-06	1.79	9.215E-07	1.65	1.004E-06	1.30
183	1.149E-06	1.79	9.531E-07	1.65	1.023E-06	1.43
184	1.123E-06	2.00	9.467E-07	1.67	1.006E-06	1.31
185	1.112E-06	1.78	9.237E-07	1.62	1.028E-06	1.40
186	1.129E-06	1.89	9.656E-07	1.70	1.040E-06	1.37
187	1.153E-06	1.88	9.788E-07	1.71	1.057E-06	1.30
188	1.183E-06	2.02	9.878E-07	1.55	1.069E-06	1.34
189	1.166E-06	1.91	1.001E-06	1.78	1.077E-06	1.45
190	3.011E-06	1.01	2.542E-06	1.03	2.763E-06	0.87
191	3.083E-06	1.19	2.607E-06	1.13	2.833E-06	0.94
192	3.133E-06	1.21	2.658E-06	1.03	2.874E-06	0.86
193	3.284E-06	1.01	2.765E-06	0.99	2.986E-06	0.72
194	6.806E-06	0.86	5.767E-06	0.80	6.185E-06	0.54
195	7.203E-06	0.83	6.090E-06	0.69	6.586E-06	0.59
196	7.715E-06	0.71	6.546E-06	0.66	7.062E-06	0.52
197	8.526E-06	0.73	7.219E-06	0.65	7.772E-06	0.52
198	8.947E-06	0.67	7.570E-06	0.52	8.160E-06	0.49
199	4.773E-06	0.87	4.031E-06	0.81	4.371E-06	0.65
200	5.149E-06	0.93	4.343E-06	0.86	4.696E-06	0.69
201	1.056E-05	0.66	8.985E-06	0.59	9.722E-06	0.44
202	1.195E-05	0.60	1.010E-05	0.53	1.099E-05	0.48
203	1.300E-05	0.52	1.098E-05	0.48	1.191E-05	0.41
204	1.483E-05	0.57	1.252E-05	0.51	1.362E-05	0.41
205	8.626E-06	0.68	7.737E-06	0.63	8.140E-06	0.46
206	9.400E-06	0.65	8.453E-06	0.56	8.937E-06	0.45
207	9.620E-06	0.67	8.753E-06	0.61	9.234E-06	0.49
208	1.128E-05	0.67	1.019E-05	0.56	1.082E-05	0.43
209	1.156E-05	0.56	1.049E-05	0.48	1.116E-05	0.42
210	1.407E-05	0.52	1.274E-05	0.48	1.358E-05	0.39

211	1.621E-05	0.53	1.460E-05	0.38	1.555E-05	0.36
212	1.918E-05	0.38	1.736E-05	0.33	1.854E-05	0.28
213	2.627E-05	0.35	2.356E-05	0.34	2.530E-05	0.29
214	3.684E-05	0.35	3.308E-05	0.28	3.551E-05	0.24
215	5.523E-05	0.24	4.982E-05	0.22	5.369E-05	0.17
216	9.193E-05	0.20	8.384E-05	0.18	9.056E-05	0.16
217	5.530E-05	0.23	5.286E-05	0.20	5.608E-05	0.17
218	7.055E-05	0.23	6.763E-05	0.21	7.207E-05	0.17
219	8.389E-05	0.19	8.131E-05	0.14	8.651E-05	0.13
220	1.014E-04	0.16	9.900E-05	0.15	1.054E-04	0.12
221	1.203E-04	0.15	1.184E-04	0.12	1.264E-04	0.11
222	1.365E-04	0.16	1.364E-04	0.14	1.454E-04	0.11
223	1.532E-04	0.15	1.574E-04	0.14	1.675E-04	0.11
224	7.526E-05	0.18	7.995E-05	0.16	8.454E-05	0.11
225	2.333E-04	0.13	2.724E-04	0.11	2.822E-04	0.09
226	3.179E-05	0.22	4.502E-05	0.17	4.450E-05	0.11
227	2.875E-05	0.25	4.632E-05	0.20	4.439E-05	0.12
228	1.044E-05	0.37	1.903E-05	0.31	1.758E-05	0.19
229	9.673E-06	0.34	1.972E-05	0.33	1.747E-05	0.15
230	4.492E-06	0.54	1.019E-05	0.46	8.687E-06	0.23
231	4.256E-06	0.53	1.054E-05	0.45	8.732E-06	0.22
232	3.950E-06	0.54	1.133E-05	0.41	8.907E-06	0.21
233	2.236E-06	0.73	7.412E-06	0.56	5.502E-06	0.26
234	1.420E-06	0.91	5.361E-06	0.63	3.827E-06	0.30
235	5.318E-07	1.23	1.051E-06	0.97	1.132E-06	0.50
236	3.445E-07	1.81	7.279E-07	1.24	7.955E-07	0.55
237	2.256E-07	2.05	5.503E-07	1.33	6.172E-07	0.61
238	5.536E-09	9.94	2.045E-08	7.04	2.542E-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
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139	0.000E+00	0.00
140	0.000E+00	0.00
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143	0.000E+00	0.00
144	0.000E+00	0.00
145	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
150	0.000E+00	0.00
151	0.000E+00	0.00
152	0.000E+00	0.00
153	0.000E+00	0.00
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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
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182	0.000E+00	0.00
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200	0.000E+00	0.00
201	0.000E+00	0.00
202	0.000E+00	0.00
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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

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  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
 0.7522 to 0.7550     *
 0.7550 to 0.7578     **
 0.7578 to 0.7606     **********
 0.7606 to 0.7635     ************************
 0.7635 to 0.7663     ********************************
 0.7663 to 0.7691     *******************
 0.7691 to 0.7720     *********
 0.7720 to 0.7748     ****

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7522 to 0.7550     *
 0.7550 to 0.7578     **
 0.7578 to 0.7606     *********
 0.7606 to 0.7635     ******************
 0.7635 to 0.7663     ********************
 0.7663 to 0.7691     ***************
 0.7691 to 0.7720     ********
 0.7720 to 0.7748     **

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7522 to 0.7550     *
 0.7550 to 0.7578     *
 0.7578 to 0.7606     *******
 0.7606 to 0.7635     **************
 0.7635 to 0.7663     *************
 0.7663 to 0.7691     *******
 0.7691 to 0.7720     *****
 0.7720 to 0.7748     **

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7522 to 0.7550
 0.7550 to 0.7578     *
```

```
 0.7578 to 0.7606     *
 0.7606 to 0.7635     *******
 0.7635 to 0.7663     ********
 0.7663 to 0.7691     ****
 0.7691 to 0.7720     ***
 0.7720 to 0.7748     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76488 + or - 0.00040                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65811E-02 + or -  1.07857E-04            ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.14242E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52676E-01 + or -  1.75691E-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     3.11467 minutes


*********************************************************************
************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22             //             11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99      //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666
```

```
      0000000      5555555555555                            44
0000000                      33333333333     99999999999
     000000000     5555555555555                          444
000000000                    3333333333333   9999999999999
    00       00    55                   :::              4444      00
00          :::       33         33   99         99
   00         00   55                   :::             44 44     00
00         :::                  33   99         99
   00         00   55                   :::            44  44     00
00         :::                  33   99         99
   00         00   555555555555                        44   44     00
00                           333    9999999999999
   00         00   5555555555555                      44    44     00
00                           333     999999999999
   00         00              55         :::        444444444444   00
00         :::                  33              99
   00         00              55         :::       4444444444444   00
00         :::                  33              99
    00       00    55         55         :::                44      00
00          :::       33         33              99
     000000000     5555555555555                            44
000000000                    3333333333333   9999999999999
      0000000       55555555555                            44
0000000                      33333333333    999999999999
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
```

```
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:40:39.82
*****
        *****
*****
        *****
*****

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

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

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

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```

```
*********************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number               data set name
name        unit function                     ***
        ***         ------               -------------
----        -------------                     ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  1.48505E-12  4.48012E-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  6.04522E-08  1.81190E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  4.13150E-15  1.36154E-14    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  9.33930E-08  6.98506E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02826E-07  7.99736E-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  1.87733E-11  4.65941E-10   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90759E-08  1.32073E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.07579E-08  2.92739E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.65714E-08  4.55891E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  2.06621E-10  5.74622E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.67927E-08  4.72037E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  1.55712E-10  4.42370E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  2.87852E-09  8.26395E-08   40096    95.9083     zr96 4043
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endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  3.47871E-19  9.67444E-18   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  3.95661E-11  1.12404E-09   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  1.13051E-08  3.21166E-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  6.98450E-09  2.02604E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.73592E-08  5.08743E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75596E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.07024E-09  2.11443E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.87628E-10  5.55500E-09   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.71519E-10  5.18070E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  1.40792E-10  4.29469E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  6.04463E-11  1.86197E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  6.27397E-11  1.95138E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  1.26719E-11  4.01725E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  3.93618E-11  1.21248E-09   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.11100E-12  3.48879E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  3.25408E-11  1.02185E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  5.04087E-12  1.61312E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  1.86268E-12  6.01640E-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  1.04851E-12  3.41806E-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  8.98615E-11  2.90251E-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
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endf/b7 rel0 rev7 mod1                12/17/09
    1048111  1.29284E-09  4.29194E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43673E-09  8.16224E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23417E-09  4.17106E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90124E-09  9.89194E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56673E-10  2.62525E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  3.86760E-13  1.33027E-11   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  6.50331E-11  2.23681E-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  1.46898E-09  5.14047E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63163E-09  1.63461E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64298E-09  5.84774E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23022E-09  2.23611E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.85852E-10  3.23250E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10803E-09  4.10965E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.85513E-12  6.99180E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  4.71837E-12  1.79238E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.85475E-11  7.15678E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25970E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  7.82287E-11  3.06538E-09   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.68038E-11  1.06636E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87635E-12  7.57725E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.91661E-10  7.62499E-09   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.75344E-16  1.10367E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  2.16183E-10  8.73002E-09   55135   134.9060     cs135 5531
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endf/b7 rel0 rev7 mod1                12/17/09
    1055137  2.02862E-10  8.31357E-09   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.31468E-08  1.36831E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.79495E-11  2.42696E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  2.18148E-10  9.07060E-09   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.13325E-10  4.77996E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.99689E-10  8.48255E-09   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21021E-12  2.65667E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  1.67189E-10  7.20232E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  9.05361E-11  3.81872E-09   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  5.86627E-11  2.50951E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.32105E-10  5.65125E-09   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  1.30329E-11  5.61426E-10   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  1.31370E-10  5.69855E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  9.99144E-11  4.36399E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.83957E-11  8.08999E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  5.50087E-11  2.43563E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  5.49089E-11  2.41474E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  3.65422E-18  1.61799E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84959E-12  8.24490E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.03231E-12  4.53981E-11   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  3.52747E-11  1.57243E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  4.68173E-15  2.10097E-13   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.01753E-09  1.36320E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  8.94218E-12  4.06649E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32593E-13  1.06470E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.43222E-09  6.47022E-08   63151   150.9198     eu151 6325
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endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.56415E-09  7.15992E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  2.18104E-15  1.00491E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  1.07062E-12  4.96490E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.63454E-13  7.62910E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.78469E-12  2.63061E-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  4.27224E-10  1.98122E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91358E-10  2.76007E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51735E-10  2.12195E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17524E-10  3.39193E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31107E-10  3.02125E-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  9.22607E-06  6.51890E-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  1.58422E-12  1.12412E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  4.95422E-19  3.53024E-17   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  1.44299E-10  1.03256E-08   94239   239.0522     pu239 9437
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endf/b7 rel5 rev7 mod5                12/17/09
    1094240  9.74750E-17  7.00428E-15   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.00295E-20  7.23706E-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  1.00801E-20  7.27355E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.86996E-28  2.80408E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99996E-21  7.27572E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.40275E-20  1.01639E-18   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.95930E-21  7.24613E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.93470E-21  7.25802E-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
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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
                                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:
  9505 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

                                          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       ........

                                 ........     0.01517 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
0.01600 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 15581 independent fission points were generated for generation 1
```

```
          1       7.61807E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15514 independent fission points were generated for generation 2
          2       7.61038E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15707 independent fission points were generated for generation 3
          3       7.68851E-01      7.68851E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.67476E-01      7.68163E-01      6.87152E-04
0.00000E+00      0.00000E+00
          5       7.66274E-01      7.67534E-01      7.44266E-04
0.00000E+00      0.00000E+00
          6       7.65469E-01      7.67017E-01      7.37135E-04
0.00000E+00      0.00000E+00
          7       7.60137E-01      7.65641E-01      1.48994E-03
0.00000E+00      0.00000E+00
          8       7.66878E-01      7.65847E-01      1.23388E-03
0.00000E+00      0.00000E+00
          9       7.68974E-01      7.66294E-01      1.13447E-03
0.00000E+00      0.00000E+00
         10       7.65875E-01      7.66242E-01      9.83875E-04
0.00000E+00      0.00000E+00
         11       7.69658E-01      7.66621E-01      9.47104E-04
0.00000E+00      0.00000E+00
         12       7.68761E-01      7.66835E-01      8.73726E-04
0.00000E+00      0.00000E+00
         13       7.71780E-01      7.67285E-01      9.09218E-04
0.00000E+00      0.00000E+00
         14       7.66438E-01      7.67214E-01      8.32992E-04
0.00000E+00      0.00000E+00
         15       7.65581E-01      7.67089E-01      7.76474E-04
0.00000E+00      0.00000E+00
         16       7.67187E-01      7.67096E-01      7.18909E-04
0.00000E+00      0.00000E+00
         17       7.66651E-01      7.67066E-01      6.69924E-04
0.00000E+00      0.00000E+00
         18       7.61711E-01      7.66731E-01      7.10434E-04
0.00000E+00      0.00000E+00
         19       7.74103E-01      7.67165E-01      7.95838E-04
0.00000E+00      0.00000E+00
         20       7.69129E-01      7.67274E-01      7.58214E-04
0.00000E+00      0.00000E+00
         21       7.65033E-01      7.67156E-01      7.26833E-04
0.00000E+00      0.00000E+00
         22       7.67733E-01      7.67185E-01      6.90137E-04
0.00000E+00      0.00000E+00
         23       7.65091E-01      7.67085E-01      6.63985E-04
0.00000E+00      0.00000E+00
         24       7.64809E-01      7.66982E-01      6.41482E-04
0.00000E+00      0.00000E+00
```

25	7.64855E-01	7.66889E-01	6.19894E-04	0.00000E+00
26	7.64240E-01	7.66779E-01	6.03681E-04	0.00000E+00
27	7.62740E-01	7.64161E-01	1.43231E-03	0.00000E+00
28	7.63014E-01	7.63932E-01	1.21347E-03	0.00000E+00
29	7.69740E-01	7.64900E-01	1.26674E-03	0.00000E+00
30	7.64149E-01	7.64792E-01	1.04204E-03	0.00000E+00
31	7.65496E-01	7.64880E-01	8.86514E-04	0.00000E+00
32	7.64962E-01	7.64889E-01	7.67808E-04	0.00000E+00
33	7.70963E-01	7.65497E-01	9.59009E-04	0.00000E+00
34	7.68493E-01	7.65769E-01	1.13815E-03	0.00000E+00
35	7.62703E-01	7.65514E-01	9.64471E-04	0.00000E+00
36	7.68964E-01	7.65779E-01	8.43806E-04	0.00000E+00
37	7.61208E-01	7.65453E-01	1.05119E-03	0.00000E+00
38	7.66680E-01	7.65534E-01	9.16628E-04	0.00000E+00
39	7.66403E-01	7.65589E-01	8.23912E-04	0.00000E+00
40	7.66443E-01	7.65639E-01	7.74920E-04	0.00000E+00
41	7.60720E-01	7.65366E-01	7.66609E-04	0.00000E+00
42	7.67460E-01	7.65476E-01	7.39132E-04	0.00000E+00
43	7.62900E-01	7.65347E-01	7.68180E-04	0.00000E+00
44	7.62300E-01	7.65202E-01	9.14416E-04	0.00000E+00
45	7.64516E-01	7.65171E-01	8.77033E-04	0.00000E+00
46	7.61671E-01	7.65019E-01	8.92755E-04	0.00000E+00
47	7.66638E-01	7.65086E-01	8.68829E-04	0.00000E+00
48	7.65086E-01	7.65086E-01	8.23936E-04	0.00000E+00
49	7.69363E-01	7.65251E-01	6.66088E-04	0.00000E+00
50	7.62057E-01	7.65132E-01	6.51748E-04	0.00000E+00

51	7.58393E-01	7.64892E-01	5.89826E-04	0.00000E+00	0.00000E+00
52	7.62123E-01	7.64796E-01	6.15386E-04	0.00000E+00	0.00000E+00
53	7.65030E-01	7.64804E-01	5.89512E-04	0.00000E+00	0.00000E+00
54	7.60340E-01	7.64660E-01	7.24375E-04	0.00000E+00	0.00000E+00
55	7.60041E-01	7.64516E-01	8.42082E-04	0.00000E+00	0.00000E+00
56	7.64472E-01	7.64514E-01	8.12563E-04	0.00000E+00	0.00000E+00
57	7.53916E-01	7.64203E-01	1.23502E-03	0.00000E+00	0.00000E+00
58	7.71919E-01	7.64423E-01	1.05605E-03	0.00000E+00	0.00000E+00
59	7.64241E-01	7.64418E-01	1.02360E-03	0.00000E+00	0.00000E+00
60	7.69018E-01	7.64542E-01	7.58309E-04	0.00000E+00	0.00000E+00
61	7.70770E-01	7.64706E-01	8.07226E-04	0.00000E+00	0.00000E+00
62	7.71246E-01	7.64874E-01	8.60684E-04	0.00000E+00	0.00000E+00
63	7.68421E-01	7.64963E-01	8.88423E-04	0.00000E+00	0.00000E+00
64	7.58783E-01	7.64812E-01	7.73856E-04	0.00000E+00	0.00000E+00
65	7.69209E-01	7.64917E-01	8.23371E-04	0.00000E+00	0.00000E+00
66	7.62316E-01	7.64856E-01	7.88333E-04	0.00000E+00	0.00000E+00
67	7.64476E-01	7.64847E-01	7.69384E-04	0.00000E+00	0.00000E+00
68	7.62229E-01	7.64789E-01	7.68360E-04	0.00000E+00	0.00000E+00
69	7.64959E-01	7.64793E-01	7.49964E-04	0.00000E+00	0.00000E+00
70	7.69894E-01	7.64901E-01	7.12796E-04	0.00000E+00	0.00000E+00
71	7.60731E-01	7.64815E-01	7.10235E-04	0.00000E+00	0.00000E+00
72	7.65660E-01	7.64832E-01	6.97902E-04	0.00000E+00	0.00000E+00
73	7.68261E-01	7.64900E-01	6.88843E-04	0.00000E+00	0.00000E+00
74	7.67452E-01	7.64950E-01	6.85271E-04	0.00000E+00	0.00000E+00
75	7.61632E-01	7.64887E-01	6.74334E-04	0.00000E+00	0.00000E+00
76	7.73514E-01	7.65049E-01	7.18680E-04	0.00000E+00	0.00000E+00

77	7.69817E-01	7.65138E-01	7.17434E-04	0.00000E+00	0.00000E+00
78	7.60633E-01	7.65056E-01	6.89167E-04	0.00000E+00	0.00000E+00
79	7.70516E-01	7.65153E-01	7.13209E-04	0.00000E+00	0.00000E+00
80	7.62558E-01	7.65108E-01	6.84296E-04	0.00000E+00	0.00000E+00
81	7.70833E-01	7.65206E-01	7.00938E-04	0.00000E+00	0.00000E+00
82	7.67564E-01	7.65246E-01	7.03988E-04	0.00000E+00	0.00000E+00
83	7.63931E-01	7.65224E-01	6.60998E-04	0.00000E+00	0.00000E+00
84	7.62046E-01	7.65172E-01	6.52252E-04	0.00000E+00	0.00000E+00
85	7.64876E-01	7.65168E-01	6.39965E-04	0.00000E+00	0.00000E+00
86	7.74442E-01	7.65315E-01	6.72697E-04	0.00000E+00	0.00000E+00
87	7.68329E-01	7.65362E-01	6.59547E-04	0.00000E+00	0.00000E+00
88	7.73315E-01	7.65484E-01	6.39020E-04	0.00000E+00	0.00000E+00
89	7.62050E-01	7.65432E-01	6.13869E-04	0.00000E+00	0.00000E+00
90	7.67190E-01	7.65458E-01	6.58990E-04	0.00000E+00	0.00000E+00
91	7.62465E-01	7.65414E-01	6.30347E-04	0.00000E+00	0.00000E+00
92	7.64204E-01	7.65397E-01	5.91456E-04	0.00000E+00	0.00000E+00
93	7.66855E-01	7.65418E-01	5.82224E-04	0.00000E+00	0.00000E+00
94	7.67593E-01	7.65448E-01	5.70925E-04	0.00000E+00	0.00000E+00
95	7.71936E-01	7.65538E-01	5.70833E-04	0.00000E+00	0.00000E+00
96	7.65181E-01	7.65534E-01	5.62158E-04	0.00000E+00	0.00000E+00
97	7.65896E-01	7.65538E-01	5.55324E-04	0.00000E+00	0.00000E+00
98	7.65883E-01	7.65543E-01	5.48312E-04	0.00000E+00	0.00000E+00
99	7.70867E-01	7.65613E-01	5.80815E-04	0.00000E+00	0.00000E+00
100	7.64436E-01	7.65598E-01	5.70259E-04	0.00000E+00	0.00000E+00
101	7.68665E-01	7.65637E-01	5.69523E-04	0.00000E+00	0.00000E+00
102	7.63273E-01	7.65607E-01	5.23599E-04	0.00000E+00	0.00000E+00

```
        103       7.71375E-01      7.65679E-01      5.27670E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=AEA3704145A54255
        104       7.62546E-01      7.65641E-01      5.24762E-04
0.00000E+00      0.00000E+00
        105       7.65252E-01      7.65636E-01      5.17489E-04
0.00000E+00      0.00000E+00
        106       7.70288E-01      7.65692E-01      5.52374E-04
0.00000E+00      0.00000E+00
        107       7.60342E-01      7.65628E-01      5.21527E-04
0.00000E+00      0.00000E+00
        108       7.59996E-01      7.65562E-01      5.36700E-04
0.00000E+00      0.00000E+00
        109       7.60605E-01      7.65504E-01      5.39831E-04
0.00000E+00      0.00000E+00
        110       7.57701E-01      7.65415E-01      5.36922E-04
0.00000E+00      0.00000E+00
        111       7.61804E-01      7.65374E-01      5.62212E-04
0.00000E+00      0.00000E+00
        112       7.65193E-01      7.65372E-01      5.56586E-04
0.00000E+00      0.00000E+00
        113       7.70291E-01      7.65426E-01      5.18974E-04
0.00000E+00      0.00000E+00
        114       7.65442E-01      7.65426E-01      5.13017E-04
0.00000E+00      0.00000E+00
        115       7.72000E-01      7.65498E-01      5.20192E-04
0.00000E+00      0.00000E+00
        116       7.62960E-01      7.65471E-01      5.12126E-04
0.00000E+00      0.00000E+00
        117       7.62313E-01      7.65437E-01      5.02647E-04
0.00000E+00      0.00000E+00
        118       7.67374E-01      7.65457E-01      4.99446E-04
0.00000E+00      0.00000E+00
        119       7.73585E-01      7.65542E-01      4.90724E-04
0.00000E+00      0.00000E+00
        120       7.57451E-01      7.65459E-01      5.03640E-04
0.00000E+00      0.00000E+00
        121       7.69663E-01      7.65502E-01      5.01658E-04
0.00000E+00      0.00000E+00
        122       7.60125E-01      7.65447E-01      4.95437E-04
0.00000E+00      0.00000E+00
        123       7.67867E-01      7.65471E-01      4.93138E-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=9C3D3FD49487A2C5
                                   A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle
```

```
 lifetime =  1.55217E-05 + or -  1.11816E-08             generation time
=  2.99510E-05 + or -  1.96728E-08
 nu bar   =  2.43895E+00 + or -  1.08921E-05       average fission group
=  2.17567E+02 + or -  1.01545E-02
                      energy(ev) of the average lethargy causing fission
=  5.67973E-02 + or -  1.32331E-04
                                                 system mean free path (cm)
=  6.52787E-01 + or -  1.92828E-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          0.76547   + or - 0.00049     0.76498 to 0.76596
0.76449 to 0.76646    0.76399 to 0.76695    2000000       8.9100

      24          0.76548   + or - 0.00050     0.76498 to 0.76598
0.76448 to 0.76647    0.76398 to 0.76697    1980000       8.8887

      25          0.76548   + or - 0.00050     0.76498 to 0.76599
0.76448 to 0.76649    0.76398 to 0.76699    1960000       8.8734

      26          0.76550   + or - 0.00051     0.76499 to 0.76600
0.76448 to 0.76651    0.76398 to 0.76702    1940000       8.8771

      27          0.76553   + or - 0.00051     0.76501 to 0.76604
0.76450 to 0.76655    0.76398 to 0.76707    1920000       8.8060

      28          0.76555   + or - 0.00052     0.76503 to 0.76607
0.76452 to 0.76659    0.76400 to 0.76711    1900000       8.8451

      29          0.76551   + or - 0.00052     0.76499 to 0.76603
0.76446 to 0.76655    0.76394 to 0.76707    1880000       8.9050

      30          0.76552   + or - 0.00053     0.76499 to 0.76605
0.76447 to 0.76658    0.76394 to 0.76711    1860000       8.8916

      31          0.76552   + or - 0.00053     0.76499 to 0.76606
0.76446 to 0.76659    0.76392 to 0.76712    1840000       8.8552

      32          0.76553   + or - 0.00054     0.76499 to 0.76607
0.76445 to 0.76661    0.76391 to 0.76715    1820000       8.8088

      37          0.76547   + or - 0.00056     0.76491 to 0.76604
0.76435 to 0.76660    0.76379 to 0.76716    1720000       9.1186

      42          0.76547   + or - 0.00059     0.76488 to 0.76606
0.76429 to 0.76665    0.76370 to 0.76724    1620000       9.1387
```

```
      47          0.76559   + or - 0.00062     0.76497 to 0.76621
0.76435 to 0.76683    0.76373 to 0.76745    1520000       9.3582

      52          0.76575   + or - 0.00065     0.76510 to 0.76639
0.76445 to 0.76704    0.76381 to 0.76769    1420000       9.7370

      57          0.76613   + or - 0.00062     0.76551 to 0.76674
0.76489 to 0.76736    0.76427 to 0.76798    1320000       9.4132

      62          0.76585   + or - 0.00065     0.76520 to 0.76651
0.76455 to 0.76716    0.76390 to 0.76781    1220000       9.8724

      67          0.76596   + or - 0.00067     0.76529 to 0.76663
0.76462 to 0.76730    0.76395 to 0.76797    1120000      10.7273

      72          0.76609   + or - 0.00073     0.76535 to 0.76682
0.76462 to 0.76756    0.76388 to 0.76829    1020000      10.5464

      77          0.76586   + or - 0.00081     0.76505 to 0.76668
0.76424 to 0.76749    0.76342 to 0.76830     920000      10.1785

      82          0.76580   + or - 0.00087     0.76492 to 0.76667
0.76405 to 0.76754    0.76318 to 0.76841     820000      11.1201

      87          0.76567   + or - 0.00094     0.76473 to 0.76660
0.76379 to 0.76754    0.76286 to 0.76847     720000      11.2218

      92          0.76564   + or - 0.00103     0.76460 to 0.76667
0.76357 to 0.76770    0.76254 to 0.76874     620000      11.4970

      97          0.76528   + or - 0.00120     0.76408 to 0.76648
0.76288 to 0.76768    0.76169 to 0.76887     520000      11.3888

     102          0.76496   + or - 0.00137     0.76359 to 0.76633
0.76222 to 0.76770    0.76085 to 0.76907     420000      12.9137

     107          0.76465   + or - 0.00180     0.76285 to 0.76645
0.76104 to 0.76825    0.75924 to 0.77005     320000      12.8110

     112          0.76628   + or - 0.00224     0.76404 to 0.76852
0.76179 to 0.77077    0.75955 to 0.77301     220000      16.3361
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          0.76601   + or - 0.00562     0.76039 to 0.77163
```

0.75477 to 0.77725 0.74915 to 0.78287 120000 9.6033
1 fuel bundle

plot of average k-effective by generation run.
the line represents k-eff = 0.76554 + or - 0.00049 which occurs for 119 generations run.

```
                                0.7639                    0.7649
0.7658

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

```
|                I
      45 +                                   I                        *
|              I
         |                               I                        *
|         I
         |                                 I                       *
|          I
         |                                   I                     *
|         I
         |                                                I
*       |          I
      50 +                                        I                  *
|      I
         |                                      I               *
I |
         |                                  I                 *
I  |
         |                                   I                *
I   |
         |                           I                   *
I   |
      55 +                   I                      *
I    |
         |                   I                      *
I     |
         |                                   *
I  |
         |          I                             *
I |
         |           I                            *
I  |
      60 +                       I                    *
I     |
         |                          I                     *
I|
         |                              I                       *
|    I
         |                               I                        *
|       I
         |                              I                     *
|I
      65 +                                I                      *
|    I
         |                               I                      *
|  I
         |                               I                     *
| I
         |                              I                     *
|I
         |                               I                     *
I
      70 +                                   I                    *
```


75
80
85
90
95

```
*              I
         |                                                        I
*              I
         |                                                        I
*              I
         |                                                         I
| *               I
     100 +                                                         I
| *              I
         |                                                          I
|  *              I
         |                                                           I
| *             I
         |                                                              I
|   *             I
         |                                                            I
|  *             I
     105 +                                                            I
|  *             I
         |                                                            I
|   *              I
         |                                                           I
| *              I
         |                                                         I
|*             I
         |                                                       I
*|             I
     110 +                                                   I
*  |          I
         |                                                I
*   |          I
         |                                                I
*    |          I
         |                                                   I
*  |          I
         |                                                   I
*  |          I
     115 +                                                      I
*|            I
         |                                                     I
* |           I
         |                                                     I
*  |          I
         |                                                     I
* |          I
         |                                                        I
*            I
     120 +                                                     I
* |          I
         |                                                      I
*|            I
         |                                                     I
```

```
* |          I
         |                                                          I
* |           I
1                           fuel bundle
```

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

```
                                0.7638                    0.7650
0.7663

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

```
I
         |                                                   I           *
I
         |                                                   I           |*
I
         |                                                    I          | *
I
      45 +                                                    I          | *
I
         |                                                     I         |
*           I
         |                                                    I          |
*           I
         |                                                    I          |
*           I
         |                                                   I           | *
I
      50 +                                                    I          |
*            I
         |                                                      I        |
*            I
         |                                                       I       |
*            I
         |                                                       I       |
*            I
         |                                                         I    |
*            I
      55 +                                                           I  |
*            I
         |                                                           I  |
*            I
         |                                                              |I
*            I
         |                                                             I|
*           I
         |                                                              I
*            I
      60 +                                                             I|
*            I
         |                                                           I  |
*           I
         |                                                         I    |
*            I
         |                                                       I      |
*            I
         |                                                           I  |
*           I
      65 +                                                         I    |
*              I
         |                                                          I   |
*            I
         |                                                           I  |
```

```
*             I
         |                                                        I |
*            I
         |                                                        I |
*             I
      70 +                                                     I   |
*              I
         |                                                        I |
*              I
         |                                                        I |
*             I
         |                                                       I  |
*              I
         |                                                     I   |
*              I
      75 +                                                       I  |
*               I
         |                                                   I     |
*               I
         |                                                I        |
*               I
         |                                                   I     |
*               I
         |                                                I        |
*                I
      80 +                                                  I      |
*                I
         |                                               I         |
*                I
         |                                            I            |
*                I
         |                                             I           |
*                 I
         |                                               I         |
*                 I
      85 +                                               I         |
*                   I
         |                                          I              |
*                 I
         |                                       I                 |
*                  I
         |                                 I                       *
I
         |                                   I                     | *
I
      90 +                                  I                      |*
I
         |                                   I                     |
*                   I
         |                                   I                     |
*                   I
         |                                  I                      |
```

```
*                   I
         |                                   I                   |*
I
      95 +                                I                     *  |
I
         |                              I                       *  |
I
         |                            I                         *  |
I
         |                          I                          *   |
I
         |                      I                        *         |
I
     100 +                      I                         *        |
I
         |                  I                          *           |
I
         |                   I                          *          |
I
         |              I                            *             |
I
         |              I                              *           |
I
     105 +           I                               *             |
I
         |  I                                  *                  |
I
         |      I                                  *             |
I
         |            I                                  *        |
I
         |                 I                                  *   |
I
     110 +                              I                         |
*
         |                                I                       |
*
         |                            I                           |
*
         |                     I                                  |
*
         |                I                                       |
*
     115 +                                                   *     |
         |                                                        |*
         |                                                        |
*
         |                                                        |
*
         |                         *                              |
     120 +                                                        |
*
```

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			2.32346E-07	100.0000	1.79287E-07	52.1771	0.00000E+00	0.0000
3	0.0000			1.23962E-05	11.7238	2.01566E-05	5.2616	0.00000E+00	0.0000
4	0.0000			2.02727E-05	10.0831	3.42987E-05	4.2176	0.00000E+00	0.0000
5	0.0000			2.32387E-05	8.3527	5.17033E-05	2.9233	0.00000E+00	0.0000
6	0.0001			9.22140E-05	4.0928	2.33563E-04	1.5885	0.00000E+00	0.0000
7	0.0002			1.23037E-04	3.2363	2.12610E-04	1.4026	0.00000E+00	0.0000
8	0.0003			2.44479E-04	1.9447	3.26624E-04	0.9057	0.00000E+00	0.0000
9	0.0005			3.85303E-04	1.2242	4.46669E-04	0.5113	0.00000E+00	0.0000
10	0.0003			1.98259E-04	1.5295	2.04938E-04	0.7391	0.00000E+00	0.0000
11	0.0012			9.15640E-04	0.7719	5.26074E-04	0.5263	0.00000E+00	0.0000
12	0.0010			7.61602E-04	0.7799	2.98580E-04	0.7670	0.00000E+00	0.0000
13	0.0003			2.32923E-04	1.5295	9.25167E-05	1.5126	0.00000E+00	0.0000
14	0.0013			1.01427E-03	0.5858	4.14541E-04	0.5802	0.00000E+00	0.0000
15	0.0010			7.62164E-04	0.5722	3.28608E-04	0.5654	0.00000E+00	0.0000
16	0.0002			1.89929E-04	1.0954	8.72633E-05	1.0805	0.00000E+00	0.0000
17	0.0001			6.85064E-05	1.7129	3.32981E-05	1.6821	0.00000E+00	0.0000
18	0.0001			5.07594E-05	1.7231	2.56442E-05	1.6935	0.00000E+00	0.0000
19	0.0001			8.11325E-05	1.4156	4.28869E-05	1.3830	0.00000E+00	0.0000
20	0.0001			5.90203E-05	1.5302	3.23463E-05	1.4911	0.00000E+00	0.0000

21	0.0002	1.20894E-04	0.9549	6.82578E-05	0.9306
0.00000E+00	0.0000				
22	0.0001	1.04836E-04	1.0781	6.20688E-05	1.0522
0.00000E+00	0.0000				
23	0.0001	1.05864E-04	1.1204	6.46410E-05	1.0920
0.00000E+00	0.0000				
24	0.0000	2.64695E-05	2.3494	1.64082E-05	2.2875
0.00000E+00	0.0000				
25	0.0000	3.05908E-05	1.9467	1.91228E-05	1.8977
0.00000E+00	0.0000				
26	0.0000	1.68097E-05	2.5367	1.05720E-05	2.4688
0.00000E+00	0.0000				
27	0.0001	5.40932E-05	1.3612	3.37503E-05	1.3338
0.00000E+00	0.0000				
28	0.0001	9.71944E-05	0.9942	6.06372E-05	0.9774
0.00000E+00	0.0000				
29	0.0001	9.83405E-05	1.0475	6.19461E-05	1.0336
0.00000E+00	0.0000				
30	0.0000	1.20852E-05	3.0114	7.58405E-06	2.9871
0.00000E+00	0.0000				
31	0.0001	9.50620E-05	0.9947	6.00653E-05	0.9823
0.00000E+00	0.0000				
32	0.0000	3.71588E-05	1.6888	2.37592E-05	1.6541
0.00000E+00	0.0000				
33	0.0000	3.28126E-05	1.5022	2.05452E-05	1.4844
0.00000E+00	0.0000				
34	0.0001	7.58925E-05	1.3216	4.76689E-05	1.3029
0.00000E+00	0.0000				
35	0.0001	4.43218E-05	1.6506	2.78291E-05	1.6265
0.00000E+00	0.0000				
36	0.0001	4.51496E-05	1.2322	2.79369E-05	1.2209
0.00000E+00	0.0000				
37	0.0000	2.87557E-05	1.6449	1.80463E-05	1.6119
0.00000E+00	0.0000				
38	0.0000	3.42751E-05	1.6722	2.15830E-05	1.6372
0.00000E+00	0.0000				
39	0.0002	1.32065E-04	1.0587	8.40208E-05	1.0346
0.00000E+00	0.0000				
40	0.0002	1.19651E-04	0.8920	7.73703E-05	0.8744
0.00000E+00	0.0000				
41	0.0002	1.58742E-04	0.7856	1.06098E-04	0.7593
0.00000E+00	0.0000				
42	0.0002	1.39811E-04	0.7755	9.51137E-05	0.7573
0.00000E+00	0.0000				
43	0.0001	7.97606E-05	1.1701	5.72524E-05	1.1177
0.00000E+00	0.0000				
44	0.0001	1.13011E-04	1.0828	8.30183E-05	1.0360
0.00000E+00	0.0000				
45	0.0001	6.06283E-05	0.9925	4.88274E-05	0.9135
0.00000E+00	0.0000				
46	0.0000	1.47778E-05	1.9011	1.18622E-05	1.7640
0.00000E+00	0.0000				

```
   47    0.0001                 4.13065E-05     1.6060
3.20640E-05     1.5470       0.00000E+00     0.0000
   48    0.0000                 1.20421E-05     3.7557
9.34185E-06     3.6467       0.00000E+00     0.0000
   49    0.0001                 8.10135E-05     1.6564
6.38692E-05     1.6186       0.00000E+00     0.0000
   50    0.0001                 5.67588E-05     1.8137
4.67467E-05     1.7767       0.00000E+00     0.0000
   51    0.0000                 1.51212E-05     3.3701
1.25638E-05     3.3043       0.00000E+00     0.0000
   52    0.0001                 4.00856E-05     1.8359
3.46785E-05     1.7891       0.00000E+00     0.0000
   53    0.0002                 1.57568E-04     0.8281
1.54792E-04     0.7658       0.00000E+00     0.0000
   54    0.0001                 7.37765E-05     1.9224
6.85617E-05     1.8600       0.00000E+00     0.0000
   55    0.0002                 1.63821E-04     1.5154
1.50198E-04     1.4753       0.00000E+00     0.0000
   56    0.0002                 1.17026E-04     1.5634
1.08535E-04     1.5257       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                 1.49073E-04     1.3831
1.35285E-04     1.3492       0.00000E+00     0.0000
   58    0.0001                 8.38789E-05     2.0930
7.34821E-05     2.0332       0.00000E+00     0.0000
   59    0.0002                 1.62327E-04     1.6073
1.45670E-04     1.5426       0.00000E+00     0.0000
   60    0.0004                 2.72290E-04     1.3128
2.47023E-04     1.2496       0.00000E+00     0.0000
   61    0.0000                 2.76572E-05     4.2420
2.12956E-05     4.1004       0.00000E+00     0.0000
   62    0.0002                 1.62795E-04     1.7221
1.36576E-04     1.6741       0.00000E+00     0.0000
   63    0.0002                 1.22436E-04     1.9917
1.00749E-04     1.9229       0.00000E+00     0.0000
   64    0.0001                 9.85846E-05     2.6536
7.95135E-05     2.5630       0.00000E+00     0.0000
   65    0.0000                 3.28163E-05     3.7509
3.24980E-05     3.6108       0.00000E+00     0.0000
   66    0.0002                 1.70970E-04     1.5933
1.51754E-04     1.5415       0.00000E+00     0.0000
   67    0.0002                 1.45945E-04     2.1730
1.19413E-04     2.1026       0.00000E+00     0.0000
   68    0.0000                 2.67508E-05     4.5546
```

2.31286E-05	4.3905	0.00000E+00	0.0000	69	0.0004	3.02320E-04	1.4814
2.37255E-04	1.4344	0.00000E+00	0.0000	70	0.0003	2.05975E-04	1.7717
1.87486E-04	1.7051	0.00000E+00	0.0000	71	0.0006	4.40124E-04	1.3544
3.63973E-04	1.3128	0.00000E+00	0.0000	72	0.0001	4.99069E-05	5.6100
2.94654E-05	5.4788	0.00000E+00	0.0000	73	0.0004	3.22784E-04	1.6003
2.46021E-04	1.5130	0.00000E+00	0.0000	74	0.0014	1.06301E-03	1.0101
7.73001E-04	0.9723	0.00000E+00	0.0000	75	0.0001	1.11366E-04	3.0201
8.56831E-05	2.8753	0.00000E+00	0.0000	76	0.0006	4.58844E-04	1.9247
2.91529E-04	1.8557	0.00000E+00	0.0000	77	0.0005	3.66306E-04	2.0139
2.62827E-04	1.9357	0.00000E+00	0.0000	78	0.0000	6.73892E-06	4.4704
6.60032E-05	4.4210	0.00000E+00	0.0000	79	0.0002	1.78363E-04	2.7163
1.20173E-04	2.6074	0.00000E+00	0.0000	80	0.0001	6.06340E-05	3.4055
8.08956E-05	3.3097	0.00000E+00	0.0000	81	0.0014	1.05535E-03	1.1433
7.76372E-04	1.0974	0.00000E+00	0.0000	82	0.0001	6.39829E-05	4.5739
3.84512E-05	4.3309	0.00000E+00	0.0000	83	0.0002	1.21968E-04	3.6463
1.35098E-04	3.5663	0.00000E+00	0.0000	84	0.0001	7.98049E-05	2.8606
8.09782E-05	2.6593	0.00000E+00	0.0000	85	0.0003	1.99092E-04	2.1088
2.45079E-04	2.0516	0.00000E+00	0.0000	86	0.0003	2.60414E-04	2.4666
2.09753E-04	2.3485	0.00000E+00	0.0000	87	0.0004	3.39900E-04	2.4284
2.11271E-04	2.3285	0.00000E+00	0.0000	88	0.0001	5.63476E-05	4.1520
1.02248E-04	4.0478	0.00000E+00	0.0000	89	0.0001	8.54029E-05	4.0185
5.97915E-05	3.6706	0.00000E+00	0.0000	90	0.0003	2.08886E-04	2.8339
1.23671E-04	2.7088	0.00000E+00	0.0000	91	0.0002	1.84646E-04	2.9376
1.17011E-04	2.7607	0.00000E+00	0.0000	92	0.0000	3.17372E-05	2.5984
2.07569E-04	2.5492	0.00000E+00	0.0000	93	0.0002	1.27264E-04	3.3437
1.03619E-04	3.1081	0.00000E+00	0.0000	94	0.0001	1.06689E-04	4.5371

```
6.01464E-05     4.2343       0.00000E+00     0.0000
   95    0.0008                 5.98792E-04     2.1596
3.69575E-04     2.0899       0.00000E+00     0.0000
   96    0.0002                 1.57757E-04     4.1638
7.99144E-05     3.9958       0.00000E+00     0.0000
   97    0.0004                 2.87157E-04     3.9199
1.64370E-04     3.8375       0.00000E+00     0.0000
   98    0.0001                 9.87271E-05     3.9494
9.48240E-05     3.8059       0.00000E+00     0.0000
   99    0.0001                 9.13632E-05     4.8539
6.14785E-05     4.6745       0.00000E+00     0.0000
  100    0.0001                 1.12617E-04     4.2064
7.57297E-05     4.0177       0.00000E+00     0.0000
  101    0.0001                 1.11584E-04     3.8363
7.08954E-05     3.5544       0.00000E+00     0.0000
  102    0.0002                 1.65238E-04     3.7195
9.19667E-05     3.5759       0.00000E+00     0.0000
  103    0.0001                 9.62282E-05     3.7253
9.38477E-05     3.5301       0.00000E+00     0.0000
  104    0.0002                 1.66011E-04     3.5318
1.31702E-04     3.4050       0.00000E+00     0.0000
  105    0.0002                 1.15334E-04     3.4426
7.65326E-05     3.2274       0.00000E+00     0.0000
  106    0.0002                 1.72963E-04     3.8692
1.28600E-04     3.8163       0.00000E+00     0.0000
  107    0.0001                 6.34578E-05     4.0170
6.41556E-05     3.7667       0.00000E+00     0.0000
  108    0.0000                 3.53875E-05     2.5375
1.52779E-04     2.4764       0.00000E+00     0.0000
  109    0.0002                 1.34697E-04     1.9399
4.46728E-04     1.9134       0.00000E+00     0.0000
  110    0.0009                 6.56360E-04     2.9379
4.04694E-04     2.9116       0.00000E+00     0.0000
  111    0.0002                 1.46793E-04     4.5384
1.35074E-04     4.4127       0.00000E+00     0.0000
  112    0.0001                 1.09725E-04     5.0908
1.15851E-04     4.9845       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                 1.26947E-04     3.7345
1.10921E-04     3.4988       0.00000E+00     0.0000
  114    0.0000                 1.01960E-05     6.6787
1.40776E-05     5.5256       0.00000E+00     0.0000
  115    0.0001                 7.02827E-05     3.8269
8.20020E-05     3.5159       0.00000E+00     0.0000
```

116	0.0002	1.91111E-04	3.0462	1.43942E-04	2.7374
0.00000E+00	0.0000				
117	0.0006	4.75719E-04	2.4566	2.54314E-04	2.2934
0.00000E+00	0.0000				
118	0.0008	6.07987E-04	2.1021	4.73926E-04	2.0202
0.00000E+00	0.0000				
119	0.0002	1.41356E-04	1.9113	3.64857E-04	1.8419
0.00000E+00	0.0000				
120	0.0002	1.74610E-04	2.1587	6.64117E-04	2.1283
0.00000E+00	0.0000				
121	0.0007	5.18821E-04	2.8824	3.99261E-04	2.8062
0.00000E+00	0.0000				
122	0.0001	1.01683E-04	4.4958	7.95464E-05	4.1916
0.00000E+00	0.0000				
123	0.0003	2.20486E-04	2.9909	1.55890E-04	2.6619
0.00000E+00	0.0000				
124	0.0003	2.36982E-04	2.8372	1.95453E-04	2.6495
0.00000E+00	0.0000				
125	0.0002	1.41658E-04	3.5528	1.30038E-04	3.2045
0.00000E+00	0.0000				
126	0.0001	9.95629E-05	3.9770	8.94386E-05	3.5077
0.00000E+00	0.0000				
127	0.0005	4.10949E-04	2.9822	2.01274E-04	2.8288
0.00000E+00	0.0000				
128	0.0003	2.25241E-04	3.1601	1.38509E-04	2.8267
0.00000E+00	0.0000				
129	0.0006	4.52665E-04	2.3683	4.16672E-04	2.2636
0.00000E+00	0.0000				
130	0.0001	1.14402E-04	3.1801	2.79252E-04	3.0834
0.00000E+00	0.0000				
131	0.0004	2.83126E-04	1.9487	2.28947E-04	1.6412
0.00000E+00	0.0000				
132	0.0007	5.06039E-04	2.2887	3.11976E-04	2.1062
0.00000E+00	0.0000				
133	0.0014	1.04005E-03	1.8365	6.57508E-04	1.7467
0.00000E+00	0.0000				
134	0.0001	8.95319E-05	2.5678	2.33705E-04	2.1466
0.00000E+00	0.0000				
135	0.0002	1.78496E-04	2.7068	2.64479E-04	2.6458
0.00000E+00	0.0000				
136	0.0001	4.69287E-05	1.9323	7.28045E-04	1.9033
0.00000E+00	0.0000				
137	0.0000	1.93394E-05	1.0234	3.48000E-03	1.0208
0.00000E+00	0.0000				
138	0.0004	3.18104E-04	2.0919	8.28475E-04	2.0623
0.00000E+00	0.0000				
139	0.0002	1.77005E-04	3.1747	2.17703E-04	2.9810
0.00000E+00	0.0000				
140	0.0003	2.14394E-04	2.1553	2.84814E-04	1.8833
0.00000E+00	0.0000				
141	0.0001	7.90330E-05	2.8581	2.49587E-04	2.5504
0.00000E+00	0.0000				

142	0.0001	6.67045E-05	3.2171	2.30148E-04	2.9461
0.00000E+00	0.0000				
143	0.0001	8.07958E-05	2.0589	1.74121E-04	1.2710
0.00000E+00	0.0000				
144	0.0000	3.31426E-05	3.5583	7.29231E-05	2.1396
0.00000E+00	0.0000				
145	0.0005	3.88513E-04	2.9308	3.04079E-04	2.6831
0.00000E+00	0.0000				
146	0.0004	3.39467E-04	2.5249	2.48751E-04	2.0443
0.00000E+00	0.0000				
147	0.0002	1.68203E-04	4.2657	1.08330E-04	3.6870
0.00000E+00	0.0000				
148	0.0001	5.22903E-05	6.5510	3.57685E-05	5.1416
0.00000E+00	0.0000				
149	0.0000	2.97456E-05	7.4347	2.07349E-05	5.6648
0.00000E+00	0.0000				
150	0.0001	8.90754E-05	4.3691	6.47384E-05	3.2393
0.00000E+00	0.0000				
151	0.0001	6.80909E-05	4.0443	5.74687E-05	2.7635
0.00000E+00	0.0000				
152	0.0001	4.06965E-05	4.6241	4.64037E-05	2.7288
0.00000E+00	0.0000				
153	0.0001	3.99239E-05	3.9108	4.56304E-05	2.3380
0.00000E+00	0.0000				
154	0.0001	4.85511E-05	3.9704	5.00001E-05	2.3467
0.00000E+00	0.0000				
155	0.0001	4.63066E-05	4.2021	4.68843E-05	2.5155
0.00000E+00	0.0000				
156	0.0001	4.65776E-05	4.0734	4.57429E-05	2.4834
0.00000E+00	0.0000				
157	0.0001	6.03263E-05	4.0029	5.82227E-05	2.5266
0.00000E+00	0.0000				
158	0.0001	6.26715E-05	4.7671	6.51987E-05	3.0470
0.00000E+00	0.0000				
159	0.0002	1.56564E-04	2.5858	2.16113E-04	2.1691
0.00000E+00	0.0000				
160	0.0001	6.03248E-05	4.1529	7.21062E-05	3.0903
0.00000E+00	0.0000				
161	0.0001	7.29956E-05	3.7277	7.24903E-05	2.4157
0.00000E+00	0.0000				
162	0.0001	8.93081E-05	3.8578	8.34611E-05	2.4492
0.00000E+00	0.0000				
163	0.0001	8.62084E-05	4.0780	8.26211E-05	2.4465
0.00000E+00	0.0000				
164	0.0001	1.02136E-04	3.8025	9.48418E-05	2.3777
0.00000E+00	0.0000				
165	0.0002	1.17254E-04	3.2066	1.06660E-04	2.0469
0.00000E+00	0.0000				
166	0.0001	7.89985E-05	4.0598	6.95025E-05	2.7154
0.00000E+00	0.0000				
167	0.0001	7.95359E-05	4.4655	7.13605E-05	2.9185
0.00000E+00	0.0000				

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  168    0.0001                 8.55705E-05     4.1414
7.67617E-05     2.7163       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                 1.02931E-04     3.5889
9.07802E-05     2.5617       0.00000E+00     0.0000
  170    0.0002                 1.30546E-04     3.6066
1.12334E-04     2.6710       0.00000E+00     0.0000
  171    0.0001                 9.77565E-05     4.8068
7.55225E-05     3.8821       0.00000E+00     0.0000
  172    0.0002                 1.45741E-04     4.5035
1.02514E-04     3.8110       0.00000E+00     0.0000
  173    0.0003                 1.95375E-04     3.6592
1.28408E-04     3.2131       0.00000E+00     0.0000
  174    0.0003                 2.53091E-04     4.3008
1.57485E-04     3.8468       0.00000E+00     0.0000
  175    0.0001                 9.90024E-05     5.8091
6.04844E-05     5.1775       0.00000E+00     0.0000
  176    0.0001                 1.14599E-04     5.9775
6.83638E-05     5.3998       0.00000E+00     0.0000
  177    0.0002                 1.27016E-04     6.1389
7.44662E-05     5.5767       0.00000E+00     0.0000
  178    0.0002                 1.22026E-04     5.9232
7.10996E-05     5.3502       0.00000E+00     0.0000
  179    0.0002                 1.30923E-04     6.4287
7.53410E-05     5.7698       0.00000E+00     0.0000
  180    0.0002                 1.16841E-04     6.4362
6.77087E-05     5.7045       0.00000E+00     0.0000
  181    0.0001                 1.05641E-04     6.7519
6.14944E-05     5.9722       0.00000E+00     0.0000
  182    0.0001                 1.07619E-04     5.9293
6.24427E-05     5.1647       0.00000E+00     0.0000
  183    0.0001                 9.14068E-05     6.4539
5.37095E-05     5.5751       0.00000E+00     0.0000
  184    0.0001                 9.80176E-05     6.2761
5.72258E-05     5.3960       0.00000E+00     0.0000
  185    0.0001                 8.66925E-05     7.0630
5.12922E-05     5.9757       0.00000E+00     0.0000
  186    0.0001                 9.08598E-05     6.8880
5.32629E-05     5.8679       0.00000E+00     0.0000
  187    0.0001                 7.86610E-05     6.6967
4.71650E-05     5.5332       0.00000E+00     0.0000
  188    0.0001                 9.22769E-05     6.0157
5.39149E-05     5.0973       0.00000E+00     0.0000
  189    0.0001                 8.63052E-05     5.8924
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5.09090E-05	4.9963	0.00000E+00	0.0000	190	0.0003	2.13605E-04	3.9667
1.26972E-04	3.2604	0.00000E+00	0.0000	191	0.0003	2.11832E-04	3.8424
1.25960E-04	3.1803	0.00000E+00	0.0000	192	0.0003	1.97115E-04	4.2906
1.19604E-04	3.4513	0.00000E+00	0.0000	193	0.0003	1.95114E-04	4.2539
1.19313E-04	3.3691	0.00000E+00	0.0000	194	0.0005	3.93801E-04	2.6986
2.43560E-04	2.1194	0.00000E+00	0.0000	195	0.0005	4.20537E-04	2.5785
2.61602E-04	2.0094	0.00000E+00	0.0000	196	0.0006	4.55633E-04	2.4791
2.84472E-04	1.9353	0.00000E+00	0.0000	197	0.0007	5.23366E-04	2.7041
3.24494E-04	2.0916	0.00000E+00	0.0000	198	0.0007	5.59393E-04	2.4228
3.49126E-04	1.8778	0.00000E+00	0.0000	199	0.0004	3.27076E-04	3.3081
2.00966E-04	2.6111	0.00000E+00	0.0000	200	0.0005	3.55343E-04	2.7772
2.18689E-04	2.1956	0.00000E+00	0.0000	201	0.0011	8.21503E-04	2.1599
4.99299E-04	1.7264	0.00000E+00	0.0000	202	0.0013	9.83743E-04	1.8188
5.96313E-04	1.4690	0.00000E+00	0.0000	203	0.0016	1.23589E-03	1.7800
7.37280E-04	1.4639	0.00000E+00	0.0000	204	0.0022	1.68970E-03	1.4772
9.90581E-04	1.2492	0.00000E+00	0.0000	205	0.0015	1.11605E-03	2.2669
6.55392E-04	1.8994	0.00000E+00	0.0000	206	0.0019	1.45460E-03	1.8533
8.43373E-04	1.5934	0.00000E+00	0.0000	207	0.0021	1.63506E-03	1.6439
9.52376E-04	1.4283	0.00000E+00	0.0000	208	0.0028	2.17292E-03	1.5553
1.26667E-03	1.3680	0.00000E+00	0.0000	209	0.0031	2.39905E-03	1.3436
1.40952E-03	1.1952	0.00000E+00	0.0000	210	0.0037	2.86947E-03	1.3222
1.70837E-03	1.1718	0.00000E+00	0.0000	211	0.0041	3.16095E-03	1.3287
1.90216E-03	1.1532	0.00000E+00	0.0000	212	0.0048	3.64507E-03	1.2147
2.20457E-03	1.0413	0.00000E+00	0.0000	213	0.0064	4.90370E-03	0.9340
2.97594E-03	0.7945	0.00000E+00	0.0000	214	0.0096	7.32278E-03	0.7464
4.41304E-03	0.6354	0.00000E+00	0.0000	215	0.0158	1.21184E-02	0.6659

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7.22135E-03     0.5595       0.00000E+00     0.0000
  216    0.0303                 2.31971E-02     0.4484
1.36704E-02     0.3840       0.00000E+00     0.0000
  217    0.0200                 1.53188E-02     0.5278
9.01403E-03     0.4491       0.00000E+00     0.0000
  218    0.0277                 2.11801E-02     0.4818
1.23921E-02     0.4061       0.00000E+00     0.0000
  219    0.0357                 2.72958E-02     0.3688
1.59246E-02     0.3138       0.00000E+00     0.0000
  220    0.0473                 3.62026E-02     0.3141
2.10448E-02     0.2674       0.00000E+00     0.0000
  221    0.0621                 4.75465E-02     0.3355
2.76104E-02     0.2885       0.00000E+00     0.0000
  222    0.0800                 6.12694E-02     0.2790
3.55151E-02     0.2391       0.00000E+00     0.0000
  223    0.1045                 7.99579E-02     0.2529
4.63966E-02     0.2173       0.00000E+00     0.0000
  224    0.0582                 4.45334E-02     0.3112
2.59449E-02     0.2634       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    0.2308                 1.76690E-01     0.1516
1.04671E-01     0.1279       0.00000E+00     0.0000
  226    0.0453                 3.47093E-02     0.3812
2.11451E-02     0.3139       0.00000E+00     0.0000
  227    0.0491                 3.75539E-02     0.3703
2.32989E-02     0.2994       0.00000E+00     0.0000
  228    0.0209                 1.59974E-02     0.5315
1.01451E-02     0.4385       0.00000E+00     0.0000
  229    0.0223                 1.71054E-02     0.5619
1.09966E-02     0.4513       0.00000E+00     0.0000
  230    0.0118                 8.99584E-03     0.7315
5.88046E-03     0.5721       0.00000E+00     0.0000
  231    0.0122                 9.31654E-03     0.7765
6.20233E-03     0.5854       0.00000E+00     0.0000
  232    0.0131                 9.99655E-03     0.7566
6.81092E-03     0.5574       0.00000E+00     0.0000
  233    0.0083                 6.36534E-03     0.9083
4.47581E-03     0.6660       0.00000E+00     0.0000
  234    0.0060                 4.61987E-03     1.0837
3.30606E-03     0.7867       0.00000E+00     0.0000
  235    0.0025                 1.89478E-03     1.6851
1.25118E-03     1.2849       0.00000E+00     0.0000
  236    0.0019                 1.48661E-03     1.9848
9.95631E-04     1.4738       0.00000E+00     0.0000
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  237    0.0017                 1.32547E-03     2.0321
9.39924E-04     1.4750       0.00000E+00     0.0000
  238    0.0001                 5.85423E-05     9.4460
5.43222E-05     5.3938       0.00000E+00     0.0000

 system total =                 7.65471E-01     0.0538
4.68863E-01     0.0476       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3139E-01  +
or -  0.0002



 elapsed time   3.10833 minutes

 random number=   6EF84F62A89CE93C
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     flux     percent     flux     percent
                deviation            deviation            deviation
    1   0.000E+00    0.00   0.000E+00    0.00   0.000E+00    0.00
    2   1.965E-08   28.67   1.470E-08   27.92   1.598E-08   28.78
    3   9.279E-07    3.69   7.495E-07    3.37   8.034E-07    3.39
    4   1.465E-06    3.29   1.213E-06    3.05   1.302E-06    3.20
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5	2.318E-06	2.23	1.904E-06	2.05	2.044E-06	2.06
6	9.534E-06	1.34	7.615E-06	1.10	8.141E-06	1.12
7	1.255E-05	1.10	9.645E-06	0.98	1.020E-05	0.97
8	3.161E-05	0.86	2.309E-05	0.69	2.420E-05	0.68
9	8.236E-05	0.48	5.907E-05	0.40	6.164E-05	0.43
10	4.611E-05	0.55	3.305E-05	0.46	3.424E-05	0.48
11	2.191E-04	0.31	1.547E-04	0.26	1.607E-04	0.24
12	1.895E-04	0.30	1.375E-04	0.25	1.442E-04	0.27
13	5.684E-05	0.51	4.151E-05	0.46	4.345E-05	0.43
14	2.537E-04	0.25	1.834E-04	0.21	1.915E-04	0.21
15	2.208E-04	0.27	1.598E-04	0.23	1.667E-04	0.24
16	7.042E-05	0.48	5.133E-05	0.35	5.389E-05	0.33
17	3.218E-05	0.67	2.350E-05	0.57	2.456E-05	0.56
18	2.771E-05	0.66	2.028E-05	0.62	2.098E-05	0.56
19	4.977E-05	0.50	3.630E-05	0.47	3.784E-05	0.46
20	3.995E-05	0.56	2.926E-05	0.45	3.061E-05	0.45
21	8.020E-05	0.38	5.876E-05	0.35	6.139E-05	0.36
22	7.258E-05	0.47	5.340E-05	0.42	5.531E-05	0.41
23	7.684E-05	0.41	5.623E-05	0.38	5.851E-05	0.36
24	1.869E-05	0.91	1.371E-05	0.76	1.425E-05	0.68
25	2.333E-05	0.72	1.721E-05	0.58	1.811E-05	0.53
26	1.340E-05	0.96	9.916E-06	0.82	1.042E-05	0.76
27	4.200E-05	0.53	3.098E-05	0.46	3.275E-05	0.45
28	7.700E-05	0.43	5.730E-05	0.35	6.079E-05	0.32
29	7.962E-05	0.37	5.936E-05	0.34	6.198E-05	0.32
30	9.935E-06	1.03	7.464E-06	0.88	7.831E-06	0.88
31	7.839E-05	0.37	5.893E-05	0.33	6.195E-05	0.33
32	3.068E-05	0.61	2.316E-05	0.49	2.442E-05	0.49
33	2.670E-05	0.62	2.020E-05	0.55	2.126E-05	0.51
34	6.061E-05	0.47	4.587E-05	0.37	4.825E-05	0.36
35	3.629E-05	0.53	2.750E-05	0.41	2.894E-05	0.46
36	3.399E-05	0.51	2.577E-05	0.41	2.693E-05	0.44
37	2.241E-05	0.67	1.676E-05	0.53	1.748E-05	0.48
38	2.602E-05	0.60	1.985E-05	0.55	2.090E-05	0.51
39	9.774E-05	0.34	7.498E-05	0.29	7.917E-05	0.24
40	8.991E-05	0.33	6.938E-05	0.28	7.397E-05	0.27
41	1.127E-04	0.30	8.826E-05	0.25	9.422E-05	0.21
42	9.375E-05	0.30	7.402E-05	0.29	7.940E-05	0.26
43	5.138E-05	0.40	4.072E-05	0.31	4.284E-05	0.29
44	6.975E-05	0.36	5.596E-05	0.29	6.009E-05	0.26
45	3.528E-05	0.39	2.813E-05	0.34	3.117E-05	0.29
46	8.323E-06	0.86	6.622E-06	0.72	7.150E-06	0.66
47	2.363E-05	0.51	1.882E-05	0.50	1.952E-05	0.40
48	6.838E-06	1.10	5.409E-06	0.92	5.706E-06	0.78
49	4.364E-05	0.44	3.504E-05	0.35	3.768E-05	0.30
50	2.941E-05	0.48	2.364E-05	0.49	2.563E-05	0.40
51	7.861E-06	0.90	6.354E-06	0.77	6.910E-06	0.64
52	2.057E-05	0.49	1.658E-05	0.41	1.812E-05	0.39
53	7.629E-05	0.30	6.151E-05	0.25	6.690E-05	0.23
54	3.347E-05	0.44	2.712E-05	0.37	2.923E-05	0.30
55	6.649E-05	0.31	5.408E-05	0.29	5.883E-05	0.23
56	4.327E-05	0.39	3.530E-05	0.34	3.847E-05	0.28

57	4.923E-05	0.34	4.016E-05	0.30	4.377E-05	0.26
58	2.578E-05	0.54	2.108E-05	0.44	2.301E-05	0.38
59	4.420E-05	0.38	3.616E-05	0.33	3.933E-05	0.25
60	6.430E-05	0.34	5.266E-05	0.27	5.726E-05	0.23
61	6.182E-06	1.08	5.094E-06	0.95	5.537E-06	0.76
62	3.245E-05	0.34	2.662E-05	0.32	2.893E-05	0.29
63	2.185E-05	0.60	1.800E-05	0.51	1.950E-05	0.42
64	1.705E-05	0.70	1.406E-05	0.56	1.527E-05	0.44
65	5.789E-06	0.95	4.732E-06	0.89	5.150E-06	0.70
66	2.850E-05	0.39	2.353E-05	0.38	2.560E-05	0.30
67	2.128E-05	0.53	1.754E-05	0.44	1.899E-05	0.33
68	4.637E-06	1.04	3.824E-06	0.91	4.169E-06	0.76
69	3.732E-05	0.42	3.080E-05	0.38	3.342E-05	0.31
70	2.637E-05	0.45	2.179E-05	0.37	2.364E-05	0.35
71	4.565E-05	0.36	3.770E-05	0.30	4.097E-05	0.26
72	2.660E-06	1.47	2.192E-06	1.25	2.383E-06	1.00
73	2.730E-05	0.52	2.262E-05	0.42	2.450E-05	0.34
74	7.941E-05	0.31	6.593E-05	0.25	7.136E-05	0.22
75	9.241E-06	0.75	7.620E-06	0.68	8.220E-06	0.61
76	2.287E-05	0.46	1.898E-05	0.44	2.067E-05	0.38
77	1.779E-05	0.53	1.474E-05	0.52	1.599E-05	0.41
78	1.515E-06	1.71	1.273E-06	1.73	1.407E-06	1.30
79	9.974E-06	0.88	8.273E-06	0.73	8.931E-06	0.59
80	4.509E-06	1.14	3.735E-06	1.02	4.057E-06	0.86
81	5.502E-05	0.30	4.586E-05	0.28	4.973E-05	0.24
82	3.257E-06	1.19	2.706E-06	1.00	2.937E-06	0.89
83	4.428E-06	1.03	3.669E-06	0.89	4.021E-06	0.73
84	8.109E-06	0.86	6.744E-06	0.67	7.331E-06	0.56
85	9.875E-06	0.74	8.205E-06	0.69	8.918E-06	0.56
86	1.353E-05	0.65	1.130E-05	0.63	1.221E-05	0.50
87	1.175E-05	0.74	9.858E-06	0.61	1.072E-05	0.54
88	3.167E-06	1.30	2.634E-06	1.16	2.855E-06	0.92
89	6.618E-06	0.91	5.527E-06	0.80	5.947E-06	0.58
90	6.852E-06	0.83	5.747E-06	0.81	6.231E-06	0.63
91	8.219E-06	0.73	6.920E-06	0.73	7.499E-06	0.58
92	4.796E-06	0.96	3.997E-06	0.80	4.337E-06	0.69
93	8.117E-06	0.73	6.775E-06	0.67	7.322E-06	0.56
94	4.292E-06	1.08	3.608E-06	1.02	3.851E-06	0.78
95	1.260E-05	0.58	1.056E-05	0.54	1.143E-05	0.42
96	3.421E-06	1.08	2.861E-06	1.18	3.093E-06	0.97
97	3.350E-06	1.13	2.841E-06	1.08	3.092E-06	0.85
98	3.568E-06	1.06	2.958E-06	0.94	3.207E-06	0.74
99	2.291E-06	1.33	1.948E-06	1.15	2.115E-06	0.91
100	3.432E-06	1.20	2.888E-06	1.04	3.110E-06	0.95
101	4.927E-06	0.96	4.171E-06	0.82	4.443E-06	0.72
102	3.322E-06	1.08	2.822E-06	1.01	3.054E-06	0.86
103	4.660E-06	1.19	3.880E-06	0.98	4.197E-06	0.76
104	4.237E-06	1.22	3.539E-06	1.04	3.851E-06	0.88
105	4.282E-06	1.06	3.595E-06	0.96	3.925E-06	0.79
106	1.502E-06	1.76	1.277E-06	1.54	1.390E-06	1.22
107	3.541E-06	1.11	3.009E-06	1.09	3.246E-06	0.85
108	3.244E-06	1.21	2.727E-06	1.01	2.996E-06	0.81

109	5.193E-06	0.89	4.345E-06	0.82	4.732E-06	0.68
110	2.993E-06	1.42	2.544E-06	1.14	2.782E-06	1.08
111	3.006E-06	1.23	2.560E-06	1.24	2.798E-06	1.02
112	1.847E-06	1.61	1.572E-06	1.45	1.674E-06	1.15
113	5.658E-06	0.90	4.752E-06	0.85	5.168E-06	0.66
114	1.973E-06	1.47	1.624E-06	1.30	1.777E-06	1.14
115	5.130E-06	0.97	4.309E-06	0.81	4.588E-06	0.74
116	1.078E-05	0.66	9.024E-06	0.61	9.754E-06	0.48
117	1.185E-05	0.73	9.881E-06	0.64	1.074E-05	0.47
118	1.276E-05	0.65	1.080E-05	0.55	1.164E-05	0.47
119	8.271E-06	0.71	6.997E-06	0.62	7.634E-06	0.55
120	5.807E-06	0.77	4.862E-06	0.71	5.313E-06	0.65
121	6.014E-06	0.86	5.144E-06	0.72	5.564E-06	0.59
122	3.209E-06	1.21	2.697E-06	1.07	2.949E-06	0.90
123	1.029E-05	0.67	8.667E-06	0.60	9.397E-06	0.49
124	7.463E-06	0.93	6.285E-06	0.90	6.746E-06	0.71
125	7.039E-06	0.92	5.944E-06	0.79	6.372E-06	0.63
126	5.819E-06	1.00	4.870E-06	0.80	5.209E-06	0.66
127	5.506E-06	1.02	4.623E-06	0.82	5.021E-06	0.62
128	7.666E-06	0.77	6.451E-06	0.70	6.978E-06	0.58
129	9.603E-06	0.80	8.121E-06	0.69	8.816E-06	0.54
130	4.071E-06	1.05	3.444E-06	0.95	3.718E-06	0.79
131	1.678E-05	0.55	1.413E-05	0.50	1.520E-05	0.41
132	1.127E-05	0.66	9.491E-06	0.57	1.021E-05	0.44
133	1.353E-05	0.56	1.146E-05	0.47	1.244E-05	0.41
134	1.470E-05	0.60	1.245E-05	0.53	1.343E-05	0.42
135	2.409E-06	1.23	2.066E-06	1.22	2.242E-06	1.08
136	3.867E-06	0.93	3.373E-06	0.97	3.713E-06	0.75
137	2.527E-06	1.05	2.657E-06	0.86	2.990E-06	0.77
138	4.074E-06	1.09	3.548E-06	0.98	3.889E-06	0.78
139	4.560E-06	0.96	3.863E-06	0.88	4.198E-06	0.72
140	1.197E-05	0.61	1.014E-05	0.56	1.095E-05	0.44
141	8.727E-06	0.73	7.407E-06	0.71	8.024E-06	0.57
142	5.805E-06	0.93	4.928E-06	0.86	5.332E-06	0.72
143	2.001E-05	0.48	1.683E-05	0.42	1.805E-05	0.35
144	7.984E-06	0.81	6.769E-06	0.65	7.314E-06	0.56
145	7.159E-06	0.81	6.046E-06	0.71	6.548E-06	0.53
146	1.204E-05	0.59	1.013E-05	0.55	1.094E-05	0.47
147	3.672E-06	0.99	3.123E-06	0.96	3.374E-06	0.74
148	1.842E-06	1.55	1.552E-06	1.48	1.690E-06	1.17
149	1.168E-06	2.24	9.974E-07	2.03	1.071E-06	1.47
150	3.946E-06	1.08	3.335E-06	1.04	3.614E-06	0.85
151	4.106E-06	1.05	3.490E-06	0.99	3.776E-06	0.77
152	4.268E-06	1.00	3.594E-06	0.94	3.876E-06	0.74
153	4.461E-06	1.06	3.791E-06	0.95	4.052E-06	0.87
154	4.589E-06	1.13	3.906E-06	1.02	4.170E-06	0.76
155	4.239E-06	1.15	3.592E-06	0.95	3.862E-06	0.76
156	3.935E-06	1.02	3.319E-06	0.85	3.581E-06	0.84
157	4.680E-06	1.08	3.911E-06	0.98	4.240E-06	0.86
158	4.971E-06	1.10	4.152E-06	1.01	4.438E-06	0.78
159	6.733E-06	0.81	5.707E-06	0.63	6.173E-06	0.57
160	3.601E-06	1.21	3.047E-06	0.99	3.243E-06	0.80

161	5.005E-06	0.91	4.228E-06	0.86	4.526E-06	0.71
162	5.848E-06	0.89	4.928E-06	0.80	5.337E-06	0.65
163	6.168E-06	0.86	5.236E-06	0.81	5.613E-06	0.60
164	6.455E-06	0.80	5.433E-06	0.71	5.876E-06	0.56
165	6.848E-06	0.76	5.746E-06	0.72	6.206E-06	0.55
166	4.045E-06	1.04	3.418E-06	0.89	3.691E-06	0.75
167	4.149E-06	1.16	3.452E-06	0.97	3.747E-06	0.82
168	4.285E-06	1.05	3.611E-06	0.87	3.950E-06	0.79
169	4.521E-06	1.04	3.791E-06	1.03	4.046E-06	0.74
170	4.603E-06	0.86	3.884E-06	0.81	4.184E-06	0.66
171	2.372E-06	1.26	2.012E-06	1.24	2.165E-06	0.99
172	2.403E-06	1.26	2.052E-06	1.15	2.218E-06	0.93
173	2.479E-06	1.25	2.105E-06	1.18	2.266E-06	0.98
174	2.518E-06	1.24	2.149E-06	1.16	2.328E-06	1.02
175	9.757E-07	2.35	8.180E-07	2.19	8.974E-07	1.51
176	1.026E-06	1.88	8.787E-07	1.57	9.372E-07	1.31
177	1.064E-06	2.19	8.949E-07	1.97	9.492E-07	1.54
178	1.037E-06	1.87	8.737E-07	1.95	9.496E-07	1.46
179	1.061E-06	2.17	8.986E-07	1.97	9.736E-07	1.56
180	1.045E-06	2.40	8.952E-07	1.92	9.718E-07	1.59
181	1.047E-06	2.09	8.960E-07	1.88	9.789E-07	1.41
182	1.061E-06	1.76	9.011E-07	1.69	9.709E-07	1.37
183	1.091E-06	2.06	9.183E-07	1.81	9.936E-07	1.40
184	1.070E-06	1.90	9.142E-07	1.66	9.945E-07	1.32
185	1.123E-06	1.78	9.535E-07	1.61	1.023E-06	1.24
186	1.097E-06	1.59	9.497E-07	1.59	1.032E-06	1.41
187	1.165E-06	1.89	9.884E-07	1.46	1.073E-06	1.22
188	1.144E-06	2.03	9.751E-07	1.94	1.039E-06	1.67
189	1.168E-06	2.32	9.850E-07	1.78	1.078E-06	1.35
190	3.033E-06	1.25	2.541E-06	1.02	2.735E-06	0.89
191	3.070E-06	1.29	2.600E-06	1.09	2.798E-06	0.83
192	3.165E-06	1.15	2.674E-06	0.99	2.896E-06	0.85
193	3.229E-06	1.18	2.728E-06	1.09	2.953E-06	0.93
194	6.769E-06	0.88	5.732E-06	0.76	6.214E-06	0.65
195	7.262E-06	0.74	6.164E-06	0.71	6.672E-06	0.56
196	7.792E-06	0.72	6.595E-06	0.70	7.134E-06	0.62
197	8.348E-06	0.74	7.115E-06	0.65	7.675E-06	0.53
198	8.972E-06	0.75	7.598E-06	0.60	8.221E-06	0.55
199	4.733E-06	0.93	4.030E-06	0.83	4.334E-06	0.67
200	5.032E-06	0.87	4.276E-06	0.82	4.643E-06	0.68
201	1.070E-05	0.61	9.045E-06	0.58	9.735E-06	0.46
202	1.193E-05	0.63	1.014E-05	0.54	1.095E-05	0.47
203	1.308E-05	0.57	1.102E-05	0.51	1.193E-05	0.40
204	1.465E-05	0.52	1.238E-05	0.47	1.348E-05	0.37
205	8.535E-06	0.65	7.703E-06	0.57	8.181E-06	0.49
206	9.362E-06	0.66	8.416E-06	0.53	8.898E-06	0.43
207	9.607E-06	0.67	8.743E-06	0.66	9.166E-06	0.44
208	1.114E-05	0.54	1.009E-05	0.51	1.070E-05	0.43
209	1.161E-05	0.52	1.054E-05	0.51	1.115E-05	0.40
210	1.408E-05	0.54	1.279E-05	0.46	1.360E-05	0.39
211	1.619E-05	0.48	1.463E-05	0.39	1.557E-05	0.33
212	1.912E-05	0.48	1.731E-05	0.40	1.850E-05	0.31

213	2.615E-05	0.38	2.355E-05	0.37	2.522E-05	0.31
214	3.674E-05	0.33	3.302E-05	0.28	3.555E-05	0.24
215	5.533E-05	0.27	4.985E-05	0.24	5.380E-05	0.20
216	9.197E-05	0.22	8.392E-05	0.18	9.081E-05	0.15
217	5.538E-05	0.23	5.297E-05	0.21	5.612E-05	0.16
218	7.062E-05	0.23	6.770E-05	0.20	7.202E-05	0.16
219	8.402E-05	0.20	8.124E-05	0.16	8.641E-05	0.14
220	1.016E-04	0.17	9.913E-05	0.13	1.056E-04	0.12
221	1.205E-04	0.18	1.186E-04	0.14	1.266E-04	0.12
222	1.371E-04	0.16	1.372E-04	0.14	1.462E-04	0.12
223	1.538E-04	0.15	1.578E-04	0.12	1.676E-04	0.10
224	7.524E-05	0.21	7.988E-05	0.17	8.455E-05	0.12
225	2.340E-04	0.12	2.729E-04	0.10	2.828E-04	0.10
226	3.178E-05	0.27	4.490E-05	0.21	4.452E-05	0.15
227	2.887E-05	0.25	4.642E-05	0.19	4.437E-05	0.13
228	1.033E-05	0.38	1.905E-05	0.29	1.755E-05	0.19
229	9.689E-06	0.35	1.960E-05	0.33	1.749E-05	0.20
230	4.480E-06	0.55	1.019E-05	0.43	8.688E-06	0.24
231	4.227E-06	0.56	1.061E-05	0.38	8.725E-06	0.22
232	3.952E-06	0.50	1.132E-05	0.42	8.891E-06	0.22
233	2.256E-06	0.65	7.387E-06	0.52	5.526E-06	0.28
234	1.429E-06	0.90	5.362E-06	0.62	3.812E-06	0.32
235	5.234E-07	1.48	1.067E-06	1.10	1.125E-06	0.46
236	3.509E-07	1.53	7.371E-07	1.18	8.008E-07	0.55
237	2.328E-07	2.02	5.712E-07	1.28	6.192E-07	0.69
238	4.219E-09	10.82	1.891E-08	6.32	2.491E-08	1.99

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
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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
 0.7527 to 0.7556     *
 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 0.7725     ***************
 0.7725 to 0.7754     ****

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7527 to 0.7556     *
 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 0.7725     *************
 0.7725 to 0.7754     ****

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7527 to 0.7556
 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 0.7725     *********
 0.7725 to 0.7754     ****

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7527 to 0.7556
 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 0.7725     *****
 0.7725 to 0.7754     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                ***
        ***
***
        ***        best estimate system k-eff
0.76547 + or - 0.00049                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.67973E-02 + or -  1.32331E-04            ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  1.08921E-05            ***
        ***
***
        ***        system mean free path (cm)
6.52787E-01 + or -  1.92828E-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     3.11467 minutes


**********************************************************************
*************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666


      0000000      5555555555555                            44
33333333333                   5555555555555   5555555555555
```

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

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCCC    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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
```

```
*****
        *****
*****
        *****    time of execution:  05:43:55.52
*****
        *****
*****
        *****
*****

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

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

*************************************************************************
*********************************************
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.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***            8
->Data\Local\Temp\scale.David.40724\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  2.08048E-12  6.27644E-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  6.04519E-08  1.81190E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  5.77753E-15  1.90399E-14    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  7.37711E-07  5.29649E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33931E-08  6.98506E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02826E-07  7.99736E-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
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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  5.24103E-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  2.60493E-11  6.46527E-10   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90763E-08  1.32074E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.08038E-08  2.93988E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.66531E-08  4.58137E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  2.97820E-10  8.28252E-09   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.68777E-08  4.74429E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  1.93565E-10  5.49910E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  2.96162E-09  8.50250E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  6.29093E-19  1.74953E-17   41093    92.9064     nb93 4125
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endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  6.18511E-11  1.75714E-09   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  1.13303E-08  3.21881E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39893E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  7.06457E-09  2.04926E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.74347E-08  5.10957E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75594E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.15279E-09  2.13912E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  2.69952E-10  7.99230E-09   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  2.39631E-10  7.23801E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  1.97115E-10  6.01278E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  7.11427E-11  2.19146E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  8.75958E-11  2.72448E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  1.73415E-11  5.49762E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  6.85838E-11  2.11262E-09   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.11087E-12  3.48838E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  4.57769E-11  1.43749E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  7.03446E-12  2.25108E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  2.60766E-12  8.42266E-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  1.47310E-12  4.80220E-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  8.98628E-11  2.90255E-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  1.29307E-09  4.29273E-08   48111   110.9042     cd111 4840
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endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43691E-09  8.16286E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23432E-09  4.17157E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90145E-09  9.89266E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.56852E-10  2.62588E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  5.52411E-13  1.90002E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50415E-11  2.23710E-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  1.46915E-09  5.14108E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63178E-09  1.63467E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64316E-09  5.84837E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23040E-09  2.23617E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.86062E-10  3.23327E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10839E-09  4.11098E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  2.59718E-12  9.78851E-11   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  6.84395E-12  2.59983E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  2.58349E-11  9.96869E-10   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25969E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  1.16259E-10  4.55559E-09   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67717E-11  1.06508E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87635E-12  7.57724E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  2.79939E-10  1.11370E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  3.91696E-16  1.57005E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  3.09495E-10  1.24982E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  2.83621E-10  1.16232E-08   55137   136.9071     cs137 5537
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endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.32360E-08  1.37199E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.94328E-11  2.48908E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  3.03320E-10  1.26120E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.28501E-10  5.42005E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  2.77469E-10  1.17866E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21018E-12  2.65666E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  2.27240E-10  9.78924E-09   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.54857E-10  6.53173E-09   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.05615E-11  2.59074E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  2.08415E-10  8.91564E-09   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  2.50455E-11  1.07890E-09   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  1.85899E-10  8.06388E-09   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  1.39386E-10  6.08802E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.86551E-11  8.20406E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  7.69859E-11  3.40871E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  8.29293E-11  3.64700E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  5.84314E-18  2.58719E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84877E-12  8.24123E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  2.27872E-12  1.00212E-10   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  4.97140E-11  2.21608E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  8.73654E-15  3.92060E-13   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.02141E-09  1.36495E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  1.25121E-11  5.68994E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32589E-13  1.06469E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.43380E-09  6.47734E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.56624E-09  7.16949E-08   63153   152.9212     eu153 6331
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endf/b7 rel1 rev7 mod1                12/17/09
    1063154  3.04494E-15  1.40296E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  1.48645E-12  6.89333E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.75800E-13  8.20530E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.78904E-12  2.63259E-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  4.27211E-10  1.98116E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91587E-10  2.76114E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51704E-10  2.12180E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17682E-10  3.39268E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31111E-10  3.02127E-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  8.13855E-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  9.22631E-06  6.51907E-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  2.33410E-12  1.65622E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.07809E-18  7.68215E-17   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  2.04780E-10  1.46536E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  1.94282E-16  1.39606E-14   94240   240.0538     pu240 9440
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endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.01962E-20  7.35733E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49926E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.01125E-20  7.29694E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.87990E-28  2.81128E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99994E-21  7.27571E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.26111E-20  9.13766E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.94306E-21  7.23432E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.90869E-21  7.23902E-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
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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

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                                        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
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                                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
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                                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
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                                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:
  9419 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

                                          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       ........

                                  ........     0.01433 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
0.01517 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 15676 independent fission points were generated for generation 1
          1       7.65887E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
```

```
  keno message number k6-132 follows:
 only 15688 independent fission points were generated for generation 2
          2       7.72967E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15772 independent fission points were generated for generation 3
          3       7.69638E-01      7.69638E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.60394E-01      7.65016E-01      4.62180E-03
0.00000E+00      0.00000E+00
          5       7.65139E-01      7.65057E-01      2.66872E-03
0.00000E+00      0.00000E+00
          6       7.61040E-01      7.64053E-01      2.13762E-03
0.00000E+00      0.00000E+00
          7       7.65584E-01      7.64359E-01      1.68389E-03
0.00000E+00      0.00000E+00
          8       7.67334E-01      7.64855E-01      1.46156E-03
0.00000E+00      0.00000E+00
          9       7.66740E-01      7.65124E-01      1.26427E-03
0.00000E+00      0.00000E+00
         10       7.65472E-01      7.65168E-01      1.09575E-03
0.00000E+00      0.00000E+00
         11       7.69439E-01      7.65642E-01      1.07661E-03
0.00000E+00      0.00000E+00
         12       7.68573E-01      7.65935E-01      1.00656E-03
0.00000E+00      0.00000E+00
         13       7.63438E-01      7.65708E-01      9.38351E-04
0.00000E+00      0.00000E+00
         14       7.67187E-01      7.65832E-01      8.65406E-04
0.00000E+00      0.00000E+00
         15       7.65178E-01      7.65781E-01      7.97645E-04
0.00000E+00      0.00000E+00
         16       7.62466E-01      7.65544E-01      7.75519E-04
0.00000E+00      0.00000E+00
         17       7.58767E-01      7.65093E-01      8.51714E-04
0.00000E+00      0.00000E+00
         18       7.66284E-01      7.65167E-01      8.00177E-04
0.00000E+00      0.00000E+00
         19       7.64538E-01      7.65130E-01      7.52546E-04
0.00000E+00      0.00000E+00
         20       7.67694E-01      7.65272E-01      7.23660E-04
0.00000E+00      0.00000E+00
         21       7.73275E-01      7.65694E-01      8.03704E-04
0.00000E+00      0.00000E+00
         22       7.69019E-01      7.65860E-01      7.80379E-04
0.00000E+00      0.00000E+00
         23       7.70468E-01      7.66079E-01      7.74045E-04
0.00000E+00      0.00000E+00
         24       7.66435E-01      7.66095E-01      7.38200E-04
0.00000E+00      0.00000E+00
         25       7.62488E-01      7.65939E-01      7.22603E-04
0.00000E+00      0.00000E+00
```

26	7.63777E-01	7.65849E-01	6.97678E-04	0.00000E+00
27	7.69856E-01	7.65639E-01	2.30260E-03	0.00000E+00
28	7.66880E-01	7.65887E-01	2.42842E-03	0.00000E+00
29	7.64219E-01	7.65609E-01	1.32976E-03	0.00000E+00
30	7.67006E-01	7.65809E-01	1.11111E-03	0.00000E+00
31	7.63678E-01	7.65542E-01	9.88107E-04	0.00000E+00
32	7.64386E-01	7.65414E-01	8.68043E-04	0.00000E+00
33	7.64094E-01	7.65282E-01	7.79645E-04	0.00000E+00
34	7.65596E-01	7.65310E-01	6.98054E-04	0.00000E+00
35	7.60058E-01	7.64873E-01	7.92850E-04	0.00000E+00
36	7.64572E-01	7.64849E-01	7.24205E-04	0.00000E+00
37	7.61786E-01	7.64631E-01	1.17841E-03	0.00000E+00
38	7.65557E-01	7.64692E-01	1.02896E-03	0.00000E+00
39	7.62927E-01	7.64582E-01	1.06095E-03	0.00000E+00
40	7.65850E-01	7.64657E-01	9.61114E-04	0.00000E+00
41	7.71728E-01	7.65050E-01	6.92419E-04	0.00000E+00
42	7.65703E-01	7.65084E-01	8.07154E-04	0.00000E+00
43	7.63805E-01	7.65020E-01	7.50515E-04	0.00000E+00
44	7.65552E-01	7.65045E-01	7.22031E-04	0.00000E+00
45	7.60597E-01	7.64843E-01	7.00540E-04	0.00000E+00
46	7.59350E-01	7.64604E-01	8.25487E-04	0.00000E+00
47	7.69051E-01	7.64790E-01	6.27639E-04	0.00000E+00
48	7.59455E-01	7.64576E-01	8.24527E-04	0.00000E+00
49	7.62138E-01	7.64482E-01	6.22312E-04	0.00000E+00
50	7.62593E-01	7.64412E-01	7.74709E-04	0.00000E+00
51	7.67643E-01	7.64528E-01	5.91805E-04	0.00000E+00

52	7.70892E-01	7.64747E-01	7.09462E-04	0.00000E+00	0.00000E+00
53	7.72197E-01	7.64996E-01	8.10180E-04	0.00000E+00	0.00000E+00
54	7.72376E-01	7.65234E-01	1.03934E-03	0.00000E+00	0.00000E+00
55	7.63246E-01	7.65172E-01	9.47077E-04	0.00000E+00	0.00000E+00
56	7.62581E-01	7.65093E-01	8.57477E-04	0.00000E+00	0.00000E+00
57	7.65856E-01	7.65115E-01	8.25036E-04	0.00000E+00	0.00000E+00
58	7.59858E-01	7.64965E-01	8.61369E-04	0.00000E+00	0.00000E+00
59	7.56963E-01	7.64743E-01	9.33962E-04	0.00000E+00	0.00000E+00
60	7.56036E-01	7.64508E-01	1.04588E-03	0.00000E+00	0.00000E+00
61	7.69757E-01	7.64646E-01	9.01389E-04	0.00000E+00	0.00000E+00
62	7.71269E-01	7.64816E-01	8.76959E-04	0.00000E+00	0.00000E+00
63	7.62498E-01	7.64758E-01	8.42697E-04	0.00000E+00	0.00000E+00
64	7.64362E-01	7.64748E-01	8.21511E-04	0.00000E+00	0.00000E+00
65	7.66240E-01	7.64784E-01	8.01066E-04	0.00000E+00	0.00000E+00
66	7.65900E-01	7.64810E-01	7.83007E-04	0.00000E+00	0.00000E+00
67	7.73246E-01	7.65001E-01	7.97145E-04	0.00000E+00	0.00000E+00
68	7.65702E-01	7.65017E-01	7.82693E-04	0.00000E+00	0.00000E+00
69	7.65493E-01	7.65027E-01	7.64945E-04	0.00000E+00	0.00000E+00
70	7.61595E-01	7.64954E-01	7.50399E-04	0.00000E+00	0.00000E+00
71	7.63273E-01	7.64919E-01	7.38503E-04	0.00000E+00	0.00000E+00
72	7.59928E-01	7.64817E-01	7.35520E-04	0.00000E+00	0.00000E+00
73	7.63836E-01	7.64798E-01	7.23254E-04	0.00000E+00	0.00000E+00
74	7.60343E-01	7.64710E-01	7.35579E-04	0.00000E+00	0.00000E+00
75	7.67139E-01	7.64757E-01	7.14284E-04	0.00000E+00	0.00000E+00
76	7.60153E-01	7.64670E-01	7.11154E-04	0.00000E+00	0.00000E+00
77	7.58292E-01	7.64552E-01	7.15687E-04	0.00000E+00	0.00000E+00

78	7.71356E-01	7.64676E-01	6.72634E-04	0.00000E+00	0.00000E+00
79	7.68003E-01	7.64735E-01	6.74781E-04	0.00000E+00	0.00000E+00
80	7.58009E-01	7.64617E-01	6.77955E-04	0.00000E+00	0.00000E+00
81	7.61641E-01	7.64566E-01	6.62221E-04	0.00000E+00	0.00000E+00
82	7.70999E-01	7.64675E-01	6.66632E-04	0.00000E+00	0.00000E+00
83	7.66769E-01	7.64710E-01	6.47165E-04	0.00000E+00	0.00000E+00
84	7.65609E-01	7.64725E-01	6.37134E-04	0.00000E+00	0.00000E+00
85	7.66339E-01	7.64751E-01	6.38930E-04	0.00000E+00	0.00000E+00
86	7.71378E-01	7.64856E-01	6.69742E-04	0.00000E+00	0.00000E+00
87	7.57792E-01	7.64745E-01	6.39432E-04	0.00000E+00	0.00000E+00
88	7.67137E-01	7.64782E-01	6.25384E-04	0.00000E+00	0.00000E+00
89	7.69044E-01	7.64847E-01	6.38172E-04	0.00000E+00	0.00000E+00
90	7.73014E-01	7.64969E-01	6.12441E-04	0.00000E+00	0.00000E+00
91	7.62059E-01	7.64926E-01	5.95426E-04	0.00000E+00	0.00000E+00
92	7.69859E-01	7.64997E-01	5.85587E-04	0.00000E+00	0.00000E+00
93	7.59702E-01	7.64922E-01	5.72153E-04	0.00000E+00	0.00000E+00
94	7.66997E-01	7.64951E-01	5.60446E-04	0.00000E+00	0.00000E+00
95	7.60828E-01	7.64894E-01	5.52274E-04	0.00000E+00	0.00000E+00
96	7.70468E-01	7.64970E-01	5.41635E-04	0.00000E+00	0.00000E+00
97	7.68416E-01	7.65017E-01	5.43182E-04	0.00000E+00	0.00000E+00
98	7.65198E-01	7.65019E-01	5.35911E-04	0.00000E+00	0.00000E+00
99	7.62777E-01	7.64990E-01	5.29324E-04	0.00000E+00	0.00000E+00
100	7.64122E-01	7.64978E-01	5.23005E-04	0.00000E+00	0.00000E+00
101	7.61288E-01	7.64931E-01	5.19409E-04	0.00000E+00	0.00000E+00
102	7.64550E-01	7.64926E-01	5.13103E-04	0.00000E+00	0.00000E+00
103	7.61496E-01	7.64883E-01	5.08788E-04	0.00000E+00	0.00000E+00

```
                                    restart data was written for
generation  103       random number=98DA526180A35924
        104       7.71791E-01      7.64969E-01      5.02298E-04
0.00000E+00      0.00000E+00
        105       7.70245E-01      7.65033E-01      5.11767E-04
0.00000E+00      0.00000E+00
        106       7.62229E-01      7.64999E-01      5.02046E-04
0.00000E+00      0.00000E+00
        107       7.72366E-01      7.65087E-01      4.97783E-04
0.00000E+00      0.00000E+00
        108       7.70799E-01      7.65154E-01      5.08864E-04
0.00000E+00      0.00000E+00
        109       7.67296E-01      7.65179E-01      5.06895E-04
0.00000E+00      0.00000E+00
        110       7.64663E-01      7.65173E-01      5.00616E-04
0.00000E+00      0.00000E+00
        111       7.61749E-01      7.65134E-01      4.96828E-04
0.00000E+00      0.00000E+00
        112       7.67378E-01      7.65159E-01      4.89672E-04
0.00000E+00      0.00000E+00
        113       7.68062E-01      7.65192E-01      4.86955E-04
0.00000E+00      0.00000E+00
        114       7.62541E-01      7.65162E-01      4.80317E-04
0.00000E+00      0.00000E+00
        115       7.62864E-01      7.65137E-01      4.77220E-04
0.00000E+00      0.00000E+00
        116       7.58903E-01      7.65070E-01      4.80521E-04
0.00000E+00      0.00000E+00
        117       7.73539E-01      7.65160E-01      4.70921E-04
0.00000E+00      0.00000E+00
        118       7.68576E-01      7.65196E-01      4.74465E-04
0.00000E+00      0.00000E+00
        119       7.60345E-01      7.65146E-01      4.68168E-04
0.00000E+00      0.00000E+00
        120       7.67345E-01      7.65169E-01      4.61213E-04
0.00000E+00      0.00000E+00
        121       7.72086E-01      7.65239E-01      4.65652E-04
0.00000E+00      0.00000E+00
        122       7.63228E-01      7.65219E-01      4.58034E-04
0.00000E+00      0.00000E+00
        123       7.63692E-01      7.65204E-01      4.54309E-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=B50937B0D54C766C
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.54960E-05 + or -  1.18682E-08             generation time
```

```
=  2.99288E-05 + or -  2.12088E-08
 nu bar   =  2.43895E+00 + or -  1.01423E-05       average fission group
=  2.17550E+02 + or -  9.53836E-03
                      energy(ev) of the average lethargy causing fission
=  5.66946E-02 + or -  1.05808E-04
                                                system mean free path (cm)
=  6.52713E-01 + or -  1.69359E-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          0.76520   + or - 0.00045     0.76475 to 0.76566
0.76429 to 0.76611    0.76384 to 0.76657    2000000       9.6866

      24          0.76519   + or - 0.00046     0.76473 to 0.76565
0.76427 to 0.76611    0.76381 to 0.76657    1980000       9.6312

      25          0.76522   + or - 0.00046     0.76476 to 0.76568
0.76429 to 0.76614    0.76383 to 0.76661    1960000       9.6781

      26          0.76523   + or - 0.00047     0.76476 to 0.76570
0.76430 to 0.76617    0.76383 to 0.76664    1940000       9.5811

      27          0.76519   + or - 0.00047     0.76472 to 0.76565
0.76425 to 0.76612    0.76378 to 0.76659    1920000       9.7840

      28          0.76517   + or - 0.00047     0.76469 to 0.76564
0.76422 to 0.76612    0.76374 to 0.76659    1900000       9.7584

      29          0.76518   + or - 0.00048     0.76470 to 0.76566
0.76422 to 0.76614    0.76374 to 0.76662    1880000       9.6984

      30          0.76516   + or - 0.00049     0.76467 to 0.76564
0.76419 to 0.76613    0.76370 to 0.76661    1860000       9.6655

      31          0.76517   + or - 0.00049     0.76468 to 0.76566
0.76419 to 0.76616    0.76370 to 0.76665    1840000       9.6425

      32          0.76518   + or - 0.00050     0.76469 to 0.76568
0.76419 to 0.76617    0.76370 to 0.76667    1820000       9.6042

      37          0.76530   + or - 0.00052     0.76478 to 0.76582
0.76426 to 0.76633    0.76374 to 0.76685    1720000       9.6217

      42          0.76523   + or - 0.00054     0.76469 to 0.76578
0.76414 to 0.76632    0.76360 to 0.76686    1620000       9.6532

      47          0.76533   + or - 0.00057     0.76476 to 0.76591
```

0.76418 to 0.76648 0.76361 to 0.76706 1520000 9.6574

52 0.76539 + or - 0.00057 0.76482 to 0.76596
0.76424 to 0.76654 0.76367 to 0.76711 1420000 10.9404

57 0.76525 + or - 0.00058 0.76467 to 0.76583
0.76408 to 0.76641 0.76350 to 0.76700 1320000 11.8725

62 0.76545 + or - 0.00056 0.76489 to 0.76601
0.76434 to 0.76657 0.76378 to 0.76713 1220000 12.9711

67 0.76536 + or - 0.00059 0.76477 to 0.76595
0.76418 to 0.76654 0.76360 to 0.76713 1120000 12.9413

72 0.76557 + or - 0.00063 0.76494 to 0.76621
0.76431 to 0.76684 0.76368 to 0.76747 1020000 13.0961

77 0.76597 + or - 0.00066 0.76531 to 0.76663
0.76465 to 0.76728 0.76400 to 0.76794 920000 14.0110

82 0.76596 + or - 0.00068 0.76529 to 0.76664
0.76461 to 0.76732 0.76393 to 0.76800 820000 15.3029

87 0.76602 + or - 0.00072 0.76530 to 0.76674
0.76458 to 0.76746 0.76385 to 0.76818 720000 14.9135

92 0.76566 + or - 0.00078 0.76489 to 0.76644
0.76411 to 0.76722 0.76333 to 0.76799 620000 16.7067

97 0.76574 + or - 0.00085 0.76489 to 0.76659
0.76404 to 0.76744 0.76318 to 0.76829 520000 18.9311

102 0.76625 + or - 0.00102 0.76523 to 0.76727
0.76421 to 0.76829 0.76319 to 0.76931 420000 18.0823

107 0.76582 + or - 0.00113 0.76468 to 0.76695
0.76355 to 0.76808 0.76242 to 0.76922 320000 25.3513

112 0.76556 + or - 0.00157 0.76399 to 0.76713
0.76242 to 0.76870 0.76085 to 0.77027 220000 28.5790
1 fuel bundle

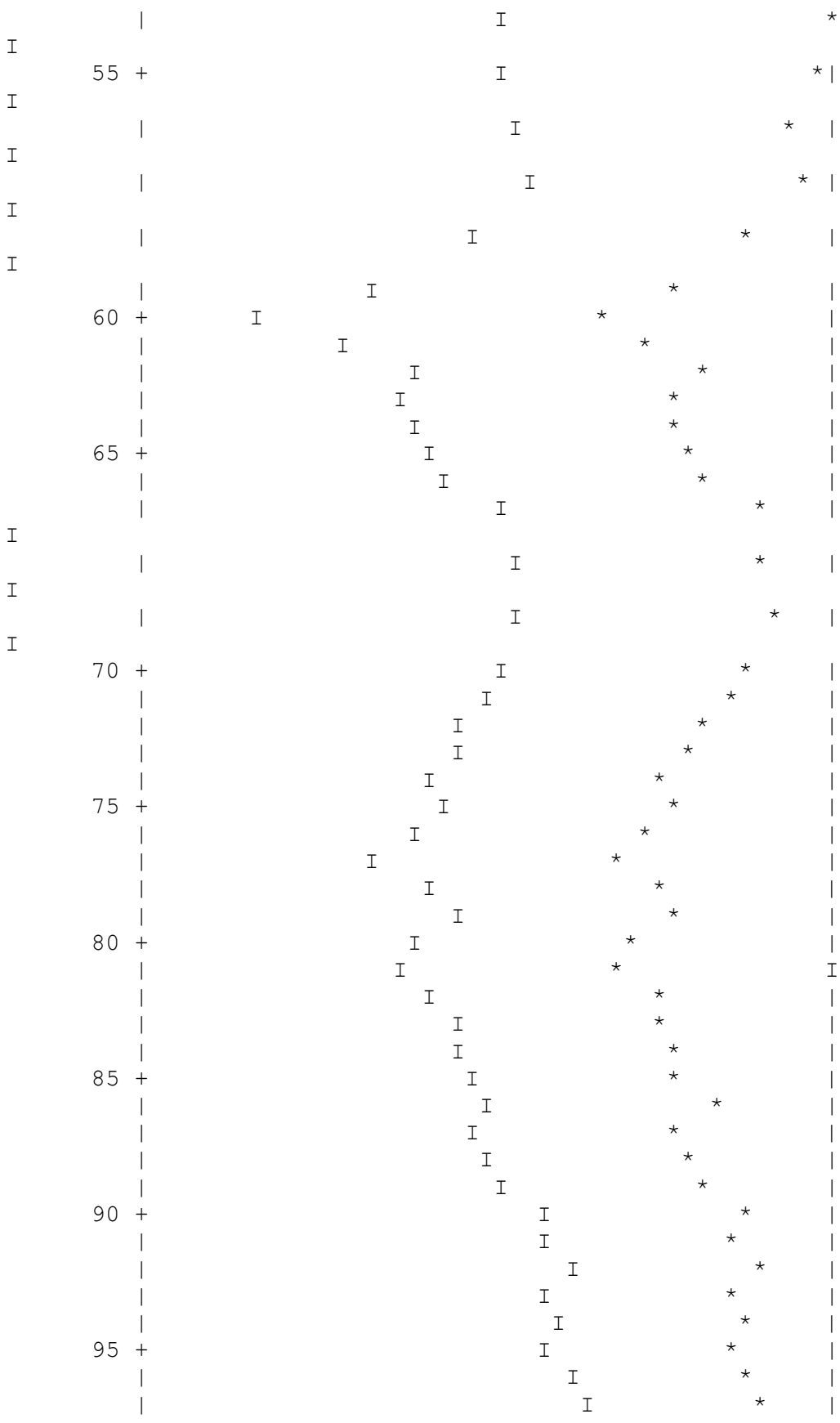
no. of initial
deviation of
generations average 67 per cent
95 per cent 99 per cent number of variance
skipped k-effective deviation confidence interval
confidence interval confidence interval histories (per cent)

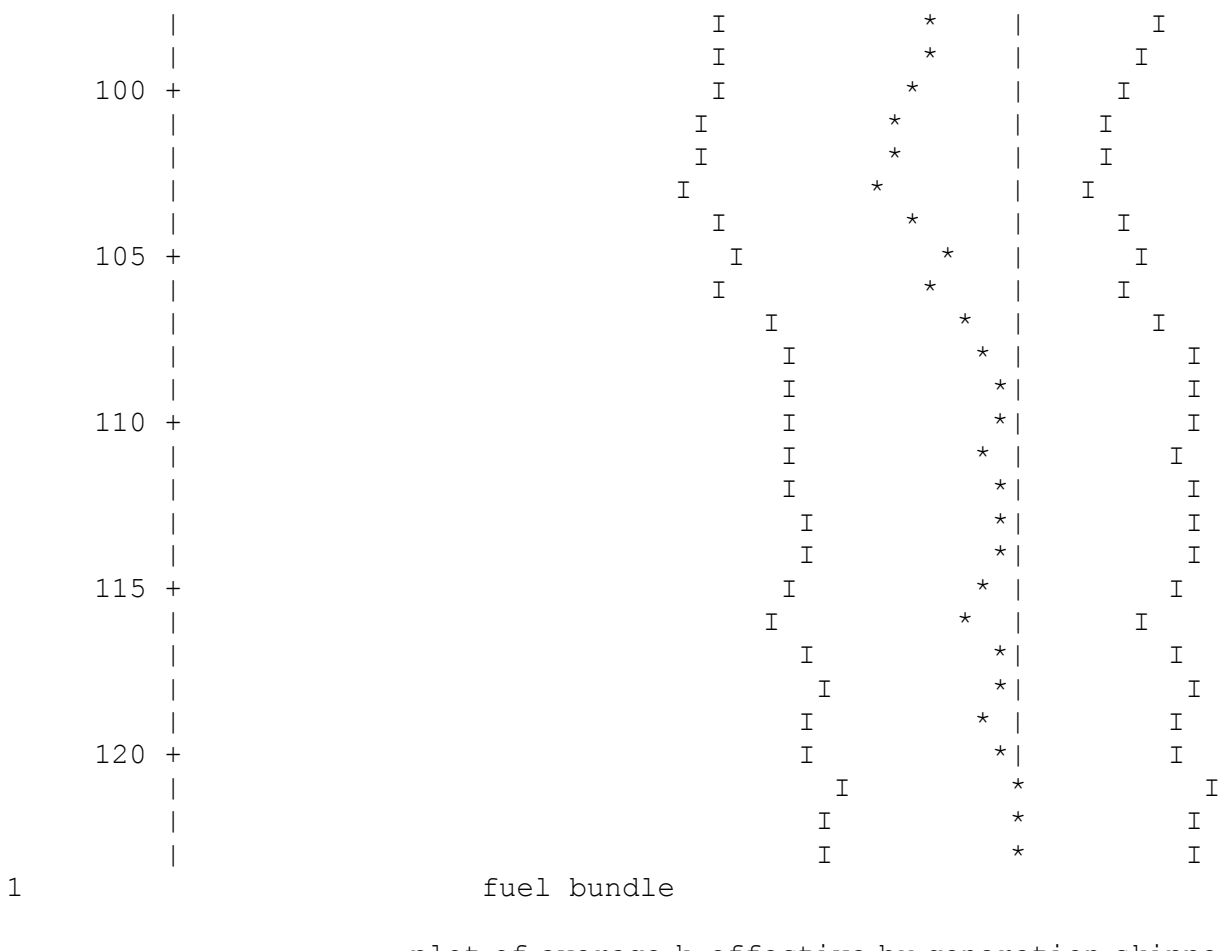
117 0.76588 + or - 0.00213 0.76375 to 0.76800
0.76163 to 0.77013 0.75950 to 0.77226 120000 34.8451
1 fuel bundle

plot of average k-effective by generation run.
the line represents k-eff = 0.76520 + or - 0.00045 which occurs for 123 generations run.

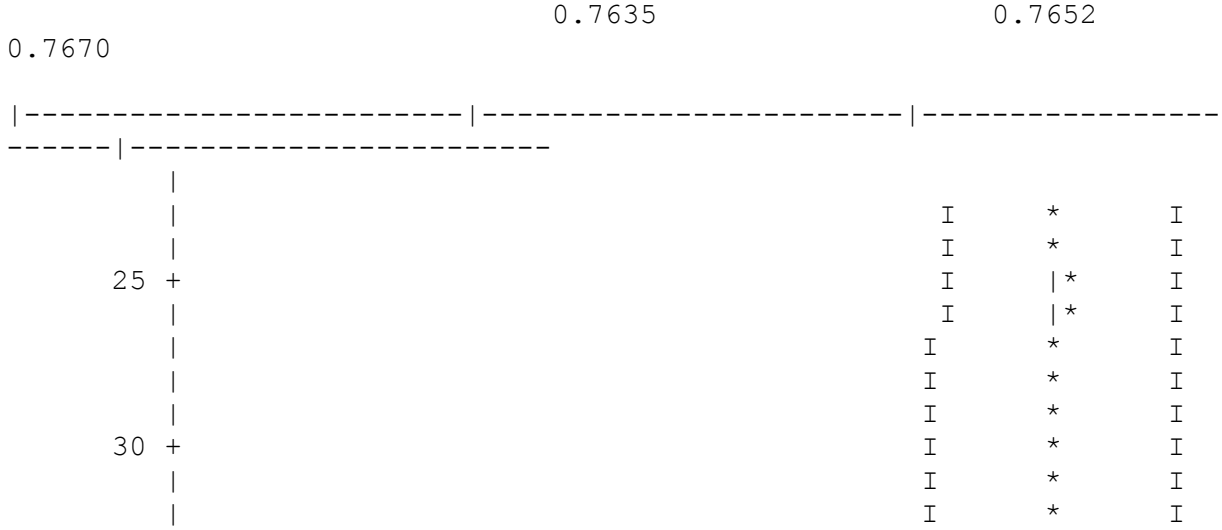
```
                                0.7642                    0.7653
0.7664

|-------------------------|------------------------|------------------
------|------------------------
         |
      25 +                              *                 |
I
         |                        *                       |
I
         |    I                                           |        *
         |       I                                        |
*
         |                          I                     |        *
I
      30 +                                  I            |             *
I
         |                                I               |      *
I
         |                                I               |   *
I
         |                               I                |*
I
         |                                 I              | *
I
      35 +                      I                  *       |          I
         |                       I                *        |        I
         |       I                            *            |
I
         |            I                        *            |           I
         |         I                        *              |          I
      40 +            I                      *             |         I
         |                            I                *   |            I
         |                          I                  *  |
I
         |                          I                 *    |            I
         |                            I                *   |            I
      45 +                       I                *        |      I
         |               I                   *             |    I
         |                        I              *         |   I
         |               I                  *              |   I
         |                 I              *              I  |
      50 +            I                 *                 I|
         |                   I            *              I |
         |                     I                *          |    I
         |                        I                  *    |
I
```





plot of average k-effective by generation skipped.
the line represents k-eff = 0.7652 + or - 0.0004 which occurs for 23 generations skipped.



```
          |                                                 I      | *       I
          |                                                 I      | *       I
          |                                                 I      | *        I
       40 +                                                 I      | *        I
          |                                                I       |*       I
          |                                                I       |*       I
          |                                                I       |*        I
          |                                                I       |*        I
       45 +                                                 I      | *        I
          |                                                  I     |  *
I
          |                                                 I      | *        I
          |                                                  I     |  *
I
          |                                                   I    |   *
I
       50 +                                                   I    |   *
I
          |                                                   I    |   *
I
          |                                                  I     |  *
I
          |                                                 I      | *       I
          |                                               I        *        I
       55 +                                               I        |*        I
          |                                                I       |*        I
          |                                                I       |*        I
          |                                                 I      | *        I
          |                                                   I    |   *
I
       60 +                                                      I |      *
I
          |                                                     I  |    *
I
          |                                                   I    |   *
I
          |                                                     I  |    *
I
          |                                                     I  |    *
I
       65 +                                                   I    |    *
I
          |                                                   I    |    *
I
          |                                                 I      |  *
I
          |                                                 I      | *         I
          |                                                 I      | *         I
       70 +                                                  I     |  *
I
          |                                                  I     |   *
I
```

```
         |                                                I  |     *
I
         |                                                I  |     *
I
         |                                                 I |       *
I
      75 +                                                 I |      *
I
         |                                                  I|        *
I
         |                                                   | I        *
I
         |                                                   I        *
I
         |                                                  I|        *
I
      80 +                                                   | I        *
I
         |                                                   |  I
*        I
         |                                                   |I
*         I
         |                                                   |I
*         I
         |                                                   |I
*         I
      85 +                                                   I          *
I
         |                                                 I |        *
I
         |                                                   | I
*         I
         |                                                   |I
*          I
         |                                                  I|         *
I
      90 +                                               I   |      *
I
         |                                                 I |        *
I
         |                                               I   |      *
I
         |                                                  I|         *
I
         |                                                 I |        *
I
      95 +                                               I   |
*              I
         |                                                 I |        *
I
         |                                               I   |       *
I
```

```
         |                                                I   |       *
I
         |                                                 I  |          *
I
     100 +                                                 I  |           *
I
         |                                                    I
*             I
         |                                                    |I
*              I
         |                                                    |   I
*             I
         |                                                    I
*              I
     105 +                                                I   |           *
I
         |                                        I           |
*                          I
         |                                              I     |        *
I
         |                                         I          |   *
I
         |                                     I              | *
I
     110 +                                   I                |  *
I
         |                                        I           |       *
I
         |                                    I               |    *
I
         |                            I                       | *
I
         |                              I                     |     *
I
     115 +                               I                    |           *
I
         |                                                I    |
*
         |                               I                    |         *
I
         |               I                                    | *
I
         |                              I                     |
*
     120 +                                                    |
*

   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
3.28663E-07    39.3416       0.00000E+00     0.0000
    3    0.0000                 1.08912E-05    12.5273
1.93275E-05     4.7377       0.00000E+00     0.0000
    4    0.0000                 2.14314E-05     9.0859
3.53936E-05     4.1259       0.00000E+00     0.0000
    5    0.0000                 2.90463E-05     7.6925
5.43979E-05     2.9381       0.00000E+00     0.0000
    6    0.0001                 9.52002E-05     3.6731
2.33835E-04     1.5304       0.00000E+00     0.0000
    7    0.0001                 1.09892E-04     3.2736
2.06115E-04     1.4982       0.00000E+00     0.0000
    8    0.0003                 2.48766E-04     1.9285
3.23458E-04     0.8958       0.00000E+00     0.0000
    9    0.0005                 3.78641E-04     1.3538
4.41405E-04     0.6407       0.00000E+00     0.0000
   10    0.0003                 2.02641E-04     1.6894
2.07362E-04     0.7476       0.00000E+00     0.0000
   11    0.0012                 9.14966E-04     0.7076
5.26361E-04     0.4650       0.00000E+00     0.0000
   12    0.0010                 7.65782E-04     0.7199
3.00212E-04     0.7084       0.00000E+00     0.0000
   13    0.0003                 2.32441E-04     1.7206
9.23440E-05     1.7018       0.00000E+00     0.0000
   14    0.0013                 1.00905E-03     0.6053
4.12446E-04     0.5995       0.00000E+00     0.0000
   15    0.0010                 7.70188E-04     0.7127
3.32033E-04     0.7046       0.00000E+00     0.0000
   16    0.0002                 1.85188E-04     1.1709
8.51271E-05     1.1540       0.00000E+00     0.0000
   17    0.0001                 6.92929E-05     1.7959
3.36935E-05     1.7659       0.00000E+00     0.0000
   18    0.0001                 5.16047E-05     1.8178
2.60636E-05     1.7790       0.00000E+00     0.0000
   19    0.0001                 8.26132E-05     1.4029
4.36434E-05     1.3687       0.00000E+00     0.0000
   20    0.0001                 5.94056E-05     1.5428
3.25566E-05     1.5026       0.00000E+00     0.0000
   21    0.0002                 1.17397E-04     1.0433
6.63136E-05     1.0172       0.00000E+00     0.0000
   22    0.0001                 1.06147E-04     1.4206
6.28123E-05     1.3879       0.00000E+00     0.0000
   23    0.0001                 1.06976E-04     1.0262
6.53087E-05     1.0009       0.00000E+00     0.0000
   24    0.0000                 2.49533E-05     2.2387
```

1.54957E-05	2.1801	0.00000E+00	0.0000	25	0.0000	3.12811E-05	2.0527
1.95453E-05	1.9949	0.00000E+00	0.0000	26	0.0000	1.83766E-05	2.5103
1.15289E-05	2.4433	0.00000E+00	0.0000	27	0.0001	5.37334E-05	1.2083
3.35311E-05	1.1825	0.00000E+00	0.0000	28	0.0001	9.66443E-05	1.0132
6.02937E-05	0.9946	0.00000E+00	0.0000	29	0.0001	9.77360E-05	1.0204
6.15703E-05	1.0069	0.00000E+00	0.0000	30	0.0000	1.21797E-05	2.8162
7.64121E-06	2.7951	0.00000E+00	0.0000	31	0.0001	9.72141E-05	0.9408
6.14128E-05	0.9298	0.00000E+00	0.0000	32	0.0001	3.89598E-05	1.4965
2.48868E-05	1.4662	0.00000E+00	0.0000	33	0.0000	3.27991E-05	1.7029
2.05364E-05	1.6842	0.00000E+00	0.0000	34	0.0001	7.49736E-05	1.0642
4.70979E-05	1.0475	0.00000E+00	0.0000	35	0.0001	4.54472E-05	1.3155
2.85152E-05	1.2972	0.00000E+00	0.0000	36	0.0001	4.37455E-05	1.4598
2.70770E-05	1.4467	0.00000E+00	0.0000	37	0.0000	2.89603E-05	1.6397
1.81706E-05	1.6060	0.00000E+00	0.0000	38	0.0000	3.32407E-05	1.7916
2.09384E-05	1.7522	0.00000E+00	0.0000	39	0.0002	1.31351E-04	1.0221
8.35658E-05	1.0001	0.00000E+00	0.0000	40	0.0002	1.19581E-04	0.8243
7.73169E-05	0.8075	0.00000E+00	0.0000	41	0.0002	1.58700E-04	0.6972
1.06077E-04	0.6786	0.00000E+00	0.0000	42	0.0002	1.41652E-04	0.8010
9.62934E-05	0.7843	0.00000E+00	0.0000	43	0.0001	7.93566E-05	1.1922
5.69714E-05	1.1448	0.00000E+00	0.0000	44	0.0001	1.14408E-04	1.0945
8.39943E-05	1.0527	0.00000E+00	0.0000	45	0.0001	6.03564E-05	1.0697
4.86578E-05	0.9856	0.00000E+00	0.0000	46	0.0000	1.40806E-05	1.9950
1.13490E-05	1.8615	0.00000E+00	0.0000	47	0.0001	4.14322E-05	1.5809
3.21650E-05	1.5228	0.00000E+00	0.0000	48	0.0000	1.22948E-05	3.7130
9.53374E-06	3.6051	0.00000E+00	0.0000	49	0.0001	8.07771E-05	1.5145
6.36856E-05	1.4834	0.00000E+00	0.0000	50	0.0001	5.63133E-05	1.8894

```
4.63902E-05     1.8525       0.00000E+00     0.0000
   51    0.0000                 1.45813E-05     3.5206
1.21260E-05     3.4458       0.00000E+00     0.0000
   52    0.0001                 4.07805E-05     2.0596
3.52603E-05     2.0093       0.00000E+00     0.0000
   53    0.0002                 1.58440E-04     0.7861
1.55704E-04     0.7297       0.00000E+00     0.0000
   54    0.0001                 7.39403E-05     1.8589
6.87020E-05     1.7899       0.00000E+00     0.0000
   55    0.0002                 1.63229E-04     1.4341
1.49659E-04     1.3951       0.00000E+00     0.0000
   56    0.0002                 1.15149E-04     1.6021
1.06879E-04     1.5601       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                 1.51240E-04     1.4905
1.37243E-04     1.4553       0.00000E+00     0.0000
   58    0.0001                 8.50571E-05     2.0004
7.44738E-05     1.9455       0.00000E+00     0.0000
   59    0.0002                 1.55614E-04     1.3486
1.39872E-04     1.2945       0.00000E+00     0.0000
   60    0.0004                 2.75548E-04     1.0722
2.49766E-04     1.0180       0.00000E+00     0.0000
   61    0.0000                 2.90463E-05     3.8891
2.23182E-05     3.7655       0.00000E+00     0.0000
   62    0.0002                 1.58341E-04     1.7053
1.32922E-04     1.6576       0.00000E+00     0.0000
   63    0.0002                 1.19203E-04     2.2279
9.82349E-05     2.1485       0.00000E+00     0.0000
   64    0.0001                 1.00955E-04     2.1674
8.13573E-05     2.1021       0.00000E+00     0.0000
   65    0.0000                 3.44153E-05     3.7325
3.40186E-05     3.6108       0.00000E+00     0.0000
   66    0.0002                 1.71755E-04     1.8750
1.52439E-04     1.8157       0.00000E+00     0.0000
   67    0.0002                 1.46399E-04     2.1394
1.19735E-04     2.0709       0.00000E+00     0.0000
   68    0.0000                 2.80322E-05     4.6295
2.41997E-05     4.4743       0.00000E+00     0.0000
   69    0.0004                 2.91769E-04     1.6858
2.29212E-04     1.6323       0.00000E+00     0.0000
   70    0.0003                 2.11647E-04     1.7588
1.92511E-04     1.6970       0.00000E+00     0.0000
   71    0.0006                 4.32786E-04     1.3289
3.58058E-04     1.2882       0.00000E+00     0.0000
```

72	0.0001	4.74416E-05	5.1500	2.80616E-05	5.0160	0.00000E+00	0.0000
73	0.0004	3.20871E-04	1.7959	2.44656E-04	1.6955	0.00000E+00	0.0000
74	0.0014	1.07967E-03	1.0024	7.84356E-04	0.9623	0.00000E+00	0.0000
75	0.0001	1.12823E-04	2.9500	8.67514E-05	2.8149	0.00000E+00	0.0000
76	0.0006	4.65588E-04	1.5987	2.95579E-04	1.5432	0.00000E+00	0.0000
77	0.0005	3.80227E-04	1.8319	2.72374E-04	1.7592	0.00000E+00	0.0000
78	0.0000	7.53397E-06	3.9180	7.36880E-05	3.8778	0.00000E+00	0.0000
79	0.0002	1.83011E-04	2.2003	1.23184E-04	2.1095	0.00000E+00	0.0000
80	0.0001	5.99755E-05	3.1796	8.00511E-05	3.0876	0.00000E+00	0.0000
81	0.0014	1.06180E-03	1.0033	7.80940E-04	0.9616	0.00000E+00	0.0000
82	0.0001	6.31825E-05	4.0539	3.79800E-05	3.8329	0.00000E+00	0.0000
83	0.0002	1.22694E-04	3.0329	1.35858E-04	2.9661	0.00000E+00	0.0000
84	0.0001	7.96260E-05	3.2352	8.08426E-05	2.9985	0.00000E+00	0.0000
85	0.0002	1.89414E-04	2.2742	2.33496E-04	2.2101	0.00000E+00	0.0000
86	0.0004	2.73602E-04	2.4784	2.19757E-04	2.3624	0.00000E+00	0.0000
87	0.0005	3.47712E-04	2.2446	2.16078E-04	2.1513	0.00000E+00	0.0000
88	0.0001	5.76657E-05	3.7134	1.04567E-04	3.6241	0.00000E+00	0.0000
89	0.0001	9.75634E-05	3.2652	6.74902E-05	3.0060	0.00000E+00	0.0000
90	0.0003	2.25809E-04	2.9224	1.33314E-04	2.7952	0.00000E+00	0.0000
91	0.0002	1.89453E-04	2.7785	1.19842E-04	2.6138	0.00000E+00	0.0000
92	0.0000	3.18175E-05	3.0481	2.08090E-04	2.9859	0.00000E+00	0.0000
93	0.0002	1.32153E-04	3.4164	1.07305E-04	3.1800	0.00000E+00	0.0000
94	0.0001	1.08262E-04	4.1177	6.09337E-05	3.8584	0.00000E+00	0.0000
95	0.0008	6.14414E-04	2.2792	3.78890E-04	2.2089	0.00000E+00	0.0000
96	0.0002	1.50599E-04	3.9036	7.63861E-05	3.7451	0.00000E+00	0.0000
97	0.0004	2.68601E-04	3.3549	1.53928E-04	3.2801	0.00000E+00	0.0000

```
   98    0.0001                 9.96257E-05     4.1005
9.56717E-05     3.9524       0.00000E+00     0.0000
   99    0.0001                 1.03915E-04     4.4550
6.95723E-05     4.3115       0.00000E+00     0.0000
  100    0.0002                 1.22216E-04     4.3951
8.18842E-05     4.1995       0.00000E+00     0.0000
  101    0.0001                 1.08841E-04     3.6950
6.94124E-05     3.4238       0.00000E+00     0.0000
  102    0.0002                 1.66157E-04     3.8388
9.24451E-05     3.6908       0.00000E+00     0.0000
  103    0.0001                 9.64678E-05     3.9781
9.40887E-05     3.7736       0.00000E+00     0.0000
  104    0.0002                 1.74409E-04     3.1726
1.38061E-04     3.0694       0.00000E+00     0.0000
  105    0.0002                 1.21393E-04     3.4138
8.04043E-05     3.2082       0.00000E+00     0.0000
  106    0.0002                 1.67982E-04     4.2145
1.24904E-04     4.1552       0.00000E+00     0.0000
  107    0.0001                 6.47431E-05     3.3768
6.53563E-05     3.1667       0.00000E+00     0.0000
  108    0.0000                 3.47616E-05     2.6668
1.50221E-04     2.5973       0.00000E+00     0.0000
  109    0.0002                 1.31737E-04     2.1728
4.37180E-04     2.1411       0.00000E+00     0.0000
  110    0.0008                 6.37027E-04     3.0064
3.92802E-04     2.9797       0.00000E+00     0.0000
  111    0.0002                 1.56161E-04     4.2392
1.43476E-04     4.1291       0.00000E+00     0.0000
  112    0.0002                 1.21845E-04     4.3818
1.28291E-04     4.3079       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                 1.24739E-04     4.1992
1.09140E-04     3.9219       0.00000E+00     0.0000
  114    0.0000                 1.11872E-05     6.5723
1.52694E-05     5.4787       0.00000E+00     0.0000
  115    0.0001                 7.73721E-05     3.8224
8.94927E-05     3.5563       0.00000E+00     0.0000
  116    0.0002                 1.85776E-04     2.8297
1.40359E-04     2.5474       0.00000E+00     0.0000
  117    0.0006                 4.63187E-04     2.2590
2.48146E-04     2.1158       0.00000E+00     0.0000
  118    0.0008                 5.74919E-04     2.0416
4.49260E-04     1.9586       0.00000E+00     0.0000
  119    0.0002                 1.40792E-04     2.1101
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3.63370E-04	2.0398	0.00000E+00	0.0000	120	0.0002	1.64886E-04	2.2914
6.27612E-04	2.2583	0.00000E+00	0.0000	121	0.0007	5.28863E-04	2.5864
4.06513E-04	2.5277	0.00000E+00	0.0000	122	0.0001	9.95745E-05	4.6009
7.80272E-05	4.2890	0.00000E+00	0.0000	123	0.0003	2.08756E-04	3.3662
1.48496E-04	2.9773	0.00000E+00	0.0000	124	0.0003	2.40877E-04	3.2838
1.98423E-04	3.0704	0.00000E+00	0.0000	125	0.0002	1.36327E-04	3.2608
1.25806E-04	2.9221	0.00000E+00	0.0000	126	0.0001	9.58357E-05	3.8462
8.64767E-05	3.3775	0.00000E+00	0.0000	127	0.0005	3.86817E-04	3.2354
1.90165E-04	3.0669	0.00000E+00	0.0000	128	0.0003	2.26785E-04	2.9730
1.39490E-04	2.6472	0.00000E+00	0.0000	129	0.0006	4.45522E-04	2.3265
4.10467E-04	2.2138	0.00000E+00	0.0000	130	0.0002	1.19638E-04	3.0415
2.91569E-04	2.9556	0.00000E+00	0.0000	131	0.0004	2.96132E-04	2.2388
2.37986E-04	1.9114	0.00000E+00	0.0000	132	0.0007	5.13553E-04	2.1403
3.15795E-04	1.9761	0.00000E+00	0.0000	133	0.0013	1.03243E-03	1.9545
6.52939E-04	1.8573	0.00000E+00	0.0000	134	0.0001	8.87356E-05	2.1181
2.31577E-04	1.7901	0.00000E+00	0.0000	135	0.0002	1.73142E-04	2.9918
2.56883E-04	2.9194	0.00000E+00	0.0000	136	0.0001	4.55859E-05	2.0427
7.07399E-04	2.0113	0.00000E+00	0.0000	137	0.0000	1.92981E-05	1.0472
3.47239E-03	1.0442	0.00000E+00	0.0000	138	0.0004	3.26375E-04	2.0151
8.49677E-04	1.9888	0.00000E+00	0.0000	139	0.0002	1.77434E-04	3.1700
2.18064E-04	2.9713	0.00000E+00	0.0000	140	0.0003	2.01882E-04	2.6983
2.69794E-04	2.3643	0.00000E+00	0.0000	141	0.0001	8.19578E-05	2.4566
2.57465E-04	2.2007	0.00000E+00	0.0000	142	0.0001	6.45269E-05	3.2990
2.23383E-04	3.0193	0.00000E+00	0.0000	143	0.0001	7.99533E-05	2.1047
1.72387E-04	1.3012	0.00000E+00	0.0000	144	0.0000	3.28923E-05	3.2137
7.26899E-05	1.9353	0.00000E+00	0.0000	145	0.0005	3.68340E-04	2.7169

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2.90124E-04     2.4675       0.00000E+00     0.0000
  146    0.0005                 3.52226E-04     2.6505
2.56824E-04     2.1804       0.00000E+00     0.0000
  147    0.0002                 1.82339E-04     3.8406
1.16374E-04     3.3473       0.00000E+00     0.0000
  148    0.0001                 5.65161E-05     6.1068
3.78516E-05     4.9032       0.00000E+00     0.0000
  149    0.0000                 3.03827E-05     7.1530
2.09433E-05     5.5612       0.00000E+00     0.0000
  150    0.0001                 9.15431E-05     4.5796
6.60271E-05     3.4257       0.00000E+00     0.0000
  151    0.0001                 6.58663E-05     4.6311
5.61365E-05     3.1859       0.00000E+00     0.0000
  152    0.0000                 3.67822E-05     4.4192
4.37399E-05     2.5635       0.00000E+00     0.0000
  153    0.0001                 4.24666E-05     4.1693
4.76483E-05     2.4396       0.00000E+00     0.0000
  154    0.0001                 4.94323E-05     3.6929
5.08475E-05     2.2669       0.00000E+00     0.0000
  155    0.0001                 5.04645E-05     4.2686
4.98777E-05     2.5974       0.00000E+00     0.0000
  156    0.0001                 5.02402E-05     4.7350
4.80029E-05     2.9608       0.00000E+00     0.0000
  157    0.0001                 6.02593E-05     3.9779
5.79062E-05     2.5050       0.00000E+00     0.0000
  158    0.0001                 6.88416E-05     4.0948
6.94288E-05     2.6359       0.00000E+00     0.0000
  159    0.0002                 1.51330E-04     2.5809
2.09985E-04     2.1847       0.00000E+00     0.0000
  160    0.0001                 6.16811E-05     4.2736
7.28690E-05     3.2593       0.00000E+00     0.0000
  161    0.0001                 7.70807E-05     4.1508
7.47767E-05     2.7682       0.00000E+00     0.0000
  162    0.0001                 8.58742E-05     3.7406
8.09554E-05     2.3566       0.00000E+00     0.0000
  163    0.0001                 8.77793E-05     4.2437
8.41016E-05     2.5886       0.00000E+00     0.0000
  164    0.0001                 1.03710E-04     3.3795
9.50347E-05     2.1162       0.00000E+00     0.0000
  165    0.0001                 1.11383E-04     3.1131
1.03276E-04     1.8952       0.00000E+00     0.0000
  166    0.0001                 6.96582E-05     4.7081
6.37448E-05     2.9527       0.00000E+00     0.0000
  167    0.0001                 7.98090E-05     4.4446
7.12259E-05     2.8957       0.00000E+00     0.0000
  168    0.0001                 9.74351E-05     3.7386
8.36689E-05     2.5768       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

 group  fission  unit   region    fissions     percent
```

absorptions	fraction	percent deviation	leakage	percent deviation
169	0.0001	8.85949E-05	9.92424E-05	3.7557
170	0.0002	1.13364E-04	1.31465E-04	4.3209
171	0.0001	7.35135E-05	9.46808E-05	5.1262
172	0.0002	9.30406E-05	1.30078E-04	4.9286
173	0.0002	1.21708E-04	1.83490E-04	4.3726
174	0.0003	1.60475E-04	2.59254E-04	3.4151
175	0.0002	7.75916E-05	1.30274E-04	5.8899
176	0.0001	6.78948E-05	1.13779E-04	5.8925
177	0.0001	6.17312E-05	1.03081E-04	6.2261
178	0.0002	6.78212E-05	1.15969E-04	6.1133
179	0.0001	6.03270E-05	1.02033E-04	6.2565
180	0.0001	6.49539E-05	1.11766E-04	6.7087
181	0.0001	5.94474E-05	1.01722E-04	5.9433
182	0.0002	6.66130E-05	1.16179E-04	6.0070
183	0.0001	5.92455E-05	1.02019E-04	5.3179
184	0.0001	5.51352E-05	9.42570E-05	6.7433
185	0.0001	5.58776E-05	9.60106E-05	5.6572
186	0.0001	5.90450E-05	1.02438E-04	6.4241
187	0.0001	5.21553E-05	8.82366E-05	6.9151
188	0.0001	5.58739E-05	9.60895E-05	7.1591
189	0.0001	5.68681E-05	9.77980E-05	6.4049
190	0.0003	1.20812E-04	2.01566E-04	4.2616
191	0.0003	1.21861E-04	2.02476E-04	4.4107
192	0.0003	1.24701E-04	2.08484E-04	3.6994
		3.0313	0.00000E+00	0.0000

193	0.0003	1.99132E-04	3.9133	1.21252E-04	3.1377
0.00000E+00	0.0000				
194	0.0005	4.11274E-04	2.6287	2.52383E-04	2.0806
0.00000E+00	0.0000				
195	0.0006	4.36454E-04	2.5830	2.68823E-04	2.0251
0.00000E+00	0.0000				
196	0.0006	4.59289E-04	2.6645	2.85478E-04	2.1020
0.00000E+00	0.0000				
197	0.0006	4.84031E-04	2.7827	3.05429E-04	2.1356
0.00000E+00	0.0000				
198	0.0008	6.01158E-04	2.5017	3.68462E-04	1.9669
0.00000E+00	0.0000				
199	0.0004	3.36707E-04	3.2554	2.06127E-04	2.5652
0.00000E+00	0.0000				
200	0.0005	3.45605E-04	3.1814	2.14373E-04	2.4793
0.00000E+00	0.0000				
201	0.0010	8.00279E-04	2.0677	4.89877E-04	1.6541
0.00000E+00	0.0000				
202	0.0013	9.99400E-04	1.8469	6.04337E-04	1.4766
0.00000E+00	0.0000				
203	0.0016	1.22360E-03	1.9205	7.30732E-04	1.5677
0.00000E+00	0.0000				
204	0.0023	1.73101E-03	1.6808	1.01167E-03	1.4075
0.00000E+00	0.0000				
205	0.0015	1.12690E-03	1.8828	6.60918E-04	1.5885
0.00000E+00	0.0000				
206	0.0019	1.44489E-03	1.5915	8.38224E-04	1.3650
0.00000E+00	0.0000				
207	0.0021	1.63001E-03	1.8534	9.50070E-04	1.6134
0.00000E+00	0.0000				
208	0.0029	2.22396E-03	1.5430	1.29228E-03	1.3636
0.00000E+00	0.0000				
209	0.0031	2.38026E-03	1.2064	1.39925E-03	1.0611
0.00000E+00	0.0000				
210	0.0038	2.91662E-03	1.2451	1.73404E-03	1.0878
0.00000E+00	0.0000				
211	0.0042	3.18817E-03	1.3965	1.91693E-03	1.2123
0.00000E+00	0.0000				
212	0.0047	3.55829E-03	1.2782	2.16128E-03	1.0835
0.00000E+00	0.0000				
213	0.0064	4.90684E-03	0.9806	2.97555E-03	0.8473
0.00000E+00	0.0000				
214	0.0096	7.37020E-03	0.6808	4.43779E-03	0.5654
0.00000E+00	0.0000				
215	0.0158	1.21106E-02	0.6258	7.21746E-03	0.5289
0.00000E+00	0.0000				
216	0.0300	2.29400E-02	0.4601	1.35386E-02	0.3979
0.00000E+00	0.0000				
217	0.0200	1.52806E-02	0.5496	8.99920E-03	0.4633
0.00000E+00	0.0000				
218	0.0278	2.12710E-02	0.4913	1.24451E-02	0.4213
0.00000E+00	0.0000				

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  219    0.0357                 2.72897E-02     0.4004
1.59306E-02     0.3370       0.00000E+00     0.0000
  220    0.0471                 3.60381E-02     0.3711
2.09721E-02     0.3140       0.00000E+00     0.0000
  221    0.0625                 4.78111E-02     0.2844
2.77242E-02     0.2426       0.00000E+00     0.0000
  222    0.0799                 6.11290E-02     0.2736
3.54283E-02     0.2316       0.00000E+00     0.0000
  223    0.1040                 7.96141E-02     0.2400
4.62148E-02     0.2069       0.00000E+00     0.0000
  224    0.0583                 4.46337E-02     0.3246
2.60054E-02     0.2722       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    0.2306                 1.76473E-01     0.1381
1.04515E-01     0.1185       0.00000E+00     0.0000
  226    0.0457                 3.50060E-02     0.3658
2.12833E-02     0.2999       0.00000E+00     0.0000
  227    0.0493                 3.77153E-02     0.3447
2.33843E-02     0.2782       0.00000E+00     0.0000
  228    0.0214                 1.63420E-02     0.5150
1.03001E-02     0.4050       0.00000E+00     0.0000
  229    0.0223                 1.70296E-02     0.5583
1.09361E-02     0.4361       0.00000E+00     0.0000
  230    0.0117                 8.98071E-03     0.7649
5.86843E-03     0.5979       0.00000E+00     0.0000
  231    0.0123                 9.42888E-03     0.7908
6.26104E-03     0.6098       0.00000E+00     0.0000
  232    0.0128                 9.79264E-03     0.7627
6.69682E-03     0.5663       0.00000E+00     0.0000
  233    0.0083                 6.37806E-03     0.8505
4.48194E-03     0.6070       0.00000E+00     0.0000
  234    0.0058                 4.47128E-03     1.2748
3.23092E-03     0.8930       0.00000E+00     0.0000
  235    0.0024                 1.82627E-03     1.6668
1.21746E-03     1.2708       0.00000E+00     0.0000
  236    0.0019                 1.44028E-03     1.8200
9.75247E-04     1.3629       0.00000E+00     0.0000
  237    0.0016                 1.24050E-03     1.9159
8.97211E-04     1.3537       0.00000E+00     0.0000
  238    0.0001                 6.26070E-05     9.1164
5.64484E-05     5.1859       0.00000E+00     0.0000

 system total =                 7.65204E-01     0.0549
4.68570E-01     0.0460       0.00000E+00     0.0000
```

the weight lost in the albedo portion of the problem = 5.3147E-01 + or - 0.0002

elapsed time 3.11150 minutes

random number= 40A14289BCD98933

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.086E-03	0.05	7.652E-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	3.225E-08	54.82	1.326E-08	26.07	1.285E-08	26.79
3	9.666E-07	4.26	7.686E-07	3.73	8.241E-07	3.77
4	1.456E-06	3.27	1.179E-06	2.91	1.263E-06	2.97
5	2.266E-06	2.62	1.852E-06	2.26	1.993E-06	2.30
6	9.473E-06	1.23	7.578E-06	1.10	8.103E-06	1.16
7	1.247E-05	1.38	9.373E-06	1.12	9.939E-06	1.14
8	3.097E-05	0.75	2.268E-05	0.63	2.385E-05	0.64
9	8.157E-05	0.51	5.847E-05	0.43	6.122E-05	0.44
10	4.597E-05	0.65	3.250E-05	0.48	3.371E-05	0.49
11	2.207E-04	0.29	1.560E-04	0.27	1.618E-04	0.25

12	1.907E-04	0.27	1.385E-04	0.24	1.451E-04	0.24
13	5.705E-05	0.54	4.170E-05	0.44	4.341E-05	0.44
14	2.540E-04	0.24	1.839E-04	0.23	1.920E-04	0.20
15	2.197E-04	0.28	1.598E-04	0.23	1.668E-04	0.23
16	7.082E-05	0.49	5.164E-05	0.36	5.409E-05	0.34
17	3.239E-05	0.70	2.344E-05	0.57	2.448E-05	0.56
18	2.760E-05	0.70	2.008E-05	0.60	2.076E-05	0.57
19	5.019E-05	0.55	3.668E-05	0.47	3.816E-05	0.46
20	4.004E-05	0.60	2.942E-05	0.49	3.076E-05	0.50
21	7.991E-05	0.40	5.855E-05	0.35	6.130E-05	0.33
22	7.310E-05	0.46	5.348E-05	0.37	5.535E-05	0.37
23	7.712E-05	0.41	5.639E-05	0.36	5.854E-05	0.35
24	1.870E-05	0.88	1.383E-05	0.79	1.443E-05	0.73
25	2.349E-05	0.71	1.739E-05	0.60	1.825E-05	0.55
26	1.362E-05	0.93	1.008E-05	0.78	1.057E-05	0.82
27	4.201E-05	0.57	3.127E-05	0.47	3.298E-05	0.45
28	7.734E-05	0.37	5.750E-05	0.30	6.075E-05	0.31
29	7.910E-05	0.41	5.922E-05	0.34	6.212E-05	0.32
30	1.011E-05	0.94	7.558E-06	0.83	7.949E-06	0.87
31	7.834E-05	0.39	5.891E-05	0.34	6.194E-05	0.34
32	3.086E-05	0.61	2.332E-05	0.54	2.460E-05	0.51
33	2.644E-05	0.62	2.004E-05	0.51	2.114E-05	0.45
34	6.071E-05	0.42	4.579E-05	0.35	4.819E-05	0.34
35	3.614E-05	0.56	2.747E-05	0.49	2.868E-05	0.45
36	3.413E-05	0.54	2.573E-05	0.45	2.698E-05	0.34
37	2.208E-05	0.62	1.664E-05	0.50	1.744E-05	0.48
38	2.568E-05	0.66	1.960E-05	0.52	2.062E-05	0.48
39	9.780E-05	0.33	7.478E-05	0.27	7.906E-05	0.23
40	8.953E-05	0.30	6.936E-05	0.28	7.400E-05	0.25
41	1.125E-04	0.33	8.814E-05	0.29	9.422E-05	0.26
42	9.356E-05	0.31	7.374E-05	0.25	7.909E-05	0.25
43	5.121E-05	0.45	4.058E-05	0.39	4.279E-05	0.32
44	6.987E-05	0.34	5.585E-05	0.28	6.004E-05	0.26
45	3.532E-05	0.41	2.824E-05	0.38	3.123E-05	0.36
46	8.402E-06	0.81	6.660E-06	0.71	7.191E-06	0.60
47	2.354E-05	0.54	1.869E-05	0.47	1.962E-05	0.42
48	6.731E-06	0.96	5.367E-06	0.82	5.672E-06	0.61
49	4.377E-05	0.45	3.499E-05	0.37	3.762E-05	0.34
50	2.937E-05	0.51	2.360E-05	0.45	2.569E-05	0.37
51	7.815E-06	0.90	6.335E-06	0.78	6.919E-06	0.72
52	2.086E-05	0.59	1.670E-05	0.51	1.817E-05	0.48
53	7.627E-05	0.33	6.143E-05	0.27	6.666E-05	0.24
54	3.333E-05	0.46	2.709E-05	0.38	2.919E-05	0.32
55	6.636E-05	0.31	5.393E-05	0.28	5.880E-05	0.23
56	4.361E-05	0.33	3.551E-05	0.31	3.875E-05	0.26
57	4.943E-05	0.36	4.044E-05	0.31	4.393E-05	0.26
58	2.573E-05	0.44	2.099E-05	0.41	2.288E-05	0.33
59	4.408E-05	0.35	3.609E-05	0.32	3.933E-05	0.26
60	6.426E-05	0.37	5.268E-05	0.33	5.708E-05	0.25
61	6.117E-06	0.92	5.025E-06	0.75	5.459E-06	0.67
62	3.215E-05	0.46	2.630E-05	0.40	2.868E-05	0.31
63	2.163E-05	0.52	1.778E-05	0.46	1.941E-05	0.37

64	1.727E-05	0.49	1.416E-05	0.44	1.536E-05	0.34
65	5.734E-06	1.04	4.730E-06	0.88	5.161E-06	0.78
66	2.860E-05	0.46	2.351E-05	0.40	2.561E-05	0.32
67	2.128E-05	0.46	1.744E-05	0.44	1.899E-05	0.33
68	4.671E-06	1.07	3.849E-06	0.98	4.158E-06	0.76
69	3.717E-05	0.42	3.071E-05	0.40	3.337E-05	0.31
70	2.671E-05	0.45	2.197E-05	0.39	2.389E-05	0.32
71	4.567E-05	0.33	3.759E-05	0.31	4.085E-05	0.25
72	2.659E-06	1.59	2.187E-06	1.36	2.360E-06	1.10
73	2.727E-05	0.46	2.240E-05	0.40	2.438E-05	0.33
74	7.939E-05	0.30	6.565E-05	0.25	7.126E-05	0.22
75	9.152E-06	0.76	7.593E-06	0.64	8.196E-06	0.57
76	2.291E-05	0.47	1.906E-05	0.41	2.062E-05	0.34
77	1.771E-05	0.51	1.466E-05	0.47	1.595E-05	0.35
78	1.531E-06	1.85	1.300E-06	1.70	1.413E-06	1.44
79	9.944E-06	0.75	8.252E-06	0.65	8.942E-06	0.54
80	4.569E-06	1.10	3.802E-06	0.97	4.104E-06	0.86
81	5.533E-05	0.32	4.606E-05	0.29	4.977E-05	0.22
82	3.184E-06	1.23	2.647E-06	1.17	2.880E-06	0.93
83	4.398E-06	1.09	3.662E-06	0.95	3.973E-06	0.73
84	8.198E-06	0.76	6.878E-06	0.71	7.390E-06	0.60
85	9.853E-06	0.68	8.228E-06	0.65	8.922E-06	0.57
86	1.357E-05	0.65	1.135E-05	0.58	1.228E-05	0.47
87	1.209E-05	0.80	1.007E-05	0.65	1.083E-05	0.51
88	3.110E-06	1.26	2.612E-06	1.23	2.831E-06	1.00
89	6.586E-06	1.00	5.479E-06	0.81	5.908E-06	0.63
90	6.938E-06	0.91	5.781E-06	0.84	6.236E-06	0.70
91	8.264E-06	0.81	6.900E-06	0.72	7.423E-06	0.55
92	4.752E-06	1.04	4.009E-06	0.98	4.335E-06	0.84
93	7.981E-06	0.92	6.724E-06	0.81	7.312E-06	0.62
94	4.255E-06	1.33	3.518E-06	1.06	3.806E-06	0.87
95	1.249E-05	0.61	1.051E-05	0.57	1.141E-05	0.48
96	3.335E-06	1.31	2.785E-06	1.13	3.028E-06	0.96
97	3.384E-06	1.09	2.847E-06	0.95	3.070E-06	0.78
98	3.485E-06	1.28	2.932E-06	1.13	3.174E-06	1.00
99	2.248E-06	1.30	1.887E-06	1.15	2.073E-06	1.01
100	3.438E-06	1.27	2.915E-06	1.23	3.110E-06	0.93
101	4.931E-06	1.01	4.139E-06	0.83	4.458E-06	0.69
102	3.353E-06	1.04	2.783E-06	1.04	3.057E-06	0.80
103	4.672E-06	1.17	3.878E-06	1.00	4.200E-06	0.79
104	4.245E-06	1.13	3.542E-06	0.98	3.842E-06	0.82
105	4.380E-06	1.08	3.650E-06	0.91	3.939E-06	0.74
106	1.500E-06	1.74	1.261E-06	1.49	1.374E-06	1.37
107	3.554E-06	1.09	2.968E-06	0.99	3.224E-06	0.82
108	3.220E-06	1.23	2.709E-06	1.29	2.954E-06	0.88
109	5.138E-06	0.91	4.323E-06	0.92	4.632E-06	0.69
110	2.941E-06	1.33	2.540E-06	1.33	2.764E-06	0.90
111	3.091E-06	1.19	2.575E-06	1.15	2.779E-06	0.94
112	1.792E-06	1.43	1.491E-06	1.28	1.651E-06	1.06
113	5.752E-06	0.91	4.779E-06	0.85	5.172E-06	0.69
114	2.015E-06	1.54	1.689E-06	1.34	1.798E-06	1.08
115	5.022E-06	1.08	4.179E-06	0.91	4.544E-06	0.78

116	1.089E-05	0.60	9.108E-06	0.54	9.799E-06	0.47
117	1.169E-05	0.67	9.870E-06	0.61	1.066E-05	0.47
118	1.279E-05	0.71	1.078E-05	0.60	1.168E-05	0.50
119	8.292E-06	0.74	7.001E-06	0.65	7.583E-06	0.51
120	5.661E-06	0.75	4.779E-06	0.66	5.234E-06	0.57
121	6.088E-06	0.96	5.151E-06	0.74	5.576E-06	0.70
122	3.293E-06	1.40	2.750E-06	1.23	3.005E-06	0.95
123	1.022E-05	0.62	8.591E-06	0.51	9.273E-06	0.47
124	7.398E-06	0.87	6.205E-06	0.75	6.678E-06	0.67
125	7.041E-06	0.85	5.867E-06	0.79	6.355E-06	0.67
126	5.760E-06	0.94	4.852E-06	0.83	5.231E-06	0.70
127	5.519E-06	0.88	4.659E-06	0.77	5.024E-06	0.59
128	7.704E-06	0.79	6.470E-06	0.70	7.013E-06	0.54
129	9.570E-06	0.69	8.146E-06	0.61	8.847E-06	0.52
130	4.032E-06	1.02	3.431E-06	0.96	3.692E-06	0.75
131	1.702E-05	0.52	1.429E-05	0.46	1.537E-05	0.37
132	1.114E-05	0.63	9.379E-06	0.50	1.015E-05	0.39
133	1.367E-05	0.63	1.151E-05	0.58	1.247E-05	0.48
134	1.469E-05	0.55	1.232E-05	0.47	1.336E-05	0.37
135	2.382E-06	1.22	2.029E-06	1.15	2.221E-06	0.96
136	3.850E-06	0.92	3.341E-06	0.82	3.656E-06	0.68
137	2.486E-06	1.05	2.603E-06	1.09	2.968E-06	0.85
138	4.112E-06	1.01	3.563E-06	0.83	3.923E-06	0.68
139	4.606E-06	1.01	3.921E-06	0.84	4.236E-06	0.68
140	1.204E-05	0.63	1.017E-05	0.54	1.098E-05	0.45
141	8.617E-06	0.73	7.373E-06	0.64	7.953E-06	0.53
142	5.788E-06	0.93	4.911E-06	0.77	5.314E-06	0.64
143	1.969E-05	0.45	1.661E-05	0.37	1.791E-05	0.34
144	8.129E-06	0.72	6.858E-06	0.58	7.366E-06	0.56
145	7.158E-06	0.76	6.075E-06	0.68	6.583E-06	0.57
146	1.201E-05	0.61	1.015E-05	0.58	1.090E-05	0.43
147	3.728E-06	1.03	3.129E-06	0.88	3.360E-06	0.74
148	1.855E-06	1.77	1.594E-06	1.59	1.707E-06	1.19
149	1.156E-06	1.74	9.781E-07	1.51	1.045E-06	1.29
150	4.014E-06	1.09	3.371E-06	0.91	3.647E-06	0.81
151	4.098E-06	1.14	3.452E-06	0.96	3.697E-06	0.77
152	4.263E-06	1.10	3.590E-06	0.89	3.896E-06	0.73
153	4.481E-06	1.16	3.759E-06	1.00	4.039E-06	0.68
154	4.658E-06	1.07	3.951E-06	0.89	4.236E-06	0.74
155	4.330E-06	1.05	3.642E-06	0.85	3.923E-06	0.73
156	3.972E-06	1.14	3.348E-06	1.02	3.603E-06	0.82
157	4.603E-06	0.99	3.915E-06	0.86	4.187E-06	0.72
158	4.937E-06	0.93	4.150E-06	0.80	4.465E-06	0.68
159	6.742E-06	0.86	5.684E-06	0.74	6.155E-06	0.61
160	3.554E-06	1.03	3.002E-06	0.88	3.260E-06	0.85
161	4.986E-06	0.94	4.168E-06	0.90	4.509E-06	0.70
162	5.811E-06	0.95	4.920E-06	0.88	5.267E-06	0.67
163	6.146E-06	0.77	5.239E-06	0.75	5.611E-06	0.59
164	6.460E-06	0.87	5.473E-06	0.76	5.919E-06	0.66
165	6.844E-06	0.82	5.804E-06	0.75	6.217E-06	0.65
166	4.064E-06	1.01	3.453E-06	0.99	3.698E-06	0.76
167	4.246E-06	1.04	3.548E-06	1.01	3.801E-06	0.86

168	4.338E-06	1.12	3.624E-06	0.98	3.924E-06	0.85
169	4.365E-06	1.02	3.695E-06	0.89	4.013E-06	0.66
170	4.596E-06	1.05	3.884E-06	0.95	4.202E-06	0.79
171	2.376E-06	1.50	2.006E-06	1.38	2.156E-06	1.02
172	2.417E-06	1.20	2.068E-06	1.05	2.221E-06	0.87
173	2.462E-06	1.38	2.091E-06	1.28	2.257E-06	0.95
174	2.456E-06	1.37	2.095E-06	1.14	2.292E-06	1.08
175	9.967E-07	1.83	8.375E-07	1.87	9.198E-07	1.42
176	9.872E-07	2.11	8.460E-07	1.90	9.271E-07	1.57
177	1.016E-06	2.16	8.598E-07	1.97	9.511E-07	1.84
178	1.042E-06	2.03	8.930E-07	1.72	9.737E-07	1.35
179	1.031E-06	2.37	8.757E-07	2.01	9.456E-07	1.63
180	1.013E-06	1.98	8.827E-07	2.06	9.565E-07	1.56
181	1.084E-06	2.21	9.166E-07	1.93	9.929E-07	1.58
182	1.083E-06	1.94	9.177E-07	1.74	9.880E-07	1.54
183	1.087E-06	1.83	9.034E-07	1.65	9.992E-07	1.33
184	1.100E-06	2.06	9.347E-07	1.91	1.018E-06	1.56
185	1.144E-06	1.89	9.698E-07	1.75	1.052E-06	1.33
186	1.136E-06	1.92	9.596E-07	1.65	1.057E-06	1.40
187	1.178E-06	2.48	1.000E-06	2.08	1.074E-06	1.63
188	1.136E-06	1.89	9.563E-07	1.80	1.041E-06	1.41
189	1.141E-06	1.78	9.926E-07	1.61	1.076E-06	1.29
190	2.978E-06	1.27	2.537E-06	1.17	2.731E-06	0.88
191	3.097E-06	1.17	2.607E-06	1.07	2.831E-06	0.79
192	3.121E-06	1.16	2.674E-06	1.20	2.861E-06	0.93
193	3.334E-06	1.20	2.835E-06	1.31	3.019E-06	0.86
194	6.912E-06	0.91	5.793E-06	0.75	6.274E-06	0.57
195	7.263E-06	0.75	6.172E-06	0.70	6.628E-06	0.51
196	7.766E-06	0.87	6.587E-06	0.75	7.077E-06	0.58
197	8.413E-06	0.58	7.099E-06	0.56	7.694E-06	0.47
198	8.952E-06	0.76	7.586E-06	0.69	8.222E-06	0.56
199	4.806E-06	1.03	4.088E-06	0.93	4.365E-06	0.69
200	5.052E-06	0.88	4.264E-06	0.87	4.649E-06	0.66
201	1.065E-05	0.61	9.047E-06	0.52	9.731E-06	0.47
202	1.209E-05	0.57	1.021E-05	0.53	1.104E-05	0.43
203	1.289E-05	0.67	1.100E-05	0.60	1.190E-05	0.47
204	1.476E-05	0.59	1.250E-05	0.49	1.357E-05	0.40
205	8.583E-06	0.74	7.696E-06	0.65	8.143E-06	0.53
206	9.291E-06	0.66	8.386E-06	0.53	8.885E-06	0.42
207	9.696E-06	0.73	8.770E-06	0.66	9.242E-06	0.55
208	1.123E-05	0.64	1.018E-05	0.54	1.078E-05	0.44
209	1.158E-05	0.60	1.050E-05	0.52	1.115E-05	0.45
210	1.422E-05	0.46	1.281E-05	0.44	1.362E-05	0.34
211	1.617E-05	0.47	1.467E-05	0.42	1.561E-05	0.32
212	1.920E-05	0.41	1.729E-05	0.40	1.845E-05	0.31
213	2.611E-05	0.33	2.347E-05	0.32	2.508E-05	0.27
214	3.681E-05	0.31	3.301E-05	0.27	3.553E-05	0.24
215	5.510E-05	0.27	4.980E-05	0.23	5.364E-05	0.18
216	9.228E-05	0.22	8.405E-05	0.18	9.092E-05	0.15
217	5.556E-05	0.22	5.309E-05	0.21	5.621E-05	0.15
218	7.070E-05	0.23	6.781E-05	0.18	7.221E-05	0.15
219	8.421E-05	0.18	8.140E-05	0.15	8.660E-05	0.12

220	1.014E-04	0.18	9.884E-05	0.15	1.054E-04	0.13
221	1.203E-04	0.16	1.184E-04	0.12	1.264E-04	0.11
222	1.366E-04	0.13	1.366E-04	0.12	1.457E-04	0.10
223	1.533E-04	0.14	1.574E-04	0.12	1.676E-04	0.10
224	7.528E-05	0.18	7.990E-05	0.15	8.451E-05	0.12
225	2.336E-04	0.13	2.721E-04	0.10	2.824E-04	0.10
226	3.166E-05	0.25	4.471E-05	0.20	4.447E-05	0.13
227	2.887E-05	0.24	4.633E-05	0.21	4.435E-05	0.12
228	1.044E-05	0.38	1.911E-05	0.28	1.753E-05	0.17
229	9.664E-06	0.41	1.958E-05	0.31	1.746E-05	0.16
230	4.540E-06	0.51	1.025E-05	0.39	8.722E-06	0.24
231	4.221E-06	0.58	1.055E-05	0.44	8.730E-06	0.22
232	3.962E-06	0.57	1.131E-05	0.41	8.889E-06	0.22
233	2.228E-06	0.67	7.404E-06	0.48	5.516E-06	0.27
234	1.417E-06	0.83	5.403E-06	0.62	3.819E-06	0.31
235	5.184E-07	1.57	1.070E-06	1.16	1.130E-06	0.54
236	3.463E-07	1.70	7.466E-07	1.33	8.056E-07	0.64
237	2.219E-07	2.06	5.364E-07	1.34	6.185E-07	0.51
238	4.964E-09	10.74	1.935E-08	6.34	2.574E-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
 0.7553 to 0.7581     ****
 0.7581 to 0.7610     *************
 0.7610 to 0.7638     ************************
 0.7638 to 0.7666     *************************
 0.7666 to 0.7694     ****************
 0.7694 to 0.7723     ***************
 0.7723 to 0.7751     *****

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7553 to 0.7581     ****
 0.7581 to 0.7610     *********
 0.7610 to 0.7638     ******************
 0.7638 to 0.7666     *************
 0.7666 to 0.7694     *************
 0.7694 to 0.7723     *************
 0.7723 to 0.7751     *****

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7553 to 0.7581     **
 0.7581 to 0.7610     *******
 0.7610 to 0.7638     ***********
 0.7638 to 0.7666     ******
 0.7666 to 0.7694     ************
 0.7694 to 0.7723     *********
 0.7723 to 0.7751     ***

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7553 to 0.7581
 0.7581 to 0.7610     **
 0.7610 to 0.7638     *********
 0.7638 to 0.7666     ***
 0.7666 to 0.7694     *****
 0.7694 to 0.7723     ****
 0.7723 to 0.7751     **

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

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76520 + or - 0.00045                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.66946E-02 + or -  1.05808E-04            ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  1.01423E-05            ***
        ***
***
        ***        system mean free path (cm)
6.52713E-01 + or -  1.69359E-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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```

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           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.11467 minutes


*********************************************************************
*************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666


      0000000      5555555555555                            44
7777777777777                          11              11
     000000000     5555555555555                           444
777777777777                         111             111
    00       00    55                    :::              4444     77
77          :::           1111            1111
   00         00   55                    :::             44 44
77           :::             11              11
   00         00   55                    :::            44  44
77            :::             11              11
   00         00   555555555555                        44   44
77                              11              11
   00         00   5555555555555                      44    44
```

```
77                              11              11
   00         00              55         :::        444444444444
77              :::             11              11
   00         00              55         :::       4444444444444
77              :::             11              11
    00       00    55         55         :::                44
77               :::             11              11
     000000000     5555555555555                            44
77                             11111111        11111111
      0000000       55555555555                              44
77                             11111111        11111111
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
```

```
*********************************************************************
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*********************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:47:11.82
*****
        *****
*****
        *****
*****

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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
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*********************************************
        ***
***
        ***                                 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.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  2.67064E-12  8.05683E-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  6.04516E-08  1.81189E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  7.43331E-15  2.44965E-14    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  7.37711E-07  5.29650E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33931E-08  6.98507E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02826E-07  7.99737E-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
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    1026056  2.26940E-05  3.79975E-04   26056    55.9349     fe56 2631
endf/b7 rel8 rev7 mod4                 12/17/09
    1026057  5.24103E-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  3.33253E-11  8.27113E-10   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90768E-08  1.32075E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.08583E-08  2.95471E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.67347E-08  4.60383E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  3.89020E-10  1.08188E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.69628E-08  4.76821E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.22444E-10  6.31953E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.04471E-09  8.74105E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.00786E-18  2.80291E-17   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  8.24321E-11  2.34183E-09   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  1.13661E-08  3.22900E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39893E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
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    1042097  7.14464E-09  2.07249E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.75103E-08  5.13171E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75596E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.23533E-09  2.16381E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  3.52276E-10  1.04296E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  3.07743E-10  9.29535E-09   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  2.53440E-10  7.73089E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  7.80226E-11  2.40339E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  1.12453E-10  3.49759E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  2.17998E-11  6.91098E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  1.01627E-10  3.13046E-09   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.11089E-12  3.48846E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  5.90133E-11  1.85314E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  9.02822E-12  2.88910E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  3.35270E-12  1.08291E-10   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  1.89771E-12  6.18639E-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  8.98640E-11  2.90259E-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  1.29331E-09  4.29351E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                 12/17/09
    1048112  2.43710E-09  8.16348E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                 12/17/09
    1048113  1.23447E-09  4.17207E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                 12/17/09
    1048114  2.90166E-09  9.89337E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                 12/17/09
    1048116  7.57032E-10  2.62650E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                 12/17/09
    1049115  7.18964E-13  2.47288E-11   49115   114.9039     in115 4931
endf/b7 rel3 rev7 mod1                 12/17/09
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    1050112  1.85479E-10  6.21305E-09   50112   111.9048     sn112 5025
endf/b7 rel0 rev7 mod1                12/17/09
    1050114  1.26202E-10  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50499E-11  2.23739E-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  1.46933E-09  5.14169E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63194E-09  1.63472E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64333E-09  5.84899E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23057E-09  2.23623E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.86272E-10  3.23403E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10875E-09  4.11232E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  3.33921E-12  1.25851E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  8.97800E-12  3.41050E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  3.31224E-11  1.27807E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30244E-12  5.25972E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  1.54334E-10  6.04758E-09   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67707E-11  1.06504E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87636E-12  7.57728E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  3.68187E-10  1.46478E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  5.13192E-16  2.05705E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  4.02808E-10  1.62664E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  3.64253E-10  1.49276E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.33251E-08  1.37567E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.98142E-11  2.50505E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  3.88493E-10  1.61535E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.37406E-10  5.79568E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  3.55250E-10  1.50906E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
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    1058143  6.21020E-12  2.65667E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  2.83748E-10  1.22235E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  2.25449E-10  9.50922E-09   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.10912E-11  2.61340E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  2.86094E-10  1.22386E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  4.06019E-11  1.74904E-09   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  2.40428E-10  1.04292E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  1.78858E-10  7.81206E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87087E-11  8.22764E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  9.89633E-11  4.38181E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  1.10651E-10  4.86614E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  8.03428E-18  3.55736E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84878E-12  8.24129E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  4.02964E-12  1.77212E-10   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  6.41513E-11  2.85964E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.40383E-14  6.29982E-13   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.02528E-09  1.36670E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  1.60823E-11  7.31346E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32592E-13  1.06470E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.43537E-09  6.48446E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.56833E-09  7.17905E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  3.90798E-15  1.80060E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  1.89818E-12  8.80266E-11   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.79750E-13  8.38969E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.79340E-12  2.63457E-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
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    1064155  4.27202E-10  1.98112E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.91825E-10  2.76225E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51673E-10  2.12166E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17840E-10  3.39342E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31116E-10  3.02129E-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  8.13855E-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  1.45934E-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  9.22655E-06  6.51924E-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  3.08179E-12  2.18676E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.89370E-18  1.34940E-16   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  2.64853E-10  1.89522E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.24284E-16  2.33022E-14   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.05259E-20  7.59524E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49926E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.01457E-20  7.32092E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.89522E-28  2.82238E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99992E-21  7.27569E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
```

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    1096242  1.13377E-20  8.21501E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.92685E-21  7.22253E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.88276E-21  7.22007E-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
```

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    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

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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
```

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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
```

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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:
  9348 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

                                                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 15615 independent fission points were generated for generation 1
          1       7.65991E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15640 independent fission points were generated for generation 2
          2       7.68420E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15620 independent fission points were generated for generation 3
          3       7.66047E-01      7.66047E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.64214E-01      7.65130E-01      9.16541E-04
0.00000E+00      0.00000E+00
          5       7.73353E-01      7.67871E-01      2.79134E-03
```

0.00000E+00	0.00000E+00				
6	7.65408E-01	7.67255E-01	2.06763E-03	0.00000E+00	0.00000E+00
7	7.66651E-01	7.67134E-01	1.60614E-03	0.00000E+00	0.00000E+00
8	7.59920E-01	7.65932E-01	1.77923E-03	0.00000E+00	0.00000E+00
9	7.58790E-01	7.64912E-01	1.81715E-03	0.00000E+00	0.00000E+00
10	7.69615E-01	7.65500E-01	1.67994E-03	0.00000E+00	0.00000E+00
11	7.72639E-01	7.66293E-01	1.68056E-03	0.00000E+00	0.00000E+00
12	7.65857E-01	7.66249E-01	1.50377E-03	0.00000E+00	0.00000E+00
13	7.61453E-01	7.65813E-01	1.42839E-03	0.00000E+00	0.00000E+00
14	7.72545E-01	7.66374E-01	1.41947E-03	0.00000E+00	0.00000E+00
15	7.69193E-01	7.66591E-01	1.32361E-03	0.00000E+00	0.00000E+00
16	7.61365E-01	7.66218E-01	1.28103E-03	0.00000E+00	0.00000E+00
17	7.61042E-01	7.65873E-01	1.24149E-03	0.00000E+00	0.00000E+00
18	7.68039E-01	7.66008E-01	1.16918E-03	0.00000E+00	0.00000E+00
19	7.69636E-01	7.66221E-01	1.11879E-03	0.00000E+00	0.00000E+00
20	7.63971E-01	7.66096E-01	1.06219E-03	0.00000E+00	0.00000E+00
21	7.72575E-01	7.66437E-01	1.06102E-03	0.00000E+00	0.00000E+00
22	7.70996E-01	7.66665E-01	1.03206E-03	0.00000E+00	0.00000E+00
23	7.62832E-01	7.66483E-01	9.98506E-04	0.00000E+00	0.00000E+00
24	7.66244E-01	7.66472E-01	9.52100E-04	0.00000E+00	0.00000E+00
25	7.64609E-01	7.66391E-01	9.13363E-04	0.00000E+00	0.00000E+00
26	7.67812E-01	7.66450E-01	8.76481E-04	0.00000E+00	0.00000E+00
27	7.69291E-01	7.66989E-01	2.94242E-03	0.00000E+00	0.00000E+00
28	7.62083E-01	7.66008E-01	1.61893E-03	0.00000E+00	0.00000E+00
29	7.73532E-01	7.67262E-01	4.73355E-03	0.00000E+00	0.00000E+00
30	7.75852E-01	7.68489E-01	4.42633E-03	0.00000E+00	0.00000E+00
31	7.65262E-01	7.68086E-01	1.89603E-03		

0.00000E+00	0.00000E+00				
32	7.57338E-01	7.66891E-01	2.65528E-03	0.00000E+00	0.00000E+00
33	7.65787E-01	7.66781E-01	2.39209E-03	0.00000E+00	0.00000E+00
34	7.67260E-01	7.66825E-01	2.10400E-03	0.00000E+00	0.00000E+00
35	7.61922E-01	7.66416E-01	2.93429E-03	0.00000E+00	0.00000E+00
36	7.69414E-01	7.66647E-01	2.32373E-03	0.00000E+00	0.00000E+00
37	7.67579E-01	7.66713E-01	2.08968E-03	0.00000E+00	0.00000E+00
38	7.73357E-01	7.67156E-01	1.54514E-03	0.00000E+00	0.00000E+00
39	7.66213E-01	7.67097E-01	1.40764E-03	0.00000E+00	0.00000E+00
40	7.62217E-01	7.66810E-01	1.36704E-03	0.00000E+00	0.00000E+00
41	7.69883E-01	7.66981E-01	1.24321E-03	0.00000E+00	0.00000E+00
42	7.65415E-01	7.66898E-01	1.15637E-03	0.00000E+00	0.00000E+00
43	7.70668E-01	7.67087E-01	1.04754E-03	0.00000E+00	0.00000E+00
44	7.66365E-01	7.67052E-01	9.94442E-04	0.00000E+00	0.00000E+00
45	7.67137E-01	7.67056E-01	9.45912E-04	0.00000E+00	0.00000E+00
46	7.72475E-01	7.67292E-01	9.34990E-04	0.00000E+00	0.00000E+00
47	7.71645E-01	7.67473E-01	9.90800E-04	0.00000E+00	0.00000E+00
48	7.66642E-01	7.67440E-01	9.39881E-04	0.00000E+00	0.00000E+00
49	7.62015E-01	7.67231E-01	9.37054E-04	0.00000E+00	0.00000E+00
50	7.66688E-01	7.67211E-01	9.04492E-04	0.00000E+00	0.00000E+00
51	7.58950E-01	7.66916E-01	9.33159E-04	0.00000E+00	0.00000E+00
52	7.67473E-01	7.66935E-01	8.90766E-04	0.00000E+00	0.00000E+00
53	7.72631E-01	7.67125E-01	8.86640E-04	0.00000E+00	0.00000E+00
54	7.59547E-01	7.66881E-01	8.33442E-04	0.00000E+00	0.00000E+00
55	7.69301E-01	7.66956E-01	8.09885E-04	0.00000E+00	0.00000E+00
56	7.62059E-01	7.66808E-01	7.98976E-04	0.00000E+00	0.00000E+00
57	7.69218E-01	7.66879E-01	7.77825E-04		

0.00000E+00	0.00000E+00				
58	7.62895E-01	7.66765E-01	7.63652E-04	0.00000E+00	0.00000E+00
59	7.59158E-01	7.66554E-01	7.72737E-04	0.00000E+00	0.00000E+00
60	7.64427E-01	7.66496E-01	7.53287E-04	0.00000E+00	0.00000E+00
61	7.66016E-01	7.66484E-01	7.32760E-04	0.00000E+00	0.00000E+00
62	7.72890E-01	7.66648E-01	7.32883E-04	0.00000E+00	0.00000E+00
63	7.60783E-01	7.66501E-01	7.29522E-04	0.00000E+00	0.00000E+00
64	7.73102E-01	7.66662E-01	7.29957E-04	0.00000E+00	0.00000E+00
65	7.62314E-01	7.66559E-01	7.19790E-04	0.00000E+00	0.00000E+00
66	7.66700E-01	7.66562E-01	7.02450E-04	0.00000E+00	0.00000E+00
67	7.67114E-01	7.66575E-01	6.86040E-04	0.00000E+00	0.00000E+00
68	7.64814E-01	7.66535E-01	6.71461E-04	0.00000E+00	0.00000E+00
69	7.61973E-01	7.66436E-01	6.64157E-04	0.00000E+00	0.00000E+00
70	7.72934E-01	7.66575E-01	6.64745E-04	0.00000E+00	0.00000E+00
71	7.68545E-01	7.66616E-01	6.51798E-04	0.00000E+00	0.00000E+00
72	7.67158E-01	7.66627E-01	6.38175E-04	0.00000E+00	0.00000E+00
73	7.68133E-01	7.66657E-01	6.25771E-04	0.00000E+00	0.00000E+00
74	7.60714E-01	7.66540E-01	6.24547E-04	0.00000E+00	0.00000E+00
75	7.72654E-01	7.66658E-01	6.23810E-04	0.00000E+00	0.00000E+00
76	7.67673E-01	7.66677E-01	6.12008E-04	0.00000E+00	0.00000E+00
77	7.62028E-01	7.66591E-01	6.06726E-04	0.00000E+00	0.00000E+00
78	7.68429E-01	7.66624E-01	5.96356E-04	0.00000E+00	0.00000E+00
79	7.65380E-01	7.66602E-01	5.85850E-04	0.00000E+00	0.00000E+00
80	7.61991E-01	7.66521E-01	5.81158E-04	0.00000E+00	0.00000E+00
81	7.64466E-01	7.66486E-01	5.72009E-04	0.00000E+00	0.00000E+00
82	7.59989E-01	7.66376E-01	5.73116E-04	0.00000E+00	0.00000E+00
83	7.59474E-01	7.66261E-01	5.75337E-04		

```
0.00000E+00      0.00000E+00
         84       7.69051E-01      7.66306E-01      5.67576E-04
0.00000E+00      0.00000E+00
         85       7.57656E-01      7.66167E-01      5.75928E-04
0.00000E+00      0.00000E+00
         86       7.66196E-01      7.66167E-01      5.66563E-04
0.00000E+00      0.00000E+00
         87       7.64451E-01      7.66140E-01      6.24024E-04
0.00000E+00      0.00000E+00
         88       7.71603E-01      7.66225E-01      5.99693E-04
0.00000E+00      0.00000E+00
         89       7.59703E-01      7.66126E-01      6.38548E-04
0.00000E+00      0.00000E+00
         90       7.62701E-01      7.66075E-01      6.37476E-04
0.00000E+00      0.00000E+00
         91       7.69725E-01      7.66128E-01      5.44875E-04
0.00000E+00      0.00000E+00
         92       7.69820E-01      7.66182E-01      5.39541E-04
0.00000E+00      0.00000E+00
         93       7.74854E-01      7.66306E-01      5.69213E-04
0.00000E+00      0.00000E+00
         94       7.67667E-01      7.66325E-01      5.65012E-04
0.00000E+00      0.00000E+00
         95       7.65631E-01      7.66315E-01      5.31260E-04
0.00000E+00      0.00000E+00
         96       7.71893E-01      7.66392E-01      5.71953E-04
0.00000E+00      0.00000E+00
         97       7.68943E-01      7.66426E-01      5.65549E-04
0.00000E+00      0.00000E+00
         98       7.71057E-01      7.66488E-01      6.41898E-04
0.00000E+00      0.00000E+00
         99       7.71973E-01      7.66560E-01      5.80943E-04
0.00000E+00      0.00000E+00
        100       7.60788E-01      7.66485E-01      5.64977E-04
0.00000E+00      0.00000E+00
        101       7.68123E-01      7.66506E-01      5.63124E-04
0.00000E+00      0.00000E+00
        102       7.64571E-01      7.66482E-01      5.56439E-04
0.00000E+00      0.00000E+00
        103       7.65146E-01      7.66465E-01      5.51161E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=1E81E9575525282E
        104       7.74056E-01      7.66559E-01      5.51913E-04
0.00000E+00      0.00000E+00
        105       7.65239E-01      7.66542E-01      5.46434E-04
0.00000E+00      0.00000E+00
        106       7.69567E-01      7.66579E-01      5.46347E-04
0.00000E+00      0.00000E+00
        107       7.61626E-01      7.66520E-01      5.34165E-04
0.00000E+00      0.00000E+00
        108       7.71587E-01      7.66580E-01      5.33601E-04
```

```
0.00000E+00      0.00000E+00
        109       7.56771E-01      7.66466E-01      5.45429E-04
0.00000E+00      0.00000E+00
        110       7.67436E-01      7.66477E-01      5.39037E-04
0.00000E+00      0.00000E+00
        111       7.68167E-01      7.66496E-01      5.30900E-04
0.00000E+00      0.00000E+00
        112       7.61736E-01      7.66442E-01      5.38433E-04
0.00000E+00      0.00000E+00
        113       7.71571E-01      7.66499E-01      5.38814E-04
0.00000E+00      0.00000E+00
        114       7.67584E-01      7.66511E-01      5.31966E-04
0.00000E+00      0.00000E+00
        115       7.62366E-01      7.66466E-01      5.27672E-04
0.00000E+00      0.00000E+00
        116       7.61533E-01      7.66413E-01      5.17329E-04
0.00000E+00      0.00000E+00
        117       7.69222E-01      7.66443E-01      5.10470E-04
0.00000E+00      0.00000E+00
        118       7.70012E-01      7.66481E-01      4.98647E-04
0.00000E+00      0.00000E+00
        119       7.63285E-01      7.66447E-01      4.96075E-04
0.00000E+00      0.00000E+00
        120       7.65807E-01      7.66441E-01      4.89864E-04
0.00000E+00      0.00000E+00
        121       7.63232E-01      7.66408E-01      4.85595E-04
0.00000E+00      0.00000E+00
        122       7.66926E-01      7.66413E-01      4.80081E-04
0.00000E+00      0.00000E+00
        123       7.60540E-01      7.66355E-01      4.84018E-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=FDB97E6C50CB3DB1
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55126E-05 + or -  1.18503E-08             generation time
=  2.99278E-05 + or -  2.08297E-08
 nu bar   =  2.43894E+00 + or -  9.13854E-06       average fission group
=  2.17559E+02 + or -  1.03674E-02
                      energy(ev) of the average lethargy causing fission
=  5.66481E-02 + or -  1.07341E-04
                                              system mean free path (cm)
=  6.52986E-01 + or -  1.82400E-04

 no. of initial
deviation of
  generations      average                          67 per cent
```

skipped	k-effective	deviation	95 per cent confidence interval	99 per cent confidence interval	number of histories	variance confidence interval (per cent)
23	0.76635	+ or - 0.00048	0.76587 to 0.76684	0.76539 to 0.76732	0.76490 to 0.76781	2000000	9.4481
24	0.76636	+ or - 0.00049	0.76587 to 0.76684	0.76538 to 0.76733	0.76489 to 0.76782	1980000	9.4021
25	0.76637	+ or - 0.00049	0.76588 to 0.76687	0.76539 to 0.76736	0.76489 to 0.76785	1960000	9.4097
26	0.76636	+ or - 0.00050	0.76586 to 0.76686	0.76536 to 0.76735	0.76487 to 0.76785	1940000	9.4146
27	0.76633	+ or - 0.00049	0.76584 to 0.76682	0.76535 to 0.76731	0.76486 to 0.76780	1920000	9.8850
28	0.76637	+ or - 0.00050	0.76587 to 0.76687	0.76537 to 0.76738	0.76487 to 0.76788	1900000	9.6291
29	0.76630	+ or - 0.00052	0.76578 to 0.76682	0.76526 to 0.76733	0.76474 to 0.76785	1880000	9.0940
30	0.76619	+ or - 0.00054	0.76566 to 0.76673	0.76512 to 0.76727	0.76459 to 0.76780	1860000	8.1475
31	0.76620	+ or - 0.00054	0.76566 to 0.76675	0.76512 to 0.76729	0.76458 to 0.76783	1840000	8.1136
32	0.76630	+ or - 0.00053	0.76577 to 0.76683	0.76524 to 0.76736	0.76471 to 0.76789	1820000	8.2578
37	0.76630	+ or - 0.00056	0.76573 to 0.76686	0.76517 to 0.76742	0.76461 to 0.76798	1720000	8.1131
42	0.76623	+ or - 0.00059	0.76564 to 0.76682	0.76505 to 0.76740	0.76446 to 0.76799	1620000	8.1446
47	0.76600	+ or - 0.00062	0.76539 to 0.76662	0.76477 to 0.76723	0.76416 to 0.76785	1520000	8.2634
52	0.76612	+ or - 0.00073	0.76539 to 0.76684	0.76466 to 0.76757	0.76394 to 0.76830	1420000	6.5876
57	0.76608	+ or - 0.00067	0.76542 to 0.76675	0.76475 to 0.76742	0.76409 to 0.76808	1320000	8.9035
62	0.76617	+ or - 0.00071	0.76546 to 0.76688	0.76475 to 0.76759	0.76404 to 0.76829	1220000	8.8207

```
      67          0.76618   + or - 0.00074     0.76544 to 0.76692
0.76470 to 0.76766    0.76396 to 0.76840    1120000       9.3249

      72          0.76609   + or - 0.00081     0.76529 to 0.76690
0.76448 to 0.76771    0.76367 to 0.76851    1020000       9.1592

      77          0.76608   + or - 0.00099     0.76508 to 0.76707
0.76409 to 0.76806    0.76310 to 0.76906     920000       7.2623

      82          0.76632   + or - 0.00086     0.76547 to 0.76718
0.76461 to 0.76804    0.76376 to 0.76889     820000      12.1942

      87          0.76674   + or - 0.00085     0.76589 to 0.76758
0.76504 to 0.76843    0.76419 to 0.76928     720000      14.5543

      92          0.76674   + or - 0.00102     0.76572 to 0.76776
0.76470 to 0.76878    0.76367 to 0.76980     620000      13.1748

      97          0.76615   + or - 0.00096     0.76519 to 0.76711
0.76423 to 0.76807    0.76327 to 0.76903     520000      18.1296

     102          0.76588   + or - 0.00115     0.76473 to 0.76703
0.76357 to 0.76818    0.76242 to 0.76933     420000      18.7397

     107          0.76549   + or - 0.00115     0.76434 to 0.76663
0.76319 to 0.76778    0.76205 to 0.76893     320000      26.3729

     112          0.76564   + or - 0.00124     0.76441 to 0.76688
0.76317 to 0.76812    0.76194 to 0.76935     220000      24.0588
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)

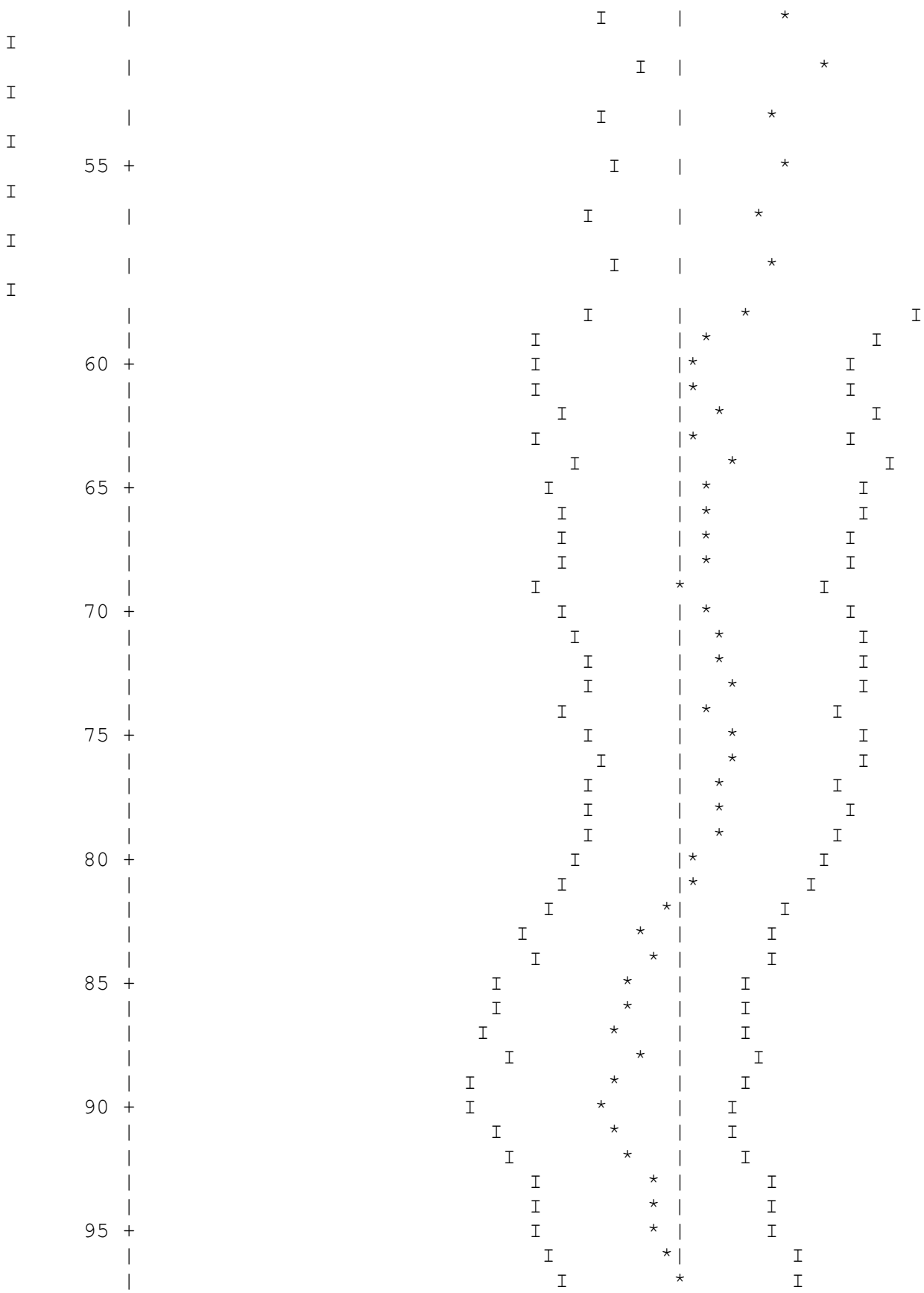
     117          0.76497   + or - 0.00288     0.76209 to 0.76784
0.75921 to 0.77072    0.75633 to 0.77360     120000      12.9499
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76641 + or - 0.00048 which occurs for
122 generations run.

                                 0.7654                   0.7670
0.7685

|-------------------------|------------------------|------------------
------|------------------------
          |
```

```
      25 +           I              *             I  |
         |           I                          *   |
I
         |  I                                       |        *
I
         |        I                        *       |
I
         |                                          |             *
      30 +  I                                      |
*
         |                                   I   |
*                                I
         |     I                                    |       *
I
         |        I                                 |      *
I
         |             I                            |      *
I
      35 +                                         *
I
         |      I                                   |  *
I
         |           I                              |    *
I
         |                            I             |           *
I
         |                             I            |          *
I
      40 +                         I                |      *
I
         |                              I           |        *
I
         |                              I           |       *
I
         |                                   I      |          *
I
         |                                   I      |         *
I
      45 +                                    I    |         *
I
         |                                       I|             *
I
         |                                        |I                *
I
         |                                        |I              *
I
         |                                      I |            *
I
      50 +                                      I |            *
I
         |                                 I      |       *
I
```



```
         |                                I          |*          I
         |                                   I       | *         I
     100 +                                 I        |*         I
         |                                 I        |*         I
         |                                 I        |*         I
         |                                I         *         I
         |                                   I       | *         I
     105 +                                   I       | *         I
         |                                   I       | *         I
         |                                   I       |*         I
         |                                     I     | *         I
         |                                 I        *         I
     110 +                                 I        |*        I
         |                                 I        |*         I
         |                                I         *         I
         |                                 I        |*         I
         |                                   I      |*         I
     115 +                                 I        *         I
         |                                I         *        I
         |                                 I        *        I
         |                                   I      |*        I
         |                                 I        *        I
     120 +                                 I        *        I
         |                                 I        *      I
         |                                 I        *      I
         |                                I        *|      I
1                         fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7663 + or - 0.0004 which occurs for 23 generations skipped.

```
                                 0.7636                   0.7652
0.7669

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                                                                I
*      I
         |                                                                I
*      I
      25 +                                                                I
*       I
         |                                                                I
*       I
         |                                                               I
*      I
         |                                                                I
*       I
         |                                                              I
*|      I
```

```
      30 +                                                          I
* |     I
         |                                                          I
* |     I
         |                                                           I
*|      I
         |                                                           I
*|      I
         |                                                           I
*|      I
      35 +                                                            I
*       I
         |                                                           I
*|       I
         |                                                           I
*|       I
         |                                                          I
* |     I
         |                                                        I
* |     I
      40 +                                                          I
*|      I
         |                                                        I
* |      I
         |                                                        I
* |      I
         |                                                        I
*  |     I
         |                                                       I
*  |     I
      45 +                                                       I
*  |     I
         |                                                     I
*   |    I
         |                                                   I
*    |   I
         |                                                 I
*    |   I
         |                                                   I
*    |    I
      50 +                                                   I
*    |    I
         |                                                   I
*  |      I
         |                                                   I
*  |      I
         |                                                 I
*    |    I
         |                                                     I
*  |     I
      55 +                                                   I
*   |     I
```

```
          |                                                          I
*  |      I
          |                                                        I
*   |      I
          |                                                      I
*  |         I
          |                                                        I
* |         I
      60 +                                                         I
*|         I
          |                                                        I
*|         I
          |                                                        I
*  |        I
          |                                                        I
*|         I
          |                                                        I
*  |       I
      65 +                                                         I
* |        I
          |                                                        I
* |         I
          |                                                        I
*  |        I
          |                                                        I
* |         I
          |                                                        I
*|           I
      70 +                                                     I
*  |            I
          |                                                      I
*   |       I
          |                                                    I
*   |       I
          |                                                I
*   |           I
          |                                              I
*  |             I
      75 +                                             I
*    |            I
          |                                         I
*    |            I
          |                                           I
*   |           I
          |                                         I
*    |           I
          |                                        I
*    |           I
      80 +                                           I
*  |            I
          |                                            I
*  |             I
```

```
         |                                                                I
*           I
         |                                                                  I
| *           I
         |                                                                 I
|*           I
      85 +                                                                   I
|    *           I
         |                                                                   I
|    *            I
         |                                                                    I
|     *           I
         |                                                                  I
|   *           I
         |                                                                    I
|      *            I
      90 +                                                                     I
|        *              I
         |                                                                   I
|      *              I
         |                                                                  I
|     *              I
         |                                                                I
| *             I
         |                                                                I
|*             I
      95 +                                                              I
| *              I
         |                                                           I
*|            I
         |                                                        I
*  |          I
         |                                                     I
*     |        I
         |                                                I              *
|    I
     100 +                                                 I                *
|        I
         |                                                 I               *
|       I
         |                                                 I                *
|         I
         |                                                I                 *
|           I
         |                                            I                *
|  I
     105 +                                         I                 *
|   I
         |                                     I                 *
I
         |                                         I                 *
|   I
```

```
         |                              I                *
I |
         |                                        I              *
|    I
     110 +                                     I               *
|   I
         |                                I                 *
| I
         |                                     I                 *
|       I
         |                            I                 *
I |
         |                      I                  *
I    |
     115 +                         I                    *
| I
         |                      I                              *
|                    I
         |   I                                        *
|                     I
         |                              *
|      I
         |                                *
|
     120 +                        *
|     I

   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                 4.64691E-07    70.3526
3.59217E-07    41.0672       0.00000E+00     0.0000
    3    0.0000                 1.04942E-05    12.2023
2.03175E-05     4.3282       0.00000E+00     0.0000
    4    0.0000                 1.86418E-05    10.3365
3.37644E-05     4.0000       0.00000E+00     0.0000
    5    0.0000                 2.67557E-05     8.2352
5.51087E-05     3.3870       0.00000E+00     0.0000
    6    0.0001                 9.47031E-05     3.4727
2.26680E-04     1.3761       0.00000E+00     0.0000
    7    0.0002                 1.16222E-04     3.3974
2.11345E-04     1.3978       0.00000E+00     0.0000
    8    0.0003                 2.46298E-04     2.0763
```

3.29030E-04	0.9301	0.00000E+00	0.0000	9	0.0005
3.80235E-04	1.3729	4.42206E-04	0.6128	0.00000E+00	0.0000
10	0.0003	1.97611E-04	1.8019	2.05267E-04	0.8417
0.00000E+00	0.0000	11	0.0012	9.14743E-04	0.8016
5.26038E-04	0.5493	0.00000E+00	0.0000	12	0.0010
7.66546E-04	0.7355	3.00518E-04	0.7252	0.00000E+00	0.0000
13	0.0003	2.28381E-04	1.4277	9.07081E-05	1.4117
0.00000E+00	0.0000	14	0.0013	1.00100E-03	0.6275
4.09185E-04	0.6212	0.00000E+00	0.0000	15	0.0010
7.57501E-04	0.8173	3.26652E-04	0.8083	0.00000E+00	0.0000
16	0.0002	1.90169E-04	1.1898	8.73810E-05	1.1720
0.00000E+00	0.0000	17	0.0001	6.84057E-05	1.6440
3.32735E-05	1.6142	0.00000E+00	0.0000	18	0.0001
4.99334E-05	1.8565	2.52277E-05	1.8175	0.00000E+00	0.0000
19	0.0001	8.00500E-05	1.4542	4.23429E-05	1.4208
0.00000E+00	0.0000	20	0.0001	5.93369E-05	1.6432
3.25244E-05	1.6061	0.00000E+00	0.0000	21	0.0002
1.21140E-04	1.0217	6.83615E-05	0.9975	0.00000E+00	0.0000
22	0.0001	1.05148E-04	1.2515	6.22729E-05	1.2213
0.00000E+00	0.0000	23	0.0001	1.07408E-04	1.1210
6.55323E-05	1.0945	0.00000E+00	0.0000	24	0.0000
2.47825E-05	2.0806	1.53923E-05	2.0185	0.00000E+00	0.0000
25	0.0000	3.06127E-05	2.0037	1.91285E-05	1.9566
0.00000E+00	0.0000	26	0.0000	1.79683E-05	2.3513
1.12774E-05	2.2905	0.00000E+00	0.0000	27	0.0001
5.36931E-05	1.2090	3.34975E-05	1.1830	0.00000E+00	0.0000
28	0.0001	9.85673E-05	0.9727	6.14731E-05	0.9574
0.00000E+00	0.0000	29	0.0001	9.77479E-05	1.1957
6.15797E-05	1.1786	0.00000E+00	0.0000	30	0.0000
1.23237E-05	2.8756	7.72987E-06	2.8546	0.00000E+00	0.0000
31	0.0001	9.60040E-05	1.0330	6.06609E-05	1.0202
0.00000E+00	0.0000	32	0.0000	3.73915E-05	1.6121
2.39085E-05	1.5758	0.00000E+00	0.0000	33	0.0000
3.26788E-05	1.6038	2.04611E-05	1.5829	0.00000E+00	0.0000
34	0.0001	7.58702E-05	1.0027		

```
4.76516E-05     0.9876       0.00000E+00     0.0000
   35    0.0001                 4.47640E-05     1.5119
2.80963E-05     1.4863       0.00000E+00     0.0000
   36    0.0001                 4.23690E-05     1.4350
2.62314E-05     1.4225       0.00000E+00     0.0000
   37    0.0000                 2.83147E-05     1.9033
1.77713E-05     1.8619       0.00000E+00     0.0000
   38    0.0000                 3.27701E-05     1.8470
2.06489E-05     1.7982       0.00000E+00     0.0000
   39    0.0002                 1.29617E-04     1.0838
8.24495E-05     1.0563       0.00000E+00     0.0000
   40    0.0002                 1.17125E-04     0.9266
7.57463E-05     0.9074       0.00000E+00     0.0000
   41    0.0002                 1.58272E-04     0.7452
1.05804E-04     0.7194       0.00000E+00     0.0000
   42    0.0002                 1.38733E-04     0.8224
9.43904E-05     0.8023       0.00000E+00     0.0000
   43    0.0001                 8.13609E-05     1.0982
5.83879E-05     1.0515       0.00000E+00     0.0000
   44    0.0001                 1.11936E-04     1.1535
8.22708E-05     1.1003       0.00000E+00     0.0000
   45    0.0001                 5.93716E-05     1.0274
4.78668E-05     0.9521       0.00000E+00     0.0000
   46    0.0000                 1.42578E-05     1.8833
1.14644E-05     1.7449       0.00000E+00     0.0000
   47    0.0001                 4.06713E-05     1.7915
3.15984E-05     1.7198       0.00000E+00     0.0000
   48    0.0000                 1.24195E-05     3.1178
9.63787E-06     3.0277       0.00000E+00     0.0000
   49    0.0001                 8.13332E-05     1.5388
6.41214E-05     1.5081       0.00000E+00     0.0000
   50    0.0001                 5.66681E-05     1.5096
4.66649E-05     1.4782       0.00000E+00     0.0000
   51    0.0000                 1.47954E-05     3.4126
1.23020E-05     3.3409       0.00000E+00     0.0000
   52    0.0001                 4.08507E-05     1.9504
3.53096E-05     1.9080       0.00000E+00     0.0000
   53    0.0002                 1.60536E-04     0.7825
1.57479E-04     0.7277       0.00000E+00     0.0000
   54    0.0001                 7.47901E-05     1.9468
6.94646E-05     1.8808       0.00000E+00     0.0000
   55    0.0002                 1.58699E-04     1.3743
1.45597E-04     1.3395       0.00000E+00     0.0000
   56    0.0002                 1.17072E-04     1.6192
1.08599E-04     1.5796       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			1.49166E-04		1.3624	
1.35356E-04		1.3286		0.00000E+00		0.0000	
58	0.0001			8.69910E-05		1.7786	
7.61396E-05		1.7310		0.00000E+00		0.0000	
59	0.0002			1.58852E-04		1.6664	
1.42595E-04		1.6044		0.00000E+00		0.0000	
60	0.0004			2.73562E-04		1.3345	
2.48089E-04		1.2627		0.00000E+00		0.0000	
61	0.0000			2.88978E-05		3.8384	
2.22143E-05		3.7235		0.00000E+00		0.0000	
62	0.0002			1.64755E-04		1.5815	
1.38147E-04		1.5387		0.00000E+00		0.0000	
63	0.0002			1.22244E-04		2.1560	
1.00581E-04		2.0786		0.00000E+00		0.0000	
64	0.0001			1.00089E-04		2.2433	
8.06803E-05		2.1719		0.00000E+00		0.0000	
65	0.0000			3.22720E-05		3.6507	
3.19730E-05		3.5264		0.00000E+00		0.0000	
66	0.0002			1.71032E-04		1.5922	
1.51770E-04		1.5422		0.00000E+00		0.0000	
67	0.0002			1.43281E-04		1.9306	
1.17285E-04		1.8677		0.00000E+00		0.0000	
68	0.0000			2.70704E-05		4.7036	
2.34031E-05		4.5312		0.00000E+00		0.0000	
69	0.0004			2.96472E-04		1.3422	
2.32770E-04		1.2992		0.00000E+00		0.0000	
70	0.0003			2.05329E-04		1.7352	
1.86957E-04		1.6730		0.00000E+00		0.0000	
71	0.0006			4.35029E-04		1.4570	
3.59906E-04		1.4117		0.00000E+00		0.0000	
72	0.0001			4.72592E-05		6.0494	
2.79387E-05		5.8939		0.00000E+00		0.0000	
73	0.0004			3.23152E-04		1.7911	
2.46055E-04		1.7000		0.00000E+00		0.0000	
74	0.0014			1.07235E-03		1.0388	
7.79318E-04		0.9959		0.00000E+00		0.0000	
75	0.0001			1.14709E-04		2.8094	
8.80949E-05		2.6814		0.00000E+00		0.0000	
76	0.0006			4.52370E-04		1.9155	
2.87643E-04		1.8478		0.00000E+00		0.0000	
77	0.0005			3.76449E-04		2.0775	
2.69701E-04		2.0013		0.00000E+00		0.0000	
78	0.0000			7.03008E-06		4.0914	
6.88037E-05		4.0476		0.00000E+00		0.0000	
79	0.0002			1.86660E-04		2.3254	
1.25479E-04		2.2359		0.00000E+00		0.0000	
80	0.0001			6.24390E-05		3.3551	
8.31983E-05		3.2666		0.00000E+00		0.0000	
81	0.0014			1.06327E-03		1.0113	
7.81885E-04		0.9672		0.00000E+00		0.0000	

82	0.0001	6.72245E-05	4.1090	4.03452E-05	3.8903	0.00000E+00	0.0000
83	0.0002	1.27153E-04	2.9050	1.40703E-04	2.8482	0.00000E+00	0.0000
84	0.0001	7.74559E-05	3.2439	7.88509E-05	3.0126	0.00000E+00	0.0000
85	0.0003	1.97710E-04	2.2548	2.43381E-04	2.1925	0.00000E+00	0.0000
86	0.0003	2.67370E-04	2.2935	2.15092E-04	2.1793	0.00000E+00	0.0000
87	0.0004	3.31830E-04	2.5458	2.06464E-04	2.4328	0.00000E+00	0.0000
88	0.0001	5.52119E-05	4.6335	1.00282E-04	4.5147	0.00000E+00	0.0000
89	0.0001	9.32029E-05	3.3002	6.47807E-05	3.0316	0.00000E+00	0.0000
90	0.0003	2.16867E-04	3.0732	1.28248E-04	2.9363	0.00000E+00	0.0000
91	0.0003	1.92308E-04	2.5618	1.21408E-04	2.4131	0.00000E+00	0.0000
92	0.0000	3.05722E-05	2.8176	2.00151E-04	2.7608	0.00000E+00	0.0000
93	0.0002	1.24182E-04	3.5062	1.01232E-04	3.2632	0.00000E+00	0.0000
94	0.0001	1.07997E-04	4.3482	6.07657E-05	4.0740	0.00000E+00	0.0000
95	0.0008	6.36449E-04	2.2099	3.91930E-04	2.1443	0.00000E+00	0.0000
96	0.0002	1.46303E-04	4.2634	7.43470E-05	4.0796	0.00000E+00	0.0000
97	0.0004	2.70011E-04	3.6300	1.54762E-04	3.5484	0.00000E+00	0.0000
98	0.0001	1.06981E-04	4.2836	1.02531E-04	4.1291	0.00000E+00	0.0000
99	0.0001	9.64509E-05	4.6952	6.47307E-05	4.5271	0.00000E+00	0.0000
100	0.0002	1.29126E-04	4.3003	8.63075E-05	4.1315	0.00000E+00	0.0000
101	0.0001	1.12957E-04	3.8346	7.18329E-05	3.5561	0.00000E+00	0.0000
102	0.0002	1.50922E-04	4.3846	8.44152E-05	4.1895	0.00000E+00	0.0000
103	0.0001	9.78926E-05	3.8951	9.54558E-05	3.6897	0.00000E+00	0.0000
104	0.0002	1.70303E-04	3.9528	1.35006E-04	3.8144	0.00000E+00	0.0000
105	0.0002	1.17477E-04	3.3890	7.79820E-05	3.1694	0.00000E+00	0.0000
106	0.0002	1.82301E-04	3.6352	1.35431E-04	3.5871	0.00000E+00	0.0000
107	0.0001	6.21876E-05	3.7297	6.29724E-05	3.4900	0.00000E+00	0.0000

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  108    0.0000                 3.45749E-05     2.4549
1.49413E-04     2.3895       0.00000E+00     0.0000
  109    0.0002                 1.28493E-04     2.2324
4.26450E-04     2.2009       0.00000E+00     0.0000
  110    0.0008                 6.31081E-04     2.6956
3.89314E-04     2.6697       0.00000E+00     0.0000
  111    0.0002                 1.56945E-04     4.5552
1.44114E-04     4.4399       0.00000E+00     0.0000
  112    0.0002                 1.14954E-04     5.1360
1.21289E-04     5.0378       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                 1.30671E-04     3.8484
1.13948E-04     3.6024       0.00000E+00     0.0000
  114    0.0000                 1.25394E-05     7.3024
1.67515E-05     6.2308       0.00000E+00     0.0000
  115    0.0001                 7.40298E-05     4.1471
8.59234E-05     3.8254       0.00000E+00     0.0000
  116    0.0003                 1.97757E-04     3.0041
1.48275E-04     2.7159       0.00000E+00     0.0000
  117    0.0007                 4.98921E-04     2.1699
2.65855E-04     2.0433       0.00000E+00     0.0000
  118    0.0008                 5.85962E-04     2.1096
4.57393E-04     2.0237       0.00000E+00     0.0000
  119    0.0002                 1.46333E-04     1.6972
3.77199E-04     1.6416       0.00000E+00     0.0000
  120    0.0002                 1.73656E-04     2.0632
6.60683E-04     2.0345       0.00000E+00     0.0000
  121    0.0007                 5.25284E-04     2.4408
4.04048E-04     2.3813       0.00000E+00     0.0000
  122    0.0001                 1.04077E-04     4.6841
8.13305E-05     4.3790       0.00000E+00     0.0000
  123    0.0003                 2.18778E-04     2.8095
1.54710E-04     2.4858       0.00000E+00     0.0000
  124    0.0003                 2.42193E-04     2.7190
1.99426E-04     2.5468       0.00000E+00     0.0000
  125    0.0002                 1.33957E-04     3.3381
1.23616E-04     2.9986       0.00000E+00     0.0000
  126    0.0001                 8.88127E-05     3.6329
8.09303E-05     3.1704       0.00000E+00     0.0000
  127    0.0005                 3.95448E-04     3.1664
1.94012E-04     2.9893       0.00000E+00     0.0000
  128    0.0003                 2.25385E-04     2.7752
1.38795E-04     2.5014       0.00000E+00     0.0000
  129    0.0006                 4.51533E-04     2.0653
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4.15948E-04	1.9676	0.00000E+00	0.0000	130	0.0002	1.21603E-04	3.3001
2.96144E-04	3.2083	0.00000E+00	0.0000	131	0.0004	3.01447E-04	2.1678
2.41300E-04	1.8335	0.00000E+00	0.0000	132	0.0007	5.23205E-04	2.6231
3.21512E-04	2.4175	0.00000E+00	0.0000	133	0.0014	1.04415E-03	2.0751
6.59761E-04	1.9744	0.00000E+00	0.0000	134	0.0001	8.91224E-05	2.2322
2.32425E-04	1.8738	0.00000E+00	0.0000	135	0.0002	1.75902E-04	3.1276
2.60690E-04	3.0522	0.00000E+00	0.0000	136	0.0001	4.34452E-05	2.2566
6.74859E-04	2.2185	0.00000E+00	0.0000	137	0.0000	1.93560E-05	1.1084
3.48295E-03	1.1055	0.00000E+00	0.0000	138	0.0004	3.18841E-04	2.4330
8.30417E-04	2.3977	0.00000E+00	0.0000	139	0.0002	1.82146E-04	3.1655
2.23871E-04	2.9664	0.00000E+00	0.0000	140	0.0003	2.16607E-04	2.4356
2.87311E-04	2.1453	0.00000E+00	0.0000	141	0.0001	7.98563E-05	2.3025
2.52008E-04	2.0534	0.00000E+00	0.0000	142	0.0001	6.42455E-05	3.2812
2.22383E-04	3.0003	0.00000E+00	0.0000	143	0.0001	8.23528E-05	2.3426
1.75740E-04	1.4816	0.00000E+00	0.0000	144	0.0000	3.46723E-05	3.1288
7.50786E-05	1.8998	0.00000E+00	0.0000	145	0.0005	3.90061E-04	2.5325
3.05633E-04	2.3068	0.00000E+00	0.0000	146	0.0005	3.59779E-04	2.5984
2.60446E-04	2.1313	0.00000E+00	0.0000	147	0.0002	1.78267E-04	3.7325
1.13943E-04	3.2774	0.00000E+00	0.0000	148	0.0001	6.01209E-05	5.4520
3.99698E-05	4.4027	0.00000E+00	0.0000	149	0.0000	3.05185E-05	8.7937
2.11622E-05	6.8277	0.00000E+00	0.0000	150	0.0001	8.48127E-05	3.8409
6.19347E-05	2.7953	0.00000E+00	0.0000	151	0.0001	7.21677E-05	4.1084
5.98955E-05	2.9594	0.00000E+00	0.0000	152	0.0001	4.50216E-05	4.6600
4.94565E-05	2.8871	0.00000E+00	0.0000	153	0.0001	4.48769E-05	4.0753
4.87544E-05	2.4999	0.00000E+00	0.0000	154	0.0001	4.84140E-05	4.4540
5.03238E-05	2.5713	0.00000E+00	0.0000	155	0.0001	5.03940E-05	4.5700

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4.94146E-05     2.7284       0.00000E+00     0.0000
  156    0.0001                 4.67655E-05     4.7198
4.59619E-05     2.8496       0.00000E+00     0.0000
  157    0.0001                 5.67228E-05     4.4747
5.59905E-05     2.7179       0.00000E+00     0.0000
  158    0.0001                 6.87012E-05     3.9871
6.90424E-05     2.6535       0.00000E+00     0.0000
  159    0.0002                 1.52767E-04     3.2209
2.11834E-04     2.7184       0.00000E+00     0.0000
  160    0.0001                 6.46317E-05     4.4162
7.59090E-05     3.3552       0.00000E+00     0.0000
  161    0.0001                 7.02585E-05     4.1360
7.04696E-05     2.6988       0.00000E+00     0.0000
  162    0.0001                 8.50725E-05     3.7326
8.03535E-05     2.3113       0.00000E+00     0.0000
  163    0.0001                 9.59863E-05     3.5749
8.75461E-05     2.2382       0.00000E+00     0.0000
  164    0.0001                 1.03952E-04     3.1406
9.54957E-05     1.9651       0.00000E+00     0.0000
  165    0.0001                 1.11040E-04     3.6268
1.02743E-04     2.2850       0.00000E+00     0.0000
  166    0.0001                 6.93798E-05     4.1767
6.26629E-05     2.7514       0.00000E+00     0.0000
  167    0.0001                 7.51628E-05     4.2962
6.85220E-05     2.7622       0.00000E+00     0.0000
  168    0.0001                 9.21122E-05     4.1171
8.06594E-05     2.7516       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                 1.07082E-04     3.3896
9.33948E-05     2.3486       0.00000E+00     0.0000
  170    0.0002                 1.21775E-04     3.4197
1.06532E-04     2.5248       0.00000E+00     0.0000
  171    0.0001                 1.02435E-04     5.4707
7.82698E-05     4.4163       0.00000E+00     0.0000
  172    0.0002                 1.37158E-04     4.5715
9.71524E-05     3.8620       0.00000E+00     0.0000
  173    0.0002                 1.87268E-04     4.0603
1.23609E-04     3.5491       0.00000E+00     0.0000
  174    0.0003                 2.60810E-04     4.1724
1.61596E-04     3.7405       0.00000E+00     0.0000
  175    0.0001                 1.08960E-04     6.0439
6.62723E-05     5.3667       0.00000E+00     0.0000
  176    0.0002                 1.25518E-04     5.5093
7.42217E-05     5.0117       0.00000E+00     0.0000
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177	0.0002	1.20466E-04	6.2517	7.09134E-05	5.6389
0.00000E+00	0.0000				
178	0.0002	1.25738E-04	6.0803	7.32300E-05	5.4985
0.00000E+00	0.0000				
179	0.0002	1.20516E-04	5.7666	6.99526E-05	5.1631
0.00000E+00	0.0000				
180	0.0001	1.08229E-04	6.3478	6.29766E-05	5.6141
0.00000E+00	0.0000				
181	0.0001	9.78104E-05	6.2145	5.73136E-05	5.4314
0.00000E+00	0.0000				
182	0.0001	1.14240E-04	6.6789	6.57839E-05	5.8852
0.00000E+00	0.0000				
183	0.0001	1.00813E-04	6.5982	5.85017E-05	5.7493
0.00000E+00	0.0000				
184	0.0001	9.63112E-05	6.9374	5.62507E-05	5.9927
0.00000E+00	0.0000				
185	0.0001	8.88046E-05	6.5491	5.23461E-05	5.5512
0.00000E+00	0.0000				
186	0.0001	9.20033E-05	6.5610	5.38810E-05	5.5915
0.00000E+00	0.0000				
187	0.0001	8.84267E-05	6.6589	5.20564E-05	5.6593
0.00000E+00	0.0000				
188	0.0001	9.49772E-05	6.9331	5.51250E-05	5.8928
0.00000E+00	0.0000				
189	0.0001	8.77866E-05	6.8752	5.15393E-05	5.7430
0.00000E+00	0.0000				
190	0.0003	2.04132E-04	3.9227	1.22097E-04	3.2224
0.00000E+00	0.0000				
191	0.0003	2.07531E-04	3.7850	1.23702E-04	3.1126
0.00000E+00	0.0000				
192	0.0002	1.86265E-04	4.3381	1.14591E-04	3.4514
0.00000E+00	0.0000				
193	0.0003	2.04535E-04	4.0771	1.23889E-04	3.2799
0.00000E+00	0.0000				
194	0.0005	4.11938E-04	2.3136	2.51673E-04	1.8768
0.00000E+00	0.0000				
195	0.0006	4.36488E-04	2.8922	2.68407E-04	2.2586
0.00000E+00	0.0000				
196	0.0006	4.56301E-04	2.7833	2.83873E-04	2.1771
0.00000E+00	0.0000				
197	0.0007	5.01188E-04	2.5930	3.13570E-04	2.0217
0.00000E+00	0.0000				
198	0.0007	5.61783E-04	2.4783	3.50402E-04	1.9133
0.00000E+00	0.0000				
199	0.0004	3.33666E-04	3.2738	2.04572E-04	2.5817
0.00000E+00	0.0000				
200	0.0005	3.52143E-04	2.6055	2.16798E-04	2.0894
0.00000E+00	0.0000				
201	0.0010	7.87505E-04	2.3025	4.82194E-04	1.8049
0.00000E+00	0.0000				
202	0.0013	9.82489E-04	2.0067	5.95715E-04	1.6105
0.00000E+00	0.0000				

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  203    0.0016                 1.22027E-03     1.6842
7.28550E-04     1.3959       0.00000E+00     0.0000
  204    0.0021                 1.61221E-03     1.6401
9.53824E-04     1.3596       0.00000E+00     0.0000
  205    0.0015                 1.14664E-03     1.7577
6.70335E-04     1.5058       0.00000E+00     0.0000
  206    0.0018                 1.41424E-03     1.8136
8.22277E-04     1.5537       0.00000E+00     0.0000
  207    0.0021                 1.64385E-03     1.7166
9.56052E-04     1.5121       0.00000E+00     0.0000
  208    0.0028                 2.13551E-03     1.5176
1.24668E-03     1.3405       0.00000E+00     0.0000
  209    0.0031                 2.39965E-03     1.3668
1.40996E-03     1.2071       0.00000E+00     0.0000
  210    0.0037                 2.84891E-03     1.2628
1.69744E-03     1.1116       0.00000E+00     0.0000
  211    0.0041                 3.13442E-03     1.2468
1.88791E-03     1.0815       0.00000E+00     0.0000
  212    0.0047                 3.61547E-03     1.1700
2.18985E-03     1.0060       0.00000E+00     0.0000
  213    0.0064                 4.92918E-03     1.0165
2.99080E-03     0.8625       0.00000E+00     0.0000
  214    0.0096                 7.34681E-03     0.8442
4.42567E-03     0.7131       0.00000E+00     0.0000
  215    0.0156                 1.19786E-02     0.6295
7.15537E-03     0.5282       0.00000E+00     0.0000
  216    0.0300                 2.29846E-02     0.4567
1.35610E-02     0.3926       0.00000E+00     0.0000
  217    0.0201                 1.53823E-02     0.5809
9.04263E-03     0.4910       0.00000E+00     0.0000
  218    0.0277                 2.12264E-02     0.4652
1.24244E-02     0.3919       0.00000E+00     0.0000
  219    0.0358                 2.74058E-02     0.3771
1.59806E-02     0.3168       0.00000E+00     0.0000
  220    0.0475                 3.63875E-02     0.3662
2.11425E-02     0.3119       0.00000E+00     0.0000
  221    0.0625                 4.79136E-02     0.2986
2.77772E-02     0.2528       0.00000E+00     0.0000
  222    0.0800                 6.13145E-02     0.2528
3.55130E-02     0.2146       0.00000E+00     0.0000
  223    0.1043                 7.99544E-02     0.2449
4.63865E-02     0.2112       0.00000E+00     0.0000
  224    0.0585                 4.48169E-02     0.3386
2.60912E-02     0.2843       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    0.2309                 1.76937E-01     0.1421
1.04774E-01     0.1202       0.00000E+00     0.0000
  226    0.0455                 3.48818E-02     0.4118
2.12097E-02     0.3381       0.00000E+00     0.0000
  227    0.0492                 3.77219E-02     0.3357
2.33898E-02     0.2699       0.00000E+00     0.0000
  228    0.0210                 1.61195E-02     0.6269
1.01893E-02     0.4990       0.00000E+00     0.0000
  229    0.0223                 1.70745E-02     0.5927
1.09621E-02     0.4753       0.00000E+00     0.0000
  230    0.0116                 8.87997E-03     0.8424
5.82348E-03     0.6498       0.00000E+00     0.0000
  231    0.0120                 9.18965E-03     0.8456
6.13221E-03     0.6438       0.00000E+00     0.0000
  232    0.0129                 9.87672E-03     0.7245
6.73665E-03     0.5445       0.00000E+00     0.0000
  233    0.0083                 6.39805E-03     0.8517
4.48718E-03     0.6242       0.00000E+00     0.0000
  234    0.0059                 4.52954E-03     1.0733
3.25811E-03     0.7577       0.00000E+00     0.0000
  235    0.0024                 1.86259E-03     1.4828
1.23243E-03     1.1431       0.00000E+00     0.0000
  236    0.0019                 1.42195E-03     1.9953
9.65894E-04     1.4890       0.00000E+00     0.0000
  237    0.0018                 1.34417E-03     1.8694
9.44865E-04     1.3697       0.00000E+00     0.0000
  238    0.0001                 6.19996E-05     8.8814
5.52426E-05     5.1186       0.00000E+00     0.0000

 system total =                  7.66355E-01     0.0574
4.69136E-01     0.0487       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3124E-01  +
or -  0.0002



 elapsed time   3.10550 minutes

 random number=   F85C8BCBB6F12915
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
```

unit	region	density	deviation	fissions
1	1	3.091E-03	0.06	7.664E-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	1.914E-08	38.46	1.504E-08	33.31	1.610E-08	36.10
3	9.530E-07	3.81	7.969E-07	3.60	8.511E-07	3.63
4	1.454E-06	3.58	1.193E-06	3.07	1.283E-06	3.17
5	2.261E-06	2.48	1.878E-06	2.23	2.002E-06	2.27
6	9.243E-06	1.16	7.424E-06	1.00	7.921E-06	0.98
7	1.265E-05	1.20	9.535E-06	1.08	1.010E-05	1.11
8	3.094E-05	0.72	2.261E-05	0.60	2.380E-05	0.59
9	8.159E-05	0.51	5.860E-05	0.48	6.115E-05	0.46
10	4.633E-05	0.59	3.310E-05	0.60	3.443E-05	0.59
11	2.197E-04	0.29	1.553E-04	0.25	1.611E-04	0.26
12	1.894E-04	0.27	1.381E-04	0.25	1.448E-04	0.24
13	5.633E-05	0.51	4.119E-05	0.44	4.312E-05	0.39
14	2.530E-04	0.27	1.831E-04	0.21	1.910E-04	0.21
15	2.205E-04	0.28	1.602E-04	0.24	1.670E-04	0.23
16	7.090E-05	0.44	5.149E-05	0.39	5.386E-05	0.37
17	3.236E-05	0.62	2.360E-05	0.56	2.460E-05	0.56
18	2.789E-05	0.86	2.028E-05	0.70	2.101E-05	0.64
19	5.063E-05	0.59	3.684E-05	0.45	3.841E-05	0.44
20	4.038E-05	0.60	2.944E-05	0.51	3.066E-05	0.48
21	8.032E-05	0.36	5.879E-05	0.30	6.147E-05	0.30
22	7.282E-05	0.43	5.327E-05	0.36	5.521E-05	0.34
23	7.721E-05	0.44	5.658E-05	0.38	5.876E-05	0.36
24	1.858E-05	0.87	1.375E-05	0.70	1.433E-05	0.65
25	2.320E-05	0.71	1.729E-05	0.67	1.809E-05	0.56
26	1.365E-05	0.95	1.002E-05	0.73	1.055E-05	0.76
27	4.209E-05	0.50	3.125E-05	0.45	3.307E-05	0.44
28	7.751E-05	0.43	5.758E-05	0.39	6.099E-05	0.37
29	7.909E-05	0.39	5.919E-05	0.32	6.223E-05	0.32
30	9.788E-06	1.13	7.360E-06	0.99	7.704E-06	0.90
31	7.862E-05	0.37	5.911E-05	0.27	6.224E-05	0.26

32	3.054E-05	0.54	2.300E-05	0.41	2.431E-05	0.41
33	2.640E-05	0.61	2.000E-05	0.57	2.108E-05	0.54
34	6.089E-05	0.45	4.600E-05	0.41	4.834E-05	0.38
35	3.632E-05	0.51	2.740E-05	0.42	2.878E-05	0.37
36	3.350E-05	0.58	2.534E-05	0.49	2.666E-05	0.48
37	2.191E-05	0.62	1.639E-05	0.50	1.719E-05	0.45
38	2.565E-05	0.59	1.956E-05	0.56	2.061E-05	0.49
39	9.752E-05	0.32	7.478E-05	0.27	7.900E-05	0.23
40	8.979E-05	0.34	6.909E-05	0.29	7.378E-05	0.26
41	1.130E-04	0.28	8.860E-05	0.26	9.452E-05	0.24
42	9.418E-05	0.30	7.418E-05	0.27	7.962E-05	0.24
43	5.093E-05	0.46	4.077E-05	0.39	4.282E-05	0.36
44	6.980E-05	0.31	5.603E-05	0.25	6.019E-05	0.22
45	3.510E-05	0.47	2.785E-05	0.41	3.109E-05	0.36
46	8.329E-06	0.88	6.581E-06	0.73	7.132E-06	0.66
47	2.353E-05	0.53	1.865E-05	0.45	1.946E-05	0.41
48	6.665E-06	1.17	5.333E-06	0.91	5.584E-06	0.86
49	4.388E-05	0.48	3.525E-05	0.40	3.778E-05	0.35
50	2.976E-05	0.48	2.380E-05	0.40	2.588E-05	0.35
51	7.858E-06	0.97	6.305E-06	0.80	6.881E-06	0.61
52	2.063E-05	0.49	1.657E-05	0.48	1.806E-05	0.41
53	7.637E-05	0.34	6.148E-05	0.27	6.655E-05	0.25
54	3.335E-05	0.45	2.692E-05	0.43	2.910E-05	0.32
55	6.645E-05	0.28	5.398E-05	0.28	5.890E-05	0.24
56	4.333E-05	0.39	3.522E-05	0.31	3.851E-05	0.29
57	4.927E-05	0.37	4.012E-05	0.30	4.373E-05	0.25
58	2.597E-05	0.44	2.124E-05	0.38	2.319E-05	0.34
59	4.423E-05	0.32	3.612E-05	0.33	3.935E-05	0.26
60	6.437E-05	0.31	5.264E-05	0.28	5.719E-05	0.24
61	6.072E-06	0.93	4.969E-06	0.73	5.494E-06	0.66
62	3.230E-05	0.43	2.661E-05	0.38	2.884E-05	0.31
63	2.169E-05	0.53	1.781E-05	0.47	1.938E-05	0.40
64	1.699E-05	0.52	1.398E-05	0.54	1.529E-05	0.43
65	5.659E-06	1.05	4.629E-06	0.90	5.030E-06	0.76
66	2.861E-05	0.41	2.346E-05	0.38	2.551E-05	0.31
67	2.115E-05	0.48	1.739E-05	0.45	1.894E-05	0.33
68	4.568E-06	1.09	3.761E-06	1.03	4.093E-06	0.80
69	3.727E-05	0.36	3.078E-05	0.36	3.349E-05	0.30
70	2.677E-05	0.46	2.197E-05	0.43	2.387E-05	0.36
71	4.593E-05	0.37	3.782E-05	0.32	4.104E-05	0.26
72	2.629E-06	1.27	2.174E-06	1.16	2.377E-06	0.97
73	2.704E-05	0.47	2.237E-05	0.42	2.427E-05	0.35
74	7.923E-05	0.28	6.574E-05	0.24	7.120E-05	0.21
75	9.064E-06	0.78	7.526E-06	0.71	8.136E-06	0.55
76	2.298E-05	0.49	1.904E-05	0.46	2.063E-05	0.32
77	1.767E-05	0.49	1.464E-05	0.46	1.589E-05	0.41
78	1.495E-06	1.77	1.271E-06	1.76	1.398E-06	1.48
79	9.986E-06	0.70	8.234E-06	0.68	8.935E-06	0.52
80	4.571E-06	0.99	3.767E-06	0.90	4.089E-06	0.70
81	5.537E-05	0.35	4.612E-05	0.31	4.979E-05	0.25
82	3.224E-06	1.00	2.687E-06	0.96	2.916E-06	0.75
83	4.469E-06	1.12	3.715E-06	0.97	4.041E-06	0.80

84	8.221E-06	0.85	6.802E-06	0.72	7.400E-06	0.58
85	1.006E-05	0.76	8.368E-06	0.66	9.054E-06	0.51
86	1.349E-05	0.59	1.128E-05	0.53	1.225E-05	0.45
87	1.213E-05	0.64	1.006E-05	0.56	1.088E-05	0.45
88	3.144E-06	1.15	2.636E-06	0.98	2.869E-06	0.92
89	6.604E-06	0.79	5.478E-06	0.78	5.970E-06	0.62
90	7.006E-06	0.86	5.769E-06	0.68	6.237E-06	0.57
91	8.290E-06	0.79	6.890E-06	0.71	7.461E-06	0.60
92	4.778E-06	1.02	4.020E-06	0.87	4.341E-06	0.66
93	8.039E-06	0.79	6.739E-06	0.74	7.299E-06	0.54
94	4.337E-06	1.09	3.624E-06	0.97	3.873E-06	0.78
95	1.258E-05	0.69	1.059E-05	0.64	1.143E-05	0.50
96	3.369E-06	1.15	2.794E-06	1.07	3.049E-06	0.89
97	3.316E-06	1.12	2.809E-06	1.07	3.066E-06	0.77
98	3.626E-06	1.24	3.043E-06	1.12	3.248E-06	0.90
99	2.274E-06	1.60	1.880E-06	1.36	2.045E-06	1.06
100	3.439E-06	1.20	2.855E-06	1.06	3.090E-06	0.81
101	4.935E-06	1.05	4.131E-06	0.91	4.492E-06	0.72
102	3.380E-06	1.14	2.861E-06	1.04	3.035E-06	0.82
103	4.661E-06	0.98	3.904E-06	0.94	4.246E-06	0.72
104	4.192E-06	1.15	3.500E-06	0.95	3.813E-06	0.75
105	4.440E-06	1.15	3.655E-06	0.94	3.980E-06	0.81
106	1.500E-06	1.73	1.267E-06	1.41	1.392E-06	1.28
107	3.606E-06	1.13	3.003E-06	0.95	3.242E-06	0.84
108	3.169E-06	1.18	2.671E-06	1.08	2.933E-06	0.92
109	5.118E-06	0.97	4.329E-06	0.83	4.630E-06	0.61
110	2.976E-06	1.31	2.580E-06	1.32	2.783E-06	1.05
111	3.037E-06	1.24	2.552E-06	1.08	2.801E-06	0.87
112	1.815E-06	1.39	1.550E-06	1.38	1.676E-06	1.07
113	5.795E-06	0.97	4.874E-06	0.84	5.224E-06	0.70
114	1.984E-06	1.49	1.671E-06	1.46	1.800E-06	1.04
115	5.139E-06	0.85	4.264E-06	0.78	4.634E-06	0.62
116	1.070E-05	0.69	8.988E-06	0.59	9.699E-06	0.48
117	1.179E-05	0.68	9.870E-06	0.62	1.067E-05	0.50
118	1.284E-05	0.55	1.078E-05	0.49	1.169E-05	0.38
119	8.140E-06	0.70	6.933E-06	0.65	7.504E-06	0.53
120	5.836E-06	0.99	4.939E-06	0.96	5.380E-06	0.70
121	6.143E-06	0.89	5.222E-06	0.76	5.665E-06	0.63
122	3.209E-06	1.10	2.711E-06	0.99	2.945E-06	0.86
123	1.037E-05	0.82	8.719E-06	0.69	9.341E-06	0.55
124	7.375E-06	0.79	6.223E-06	0.68	6.762E-06	0.54
125	7.015E-06	0.84	5.908E-06	0.70	6.377E-06	0.55
126	5.805E-06	0.96	4.835E-06	0.88	5.271E-06	0.73
127	5.551E-06	0.99	4.656E-06	0.83	5.046E-06	0.64
128	7.702E-06	0.73	6.458E-06	0.69	7.036E-06	0.56
129	9.661E-06	0.66	8.153E-06	0.60	8.866E-06	0.47
130	4.011E-06	1.10	3.397E-06	0.96	3.675E-06	0.88
131	1.679E-05	0.51	1.417E-05	0.45	1.520E-05	0.38
132	1.122E-05	0.62	9.413E-06	0.55	1.016E-05	0.39
133	1.359E-05	0.68	1.148E-05	0.55	1.241E-05	0.50
134	1.492E-05	0.55	1.245E-05	0.50	1.340E-05	0.37
135	2.374E-06	1.41	2.017E-06	1.22	2.195E-06	1.16

136	3.870E-06	0.98	3.339E-06	0.88	3.662E-06	0.69
137	2.491E-06	0.90	2.628E-06	0.90	2.966E-06	0.63
138	4.114E-06	1.06	3.590E-06	0.98	3.928E-06	0.75
139	4.622E-06	0.86	3.934E-06	0.83	4.273E-06	0.69
140	1.201E-05	0.58	1.018E-05	0.55	1.100E-05	0.43
141	8.888E-06	0.69	7.528E-06	0.60	8.080E-06	0.51
142	5.849E-06	0.87	4.995E-06	0.78	5.341E-06	0.65
143	1.996E-05	0.56	1.678E-05	0.51	1.809E-05	0.41
144	8.097E-06	0.71	6.859E-06	0.65	7.379E-06	0.49
145	7.268E-06	0.80	6.155E-06	0.70	6.630E-06	0.60
146	1.190E-05	0.62	1.002E-05	0.55	1.089E-05	0.46
147	3.713E-06	1.20	3.159E-06	0.95	3.357E-06	0.72
148	1.889E-06	1.47	1.593E-06	1.30	1.722E-06	1.11
149	1.163E-06	2.08	1.007E-06	1.84	1.069E-06	1.44
150	3.973E-06	1.11	3.349E-06	0.96	3.586E-06	0.73
151	4.118E-06	0.99	3.478E-06	0.89	3.763E-06	0.78
152	4.339E-06	1.04	3.646E-06	0.92	3.948E-06	0.77
153	4.474E-06	1.02	3.756E-06	0.91	4.040E-06	0.69
154	4.747E-06	0.98	3.969E-06	0.75	4.233E-06	0.69
155	4.333E-06	1.02	3.619E-06	1.01	3.882E-06	0.76
156	3.944E-06	1.16	3.323E-06	0.99	3.565E-06	0.87
157	4.697E-06	0.89	3.950E-06	0.86	4.241E-06	0.67
158	4.909E-06	0.99	4.079E-06	0.88	4.409E-06	0.72
159	6.793E-06	0.80	5.771E-06	0.75	6.215E-06	0.61
160	3.508E-06	1.17	3.000E-06	1.05	3.218E-06	0.85
161	4.929E-06	1.02	4.181E-06	0.97	4.482E-06	0.88
162	5.906E-06	0.89	4.959E-06	0.79	5.311E-06	0.64
163	6.069E-06	0.93	5.105E-06	0.90	5.537E-06	0.70
164	6.512E-06	0.75	5.470E-06	0.75	5.891E-06	0.57
165	6.825E-06	0.81	5.746E-06	0.69	6.228E-06	0.62
166	4.003E-06	1.13	3.328E-06	0.85	3.587E-06	0.72
167	4.196E-06	1.19	3.543E-06	1.02	3.777E-06	0.81
168	4.240E-06	1.01	3.600E-06	0.90	3.890E-06	0.77
169	4.366E-06	1.03	3.688E-06	0.92	4.024E-06	0.71
170	4.625E-06	0.92	3.897E-06	0.73	4.235E-06	0.62
171	2.369E-06	1.66	1.975E-06	1.34	2.144E-06	1.15
172	2.394E-06	1.41	2.009E-06	1.15	2.174E-06	0.97
173	2.482E-06	1.42	2.120E-06	1.25	2.270E-06	0.97
174	2.477E-06	1.27	2.128E-06	1.09	2.297E-06	0.96
175	1.013E-06	1.84	8.648E-07	1.68	9.488E-07	1.27
176	1.026E-06	1.91	8.794E-07	1.82	9.402E-07	1.27
177	1.020E-06	2.13	8.745E-07	1.97	9.499E-07	1.67
178	1.054E-06	1.96	9.031E-07	2.03	9.630E-07	1.58
179	1.003E-06	1.59	8.609E-07	1.48	9.572E-07	1.22
180	1.043E-06	1.95	8.895E-07	1.67	9.705E-07	1.24
181	1.045E-06	1.84	8.970E-07	1.98	9.594E-07	1.49
182	1.108E-06	2.24	9.299E-07	1.84	1.002E-06	1.55
183	1.112E-06	2.19	9.543E-07	2.02	1.020E-06	1.40
184	1.147E-06	2.00	9.693E-07	1.81	1.045E-06	1.34
185	1.111E-06	1.97	9.442E-07	1.86	1.027E-06	1.26
186	1.139E-06	2.00	9.572E-07	1.73	1.039E-06	1.47
187	1.171E-06	1.88	9.866E-07	1.65	1.074E-06	1.47

188	1.168E-06	2.09	9.938E-07	1.82	1.067E-06	1.54
189	1.188E-06	2.07	1.004E-06	1.92	1.078E-06	1.47
190	3.009E-06	1.24	2.562E-06	1.11	2.785E-06	0.79
191	3.067E-06	1.07	2.615E-06	1.00	2.809E-06	0.81
192	3.179E-06	1.13	2.693E-06	1.08	2.898E-06	0.94
193	3.272E-06	1.29	2.756E-06	1.12	2.985E-06	0.88
194	6.723E-06	0.76	5.691E-06	0.69	6.187E-06	0.55
195	7.219E-06	0.76	6.117E-06	0.65	6.623E-06	0.58
196	7.757E-06	0.74	6.546E-06	0.65	7.112E-06	0.53
197	8.461E-06	0.76	7.120E-06	0.69	7.740E-06	0.56
198	8.999E-06	0.73	7.594E-06	0.64	8.222E-06	0.62
199	4.707E-06	0.98	3.984E-06	0.87	4.296E-06	0.62
200	5.021E-06	0.89	4.259E-06	0.87	4.605E-06	0.69
201	1.063E-05	0.68	8.995E-06	0.59	9.759E-06	0.54
202	1.192E-05	0.70	1.005E-05	0.56	1.095E-05	0.49
203	1.289E-05	0.55	1.091E-05	0.47	1.183E-05	0.37
204	1.476E-05	0.57	1.256E-05	0.54	1.358E-05	0.41
205	8.640E-06	0.76	7.718E-06	0.67	8.175E-06	0.48
206	9.429E-06	0.63	8.472E-06	0.52	8.968E-06	0.41
207	9.488E-06	0.61	8.642E-06	0.52	9.157E-06	0.44
208	1.125E-05	0.64	1.018E-05	0.57	1.083E-05	0.42
209	1.158E-05	0.57	1.055E-05	0.50	1.119E-05	0.41
210	1.408E-05	0.52	1.275E-05	0.46	1.355E-05	0.38
211	1.620E-05	0.47	1.459E-05	0.46	1.553E-05	0.39
212	1.911E-05	0.45	1.729E-05	0.40	1.832E-05	0.33
213	2.611E-05	0.36	2.344E-05	0.37	2.513E-05	0.29
214	3.700E-05	0.32	3.317E-05	0.28	3.570E-05	0.24
215	5.530E-05	0.23	4.986E-05	0.20	5.379E-05	0.18
216	9.233E-05	0.19	8.398E-05	0.17	9.073E-05	0.13
217	5.537E-05	0.25	5.292E-05	0.19	5.619E-05	0.15
218	7.068E-05	0.21	6.791E-05	0.17	7.211E-05	0.15
219	8.403E-05	0.19	8.127E-05	0.15	8.652E-05	0.12
220	1.016E-04	0.16	9.914E-05	0.14	1.054E-04	0.12
221	1.202E-04	0.16	1.184E-04	0.13	1.263E-04	0.11
222	1.365E-04	0.15	1.363E-04	0.14	1.456E-04	0.12
223	1.537E-04	0.15	1.575E-04	0.13	1.675E-04	0.12
224	7.507E-05	0.21	7.968E-05	0.16	8.437E-05	0.13
225	2.338E-04	0.13	2.721E-04	0.11	2.825E-04	0.09
226	3.172E-05	0.25	4.472E-05	0.21	4.447E-05	0.13
227	2.892E-05	0.25	4.628E-05	0.19	4.437E-05	0.13
228	1.041E-05	0.40	1.911E-05	0.28	1.757E-05	0.18
229	9.655E-06	0.38	1.967E-05	0.31	1.744E-05	0.16
230	4.453E-06	0.54	1.019E-05	0.42	8.704E-06	0.21
231	4.236E-06	0.57	1.061E-05	0.41	8.717E-06	0.23
232	3.999E-06	0.60	1.135E-05	0.37	8.893E-06	0.20
233	2.243E-06	0.76	7.437E-06	0.50	5.519E-06	0.22
234	1.413E-06	0.89	5.349E-06	0.53	3.792E-06	0.29
235	5.226E-07	1.45	1.061E-06	1.12	1.122E-06	0.57
236	3.537E-07	1.65	7.272E-07	1.25	8.029E-07	0.58
237	2.299E-07	2.08	5.609E-07	1.50	6.176E-07	0.58
238	5.228E-09	10.90	1.748E-08	7.42	2.522E-08	2.17

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 0.7649     *************
 0.7649 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 0.7649     ***********
 0.7649 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 0.7649     *******
 0.7649 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 0.7649     ****
 0.7649 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
0.76635 + or - 0.00048                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.66481E-02 + or -  1.07341E-04           ***
        ***
***
```

```
        ***        system nu bar
2.43894E+00 + or -  9.13854E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52986E-01 + or -  1.82400E-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     3.10367 minutes


*********************************************************************
*********************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
```

```
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666



      0000000      5555555555555                  5555555555555
0000000                      22222222222    7777777777777
     000000000     5555555555555                  5555555555555
000000000                    2222222222222   777777777777
    00       00    55                    :::       55              00
00          :::       22         22   77        77
   00         00   55                    :::       55             00
00         :::                  22            77
   00         00   55                    :::       55             00
00         :::                  22           77
   00         00   555555555555                    555555555555    00
00                           22            77
   00         00   5555555555555                   5555555555555   00
00                         22              77
   00         00              55         :::                  55   00
00         :::            22               77
   00         00              55         :::                  55   00
00         :::          22                 77
    00       00    55         55         :::       55         55    00
00          :::        22                 77
     000000000     5555555555555                  5555555555555
000000000                    2222222222222        77
      0000000       55555555555                   55555555555
0000000                     2222222222222        77
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
```

```
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE




*********************************************************************
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*********************************************************************
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        *****
*****
        *****                                        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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:50:27.84
*****
        *****
*****
        *****
*****

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1

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

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```

```
        ***                                   ******       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)                       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
***
        ***
***

*********************************************************************
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*********************************************************************
*********************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
```

```
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  3.25941E-12  9.83305E-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  6.04513E-08  1.81188E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  9.07880E-15  2.99192E-14    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  7.37711E-07  5.29650E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33932E-08  6.98508E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02826E-07  7.99738E-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  5.24103E-07  8.93225E-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  2.96839E-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
```

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    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  4.06013E-11  1.00770E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90774E-08  1.32077E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.09193E-08  2.97129E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.68163E-08  4.62628E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  4.80220E-10  1.33551E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.70479E-08  4.79212E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.44475E-10  6.94544E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.12780E-09  8.97961E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.49216E-18  4.14976E-17   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.00315E-10  2.84987E-09   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  1.14115E-08  3.24190E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39893E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  7.22470E-09  2.09572E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.75858E-08  5.15385E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75595E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.31788E-09  2.18849E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  4.34599E-10  1.28669E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  3.75855E-10  1.13527E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  3.09763E-10  9.44897E-09   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  8.24466E-11  2.53967E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  1.37308E-10  4.27068E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  2.60554E-11  8.26011E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
```

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    1045103  1.37127E-10  4.22399E-09   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.11085E-12  3.48832E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  7.22489E-11  2.26876E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  1.10216E-11  3.52700E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  4.09758E-12  1.32351E-10   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  2.32223E-12  7.57032E-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  8.98653E-11  2.90263E-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  1.29355E-09  4.29430E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43728E-09  8.16410E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23461E-09  4.17258E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90187E-09  9.89409E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.57211E-10  2.62712E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  8.86113E-13  3.04780E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50583E-11  2.23768E-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  1.46950E-09  5.14230E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63210E-09  1.63478E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64351E-09  5.84961E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23074E-09  2.23629E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.86481E-10  3.23480E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10911E-09  4.11365E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
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    1050126  4.08120E-12  1.53816E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  1.11204E-11  4.22433E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  4.04097E-11  1.55925E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25970E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  1.92416E-10  7.53981E-09   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67706E-11  1.06503E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87636E-12  7.57726E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  4.56433E-10  1.81586E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  6.39498E-16  2.56333E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  4.96120E-10  2.00346E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  4.44758E-10  1.82268E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.34143E-08  1.37935E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99121E-11  2.50915E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  4.73665E-10  1.96950E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.42632E-10  6.01609E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  4.33030E-10  1.83946E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21020E-12  2.65667E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  3.36921E-10  1.45142E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  2.99720E-10  1.26419E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12390E-11  2.61972E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  3.64155E-10  1.55779E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  5.94930E-11  2.56282E-09   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  2.94956E-10  1.27946E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  2.18330E-10  9.53609E-09   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87197E-11  8.23248E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.20940E-10  5.35490E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
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    1061147  1.37918E-10  6.06526E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.02929E-17  4.55740E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84877E-12  8.24123E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  6.27789E-12  2.76084E-10   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  7.85872E-11  3.50315E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  2.05776E-14  9.23438E-13   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.02915E-09  1.36845E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  1.96524E-11  8.93699E-10   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32588E-13  1.06468E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.43695E-09  6.49159E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.57042E-09  7.18862E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  4.76717E-15  2.19647E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  2.30577E-12  1.06929E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81006E-13  8.44830E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.79778E-12  2.63656E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29364E-11  2.89976E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27198E-10  1.98110E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.92066E-10  2.76337E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51642E-10  2.12151E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.17998E-10  3.39417E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31120E-10  3.02131E-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
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    1082206  1.31999E-09  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76387E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22679E-06  6.51941E-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  3.82936E-12  2.71722E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.94010E-18  2.09504E-16   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  3.25154E-10  2.32672E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  4.87144E-16  3.50048E-14   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.10645E-20  7.98387E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49926E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.01804E-20  7.34592E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.90604E-28  2.83022E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99990E-21  7.27568E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  1.01929E-20  7.38552E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.91067E-21  7.21076E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.85689E-21  7.20118E-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
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    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
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    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

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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
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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:
  9316 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 +/- 4.35452E+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       ........

                                 ........     0.01483 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
0.01567 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 15487 independent fission points were generated for generation 1
          1       7.61988E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15739 independent fission points were generated for generation 2
          2       7.66764E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15738 independent fission points were generated for generation 3
          3       7.66352E-01      7.66352E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.67229E-01      7.66790E-01      4.38422E-04
0.00000E+00      0.00000E+00
          5       7.65741E-01      7.66441E-01      4.31656E-04
0.00000E+00      0.00000E+00
          6       7.73107E-01      7.68107E-01      1.69436E-03
0.00000E+00      0.00000E+00
          7       7.66821E-01      7.67850E-01      1.33742E-03
0.00000E+00      0.00000E+00
          8       7.65526E-01      7.67463E-01      1.15865E-03
0.00000E+00      0.00000E+00
          9       7.65260E-01      7.67148E-01      1.02855E-03
0.00000E+00      0.00000E+00
         10       7.68552E-01      7.67323E-01      9.07863E-04
0.00000E+00      0.00000E+00
         11       7.61411E-01      7.66667E-01      1.03566E-03
0.00000E+00      0.00000E+00
         12       7.68562E-01      7.66856E-01      9.45504E-04
0.00000E+00      0.00000E+00
         13       7.68870E-01      7.67039E-01      8.74608E-04
0.00000E+00      0.00000E+00
         14       7.66395E-01      7.66985E-01      8.00208E-04
0.00000E+00      0.00000E+00
         15       7.63515E-01      7.66718E-01      7.83002E-04
```

0.00000E+00	0.00000E+00				
16	7.65982E-01	7.66666E-01	7.26823E-04	0.00000E+00	0.00000E+00
17	7.63613E-01	7.66462E-01	7.06581E-04	0.00000E+00	0.00000E+00
18	7.63181E-01	7.66257E-01	6.92030E-04	0.00000E+00	0.00000E+00
19	7.69332E-01	7.66438E-01	6.74735E-04	0.00000E+00	0.00000E+00
20	7.67470E-01	7.66495E-01	6.38726E-04	0.00000E+00	0.00000E+00
21	7.72453E-01	7.66809E-01	6.80701E-04	0.00000E+00	0.00000E+00
22	7.73712E-01	7.67154E-01	7.32222E-04	0.00000E+00	0.00000E+00
23	7.58977E-01	7.66765E-01	7.97934E-04	0.00000E+00	0.00000E+00
24	7.70878E-01	7.66952E-01	7.83438E-04	0.00000E+00	0.00000E+00
25	7.62897E-01	7.66775E-01	7.69079E-04	0.00000E+00	0.00000E+00
26	7.58514E-01	7.66431E-01	8.12822E-04	0.00000E+00	0.00000E+00
27	7.68389E-01	7.65170E-01	3.92433E-03	0.00000E+00	0.00000E+00
28	7.69927E-01	7.66121E-01	4.32079E-03	0.00000E+00	0.00000E+00
29	7.57547E-01	7.64692E-01	2.93067E-03	0.00000E+00	0.00000E+00
30	7.70310E-01	7.65495E-01	2.57442E-03	0.00000E+00	0.00000E+00
31	7.69141E-01	7.65950E-01	2.23853E-03	0.00000E+00	0.00000E+00
32	7.66751E-01	7.66039E-01	1.94123E-03	0.00000E+00	0.00000E+00
33	7.68141E-01	7.66249E-01	1.72806E-03	0.00000E+00	0.00000E+00
34	7.66193E-01	7.66244E-01	1.54564E-03	0.00000E+00	0.00000E+00
35	7.62510E-01	7.65933E-01	1.43905E-03	0.00000E+00	0.00000E+00
36	7.64472E-01	7.65821E-01	1.31933E-03	0.00000E+00	0.00000E+00
37	7.56741E-01	7.65172E-01	1.40126E-03	0.00000E+00	0.00000E+00
38	7.65438E-01	7.65190E-01	1.29746E-03	0.00000E+00	0.00000E+00
39	7.61091E-01	7.64934E-01	1.23852E-03	0.00000E+00	0.00000E+00
40	7.71638E-01	7.65328E-01	1.23225E-03	0.00000E+00	0.00000E+00
41	7.66540E-01	7.65395E-01	1.15970E-03		

0.00000E+00	0.00000E+00				
42	7.73008E-01	7.65796E-01	1.35716E-03	0.00000E+00	0.00000E+00
43	7.61216E-01	7.65567E-01	1.20884E-03	0.00000E+00	0.00000E+00
44	7.62513E-01	7.65422E-01	1.08764E-03	0.00000E+00	0.00000E+00
45	7.64981E-01	7.65402E-01	1.03477E-03	0.00000E+00	0.00000E+00
46	7.64962E-01	7.65383E-01	9.86815E-04	0.00000E+00	0.00000E+00
47	7.53477E-01	7.64886E-01	1.07591E-03	0.00000E+00	0.00000E+00
48	7.70155E-01	7.65097E-01	1.05328E-03	0.00000E+00	0.00000E+00
49	7.67228E-01	7.65179E-01	1.01387E-03	0.00000E+00	0.00000E+00
50	7.63406E-01	7.65113E-01	9.76479E-04	0.00000E+00	0.00000E+00
51	7.64930E-01	7.65107E-01	9.39642E-04	0.00000E+00	0.00000E+00
52	7.68022E-01	7.65207E-01	9.11436E-04	0.00000E+00	0.00000E+00
53	7.67145E-01	7.65272E-01	8.81983E-04	0.00000E+00	0.00000E+00
54	7.62575E-01	7.65185E-01	8.56810E-04	0.00000E+00	0.00000E+00
55	7.74275E-01	7.65469E-01	8.79114E-04	0.00000E+00	0.00000E+00
56	7.69935E-01	7.65604E-01	8.62573E-04	0.00000E+00	0.00000E+00
57	7.59350E-01	7.65420E-01	8.57259E-04	0.00000E+00	0.00000E+00
58	7.67761E-01	7.65487E-01	8.34509E-04	0.00000E+00	0.00000E+00
59	7.65230E-01	7.65480E-01	8.10349E-04	0.00000E+00	0.00000E+00
60	7.62088E-01	7.65389E-01	7.93139E-04	0.00000E+00	0.00000E+00
61	7.62927E-01	7.65324E-01	7.74269E-04	0.00000E+00	0.00000E+00
62	7.65224E-01	7.65321E-01	7.53623E-04	0.00000E+00	0.00000E+00
63	7.64933E-01	7.65311E-01	7.34113E-04	0.00000E+00	0.00000E+00
64	7.67476E-01	7.65364E-01	7.17570E-04	0.00000E+00	0.00000E+00
65	7.77295E-01	7.65648E-01	7.57971E-04	0.00000E+00	0.00000E+00
66	7.65746E-01	7.65651E-01	7.39706E-04	0.00000E+00	0.00000E+00
67	7.63709E-01	7.65607E-01	7.23710E-04		

0.00000E+00	0.00000E+00				
68	7.64661E-01	7.65586E-01	7.07397E-04	0.00000E+00	0.00000E+00
69	7.61295E-01	7.65492E-01	6.98043E-04	0.00000E+00	0.00000E+00
70	7.61703E-01	7.65412E-01	6.87653E-04	0.00000E+00	0.00000E+00
71	7.70198E-01	7.65511E-01	6.80528E-04	0.00000E+00	0.00000E+00
72	7.67411E-01	7.65550E-01	6.67374E-04	0.00000E+00	0.00000E+00
73	7.62398E-01	7.65487E-01	6.56771E-04	0.00000E+00	0.00000E+00
74	7.65385E-01	7.65485E-01	6.43505E-04	0.00000E+00	0.00000E+00
75	7.72110E-01	7.65612E-01	6.44005E-04	0.00000E+00	0.00000E+00
76	7.59581E-01	7.65499E-01	6.42066E-04	0.00000E+00	0.00000E+00
77	7.63114E-01	7.65455E-01	6.31441E-04	0.00000E+00	0.00000E+00
78	7.71046E-01	7.65556E-01	6.28233E-04	0.00000E+00	0.00000E+00
79	7.62597E-01	7.65503E-01	6.19048E-04	0.00000E+00	0.00000E+00
80	7.69427E-01	7.65572E-01	6.11919E-04	0.00000E+00	0.00000E+00
81	7.67204E-01	7.65600E-01	6.01769E-04	0.00000E+00	0.00000E+00
82	7.66226E-01	7.65611E-01	5.91402E-04	0.00000E+00	0.00000E+00
83	7.67760E-01	7.65647E-01	5.82432E-04	0.00000E+00	0.00000E+00
84	7.69154E-01	7.65704E-01	5.75619E-04	0.00000E+00	0.00000E+00
85	7.66223E-01	7.65713E-01	5.66168E-04	0.00000E+00	0.00000E+00
86	7.63412E-01	7.65676E-01	5.58196E-04	0.00000E+00	0.00000E+00
87	7.71906E-01	7.65773E-01	5.58097E-04	0.00000E+00	0.00000E+00
88	7.67793E-01	7.65805E-01	5.50214E-04	0.00000E+00	0.00000E+00
89	7.67011E-01	7.65823E-01	5.42001E-04	0.00000E+00	0.00000E+00
90	7.63968E-01	7.65795E-01	5.34465E-04	0.00000E+00	0.00000E+00
91	7.67845E-01	7.65825E-01	5.27317E-04	0.00000E+00	0.00000E+00
92	7.66927E-01	7.65841E-01	5.19757E-04	0.00000E+00	0.00000E+00
93	7.68700E-01	7.65882E-01	5.13842E-04		

```
0.00000E+00      0.00000E+00
         94       7.65429E-01      7.65876E-01      5.06490E-04
0.00000E+00      0.00000E+00
         95       7.59955E-01      7.65793E-01      5.06222E-04
0.00000E+00      0.00000E+00
         96       7.57827E-01      7.65684E-01      5.11260E-04
0.00000E+00      0.00000E+00
         97       7.63894E-01      7.65660E-01      5.04804E-04
0.00000E+00      0.00000E+00
         98       7.67676E-01      7.65687E-01      4.98680E-04
0.00000E+00      0.00000E+00
         99       7.67011E-01      7.65704E-01      4.92303E-04
0.00000E+00      0.00000E+00
        100       7.66196E-01      7.65711E-01      4.85825E-04
0.00000E+00      0.00000E+00
        101       7.63367E-01      7.65681E-01      4.80440E-04
0.00000E+00      0.00000E+00
        102       7.62010E-01      7.65634E-01      4.76569E-04
0.00000E+00      0.00000E+00
        103       7.66313E-01      7.65643E-01      4.70577E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=FCC0A4F1D7F70E7E
        104       7.66837E-01      7.65658E-01      4.64897E-04
0.00000E+00      0.00000E+00
        105       7.65012E-01      7.65650E-01      4.59191E-04
0.00000E+00      0.00000E+00
        106       7.69800E-01      7.65700E-01      4.56373E-04
0.00000E+00      0.00000E+00
        107       7.65937E-01      7.65703E-01      4.50850E-04
0.00000E+00      0.00000E+00
        108       7.63105E-01      7.65672E-01      4.46523E-04
0.00000E+00      0.00000E+00
        109       7.66161E-01      7.65678E-01      4.41276E-04
0.00000E+00      0.00000E+00
        110       7.71335E-01      7.65743E-01      4.41048E-04
0.00000E+00      0.00000E+00
        111       7.67612E-01      7.65764E-01      4.36478E-04
0.00000E+00      0.00000E+00
        112       7.71207E-01      7.65825E-01      4.35901E-04
0.00000E+00      0.00000E+00
        113       7.65440E-01      7.65821E-01      4.30997E-04
0.00000E+00      0.00000E+00
        114       7.67707E-01      7.65842E-01      4.26696E-04
0.00000E+00      0.00000E+00
        115       7.68346E-01      7.65869E-01      4.22878E-04
0.00000E+00      0.00000E+00
        116       7.65788E-01      7.65868E-01      4.18257E-04
0.00000E+00      0.00000E+00
        117       7.62320E-01      7.65830E-01      4.15491E-04
0.00000E+00      0.00000E+00
        118       7.65074E-01      7.65822E-01      4.11126E-04
```

```
0.00000E+00      0.00000E+00
        119       7.58915E-01      7.65750E-01      4.13222E-04
0.00000E+00      0.00000E+00
        120       7.64073E-01      7.65733E-01      4.09268E-04
0.00000E+00      0.00000E+00
        121       7.70475E-01      7.65781E-01      4.07966E-04
0.00000E+00      0.00000E+00
        122       7.66942E-01      7.65793E-01      4.03956E-04
0.00000E+00      0.00000E+00
        123       7.57640E-01      7.65712E-01      4.08248E-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=FDB4450EF59BDAE1
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55178E-05 + or -  1.22889E-08             generation time
=  2.99454E-05 + or -  2.06896E-08
 nu bar   =  2.43895E+00 + or -  1.02219E-05       average fission group
=  2.17562E+02 + or -  9.70990E-03
                      energy(ev) of the average lethargy causing fission
=  5.67181E-02 + or -  1.12843E-04
                                                 system mean free path (cm)
=  6.52640E-01 + or -  1.75916E-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          0.76571   + or - 0.00041     0.76530 to 0.76612
0.76490 to 0.76653    0.76449 to 0.76694    2000000      15.6517

      24          0.76566   + or - 0.00041     0.76525 to 0.76607
0.76484 to 0.76648    0.76443 to 0.76689    1980000      15.8663

      25          0.76569   + or - 0.00041     0.76528 to 0.76610
0.76486 to 0.76651    0.76445 to 0.76692    1960000      15.9534

      26          0.76576   + or - 0.00041     0.76535 to 0.76617
0.76494 to 0.76658    0.76453 to 0.76699    1940000      16.3818

      27          0.76573   + or - 0.00041     0.76532 to 0.76615
0.76491 to 0.76656    0.76450 to 0.76697    1920000      16.4265

      28          0.76569   + or - 0.00042     0.76527 to 0.76610
```

0.76486 to 0.76652 0.76444 to 0.76693 1900000 16.5902

29 0.76578 + or - 0.00045 0.76533 to 0.76622
0.76489 to 0.76667 0.76444 to 0.76711 1880000 14.4486

30 0.76573 + or - 0.00044 0.76529 to 0.76617
0.76485 to 0.76661 0.76441 to 0.76705 1860000 15.1044

31 0.76569 + or - 0.00044 0.76525 to 0.76613
0.76481 to 0.76657 0.76437 to 0.76702 1840000 15.2976

32 0.76568 + or - 0.00042 0.76526 to 0.76610
0.76484 to 0.76652 0.76442 to 0.76694 1820000 17.3679

37 0.76580 + or - 0.00043 0.76537 to 0.76623
0.76494 to 0.76665 0.76452 to 0.76708 1720000 17.9580

42 0.76569 + or - 0.00052 0.76517 to 0.76621
0.76465 to 0.76673 0.76413 to 0.76726 1620000 13.3444

47 0.76597 + or - 0.00051 0.76547 to 0.76648
0.76496 to 0.76698 0.76445 to 0.76749 1520000 12.8163

52 0.76592 + or - 0.00053 0.76539 to 0.76645
0.76486 to 0.76697 0.76433 to 0.76750 1420000 13.4311

57 0.76586 + or - 0.00052 0.76534 to 0.76639
0.76481 to 0.76691 0.76429 to 0.76743 1320000 14.7981

62 0.76596 + or - 0.00056 0.76540 to 0.76652
0.76484 to 0.76708 0.76428 to 0.76764 1220000 15.0139

67 0.76579 + or - 0.00060 0.76519 to 0.76639
0.76460 to 0.76699 0.76400 to 0.76759 1120000 10.9917

72 0.76587 + or - 0.00059 0.76528 to 0.76646
0.76468 to 0.76705 0.76409 to 0.76764 1020000 13.6433

77 0.76601 + or - 0.00059 0.76542 to 0.76661
0.76482 to 0.76720 0.76423 to 0.76780 920000 15.9733

82 0.76586 + or - 0.00067 0.76518 to 0.76653
0.76451 to 0.76720 0.76384 to 0.76787 820000 15.2047

87 0.76560 + or - 0.00073 0.76487 to 0.76633
0.76414 to 0.76706 0.76341 to 0.76780 720000 15.3564

92 0.76542 + or - 0.00084 0.76458 to 0.76626
0.76374 to 0.76711 0.76290 to 0.76795 620000 15.0602

97 0.76586 + or - 0.00095 0.76491 to 0.76681
0.76395 to 0.76776 0.76300 to 0.76872 520000 14.9686

```
     102          0.76600   + or - 0.00125     0.76475 to 0.76725
0.76350 to 0.76851    0.76225 to 0.76976     420000      13.5906

     107          0.76576   + or - 0.00168     0.76407 to 0.76744
0.76239 to 0.76913    0.76070 to 0.77081     320000      12.3123

     112          0.76479   + or - 0.00153     0.76326 to 0.76633
0.76172 to 0.76786    0.76019 to 0.76940     220000      24.8461
1                                                fuel bundle

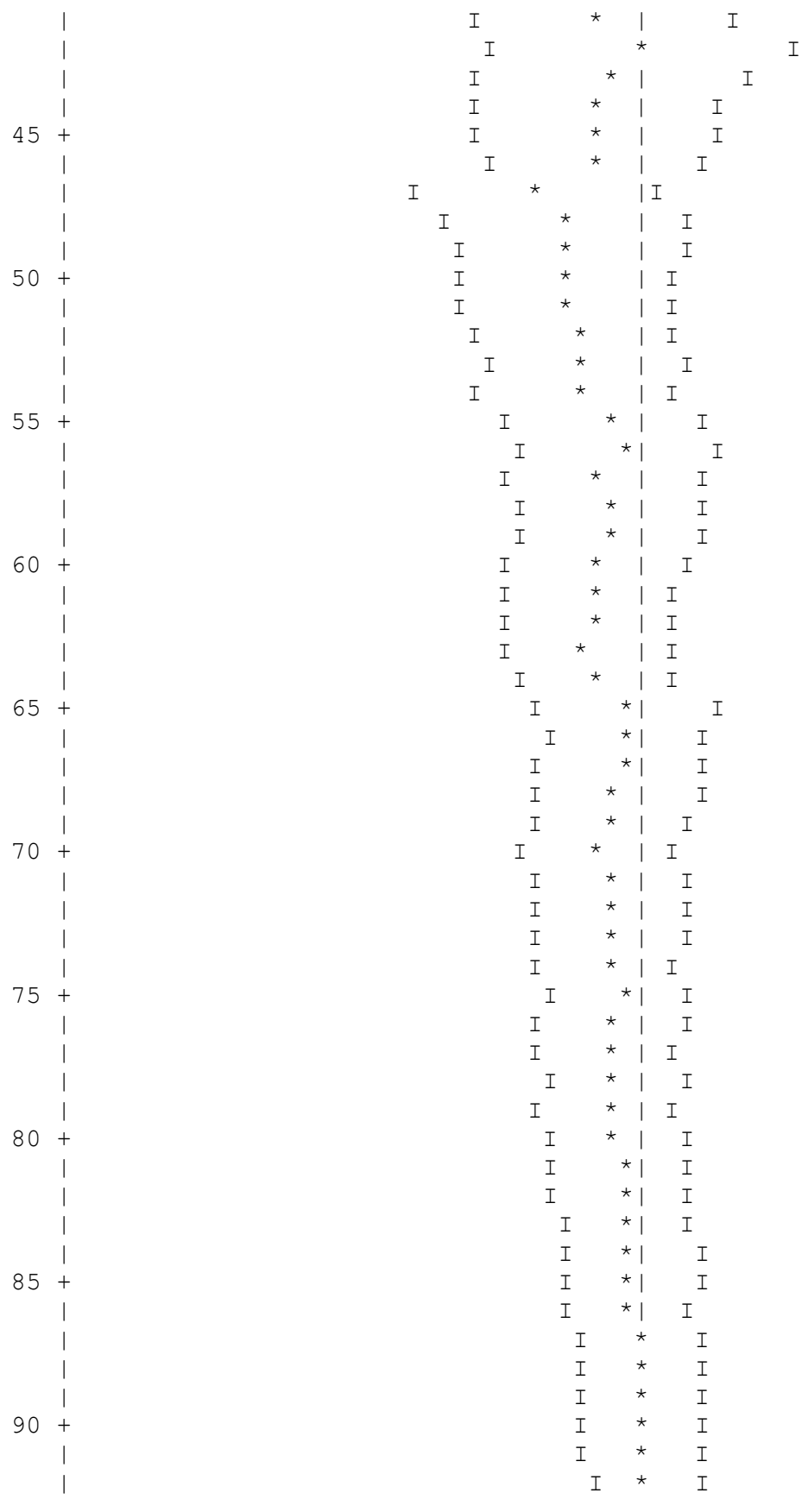
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76385   + or - 0.00243     0.76143 to 0.76628
0.75900 to 0.76871    0.75657 to 0.77114     120000      32.6933
1                           fuel bundle
```

plot of average k-effective by generation run.
the line represents k-eff = 0.76579 + or - 0.00040 which occurs for 122 generations run.

```
                                0.7641                   0.7675
0.7709

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


45
50
55
60
65
70
75
80
85
90

```
         |                                   I  |*  I
         |                                   I  |*  I
      95 +                                  I   *   I
         |                                 I   *|  I
         |                                 I   *|  I
         |                                  I  *|  I
         |                                  I  *|  I
     100 +                                  I  *|  I
         |                                  I  *|  I
         |                                 I   *| I
         |                                 I   *| I
         |                                  I  *| I
     105 +                                  I  *| I
         |                                  I  *|  I
         |                                  I  *|  I
         |                                  I  *| I
         |                                  I  *| I
     110 +                                  I   *  I
         |                                   I  *  I
         |                                   I  *  I
         |                                   I  *  I
         |                                   I  *   I
     115 +                                   I  |*  I
         |                                   I  |*  I
         |                                   I  *  I
         |                                   I  *  I
         |                                   I  *  I
     120 +                                   I  *  I
         |                                   I  *  I
         |                                   I  *  I
         |                                  I  *| I
1                         fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7657 + or - 0.0004 which occurs for 23 generations skipped.

```
                                0.7623                   0.7642
0.7660

|-------------------------|-----------------------|------------------
------|-----------------------
         |
         |
I    *     I
         |
I     *    I
      25 +
I    *     I
         |
I   |*     I
         |
```

```
I    |*    I
         |
I    *     I
         |
I    |*     I
      30 +
I    |*     I
         |
I     *     I
         |
I     *     I
         |
I     *    I
         |
I     *    I
      35 +
I     *     I
         |
I     *     I
         |
I   | *    I
         |
I   | *    I
         |
I   | *      I
      40 +
I    | *     I
         |
I    |*     I
         |
I      *      I
         |
I     |*      I
         |
I    |*      I
      45 +
I    | *      I
         |
I   | *     I
         |
I  |   *      I
         |
I   |  *      I
         |
I   |  *      I
      50 +
I   |  *      I
         |
I   |   *      I
         |
I   |  *      I
         |
```

```
I   |  *      I
          |
I   |   *      I
      55 +
I    | *      I
          |
I     |*      I
          |
I    | *       I
          |
I    | *      I
          |
I    | *      I
      60 +
I   |  *      I
          |
I   |   *      I
          |
I   |   *      I
          |
I   |   *       I
          |
I   |   *      I
      65 +
I      |*       I
          |
I      |*       I
          |
I     | *       I
          |
I     | *       I
          |
I    |  *       I
      70 +
I   |   *       I
          |
I    |  *       I
          |
I    |  *      I
          |
I   |  *       I
          |
I   |   *       I
      75 +
I     | *       I
          |
I   |   *      I
          |
I  |    *      I
          |
I    |  *       I
          |
```

```
I    |   *        I
      80 +
I     |  *        I
         |
I     |  *       I
         |
I      | *        I
         |
I      | *        I
         |
I        |*        I
      85 +
I        *          I
         |
I        |*          I
         |                                                          I
*|        I
         |                                                        I
* |       I
         |                                                       I
* |       I
      90 +                                                       I
* |        I
         |                                                     I
*  |       I
         |                                                   I
*  |       I
         |                                                 I
*    |      I
         |                                                 I
*    |      I
      95 +                                              I
* |             I
         |                                                         I
|*            I
         |
I         | *            I
         |                                                        I
|*             I
         |                                                     I
|*             I
     100 +                                                   I
*               I
         |                                                     I
| *               I
         |                                                        I
|   *                I
         |                                                     I
|   *                 I
         |                                                 I
|   *                  I
     105 +                                               I
```

```
|   *                    I
         |                                                    I
|*                    I
         |                                                 I
|*                      I
         |                                               I
|  *                         I
         |                                            I
|  *
     110 +                                        I
* |                         I
         |                                     I
*    |                      I
         |                                      I                    *
|        I
         |                                  I                      *
|         I
         |                              I                     *
|   I
     115 +                       I                      *
I|
         |                I                          *
I|
         |             I                              *
|       I
         |                                        *
|
         |      I                                                    *
|
     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 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			2.32345E-07	100.0000	3.01766E-07	41.8890	0.00000E+00	0.0000
3	0.0000			1.47743E-05	10.3557	1.98411E-05	4.9357	0.00000E+00	0.0000
4	0.0000			1.56934E-05	9.4432	3.27380E-05	3.8840	0.00000E+00	0.0000
5	0.0000			2.60048E-05	7.0808	5.44829E-05	2.7396	0.00000E+00	0.0000

6	0.0001	9.35479E-05	4.2595	2.21389E-04	1.5010
7	0.0002	1.20140E-04	3.7885	2.10501E-04	1.6070
8	0.0003	2.47746E-04	2.0154	3.27079E-04	0.8654
9	0.0005	3.82275E-04	1.3308	4.41478E-04	0.5594
10	0.0003	2.07905E-04	1.5435	2.09443E-04	0.6806
11	0.0012	9.12198E-04	0.7025	5.24520E-04	0.4727
12	0.0010	7.69467E-04	0.7112	3.01584E-04	0.7011
13	0.0003	2.37826E-04	1.4304	9.44377E-05	1.4142
14	0.0013	1.00315E-03	0.5359	4.10047E-04	0.5307
15	0.0010	7.57325E-04	0.7164	3.26515E-04	0.7087
16	0.0002	1.91267E-04	1.1528	8.78761E-05	1.1368
17	0.0001	6.92458E-05	1.7238	3.36599E-05	1.6931
18	0.0001	5.17859E-05	1.9574	2.61728E-05	1.9170
19	0.0001	7.97723E-05	1.2961	4.21923E-05	1.2651
20	0.0001	5.95263E-05	1.5829	3.26400E-05	1.5430
21	0.0002	1.21092E-04	0.9458	6.83467E-05	0.9282
22	0.0001	1.06464E-04	1.1817	6.30230E-05	1.1556
23	0.0001	1.06480E-04	1.1432	6.49953E-05	1.1109
24	0.0000	2.50802E-05	2.3038	1.55825E-05	2.2458
25	0.0000	3.11266E-05	1.7142	1.94364E-05	1.6661
26	0.0000	1.72260E-05	2.5277	1.08281E-05	2.4573
27	0.0001	5.33675E-05	1.3413	3.32928E-05	1.3124
28	0.0001	9.69987E-05	0.9708	6.05022E-05	0.9536
29	0.0001	9.80793E-05	1.0575	6.17927E-05	1.0437
30	0.0000	1.20477E-05	3.2629	7.55938E-06	3.2387
31	0.0001	9.82927E-05	1.0611	6.20827E-05	1.0493

```
   32    0.0000                 3.70238E-05     1.6903
2.36718E-05     1.6532       0.00000E+00     0.0000
   33    0.0000                 3.34385E-05     1.5753
2.09327E-05     1.5563       0.00000E+00     0.0000
   34    0.0001                 7.55767E-05     1.2287
4.74802E-05     1.2120       0.00000E+00     0.0000
   35    0.0001                 4.52197E-05     1.6304
2.83741E-05     1.6040       0.00000E+00     0.0000
   36    0.0001                 4.31655E-05     1.6715
2.67222E-05     1.6551       0.00000E+00     0.0000
   37    0.0000                 2.83021E-05     1.8380
1.77665E-05     1.7969       0.00000E+00     0.0000
   38    0.0000                 3.41956E-05     1.6900
2.15264E-05     1.6559       0.00000E+00     0.0000
   39    0.0002                 1.30863E-04     1.0299
8.32414E-05     1.0086       0.00000E+00     0.0000
   40    0.0002                 1.18988E-04     0.8465
7.69226E-05     0.8309       0.00000E+00     0.0000
   41    0.0002                 1.59557E-04     0.7113
1.06618E-04     0.6898       0.00000E+00     0.0000
   42    0.0002                 1.39705E-04     0.8685
9.50154E-05     0.8503       0.00000E+00     0.0000
   43    0.0001                 7.81528E-05     1.1592
5.61518E-05     1.1045       0.00000E+00     0.0000
   44    0.0001                 1.13489E-04     1.0335
8.32965E-05     0.9852       0.00000E+00     0.0000
   45    0.0001                 5.99628E-05     0.9545
4.83272E-05     0.8823       0.00000E+00     0.0000
   46    0.0000                 1.44982E-05     1.7200
1.16678E-05     1.6070       0.00000E+00     0.0000
   47    0.0001                 4.08137E-05     1.6473
3.16931E-05     1.5816       0.00000E+00     0.0000
   48    0.0000                 1.20917E-05     3.7231
9.38020E-06     3.6273       0.00000E+00     0.0000
   49    0.0001                 8.06856E-05     1.3942
6.36277E-05     1.3615       0.00000E+00     0.0000
   50    0.0001                 5.78781E-05     1.8116
4.76521E-05     1.7760       0.00000E+00     0.0000
   51    0.0000                 1.50395E-05     3.2743
1.25002E-05     3.2120       0.00000E+00     0.0000
   52    0.0001                 4.12822E-05     1.9871
3.56781E-05     1.9385       0.00000E+00     0.0000
   53    0.0002                 1.59506E-04     0.7999
1.56589E-04     0.7437       0.00000E+00     0.0000
   54    0.0001                 7.53834E-05     2.3456
7.00202E-05     2.2607       0.00000E+00     0.0000
   55    0.0002                 1.66085E-04     1.3086
1.52197E-04     1.2748       0.00000E+00     0.0000
   56    0.0002                 1.20361E-04     1.6293
1.11576E-04     1.5879       0.00000E+00     0.0000
1                            fuel bundle
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skipping 23 generations

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

   57    0.0002                 1.47746E-04     1.4315
1.34105E-04     1.3965       0.00000E+00     0.0000
   58    0.0001                 8.64552E-05     1.9634
7.56670E-05     1.9114       0.00000E+00     0.0000
   59    0.0002                 1.60801E-04     1.4822
1.44360E-04     1.4191       0.00000E+00     0.0000
   60    0.0004                 2.76732E-04     1.3265
2.50743E-04     1.2437       0.00000E+00     0.0000
   61    0.0000                 2.80546E-05     3.8401
2.15957E-05     3.7162       0.00000E+00     0.0000
   62    0.0002                 1.62828E-04     1.6037
1.36608E-04     1.5604       0.00000E+00     0.0000
   63    0.0002                 1.14862E-04     1.8013
9.47092E-05     1.7398       0.00000E+00     0.0000
   64    0.0001                 1.00869E-04     2.7166
8.13000E-05     2.6184       0.00000E+00     0.0000
   65    0.0000                 3.76357E-05     3.5707
3.71202E-05     3.4545       0.00000E+00     0.0000
   66    0.0002                 1.77253E-04     1.9051
1.57133E-04     1.8463       0.00000E+00     0.0000
   67    0.0002                 1.48594E-04     1.9557
1.21448E-04     1.8902       0.00000E+00     0.0000
   68    0.0000                 2.63975E-05     3.8937
2.28490E-05     3.7516       0.00000E+00     0.0000
   69    0.0004                 2.95702E-04     1.6410
2.32184E-04     1.5893       0.00000E+00     0.0000
   70    0.0003                 2.11501E-04     1.8792
1.92499E-04     1.8092       0.00000E+00     0.0000
   71    0.0006                 4.25603E-04     1.5146
3.52354E-04     1.4681       0.00000E+00     0.0000
   72    0.0001                 4.78004E-05     6.6917
2.82447E-05     6.5296       0.00000E+00     0.0000
   73    0.0004                 3.25231E-04     1.7990
2.47861E-04     1.6999       0.00000E+00     0.0000
   74    0.0014                 1.07682E-03     1.1092
7.82284E-04     1.0640       0.00000E+00     0.0000
   75    0.0001                 1.11950E-04     3.0520
8.60772E-05     2.9043       0.00000E+00     0.0000
   76    0.0006                 4.61775E-04     1.8861
2.93300E-04     1.8177       0.00000E+00     0.0000
   77    0.0005                 3.59908E-04     1.7668
2.58466E-04     1.6995       0.00000E+00     0.0000
   78    0.0000                 7.24401E-06     4.4941
7.09028E-05     4.4447       0.00000E+00     0.0000
   79    0.0002                 1.85340E-04     2.4349
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1.24699E-04	2.3382	0.00000E+00	0.0000	80	0.0001	6.20567E-05	3.3146
8.27303E-05	3.2218	0.00000E+00	0.0000	81	0.0014	1.03808E-03	1.0678
7.64128E-04	1.0248	0.00000E+00	0.0000	82	0.0001	6.72571E-05	5.1199
4.03359E-05	4.8543	0.00000E+00	0.0000	83	0.0002	1.24536E-04	2.9715
1.37851E-04	2.9087	0.00000E+00	0.0000	84	0.0001	8.06560E-05	3.1631
8.17974E-05	2.9338	0.00000E+00	0.0000	85	0.0003	2.01037E-04	2.1594
2.47371E-04	2.1008	0.00000E+00	0.0000	86	0.0004	2.70033E-04	2.5553
2.17141E-04	2.4320	0.00000E+00	0.0000	87	0.0004	3.40549E-04	2.3456
2.11689E-04	2.2472	0.00000E+00	0.0000	88	0.0001	5.46244E-05	4.5156
9.92407E-05	4.4000	0.00000E+00	0.0000	89	0.0001	9.60024E-05	3.4555
6.65355E-05	3.1773	0.00000E+00	0.0000	90	0.0003	2.28351E-04	2.7079
1.34789E-04	2.5923	0.00000E+00	0.0000	91	0.0003	1.98836E-04	2.6372
1.25390E-04	2.4943	0.00000E+00	0.0000	92	0.0000	2.98396E-05	2.8502
1.95394E-04	2.7931	0.00000E+00	0.0000	93	0.0002	1.31317E-04	2.8568
1.06670E-04	2.6610	0.00000E+00	0.0000	94	0.0002	1.18425E-04	4.1004
6.62437E-05	3.8568	0.00000E+00	0.0000	95	0.0008	6.07724E-04	2.2096
3.74815E-04	2.1411	0.00000E+00	0.0000	96	0.0002	1.52279E-04	3.8201
7.73038E-05	3.6518	0.00000E+00	0.0000	97	0.0004	2.87876E-04	3.0299
1.64749E-04	2.9652	0.00000E+00	0.0000	98	0.0001	1.08967E-04	3.9074
1.04335E-04	3.7687	0.00000E+00	0.0000	99	0.0001	9.35788E-05	4.7515
6.29605E-05	4.5651	0.00000E+00	0.0000	100	0.0002	1.25102E-04	4.0676
8.37477E-05	3.8917	0.00000E+00	0.0000	101	0.0002	1.17739E-04	3.6307
7.46392E-05	3.3924	0.00000E+00	0.0000	102	0.0002	1.62922E-04	4.1547
9.07580E-05	3.9939	0.00000E+00	0.0000	103	0.0001	9.60221E-05	3.3188
9.37913E-05	3.1426	0.00000E+00	0.0000	104	0.0002	1.70882E-04	3.4349
1.35464E-04	3.3142	0.00000E+00	0.0000	105	0.0002	1.15506E-04	3.5717

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7.66439E-05     3.3422       0.00000E+00     0.0000
  106    0.0002                 1.81551E-04     4.3954
1.34922E-04     4.3337       0.00000E+00     0.0000
  107    0.0001                 6.45614E-05     3.4505
6.52211E-05     3.2360       0.00000E+00     0.0000
  108    0.0000                 3.51097E-05     2.3182
1.51704E-04     2.2622       0.00000E+00     0.0000
  109    0.0002                 1.31360E-04     2.0405
4.35826E-04     2.0126       0.00000E+00     0.0000
  110    0.0008                 6.07770E-04     3.1464
3.74978E-04     3.1145       0.00000E+00     0.0000
  111    0.0002                 1.53239E-04     4.5876
1.40921E-04     4.4669       0.00000E+00     0.0000
  112    0.0002                 1.20151E-04     5.0293
1.26605E-04     4.9422       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                 1.28341E-04     3.5844
1.12134E-04     3.3471       0.00000E+00     0.0000
  114    0.0000                 1.04441E-05     6.7540
1.43285E-05     5.5742       0.00000E+00     0.0000
  115    0.0001                 7.05334E-05     3.6970
8.20784E-05     3.4009       0.00000E+00     0.0000
  116    0.0002                 1.91252E-04     3.0479
1.43920E-04     2.7451       0.00000E+00     0.0000
  117    0.0006                 4.70780E-04     2.4627
2.51905E-04     2.3063       0.00000E+00     0.0000
  118    0.0008                 6.08945E-04     1.9457
4.74881E-04     1.8696       0.00000E+00     0.0000
  119    0.0002                 1.42049E-04     1.9441
3.66518E-04     1.8739       0.00000E+00     0.0000
  120    0.0002                 1.64557E-04     2.1945
6.26424E-04     2.1612       0.00000E+00     0.0000
  121    0.0007                 5.18395E-04     2.7866
3.98927E-04     2.7175       0.00000E+00     0.0000
  122    0.0001                 1.04503E-04     4.4427
8.15969E-05     4.1417       0.00000E+00     0.0000
  123    0.0003                 2.10224E-04     3.1450
1.49444E-04     2.7758       0.00000E+00     0.0000
  124    0.0003                 2.22220E-04     3.0025
1.84107E-04     2.7954       0.00000E+00     0.0000
  125    0.0002                 1.32704E-04     3.6346
1.22639E-04     3.2653       0.00000E+00     0.0000
  126    0.0001                 1.05792E-04     3.4508
9.43438E-05     3.0733       0.00000E+00     0.0000
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127	0.0005	4.12117E-04	2.9231	2.01920E-04	2.7677
0.00000E+00	0.0000				
128	0.0003	2.23491E-04	2.9619	1.37775E-04	2.6310
0.00000E+00	0.0000				
129	0.0006	4.46742E-04	2.6350	4.11639E-04	2.5068
0.00000E+00	0.0000				
130	0.0001	1.13845E-04	3.4780	2.77852E-04	3.3751
0.00000E+00	0.0000				
131	0.0004	2.85939E-04	1.8336	2.30995E-04	1.5464
0.00000E+00	0.0000				
132	0.0007	5.06461E-04	2.1315	3.11975E-04	1.9528
0.00000E+00	0.0000				
133	0.0014	1.05860E-03	2.0266	6.68435E-04	1.9227
0.00000E+00	0.0000				
134	0.0001	9.06977E-05	2.4405	2.36316E-04	2.0495
0.00000E+00	0.0000				
135	0.0002	1.75923E-04	3.1801	2.60755E-04	3.1043
0.00000E+00	0.0000				
136	0.0001	4.45437E-05	1.9067	6.91377E-04	1.8766
0.00000E+00	0.0000				
137	0.0000	1.89383E-05	0.9009	3.40783E-03	0.8984
0.00000E+00	0.0000				
138	0.0004	3.21555E-04	2.1035	8.37217E-04	2.0751
0.00000E+00	0.0000				
139	0.0002	1.78541E-04	3.4112	2.19542E-04	3.1996
0.00000E+00	0.0000				
140	0.0003	2.09336E-04	2.4291	2.79202E-04	2.1109
0.00000E+00	0.0000				
141	0.0001	8.09150E-05	2.4727	2.54719E-04	2.2068
0.00000E+00	0.0000				
142	0.0001	6.43556E-05	3.1321	2.22966E-04	2.8681
0.00000E+00	0.0000				
143	0.0001	8.23372E-05	2.1507	1.75804E-04	1.3678
0.00000E+00	0.0000				
144	0.0000	3.43800E-05	4.2339	7.45741E-05	2.6061
0.00000E+00	0.0000				
145	0.0005	3.90471E-04	2.6687	3.06083E-04	2.4295
0.00000E+00	0.0000				
146	0.0004	3.38266E-04	2.3855	2.48207E-04	1.9240
0.00000E+00	0.0000				
147	0.0002	1.72865E-04	3.9577	1.11012E-04	3.4204
0.00000E+00	0.0000				
148	0.0001	6.54000E-05	6.4373	4.27741E-05	5.2518
0.00000E+00	0.0000				
149	0.0000	3.06019E-05	8.5583	2.12468E-05	6.5623
0.00000E+00	0.0000				
150	0.0001	8.24990E-05	4.5395	6.12696E-05	3.2836
0.00000E+00	0.0000				
151	0.0001	6.71815E-05	3.9683	5.68839E-05	2.7742
0.00000E+00	0.0000				
152	0.0001	3.94400E-05	4.7559	4.56341E-05	2.8873
0.00000E+00	0.0000				

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  153    0.0001                 3.94422E-05     4.5100
4.50421E-05     2.5869       0.00000E+00     0.0000
  154    0.0001                 5.10135E-05     4.2139
5.18113E-05     2.5421       0.00000E+00     0.0000
  155    0.0001                 4.77612E-05     4.9102
4.83894E-05     2.8823       0.00000E+00     0.0000
  156    0.0001                 4.80961E-05     4.9125
4.67781E-05     3.0375       0.00000E+00     0.0000
  157    0.0001                 5.91319E-05     4.4904
5.76529E-05     2.7856       0.00000E+00     0.0000
  158    0.0001                 7.17300E-05     3.9392
7.07566E-05     2.6395       0.00000E+00     0.0000
  159    0.0002                 1.49431E-04     3.0204
2.07987E-04     2.5420       0.00000E+00     0.0000
  160    0.0001                 5.67080E-05     4.9099
6.90588E-05     3.6507       0.00000E+00     0.0000
  161    0.0001                 6.77400E-05     4.2442
6.86533E-05     2.7235       0.00000E+00     0.0000
  162    0.0001                 7.89670E-05     3.5863
7.70564E-05     2.2125       0.00000E+00     0.0000
  163    0.0001                 9.91727E-05     3.3824
8.98578E-05     2.1802       0.00000E+00     0.0000
  164    0.0001                 1.06698E-04     3.2142
9.70272E-05     2.0574       0.00000E+00     0.0000
  165    0.0002                 1.21151E-04     3.2290
1.09115E-04     2.0877       0.00000E+00     0.0000
  166    0.0001                 6.99214E-05     4.3315
6.40922E-05     2.7672       0.00000E+00     0.0000
  167    0.0001                 7.27775E-05     4.0197
6.74059E-05     2.5783       0.00000E+00     0.0000
  168    0.0001                 8.28060E-05     4.4418
7.51325E-05     2.9072       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                 1.13034E-04     3.5829
9.70266E-05     2.5737       0.00000E+00     0.0000
  170    0.0002                 1.30060E-04     3.7950
1.12361E-04     2.8366       0.00000E+00     0.0000
  171    0.0001                 1.00989E-04     4.7268
7.74392E-05     3.8579       0.00000E+00     0.0000
  172    0.0002                 1.31855E-04     4.4149
9.42672E-05     3.6808       0.00000E+00     0.0000
  173    0.0002                 1.91226E-04     4.0216
1.26146E-04     3.5082       0.00000E+00     0.0000
  174    0.0003                 2.52063E-04     4.3334
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1.56714E-04	3.8816	0.00000E+00	0.0000	175	0.0002	1.18686E-04	6.7280
7.11163E-05	6.1008	0.00000E+00	0.0000	176	0.0001	1.14580E-04	5.7463
6.85181E-05	5.1566	0.00000E+00	0.0000	177	0.0002	1.18798E-04	5.0929
7.00274E-05	4.5887	0.00000E+00	0.0000	178	0.0002	1.36101E-04	6.0235
7.87070E-05	5.5081	0.00000E+00	0.0000	179	0.0001	1.13010E-04	6.0422
6.60353E-05	5.4073	0.00000E+00	0.0000	180	0.0001	1.09614E-04	6.4553
6.38270E-05	5.7439	0.00000E+00	0.0000	181	0.0002	1.15127E-04	6.1622
6.62551E-05	5.4840	0.00000E+00	0.0000	182	0.0001	1.09310E-04	6.2956
6.31776E-05	5.5006	0.00000E+00	0.0000	183	0.0001	1.02952E-04	6.2831
5.96853E-05	5.4501	0.00000E+00	0.0000	184	0.0001	1.02534E-04	5.5328
5.92213E-05	4.8571	0.00000E+00	0.0000	185	0.0001	9.29285E-05	6.6763
5.43730E-05	5.7138	0.00000E+00	0.0000	186	0.0001	8.35277E-05	7.3922
4.95187E-05	6.2118	0.00000E+00	0.0000	187	0.0001	8.99844E-05	7.1397
5.26834E-05	6.0189	0.00000E+00	0.0000	188	0.0001	8.57684E-05	6.3511
5.07850E-05	5.3473	0.00000E+00	0.0000	189	0.0001	8.72737E-05	6.1830
5.16227E-05	5.1652	0.00000E+00	0.0000	190	0.0003	2.13330E-04	4.2057
1.26722E-04	3.4697	0.00000E+00	0.0000	191	0.0003	1.97704E-04	3.9300
1.19088E-04	3.1999	0.00000E+00	0.0000	192	0.0003	1.99554E-04	4.4476
1.20912E-04	3.6015	0.00000E+00	0.0000	193	0.0003	2.02055E-04	3.8474
1.23055E-04	3.0408	0.00000E+00	0.0000	194	0.0005	4.01637E-04	2.6097
2.47664E-04	2.0588	0.00000E+00	0.0000	195	0.0006	4.24995E-04	2.7275
2.63739E-04	2.1353	0.00000E+00	0.0000	196	0.0006	4.82419E-04	2.5567
2.96096E-04	2.0255	0.00000E+00	0.0000	197	0.0006	4.95377E-04	2.7272
3.10995E-04	2.1261	0.00000E+00	0.0000	198	0.0007	5.67043E-04	2.2862
3.52583E-04	1.7888	0.00000E+00	0.0000	199	0.0004	3.15874E-04	3.1173
1.96725E-04	2.3992	0.00000E+00	0.0000	200	0.0005	3.62454E-04	3.1618

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2.21729E-04     2.5080       0.00000E+00     0.0000
  201    0.0010                 7.78693E-04     2.4301
4.78084E-04     1.9331       0.00000E+00     0.0000
  202    0.0013                 9.58208E-04     2.1614
5.83050E-04     1.7363       0.00000E+00     0.0000
  203    0.0015                 1.17760E-03     1.9537
7.10041E-04     1.5910       0.00000E+00     0.0000
  204    0.0021                 1.64013E-03     1.7418
9.68604E-04     1.4617       0.00000E+00     0.0000
  205    0.0014                 1.10919E-03     1.9324
6.52357E-04     1.6333       0.00000E+00     0.0000
  206    0.0019                 1.43719E-03     1.6876
8.35066E-04     1.4634       0.00000E+00     0.0000
  207    0.0021                 1.62570E-03     1.6600
9.46941E-04     1.4545       0.00000E+00     0.0000
  208    0.0029                 2.21772E-03     1.3525
1.28880E-03     1.1928       0.00000E+00     0.0000
  209    0.0031                 2.39137E-03     1.4726
1.40540E-03     1.3080       0.00000E+00     0.0000
  210    0.0037                 2.84633E-03     1.2191
1.69569E-03     1.0678       0.00000E+00     0.0000
  211    0.0040                 3.09245E-03     1.1321
1.86574E-03     0.9697       0.00000E+00     0.0000
  212    0.0047                 3.59341E-03     1.1839
2.17769E-03     1.0026       0.00000E+00     0.0000
  213    0.0065                 4.96271E-03     0.8777
3.00718E-03     0.7378       0.00000E+00     0.0000
  214    0.0095                 7.30845E-03     0.7447
4.40860E-03     0.6210       0.00000E+00     0.0000
  215    0.0158                 1.20892E-02     0.5863
7.20875E-03     0.4933       0.00000E+00     0.0000
  216    0.0303                 2.32083E-02     0.4583
1.36721E-02     0.3951       0.00000E+00     0.0000
  217    0.0202                 1.54438E-02     0.6240
9.07261E-03     0.5290       0.00000E+00     0.0000
  218    0.0278                 2.12999E-02     0.4149
1.24579E-02     0.3579       0.00000E+00     0.0000
  219    0.0356                 2.72250E-02     0.3767
1.58835E-02     0.3147       0.00000E+00     0.0000
  220    0.0475                 3.64035E-02     0.3575
2.11566E-02     0.3020       0.00000E+00     0.0000
  221    0.0628                 4.80576E-02     0.2986
2.78437E-02     0.2535       0.00000E+00     0.0000
  222    0.0800                 6.12825E-02     0.2698
3.55024E-02     0.2326       0.00000E+00     0.0000
  223    0.1045                 8.00032E-02     0.2442
4.63995E-02     0.2072       0.00000E+00     0.0000
  224    0.0581                 4.44581E-02     0.3389
2.58986E-02     0.2913       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations
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 group  fission  unit   region    fissions     percent
absorptions    percent         leakage      percent
       fraction                                deviation
deviation                    deviation

  225    0.2307                 1.76642E-01     0.1492
1.04630E-01     0.1272       0.00000E+00     0.0000
  226    0.0453                 3.46553E-02     0.3513
2.11218E-02     0.2900       0.00000E+00     0.0000
  227    0.0489                 3.74531E-02     0.3430
2.32638E-02     0.2802       0.00000E+00     0.0000
  228    0.0212                 1.62092E-02     0.5399
1.02413E-02     0.4189       0.00000E+00     0.0000
  229    0.0222                 1.70081E-02     0.5500
1.09389E-02     0.4342       0.00000E+00     0.0000
  230    0.0118                 9.04675E-03     0.8195
5.90705E-03     0.6247       0.00000E+00     0.0000
  231    0.0122                 9.30866E-03     0.7066
6.19948E-03     0.5530       0.00000E+00     0.0000
  232    0.0128                 9.82789E-03     0.7409
6.71524E-03     0.5513       0.00000E+00     0.0000
  233    0.0084                 6.41406E-03     0.9833
4.48973E-03     0.7330       0.00000E+00     0.0000
  234    0.0059                 4.50497E-03     1.1208
3.26093E-03     0.7939       0.00000E+00     0.0000
  235    0.0023                 1.78631E-03     1.7335
1.19152E-03     1.3143       0.00000E+00     0.0000
  236    0.0019                 1.44962E-03     1.9287
9.80382E-04     1.4408       0.00000E+00     0.0000
  237    0.0017                 1.28359E-03     1.9529
9.19068E-04     1.4356       0.00000E+00     0.0000
  238    0.0001                 7.21534E-05     9.0612
6.07297E-05     5.4788       0.00000E+00     0.0000

 system total =                  7.65712E-01     0.0528
4.68747E-01     0.0467       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3144E-01  +
or -  0.0002



 elapsed time   3.10317 minutes

 random number=   7A78913861055465
1                                                fuel bundle

                                                     **** fission
```

densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.088E-03	0.05	7.657E-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	2.008E-08	25.45	1.440E-08	23.85	1.629E-08	25.18
3	8.783E-07	3.67	7.193E-07	3.11	7.735E-07	3.26
4	1.500E-06	3.20	1.208E-06	2.93	1.310E-06	3.07
5	2.259E-06	2.46	1.866E-06	2.27	2.003E-06	2.32
6	9.061E-06	1.23	7.305E-06	1.12	7.828E-06	1.13
7	1.254E-05	1.15	9.504E-06	1.01	1.010E-05	1.00
8	3.110E-05	0.81	2.276E-05	0.72	2.392E-05	0.73
9	8.223E-05	0.50	5.858E-05	0.40	6.125E-05	0.43
10	4.685E-05	0.62	3.312E-05	0.58	3.438E-05	0.59
11	2.204E-04	0.28	1.557E-04	0.25	1.615E-04	0.23
12	1.903E-04	0.29	1.378E-04	0.24	1.447E-04	0.23
13	5.636E-05	0.50	4.130E-05	0.43	4.334E-05	0.45
14	2.523E-04	0.26	1.829E-04	0.24	1.911E-04	0.23
15	2.199E-04	0.26	1.597E-04	0.22	1.666E-04	0.22
16	7.105E-05	0.44	5.150E-05	0.41	5.373E-05	0.38
17	3.253E-05	0.67	2.371E-05	0.59	2.468E-05	0.57
18	2.796E-05	0.72	2.042E-05	0.59	2.112E-05	0.53
19	5.039E-05	0.53	3.686E-05	0.43	3.831E-05	0.39
20	4.007E-05	0.54	2.932E-05	0.51	3.075E-05	0.48
21	8.056E-05	0.39	5.891E-05	0.32	6.134E-05	0.30
22	7.331E-05	0.44	5.351E-05	0.36	5.542E-05	0.35
23	7.714E-05	0.43	5.651E-05	0.37	5.867E-05	0.32
24	1.845E-05	0.71	1.363E-05	0.64	1.425E-05	0.64
25	2.337E-05	0.65	1.727E-05	0.54	1.820E-05	0.58
26	1.349E-05	1.03	9.923E-06	0.87	1.049E-05	0.80

27	4.197E-05	0.53	3.111E-05	0.47	3.302E-05	0.45
28	7.713E-05	0.42	5.728E-05	0.38	6.074E-05	0.37
29	7.902E-05	0.39	5.933E-05	0.34	6.214E-05	0.33
30	9.978E-06	1.11	7.466E-06	1.00	7.819E-06	0.94
31	7.844E-05	0.39	5.892E-05	0.34	6.199E-05	0.31
32	3.076E-05	0.65	2.315E-05	0.57	2.442E-05	0.55
33	2.685E-05	0.69	2.017E-05	0.61	2.127E-05	0.54
34	6.091E-05	0.40	4.597E-05	0.36	4.831E-05	0.35
35	3.634E-05	0.52	2.756E-05	0.48	2.889E-05	0.42
36	3.426E-05	0.52	2.578E-05	0.44	2.700E-05	0.41
37	2.171E-05	0.64	1.649E-05	0.52	1.724E-05	0.47
38	2.585E-05	0.66	1.966E-05	0.58	2.066E-05	0.51
39	9.717E-05	0.32	7.462E-05	0.27	7.861E-05	0.24
40	8.936E-05	0.32	6.925E-05	0.28	7.370E-05	0.27
41	1.129E-04	0.31	8.829E-05	0.26	9.419E-05	0.24
42	9.387E-05	0.35	7.400E-05	0.30	7.938E-05	0.27
43	5.098E-05	0.37	4.065E-05	0.34	4.276E-05	0.28
44	6.913E-05	0.33	5.545E-05	0.30	5.965E-05	0.28
45	3.528E-05	0.42	2.797E-05	0.38	3.105E-05	0.33
46	8.266E-06	0.83	6.612E-06	0.71	7.112E-06	0.61
47	2.336E-05	0.60	1.856E-05	0.54	1.944E-05	0.46
48	6.674E-06	1.06	5.385E-06	0.95	5.655E-06	0.82
49	4.367E-05	0.39	3.494E-05	0.36	3.770E-05	0.30
50	2.968E-05	0.48	2.387E-05	0.39	2.586E-05	0.31
51	7.861E-06	0.88	6.373E-06	0.78	6.936E-06	0.71
52	2.070E-05	0.57	1.671E-05	0.44	1.816E-05	0.37
53	7.623E-05	0.31	6.149E-05	0.24	6.678E-05	0.23
54	3.335E-05	0.43	2.706E-05	0.36	2.922E-05	0.30
55	6.671E-05	0.31	5.413E-05	0.25	5.901E-05	0.23
56	4.343E-05	0.42	3.534E-05	0.35	3.846E-05	0.29
57	4.894E-05	0.41	4.002E-05	0.35	4.365E-05	0.29
58	2.589E-05	0.43	2.113E-05	0.36	2.297E-05	0.30
59	4.404E-05	0.39	3.607E-05	0.33	3.939E-05	0.28
60	6.437E-05	0.31	5.268E-05	0.28	5.727E-05	0.23
61	6.196E-06	1.08	5.037E-06	0.93	5.489E-06	0.80
62	3.247E-05	0.39	2.652E-05	0.36	2.884E-05	0.29
63	2.181E-05	0.59	1.791E-05	0.48	1.942E-05	0.39
64	1.707E-05	0.58	1.403E-05	0.54	1.528E-05	0.44
65	5.768E-06	1.08	4.744E-06	0.84	5.143E-06	0.78
66	2.832E-05	0.45	2.332E-05	0.42	2.550E-05	0.38
67	2.110E-05	0.48	1.740E-05	0.41	1.885E-05	0.36
68	4.704E-06	1.01	3.920E-06	0.93	4.223E-06	0.78
69	3.741E-05	0.38	3.073E-05	0.33	3.336E-05	0.30
70	2.678E-05	0.51	2.211E-05	0.44	2.399E-05	0.36
71	4.550E-05	0.39	3.760E-05	0.33	4.098E-05	0.30
72	2.664E-06	1.33	2.217E-06	1.33	2.412E-06	0.99
73	2.713E-05	0.40	2.238E-05	0.37	2.434E-05	0.31
74	7.954E-05	0.29	6.582E-05	0.26	7.136E-05	0.23
75	9.131E-06	0.84	7.606E-06	0.64	8.191E-06	0.52
76	2.294E-05	0.49	1.905E-05	0.46	2.061E-05	0.39
77	1.760E-05	0.56	1.461E-05	0.50	1.595E-05	0.45
78	1.503E-06	1.43	1.262E-06	1.37	1.395E-06	1.22

79	9.884E-06	0.72	8.206E-06	0.62	8.902E-06	0.55
80	4.496E-06	1.04	3.721E-06	0.91	4.054E-06	0.80
81	5.511E-05	0.33	4.587E-05	0.30	4.978E-05	0.24
82	3.183E-06	1.36	2.656E-06	1.17	2.899E-06	0.99
83	4.471E-06	1.18	3.694E-06	0.98	4.035E-06	0.79
84	8.020E-06	0.87	6.697E-06	0.74	7.326E-06	0.67
85	9.931E-06	0.73	8.275E-06	0.70	8.950E-06	0.60
86	1.370E-05	0.67	1.136E-05	0.57	1.231E-05	0.52
87	1.192E-05	0.66	9.976E-06	0.59	1.082E-05	0.51
88	3.150E-06	1.37	2.646E-06	1.08	2.880E-06	0.92
89	6.547E-06	0.98	5.455E-06	0.88	5.955E-06	0.67
90	6.942E-06	0.94	5.756E-06	0.82	6.204E-06	0.70
91	8.302E-06	0.86	6.887E-06	0.73	7.467E-06	0.56
92	4.726E-06	0.92	3.964E-06	0.82	4.289E-06	0.74
93	8.073E-06	0.86	6.698E-06	0.77	7.278E-06	0.66
94	4.238E-06	1.18	3.513E-06	0.96	3.808E-06	0.85
95	1.253E-05	0.63	1.049E-05	0.54	1.137E-05	0.49
96	3.354E-06	1.14	2.803E-06	0.99	3.050E-06	0.80
97	3.417E-06	1.00	2.882E-06	0.98	3.128E-06	0.81
98	3.540E-06	1.19	2.962E-06	1.08	3.229E-06	0.95
99	2.417E-06	1.61	2.003E-06	1.49	2.152E-06	1.18
100	3.466E-06	1.13	2.867E-06	1.08	3.129E-06	0.96
101	4.958E-06	0.97	4.154E-06	0.93	4.459E-06	0.79
102	3.342E-06	1.09	2.783E-06	1.03	3.030E-06	0.83
103	4.684E-06	0.99	3.950E-06	0.91	4.249E-06	0.74
104	4.259E-06	0.90	3.570E-06	0.84	3.856E-06	0.75
105	4.258E-06	1.01	3.603E-06	0.94	3.881E-06	0.71
106	1.533E-06	1.56	1.288E-06	1.41	1.419E-06	1.22
107	3.585E-06	1.17	3.016E-06	1.09	3.239E-06	0.89
108	3.220E-06	1.11	2.730E-06	1.06	2.985E-06	0.93
109	5.079E-06	0.95	4.275E-06	0.84	4.668E-06	0.68
110	2.990E-06	1.25	2.562E-06	1.14	2.788E-06	0.91
111	3.086E-06	1.22	2.606E-06	1.11	2.823E-06	0.83
112	1.822E-06	1.73	1.525E-06	1.60	1.664E-06	1.21
113	5.712E-06	0.94	4.820E-06	0.79	5.196E-06	0.65
114	2.016E-06	1.90	1.703E-06	1.45	1.801E-06	1.11
115	5.102E-06	0.98	4.293E-06	0.91	4.588E-06	0.67
116	1.065E-05	0.64	8.933E-06	0.54	9.689E-06	0.45
117	1.179E-05	0.72	9.928E-06	0.63	1.076E-05	0.53
118	1.292E-05	0.62	1.078E-05	0.51	1.172E-05	0.47
119	8.253E-06	0.73	7.024E-06	0.69	7.571E-06	0.57
120	5.685E-06	0.79	4.827E-06	0.76	5.246E-06	0.63
121	6.053E-06	0.89	5.152E-06	0.78	5.606E-06	0.69
122	3.239E-06	1.21	2.716E-06	1.06	2.962E-06	0.85
123	1.038E-05	0.78	8.658E-06	0.63	9.388E-06	0.51
124	7.412E-06	0.79	6.243E-06	0.73	6.725E-06	0.59
125	7.013E-06	0.84	5.935E-06	0.78	6.393E-06	0.61
126	5.842E-06	1.01	4.941E-06	0.87	5.265E-06	0.67
127	5.515E-06	0.94	4.648E-06	0.78	5.048E-06	0.69
128	7.822E-06	0.80	6.567E-06	0.77	7.039E-06	0.54
129	9.617E-06	0.58	8.135E-06	0.63	8.826E-06	0.49
130	4.001E-06	1.03	3.416E-06	0.91	3.694E-06	0.80

131	1.688E-05	0.51	1.421E-05	0.45	1.531E-05	0.38
132	1.112E-05	0.68	9.373E-06	0.60	1.013E-05	0.54
133	1.362E-05	0.66	1.153E-05	0.53	1.249E-05	0.48
134	1.486E-05	0.66	1.257E-05	0.57	1.355E-05	0.48
135	2.403E-06	1.31	2.039E-06	1.26	2.218E-06	1.04
136	3.841E-06	1.10	3.300E-06	1.00	3.646E-06	0.83
137	2.454E-06	0.93	2.575E-06	0.92	2.933E-06	0.75
138	4.087E-06	1.04	3.552E-06	0.96	3.892E-06	0.76
139	4.587E-06	1.03	3.912E-06	0.92	4.260E-06	0.78
140	1.201E-05	0.56	1.020E-05	0.55	1.104E-05	0.43
141	8.825E-06	0.65	7.513E-06	0.57	8.085E-06	0.44
142	5.803E-06	0.89	4.935E-06	0.93	5.323E-06	0.70
143	1.988E-05	0.49	1.677E-05	0.43	1.802E-05	0.34
144	8.148E-06	0.80	6.826E-06	0.72	7.379E-06	0.57
145	7.233E-06	0.87	6.136E-06	0.76	6.616E-06	0.64
146	1.203E-05	0.60	1.019E-05	0.52	1.098E-05	0.44
147	3.650E-06	1.11	3.119E-06	0.96	3.335E-06	0.84
148	1.893E-06	1.40	1.600E-06	1.29	1.716E-06	0.96
149	1.167E-06	2.13	1.002E-06	2.07	1.069E-06	1.46
150	3.934E-06	1.11	3.331E-06	1.04	3.595E-06	0.80
151	4.103E-06	1.12	3.492E-06	0.97	3.758E-06	0.72
152	4.261E-06	1.14	3.564E-06	0.98	3.891E-06	0.84
153	4.512E-06	1.07	3.783E-06	0.99	4.071E-06	0.81
154	4.664E-06	1.04	3.907E-06	0.84	4.203E-06	0.76
155	4.340E-06	1.14	3.647E-06	0.93	3.933E-06	0.73
156	3.980E-06	1.23	3.366E-06	1.11	3.617E-06	0.89
157	4.624E-06	0.99	3.889E-06	0.85	4.216E-06	0.70
158	4.935E-06	1.04	4.143E-06	0.85	4.432E-06	0.72
159	6.830E-06	0.80	5.769E-06	0.70	6.237E-06	0.59
160	3.557E-06	1.11	2.992E-06	0.98	3.223E-06	0.81
161	4.959E-06	0.88	4.188E-06	0.87	4.494E-06	0.67
162	5.798E-06	0.93	4.914E-06	0.78	5.290E-06	0.67
163	6.077E-06	0.78	5.163E-06	0.81	5.537E-06	0.63
164	6.508E-06	0.96	5.450E-06	0.82	5.889E-06	0.71
165	6.954E-06	0.83	5.831E-06	0.68	6.299E-06	0.59
166	4.003E-06	1.07	3.382E-06	0.98	3.625E-06	0.82
167	4.159E-06	1.14	3.493E-06	1.02	3.755E-06	0.79
168	4.322E-06	0.99	3.584E-06	0.86	3.880E-06	0.71
169	4.441E-06	1.14	3.763E-06	1.03	4.093E-06	0.78
170	4.627E-06	0.90	3.918E-06	0.81	4.220E-06	0.78
171	2.386E-06	1.42	2.010E-06	1.30	2.188E-06	1.05
172	2.428E-06	1.43	2.063E-06	1.22	2.238E-06	1.01
173	2.481E-06	1.51	2.078E-06	1.20	2.259E-06	1.05
174	2.495E-06	1.38	2.120E-06	1.20	2.283E-06	1.02
175	9.746E-07	2.19	8.426E-07	1.85	9.145E-07	1.59
176	1.006E-06	1.70	8.682E-07	1.69	9.372E-07	1.30
177	1.054E-06	2.00	9.103E-07	2.00	9.675E-07	1.69
178	1.074E-06	2.02	8.946E-07	1.86	9.578E-07	1.59
179	1.079E-06	2.15	8.990E-07	1.80	9.753E-07	1.62
180	1.058E-06	2.04	8.915E-07	1.83	9.655E-07	1.31
181	1.084E-06	2.30	8.951E-07	2.01	9.854E-07	1.46
182	1.059E-06	2.00	9.410E-07	1.99	1.005E-06	1.38

183	1.094E-06	1.87	9.260E-07	1.74	1.013E-06	1.44
184	1.091E-06	1.95	9.293E-07	1.79	1.002E-06	1.44
185	1.118E-06	2.06	9.445E-07	1.81	1.046E-06	1.48
186	1.105E-06	2.12	9.390E-07	1.77	1.023E-06	1.55
187	1.123E-06	2.11	9.605E-07	1.89	1.051E-06	1.50
188	1.134E-06	2.03	9.504E-07	1.84	1.060E-06	1.52
189	1.152E-06	1.75	9.821E-07	1.60	1.065E-06	1.48
190	3.024E-06	1.22	2.568E-06	1.05	2.789E-06	0.92
191	3.065E-06	1.20	2.633E-06	1.02	2.820E-06	0.86
192	3.156E-06	1.08	2.659E-06	0.94	2.904E-06	0.87
193	3.259E-06	1.22	2.752E-06	1.07	2.964E-06	0.82
194	6.831E-06	0.81	5.802E-06	0.68	6.253E-06	0.62
195	7.267E-06	0.77	6.099E-06	0.67	6.630E-06	0.54
196	7.743E-06	0.75	6.555E-06	0.71	7.061E-06	0.52
197	8.406E-06	0.67	7.113E-06	0.60	7.714E-06	0.51
198	9.010E-06	0.72	7.593E-06	0.76	8.201E-06	0.55
199	4.790E-06	0.89	4.072E-06	0.78	4.427E-06	0.64
200	5.033E-06	0.89	4.263E-06	0.85	4.633E-06	0.71
201	1.065E-05	0.58	9.024E-06	0.50	9.749E-06	0.44
202	1.205E-05	0.66	1.015E-05	0.60	1.099E-05	0.49
203	1.315E-05	0.62	1.112E-05	0.53	1.196E-05	0.45
204	1.464E-05	0.51	1.247E-05	0.47	1.355E-05	0.41
205	8.644E-06	0.68	7.754E-06	0.59	8.159E-06	0.51
206	9.391E-06	0.68	8.440E-06	0.63	8.934E-06	0.51
207	9.625E-06	0.57	8.716E-06	0.53	9.195E-06	0.44
208	1.127E-05	0.56	1.021E-05	0.52	1.083E-05	0.42
209	1.165E-05	0.60	1.059E-05	0.52	1.119E-05	0.41
210	1.404E-05	0.47	1.273E-05	0.46	1.362E-05	0.33
211	1.616E-05	0.48	1.453E-05	0.42	1.552E-05	0.33
212	1.915E-05	0.44	1.734E-05	0.39	1.844E-05	0.36
213	2.612E-05	0.36	2.350E-05	0.31	2.523E-05	0.25
214	3.704E-05	0.25	3.323E-05	0.25	3.564E-05	0.20
215	5.536E-05	0.28	4.989E-05	0.25	5.381E-05	0.20
216	9.230E-05	0.18	8.410E-05	0.16	9.071E-05	0.13
217	5.507E-05	0.24	5.280E-05	0.22	5.597E-05	0.18
218	7.079E-05	0.20	6.794E-05	0.17	7.236E-05	0.16
219	8.400E-05	0.19	8.116E-05	0.17	8.650E-05	0.13
220	1.015E-04	0.16	9.897E-05	0.15	1.055E-04	0.12
221	1.203E-04	0.17	1.182E-04	0.13	1.263E-04	0.12
222	1.364E-04	0.16	1.364E-04	0.14	1.455E-04	0.11
223	1.534E-04	0.15	1.574E-04	0.12	1.674E-04	0.11
224	7.498E-05	0.20	7.968E-05	0.18	8.437E-05	0.13
225	2.340E-04	0.11	2.724E-04	0.11	2.827E-04	0.10
226	3.184E-05	0.25	4.480E-05	0.19	4.452E-05	0.13
227	2.893E-05	0.25	4.640E-05	0.20	4.444E-05	0.14
228	1.045E-05	0.41	1.914E-05	0.33	1.759E-05	0.19
229	9.631E-06	0.39	1.970E-05	0.30	1.752E-05	0.17
230	4.536E-06	0.50	1.018E-05	0.44	8.695E-06	0.21
231	4.214E-06	0.50	1.050E-05	0.42	8.737E-06	0.20
232	3.936E-06	0.54	1.128E-05	0.43	8.890E-06	0.22
233	2.252E-06	0.74	7.383E-06	0.54	5.487E-06	0.23
234	1.403E-06	1.02	5.392E-06	0.59	3.839E-06	0.26

235	5.104E-07	1.48	1.045E-06	1.01	1.123E-06	0.58
236	3.424E-07	1.88	7.293E-07	1.19	7.962E-07	0.56
237	2.239E-07	2.24	5.421E-07	1.49	6.128E-07	0.58
238	5.320E-09	10.43	1.969E-08	6.63	2.469E-08	2.29

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
 0.7530 to 0.7558     *
 0.7558 to 0.7586     *****
 0.7586 to 0.7615     *******
 0.7615 to 0.7643     ********************
 0.7643 to 0.7671     ******************************
 0.7671 to 0.7700     ************************
 0.7700 to 0.7728     ***********
```

```
 0.7728 to 0.7756     **
 0.7756 to 0.7784     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7530 to 0.7558
 0.7558 to 0.7586     **
 0.7586 to 0.7615     *****
 0.7615 to 0.7643     *****************
 0.7643 to 0.7671     **********************
 0.7671 to 0.7700     *******************
 0.7700 to 0.7728     *******
 0.7728 to 0.7756     *
 0.7756 to 0.7784     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7530 to 0.7558
 0.7558 to 0.7586     **
 0.7586 to 0.7615     ***
 0.7615 to 0.7643     **********
 0.7643 to 0.7671     *****************
 0.7671 to 0.7700     ************
 0.7700 to 0.7728     ******
 0.7728 to 0.7756
 0.7756 to 0.7784

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7530 to 0.7558
 0.7558 to 0.7586     *
 0.7586 to 0.7615     *
 0.7615 to 0.7643     *****
 0.7643 to 0.7671     ***********
 0.7671 to 0.7700     ****
 0.7700 to 0.7728     ***
 0.7728 to 0.7756
 0.7756 to 0.7784

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

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

```
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76571 + or - 0.00040                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.67181E-02 + or -  1.12843E-04            ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  1.02219E-05            ***
        ***
***
        ***        system mean free path (cm)
6.52640E-01 + or -  1.75916E-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     3.10400 minutes
```

```
*********************************************************************
*********************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


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

```
     000000000     5555555555555                    5555555555555
3333333333333                           44     3333333333333
      0000000       55555555555                     55555555555
33333333333                            44      33333333333
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

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

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**********************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:53:43.55
*****
        *****
*****
        *****
*****

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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
***
        ***
***

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

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        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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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  ***
                 ***
***

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                                 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  3.84848E-12  1.16102E-12    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  6.04510E-08  1.81187E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  1.07347E-14  3.53761E-14    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  7.37712E-07  5.29650E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33933E-08  6.98508E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02826E-07  7.99739E-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  5.24103E-07  8.93225E-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  2.96839E-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  4.78774E-11  1.18828E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90781E-08  1.32079E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.09850E-08  2.98918E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.68980E-08  4.64874E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  5.71420E-10  1.58914E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.71330E-08  4.81604E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  2.61284E-10  7.42296E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.21090E-09  9.21816E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  2.09000E-18  5.81237E-17   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.15287E-10  3.27522E-09   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  1.14651E-08  3.25711E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                  12/17/09
    1042096  1.18397E-08  3.39893E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                  12/17/09
    1042097  7.30477E-09  2.11894E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                  12/17/09
    1042098  1.76614E-08  5.17598E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                  12/17/09
    1042099  1.26862E-11  3.75597E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                  12/17/09
    1042100  7.40042E-09  2.21318E-07   42100    99.9075     mo100 4249
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  5.16923E-10  1.53042E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  4.43968E-10  1.34100E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  3.66087E-10  1.11671E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.52926E-11  2.62733E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  1.62165E-10  5.04379E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  3.01186E-11  9.54821E-10   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  1.74208E-10  5.36621E-09   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.11088E-12  3.48840E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  8.54851E-11  2.68441E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  1.30153E-11  4.16499E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  4.84259E-12  1.56414E-10   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  2.74682E-12  8.95445E-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  8.98665E-11  2.90267E-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  1.29379E-09  4.29509E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43747E-09  8.16472E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23476E-09  4.17308E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90207E-09  9.89480E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.57391E-10  2.62775E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.05370E-12  3.62422E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50667E-11  2.23796E-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  1.46968E-09  5.14291E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63225E-09  1.63483E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64368E-09  5.85024E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23091E-09  2.23635E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.86691E-10  3.23557E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10947E-09  4.11498E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  4.82323E-12  1.81783E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  1.32699E-11  5.04089E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  4.76972E-11  1.84045E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30244E-12  5.25974E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  2.30500E-10  9.03210E-09   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67707E-11  1.06504E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87637E-12  7.57731E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  5.44680E-10  2.16693E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  7.70607E-16  3.08885E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  5.89433E-10  2.38028E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  5.25136E-10  2.15209E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.35035E-08  1.38303E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99375E-11  2.51022E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  5.58838E-10  2.32365E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.45698E-10  6.14544E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  5.10811E-10  2.16987E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21023E-12  2.65668E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  3.86957E-10  1.66696E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  3.76151E-10  1.58657E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12804E-11  2.62149E-09   59143   142.9108     pr143 5931
```

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endf/b7 rel0 rev7 mod1                12/17/09
    1060143  4.42322E-10  1.89218E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  8.15219E-11  3.51178E-09   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  3.49485E-10  1.51599E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  2.57803E-10  1.12601E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87221E-11  8.23352E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.42918E-10  6.32800E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  1.64705E-10  7.24329E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.24259E-17  5.50186E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84878E-12  8.24130E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  9.01493E-12  3.96451E-10   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  9.30221E-11  4.14661E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  2.83568E-14  1.27254E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.03302E-09  1.37020E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  2.32227E-11  1.05606E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32591E-13  1.06470E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.43853E-09  6.49873E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.57251E-09  7.19818E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  5.62251E-15  2.59057E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  2.70934E-12  1.25644E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81415E-13  8.46738E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.80218E-12  2.63856E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29364E-11  2.89976E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27197E-10  1.98109E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.92307E-10  2.76450E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51611E-10  2.12137E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.18156E-10  3.39492E-08   64158   157.9241     gd158 6443
```

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endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31125E-10  3.02134E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76387E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22703E-06  6.51958E-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  4.57404E-12  3.24562E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  4.22163E-18  3.00822E-16   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  3.85013E-10  2.75505E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  6.83047E-16  4.90819E-14   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.18443E-20  8.54655E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49927E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.02172E-20  7.37249E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.92445E-28  2.84356E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99989E-21  7.27567E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  9.16371E-21  6.63979E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.89451E-21  7.19900E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.83109E-21  7.18233E-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
```

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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							

```
                                        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:
  9406 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

                                                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       ........

                                ........     0.01600 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
0.01667 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 15584 independent fission points were generated for generation 1
          1       7.60463E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15826 independent fission points were generated for generation 2
          2       7.72573E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15650 independent fission points were generated for generation 3
          3       7.67398E-01      7.67398E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.66038E-01      7.66718E-01      6.80029E-04
0.00000E+00      0.00000E+00
          5       7.68307E-01      7.67248E-01      6.59473E-04
0.00000E+00      0.00000E+00
          6       7.58447E-01      7.65048E-01      2.24889E-03
0.00000E+00      0.00000E+00
          7       7.65533E-01      7.65145E-01      1.74469E-03
0.00000E+00      0.00000E+00
          8       7.62775E-01      7.64750E-01      1.47826E-03
0.00000E+00      0.00000E+00
```

9	7.60628E-01	7.64161E-01	1.38117E-03	0.00000E+00	0.00000E+00
10	7.61970E-01	7.63887E-01	1.22708E-03	0.00000E+00	0.00000E+00
11	7.68479E-01	7.64397E-01	1.19643E-03	0.00000E+00	0.00000E+00
12	7.69671E-01	7.64925E-01	1.19300E-03	0.00000E+00	0.00000E+00
13	7.62269E-01	7.64683E-01	1.10578E-03	0.00000E+00	0.00000E+00
14	7.68032E-01	7.64962E-01	1.04729E-03	0.00000E+00	0.00000E+00
15	7.63436E-01	7.64845E-01	9.70494E-04	0.00000E+00	0.00000E+00
16	7.69816E-01	7.65200E-01	9.66109E-04	0.00000E+00	0.00000E+00
17	7.68763E-01	7.65437E-01	9.30237E-04	0.00000E+00	0.00000E+00
18	7.62393E-01	7.65247E-01	8.90712E-04	0.00000E+00	0.00000E+00
19	7.70590E-01	7.65561E-01	8.93765E-04	0.00000E+00	0.00000E+00
20	7.65861E-01	7.65578E-01	8.42813E-04	0.00000E+00	0.00000E+00
21	7.68425E-01	7.65728E-01	8.11180E-04	0.00000E+00	0.00000E+00
22	7.68117E-01	7.65847E-01	7.78769E-04	0.00000E+00	0.00000E+00
23	7.64190E-01	7.65768E-01	7.44951E-04	0.00000E+00	0.00000E+00
24	7.60157E-01	7.65513E-01	7.54692E-04	0.00000E+00	0.00000E+00
25	7.71197E-01	7.65760E-01	7.62294E-04	0.00000E+00	0.00000E+00
26	7.65651E-01	7.65756E-01	7.29855E-04	0.00000E+00	0.00000E+00
27	7.61851E-01	7.64714E-01	3.46077E-03	0.00000E+00	0.00000E+00
28	7.67201E-01	7.65211E-01	2.52998E-03	0.00000E+00	0.00000E+00
29	7.64710E-01	7.65128E-01	1.96242E-03	0.00000E+00	0.00000E+00
30	7.67952E-01	7.65531E-01	1.67191E-03	0.00000E+00	0.00000E+00
31	7.63521E-01	7.65280E-01	1.44250E-03	0.00000E+00	0.00000E+00
32	7.62841E-01	7.65009E-01	1.28647E-03	0.00000E+00	0.00000E+00
33	7.69738E-01	7.65482E-01	1.25170E-03	0.00000E+00	0.00000E+00
34	7.59726E-01	7.64959E-01	1.26018E-03	0.00000E+00	0.00000E+00

35	7.66949E-01	7.65125E-01	1.15428E-03	0.00000E+00
36	7.62412E-01	7.64916E-01	1.56008E-03	0.00000E+00
37	7.63041E-01	7.64782E-01	1.45957E-03	0.00000E+00
38	7.69655E-01	7.65107E-01	9.91126E-04	0.00000E+00
39	7.64082E-01	7.65043E-01	9.25225E-04	0.00000E+00
40	7.65019E-01	7.65041E-01	8.65471E-04	0.00000E+00
41	7.63352E-01	7.64948E-01	8.19037E-04	0.00000E+00
42	7.61599E-01	7.64771E-01	7.94351E-04	0.00000E+00
43	7.65174E-01	7.64791E-01	7.51678E-04	0.00000E+00
44	7.63131E-01	7.64712E-01	7.17933E-04	0.00000E+00
45	7.72440E-01	7.65064E-01	9.29306E-04	0.00000E+00
46	7.60575E-01	7.64868E-01	9.24493E-04	0.00000E+00
47	7.69553E-01	7.65064E-01	9.80453E-04	0.00000E+00
48	7.67584E-01	7.65164E-01	9.60682E-04	0.00000E+00
49	7.60434E-01	7.64983E-01	9.37679E-04	0.00000E+00
50	7.61095E-01	7.64839E-01	8.53144E-04	0.00000E+00
51	7.79032E-01	7.65345E-01	8.68564E-04	0.00000E+00
52	7.68730E-01	7.65462E-01	8.45662E-04	0.00000E+00
53	7.64153E-01	7.65418E-01	8.17230E-04	0.00000E+00
54	7.65595E-01	7.65424E-01	7.89541E-04	0.00000E+00
55	7.62333E-01	7.65328E-01	7.70136E-04	0.00000E+00
56	7.63418E-01	7.65270E-01	7.48069E-04	0.00000E+00
57	7.70015E-01	7.65409E-01	7.39178E-04	0.00000E+00
58	7.62581E-01	7.65328E-01	7.21921E-04	0.00000E+00
59	7.64643E-01	7.65309E-01	7.01265E-04	0.00000E+00
60	7.63758E-01	7.65268E-01	6.82869E-04	0.00000E+00

61	7.61267E-01	7.65162E-01	6.72906E-04	0.00000E+00
62	7.74058E-01	7.65390E-01	6.95564E-04	0.00000E+00
63	7.65127E-01	7.65384E-01	6.77528E-04	0.00000E+00
64	7.67194E-01	7.65428E-01	6.61923E-04	0.00000E+00
65	7.67354E-01	7.65474E-01	6.47286E-04	0.00000E+00
66	7.65192E-01	7.65467E-01	6.31721E-04	0.00000E+00
67	7.64461E-01	7.65444E-01	6.17298E-04	0.00000E+00
68	7.68757E-01	7.65518E-01	6.07791E-04	0.00000E+00
69	7.69605E-01	7.65607E-01	6.01037E-04	0.00000E+00
70	7.67630E-01	7.65650E-01	5.89469E-04	0.00000E+00
71	7.62891E-01	7.65592E-01	5.79771E-04	0.00000E+00
72	7.63861E-01	7.65557E-01	5.68710E-04	0.00000E+00
73	7.66467E-01	7.65575E-01	5.57292E-04	0.00000E+00
74	7.71145E-01	7.65684E-01	5.57285E-04	0.00000E+00
75	7.65695E-01	7.65685E-01	5.46249E-04	0.00000E+00
76	7.66464E-01	7.65699E-01	5.35851E-04	0.00000E+00
77	7.71787E-01	7.65812E-01	5.38052E-04	0.00000E+00
78	7.65278E-01	7.65802E-01	5.28087E-04	0.00000E+00
79	7.55688E-01	7.65622E-01	5.50060E-04	0.00000E+00
80	7.64746E-01	7.65606E-01	5.40375E-04	0.00000E+00
81	7.61534E-01	7.65536E-01	5.35598E-04	0.00000E+00
82	7.68928E-01	7.65594E-01	5.29523E-04	0.00000E+00
83	7.68697E-01	7.65645E-01	5.23123E-04	0.00000E+00
84	7.73540E-01	7.65775E-01	5.30897E-04	0.00000E+00
85	7.67288E-01	7.65799E-01	5.22710E-04	0.00000E+00
86	7.69401E-01	7.65856E-01	5.17482E-04	0.00000E+00

```
         87       7.63580E-01      7.65821E-01      5.10482E-04
0.00000E+00      0.00000E+00
         88       7.66525E-01      7.65832E-01      5.02563E-04
0.00000E+00      0.00000E+00
         89       7.68660E-01      7.65875E-01      4.96680E-04
0.00000E+00      0.00000E+00
         90       7.60663E-01      7.65797E-01      4.95431E-04
0.00000E+00      0.00000E+00
         91       7.65404E-01      7.65791E-01      4.88016E-04
0.00000E+00      0.00000E+00
         92       7.58412E-01      7.65684E-01      4.92884E-04
0.00000E+00      0.00000E+00
         93       7.70356E-01      7.65751E-01      4.90385E-04
0.00000E+00      0.00000E+00
         94       7.60708E-01      7.65680E-01      4.88670E-04
0.00000E+00      0.00000E+00
         95       7.74855E-01      7.65807E-01      5.11453E-04
0.00000E+00      0.00000E+00
         96       7.63264E-01      7.65772E-01      5.10554E-04
0.00000E+00      0.00000E+00
         97       7.63874E-01      7.65747E-01      4.97295E-04
0.00000E+00      0.00000E+00
         98       7.68554E-01      7.65784E-01      4.89170E-04
0.00000E+00      0.00000E+00
         99       7.66074E-01      7.65788E-01      4.82318E-04
0.00000E+00      0.00000E+00
        100       7.68462E-01      7.65823E-01      4.80001E-04
0.00000E+00      0.00000E+00
        101       7.64910E-01      7.65811E-01      4.73698E-04
0.00000E+00      0.00000E+00
        102       7.66640E-01      7.65821E-01      4.68438E-04
0.00000E+00      0.00000E+00
        103       7.64441E-01      7.65804E-01      4.63186E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=6CB79E7908B6D3AD
        104       7.61760E-01      7.65754E-01      4.58959E-04
0.00000E+00      0.00000E+00
        105       7.69264E-01      7.65797E-01      4.53616E-04
0.00000E+00      0.00000E+00
        106       7.71763E-01      7.65869E-01      4.47169E-04
0.00000E+00      0.00000E+00
        107       7.66440E-01      7.65876E-01      4.41802E-04
0.00000E+00      0.00000E+00
        108       7.68435E-01      7.65906E-01      4.37573E-04
0.00000E+00      0.00000E+00
        109       7.71709E-01      7.65973E-01      4.43028E-04
0.00000E+00      0.00000E+00
        110       7.62392E-01      7.65932E-01      4.34632E-04
0.00000E+00      0.00000E+00
        111       7.59500E-01      7.65859E-01      4.35922E-04
0.00000E+00      0.00000E+00
```

```
        112       7.70283E-01      7.65909E-01      4.33863E-04
0.00000E+00      0.00000E+00
        113       7.65532E-01      7.65905E-01      4.28981E-04
0.00000E+00      0.00000E+00
        114       7.69592E-01      7.65945E-01      4.26162E-04
0.00000E+00      0.00000E+00
        115       7.74073E-01      7.66033E-01      4.30814E-04
0.00000E+00      0.00000E+00
        116       7.68323E-01      7.66058E-01      4.26831E-04
0.00000E+00      0.00000E+00
        117       7.61271E-01      7.66007E-01      4.25344E-04
0.00000E+00      0.00000E+00
        118       7.66331E-01      7.66011E-01      4.20809E-04
0.00000E+00      0.00000E+00
        119       7.64195E-01      7.65992E-01      4.16794E-04
0.00000E+00      0.00000E+00
        120       7.69884E-01      7.66032E-01      4.14418E-04
0.00000E+00      0.00000E+00
        121       7.73622E-01      7.66109E-01      4.17523E-04
0.00000E+00      0.00000E+00
        122       7.63696E-01      7.66085E-01      4.13974E-04
0.00000E+00      0.00000E+00
        123       7.63281E-01      7.66057E-01      4.10748E-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=3CD69BE3E101F4ED
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55214E-05 + or -  1.26188E-08             generation time
=  2.99491E-05 + or -  2.20513E-08
 nu bar   =  2.43894E+00 + or -  1.00954E-05       average fission group
=  2.17564E+02 + or -  1.16213E-02
                      energy(ev) of the average lethargy causing fission
=  5.65584E-02 + or -  1.33633E-04
                                                 system mean free path (cm)
=  6.52672E-01 + or -  1.75249E-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          0.76606   + or - 0.00041     0.76565 to 0.76647
0.76524 to 0.76688    0.76482 to 0.76729    2000000      14.7441
```

24 0.76612 + or - 0.00041 0.76571 to 0.76653
0.76530 to 0.76694 0.76488 to 0.76735 1980000 14.9479

25 0.76606 + or - 0.00041 0.76565 to 0.76648
0.76524 to 0.76689 0.76483 to 0.76730 1960000 15.2469

26 0.76607 + or - 0.00042 0.76565 to 0.76648
0.76524 to 0.76690 0.76482 to 0.76732 1940000 15.2088

27 0.76611 + or - 0.00042 0.76570 to 0.76653
0.76528 to 0.76695 0.76486 to 0.76737 1920000 15.3275

28 0.76610 + or - 0.00042 0.76568 to 0.76652
0.76526 to 0.76695 0.76484 to 0.76737 1900000 15.3224

29 0.76612 + or - 0.00043 0.76569 to 0.76654
0.76526 to 0.76697 0.76484 to 0.76739 1880000 15.2942

30 0.76610 + or - 0.00043 0.76567 to 0.76653
0.76524 to 0.76696 0.76481 to 0.76739 1860000 15.3284

31 0.76612 + or - 0.00043 0.76569 to 0.76656
0.76526 to 0.76699 0.76482 to 0.76743 1840000 15.3452

32 0.76616 + or - 0.00044 0.76572 to 0.76660
0.76529 to 0.76704 0.76485 to 0.76747 1820000 15.4052

37 0.76626 + or - 0.00045 0.76581 to 0.76672
0.76536 to 0.76717 0.76491 to 0.76762 1720000 15.9768

42 0.76636 + or - 0.00047 0.76589 to 0.76683
0.76542 to 0.76730 0.76494 to 0.76777 1620000 16.3410

47 0.76637 + or - 0.00049 0.76588 to 0.76686
0.76540 to 0.76734 0.76491 to 0.76783 1520000 17.3077

52 0.76630 + or - 0.00047 0.76583 to 0.76677
0.76535 to 0.76725 0.76488 to 0.76772 1420000 16.0941

57 0.76639 + or - 0.00050 0.76589 to 0.76689
0.76539 to 0.76739 0.76489 to 0.76789 1320000 16.6488

62 0.76648 + or - 0.00051 0.76597 to 0.76700
0.76546 to 0.76751 0.76495 to 0.76802 1220000 17.9744

67 0.76654 + or - 0.00056 0.76598 to 0.76709
0.76543 to 0.76765 0.76487 to 0.76821 1120000 17.8641

72 0.76654 + or - 0.00060 0.76594 to 0.76714
0.76534 to 0.76774 0.76474 to 0.76834 1020000 18.3877

77 0.76634 + or - 0.00070 0.76564 to 0.76705

```
0.76494 to 0.76775    0.76424 to 0.76845     920000      16.1227

      82          0.76672   + or - 0.00066     0.76606 to 0.76738
0.76540 to 0.76804    0.76474 to 0.76870     820000      17.8175

      87          0.76648   + or - 0.00072     0.76576 to 0.76719
0.76505 to 0.76791    0.76433 to 0.76862     720000      18.8958

      92          0.76689   + or - 0.00076     0.76613 to 0.76764
0.76537 to 0.76840    0.76461 to 0.76916     620000      19.1671

      97          0.76694   + or - 0.00085     0.76609 to 0.76779
0.76523 to 0.76864    0.76438 to 0.76950     520000      18.1525

     102          0.76694   + or - 0.00108     0.76586 to 0.76803
0.76478 to 0.76911    0.76369 to 0.77019     420000      16.4135

     107          0.76701   + or - 0.00133     0.76568 to 0.76833
0.76435 to 0.76966    0.76303 to 0.77099     320000      18.3847

     112          0.76725   + or - 0.00177     0.76549 to 0.76902
0.76372 to 0.77079    0.76195 to 0.77256     220000      17.8854
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          0.76684   + or - 0.00281     0.76403 to 0.76964
0.76122 to 0.77245    0.75841 to 0.77526     120000      20.9320
1                           fuel bundle

                        plot of average k-effective by generation run.
      the line represents k-eff = 0.76605 + or - 0.00041 which occurs for
123 generations run.

                                 0.7602                   0.7631
0.7661

|-------------------------|------------------------|------------------
------|------------------------
         |
      25 +                          I
*  |
         |                        I
*  |
         |                                   I
*          |                 I
         |                                                I
```

```
*      |              I
         |                                                        I
*        |         I
      30 +                                                            I
*   |          I
         |                                                         I
*     |      I
         |                                                       I
*        | I
         |                                                            I
*    |      I
         |                                                       I
*        |I
      35 +                                                          I
*       | I
         |                                                     I
*         |   I
         |                                                     I
*          | I
         |                                                          I
*       I
         |                                                          I
*      I|
      40 +                                                          I
*      I|
         |                                                          I
*      I |
         |                                                         I
*      I   |
         |                                                         I
*      I   |
         |                                                         I
*     I    |
      45 +                                                          I
*       I
         |                                                        I
*       I |
         |                                                         I
*       I
         |                                                          I
*      |I
         |                                                         I
*       I|
      50 +                                                          I
*      I  |
         |
I      *     |I
         |
I      *    | I
         |
I      *    | I
         |
```

```
I      *    |I
      55 +
I      *     I
         |
I     *      I
         |
I      *    |I
         |
I     *     I
         |
I     *     I
      60 +
I    *     I|
         |
I     *    I |
         |
I    *     I
         |
I    *     I
         |
I     *    I
      65 +
I    *    |I
         |
I    *    I
         |
I    *    I
         |
I     *   |I
         |
I    *   |I
      70 +
I    *  | I
         |
I    *   |I
         |
I    *   |I
         |
I    *   |I
         |
I    *  | I
      75 +
I    *  | I
         |
I   *  | I
         |
I    * |  I
         |
I    * | I
         |
I   *   |I
      80 +
```

```
I   *   |I
         |
I    *   I
         |
I   *   |I
         |
I    *  |I
         |
I    * | I
      85 +
I   * | I
         |
I   * |  I
         |
I   * | I
         |
I   * | I
         |
I    *|  I
      90 +
I   * | I
         |
I   * | I
         |
I   *  |I
         |
I   *  | I
         |
I   *  |I
      95 +
I   * | I
         |
I    * | I
         |
I   *  | I
         |
I   * | I
         |
I   * | I
     100 +
I   * | I
         |
I   * | I
         |
I   * | I
         |
I   * | I
         |
I   * |I
     105 +
I   * | I
         |
```

```
I  * | I
         |
I   *| I
         |
I   *| I
         |
I  *|  I
     110 +
I   *|  I
         |
I  * | I
         |
I   *| I
         |
I   *| I
         |
I  *|  I
     115 +
I   *  I
         |
I   *   I
         |
I   *  I
         |
I   *  I
         |
I   *  I
     120 +
I   *  I
         |
I  |*  I
         |
I  *   I
         |
I  *   I
1                           fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7661 + or - 0.0004 which occurs for 24 generations skipped.

```
                                0.7635                   0.7656
0.7676

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                                                   I    *
I
         |                                                   I    *
I
      25 +                                                   I    *
```

```
I
         |                                                   I    *
I
         |                                                   I    *
I
         |                                                   I    *
I
         |                                                   I    *
I
      30 +                                                   I    *
I
         |                                                   I    *
I
         |                                                    I   |*
I
         |                                                   I    *
I
         |                                                    I   |*
I
      35 +                                                    I   |*
I
         |                                                    I   | *
I
         |                                                     I  | *
I
         |                                                    I   | *
I
         |                                                    I   | *
I
      40 +                                                    I   | *
I
         |                                                     I  |  *
I
         |                                                      I |  *
I
         |                                                      I |  *
I
         |                                                      I |   *
I
      45 +                                                     I  |  *
I
         |                                                      I |   *
I
         |                                                     I  |  *
I
         |                                                     I  |  *
I
         |                                                      I |   *
I
      50 +                                                       I|
*     I
         |                                                     I  |  *
```

```
I
         |                                                        I  |  *
I
         |                                                        I  |  *
I
         |                                                        I  |  *
I
      55 +                                                         I |   *
I
         |                                                         I |   *
I
         |                                                         I |   *
I
         |                                                         I |   *
I
         |                                                         I |
*     I
      60 +                                                          I|
*     I
         |                                                           I
*     I
         |                                                          I|
*     I
         |                                                          I|
*     I
         |                                                         I |
*     I
      65 +                                                         I |
*     I
         |                                                         I |
*      I
         |                                                          I|
*      I
         |                                                         I |
*      I
         |                                                        I  |
*      I
      70 +                                                        I  |   *
I
         |                                                         I |
*      I
         |                                                         I |
*       I
         |                                                         I |
*       I
         |                                                        I  |
*       I
      75 +                                                        I  |   *
I
         |                                                        I  |
*       I
         |                                                     I    |  *
```

```
I
         |                                                        I    |  *
I
         |                                                            I|
*       I
      80 +                                                            I|
*       I
         |                                                             I
*       I
         |                                                             I
*       I
         |                                                            I|
*       I
         |                                                          I  |
*       I
      85 +                                                         I   |
*       I
         |                                                        I    |
*       I
         |                                                         I   |
*       I
         |                                                         I   |
*        I
         |                                                        I    |
*        I
      90 +                                                          I  |
*        I
         |                                                          I  |
*         I
         |                                                             I
*        I
         |                                                            I|
*         I
         |                                                             |I
*        I
      95 +                                                          I  |
*         I
         |                                                            I|
*         I
         |                                                             I
*          I
         |                                                            I|
*          I
         |                                                            I|
*          I
     100 +                                                          I  |
*           I
         |                                                           I |
*            I
         |                                                          I  |
*            I
         |                                                            I|
```

```
*            I
         |                                                          |I
*             I
     105 +                                                          I
*             I
         |                                                       I   |
*              I
         |                                                     I    |
*               I
         |                                                 I      |
*                I
         |                                            I            |
*                  I
     110 +                                               I      |
*               I
         |                                                        I |
*                  I
         |                                                 I      |
*                    I
         |                                              I       |
*                        I
         |                                            I            |
*                         I
     115 +                                       I                |  *
I
         |                       I                              *|
I
         |                               I                        |
*                            I
         |                   I                                   |
*
         |                                                       |
*
     120 +                                                       |
*

   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                 6.97036E-07    57.1489
4.39537E-07    38.9360       0.00000E+00     0.0000
    3    0.0000                 1.32281E-05    11.1664
2.06112E-05     4.5303       0.00000E+00     0.0000
```

4	0.0000	1.87530E-05	8.7234	3.45599E-05	3.4089
0.00000E+00	0.0000				
5	0.0000	2.22741E-05	8.7962	5.37936E-05	3.0429
0.00000E+00	0.0000				
6	0.0001	9.97658E-05	3.6377	2.31188E-04	1.4200
0.00000E+00	0.0000				
7	0.0002	1.17410E-04	3.2219	2.04250E-04	1.2675
0.00000E+00	0.0000				
8	0.0003	2.37473E-04	2.1914	3.23790E-04	1.0349
0.00000E+00	0.0000				
9	0.0005	3.79969E-04	1.2803	4.43250E-04	0.5588
0.00000E+00	0.0000				
10	0.0003	2.04836E-04	1.5734	2.07631E-04	0.7975
0.00000E+00	0.0000				
11	0.0012	9.13461E-04	0.7174	5.25439E-04	0.4887
0.00000E+00	0.0000				
12	0.0010	7.60018E-04	0.7436	2.97974E-04	0.7314
0.00000E+00	0.0000				
13	0.0003	2.32033E-04	1.4598	9.21473E-05	1.4460
0.00000E+00	0.0000				
14	0.0013	9.97682E-04	0.5930	4.07801E-04	0.5864
0.00000E+00	0.0000				
15	0.0010	7.70125E-04	0.6557	3.31981E-04	0.6485
0.00000E+00	0.0000				
16	0.0002	1.89597E-04	1.1314	8.71157E-05	1.1168
0.00000E+00	0.0000				
17	0.0001	6.68502E-05	1.9049	3.25244E-05	1.8718
0.00000E+00	0.0000				
18	0.0001	4.98783E-05	1.9145	2.52151E-05	1.8747
0.00000E+00	0.0000				
19	0.0001	8.00001E-05	1.3007	4.22982E-05	1.2743
0.00000E+00	0.0000				
20	0.0001	6.06787E-05	1.3885	3.32389E-05	1.3586
0.00000E+00	0.0000				
21	0.0002	1.18836E-04	1.0795	6.70973E-05	1.0559
0.00000E+00	0.0000				
22	0.0001	1.04569E-04	1.3724	6.19165E-05	1.3405
0.00000E+00	0.0000				
23	0.0001	1.05033E-04	1.1378	6.41504E-05	1.1119
0.00000E+00	0.0000				
24	0.0000	2.56682E-05	1.7526	1.59218E-05	1.7048
0.00000E+00	0.0000				
25	0.0000	3.13303E-05	2.0703	1.95624E-05	2.0195
0.00000E+00	0.0000				
26	0.0000	1.73839E-05	2.6330	1.09133E-05	2.5573
0.00000E+00	0.0000				
27	0.0001	5.30678E-05	1.4536	3.31149E-05	1.4255
0.00000E+00	0.0000				
28	0.0001	9.71934E-05	1.0518	6.06340E-05	1.0349
0.00000E+00	0.0000				
29	0.0001	1.00119E-04	1.0116	6.30574E-05	0.9981
0.00000E+00	0.0000				

30	0.0000	1.19981E-05	2.8319	7.52898E-06	2.8100	0.00000E+00	0.0000
31	0.0001	9.68753E-05	1.0247	6.12054E-05	1.0114	0.00000E+00	0.0000
32	0.0000	3.79829E-05	1.7330	2.42908E-05	1.6981	0.00000E+00	0.0000
33	0.0000	3.31854E-05	1.4378	2.07707E-05	1.4219	0.00000E+00	0.0000
34	0.0001	7.39645E-05	1.1478	4.64787E-05	1.1320	0.00000E+00	0.0000
35	0.0001	4.57234E-05	1.7441	2.86874E-05	1.7191	0.00000E+00	0.0000
36	0.0001	4.39103E-05	1.5540	2.71761E-05	1.5400	0.00000E+00	0.0000
37	0.0000	2.76472E-05	1.8938	1.73583E-05	1.8519	0.00000E+00	0.0000
38	0.0000	3.42958E-05	1.5354	2.15955E-05	1.4974	0.00000E+00	0.0000
39	0.0002	1.29663E-04	0.9513	8.25055E-05	0.9290	0.00000E+00	0.0000
40	0.0002	1.22460E-04	0.9311	7.91241E-05	0.9127	0.00000E+00	0.0000
41	0.0002	1.60494E-04	0.8164	1.07220E-04	0.7945	0.00000E+00	0.0000
42	0.0002	1.39635E-04	0.8036	9.49637E-05	0.7852	0.00000E+00	0.0000
43	0.0001	8.12464E-05	1.0530	5.82648E-05	1.0071	0.00000E+00	0.0000
44	0.0001	1.13751E-04	1.0625	8.35721E-05	1.0136	0.00000E+00	0.0000
45	0.0001	6.09792E-05	0.9363	4.91038E-05	0.8669	0.00000E+00	0.0000
46	0.0000	1.43750E-05	1.9587	1.15724E-05	1.8285	0.00000E+00	0.0000
47	0.0001	4.21808E-05	1.5888	3.27367E-05	1.5302	0.00000E+00	0.0000
48	0.0000	1.25860E-05	3.2247	9.75851E-06	3.1434	0.00000E+00	0.0000
49	0.0001	8.19761E-05	1.3396	6.46284E-05	1.3101	0.00000E+00	0.0000
50	0.0001	5.55019E-05	1.7786	4.57179E-05	1.7446	0.00000E+00	0.0000
51	0.0000	1.47354E-05	3.8034	1.22520E-05	3.7214	0.00000E+00	0.0000
52	0.0001	4.01275E-05	2.0285	3.47210E-05	1.9740	0.00000E+00	0.0000
53	0.0002	1.57886E-04	0.7952	1.55156E-04	0.7425	0.00000E+00	0.0000
54	0.0001	7.40200E-05	2.1215	6.87155E-05	2.0433	0.00000E+00	0.0000
55	0.0002	1.67909E-04	1.3765	1.53828E-04	1.3414	0.00000E+00	0.0000

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   56    0.0002                 1.21271E-04     1.6264
1.12390E-04     1.5876       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                 1.54393E-04     1.4772
1.39998E-04     1.4418       0.00000E+00     0.0000
   58    0.0001                 8.53796E-05     1.7526
7.47567E-05     1.7058       0.00000E+00     0.0000
   59    0.0002                 1.64428E-04     1.4209
1.47422E-04     1.3595       0.00000E+00     0.0000
   60    0.0004                 2.73541E-04     1.1635
2.47966E-04     1.1038       0.00000E+00     0.0000
   61    0.0000                 3.21142E-05     3.6837
2.46099E-05     3.5785       0.00000E+00     0.0000
   62    0.0002                 1.59807E-04     1.7072
1.34137E-04     1.6591       0.00000E+00     0.0000
   63    0.0002                 1.21253E-04     2.0103
9.98597E-05     1.9319       0.00000E+00     0.0000
   64    0.0001                 9.93813E-05     2.1694
8.01712E-05     2.0933       0.00000E+00     0.0000
   65    0.0000                 3.49218E-05     3.7435
3.44855E-05     3.6255       0.00000E+00     0.0000
   66    0.0002                 1.71761E-04     1.7442
1.52393E-04     1.6868       0.00000E+00     0.0000
   67    0.0002                 1.50273E-04     1.8126
1.22845E-04     1.7581       0.00000E+00     0.0000
   68    0.0000                 2.87845E-05     5.0357
2.48299E-05     4.8672       0.00000E+00     0.0000
   69    0.0004                 2.95002E-04     1.4056
2.31691E-04     1.3591       0.00000E+00     0.0000
   70    0.0003                 2.08080E-04     1.8627
1.89449E-04     1.7930       0.00000E+00     0.0000
   71    0.0006                 4.35950E-04     1.4223
3.60701E-04     1.3791       0.00000E+00     0.0000
   72    0.0001                 5.24230E-05     5.8668
3.09238E-05     5.7314       0.00000E+00     0.0000
   73    0.0004                 3.16538E-04     1.7568
2.41912E-04     1.6570       0.00000E+00     0.0000
   74    0.0014                 1.05314E-03     0.9308
7.66114E-04     0.8891       0.00000E+00     0.0000
   75    0.0001                 1.14218E-04     2.8367
8.77555E-05     2.6980       0.00000E+00     0.0000
   76    0.0006                 4.70393E-04     1.8226
2.98530E-04     1.7618       0.00000E+00     0.0000
   77    0.0005                 3.73146E-04     2.1137
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2.67535E-04	2.0338	0.00000E+00	0.0000	78	0.0000	7.01829E-06	4.1488
6.87113E-05	4.0996	0.00000E+00	0.0000	79	0.0002	1.84272E-04	2.3290
1.23952E-04	2.2371	0.00000E+00	0.0000	80	0.0001	6.55863E-05	3.3214
8.72647E-05	3.2374	0.00000E+00	0.0000	81	0.0014	1.07959E-03	1.2520
7.93412E-04	1.2013	0.00000E+00	0.0000	82	0.0001	6.51860E-05	5.1840
3.91671E-05	4.9052	0.00000E+00	0.0000	83	0.0002	1.27575E-04	3.0930
1.41163E-04	3.0322	0.00000E+00	0.0000	84	0.0001	7.86937E-05	3.0346
8.00095E-05	2.8062	0.00000E+00	0.0000	85	0.0002	1.90835E-04	2.3074
2.35193E-04	2.2396	0.00000E+00	0.0000	86	0.0004	2.71155E-04	2.3065
2.17957E-04	2.1983	0.00000E+00	0.0000	87	0.0004	3.33830E-04	2.6684
2.07792E-04	2.5519	0.00000E+00	0.0000	88	0.0001	5.52974E-05	4.3584
1.00380E-04	4.2523	0.00000E+00	0.0000	89	0.0001	9.61509E-05	3.5687
6.66294E-05	3.2806	0.00000E+00	0.0000	90	0.0003	2.35437E-04	3.1771
1.38824E-04	3.0488	0.00000E+00	0.0000	91	0.0003	1.92969E-04	3.0302
1.21940E-04	2.8547	0.00000E+00	0.0000	92	0.0000	3.03668E-05	2.9186
1.98771E-04	2.8588	0.00000E+00	0.0000	93	0.0002	1.29697E-04	3.1790
1.05528E-04	2.9649	0.00000E+00	0.0000	94	0.0002	1.16269E-04	4.1024
6.51239E-05	3.8512	0.00000E+00	0.0000	95	0.0008	6.16117E-04	2.1348
3.79743E-04	2.0691	0.00000E+00	0.0000	96	0.0002	1.43560E-04	4.2370
7.31022E-05	4.0529	0.00000E+00	0.0000	97	0.0004	2.85750E-04	3.3807
1.63638E-04	3.3066	0.00000E+00	0.0000	98	0.0001	1.06952E-04	3.8343
1.02481E-04	3.6937	0.00000E+00	0.0000	99	0.0001	1.08911E-04	4.4732
7.28731E-05	4.3195	0.00000E+00	0.0000	100	0.0002	1.25921E-04	4.0949
8.42301E-05	3.9210	0.00000E+00	0.0000	101	0.0001	1.12490E-04	3.6292
7.15856E-05	3.3639	0.00000E+00	0.0000	102	0.0002	1.57948E-04	3.7197
8.80866E-05	3.5715	0.00000E+00	0.0000	103	0.0001	9.91689E-05	3.6117

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9.66654E-05     3.4187       0.00000E+00     0.0000
  104    0.0002                 1.70538E-04     3.4932
1.35043E-04     3.3728       0.00000E+00     0.0000
  105    0.0002                 1.20501E-04     3.7996
7.97173E-05     3.5838       0.00000E+00     0.0000
  106    0.0002                 1.64291E-04     4.2537
1.22215E-04     4.1941       0.00000E+00     0.0000
  107    0.0001                 6.45670E-05     4.0421
6.51642E-05     3.7884       0.00000E+00     0.0000
  108    0.0000                 3.48467E-05     2.3445
1.50516E-04     2.2873       0.00000E+00     0.0000
  109    0.0002                 1.29461E-04     2.2791
4.29610E-04     2.2484       0.00000E+00     0.0000
  110    0.0008                 6.02917E-04     3.0982
3.71991E-04     3.0682       0.00000E+00     0.0000
  111    0.0002                 1.63314E-04     4.1023
1.49841E-04     4.0017       0.00000E+00     0.0000
  112    0.0001                 1.12669E-04     4.9669
1.18865E-04     4.8712       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                 1.30761E-04     3.4470
1.14142E-04     3.2307       0.00000E+00     0.0000
  114    0.0000                 1.04221E-05     6.9651
1.43533E-05     5.7153       0.00000E+00     0.0000
  115    0.0001                 7.35573E-05     4.5850
8.54289E-05     4.2405       0.00000E+00     0.0000
  116    0.0002                 1.83936E-04     2.8400
1.38978E-04     2.5586       0.00000E+00     0.0000
  117    0.0006                 4.74085E-04     2.2246
2.53407E-04     2.0849       0.00000E+00     0.0000
  118    0.0007                 5.63378E-04     1.8627
4.40768E-04     1.7831       0.00000E+00     0.0000
  119    0.0002                 1.40145E-04     2.2108
3.61611E-04     2.1351       0.00000E+00     0.0000
  120    0.0002                 1.62172E-04     2.0438
6.17419E-04     2.0131       0.00000E+00     0.0000
  121    0.0006                 4.97900E-04     3.0937
3.83349E-04     3.0133       0.00000E+00     0.0000
  122    0.0001                 1.01816E-04     5.1103
7.96344E-05     4.7617       0.00000E+00     0.0000
  123    0.0003                 2.12307E-04     2.8187
1.50672E-04     2.5007       0.00000E+00     0.0000
  124    0.0003                 2.41103E-04     3.0785
1.98718E-04     2.8734       0.00000E+00     0.0000
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125	0.0002	1.40286E-04	3.3499	1.28751E-04	3.0288
0.00000E+00	0.0000				
126	0.0001	9.41870E-05	3.6868	8.49970E-05	3.2439
0.00000E+00	0.0000				
127	0.0005	3.84845E-04	2.9363	1.89243E-04	2.7687
0.00000E+00	0.0000				
128	0.0003	2.12312E-04	3.0724	1.31515E-04	2.7192
0.00000E+00	0.0000				
129	0.0006	4.63152E-04	2.2847	4.25839E-04	2.1845
0.00000E+00	0.0000				
130	0.0002	1.18148E-04	3.2601	2.87965E-04	3.1668
0.00000E+00	0.0000				
131	0.0004	2.98130E-04	2.2970	2.38936E-04	1.9380
0.00000E+00	0.0000				
132	0.0007	5.30455E-04	2.2109	3.25975E-04	2.0362
0.00000E+00	0.0000				
133	0.0013	1.02733E-03	1.7014	6.49766E-04	1.6194
0.00000E+00	0.0000				
134	0.0001	9.06609E-05	2.6390	2.36002E-04	2.2086
0.00000E+00	0.0000				
135	0.0002	1.70994E-04	3.1939	2.53764E-04	3.1013
0.00000E+00	0.0000				
136	0.0001	4.65180E-05	2.1860	7.21727E-04	2.1520
0.00000E+00	0.0000				
137	0.0000	1.91011E-05	1.0694	3.43713E-03	1.0662
0.00000E+00	0.0000				
138	0.0004	3.08502E-04	2.4135	8.04088E-04	2.3791
0.00000E+00	0.0000				
139	0.0002	1.80720E-04	3.2444	2.21772E-04	3.0553
0.00000E+00	0.0000				
140	0.0003	2.27426E-04	2.4108	2.99574E-04	2.1223
0.00000E+00	0.0000				
141	0.0001	8.44156E-05	2.6926	2.64665E-04	2.4107
0.00000E+00	0.0000				
142	0.0001	6.71217E-05	3.2585	2.31453E-04	3.0082
0.00000E+00	0.0000				
143	0.0001	8.41564E-05	2.0702	1.78024E-04	1.2816
0.00000E+00	0.0000				
144	0.0000	3.46424E-05	2.8547	7.46561E-05	1.7412
0.00000E+00	0.0000				
145	0.0005	3.79524E-04	2.5364	2.98165E-04	2.2965
0.00000E+00	0.0000				
146	0.0004	3.27140E-04	2.5937	2.41572E-04	2.0909
0.00000E+00	0.0000				
147	0.0002	1.79252E-04	3.9071	1.14445E-04	3.4060
0.00000E+00	0.0000				
148	0.0001	5.89978E-05	5.6047	3.94244E-05	4.4550
0.00000E+00	0.0000				
149	0.0000	2.91549E-05	7.7233	2.04674E-05	5.8319
0.00000E+00	0.0000				
150	0.0001	9.09106E-05	4.5003	6.56391E-05	3.3672
0.00000E+00	0.0000				

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  151    0.0001                 7.02738E-05     3.4878
5.87395E-05     2.5069       0.00000E+00     0.0000
  152    0.0001                 4.29996E-05     4.3670
4.85050E-05     2.6569       0.00000E+00     0.0000
  153    0.0001                 4.40005E-05     4.0726
4.82216E-05     2.3971       0.00000E+00     0.0000
  154    0.0001                 4.89514E-05     4.1469
5.07452E-05     2.4415       0.00000E+00     0.0000
  155    0.0001                 5.16946E-05     4.5318
5.03348E-05     2.7693       0.00000E+00     0.0000
  156    0.0001                 4.76150E-05     4.2466
4.64535E-05     2.5425       0.00000E+00     0.0000
  157    0.0001                 5.36831E-05     4.5998
5.43392E-05     2.7290       0.00000E+00     0.0000
  158    0.0001                 7.04274E-05     3.8932
7.02867E-05     2.5993       0.00000E+00     0.0000
  159    0.0002                 1.48673E-04     2.8366
2.07010E-04     2.3755       0.00000E+00     0.0000
  160    0.0001                 6.04843E-05     4.2959
7.22210E-05     3.2456       0.00000E+00     0.0000
  161    0.0001                 7.62423E-05     3.6200
7.41225E-05     2.3767       0.00000E+00     0.0000
  162    0.0001                 9.20968E-05     4.1459
8.45733E-05     2.6151       0.00000E+00     0.0000
  163    0.0001                 9.38083E-05     3.7993
8.74369E-05     2.3233       0.00000E+00     0.0000
  164    0.0001                 1.02694E-04     3.4721
9.50706E-05     2.1170       0.00000E+00     0.0000
  165    0.0001                 1.14320E-04     3.4496
1.05042E-04     2.1421       0.00000E+00     0.0000
  166    0.0001                 6.62358E-05     4.7878
6.17803E-05     2.9990       0.00000E+00     0.0000
  167    0.0001                 7.28070E-05     4.1956
6.73206E-05     2.6978       0.00000E+00     0.0000
  168    0.0001                 8.83964E-05     4.6896
7.84324E-05     3.1397       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                 1.11486E-04     4.0407
9.60222E-05     2.9420       0.00000E+00     0.0000
  170    0.0002                 1.38504E-04     3.2054
1.17922E-04     2.3878       0.00000E+00     0.0000
  171    0.0001                 9.35242E-05     5.1759
7.27751E-05     4.0814       0.00000E+00     0.0000
  172    0.0002                 1.40098E-04     4.3103
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9.92964E-05 3.6223 0.00000E+00 0.0000
173 0.0003 2.05417E-04 4.1835
1.34305E-04 3.6576 0.00000E+00 0.0000
174 0.0003 2.44628E-04 3.6721
1.52986E-04 3.2629 0.00000E+00 0.0000
175 0.0002 1.19747E-04 6.2415
7.18440E-05 5.6639 0.00000E+00 0.0000
176 0.0002 1.22996E-04 5.3297
7.27794E-05 4.8288 0.00000E+00 0.0000
177 0.0002 1.21919E-04 6.2883
7.16814E-05 5.6680 0.00000E+00 0.0000
178 0.0002 1.21387E-04 5.1406
7.07227E-05 4.6108 0.00000E+00 0.0000
179 0.0001 1.13578E-04 6.2391
6.61774E-05 5.5667 0.00000E+00 0.0000
180 0.0001 1.09304E-04 6.0226
6.38161E-05 5.3260 0.00000E+00 0.0000
181 0.0001 1.03623E-04 6.8297
6.04429E-05 5.9905 0.00000E+00 0.0000
182 0.0001 1.03928E-04 6.8584
6.04397E-05 5.9761 0.00000E+00 0.0000
183 0.0001 8.99649E-05 6.3398
5.29798E-05 5.4257 0.00000E+00 0.0000
184 0.0001 1.01900E-04 5.4226
5.88987E-05 4.7237 0.00000E+00 0.0000
185 0.0001 1.00614E-04 5.8799
5.82199E-05 5.1215 0.00000E+00 0.0000
186 0.0001 9.27252E-05 7.1216
5.41427E-05 6.1132 0.00000E+00 0.0000
187 0.0001 7.96421E-05 6.8025
4.75523E-05 5.6804 0.00000E+00 0.0000
188 0.0001 9.66101E-05 5.9394
5.59492E-05 5.0742 0.00000E+00 0.0000
189 0.0001 8.66437E-05 6.6132
5.09844E-05 5.4903 0.00000E+00 0.0000
190 0.0003 2.09312E-04 4.0632
1.24160E-04 3.3236 0.00000E+00 0.0000
191 0.0003 2.02107E-04 4.1183
1.21215E-04 3.3784 0.00000E+00 0.0000
192 0.0003 1.94962E-04 4.1849
1.18063E-04 3.3657 0.00000E+00 0.0000
193 0.0003 1.94480E-04 4.4782
1.19168E-04 3.5820 0.00000E+00 0.0000
194 0.0005 4.05090E-04 2.6156
2.49263E-04 2.0474 0.00000E+00 0.0000
195 0.0006 4.32030E-04 2.2471
2.66365E-04 1.7753 0.00000E+00 0.0000
196 0.0006 4.45494E-04 2.8478
2.79397E-04 2.2232 0.00000E+00 0.0000
197 0.0007 5.06726E-04 2.6769
3.16825E-04 2.0898 0.00000E+00 0.0000
198 0.0008 5.76148E-04 2.5379

3.56800E-04	1.9764	0.00000E+00	0.0000	199	0.0004	3.26915E-04	3.4368
2.00933E-04	2.7086	0.00000E+00	0.0000	200	0.0005	3.46773E-04	3.5603
2.14348E-04	2.7841	0.00000E+00	0.0000	201	0.0011	8.18402E-04	2.4359
4.97746E-04	1.9188	0.00000E+00	0.0000	202	0.0013	1.01570E-03	2.1396
6.11590E-04	1.7201	0.00000E+00	0.0000	203	0.0016	1.20899E-03	1.9822
7.25444E-04	1.6066	0.00000E+00	0.0000	204	0.0022	1.65005E-03	1.4683
9.73346E-04	1.2198	0.00000E+00	0.0000	205	0.0015	1.11284E-03	1.9415
6.53570E-04	1.6390	0.00000E+00	0.0000	206	0.0018	1.34267E-03	1.8864
7.86267E-04	1.6241	0.00000E+00	0.0000	207	0.0022	1.66203E-03	1.5506
9.64494E-04	1.3559	0.00000E+00	0.0000	208	0.0029	2.20289E-03	1.4088
1.28194E-03	1.2419	0.00000E+00	0.0000	209	0.0032	2.43190E-03	1.5226
1.42613E-03	1.3395	0.00000E+00	0.0000	210	0.0037	2.85774E-03	1.3090
1.70163E-03	1.1532	0.00000E+00	0.0000	211	0.0040	3.06275E-03	1.0552
1.85086E-03	0.9107	0.00000E+00	0.0000	212	0.0047	3.61309E-03	1.1817
2.18863E-03	1.0119	0.00000E+00	0.0000	213	0.0064	4.89974E-03	0.8681
2.97611E-03	0.7334	0.00000E+00	0.0000	214	0.0096	7.32950E-03	0.8365
4.41914E-03	0.7064	0.00000E+00	0.0000	215	0.0157	1.20536E-02	0.6010
7.19683E-03	0.5091	0.00000E+00	0.0000	216	0.0301	2.30676E-02	0.4335
1.35980E-02	0.3711	0.00000E+00	0.0000	217	0.0202	1.54808E-02	0.5593
9.09834E-03	0.4647	0.00000E+00	0.0000	218	0.0277	2.12454E-02	0.4837
1.24303E-02	0.4098	0.00000E+00	0.0000	219	0.0357	2.73334E-02	0.4187
1.59449E-02	0.3577	0.00000E+00	0.0000	220	0.0475	3.64016E-02	0.3586
2.11480E-02	0.3060	0.00000E+00	0.0000	221	0.0624	4.78292E-02	0.3315
2.77320E-02	0.2768	0.00000E+00	0.0000	222	0.0799	6.11805E-02	0.2570
3.54589E-02	0.2199	0.00000E+00	0.0000	223	0.1041	7.97782E-02	0.2441
4.62874E-02	0.2094	0.00000E+00	0.0000	224	0.0585	4.47797E-02	0.3145

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2.60759E-02     0.2682       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    0.2308                 1.76791E-01     0.1871
1.04692E-01     0.1605       0.00000E+00     0.0000
  226    0.0455                 3.48882E-02     0.3997
2.12085E-02     0.3337       0.00000E+00     0.0000
  227    0.0493                 3.77957E-02     0.3883
2.34374E-02     0.3220       0.00000E+00     0.0000
  228    0.0210                 1.60697E-02     0.5295
1.01769E-02     0.4118       0.00000E+00     0.0000
  229    0.0222                 1.70270E-02     0.4978
1.09386E-02     0.3929       0.00000E+00     0.0000
  230    0.0117                 8.97992E-03     0.8114
5.87793E-03     0.6334       0.00000E+00     0.0000
  231    0.0121                 9.28915E-03     0.7837
6.18416E-03     0.6048       0.00000E+00     0.0000
  232    0.0128                 9.83203E-03     0.7857
6.71339E-03     0.5834       0.00000E+00     0.0000
  233    0.0083                 6.35320E-03     0.7938
4.46456E-03     0.5798       0.00000E+00     0.0000
  234    0.0060                 4.57604E-03     1.0078
3.29780E-03     0.7457       0.00000E+00     0.0000
  235    0.0024                 1.82525E-03     1.6563
1.21276E-03     1.2394       0.00000E+00     0.0000
  236    0.0020                 1.51115E-03     1.7306
1.00749E-03     1.3427       0.00000E+00     0.0000
  237    0.0017                 1.32162E-03     1.9336
9.33190E-04     1.3697       0.00000E+00     0.0000
  238    0.0001                 7.62785E-05     9.2900
6.32019E-05     5.6219       0.00000E+00     0.0000

 system total =                 7.66057E-01     0.0531
4.68964E-01     0.0448       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3122E-01  +
or -  0.0002



 elapsed time   3.09533 minutes
```

random number= A29AEC8A355787FF

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.090E-03	0.05	7.661E-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	2.651E-08	45.95	1.259E-08	24.94	1.321E-08	25.83
3	9.299E-07	4.19	7.474E-07	4.00	8.058E-07	4.08
4	1.488E-06	3.09	1.217E-06	2.67	1.305E-06	2.74
5	2.196E-06	2.54	1.814E-06	2.40	1.936E-06	2.31
6	9.627E-06	1.24	7.666E-06	1.16	8.156E-06	1.18
7	1.249E-05	1.16	9.616E-06	0.96	1.014E-05	0.98
8	3.058E-05	0.69	2.249E-05	0.63	2.368E-05	0.63
9	8.231E-05	0.52	5.882E-05	0.43	6.145E-05	0.43
10	4.575E-05	0.65	3.262E-05	0.53	3.389E-05	0.54
11	2.204E-04	0.22	1.556E-04	0.20	1.612E-04	0.21
12	1.903E-04	0.25	1.380E-04	0.23	1.444E-04	0.24
13	5.651E-05	0.45	4.114E-05	0.43	4.317E-05	0.45
14	2.531E-04	0.26	1.831E-04	0.21	1.910E-04	0.21
15	2.202E-04	0.27	1.595E-04	0.22	1.663E-04	0.20
16	7.093E-05	0.44	5.139E-05	0.34	5.372E-05	0.34
17	3.160E-05	0.66	2.322E-05	0.55	2.427E-05	0.52
18	2.790E-05	0.67	2.039E-05	0.47	2.112E-05	0.47
19	5.030E-05	0.53	3.674E-05	0.39	3.830E-05	0.38
20	3.982E-05	0.64	2.922E-05	0.51	3.049E-05	0.50
21	8.035E-05	0.43	5.895E-05	0.41	6.156E-05	0.39
22	7.317E-05	0.43	5.339E-05	0.36	5.517E-05	0.37

23	7.663E-05	0.41	5.630E-05	0.34	5.845E-05	0.33
24	1.872E-05	0.89	1.389E-05	0.69	1.451E-05	0.68
25	2.340E-05	0.75	1.737E-05	0.57	1.825E-05	0.57
26	1.340E-05	0.89	9.894E-06	0.75	1.038E-05	0.76
27	4.207E-05	0.57	3.108E-05	0.46	3.291E-05	0.44
28	7.709E-05	0.36	5.736E-05	0.29	6.073E-05	0.28
29	7.950E-05	0.37	5.924E-05	0.34	6.220E-05	0.33
30	9.906E-06	1.13	7.512E-06	0.98	7.858E-06	0.92
31	7.864E-05	0.39	5.900E-05	0.37	6.209E-05	0.35
32	3.092E-05	0.54	2.336E-05	0.49	2.459E-05	0.50
33	2.671E-05	0.71	2.009E-05	0.57	2.124E-05	0.56
34	6.075E-05	0.44	4.587E-05	0.39	4.854E-05	0.37
35	3.630E-05	0.69	2.750E-05	0.52	2.885E-05	0.47
36	3.388E-05	0.57	2.548E-05	0.44	2.681E-05	0.44
37	2.205E-05	0.76	1.657E-05	0.54	1.733E-05	0.54
38	2.585E-05	0.63	1.975E-05	0.54	2.076E-05	0.48
39	9.761E-05	0.37	7.486E-05	0.32	7.878E-05	0.29
40	9.010E-05	0.30	6.932E-05	0.29	7.395E-05	0.26
41	1.135E-04	0.29	8.855E-05	0.23	9.457E-05	0.21
42	9.368E-05	0.35	7.377E-05	0.28	7.907E-05	0.26
43	5.129E-05	0.42	4.081E-05	0.34	4.286E-05	0.31
44	6.981E-05	0.35	5.588E-05	0.27	6.018E-05	0.25
45	3.546E-05	0.40	2.821E-05	0.36	3.132E-05	0.33
46	8.398E-06	0.91	6.676E-06	0.74	7.209E-06	0.65
47	2.380E-05	0.61	1.887E-05	0.53	1.968E-05	0.46
48	6.803E-06	1.06	5.431E-06	0.83	5.761E-06	0.74
49	4.373E-05	0.42	3.502E-05	0.34	3.780E-05	0.32
50	2.932E-05	0.50	2.353E-05	0.46	2.557E-05	0.37
51	7.855E-06	0.94	6.336E-06	0.81	6.932E-06	0.67
52	2.079E-05	0.63	1.670E-05	0.50	1.821E-05	0.46
53	7.625E-05	0.34	6.143E-05	0.29	6.674E-05	0.22
54	3.319E-05	0.46	2.700E-05	0.42	2.924E-05	0.36
55	6.694E-05	0.33	5.420E-05	0.32	5.899E-05	0.27
56	4.379E-05	0.41	3.566E-05	0.38	3.874E-05	0.32
57	4.960E-05	0.38	4.029E-05	0.33	4.395E-05	0.26
58	2.612E-05	0.51	2.122E-05	0.39	2.309E-05	0.33
59	4.441E-05	0.33	3.638E-05	0.33	3.950E-05	0.26
60	6.431E-05	0.31	5.257E-05	0.28	5.725E-05	0.23
61	6.098E-06	0.90	5.019E-06	0.86	5.495E-06	0.70
62	3.227E-05	0.43	2.647E-05	0.36	2.887E-05	0.35
63	2.176E-05	0.58	1.782E-05	0.47	1.946E-05	0.38
64	1.727E-05	0.55	1.416E-05	0.46	1.543E-05	0.41
65	5.692E-06	0.88	4.700E-06	0.84	5.110E-06	0.63
66	2.857E-05	0.44	2.348E-05	0.39	2.551E-05	0.31
67	2.135E-05	0.46	1.758E-05	0.44	1.905E-05	0.40
68	4.643E-06	1.23	3.844E-06	1.06	4.202E-06	0.87
69	3.732E-05	0.38	3.084E-05	0.32	3.337E-05	0.25
70	2.664E-05	0.49	2.196E-05	0.38	2.390E-05	0.28
71	4.625E-05	0.37	3.806E-05	0.32	4.119E-05	0.26
72	2.648E-06	1.45	2.174E-06	1.23	2.353E-06	0.94
73	2.733E-05	0.42	2.251E-05	0.38	2.441E-05	0.29
74	7.943E-05	0.26	6.575E-05	0.24	7.133E-05	0.20

75	9.005E-06	0.86	7.461E-06	0.67	8.151E-06	0.60
76	2.274E-05	0.50	1.889E-05	0.46	2.047E-05	0.39
77	1.762E-05	0.55	1.465E-05	0.52	1.592E-05	0.42
78	1.510E-06	1.92	1.274E-06	1.56	1.401E-06	1.29
79	1.006E-05	0.60	8.258E-06	0.56	8.926E-06	0.49
80	4.569E-06	1.13	3.769E-06	0.99	4.034E-06	0.81
81	5.529E-05	0.34	4.588E-05	0.30	4.977E-05	0.25
82	3.249E-06	1.29	2.705E-06	1.17	2.910E-06	0.86
83	4.436E-06	1.17	3.678E-06	1.05	3.969E-06	0.82
84	8.319E-06	0.73	6.942E-06	0.63	7.476E-06	0.57
85	9.956E-06	0.68	8.293E-06	0.60	8.999E-06	0.54
86	1.361E-05	0.57	1.138E-05	0.56	1.232E-05	0.44
87	1.191E-05	0.67	9.988E-06	0.54	1.075E-05	0.40
88	3.128E-06	1.17	2.620E-06	1.10	2.826E-06	0.89
89	6.579E-06	1.02	5.488E-06	0.82	5.934E-06	0.65
90	6.934E-06	0.85	5.802E-06	0.75	6.295E-06	0.61
91	8.338E-06	0.93	6.896E-06	0.71	7.507E-06	0.60
92	4.728E-06	1.02	3.935E-06	0.88	4.321E-06	0.72
93	8.160E-06	0.93	6.807E-06	0.80	7.383E-06	0.64
94	4.264E-06	1.13	3.539E-06	1.01	3.827E-06	0.81
95	1.255E-05	0.64	1.051E-05	0.58	1.137E-05	0.51
96	3.369E-06	1.17	2.826E-06	1.06	3.048E-06	0.80
97	3.337E-06	1.17	2.833E-06	1.03	3.103E-06	0.83
98	3.585E-06	1.29	2.965E-06	1.16	3.215E-06	0.88
99	2.361E-06	1.43	1.975E-06	1.28	2.123E-06	0.92
100	3.426E-06	1.12	2.889E-06	1.00	3.123E-06	0.75
101	4.953E-06	0.98	4.110E-06	0.86	4.464E-06	0.74
102	3.389E-06	1.14	2.847E-06	1.08	3.052E-06	0.95
103	4.661E-06	0.95	3.905E-06	0.88	4.264E-06	0.71
104	4.184E-06	1.03	3.520E-06	0.95	3.824E-06	0.77
105	4.327E-06	1.06	3.629E-06	0.95	3.905E-06	0.84
106	1.572E-06	2.03	1.316E-06	1.67	1.438E-06	1.35
107	3.560E-06	1.08	2.989E-06	1.08	3.198E-06	0.88
108	3.172E-06	1.20	2.687E-06	1.15	2.968E-06	0.93
109	5.114E-06	0.95	4.292E-06	0.86	4.678E-06	0.73
110	2.967E-06	1.18	2.537E-06	0.98	2.767E-06	0.79
111	3.058E-06	1.34	2.566E-06	1.12	2.775E-06	0.95
112	1.835E-06	1.64	1.541E-06	1.53	1.667E-06	1.28
113	5.778E-06	0.93	4.838E-06	0.85	5.255E-06	0.68
114	2.001E-06	1.44	1.637E-06	1.49	1.778E-06	1.09
115	5.138E-06	1.02	4.259E-06	0.88	4.606E-06	0.77
116	1.071E-05	0.64	8.981E-06	0.54	9.709E-06	0.45
117	1.173E-05	0.70	9.829E-06	0.58	1.064E-05	0.47
118	1.281E-05	0.54	1.082E-05	0.51	1.166E-05	0.44
119	8.215E-06	0.82	6.938E-06	0.68	7.520E-06	0.57
120	5.711E-06	0.82	4.839E-06	0.80	5.184E-06	0.62
121	6.062E-06	0.95	5.090E-06	0.82	5.553E-06	0.60
122	3.228E-06	1.27	2.747E-06	1.07	2.961E-06	0.85
123	1.032E-05	0.64	8.712E-06	0.55	9.354E-06	0.45
124	7.383E-06	0.74	6.209E-06	0.62	6.709E-06	0.49
125	6.862E-06	0.72	5.796E-06	0.70	6.243E-06	0.51
126	5.726E-06	0.88	4.846E-06	0.81	5.215E-06	0.61

127	5.548E-06	0.89	4.662E-06	0.79	5.067E-06	0.65
128	7.738E-06	0.81	6.483E-06	0.65	7.005E-06	0.53
129	9.557E-06	0.74	8.105E-06	0.68	8.782E-06	0.55
130	3.905E-06	0.96	3.332E-06	0.90	3.610E-06	0.73
131	1.691E-05	0.68	1.416E-05	0.54	1.530E-05	0.42
132	1.125E-05	0.76	9.468E-06	0.61	1.023E-05	0.50
133	1.353E-05	0.62	1.149E-05	0.57	1.239E-05	0.46
134	1.479E-05	0.57	1.246E-05	0.48	1.345E-05	0.42
135	2.381E-06	1.28	2.025E-06	1.19	2.209E-06	1.06
136	3.875E-06	0.96	3.338E-06	0.90	3.711E-06	0.76
137	2.506E-06	1.13	2.638E-06	1.03	2.978E-06	0.80
138	4.129E-06	1.02	3.611E-06	0.84	3.930E-06	0.74
139	4.515E-06	0.93	3.858E-06	0.79	4.178E-06	0.70
140	1.208E-05	0.60	1.021E-05	0.57	1.107E-05	0.45
141	8.843E-06	0.72	7.486E-06	0.68	8.064E-06	0.51
142	5.930E-06	0.98	4.987E-06	0.89	5.401E-06	0.73
143	1.994E-05	0.49	1.678E-05	0.41	1.807E-05	0.32
144	8.028E-06	0.73	6.754E-06	0.69	7.249E-06	0.57
145	7.184E-06	0.83	6.115E-06	0.68	6.597E-06	0.58
146	1.204E-05	0.76	1.016E-05	0.61	1.096E-05	0.48
147	3.689E-06	1.19	3.085E-06	1.10	3.319E-06	0.83
148	1.895E-06	1.60	1.580E-06	1.36	1.725E-06	1.09
149	1.166E-06	1.86	9.747E-07	1.54	1.061E-06	1.38
150	3.981E-06	1.01	3.378E-06	0.96	3.628E-06	0.78
151	4.170E-06	1.01	3.530E-06	0.95	3.781E-06	0.71
152	4.360E-06	0.90	3.702E-06	0.82	3.976E-06	0.65
153	4.545E-06	1.13	3.769E-06	0.90	4.070E-06	0.82
154	4.587E-06	1.07	3.867E-06	0.86	4.173E-06	0.71
155	4.334E-06	1.05	3.690E-06	0.94	3.939E-06	0.75
156	3.974E-06	1.24	3.337E-06	1.00	3.608E-06	0.78
157	4.579E-06	1.10	3.931E-06	0.91	4.211E-06	0.78
158	4.869E-06	1.06	4.113E-06	0.95	4.418E-06	0.64
159	6.757E-06	0.79	5.699E-06	0.65	6.158E-06	0.62
160	3.513E-06	1.34	2.947E-06	1.02	3.197E-06	0.83
161	4.876E-06	0.99	4.131E-06	0.84	4.453E-06	0.74
162	5.808E-06	0.84	4.915E-06	0.71	5.278E-06	0.60
163	6.248E-06	0.97	5.254E-06	0.76	5.620E-06	0.58
164	6.508E-06	0.99	5.494E-06	0.77	5.932E-06	0.68
165	6.881E-06	0.93	5.819E-06	0.77	6.273E-06	0.65
166	3.974E-06	1.11	3.367E-06	0.95	3.627E-06	0.77
167	4.154E-06	1.17	3.509E-06	0.99	3.788E-06	0.79
168	4.331E-06	1.11	3.644E-06	1.06	3.946E-06	0.77
169	4.441E-06	1.09	3.762E-06	1.03	4.064E-06	0.84
170	4.613E-06	1.02	3.904E-06	0.94	4.211E-06	0.69
171	2.330E-06	1.27	1.971E-06	1.07	2.152E-06	0.92
172	2.445E-06	1.47	2.060E-06	1.16	2.206E-06	1.00
173	2.483E-06	1.30	2.124E-06	1.16	2.288E-06	0.87
174	2.552E-06	1.21	2.148E-06	1.02	2.321E-06	0.87
175	1.014E-06	2.23	8.450E-07	1.79	9.267E-07	1.48
176	1.026E-06	1.97	8.812E-07	1.69	9.359E-07	1.47
177	1.029E-06	2.09	8.530E-07	1.78	9.424E-07	1.48
178	1.057E-06	1.93	8.879E-07	1.77	9.537E-07	1.56

179	1.049E-06	2.18	8.950E-07	1.89	9.643E-07	1.70
180	1.062E-06	2.17	8.935E-07	1.96	9.579E-07	1.48
181	1.076E-06	1.80	9.121E-07	1.73	9.901E-07	1.42
182	1.095E-06	2.29	9.478E-07	2.04	1.021E-06	1.65
183	1.070E-06	1.69	9.170E-07	1.77	1.005E-06	1.37
184	1.118E-06	1.91	9.453E-07	1.85	1.026E-06	1.37
185	1.091E-06	1.84	9.476E-07	1.70	1.029E-06	1.44
186	1.128E-06	1.92	9.698E-07	1.77	1.054E-06	1.45
187	1.087E-06	1.91	9.478E-07	1.73	1.029E-06	1.44
188	1.181E-06	1.78	9.937E-07	1.60	1.080E-06	1.46
189	1.178E-06	1.93	9.978E-07	1.65	1.081E-06	1.25
190	2.959E-06	1.27	2.532E-06	1.18	2.748E-06	0.90
191	3.115E-06	1.14	2.596E-06	1.14	2.826E-06	0.90
192	3.104E-06	1.23	2.624E-06	1.07	2.852E-06	0.89
193	3.306E-06	1.15	2.774E-06	1.06	2.994E-06	0.83
194	6.872E-06	0.79	5.793E-06	0.74	6.283E-06	0.59
195	7.137E-06	0.82	6.090E-06	0.74	6.556E-06	0.65
196	7.659E-06	0.79	6.498E-06	0.63	7.028E-06	0.57
197	8.488E-06	0.72	7.131E-06	0.71	7.740E-06	0.51
198	8.799E-06	0.76	7.510E-06	0.71	8.134E-06	0.52
199	4.795E-06	0.97	4.086E-06	0.77	4.374E-06	0.68
200	5.029E-06	0.89	4.286E-06	0.80	4.660E-06	0.64
201	1.071E-05	0.68	9.074E-06	0.63	9.797E-06	0.50
202	1.215E-05	0.60	1.020E-05	0.53	1.108E-05	0.39
203	1.304E-05	0.62	1.096E-05	0.54	1.190E-05	0.41
204	1.477E-05	0.55	1.255E-05	0.47	1.361E-05	0.42
205	8.542E-06	0.66	7.680E-06	0.57	8.101E-06	0.46
206	9.313E-06	0.65	8.372E-06	0.60	8.898E-06	0.48
207	9.592E-06	0.67	8.671E-06	0.57	9.165E-06	0.45
208	1.129E-05	0.61	1.022E-05	0.58	1.082E-05	0.47
209	1.163E-05	0.65	1.056E-05	0.54	1.117E-05	0.43
210	1.409E-05	0.50	1.276E-05	0.43	1.359E-05	0.35
211	1.611E-05	0.50	1.450E-05	0.40	1.548E-05	0.34
212	1.927E-05	0.46	1.734E-05	0.37	1.854E-05	0.32
213	2.625E-05	0.37	2.360E-05	0.32	2.535E-05	0.23
214	3.698E-05	0.34	3.325E-05	0.28	3.572E-05	0.21
215	5.521E-05	0.27	4.990E-05	0.24	5.389E-05	0.19
216	9.191E-05	0.18	8.367E-05	0.18	9.060E-05	0.15
217	5.547E-05	0.24	5.301E-05	0.20	5.630E-05	0.17
218	7.054E-05	0.22	6.779E-05	0.20	7.211E-05	0.16
219	8.409E-05	0.22	8.116E-05	0.15	8.658E-05	0.14
220	1.017E-04	0.19	9.897E-05	0.15	1.054E-04	0.13
221	1.204E-04	0.18	1.186E-04	0.15	1.265E-04	0.13
222	1.366E-04	0.16	1.364E-04	0.14	1.455E-04	0.13
223	1.535E-04	0.18	1.573E-04	0.13	1.673E-04	0.13
224	7.533E-05	0.19	7.984E-05	0.15	8.455E-05	0.13
225	2.336E-04	0.14	2.720E-04	0.10	2.821E-04	0.10
226	3.183E-05	0.25	4.483E-05	0.19	4.444E-05	0.14
227	2.897E-05	0.27	4.643E-05	0.18	4.445E-05	0.14
228	1.045E-05	0.36	1.901E-05	0.26	1.757E-05	0.18
229	9.664E-06	0.39	1.963E-05	0.34	1.744E-05	0.17
230	4.524E-06	0.52	1.021E-05	0.48	8.736E-06	0.22

231	4.261E-06	0.52	1.053E-05	0.40	8.760E-06	0.24
232	3.955E-06	0.58	1.125E-05	0.45	8.877E-06	0.22
233	2.257E-06	0.69	7.449E-06	0.53	5.504E-06	0.26
234	1.428E-06	0.90	5.421E-06	0.56	3.824E-06	0.31
235	5.206E-07	1.64	1.047E-06	1.07	1.125E-06	0.48
236	3.512E-07	1.59	7.542E-07	1.27	8.001E-07	0.54
237	2.261E-07	2.05	5.446E-07	1.94	6.105E-07	0.61
238	4.845E-09	11.45	2.040E-08	6.93	2.520E-08	1.97

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

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  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
 0.7534 to 0.7562     *
 0.7562 to 0.7590     *
 0.7590 to 0.7619     **************
```

```
 0.7619 to 0.7647     ************************
 0.7647 to 0.7675     *************************
 0.7675 to 0.7704     ************************
 0.7704 to 0.7732     ******
 0.7732 to 0.7760     *****
 0.7760 to 0.7788
 0.7788 to 0.7817     *

                               frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7534 to 0.7562     *
 0.7562 to 0.7590     *
 0.7590 to 0.7619     *********
 0.7619 to 0.7647     *****************
 0.7647 to 0.7675     *******************
 0.7675 to 0.7704     ******************
 0.7704 to 0.7732     ****
 0.7732 to 0.7760     *****
 0.7760 to 0.7788
 0.7788 to 0.7817     *

                               frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7534 to 0.7562     *
 0.7562 to 0.7590     *
 0.7590 to 0.7619     ******
 0.7619 to 0.7647     ********
 0.7647 to 0.7675     *************
 0.7675 to 0.7704     *************
 0.7704 to 0.7732     ****
 0.7732 to 0.7760     ****
 0.7760 to 0.7788
 0.7788 to 0.7817

                               frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7534 to 0.7562
 0.7562 to 0.7590
 0.7590 to 0.7619     ***
 0.7619 to 0.7647     *****
 0.7647 to 0.7675     ******
 0.7675 to 0.7704     *******
 0.7704 to 0.7732     **
 0.7732 to 0.7760     **
 0.7760 to 0.7788
 0.7788 to 0.7817

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

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                ***
        ***
***
        ***        best estimate system k-eff
0.76611 + or - 0.00041                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65584E-02 + or -  1.33633E-04            ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  1.00954E-05            ***
        ***
***
        ***        system mean free path (cm)
6.52672E-01 + or -  1.75249E-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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*********************************************
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*********************************************************************
*************************************************************

           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.09333 minutes


*********************************************************************
*************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


      0000000      5555555555555                   5555555555555
666666666666                   5555555555555    88888888888
     000000000     5555555555555                   5555555555555
6666666666666                   5555555555555   8888888888888
    00       00    55                     :::       55              66
:::       55              88         88
   00         00   55                     :::       55              66
:::       55              88         88
   00         00   55                     :::       55              66
:::       55              88         88
   00         00   555555555555                   555555555555
666666666666                   555555555555     88888888888
```

```
   00         00   5555555555555                    5555555555555
6666666666666                  5555555555555    88888888888
   00         00              55         :::                  55   66
66         :::                  55   88         88
   00         00              55         :::                  55   66
66         :::                  55   88         88
    00       00    55         55         :::       55         55   66
66         :::       55         55   88         88
     000000000     5555555555555                    5555555555555
6666666666666                  5555555555555   8888888888888
      0000000       55555555555                     55555555555
66666666666                    55555555555     88888888888
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE




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

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*************************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  05:56:58.34
*****
        *****
*****
        *****
*****
```

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

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

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        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
```

```
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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

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

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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  4.44085E-12  1.33972E-12    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  6.04507E-08  1.81186E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                    12/17/09
    1005011  1.23823E-14  4.08058E-14    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  7.37712E-07  5.29650E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33933E-08  6.98508E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02826E-07  7.99739E-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  5.24103E-07  8.93225E-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  2.96839E-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  5.51533E-11  1.36887E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90790E-08  1.32081E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.10543E-08  3.00803E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.69796E-08  4.67120E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  6.62620E-10  1.84278E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.72181E-08  4.83996E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  2.74106E-10  7.78723E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.29399E-09  9.45671E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  2.80938E-18  7.81300E-17   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.27520E-10  3.62274E-09   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  1.15254E-08  3.27423E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                  12/17/09
    1042096  1.18397E-08  3.39893E-07   42096    95.9047     mo96 4237
```

```
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  7.38484E-09  2.14217E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.77369E-08  5.19812E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75595E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.48297E-09  2.23786E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  5.99246E-10  1.77415E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  5.12080E-10  1.54673E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  4.22411E-10  1.28852E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.71224E-11  2.68370E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  1.87021E-10  5.81688E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  3.39973E-11  1.07778E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  2.12305E-10  6.53974E-09   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.11086E-12  3.48835E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  9.87209E-11  3.10004E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  1.50088E-11  4.80293E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  5.58753E-12  1.80476E-10   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  3.17138E-12  1.03385E-10   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  8.98678E-11  2.90271E-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  1.29402E-09  4.29587E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43765E-09  8.16534E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23491E-09  4.17358E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90228E-09  9.89551E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.57570E-10  2.62837E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.22157E-12  4.20162E-11   49115   114.9039     in115 4931
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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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50750E-11  2.23825E-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  1.46985E-09  5.14352E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63241E-09  1.63489E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64386E-09  5.85086E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23108E-09  2.23642E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.86901E-10  3.23633E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.10983E-09  4.11631E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  5.56525E-12  2.09749E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  1.54256E-11  5.85977E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  5.49845E-11  2.12164E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25970E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  2.68583E-10  1.05244E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67706E-11  1.06503E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87635E-12  7.57726E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  6.32925E-10  2.51801E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  9.06453E-16  3.63337E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  6.82744E-10  2.75709E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  6.05387E-10  2.48097E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.35926E-08  1.38671E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99437E-11  2.51048E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  6.44010E-10  2.67779E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.47497E-10  6.22133E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  5.88591E-10  2.50027E-08   58142   141.9092     ce142 5843
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endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21020E-12  2.65667E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  4.34039E-10  1.86979E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  4.53849E-10  1.91429E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12916E-11  2.62197E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  5.20519E-10  2.22669E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  1.06504E-10  4.58793E-09   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  4.04014E-10  1.75253E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  2.97274E-10  1.29842E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87225E-11  8.23369E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.64895E-10  7.30108E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  1.91014E-10  8.40027E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.45701E-17  6.45124E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84877E-12  8.24123E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.22321E-11  5.37933E-10   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.07456E-10  4.79000E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  3.73752E-14  1.67725E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.03689E-09  1.37195E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  2.67930E-11  1.21842E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32589E-13  1.06469E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.44012E-09  6.50588E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.57460E-09  7.20774E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  6.47272E-15  2.98230E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  3.10889E-12  1.44173E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81543E-13  8.47339E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.80659E-12  2.64057E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29364E-11  2.89976E-09   64154   153.9209     gd154 6431
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endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27200E-10  1.98111E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.92549E-10  2.76563E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51580E-10  2.12122E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.18314E-10  3.39566E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31129E-10  3.02136E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76386E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22727E-06  6.51975E-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  5.32325E-12  3.77725E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  5.73283E-18  4.08506E-16   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  4.45423E-10  3.18733E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  9.11828E-16  6.55214E-14   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.29238E-20  9.32549E-19   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49927E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.02571E-20  7.40127E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.93879E-28  2.85396E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99987E-21  7.27565E-19   95243   243.0614     am243 9549
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endf/b7 rel5 rev7 mod0                12/17/09
    1096242  8.23843E-21  5.96935E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.87838E-21  7.18727E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.80536E-21  7.16353E-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
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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
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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:
  9479 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

                                            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       ........

                                 ........     0.01567 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
0.01650 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 15681 independent fission points were generated for generation 1
          1       7.69684E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15586 independent fission points were generated for generation 2
          2       7.59989E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15537 independent fission points were generated for generation 3
          3       7.65279E-01      7.65279E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.63182E-01      7.64231E-01      1.04854E-03
0.00000E+00      0.00000E+00
```

5	7.67762E-01	7.65408E-01	1.32351E-03	0.00000E+00	0.00000E+00
6	7.62124E-01	7.64587E-01	1.24498E-03	0.00000E+00	0.00000E+00
7	7.66427E-01	7.64955E-01	1.03219E-03	0.00000E+00	0.00000E+00
8	7.65158E-01	7.64989E-01	8.43457E-04	0.00000E+00	0.00000E+00
9	7.60368E-01	7.64329E-01	9.71479E-04	0.00000E+00	0.00000E+00
10	7.64914E-01	7.64402E-01	8.44504E-04	0.00000E+00	0.00000E+00
11	7.65967E-01	7.64576E-01	7.64824E-04	0.00000E+00	0.00000E+00
12	7.69243E-01	7.65042E-01	8.28120E-04	0.00000E+00	0.00000E+00
13	7.69472E-01	7.65445E-01	8.50458E-04	0.00000E+00	0.00000E+00
14	7.63210E-01	7.65259E-01	7.98392E-04	0.00000E+00	0.00000E+00
15	7.65718E-01	7.65294E-01	7.35261E-04	0.00000E+00	0.00000E+00
16	7.69031E-01	7.65561E-01	7.31184E-04	0.00000E+00	0.00000E+00
17	7.67736E-01	7.65706E-01	6.95963E-04	0.00000E+00	0.00000E+00
18	7.63801E-01	7.65587E-01	6.61814E-04	0.00000E+00	0.00000E+00
19	7.77651E-01	7.66297E-01	9.43426E-04	0.00000E+00	0.00000E+00
20	7.65659E-01	7.66261E-01	8.90176E-04	0.00000E+00	0.00000E+00
21	7.62585E-01	7.66068E-01	8.63964E-04	0.00000E+00	0.00000E+00
22	7.57659E-01	7.65647E-01	9.21159E-04	0.00000E+00	0.00000E+00
23	7.64050E-01	7.65571E-01	8.79491E-04	0.00000E+00	0.00000E+00
24	7.68534E-01	7.65706E-01	8.49309E-04	0.00000E+00	0.00000E+00
25	7.59367E-01	7.65430E-01	8.57061E-04	0.00000E+00	0.00000E+00
26	7.63191E-01	7.65337E-01	8.25862E-04	0.00000E+00	0.00000E+00
27	7.74949E-01	7.66510E-01	4.78439E-03	0.00000E+00	0.00000E+00
28	7.64033E-01	7.66015E-01	3.44305E-03	0.00000E+00	0.00000E+00
29	7.61688E-01	7.65294E-01	2.80942E-03	0.00000E+00	0.00000E+00
30	7.64206E-01	7.65138E-01	2.30124E-03	0.00000E+00	0.00000E+00

31	7.63122E-01	7.64886E-01	1.96655E-03	0.00000E+00
32	7.69884E-01	7.65442E-01	1.81576E-03	0.00000E+00
33	7.71651E-01	7.66063E-01	1.74538E-03	0.00000E+00
34	7.65934E-01	7.66051E-01	1.56117E-03	0.00000E+00
35	7.60954E-01	7.65626E-01	1.48682E-03	0.00000E+00
36	7.63577E-01	7.65468E-01	1.36805E-03	0.00000E+00
37	7.60516E-01	7.65115E-01	1.47251E-03	0.00000E+00
38	7.64624E-01	7.65082E-01	1.36571E-03	0.00000E+00
39	7.57313E-01	7.64596E-01	1.38868E-03	0.00000E+00
40	7.68506E-01	7.64826E-01	1.19202E-03	0.00000E+00
41	7.71124E-01	7.65176E-01	1.28394E-03	0.00000E+00
42	7.66371E-01	7.65239E-01	1.23136E-03	0.00000E+00
43	7.62298E-01	7.65092E-01	1.16097E-03	0.00000E+00
44	7.70877E-01	7.65368E-01	1.05121E-03	0.00000E+00
45	7.62552E-01	7.65240E-01	1.00887E-03	0.00000E+00
46	7.61682E-01	7.65085E-01	9.75445E-04	0.00000E+00
47	7.61827E-01	7.64949E-01	9.42791E-04	0.00000E+00
48	7.64967E-01	7.64950E-01	9.02654E-04	0.00000E+00
49	7.65467E-01	7.64970E-01	8.66043E-04	0.00000E+00
50	7.64836E-01	7.64965E-01	8.32083E-04	0.00000E+00
51	7.64317E-01	7.64942E-01	8.01033E-04	0.00000E+00
52	7.67685E-01	7.65036E-01	7.78097E-04	0.00000E+00
53	7.68535E-01	7.65153E-01	8.02187E-04	0.00000E+00
54	7.72236E-01	7.65381E-01	8.49575E-04	0.00000E+00
55	7.67390E-01	7.65444E-01	8.43351E-04	0.00000E+00
56	7.65611E-01	7.65449E-01	8.16109E-04	0.00000E+00

57	7.64960E-01	7.65435E-01	7.90118E-04	0.00000E+00
58	7.66713E-01	7.65471E-01	7.66097E-04	0.00000E+00
59	7.61695E-01	7.65366E-01	7.45288E-04	0.00000E+00
60	7.59342E-01	7.65204E-01	7.68522E-04	0.00000E+00
61	7.65366E-01	7.65208E-01	7.45803E-04	0.00000E+00
62	7.74083E-01	7.65436E-01	7.66132E-04	0.00000E+00
63	7.67612E-01	7.65490E-01	7.66160E-04	0.00000E+00
64	7.67665E-01	7.65543E-01	7.52691E-04	0.00000E+00
65	7.61318E-01	7.65442E-01	7.32888E-04	0.00000E+00
66	7.57316E-01	7.65253E-01	7.68957E-04	0.00000E+00
67	7.63403E-01	7.65211E-01	7.63090E-04	0.00000E+00
68	7.70386E-01	7.65326E-01	7.47967E-04	0.00000E+00
69	7.72571E-01	7.65484E-01	7.75396E-04	0.00000E+00
70	7.60336E-01	7.65374E-01	7.41290E-04	0.00000E+00
71	7.60512E-01	7.65273E-01	7.48737E-04	0.00000E+00
72	7.62636E-01	7.65219E-01	7.42653E-04	0.00000E+00
73	7.73465E-01	7.65384E-01	7.34318E-04	0.00000E+00
74	7.62432E-01	7.65326E-01	7.07062E-04	0.00000E+00
75	7.69089E-01	7.65399E-01	6.90428E-04	0.00000E+00
76	7.59845E-01	7.65294E-01	6.73180E-04	0.00000E+00
77	7.66610E-01	7.65318E-01	6.56437E-04	0.00000E+00
78	7.59312E-01	7.65209E-01	6.49210E-04	0.00000E+00
79	7.63385E-01	7.65176E-01	6.43868E-04	0.00000E+00
80	7.67414E-01	7.65216E-01	6.31247E-04	0.00000E+00
81	7.65627E-01	7.65223E-01	6.20398E-04	0.00000E+00
82	7.58387E-01	7.65107E-01	6.19476E-04	0.00000E+00

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         83       7.62963E-01      7.65071E-01      6.16977E-04
0.00000E+00      0.00000E+00
         84       7.60602E-01      7.64998E-01      6.15571E-04
0.00000E+00      0.00000E+00
         85       7.66601E-01      7.65024E-01      6.02496E-04
0.00000E+00      0.00000E+00
         86       7.77538E-01      7.65222E-01      6.36025E-04
0.00000E+00      0.00000E+00
         87       7.59739E-01      7.65137E-01      6.02367E-04
0.00000E+00      0.00000E+00
         88       7.74099E-01      7.65275E-01      5.84596E-04
0.00000E+00      0.00000E+00
         89       7.63211E-01      7.65243E-01      5.76408E-04
0.00000E+00      0.00000E+00
         90       7.61073E-01      7.65181E-01      5.71114E-04
0.00000E+00      0.00000E+00
         91       7.75229E-01      7.65329E-01      5.82178E-04
0.00000E+00      0.00000E+00
         92       7.66251E-01      7.65342E-01      5.73713E-04
0.00000E+00      0.00000E+00
         93       7.59468E-01      7.65258E-01      5.71713E-04
0.00000E+00      0.00000E+00
         94       7.72308E-01      7.65358E-01      5.72417E-04
0.00000E+00      0.00000E+00
         95       7.61360E-01      7.65302E-01      5.67100E-04
0.00000E+00      0.00000E+00
         96       7.65412E-01      7.65304E-01      5.59170E-04
0.00000E+00      0.00000E+00
         97       7.63552E-01      7.65280E-01      5.51979E-04
0.00000E+00      0.00000E+00
         98       7.66578E-01      7.65297E-01      5.44751E-04
0.00000E+00      0.00000E+00
         99       7.62892E-01      7.65266E-01      5.38395E-04
0.00000E+00      0.00000E+00
        100       7.63842E-01      7.65247E-01      5.31594E-04
0.00000E+00      0.00000E+00
        101       7.70488E-01      7.65314E-01      5.29041E-04
0.00000E+00      0.00000E+00
        102       7.55861E-01      7.65195E-01      5.36097E-04
0.00000E+00      0.00000E+00
        103       7.64741E-01      7.65189E-01      5.29298E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=BF890313F8E68717
        104       7.63657E-01      7.65170E-01      5.22991E-04
0.00000E+00      0.00000E+00
        105       7.66094E-01      7.65181E-01      5.16620E-04
0.00000E+00      0.00000E+00
        106       7.67642E-01      7.65211E-01      5.11162E-04
0.00000E+00      0.00000E+00
        107       7.63537E-01      7.65191E-01      5.05369E-04
0.00000E+00      0.00000E+00
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        108       7.68046E-01      7.65225E-01      5.00472E-04
0.00000E+00      0.00000E+00
        109       7.64953E-01      7.65221E-01      4.94559E-04
0.00000E+00      0.00000E+00
        110       7.60243E-01      7.65164E-01      4.92192E-04
0.00000E+00      0.00000E+00
        111       7.73907E-01      7.65263E-01      4.96773E-04
0.00000E+00      0.00000E+00
        112       7.68751E-01      7.65303E-01      4.92692E-04
0.00000E+00      0.00000E+00
        113       7.67106E-01      7.65323E-01      4.87546E-04
0.00000E+00      0.00000E+00
        114       7.69555E-01      7.65369E-01      4.84387E-04
0.00000E+00      0.00000E+00
        115       7.70974E-01      7.65430E-01      4.82979E-04
0.00000E+00      0.00000E+00
        116       7.66420E-01      7.65441E-01      4.77821E-04
0.00000E+00      0.00000E+00
        117       7.59141E-01      7.65374E-01      4.77486E-04
0.00000E+00      0.00000E+00
        118       7.66221E-01      7.65383E-01      4.72465E-04
0.00000E+00      0.00000E+00
        119       7.63115E-01      7.65359E-01      4.68074E-04
0.00000E+00      0.00000E+00
        120       7.69941E-01      7.65406E-01      4.65626E-04
0.00000E+00      0.00000E+00
        121       7.63452E-01      7.65386E-01      4.61241E-04
0.00000E+00      0.00000E+00
        122       7.64114E-01      7.65374E-01      4.56695E-04
0.00000E+00      0.00000E+00
        123       7.66907E-01      7.65389E-01      4.52324E-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=409D3035243139F4
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55136E-05 + or -  1.18687E-08             generation time
=  2.99474E-05 + or -  2.20520E-08
 nu bar   =  2.43896E+00 + or -  9.58731E-06       average fission group
=  2.17559E+02 + or -  1.09014E-02
                      energy(ev) of the average lethargy causing fission
=  5.66736E-02 + or -  1.15994E-04
                                                 system mean free path (cm)
=  6.52550E-01 + or -  1.72653E-04

 no. of initial
deviation of
```

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)
23	0.76539	+ or - 0.00045	0.76494 to 0.76584	0.76448 to 0.76629	0.76403 to 0.76675	2000000	13.2106
24	0.76536	+ or - 0.00046	0.76490 to 0.76581	0.76445 to 0.76627	0.76399 to 0.76672	1980000	13.3122
25	0.76542	+ or - 0.00046	0.76496 to 0.76587	0.76451 to 0.76633	0.76405 to 0.76679	1960000	13.4460
26	0.76544	+ or - 0.00046	0.76498 to 0.76590	0.76452 to 0.76636	0.76406 to 0.76682	1940000	13.4262
27	0.76534	+ or - 0.00045	0.76489 to 0.76580	0.76443 to 0.76625	0.76398 to 0.76670	1920000	13.6899
28	0.76536	+ or - 0.00046	0.76490 to 0.76581	0.76444 to 0.76627	0.76398 to 0.76673	1900000	13.6505
29	0.76539	+ or - 0.00046	0.76493 to 0.76586	0.76447 to 0.76632	0.76401 to 0.76678	1880000	13.6964
30	0.76541	+ or - 0.00047	0.76494 to 0.76587	0.76447 to 0.76634	0.76401 to 0.76681	1860000	13.6546
31	0.76543	+ or - 0.00047	0.76496 to 0.76590	0.76449 to 0.76638	0.76402 to 0.76685	1840000	13.6400
32	0.76538	+ or - 0.00047	0.76491 to 0.76586	0.76444 to 0.76633	0.76396 to 0.76681	1820000	13.8526
37	0.76543	+ or - 0.00049	0.76494 to 0.76592	0.76445 to 0.76641	0.76396 to 0.76690	1720000	14.3605
42	0.76542	+ or - 0.00050	0.76492 to 0.76593	0.76442 to 0.76643	0.76391 to 0.76694	1620000	14.9527
47	0.76553	+ or - 0.00052	0.76500 to 0.76605	0.76448 to 0.76658	0.76395 to 0.76710	1520000	15.4765
52	0.76553	+ or - 0.00056	0.76497 to 0.76609	0.76441 to 0.76666	0.76385 to 0.76722	1420000	15.2710
57	0.76537	+ or - 0.00059	0.76477 to 0.76596	0.76418 to 0.76655	0.76359 to 0.76714	1320000	15.8567
62	0.76536	+ or - 0.00061	0.76474 to 0.76597	0.76413 to 0.76659	0.76352 to 0.76720	1220000	16.7095

```
      67          0.76553   + or - 0.00065     0.76488 to 0.76617
0.76424 to 0.76682    0.76359 to 0.76747    1120000      17.1719

      72          0.76555   + or - 0.00083     0.76472 to 0.76638
0.76389 to 0.76721    0.76307 to 0.76804    1020000      12.4545

      77          0.76547   + or - 0.00071     0.76477 to 0.76618
0.76406 to 0.76688    0.76336 to 0.76759     920000      20.8177

      82          0.76579   + or - 0.00075     0.76504 to 0.76655
0.76429 to 0.76730    0.76353 to 0.76805     820000      21.7836

      87          0.76584   + or - 0.00075     0.76508 to 0.76659
0.76433 to 0.76734    0.76358 to 0.76810     720000      22.3070

      92          0.76549   + or - 0.00092     0.76457 to 0.76641
0.76366 to 0.76733    0.76274 to 0.76825     620000      16.2504

      97          0.76570   + or - 0.00080     0.76490 to 0.76650
0.76411 to 0.76729    0.76331 to 0.76809     520000      29.6969

     102          0.76612   + or - 0.00080     0.76532 to 0.76692
0.76452 to 0.76772    0.76371 to 0.76853     420000      29.8579

     107          0.76643   + or - 0.00104     0.76539 to 0.76747
0.76435 to 0.76850    0.76331 to 0.76954     320000      30.7442

     112          0.76609   + or - 0.00130     0.76479 to 0.76739
0.76349 to 0.76868    0.76219 to 0.76998     220000      28.6685
1                                                 fuel bundle

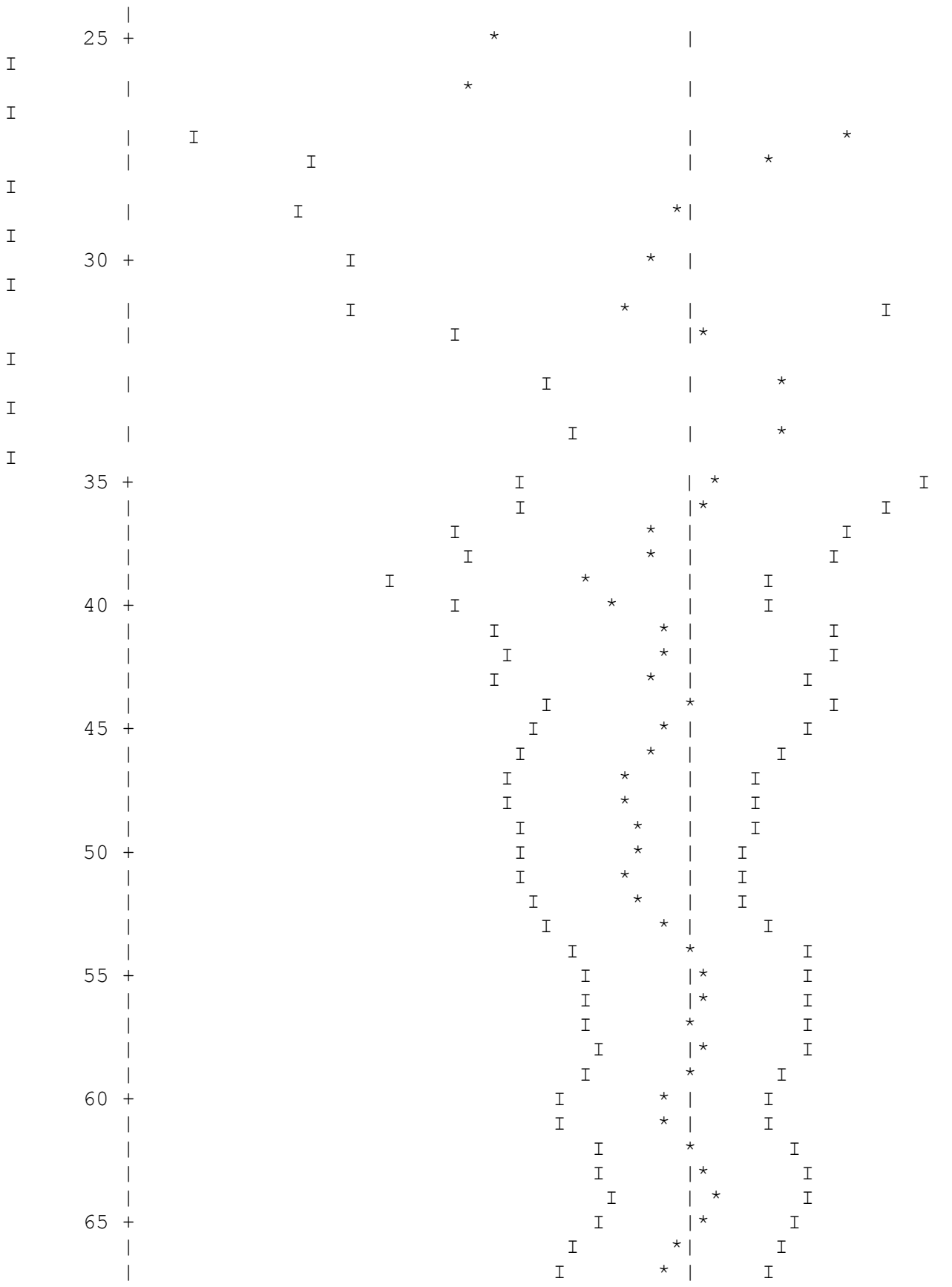
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

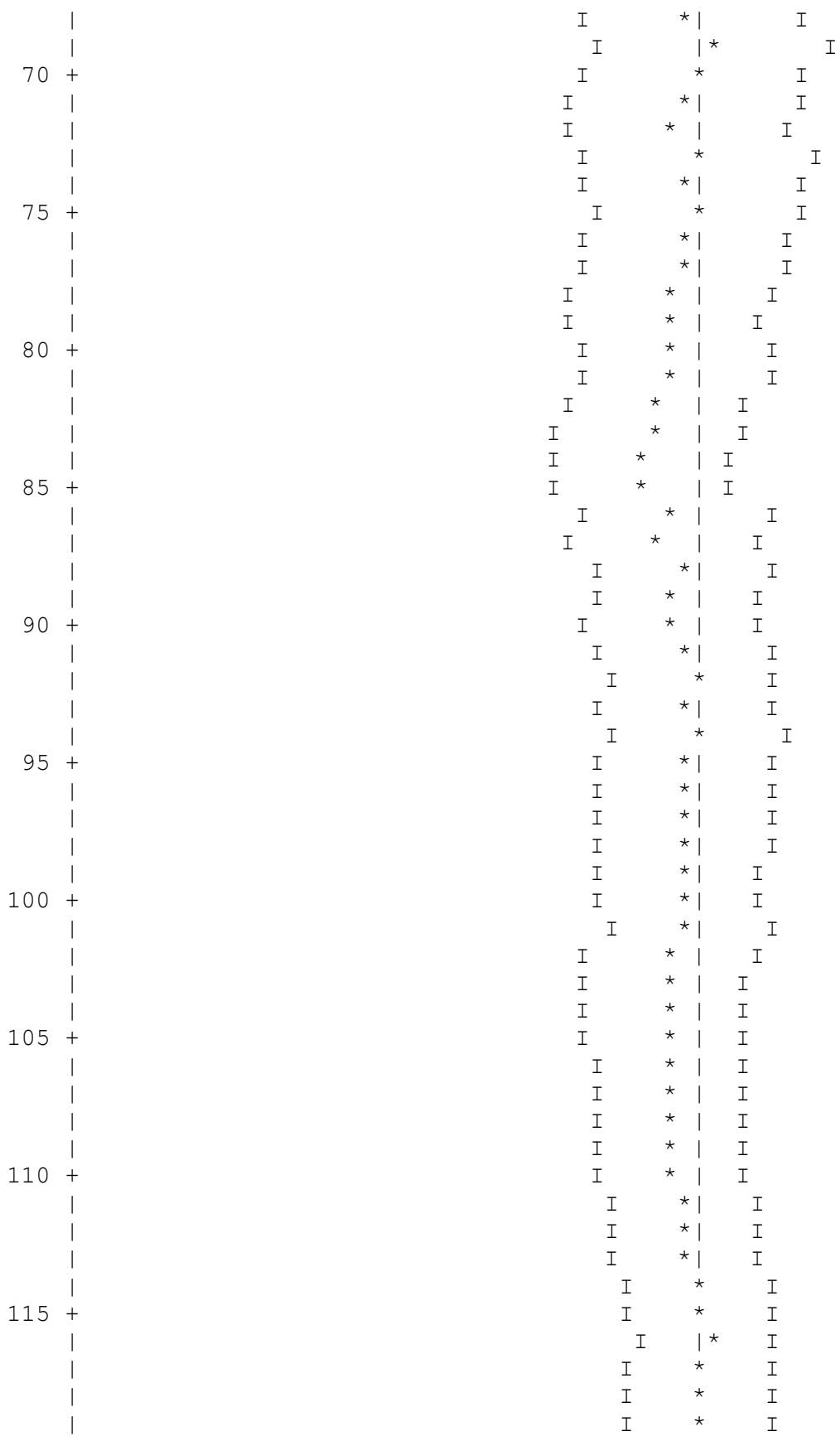
     117          0.76563   + or - 0.00130     0.76432 to 0.76693
0.76302 to 0.76823    0.76172 to 0.76953     120000      40.3734
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76538 + or - 0.00045 which occurs for
123 generations run.

                                 0.7637                   0.7661
0.7685

|-------------------------|-------------------------|------------------
------|------------------------
```




70
75
80
85
90
95
100
105
110
115

```
     120 +                                     I    *    I
         |                                     I    *    I
         |                                     I    *    I
         |                                     I    *    I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7653 + or - 0.0004 which occurs for 23 generations skipped.

```
                                 0.7647                   0.7658
0.7669

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                                I          *           I
         |                               I           *          I
      25 +                                I          |*          I
         |                                 I         |*           I
         |                               I          *|          I
         |                               I          *|          I
         |                                I          *           I
      30 +                                I          |*          I
         |                                I          |*           I
         |                               I           *           I
         |                             I           *|         I
         |                            I           * |         I
      35 +                             I           *|          I
         |                              I           *           I
         |                               I          |*           I
         |                               I          |*            I
         |                                 I        |   *           I
      40 +                                 I        |  *           I
         |                               I          |*            I
         |                               I          |*            I
         |                               I          | *            I
         |                              I           *            I
      45 +                              I           |*            I
         |                               I          | *            I
         |                                I         |  *            I
         |                                I         |   *            I
         |                                I         |   *            I
      50 +                                I         |   *            I
         |                                 I        |   *             I
         |                                I         |   *            I
         |                               I          |  *            I
         |                            I             *             I
      55 +                            I             *             I
         |                          I               *             I
         |                          I               *             I
         |                        I               *|             I
```

```
    |                           I             |*             I
 60 +                             I           |  *              I
    |                             I           |  *              I
    |                          I              *              I
    |                       I               *|             I
    |                      I               * |            I
 65 +                        I              *|              I
    |                           I            |  *              I
    |                            I           |  *               I
    |                         I              |*                 I
    |                    I                 * |                I
 70 +                      I                 |*                  I
    |                       I                |  *
I
    |                         I              |   *
I
    |                    I                   *                    I
    |                     I                  | *
I
 75 +                  I                     *                     I
    |                          I             |  *               I
    |                         I              | *                I
    |                            I           |    *
I
    |                              I         |     *
I
 80 +                         I              |    *
I
    |                         I               |    *
I
    |                                I        |        *
I
    |                                  I      |          *
I
    |                              I          |              *
I
 85 +                              I          |              *
I
    |                              I          |      *
I
    |                                 I       |         *
I
    |                            I            |    *
I
    |                              I          |      *
I
 90 +                                I        |         *
I
    |                       I                 |  *
I
    |                     I                   |  *
I
```

```
         |                           I             |      *
I
         |                     I                   | *
I
      95 +                        I                |    *
I
         |                        I                |    *
I
         |                             I           |      *
I
         |                       I                 |     *
I
         |                          I              |        *
I
     100 +                               I         |          *
I
         |                      I                  |     *
I
         |                                         I|                *
I
         |                                         I|                 *
I
         |                                          |I
*                    I
     105 +                                          |I
*                    I
         |                                       I |                   *
I
         |                                          I
*                       I
         |                                     I   |
*                         I
         |                                      I  |
*                           I
     110 +                  I                       |
*
         |                                I         |
*                            I
         |                           I             |               *
I
         |                        I                |             *
I
         |               I                         |    *
I
     115 +                             *           |
I
         |                        *                |
I
         |                 I                       |     *
I
         |     I                                   |  *
I
```

```
         |         I                               |                *
     120 +                            *            |
I

   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                 0.00000E+00     0.0000
1.74042E-07    46.7149       0.00000E+00     0.0000
    3    0.0000                 1.26137E-05    11.8877
2.05047E-05     5.2117       0.00000E+00     0.0000
    4    0.0000                 1.43859E-05    10.7684
3.06661E-05     3.8314       0.00000E+00     0.0000
    5    0.0000                 2.91722E-05     6.7488
5.22492E-05     2.8754       0.00000E+00     0.0000
    6    0.0001                 9.57892E-05     3.8873
2.24518E-04     1.4452       0.00000E+00     0.0000
    7    0.0002                 1.19978E-04     3.4116
2.10010E-04     1.2975       0.00000E+00     0.0000
    8    0.0003                 2.53329E-04     2.0087
3.29080E-04     1.0378       0.00000E+00     0.0000
    9    0.0005                 3.85979E-04     1.4125
4.46343E-04     0.6174       0.00000E+00     0.0000
   10    0.0003                 2.04448E-04     1.5701
2.06719E-04     0.6722       0.00000E+00     0.0000
   11    0.0012                 9.18974E-04     0.6989
5.27669E-04     0.4913       0.00000E+00     0.0000
   12    0.0010                 7.70830E-04     0.7184
3.02178E-04     0.7077       0.00000E+00     0.0000
   13    0.0003                 2.30456E-04     1.4432
9.15418E-05     1.4278       0.00000E+00     0.0000
   14    0.0013                 1.00235E-03     0.6536
4.09705E-04     0.6475       0.00000E+00     0.0000
   15    0.0010                 7.59860E-04     0.6504
3.27595E-04     0.6430       0.00000E+00     0.0000
   16    0.0002                 1.91185E-04     1.2712
8.78560E-05     1.2506       0.00000E+00     0.0000
   17    0.0001                 6.82285E-05     1.9327
3.31794E-05     1.8963       0.00000E+00     0.0000
   18    0.0001                 5.06803E-05     1.8242
2.56194E-05     1.7871       0.00000E+00     0.0000
   19    0.0001                 8.19713E-05     1.5124
4.33363E-05     1.4770       0.00000E+00     0.0000
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20	0.0001	6.00497E-05	1.6302	3.29008E-05	1.5898
0.00000E+00	0.0000				
21	0.0002	1.20076E-04	0.9721	6.77830E-05	0.9508
0.00000E+00	0.0000				
22	0.0001	1.03366E-04	1.1631	6.12391E-05	1.1323
0.00000E+00	0.0000				
23	0.0001	1.04762E-04	1.0681	6.39843E-05	1.0397
0.00000E+00	0.0000				
24	0.0000	2.46151E-05	2.2988	1.52914E-05	2.2409
0.00000E+00	0.0000				
25	0.0000	3.04326E-05	1.9499	1.90232E-05	1.8945
0.00000E+00	0.0000				
26	0.0000	1.66976E-05	2.5415	1.05157E-05	2.4698
0.00000E+00	0.0000				
27	0.0001	5.18813E-05	1.4625	3.23924E-05	1.4286
0.00000E+00	0.0000				
28	0.0001	9.65304E-05	1.0114	6.02313E-05	0.9951
0.00000E+00	0.0000				
29	0.0001	9.73395E-05	1.0537	6.13363E-05	1.0386
0.00000E+00	0.0000				
30	0.0000	1.24696E-05	2.9255	7.82196E-06	2.9044
0.00000E+00	0.0000				
31	0.0001	9.74639E-05	1.0815	6.15677E-05	1.0691
0.00000E+00	0.0000				
32	0.0000	3.82347E-05	1.8086	2.44410E-05	1.7702
0.00000E+00	0.0000				
33	0.0000	3.36054E-05	1.5850	2.10324E-05	1.5687
0.00000E+00	0.0000				
34	0.0001	7.44761E-05	1.1091	4.67843E-05	1.0936
0.00000E+00	0.0000				
35	0.0001	4.50694E-05	1.5032	2.82814E-05	1.4823
0.00000E+00	0.0000				
36	0.0001	4.29205E-05	1.5464	2.65703E-05	1.5317
0.00000E+00	0.0000				
37	0.0000	2.88373E-05	1.6215	1.80829E-05	1.5910
0.00000E+00	0.0000				
38	0.0000	3.38953E-05	1.6901	2.13402E-05	1.6552
0.00000E+00	0.0000				
39	0.0002	1.28223E-04	1.0039	8.16137E-05	0.9794
0.00000E+00	0.0000				
40	0.0002	1.17570E-04	0.9110	7.60521E-05	0.8937
0.00000E+00	0.0000				
41	0.0002	1.60684E-04	0.8626	1.07351E-04	0.8363
0.00000E+00	0.0000				
42	0.0002	1.38854E-04	0.8252	9.44594E-05	0.8041
0.00000E+00	0.0000				
43	0.0001	8.01094E-05	1.0832	5.74986E-05	1.0359
0.00000E+00	0.0000				
44	0.0001	1.14271E-04	1.0369	8.38915E-05	0.9983
0.00000E+00	0.0000				
45	0.0001	6.11757E-05	0.9970	4.92669E-05	0.9249
0.00000E+00	0.0000				

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   46    0.0000                 1.42980E-05     2.0308
1.15118E-05     1.9013       0.00000E+00     0.0000
   47    0.0001                 4.22586E-05     1.6981
3.27891E-05     1.6334       0.00000E+00     0.0000
   48    0.0000                 1.21278E-05     3.5384
9.40702E-06     3.4372       0.00000E+00     0.0000
   49    0.0001                 8.09137E-05     1.6176
6.38062E-05     1.5845       0.00000E+00     0.0000
   50    0.0001                 5.58570E-05     1.4546
4.60140E-05     1.4240       0.00000E+00     0.0000
   51    0.0000                 1.55734E-05     3.3956
1.29338E-05     3.3295       0.00000E+00     0.0000
   52    0.0001                 3.89554E-05     2.1522
3.37185E-05     2.0970       0.00000E+00     0.0000
   53    0.0002                 1.57393E-04     0.7842
1.54717E-04     0.7278       0.00000E+00     0.0000
   54    0.0001                 7.43118E-05     1.6676
6.90628E-05     1.5974       0.00000E+00     0.0000
   55    0.0002                 1.64745E-04     1.3122
1.51034E-04     1.2755       0.00000E+00     0.0000
   56    0.0002                 1.16186E-04     1.6636
1.07769E-04     1.6219       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                 1.51389E-04     1.3959
1.37323E-04     1.3591       0.00000E+00     0.0000
   58    0.0001                 8.55618E-05     2.0668
7.48875E-05     2.0116       0.00000E+00     0.0000
   59    0.0002                 1.59478E-04     1.4704
1.43125E-04     1.4122       0.00000E+00     0.0000
   60    0.0003                 2.67764E-04     1.3196
2.43110E-04     1.2511       0.00000E+00     0.0000
   61    0.0000                 2.80970E-05     4.3417
2.16199E-05     4.2037       0.00000E+00     0.0000
   62    0.0002                 1.65391E-04     1.7615
1.38660E-04     1.7129       0.00000E+00     0.0000
   63    0.0002                 1.16574E-04     2.0472
9.60982E-05     1.9753       0.00000E+00     0.0000
   64    0.0001                 9.89998E-05     2.6495
7.98449E-05     2.5609       0.00000E+00     0.0000
   65    0.0000                 3.22392E-05     3.5790
3.19597E-05     3.4633       0.00000E+00     0.0000
   66    0.0002                 1.75155E-04     2.0283
1.55333E-04     1.9658       0.00000E+00     0.0000
   67    0.0002                 1.46019E-04     2.1759
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1.19437E-04	2.1059	0.00000E+00	0.0000	68	0.0000	2.79618E-05	4.5645
2.41510E-05	4.4057	0.00000E+00	0.0000	69	0.0004	3.03575E-04	1.5185
2.38135E-04	1.4720	0.00000E+00	0.0000	70	0.0003	2.01666E-04	1.9485
1.83696E-04	1.8708	0.00000E+00	0.0000	71	0.0006	4.28833E-04	1.3221
3.54898E-04	1.2799	0.00000E+00	0.0000	72	0.0001	4.76553E-05	5.9422
2.81781E-05	5.7932	0.00000E+00	0.0000	73	0.0004	3.20966E-04	1.4734
2.44702E-04	1.3997	0.00000E+00	0.0000	74	0.0014	1.05404E-03	1.0166
7.66393E-04	0.9739	0.00000E+00	0.0000	75	0.0001	1.10707E-04	3.0948
8.51687E-05	2.9471	0.00000E+00	0.0000	76	0.0006	4.61944E-04	2.0672
2.93386E-04	1.9953	0.00000E+00	0.0000	77	0.0005	3.65132E-04	1.7913
2.61985E-04	1.7189	0.00000E+00	0.0000	78	0.0000	7.38371E-06	3.8586
7.22202E-05	3.8175	0.00000E+00	0.0000	79	0.0003	1.92894E-04	2.3188
1.29565E-04	2.2302	0.00000E+00	0.0000	80	0.0001	6.29299E-05	3.1690
8.38686E-05	3.0845	0.00000E+00	0.0000	81	0.0014	1.06686E-03	1.2169
7.84590E-04	1.1674	0.00000E+00	0.0000	82	0.0001	6.98558E-05	4.7163
4.18477E-05	4.4737	0.00000E+00	0.0000	83	0.0002	1.29302E-04	3.2746
1.43013E-04	3.2093	0.00000E+00	0.0000	84	0.0001	7.86420E-05	3.1192
7.99331E-05	2.8821	0.00000E+00	0.0000	85	0.0003	1.93548E-04	2.1529
2.38373E-04	2.0939	0.00000E+00	0.0000	86	0.0004	2.71133E-04	2.2230
2.17948E-04	2.1174	0.00000E+00	0.0000	87	0.0004	3.30341E-04	2.5985
2.05591E-04	2.4826	0.00000E+00	0.0000	88	0.0001	5.84800E-05	3.6251
1.06082E-04	3.5394	0.00000E+00	0.0000	89	0.0001	9.26210E-05	3.1166
6.43852E-05	2.8552	0.00000E+00	0.0000	90	0.0003	2.13762E-04	3.3917
1.26514E-04	3.2407	0.00000E+00	0.0000	91	0.0003	1.94467E-04	2.6186
1.22763E-04	2.4763	0.00000E+00	0.0000	92	0.0000	3.22929E-05	2.9586
2.11053E-04	2.8993	0.00000E+00	0.0000	93	0.0002	1.32282E-04	3.3546

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1.07405E-04     3.1327       0.00000E+00     0.0000
   94    0.0001                 1.05069E-04     4.3775
5.92178E-05     4.0850       0.00000E+00     0.0000
   95    0.0008                 6.09343E-04     2.2139
3.75834E-04     2.1423       0.00000E+00     0.0000
   96    0.0002                 1.49321E-04     4.2087
7.59117E-05     4.0162       0.00000E+00     0.0000
   97    0.0004                 2.83083E-04     3.8611
1.62088E-04     3.7793       0.00000E+00     0.0000
   98    0.0001                 1.01801E-04     4.1121
9.77302E-05     3.9640       0.00000E+00     0.0000
   99    0.0001                 9.13923E-05     5.0819
6.15168E-05     4.8846       0.00000E+00     0.0000
  100    0.0002                 1.32889E-04     3.6766
8.87455E-05     3.5333       0.00000E+00     0.0000
  101    0.0001                 1.13849E-04     4.1607
7.22347E-05     3.8665       0.00000E+00     0.0000
  102    0.0002                 1.50250E-04     3.9771
8.40770E-05     3.7955       0.00000E+00     0.0000
  103    0.0001                 9.62756E-05     3.6011
9.39299E-05     3.4007       0.00000E+00     0.0000
  104    0.0002                 1.71777E-04     3.2967
1.36068E-04     3.1895       0.00000E+00     0.0000
  105    0.0002                 1.18781E-04     3.5442
7.86666E-05     3.3327       0.00000E+00     0.0000
  106    0.0002                 1.75132E-04     3.9086
1.30165E-04     3.8591       0.00000E+00     0.0000
  107    0.0001                 6.67501E-05     3.5374
6.72842E-05     3.3208       0.00000E+00     0.0000
  108    0.0000                 3.40299E-05     2.6703
1.47103E-04     2.6000       0.00000E+00     0.0000
  109    0.0002                 1.28085E-04     2.3454
4.25119E-04     2.3135       0.00000E+00     0.0000
  110    0.0009                 6.55720E-04     2.7664
4.04348E-04     2.7394       0.00000E+00     0.0000
  111    0.0002                 1.67639E-04     4.1931
1.53703E-04     4.0889       0.00000E+00     0.0000
  112    0.0001                 1.07548E-04     5.0741
1.13538E-04     4.9731       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                 1.29569E-04     3.7588
1.13108E-04     3.5273       0.00000E+00     0.0000
  114    0.0000                 9.31730E-06     8.0477
1.31309E-05     6.4836       0.00000E+00     0.0000
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115	0.0001	7.68392E-05	3.2196	8.89092E-05	2.9837
0.00000E+00	0.0000				
116	0.0003	1.92686E-04	2.4628	1.44820E-04	2.2091
0.00000E+00	0.0000				
117	0.0006	4.91008E-04	2.3430	2.61936E-04	2.1939
0.00000E+00	0.0000				
118	0.0007	5.62672E-04	2.2092	4.39961E-04	2.1153
0.00000E+00	0.0000				
119	0.0002	1.40039E-04	2.0105	3.61625E-04	1.9414
0.00000E+00	0.0000				
120	0.0002	1.66658E-04	2.1892	6.34262E-04	2.1560
0.00000E+00	0.0000				
121	0.0007	5.18350E-04	2.6364	3.98738E-04	2.5721
0.00000E+00	0.0000				
122	0.0001	9.13408E-05	5.1853	7.20430E-05	4.7886
0.00000E+00	0.0000				
123	0.0003	2.20843E-04	2.5505	1.55880E-04	2.2702
0.00000E+00	0.0000				
124	0.0003	2.41622E-04	3.3355	1.98834E-04	3.1226
0.00000E+00	0.0000				
125	0.0002	1.43233E-04	3.3356	1.31382E-04	3.0135
0.00000E+00	0.0000				
126	0.0001	1.03263E-04	3.7397	9.24407E-05	3.3241
0.00000E+00	0.0000				
127	0.0005	3.90585E-04	3.1848	1.91980E-04	3.0032
0.00000E+00	0.0000				
128	0.0003	2.21980E-04	3.0112	1.36824E-04	2.6943
0.00000E+00	0.0000				
129	0.0006	4.51958E-04	2.3379	4.16076E-04	2.2245
0.00000E+00	0.0000				
130	0.0002	1.19404E-04	3.0296	2.90953E-04	2.9444
0.00000E+00	0.0000				
131	0.0004	2.84264E-04	2.4421	2.29902E-04	2.0755
0.00000E+00	0.0000				
132	0.0007	5.23832E-04	1.7814	3.21906E-04	1.6397
0.00000E+00	0.0000				
133	0.0014	1.05688E-03	2.0251	6.67474E-04	1.9278
0.00000E+00	0.0000				
134	0.0001	8.98670E-05	2.0157	2.34608E-04	1.6884
0.00000E+00	0.0000				
135	0.0002	1.71787E-04	3.4717	2.54878E-04	3.3792
0.00000E+00	0.0000				
136	0.0001	4.54272E-05	2.1250	7.05037E-04	2.0907
0.00000E+00	0.0000				
137	0.0000	1.97214E-05	0.9852	3.54836E-03	0.9831
0.00000E+00	0.0000				
138	0.0004	3.09523E-04	2.1134	8.06296E-04	2.0811
0.00000E+00	0.0000				
139	0.0002	1.84280E-04	3.0437	2.26202E-04	2.8612
0.00000E+00	0.0000				
140	0.0003	2.13856E-04	2.6036	2.83966E-04	2.2726
0.00000E+00	0.0000				

141	0.0001	8.36200E-05	2.5226	2.62255E-04	2.2579
0.00000E+00	0.0000				
142	0.0001	6.61840E-05	3.1505	2.28635E-04	2.8951
0.00000E+00	0.0000				
143	0.0001	8.13999E-05	1.9931	1.74254E-04	1.2619
0.00000E+00	0.0000				
144	0.0000	3.50735E-05	3.3541	7.56324E-05	2.0641
0.00000E+00	0.0000				
145	0.0005	3.81656E-04	2.6924	2.99218E-04	2.4518
0.00000E+00	0.0000				
146	0.0005	3.45701E-04	2.7971	2.52571E-04	2.2764
0.00000E+00	0.0000				
147	0.0002	1.64651E-04	4.8072	1.06304E-04	4.1514
0.00000E+00	0.0000				
148	0.0001	5.85952E-05	6.0666	3.90978E-05	4.8708
0.00000E+00	0.0000				
149	0.0000	3.30957E-05	8.2388	2.27155E-05	6.4241
0.00000E+00	0.0000				
150	0.0001	8.60301E-05	3.8065	6.27323E-05	2.8139
0.00000E+00	0.0000				
151	0.0001	6.79329E-05	3.7142	5.73593E-05	2.5696
0.00000E+00	0.0000				
152	0.0001	4.04671E-05	3.8743	4.61943E-05	2.3217
0.00000E+00	0.0000				
153	0.0001	4.22222E-05	4.2341	4.70439E-05	2.4453
0.00000E+00	0.0000				
154	0.0001	4.71103E-05	4.5242	4.96391E-05	2.6503
0.00000E+00	0.0000				
155	0.0001	4.80121E-05	4.3032	4.79676E-05	2.6234
0.00000E+00	0.0000				
156	0.0001	5.00522E-05	4.3109	4.79254E-05	2.7658
0.00000E+00	0.0000				
157	0.0001	5.91357E-05	4.2280	5.74765E-05	2.6218
0.00000E+00	0.0000				
158	0.0001	6.81438E-05	3.6292	6.84964E-05	2.3902
0.00000E+00	0.0000				
159	0.0002	1.51086E-04	3.2210	2.09874E-04	2.6771
0.00000E+00	0.0000				
160	0.0001	6.98026E-05	3.8670	8.06259E-05	3.0475
0.00000E+00	0.0000				
161	0.0001	7.53401E-05	3.8766	7.40480E-05	2.5495
0.00000E+00	0.0000				
162	0.0001	8.43262E-05	3.4170	7.99767E-05	2.1172
0.00000E+00	0.0000				
163	0.0001	9.37327E-05	3.5447	8.70277E-05	2.1990
0.00000E+00	0.0000				
164	0.0001	1.04368E-04	3.1635	9.56725E-05	1.9849
0.00000E+00	0.0000				
165	0.0002	1.16705E-04	3.4960	1.06387E-04	2.2424
0.00000E+00	0.0000				
166	0.0001	7.36248E-05	4.1028	6.63718E-05	2.6592
0.00000E+00	0.0000				

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  167    0.0001                 7.34273E-05     4.0767
6.79152E-05     2.5395       0.00000E+00     0.0000
  168    0.0001                 9.26016E-05     3.9483
8.10172E-05     2.6369       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                 1.05013E-04     4.0432
9.19723E-05     2.8539       0.00000E+00     0.0000
  170    0.0002                 1.35045E-04     3.3463
1.15290E-04     2.5013       0.00000E+00     0.0000
  171    0.0001                 9.80510E-05     5.0851
7.55541E-05     4.0614       0.00000E+00     0.0000
  172    0.0002                 1.40013E-04     4.6094
9.89324E-05     3.8903       0.00000E+00     0.0000
  173    0.0002                 1.77114E-04     4.7250
1.17903E-04     4.0740       0.00000E+00     0.0000
  174    0.0003                 2.50033E-04     3.8637
1.55769E-04     3.4506       0.00000E+00     0.0000
  175    0.0001                 1.03692E-04     6.3038
6.28677E-05     5.6299       0.00000E+00     0.0000
  176    0.0001                 1.09499E-04     5.2008
6.56637E-05     4.6603       0.00000E+00     0.0000
  177    0.0001                 1.10778E-04     5.7937
6.59653E-05     5.1340       0.00000E+00     0.0000
  178    0.0001                 1.11992E-04     5.7386
6.57184E-05     5.1329       0.00000E+00     0.0000
  179    0.0001                 1.14486E-04     6.5526
6.71091E-05     5.8016       0.00000E+00     0.0000
  180    0.0002                 1.26794E-04     6.0073
7.26010E-05     5.4161       0.00000E+00     0.0000
  181    0.0002                 1.22926E-04     5.4247
7.03393E-05     4.8525       0.00000E+00     0.0000
  182    0.0001                 1.04624E-04     6.2568
6.07370E-05     5.4934       0.00000E+00     0.0000
  183    0.0001                 9.38427E-05     6.4586
5.47162E-05     5.5812       0.00000E+00     0.0000
  184    0.0001                 1.01250E-04     5.9328
5.85707E-05     5.0925       0.00000E+00     0.0000
  185    0.0001                 1.01620E-04     6.2391
5.87237E-05     5.4143       0.00000E+00     0.0000
  186    0.0001                 9.07754E-05     6.6333
5.33974E-05     5.6085       0.00000E+00     0.0000
  187    0.0001                 9.12878E-05     6.3024
5.35708E-05     5.3247       0.00000E+00     0.0000
  188    0.0001                 9.76060E-05     6.3175
```

5.66191E-05 5.3422 0.00000E+00 0.0000
189 0.0001 9.01996E-05 7.2366
5.28219E-05 6.0966 0.00000E+00 0.0000
190 0.0003 2.19851E-04 4.2648
1.29555E-04 3.5653 0.00000E+00 0.0000
191 0.0003 1.97671E-04 4.2059
1.19412E-04 3.3714 0.00000E+00 0.0000
192 0.0002 1.91243E-04 4.0929
1.16664E-04 3.2757 0.00000E+00 0.0000
193 0.0003 2.00261E-04 4.1860
1.22117E-04 3.3719 0.00000E+00 0.0000
194 0.0005 4.08846E-04 2.7349
2.50352E-04 2.1551 0.00000E+00 0.0000
195 0.0006 4.23306E-04 2.7649
2.62677E-04 2.1695 0.00000E+00 0.0000
196 0.0006 4.71912E-04 2.3782
2.91739E-04 1.8660 0.00000E+00 0.0000
197 0.0007 5.01250E-04 2.2348
3.13338E-04 1.7599 0.00000E+00 0.0000
198 0.0007 5.62265E-04 2.2875
3.50333E-04 1.7931 0.00000E+00 0.0000
199 0.0004 3.28462E-04 3.2385
2.01455E-04 2.5571 0.00000E+00 0.0000
200 0.0005 3.45337E-04 3.0248
2.14148E-04 2.3688 0.00000E+00 0.0000
201 0.0010 7.92918E-04 2.0928
4.84787E-04 1.6735 0.00000E+00 0.0000
202 0.0013 9.94884E-04 1.6309
6.02044E-04 1.3148 0.00000E+00 0.0000
203 0.0016 1.22948E-03 1.6554
7.33863E-04 1.3466 0.00000E+00 0.0000
204 0.0021 1.64427E-03 1.5884
9.68645E-04 1.3306 0.00000E+00 0.0000
205 0.0014 1.09920E-03 2.2136
6.46770E-04 1.8689 0.00000E+00 0.0000
206 0.0018 1.36558E-03 2.0369
7.99194E-04 1.7355 0.00000E+00 0.0000
207 0.0021 1.61525E-03 1.5956
9.41823E-04 1.3982 0.00000E+00 0.0000
208 0.0029 2.23953E-03 1.5073
1.29961E-03 1.3379 0.00000E+00 0.0000
209 0.0031 2.36001E-03 1.7271
1.38854E-03 1.5081 0.00000E+00 0.0000
210 0.0037 2.85824E-03 1.1839
1.70371E-03 1.0410 0.00000E+00 0.0000
211 0.0041 3.10089E-03 1.1753
1.87142E-03 1.0134 0.00000E+00 0.0000
212 0.0047 3.56225E-03 1.2164
2.16177E-03 1.0387 0.00000E+00 0.0000
213 0.0065 4.96293E-03 1.0536
3.00578E-03 0.8915 0.00000E+00 0.0000
214 0.0096 7.36903E-03 0.8323

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4.43847E-03     0.6918       0.00000E+00     0.0000
  215    0.0157                 1.20129E-02     0.6935
7.16896E-03     0.5868       0.00000E+00     0.0000
  216    0.0299                 2.29059E-02     0.4575
1.35192E-02     0.3907       0.00000E+00     0.0000
  217    0.0202                 1.54350E-02     0.5333
9.07046E-03     0.4525       0.00000E+00     0.0000
  218    0.0276                 2.11005E-02     0.4838
1.23613E-02     0.4106       0.00000E+00     0.0000
  219    0.0359                 2.74653E-02     0.3562
1.60096E-02     0.3042       0.00000E+00     0.0000
  220    0.0474                 3.62684E-02     0.3255
2.10962E-02     0.2743       0.00000E+00     0.0000
  221    0.0625                 4.78720E-02     0.2827
2.77638E-02     0.2425       0.00000E+00     0.0000
  222    0.0801                 6.12827E-02     0.2876
3.55174E-02     0.2458       0.00000E+00     0.0000
  223    0.1044                 7.99312E-02     0.2407
4.63626E-02     0.2074       0.00000E+00     0.0000
  224    0.0580                 4.43800E-02     0.3265
2.58689E-02     0.2745       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    0.2303                 1.76291E-01     0.1613
1.04449E-01     0.1397       0.00000E+00     0.0000
  226    0.0456                 3.48817E-02     0.3677
2.12282E-02     0.3107       0.00000E+00     0.0000
  227    0.0494                 3.77955E-02     0.3444
2.34417E-02     0.2860       0.00000E+00     0.0000
  228    0.0211                 1.61705E-02     0.5971
1.02202E-02     0.4743       0.00000E+00     0.0000
  229    0.0222                 1.69820E-02     0.6036
1.09148E-02     0.4763       0.00000E+00     0.0000
  230    0.0119                 9.10277E-03     0.7369
5.94110E-03     0.5703       0.00000E+00     0.0000
  231    0.0121                 9.26929E-03     0.7603
6.18942E-03     0.5748       0.00000E+00     0.0000
  232    0.0130                 9.98047E-03     0.7045
6.79225E-03     0.5287       0.00000E+00     0.0000
  233    0.0085                 6.49362E-03     1.0560
4.53519E-03     0.7516       0.00000E+00     0.0000
  234    0.0059                 4.53252E-03     1.0954
3.26909E-03     0.7871       0.00000E+00     0.0000
  235    0.0024                 1.85300E-03     1.8222
1.23196E-03     1.3896       0.00000E+00     0.0000
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  236    0.0019                 1.44680E-03     2.2076
9.77450E-04     1.7346       0.00000E+00     0.0000
  237    0.0017                 1.26716E-03     2.0174
9.08699E-04     1.4996       0.00000E+00     0.0000
  238    0.0001                 7.11593E-05     8.3017
6.14605E-05     5.0402       0.00000E+00     0.0000

 system total =                 7.65389E-01     0.0585
4.68785E-01     0.0488       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3132E-01  +
or -  0.0002



 elapsed time   3.09833 minutes

 random number=   29A5A0EF134D48E7
1                                                fuel bundle

                                                     **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      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

      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     flux     percent     flux     percent
                 deviation            deviation            deviation
    1   0.000E+00    0.00   0.000E+00    0.00   0.000E+00    0.00
    2   1.483E-08   27.83   9.849E-09   27.80   1.071E-08   27.44
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3	9.084E-07	3.52	7.604E-07	3.31	8.125E-07	3.32
4	1.439E-06	3.27	1.192E-06	3.08	1.266E-06	3.11
5	2.252E-06	2.53	1.846E-06	2.42	1.972E-06	2.39
6	9.262E-06	1.29	7.446E-06	1.15	7.950E-06	1.16
7	1.254E-05	1.38	9.475E-06	1.10	1.001E-05	1.10
8	3.137E-05	0.76	2.287E-05	0.69	2.401E-05	0.67
9	8.165E-05	0.47	5.840E-05	0.38	6.088E-05	0.38
10	4.610E-05	0.67	3.257E-05	0.55	3.393E-05	0.49
11	2.211E-04	0.31	1.555E-04	0.25	1.615E-04	0.25
12	1.912E-04	0.31	1.383E-04	0.27	1.451E-04	0.27
13	5.686E-05	0.54	4.145E-05	0.40	4.333E-05	0.40
14	2.518E-04	0.24	1.829E-04	0.22	1.909E-04	0.23
15	2.191E-04	0.30	1.591E-04	0.26	1.660E-04	0.27
16	7.142E-05	0.46	5.163E-05	0.33	5.402E-05	0.32
17	3.195E-05	0.66	2.343E-05	0.54	2.441E-05	0.52
18	2.771E-05	0.66	2.023E-05	0.59	2.092E-05	0.60
19	5.019E-05	0.60	3.673E-05	0.44	3.819E-05	0.42
20	3.985E-05	0.58	2.918E-05	0.47	3.044E-05	0.45
21	8.010E-05	0.44	5.837E-05	0.36	6.080E-05	0.35
22	7.357E-05	0.44	5.377E-05	0.33	5.551E-05	0.30
23	7.635E-05	0.31	5.594E-05	0.29	5.822E-05	0.30
24	1.869E-05	0.95	1.377E-05	0.77	1.438E-05	0.74
25	2.365E-05	0.73	1.746E-05	0.62	1.831E-05	0.57
26	1.339E-05	0.91	9.917E-06	0.80	1.046E-05	0.74
27	4.209E-05	0.60	3.129E-05	0.47	3.303E-05	0.41
28	7.717E-05	0.44	5.740E-05	0.38	6.070E-05	0.35
29	7.991E-05	0.40	5.958E-05	0.34	6.253E-05	0.30
30	1.013E-05	0.97	7.566E-06	0.83	7.886E-06	0.74
31	7.921E-05	0.39	5.937E-05	0.31	6.255E-05	0.30
32	3.125E-05	0.60	2.333E-05	0.56	2.461E-05	0.50
33	2.666E-05	0.70	2.004E-05	0.55	2.115E-05	0.53
34	6.014E-05	0.43	4.556E-05	0.33	4.804E-05	0.32
35	3.639E-05	0.56	2.747E-05	0.48	2.896E-05	0.46
36	3.407E-05	0.55	2.583E-05	0.47	2.696E-05	0.40
37	2.189E-05	0.64	1.646E-05	0.58	1.724E-05	0.51
38	2.583E-05	0.66	1.969E-05	0.57	2.073E-05	0.54
39	9.753E-05	0.33	7.489E-05	0.29	7.903E-05	0.26
40	9.008E-05	0.35	6.944E-05	0.28	7.404E-05	0.26
41	1.127E-04	0.26	8.817E-05	0.24	9.423E-05	0.23
42	9.350E-05	0.27	7.388E-05	0.23	7.930E-05	0.22
43	5.132E-05	0.39	4.069E-05	0.30	4.260E-05	0.29
44	6.955E-05	0.40	5.573E-05	0.34	5.984E-05	0.31
45	3.553E-05	0.46	2.832E-05	0.39	3.137E-05	0.32
46	8.268E-06	0.72	6.581E-06	0.66	7.092E-06	0.62
47	2.370E-05	0.53	1.883E-05	0.44	1.957E-05	0.40
48	6.757E-06	1.03	5.427E-06	0.88	5.709E-06	0.71
49	4.378E-05	0.41	3.509E-05	0.35	3.777E-05	0.29
50	2.934E-05	0.49	2.364E-05	0.47	2.569E-05	0.42
51	7.940E-06	0.96	6.366E-06	0.81	6.940E-06	0.71
52	2.066E-05	0.56	1.664E-05	0.48	1.808E-05	0.42
53	7.622E-05	0.34	6.172E-05	0.27	6.687E-05	0.24
54	3.317E-05	0.46	2.705E-05	0.42	2.915E-05	0.35

55	6.649E-05	0.31	5.415E-05	0.28	5.895E-05	0.24
56	4.311E-05	0.33	3.511E-05	0.27	3.850E-05	0.26
57	4.910E-05	0.33	4.019E-05	0.32	4.369E-05	0.25
58	2.571E-05	0.43	2.102E-05	0.40	2.290E-05	0.36
59	4.430E-05	0.37	3.608E-05	0.33	3.930E-05	0.27
60	6.408E-05	0.31	5.253E-05	0.29	5.699E-05	0.26
61	6.164E-06	1.06	5.055E-06	0.81	5.498E-06	0.62
62	3.217E-05	0.41	2.646E-05	0.38	2.880E-05	0.31
63	2.176E-05	0.55	1.786E-05	0.47	1.939E-05	0.38
64	1.710E-05	0.55	1.400E-05	0.54	1.524E-05	0.43
65	5.695E-06	1.06	4.704E-06	0.96	5.099E-06	0.76
66	2.859E-05	0.42	2.360E-05	0.38	2.563E-05	0.33
67	2.100E-05	0.54	1.725E-05	0.51	1.881E-05	0.40
68	4.628E-06	1.13	3.816E-06	0.91	4.134E-06	0.79
69	3.730E-05	0.38	3.078E-05	0.31	3.337E-05	0.27
70	2.646E-05	0.40	2.181E-05	0.41	2.376E-05	0.30
71	4.562E-05	0.38	3.760E-05	0.32	4.084E-05	0.27
72	2.612E-06	1.51	2.150E-06	1.22	2.338E-06	1.04
73	2.725E-05	0.44	2.240E-05	0.41	2.432E-05	0.36
74	7.914E-05	0.24	6.559E-05	0.23	7.129E-05	0.21
75	9.089E-06	0.76	7.585E-06	0.72	8.210E-06	0.55
76	2.295E-05	0.47	1.915E-05	0.45	2.065E-05	0.35
77	1.763E-05	0.57	1.464E-05	0.52	1.582E-05	0.41
78	1.540E-06	1.71	1.283E-06	1.58	1.424E-06	1.40
79	9.897E-06	0.78	8.254E-06	0.69	8.918E-06	0.58
80	4.599E-06	1.23	3.795E-06	1.08	4.076E-06	0.80
81	5.519E-05	0.33	4.602E-05	0.27	4.983E-05	0.23
82	3.312E-06	1.31	2.729E-06	1.09	2.948E-06	0.84
83	4.373E-06	0.95	3.651E-06	0.92	3.976E-06	0.75
84	8.164E-06	0.76	6.777E-06	0.74	7.354E-06	0.61
85	9.945E-06	0.68	8.301E-06	0.66	8.942E-06	0.56
86	1.344E-05	0.58	1.119E-05	0.45	1.219E-05	0.39
87	1.190E-05	0.67	1.003E-05	0.62	1.079E-05	0.50
88	3.200E-06	1.20	2.656E-06	1.12	2.894E-06	0.93
89	6.529E-06	0.99	5.446E-06	0.86	5.909E-06	0.71
90	6.880E-06	0.81	5.707E-06	0.72	6.194E-06	0.59
91	8.259E-06	0.75	6.855E-06	0.63	7.415E-06	0.54
92	4.747E-06	0.94	3.948E-06	0.77	4.290E-06	0.67
93	8.091E-06	0.80	6.718E-06	0.69	7.287E-06	0.53
94	4.214E-06	0.92	3.519E-06	0.92	3.832E-06	0.78
95	1.256E-05	0.64	1.054E-05	0.61	1.140E-05	0.48
96	3.362E-06	1.19	2.813E-06	1.08	3.053E-06	0.96
97	3.414E-06	1.09	2.865E-06	0.98	3.104E-06	0.81
98	3.517E-06	1.17	2.980E-06	1.09	3.214E-06	0.84
99	2.295E-06	1.29	1.915E-06	1.24	2.099E-06	0.91
100	3.480E-06	1.19	2.905E-06	1.09	3.131E-06	0.82
101	4.935E-06	0.93	4.084E-06	0.86	4.438E-06	0.72
102	3.364E-06	1.28	2.806E-06	1.14	3.047E-06	0.90
103	4.604E-06	0.91	3.860E-06	0.86	4.183E-06	0.73
104	4.148E-06	1.21	3.472E-06	1.01	3.763E-06	0.81
105	4.345E-06	1.06	3.634E-06	0.99	3.949E-06	0.77
106	1.533E-06	1.96	1.303E-06	1.64	1.406E-06	1.17

107	3.516E-06	1.19	2.923E-06	0.96	3.192E-06	0.87
108	3.216E-06	1.19	2.723E-06	1.29	2.930E-06	0.88
109	5.081E-06	0.96	4.300E-06	0.86	4.645E-06	0.70
110	3.050E-06	1.25	2.586E-06	1.23	2.832E-06	0.92
111	3.073E-06	1.14	2.586E-06	0.98	2.782E-06	0.86
112	1.781E-06	1.81	1.505E-06	1.56	1.638E-06	1.18
113	5.729E-06	0.96	4.766E-06	0.77	5.192E-06	0.65
114	1.987E-06	1.74	1.663E-06	1.48	1.797E-06	1.11
115	5.086E-06	0.96	4.233E-06	0.80	4.607E-06	0.69
116	1.071E-05	0.64	8.982E-06	0.59	9.756E-06	0.46
117	1.170E-05	0.72	9.848E-06	0.66	1.060E-05	0.54
118	1.281E-05	0.61	1.083E-05	0.51	1.166E-05	0.40
119	8.260E-06	0.71	7.005E-06	0.61	7.598E-06	0.57
120	5.780E-06	0.88	4.881E-06	0.70	5.286E-06	0.62
121	6.066E-06	0.78	5.168E-06	0.74	5.552E-06	0.64
122	3.236E-06	1.21	2.737E-06	1.06	2.960E-06	0.93
123	1.033E-05	0.64	8.676E-06	0.51	9.347E-06	0.48
124	7.324E-06	0.79	6.131E-06	0.74	6.653E-06	0.59
125	6.984E-06	0.80	5.841E-06	0.74	6.381E-06	0.60
126	5.740E-06	0.93	4.837E-06	0.84	5.246E-06	0.71
127	5.498E-06	0.94	4.651E-06	0.80	5.056E-06	0.69
128	7.737E-06	0.74	6.481E-06	0.64	6.990E-06	0.52
129	9.515E-06	0.58	8.093E-06	0.56	8.768E-06	0.49
130	3.918E-06	1.16	3.340E-06	1.10	3.636E-06	0.85
131	1.683E-05	0.50	1.410E-05	0.44	1.528E-05	0.37
132	1.118E-05	0.60	9.430E-06	0.59	1.019E-05	0.43
133	1.358E-05	0.58	1.149E-05	0.58	1.248E-05	0.47
134	1.484E-05	0.57	1.250E-05	0.46	1.349E-05	0.44
135	2.370E-06	1.11	2.028E-06	1.01	2.216E-06	0.86
136	3.801E-06	0.87	3.337E-06	0.86	3.666E-06	0.63
137	2.526E-06	1.06	2.664E-06	0.95	3.011E-06	0.72
138	4.104E-06	0.99	3.581E-06	0.86	3.885E-06	0.74
139	4.658E-06	0.85	3.942E-06	0.73	4.274E-06	0.64
140	1.198E-05	0.66	1.013E-05	0.58	1.096E-05	0.45
141	8.901E-06	0.73	7.457E-06	0.66	8.030E-06	0.53
142	5.862E-06	0.90	4.960E-06	0.78	5.342E-06	0.62
143	1.970E-05	0.52	1.662E-05	0.43	1.794E-05	0.37
144	8.056E-06	0.87	6.847E-06	0.70	7.373E-06	0.57
145	7.078E-06	0.82	6.064E-06	0.77	6.498E-06	0.60
146	1.211E-05	0.59	1.020E-05	0.48	1.094E-05	0.46
147	3.617E-06	1.06	3.084E-06	1.04	3.321E-06	0.80
148	1.837E-06	1.75	1.560E-06	1.62	1.698E-06	1.34
149	1.167E-06	2.05	9.930E-07	1.90	1.075E-06	1.46
150	3.940E-06	1.08	3.362E-06	0.96	3.617E-06	0.84
151	4.188E-06	1.24	3.527E-06	1.02	3.782E-06	0.84
152	4.298E-06	0.95	3.622E-06	0.89	3.929E-06	0.70
153	4.434E-06	1.18	3.743E-06	0.96	4.076E-06	0.83
154	4.621E-06	1.13	3.886E-06	0.94	4.198E-06	0.76
155	4.359E-06	1.00	3.639E-06	0.96	3.918E-06	0.75
156	3.970E-06	1.01	3.335E-06	0.89	3.580E-06	0.71
157	4.580E-06	1.01	3.890E-06	0.92	4.202E-06	0.75
158	4.877E-06	0.95	4.081E-06	0.82	4.393E-06	0.73

159	6.785E-06	0.79	5.714E-06	0.77	6.164E-06	0.57
160	3.536E-06	1.31	2.992E-06	1.15	3.219E-06	1.02
161	5.050E-06	1.06	4.266E-06	0.91	4.578E-06	0.77
162	5.849E-06	0.93	4.915E-06	0.80	5.299E-06	0.69
163	6.078E-06	0.90	5.114E-06	0.77	5.530E-06	0.67
164	6.544E-06	0.84	5.528E-06	0.76	5.935E-06	0.59
165	6.887E-06	0.92	5.782E-06	0.79	6.277E-06	0.65
166	4.050E-06	1.07	3.408E-06	0.88	3.664E-06	0.73
167	4.113E-06	0.93	3.464E-06	0.89	3.783E-06	0.72
168	4.394E-06	1.11	3.689E-06	0.98	3.979E-06	0.80
169	4.493E-06	1.01	3.789E-06	0.85	4.055E-06	0.72
170	4.593E-06	1.06	3.885E-06	0.93	4.183E-06	0.74
171	2.317E-06	1.26	1.988E-06	1.10	2.141E-06	0.96
172	2.427E-06	1.46	2.042E-06	1.29	2.197E-06	1.03
173	2.426E-06	1.23	2.032E-06	1.20	2.234E-06	0.90
174	2.476E-06	1.18	2.103E-06	1.07	2.275E-06	0.89
175	1.011E-06	2.13	8.511E-07	1.88	9.285E-07	1.57
176	1.035E-06	1.88	8.837E-07	1.69	9.589E-07	1.51
177	1.024E-06	2.07	8.648E-07	1.84	9.295E-07	1.44
178	1.013E-06	1.90	8.630E-07	1.86	9.253E-07	1.58
179	1.068E-06	2.15	8.983E-07	1.88	9.738E-07	1.47
180	1.046E-06	2.09	8.997E-07	1.94	9.666E-07	1.48
181	1.083E-06	2.04	9.263E-07	1.96	9.696E-07	1.55
182	1.088E-06	2.14	9.307E-07	1.87	1.002E-06	1.60
183	1.050E-06	2.12	8.970E-07	2.06	9.797E-07	1.51
184	1.105E-06	1.77	9.294E-07	1.60	1.018E-06	1.24
185	1.123E-06	1.84	9.566E-07	1.68	1.039E-06	1.41
186	1.147E-06	2.05	9.751E-07	1.81	1.041E-06	1.46
187	1.137E-06	1.57	9.686E-07	1.58	1.054E-06	1.35
188	1.169E-06	1.95	9.889E-07	1.78	1.063E-06	1.50
189	1.152E-06	1.93	9.743E-07	1.88	1.067E-06	1.27
190	3.026E-06	1.17	2.541E-06	1.04	2.763E-06	0.85
191	3.044E-06	1.27	2.581E-06	1.14	2.802E-06	0.88
192	3.161E-06	1.18	2.684E-06	1.05	2.867E-06	0.83
193	3.218E-06	1.17	2.730E-06	0.95	2.957E-06	0.81
194	6.913E-06	0.82	5.866E-06	0.68	6.258E-06	0.58
195	7.315E-06	0.79	6.191E-06	0.75	6.639E-06	0.56
196	7.862E-06	0.69	6.601E-06	0.69	7.168E-06	0.51
197	8.270E-06	0.74	7.018E-06	0.67	7.675E-06	0.56
198	8.909E-06	0.72	7.539E-06	0.62	8.200E-06	0.54
199	4.765E-06	0.93	4.035E-06	0.82	4.343E-06	0.68
200	5.099E-06	0.83	4.329E-06	0.78	4.685E-06	0.57
201	1.067E-05	0.65	8.990E-06	0.52	9.746E-06	0.46
202	1.183E-05	0.56	1.005E-05	0.53	1.094E-05	0.43
203	1.301E-05	0.57	1.095E-05	0.50	1.186E-05	0.40
204	1.470E-05	0.48	1.246E-05	0.49	1.354E-05	0.36
205	8.522E-06	0.74	7.652E-06	0.58	8.104E-06	0.50
206	9.377E-06	0.57	8.416E-06	0.55	8.903E-06	0.45
207	9.591E-06	0.71	8.600E-06	0.60	9.119E-06	0.51
208	1.137E-05	0.66	1.022E-05	0.62	1.085E-05	0.49
209	1.155E-05	0.57	1.051E-05	0.48	1.118E-05	0.44
210	1.403E-05	0.56	1.272E-05	0.46	1.352E-05	0.41

211	1.621E-05	0.53	1.462E-05	0.47	1.561E-05	0.34
212	1.927E-05	0.45	1.739E-05	0.41	1.850E-05	0.30
213	2.630E-05	0.36	2.353E-05	0.32	2.515E-05	0.26
214	3.688E-05	0.30	3.307E-05	0.31	3.558E-05	0.25
215	5.525E-05	0.27	4.984E-05	0.22	5.369E-05	0.15
216	9.205E-05	0.22	8.369E-05	0.19	9.063E-05	0.17
217	5.552E-05	0.27	5.317E-05	0.24	5.632E-05	0.18
218	7.074E-05	0.20	6.789E-05	0.17	7.216E-05	0.15
219	8.417E-05	0.19	8.141E-05	0.17	8.667E-05	0.13
220	1.016E-04	0.17	9.897E-05	0.15	1.055E-04	0.12
221	1.205E-04	0.17	1.187E-04	0.14	1.264E-04	0.13
222	1.365E-04	0.15	1.368E-04	0.14	1.458E-04	0.11
223	1.532E-04	0.13	1.573E-04	0.12	1.675E-04	0.10
224	7.505E-05	0.19	7.969E-05	0.16	8.435E-05	0.11
225	2.336E-04	0.12	2.724E-04	0.10	2.824E-04	0.09
226	3.178E-05	0.27	4.491E-05	0.18	4.452E-05	0.12
227	2.897E-05	0.27	4.651E-05	0.22	4.452E-05	0.15
228	1.049E-05	0.37	1.910E-05	0.30	1.760E-05	0.16
229	9.695E-06	0.44	1.965E-05	0.30	1.747E-05	0.18
230	4.515E-06	0.55	1.025E-05	0.46	8.736E-06	0.23
231	4.201E-06	0.48	1.061E-05	0.45	8.754E-06	0.20
232	3.957E-06	0.58	1.129E-05	0.45	8.878E-06	0.24
233	2.249E-06	0.69	7.423E-06	0.59	5.521E-06	0.25
234	1.451E-06	0.91	5.371E-06	0.67	3.845E-06	0.31
235	5.208E-07	1.31	1.055E-06	1.11	1.119E-06	0.51
236	3.477E-07	1.85	7.353E-07	1.36	8.027E-07	0.61
237	2.126E-07	2.03	5.429E-07	1.43	6.145E-07	0.56
238	6.183E-09	10.83	2.079E-08	5.78	2.476E-08	1.67

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
 0.7555 to 0.7583     ***
 0.7583 to 0.7611     ***************
 0.7611 to 0.7640     ************************
 0.7640 to 0.7668     *************************
 0.7668 to 0.7696     ***************
 0.7696 to 0.7725     **********
 0.7725 to 0.7753     *******
 0.7753 to 0.7781     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7555 to 0.7583     **
 0.7583 to 0.7611     ************
 0.7611 to 0.7640     ****************
 0.7640 to 0.7668     *******************
 0.7668 to 0.7696     *************
 0.7696 to 0.7725     ******
 0.7725 to 0.7753     ******
 0.7753 to 0.7781     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7555 to 0.7583     *
 0.7583 to 0.7611     *********
 0.7611 to 0.7640     ************
 0.7640 to 0.7668     ************
 0.7668 to 0.7696     ********
 0.7696 to 0.7725     ****
 0.7725 to 0.7753     ***
 0.7753 to 0.7781     *

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7555 to 0.7583     *
 0.7583 to 0.7611     **
```

```
 0.7611 to 0.7640     ******
 0.7640 to 0.7668     ******
 0.7668 to 0.7696     ******
 0.7696 to 0.7725     ***
 0.7725 to 0.7753     *
 0.7753 to 0.7781

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76538 + or - 0.00045                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.66736E-02 + or -  1.15994E-04            ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.58731E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52550E-01 + or -  1.72653E-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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***
        ***
***

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

           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.10400 minutes


*********************************************************************
************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22               //               11        66         66
   00         00              99      //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666
```

```
      0000000       666666666666                      0000000
0000000                              11         33333333333
     000000000     6666666666666                    000000000
000000000                            111        3333333333333
    00       00    66                  :::        00       00     00
00          :::           1111        33         33
   00         00   66                    :::       00         00   00
00         :::             11                   33
   00         00   66                    :::       00         00   00
00         :::             11                   33
   00         00   666666666666                    00         00   00
00                         11                 333
   00         00   6666666666666                   00         00   00
00                         11                 333
   00         00   66         66         :::       00         00   00
00         :::             11                   33
   00         00   66         66         :::       00         00   00
00         :::             11                   33
    00       00    66         66         :::        00       00     00
00          :::             11        33         33
     000000000     6666666666666                    000000000
000000000                        11111111     3333333333333
      0000000       66666666666                      0000000
0000000                          11111111      33333333333
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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     CCCCCCCCCCC    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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
```

```
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:00:13.38
*****
        *****
*****
        *****
*****

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

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

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

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

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```

```
*********************************************
        ***
***
        ***          unit
volume                                          ***
        ***         number               data set name
name        unit function                     ***
        ***         ------               -------------
----        -------------                     ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  5.03035E-12  1.51757E-12    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  6.04504E-08  1.81185E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  1.40369E-14  4.62587E-14    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  7.37712E-07  5.29650E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33934E-08  6.98509E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02826E-07  7.99740E-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  5.24103E-07  8.93225E-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  2.96839E-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  6.24293E-11  1.54946E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90799E-08  1.32083E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.11262E-08  3.02760E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.70612E-08  4.69366E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  7.53819E-10  2.09640E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.73032E-08  4.86387E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  2.83888E-10  8.06514E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.37708E-09  9.69526E-08   40096    95.9083     zr96 4043
```

```
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  3.65820E-18  1.01736E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.37346E-10  3.90189E-09   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  1.15911E-08  3.29290E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39894E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  7.46491E-09  2.16540E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.78125E-08  5.22026E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75595E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.56551E-09  2.26255E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  6.81570E-10  2.01788E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  5.80193E-10  1.75246E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  4.78735E-10  1.46033E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.82994E-11  2.71996E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  2.11877E-10  6.58998E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  3.77004E-11  1.19518E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  2.51056E-10  7.73340E-09   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.11087E-12  3.48838E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.11957E-10  3.51568E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  1.70024E-11  5.44091E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  6.33253E-12  2.04539E-10   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  3.59597E-12  1.17226E-10   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  8.98690E-11  2.90275E-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
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endf/b7 rel0 rev7 mod1                12/17/09
    1048111  1.29426E-09  4.29666E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43784E-09  8.16596E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23506E-09  4.17409E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90249E-09  9.89623E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.57750E-10  2.62899E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.38965E-12  4.77971E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50834E-11  2.23854E-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  1.47003E-09  5.14414E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63257E-09  1.63495E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64403E-09  5.85148E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23126E-09  2.23648E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.87111E-10  3.23710E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11019E-09  4.11764E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  6.30729E-12  2.37715E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  1.75865E-11  6.68063E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  6.22720E-11  2.40284E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25970E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  3.06666E-10  1.20167E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67705E-11  1.06503E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87635E-12  7.57725E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  7.21171E-10  2.86908E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.04674E-15  4.19571E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  7.76056E-10  3.13391E-08   55135   134.9060     cs135 5531
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endf/b7 rel0 rev7 mod1                12/17/09
    1055137  6.85511E-10  2.80933E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.36818E-08  1.39039E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99453E-11  2.51054E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  7.29182E-10  3.03194E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.48553E-10  6.26586E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  6.66371E-10  2.83067E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21019E-12  2.65666E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  4.78344E-10  2.06065E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  5.32290E-10  2.24515E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12947E-11  2.62210E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  5.98724E-10  2.56124E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  1.34264E-10  5.78378E-09   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  4.58543E-10  1.98906E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  3.36746E-10  1.47082E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87225E-11  8.23372E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  1.86872E-10  8.27417E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  2.16851E-10  9.53653E-09   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.66637E-17  7.37822E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84877E-12  8.24124E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  1.59207E-11  7.00150E-10   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.21888E-10  5.43334E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  4.76463E-14  2.13817E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.04075E-09  1.37369E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  3.03635E-11  1.38079E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32590E-13  1.06469E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.44170E-09  6.51304E-08   63151   150.9198     eu151 6325
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endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.57669E-09  7.21731E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  7.32058E-15  3.37296E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  3.50447E-12  1.62518E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81589E-13  8.47551E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.81102E-12  2.64258E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29365E-11  2.89976E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27208E-10  1.98114E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.92790E-10  2.76676E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51550E-10  2.12108E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.18472E-10  3.39641E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31134E-10  3.02138E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76386E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22751E-06  6.51992E-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  6.07083E-12  4.30771E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  7.47443E-18  5.32608E-16   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  5.05846E-10  3.61970E-08   94239   239.0522     pu239 9437
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endf/b7 rel5 rev7 mod5                12/17/09
    1094240  1.17383E-15  8.43483E-14   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.43487E-20  1.03537E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49927E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.03011E-20  7.43305E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.95535E-28  2.86596E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99985E-21  7.27564E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  7.40658E-21  5.36661E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.86228E-21  7.17555E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.77970E-21  7.14478E-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
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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
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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:
  9361 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

                                          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 +/- 4.35452E+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

   0.00050 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 15652 independent fission points were generated for generation 1
```

```
          1       7.65988E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15824 independent fission points were generated for generation 2
          2       7.73883E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15817 independent fission points were generated for generation 3
          3       7.68547E-01      7.68547E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.60884E-01      7.64715E-01      3.83139E-03
0.00000E+00      0.00000E+00
          5       7.65833E-01      7.65088E-01      2.24318E-03
0.00000E+00      0.00000E+00
          6       7.64330E-01      7.64898E-01      1.59744E-03
0.00000E+00      0.00000E+00
          7       7.70989E-01      7.66116E-01      1.73641E-03
0.00000E+00      0.00000E+00
          8       7.66315E-01      7.66150E-01      1.41816E-03
0.00000E+00      0.00000E+00
          9       7.63731E-01      7.65804E-01      1.24737E-03
0.00000E+00      0.00000E+00
         10       7.68178E-01      7.66101E-01      1.12028E-03
0.00000E+00      0.00000E+00
         11       7.67450E-01      7.66251E-01      9.99298E-04
0.00000E+00      0.00000E+00
         12       7.69385E-01      7.66564E-01      9.47156E-04
0.00000E+00      0.00000E+00
         13       7.69322E-01      7.66815E-01      8.92666E-04
0.00000E+00      0.00000E+00
         14       7.60036E-01      7.66250E-01      9.91542E-04
0.00000E+00      0.00000E+00
         15       7.65685E-01      7.66207E-01      9.13120E-04
0.00000E+00      0.00000E+00
         16       7.65166E-01      7.66132E-01      8.48648E-04
0.00000E+00      0.00000E+00
         17       7.68294E-01      7.66276E-01      8.03090E-04
0.00000E+00      0.00000E+00
         18       7.68872E-01      7.66439E-01      7.68540E-04
0.00000E+00      0.00000E+00
         19       7.66733E-01      7.66456E-01      7.22126E-04
0.00000E+00      0.00000E+00
         20       7.65618E-01      7.66409E-01      6.82417E-04
0.00000E+00      0.00000E+00
         21       7.63264E-01      7.66244E-01      6.66389E-04
0.00000E+00      0.00000E+00
         22       7.62836E-01      7.66073E-01      6.54754E-04
0.00000E+00      0.00000E+00
         23       7.69361E-01      7.66230E-01      6.42167E-04
0.00000E+00      0.00000E+00
         24       7.78374E-01      7.66782E-01      8.24374E-04
0.00000E+00      0.00000E+00
```

25	7.66194E-01	7.66756E-01	7.88132E-04	0.00000E+00
26	7.65751E-01	7.66714E-01	7.55740E-04	0.00000E+00
27	7.69072E-01	7.69848E-01	4.15179E-03	0.00000E+00
28	7.60838E-01	7.68046E-01	3.74574E-03	0.00000E+00
29	7.65955E-01	7.67697E-01	2.93269E-03	0.00000E+00
30	7.74699E-01	7.68697E-01	2.67103E-03	0.00000E+00
31	7.63715E-01	7.68075E-01	2.36921E-03	0.00000E+00
32	7.69798E-01	7.68266E-01	2.06323E-03	0.00000E+00
33	7.64331E-01	7.67873E-01	1.87205E-03	0.00000E+00
34	7.61166E-01	7.67263E-01	1.80498E-03	0.00000E+00
35	7.57567E-01	7.66455E-01	1.85716E-03	0.00000E+00
36	7.56301E-01	7.65674E-01	3.43390E-03	0.00000E+00
37	7.65257E-01	7.65644E-01	3.10067E-03	0.00000E+00
38	7.62142E-01	7.65410E-01	3.00614E-03	0.00000E+00
39	7.61846E-01	7.65188E-01	2.86355E-03	0.00000E+00
40	7.59924E-01	7.64878E-01	3.52272E-03	0.00000E+00
41	7.62040E-01	7.64720E-01	4.17040E-03	0.00000E+00
42	7.65343E-01	7.64753E-01	3.09345E-03	0.00000E+00
43	7.65086E-01	7.64770E-01	2.85596E-03	0.00000E+00
44	7.68431E-01	7.64944E-01	2.63536E-03	0.00000E+00
45	7.70505E-01	7.65197E-01	2.48032E-03	0.00000E+00
46	7.61756E-01	7.65047E-01	2.31205E-03	0.00000E+00
47	7.69888E-01	7.65249E-01	2.24129E-03	0.00000E+00
48	7.65817E-01	7.65272E-01	2.12711E-03	0.00000E+00
49	7.68691E-01	7.65403E-01	2.06131E-03	0.00000E+00
50	7.77877E-01	7.65865E-01	2.32293E-03	0.00000E+00

51	7.65184E-01	7.65841E-01	2.20010E-03	0.00000E+00
52	7.67341E-01	7.65893E-01	2.12794E-03	0.00000E+00
53	7.64487E-01	7.65846E-01	2.01135E-03	0.00000E+00
54	7.67046E-01	7.65884E-01	2.02170E-03	0.00000E+00
55	7.70115E-01	7.66017E-01	2.10964E-03	0.00000E+00
56	7.58114E-01	7.65777E-01	1.77034E-03	0.00000E+00
57	7.66717E-01	7.65805E-01	1.70585E-03	0.00000E+00
58	7.73617E-01	7.66028E-01	1.66222E-03	0.00000E+00
59	7.73476E-01	7.66235E-01	1.83424E-03	0.00000E+00
60	7.59613E-01	7.66056E-01	1.67090E-03	0.00000E+00
61	7.67095E-01	7.66083E-01	1.61946E-03	0.00000E+00
62	7.64347E-01	7.66039E-01	1.56381E-03	0.00000E+00
63	7.69432E-01	7.66124E-01	1.37494E-03	0.00000E+00
64	7.65213E-01	7.66101E-01	1.32394E-03	0.00000E+00
65	7.73206E-01	7.66271E-01	1.49257E-03	0.00000E+00
66	7.68119E-01	7.66314E-01	1.47093E-03	0.00000E+00
67	7.66925E-01	7.66327E-01	1.43394E-03	0.00000E+00
68	7.58066E-01	7.66144E-01	1.38155E-03	0.00000E+00
69	7.69557E-01	7.66218E-01	1.35705E-03	0.00000E+00
70	7.60346E-01	7.66093E-01	1.30700E-03	0.00000E+00
71	7.68964E-01	7.66153E-01	1.28093E-03	0.00000E+00
72	7.67646E-01	7.66183E-01	1.25182E-03	0.00000E+00
73	7.71896E-01	7.66298E-01	1.24315E-03	0.00000E+00
74	7.64021E-01	7.66253E-01	1.21099E-03	0.00000E+00
75	7.74529E-01	7.66412E-01	9.40440E-04	0.00000E+00
76	7.66240E-01	7.66409E-01	9.19866E-04	0.00000E+00

77	7.62255E-01	7.66332E-01	8.81410E-04	0.00000E+00
78	7.66470E-01	7.66334E-01	8.64071E-04	0.00000E+00
79	7.69689E-01	7.66394E-01	8.57086E-04	0.00000E+00
80	7.64627E-01	7.66363E-01	8.41346E-04	0.00000E+00
81	7.65985E-01	7.66357E-01	8.25857E-04	0.00000E+00
82	7.64919E-01	7.66332E-01	8.09770E-04	0.00000E+00
83	7.70336E-01	7.66399E-01	7.99329E-04	0.00000E+00
84	7.53742E-01	7.66192E-01	8.19915E-04	0.00000E+00
85	7.62535E-01	7.66133E-01	8.11413E-04	0.00000E+00
86	7.67636E-01	7.66157E-01	7.90785E-04	0.00000E+00
87	7.66890E-01	7.66168E-01	7.74894E-04	0.00000E+00
88	7.66245E-01	7.66169E-01	7.61691E-04	0.00000E+00
89	7.70746E-01	7.66239E-01	7.51989E-04	0.00000E+00
90	7.71683E-01	7.66320E-01	7.59108E-04	0.00000E+00
91	7.66929E-01	7.66329E-01	7.49519E-04	0.00000E+00
92	7.60923E-01	7.66250E-01	7.22264E-04	0.00000E+00
93	7.62385E-01	7.66195E-01	7.06054E-04	0.00000E+00
94	7.66943E-01	7.66206E-01	6.94904E-04	0.00000E+00
95	7.62746E-01	7.66158E-01	6.94386E-04	0.00000E+00
96	7.61488E-01	7.66094E-01	7.03679E-04	0.00000E+00
97	7.72463E-01	7.66180E-01	6.79323E-04	0.00000E+00
98	7.70406E-01	7.66236E-01	6.71890E-04	0.00000E+00
99	7.65661E-01	7.66229E-01	6.61995E-04	0.00000E+00
100	7.68881E-01	7.66263E-01	6.58473E-04	0.00000E+00
101	7.64945E-01	7.66246E-01	6.44723E-04	0.00000E+00
102	7.60080E-01	7.66168E-01	6.31506E-04	0.00000E+00

```
        103       7.69686E-01      7.66212E-01      6.20132E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=FF6739E3505B67A5
        104       7.70161E-01      7.66261E-01      6.13409E-04
0.00000E+00      0.00000E+00
        105       7.69838E-01      7.66304E-01      6.07799E-04
0.00000E+00      0.00000E+00
        106       7.66590E-01      7.66308E-01      6.00481E-04
0.00000E+00      0.00000E+00
        107       7.64086E-01      7.66281E-01      5.86464E-04
0.00000E+00      0.00000E+00
        108       7.68003E-01      7.66302E-01      5.82387E-04
0.00000E+00      0.00000E+00
        109       7.66105E-01      7.66299E-01      5.75036E-04
0.00000E+00      0.00000E+00
        110       7.75772E-01      7.66408E-01      5.79785E-04
0.00000E+00      0.00000E+00
        111       7.70496E-01      7.66455E-01      5.84323E-04
0.00000E+00      0.00000E+00
        112       7.63513E-01      7.66422E-01      5.67199E-04
0.00000E+00      0.00000E+00
        113       7.66335E-01      7.66421E-01      5.60326E-04
0.00000E+00      0.00000E+00
        114       7.58952E-01      7.66339E-01      5.43510E-04
0.00000E+00      0.00000E+00
        115       7.60698E-01      7.66277E-01      5.59104E-04
0.00000E+00      0.00000E+00
        116       7.74484E-01      7.66366E-01      5.34281E-04
0.00000E+00      0.00000E+00
        117       7.61669E-01      7.66316E-01      5.37473E-04
0.00000E+00      0.00000E+00
        118       7.67728E-01      7.66330E-01      5.31188E-04
0.00000E+00      0.00000E+00
        119       7.64929E-01      7.66316E-01      5.23911E-04
0.00000E+00      0.00000E+00
        120       7.66312E-01      7.66316E-01      5.18249E-04
0.00000E+00      0.00000E+00
        121       7.70424E-01      7.66358E-01      5.14901E-04
0.00000E+00      0.00000E+00
        122       7.62851E-01      7.66322E-01      5.08427E-04
0.00000E+00      0.00000E+00
        123       7.64930E-01      7.66308E-01      5.03021E-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=1980A8EDEDA405FC
                                   A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle
```

```
 lifetime =  1.55396E-05 + or -  1.03033E-08             generation time
=  2.99770E-05 + or -  1.87597E-08
 nu bar   =  2.43894E+00 + or -  9.44868E-06       average fission group
=  2.17556E+02 + or -  9.94594E-03
                      energy(ev) of the average lethargy causing fission
=  5.66490E-02 + or -  1.15649E-04
                                                 system mean free path (cm)
=  6.52590E-01 + or -  1.53572E-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          0.76631   + or - 0.00050     0.76581 to 0.76681
0.76530 to 0.76731    0.76480 to 0.76782    2000000      12.5936

      24          0.76619   + or - 0.00048     0.76571 to 0.76667
0.76523 to 0.76715    0.76475 to 0.76763    1980000      12.8934

      25          0.76619   + or - 0.00049     0.76570 to 0.76667
0.76522 to 0.76716    0.76473 to 0.76764    1960000      12.8547

      26          0.76619   + or - 0.00049     0.76570 to 0.76668
0.76521 to 0.76717    0.76472 to 0.76766    1940000      12.8310

      27          0.76616   + or - 0.00050     0.76566 to 0.76666
0.76516 to 0.76716    0.76467 to 0.76766    1920000      12.6601

      28          0.76622   + or - 0.00051     0.76571 to 0.76673
0.76520 to 0.76724    0.76468 to 0.76775    1900000      12.3057

      29          0.76622   + or - 0.00052     0.76570 to 0.76674
0.76519 to 0.76725    0.76467 to 0.76777    1880000      12.2492

      30          0.76613   + or - 0.00053     0.76560 to 0.76665
0.76508 to 0.76718    0.76455 to 0.76771    1860000      11.8717

      31          0.76615   + or - 0.00053     0.76563 to 0.76668
0.76510 to 0.76721    0.76457 to 0.76774    1840000      12.0712

      32          0.76611   + or - 0.00055     0.76557 to 0.76666
0.76502 to 0.76721    0.76447 to 0.76776    1820000      11.4488

      37          0.76642   + or - 0.00048     0.76594 to 0.76690
0.76546 to 0.76738    0.76497 to 0.76786    1720000      15.5343

      42          0.76667   + or - 0.00049     0.76618 to 0.76717
0.76569 to 0.76766    0.76519 to 0.76816    1620000      16.5645
```

```
      47          0.76664   + or - 0.00052     0.76613 to 0.76716
0.76561 to 0.76768    0.76509 to 0.76820    1520000      17.0684

      52          0.76648   + or - 0.00053     0.76595 to 0.76701
0.76542 to 0.76754    0.76489 to 0.76807    1420000      16.6742

      57          0.76657   + or - 0.00055     0.76602 to 0.76712
0.76547 to 0.76767    0.76491 to 0.76822    1320000      17.2747

      62          0.76648   + or - 0.00056     0.76592 to 0.76704
0.76536 to 0.76760    0.76480 to 0.76816    1220000      18.8469

      67          0.76629   + or - 0.00060     0.76570 to 0.76689
0.76510 to 0.76748    0.76451 to 0.76808    1120000      19.3165

      72          0.76643   + or - 0.00062     0.76581 to 0.76704
0.76520 to 0.76766    0.76458 to 0.76828    1020000      21.1180

      77          0.76628   + or - 0.00066     0.76562 to 0.76694
0.76497 to 0.76759    0.76431 to 0.76825     920000      21.8958

      82          0.76627   + or - 0.00074     0.76553 to 0.76702
0.76479 to 0.76776    0.76404 to 0.76850     820000      21.2602

      87          0.76656   + or - 0.00075     0.76580 to 0.76731
0.76505 to 0.76806    0.76430 to 0.76882     720000      17.1830

      92          0.76644   + or - 0.00078     0.76566 to 0.76721
0.76489 to 0.76799    0.76411 to 0.76877     620000      21.5961

      97          0.76667   + or - 0.00085     0.76583 to 0.76752
0.76498 to 0.76837    0.76413 to 0.76922     520000      25.0340

     102          0.76684   + or - 0.00098     0.76586 to 0.76782
0.76488 to 0.76879    0.76390 to 0.76977     420000      27.5056

     107          0.76645   + or - 0.00125     0.76520 to 0.76770
0.76396 to 0.76894    0.76271 to 0.77019     320000      30.5994

     112          0.76539   + or - 0.00149     0.76390 to 0.76688
0.76241 to 0.76837    0.76093 to 0.76986     220000      38.0359
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          0.76620   + or - 0.00132     0.76488 to 0.76751
```

0.76356 to 0.76883 0.76225 to 0.77014 120000 42.1342
1 fuel bundle

plot of average k-effective by generation run.
the line represents k-eff = 0.76630 + or - 0.00050 which occurs for 123 generations run.

```
                                0.7647                    0.7715
0.7784

|-------------------------|-------------------------|------------------
------|------------------------
         |
      25 +                              I                      *
I
         |                  I           |             *
I
         |                            I |            *               I
         |                       I      |      *             I
         |                         I    |    *           I
      30 +                            I|        *          I
         |                            I |      *        I
         |                              I      *        I
         |                             I|     *       I
         |                           I  |   *     I
      35 +                        I     |*      I
         |               I            * |           I
         |                 I          * |         I
         |                I          *  |        I
         |                I         *   |       I
      40 +            I             *    |        I
         |         I                *    |          I
         |             I            *    |     I
         |              I           *    |    I
         |                I        *    |    I
      45 +                 I        *   |    I
         |                 I        *   |   I
         |                  I       *   |    I
         |                   I       *  |   I
         |                   I       *  |    I
      50 +                    I        *|      I
         |                     I       *|      I
         |                     I       *|      I
         |                     I       *|     I
         |                     I       *|     I
      55 +                      I      *|      I
         |                      I     * |    I
         |                      I     * |    I
         |                       I     *|    I
         |                       I      *      I
      60 +                       I     *|     I
         |                        I    *|    I
```

```
    |                           I    *|    I
    |                            I    *    I
    |                            I    *   I
 65 +                            I    *     I
    |                            I    *     I
    |                            I    *     I
    |                            I    *    I
    |                            I    *    I
 70 +                            I    *   I
    |                            I    *   I
    |                            I    *   I
    |                             I   *    I
    |                             I   *    I
 75 +                              I  |*  I
    |                              I  |*  I
    |                              I  *   I
    |                              I  *   I
    |                              I  |*  I
 80 +                              I  |*  I
    |                              I  *   I
    |                              I  *  I
    |                               I |*  I
    |                              I  *  I
 85 +                              I  *  I
    |                              I  *  I
    |                              I  *  I
    |                              I  *  I
    |                              I  *  I
 90 +                               I *  I
    |                               I *  I
    |                              I  *  I
    |                              I  * I
    |                              I  * I
 95 +                              I  * I
    |                              I  * I
    |                              I  * I
    |                               I *  I
    |                               I * I
100 +                               I *  I
    |                               I * I
    |                              I  * I
    |                               I * I
    |                               I * I
105 +                               I *  I
    |                               I *  I
    |                               I * I
    |                               I * I
    |                               I * I
110 +                                I|* I
    |                                I|* I
    |                                I|* I
    |                                I|* I
```

```
         |                            I * I
     115 +                            I * I
         |                             I|*I
         |                            I * I
         |                            I * I
         |                            I * I
     120 +                            I * I
         |                             I* I
         |                             I* I
         |                            I * I
1                         fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7664 + or - 0.0004 which occurs for 36 generations skipped.

```
                                0.7639                    0.7654
0.7669

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

```
          |                                                                I
|*         I
          |
I     | *        I
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         |                        I
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     120 +
*    |
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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 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			4.64691E-07	70.3526	2.87094E-07	46.9209	0.00000E+00	0.0000
3	0.0000			1.15946E-05	12.4889	1.94175E-05	4.7032	0.00000E+00	0.0000
4	0.0000			1.86926E-05	8.5518	3.33819E-05	3.3666	0.00000E+00	0.0000
5	0.0000			2.50717E-05	8.0687	5.18810E-05	3.0132	0.00000E+00	0.0000
6	0.0001			9.40173E-05	3.6129	2.29025E-04	1.6784	0.00000E+00	0.0000
7	0.0002			1.15127E-04	3.0645	2.10243E-04	1.3537	0.00000E+00	0.0000
8	0.0003			2.41712E-04	2.0337	3.20947E-04	0.9596	0.00000E+00	0.0000
9	0.0005			3.86626E-04	1.1738	4.39851E-04	0.5620	0.00000E+00	0.0000
10	0.0003			2.03222E-04	1.5247	2.06317E-04	0.7657	0.00000E+00	0.0000
11	0.0012			9.09448E-04	0.7058	5.23092E-04	0.4790	0.00000E+00	0.0000
12	0.0010			7.65420E-04	0.7321	3.00023E-04	0.7224	0.00000E+00	0.0000
13	0.0003			2.29747E-04	1.4779	9.12876E-05	1.4633	0.00000E+00	0.0000
14	0.0013			9.95036E-04	0.7018	4.06763E-04	0.6956	0.00000E+00	0.0000
15	0.0010			7.55645E-04	0.6784	3.25817E-04	0.6701	0.00000E+00	0.0000
16	0.0002			1.87804E-04	1.2177				

8.63142E-05	1.1975	0.00000E+00	0.0000	17	0.0001	6.84154E-05	1.7153
3.32749E-05	1.6837	0.00000E+00	0.0000	18	0.0001	5.24052E-05	1.9357
2.64614E-05	1.8982	0.00000E+00	0.0000	19	0.0001	8.05864E-05	1.4324
4.26116E-05	1.4002	0.00000E+00	0.0000	20	0.0001	5.95070E-05	1.5228
3.26081E-05	1.4858	0.00000E+00	0.0000	21	0.0002	1.18266E-04	1.0255
6.67924E-05	1.0002	0.00000E+00	0.0000	22	0.0001	1.03233E-04	1.1325
6.11435E-05	1.1082	0.00000E+00	0.0000	23	0.0001	1.07281E-04	1.3171
6.54742E-05	1.2854	0.00000E+00	0.0000	24	0.0000	2.51733E-05	2.4752
1.56230E-05	2.4084	0.00000E+00	0.0000	25	0.0000	3.17431E-05	1.8627
1.98145E-05	1.8139	0.00000E+00	0.0000	26	0.0000	1.68579E-05	2.4376
1.05929E-05	2.3684	0.00000E+00	0.0000	27	0.0001	5.40983E-05	1.3401
3.37510E-05	1.3095	0.00000E+00	0.0000	28	0.0001	9.60983E-05	0.9659
5.99549E-05	0.9495	0.00000E+00	0.0000	29	0.0001	9.86031E-05	1.1376
6.21093E-05	1.1223	0.00000E+00	0.0000	30	0.0000	1.30416E-05	2.9619
8.17830E-06	2.9417	0.00000E+00	0.0000	31	0.0001	9.62847E-05	1.0563
6.08365E-05	1.0437	0.00000E+00	0.0000	32	0.0000	3.75135E-05	1.6124
2.39853E-05	1.5804	0.00000E+00	0.0000	33	0.0000	3.33695E-05	1.6950
2.08902E-05	1.6745	0.00000E+00	0.0000	34	0.0001	7.58469E-05	1.2861
4.76401E-05	1.2671	0.00000E+00	0.0000	35	0.0001	4.51017E-05	1.4708
2.83029E-05	1.4471	0.00000E+00	0.0000	36	0.0001	4.27019E-05	1.5374
2.64343E-05	1.5236	0.00000E+00	0.0000	37	0.0000	2.81397E-05	1.9180
1.76604E-05	1.8758	0.00000E+00	0.0000	38	0.0000	3.43448E-05	1.6462
2.16222E-05	1.6100	0.00000E+00	0.0000	39	0.0002	1.27467E-04	0.8456
8.11401E-05	0.8257	0.00000E+00	0.0000	40	0.0002	1.19609E-04	0.8030
7.73355E-05	0.7866	0.00000E+00	0.0000	41	0.0002	1.59749E-04	0.7295
1.06729E-04	0.7063	0.00000E+00	0.0000	42	0.0002	1.39413E-04	0.8190

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9.48136E-05     0.7987       0.00000E+00     0.0000
   43    0.0001                 7.78520E-05     1.2224
5.59637E-05     1.1697       0.00000E+00     0.0000
   44    0.0002                 1.15129E-04     1.0647
8.45344E-05     1.0214       0.00000E+00     0.0000
   45    0.0001                 6.01026E-05     0.9891
4.84712E-05     0.9102       0.00000E+00     0.0000
   46    0.0000                 1.47667E-05     1.6885
1.18460E-05     1.5798       0.00000E+00     0.0000
   47    0.0001                 4.11091E-05     1.6965
3.18985E-05     1.6281       0.00000E+00     0.0000
   48    0.0000                 1.17656E-05     3.5909
9.13087E-06     3.4930       0.00000E+00     0.0000
   49    0.0001                 7.95543E-05     1.6806
6.27469E-05     1.6436       0.00000E+00     0.0000
   50    0.0001                 5.81103E-05     1.6317
4.78235E-05     1.6018       0.00000E+00     0.0000
   51    0.0000                 1.52961E-05     3.3547
1.27102E-05     3.2896       0.00000E+00     0.0000
   52    0.0001                 4.02295E-05     1.8973
3.47920E-05     1.8502       0.00000E+00     0.0000
   53    0.0002                 1.56854E-04     0.8181
1.54225E-04     0.7549       0.00000E+00     0.0000
   54    0.0001                 7.36844E-05     2.0027
6.84709E-05     1.9278       0.00000E+00     0.0000
   55    0.0002                 1.63497E-04     1.3778
1.49929E-04     1.3388       0.00000E+00     0.0000
   56    0.0002                 1.19651E-04     1.5233
1.10910E-04     1.4858       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                 1.50974E-04     1.5231
1.36996E-04     1.4862       0.00000E+00     0.0000
   58    0.0001                 8.46207E-05     1.9467
7.41375E-05     1.8921       0.00000E+00     0.0000
   59    0.0002                 1.61080E-04     1.5998
1.44659E-04     1.5324       0.00000E+00     0.0000
   60    0.0004                 2.71849E-04     1.2981
2.46571E-04     1.2226       0.00000E+00     0.0000
   61    0.0000                 2.86911E-05     3.7251
2.20584E-05     3.6081       0.00000E+00     0.0000
   62    0.0002                 1.60730E-04     1.7425
1.34891E-04     1.6932       0.00000E+00     0.0000
   63    0.0002                 1.17623E-04     1.8033
9.69714E-05     1.7329       0.00000E+00     0.0000
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64	0.0001	1.01286E-04	2.4453	8.16000E-05	2.3690	0.00000E+00	0.0000
65	0.0000	3.47925E-05	3.8647	3.43968E-05	3.7346	0.00000E+00	0.0000
66	0.0002	1.68197E-04	1.8730	1.49398E-04	1.8123	0.00000E+00	0.0000
67	0.0002	1.46831E-04	2.0103	1.20120E-04	1.9471	0.00000E+00	0.0000
68	0.0000	2.55223E-05	3.9227	2.21199E-05	3.7699	0.00000E+00	0.0000
69	0.0004	3.07923E-04	1.5725	2.41537E-04	1.5231	0.00000E+00	0.0000
70	0.0003	2.09930E-04	1.8627	1.91078E-04	1.7901	0.00000E+00	0.0000
71	0.0006	4.36674E-04	1.4195	3.61239E-04	1.3759	0.00000E+00	0.0000
72	0.0001	4.86180E-05	5.0653	2.87387E-05	4.9395	0.00000E+00	0.0000
73	0.0004	3.23166E-04	1.6831	2.46613E-04	1.5859	0.00000E+00	0.0000
74	0.0014	1.07238E-03	0.9127	7.79336E-04	0.8776	0.00000E+00	0.0000
75	0.0001	1.10722E-04	2.8101	8.51215E-05	2.6736	0.00000E+00	0.0000
76	0.0006	4.87730E-04	1.7692	3.09241E-04	1.7105	0.00000E+00	0.0000
77	0.0005	3.56253E-04	1.9167	2.55890E-04	1.8444	0.00000E+00	0.0000
78	0.0000	6.97002E-06	4.0743	6.82147E-05	4.0330	0.00000E+00	0.0000
79	0.0002	1.84861E-04	2.6207	1.24446E-04	2.5173	0.00000E+00	0.0000
80	0.0001	6.21447E-05	2.9619	8.29035E-05	2.8739	0.00000E+00	0.0000
81	0.0014	1.06199E-03	1.1874	7.81104E-04	1.1381	0.00000E+00	0.0000
82	0.0001	6.55558E-05	4.1975	3.93921E-05	3.9686	0.00000E+00	0.0000
83	0.0002	1.34744E-04	3.1611	1.48895E-04	3.0985	0.00000E+00	0.0000
84	0.0001	8.13822E-05	3.2421	8.24683E-05	3.0137	0.00000E+00	0.0000
85	0.0003	2.02121E-04	2.1361	2.48761E-04	2.0781	0.00000E+00	0.0000
86	0.0004	2.74458E-04	2.1524	2.20519E-04	2.0481	0.00000E+00	0.0000
87	0.0005	3.45999E-04	2.5493	2.15017E-04	2.4416	0.00000E+00	0.0000
88	0.0001	5.46757E-05	4.4776	9.92891E-05	4.3659	0.00000E+00	0.0000
89	0.0001	9.24104E-05	3.5488	6.43343E-05	3.2615	0.00000E+00	0.0000

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   90    0.0003                 2.27760E-04     2.9665
1.34420E-04     2.8438       0.00000E+00     0.0000
   91    0.0003                 1.94031E-04     3.3250
1.22507E-04     3.1379       0.00000E+00     0.0000
   92    0.0000                 3.06983E-05     2.3063
2.00890E-04     2.2593       0.00000E+00     0.0000
   93    0.0002                 1.18902E-04     3.2180
9.73180E-05     2.9744       0.00000E+00     0.0000
   94    0.0002                 1.31969E-04     3.8049
7.34464E-05     3.6036       0.00000E+00     0.0000
   95    0.0008                 6.16197E-04     2.0989
3.79887E-04     2.0335       0.00000E+00     0.0000
   96    0.0002                 1.50076E-04     4.5444
7.62078E-05     4.3470       0.00000E+00     0.0000
   97    0.0004                 2.96309E-04     3.1200
1.69523E-04     3.0550       0.00000E+00     0.0000
   98    0.0001                 9.56387E-05     3.7549
9.20256E-05     3.6150       0.00000E+00     0.0000
   99    0.0001                 9.92342E-05     4.6902
6.65970E-05     4.5111       0.00000E+00     0.0000
  100    0.0002                 1.27977E-04     3.7833
8.55581E-05     3.6396       0.00000E+00     0.0000
  101    0.0001                 1.08587E-04     3.6105
6.92411E-05     3.3328       0.00000E+00     0.0000
  102    0.0002                 1.60828E-04     4.0873
8.96291E-05     3.9208       0.00000E+00     0.0000
  103    0.0001                 9.50594E-05     3.8783
9.28010E-05     3.6708       0.00000E+00     0.0000
  104    0.0002                 1.70422E-04     3.3497
1.35029E-04     3.2389       0.00000E+00     0.0000
  105    0.0001                 1.14842E-04     3.7735
7.62647E-05     3.5308       0.00000E+00     0.0000
  106    0.0002                 1.82248E-04     4.2551
1.35417E-04     4.1994       0.00000E+00     0.0000
  107    0.0001                 6.57090E-05     3.4633
6.62302E-05     3.2596       0.00000E+00     0.0000
  108    0.0000                 3.53408E-05     2.5219
1.52612E-04     2.4585       0.00000E+00     0.0000
  109    0.0002                 1.29575E-04     2.2267
4.29932E-04     2.1949       0.00000E+00     0.0000
  110    0.0008                 6.19596E-04     3.0394
3.82305E-04     3.0110       0.00000E+00     0.0000
  111    0.0002                 1.49983E-04     4.2228
1.37932E-04     4.1048       0.00000E+00     0.0000
  112    0.0002                 1.24686E-04     5.2194
1.31284E-04     5.1262       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations

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

	fraction			deviation			deviation
113	0.0002	1.11244E-04	3.3518	1.27204E-04	0.00000E+00	0.0000	3.5761
114	0.0000	1.41243E-05	6.2758	1.02418E-05	0.00000E+00	0.0000	7.6251
115	0.0001	8.75871E-05	3.4316	7.55722E-05	0.00000E+00	0.0000	3.7165
116	0.0002	1.43847E-04	2.5744	1.91027E-04	0.00000E+00	0.0000	2.8525
117	0.0006	2.63758E-04	2.2306	4.94589E-04	0.00000E+00	0.0000	2.3797
118	0.0007	4.33389E-04	1.8773	5.53773E-04	0.00000E+00	0.0000	1.9618
119	0.0002	3.61672E-04	2.1554	1.40052E-04	0.00000E+00	0.0000	2.2335
120	0.0002	6.50573E-04	2.1748	1.70982E-04	0.00000E+00	0.0000	2.2061
121	0.0007	3.87128E-04	2.1970	5.02696E-04	0.00000E+00	0.0000	2.2538
122	0.0001	7.28923E-05	4.4109	9.26844E-05	0.00000E+00	0.0000	4.7591
123	0.0003	1.48695E-04	2.7149	2.08980E-04	0.00000E+00	0.0000	3.0783
124	0.0003	2.04885E-04	2.9491	2.49355E-04	0.00000E+00	0.0000	3.1574
125	0.0002	1.38451E-04	2.8749	1.51817E-04	0.00000E+00	0.0000	3.1656
126	0.0001	9.39731E-05	3.1431	1.05202E-04	0.00000E+00	0.0000	3.5404
127	0.0005	1.95477E-04	3.4990	3.98316E-04	0.00000E+00	0.0000	3.6994
128	0.0003	1.34713E-04	2.4270	2.18044E-04	0.00000E+00	0.0000	2.7266
129	0.0006	4.10034E-04	2.3431	4.44626E-04	0.00000E+00	0.0000	2.4629
130	0.0002	2.85535E-04	2.9695	1.17098E-04	0.00000E+00	0.0000	3.0608
131	0.0004	2.37821E-04	1.7046	2.96442E-04	0.00000E+00	0.0000	2.0114
132	0.0007	3.35163E-04	2.0483	5.47334E-04	0.00000E+00	0.0000	2.2271
133	0.0013	6.35715E-04	1.5977	1.00401E-03	0.00000E+00	0.0000	1.6809
134	0.0001	2.31869E-04	1.7712	8.86892E-05	0.00000E+00	0.0000	2.0987
135	0.0002	2.58329E-04	3.1756	1.74167E-04	0.00000E+00	0.0000	3.2590
136	0.0001	6.93783E-04	1.9443	4.46996E-05	0.00000E+00	0.0000	1.9748
137	0.0000			1.95015E-05			1.0082

3.50897E-03	1.0056	0.00000E+00	0.0000	138	0.0004	3.07623E-04	2.2140
8.01583E-04	2.1782	0.00000E+00	0.0000	139	0.0002	1.70836E-04	3.4350
2.10581E-04	3.2160	0.00000E+00	0.0000	140	0.0003	2.17241E-04	2.5447
2.88133E-04	2.2289	0.00000E+00	0.0000	141	0.0001	8.05317E-05	2.6363
2.53755E-04	2.3417	0.00000E+00	0.0000	142	0.0001	6.45662E-05	2.8670
2.23530E-04	2.6224	0.00000E+00	0.0000	143	0.0001	8.35530E-05	2.1121
1.77192E-04	1.3157	0.00000E+00	0.0000	144	0.0000	3.31302E-05	3.6229
7.31285E-05	2.1963	0.00000E+00	0.0000	145	0.0005	3.78784E-04	2.7610
2.97699E-04	2.5103	0.00000E+00	0.0000	146	0.0004	3.44484E-04	2.5234
2.51574E-04	2.0758	0.00000E+00	0.0000	147	0.0002	1.83484E-04	3.8586
1.17004E-04	3.3825	0.00000E+00	0.0000	148	0.0001	5.62015E-05	6.0151
3.79287E-05	4.8465	0.00000E+00	0.0000	149	0.0000	3.51439E-05	7.6624
2.36607E-05	6.0839	0.00000E+00	0.0000	150	0.0001	8.28874E-05	4.9869
6.11000E-05	3.6931	0.00000E+00	0.0000	151	0.0001	6.49853E-05	5.0535
5.54989E-05	3.4714	0.00000E+00	0.0000	152	0.0001	4.00689E-05	4.8157
4.62549E-05	2.8399	0.00000E+00	0.0000	153	0.0001	3.96146E-05	4.1441
4.59036E-05	2.3233	0.00000E+00	0.0000	154	0.0001	4.91659E-05	4.2118
5.07425E-05	2.4726	0.00000E+00	0.0000	155	0.0001	4.77634E-05	4.3779
4.77853E-05	2.5862	0.00000E+00	0.0000	156	0.0001	4.68522E-05	4.7493
4.66060E-05	2.8600	0.00000E+00	0.0000	157	0.0001	6.05685E-05	4.2020
5.83005E-05	2.7230	0.00000E+00	0.0000	158	0.0001	6.90369E-05	4.1353
6.93613E-05	2.7346	0.00000E+00	0.0000	159	0.0002	1.49194E-04	3.0557
2.07784E-04	2.5710	0.00000E+00	0.0000	160	0.0001	6.09905E-05	5.1110
7.27143E-05	3.8473	0.00000E+00	0.0000	161	0.0001	6.97750E-05	3.9500
6.99458E-05	2.5830	0.00000E+00	0.0000	162	0.0001	9.34371E-05	3.5555
8.57958E-05	2.2585	0.00000E+00	0.0000	163	0.0001	9.57513E-05	3.5197

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8.81488E-05     2.1336       0.00000E+00     0.0000
  164    0.0001                 9.84781E-05     3.9130
9.26993E-05     2.3514       0.00000E+00     0.0000
  165    0.0001                 1.12533E-04     3.3221
1.04151E-04     2.0943       0.00000E+00     0.0000
  166    0.0001                 7.14045E-05     4.3011
6.52474E-05     2.7679       0.00000E+00     0.0000
  167    0.0001                 8.25784E-05     4.9280
7.31883E-05     3.2294       0.00000E+00     0.0000
  168    0.0001                 8.60036E-05     4.0331
7.72157E-05     2.6919       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                 1.13257E-04     3.4551
9.70806E-05     2.5028       0.00000E+00     0.0000
  170    0.0002                 1.26896E-04     3.5637
1.10324E-04     2.6048       0.00000E+00     0.0000
  171    0.0001                 9.73618E-05     4.8540
7.52655E-05     3.8226       0.00000E+00     0.0000
  172    0.0002                 1.31361E-04     4.0174
9.42576E-05     3.3189       0.00000E+00     0.0000
  173    0.0003                 2.01479E-04     3.8772
1.32166E-04     3.4007       0.00000E+00     0.0000
  174    0.0003                 2.28954E-04     4.2276
1.44187E-04     3.6902       0.00000E+00     0.0000
  175    0.0002                 1.20363E-04     5.7143
7.20820E-05     5.1921       0.00000E+00     0.0000
  176    0.0001                 1.01295E-04     6.4956
6.11948E-05     5.7638       0.00000E+00     0.0000
  177    0.0002                 1.28547E-04     5.3290
7.52614E-05     4.8394       0.00000E+00     0.0000
  178    0.0001                 1.13685E-04     5.6594
6.68233E-05     5.0443       0.00000E+00     0.0000
  179    0.0001                 1.14200E-04     6.0022
6.64575E-05     5.3828       0.00000E+00     0.0000
  180    0.0001                 1.03860E-04     6.4384
6.11255E-05     5.6662       0.00000E+00     0.0000
  181    0.0002                 1.21002E-04     5.7490
6.94835E-05     5.1208       0.00000E+00     0.0000
  182    0.0001                 1.11623E-04     6.1355
6.43336E-05     5.4310       0.00000E+00     0.0000
  183    0.0001                 1.05286E-04     6.8233
6.09982E-05     5.9643       0.00000E+00     0.0000
  184    0.0001                 9.75319E-05     6.6926
5.66240E-05     5.8325       0.00000E+00     0.0000
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185	0.0001	1.09091E-04	6.5404	6.24173E-05	5.7276
186	0.0001	9.65372E-05	5.8262	5.61402E-05	4.9632
187	0.0001	8.61864E-05	7.1831	5.07749E-05	6.0868
188	0.0001	9.65782E-05	6.0880	5.60801E-05	5.2147
189	0.0001	8.90752E-05	6.2572	5.22604E-05	5.2268
190	0.0003	2.08227E-04	3.9771	1.24168E-04	3.2478
191	0.0003	2.08231E-04	4.3087	1.24041E-04	3.5292
192	0.0002	1.85950E-04	3.8886	1.13607E-04	3.1304
193	0.0003	2.09497E-04	3.5823	1.26447E-04	2.8944
194	0.0005	4.05069E-04	2.9969	2.49236E-04	2.3669
195	0.0005	4.11974E-04	3.1022	2.57075E-04	2.4275
196	0.0006	4.73567E-04	2.7533	2.92508E-04	2.1710
197	0.0007	5.24246E-04	2.5535	3.25592E-04	2.0366
198	0.0007	5.70115E-04	2.2705	3.54845E-04	1.7455
199	0.0004	3.30051E-04	3.5981	2.02410E-04	2.8154
200	0.0005	3.59181E-04	3.1470	2.20980E-04	2.5047
201	0.0010	7.98398E-04	2.1880	4.86954E-04	1.7568
202	0.0013	9.90529E-04	2.0747	5.99365E-04	1.6571
203	0.0016	1.20028E-03	1.9369	7.20100E-04	1.5590
204	0.0021	1.63840E-03	1.4963	9.68412E-04	1.2598
205	0.0015	1.13762E-03	1.9643	6.65747E-04	1.6672
206	0.0019	1.44248E-03	1.7056	8.37577E-04	1.4666
207	0.0021	1.63949E-03	1.4773	9.54119E-04	1.2871
208	0.0028	2.17329E-03	1.5862	1.26817E-03	1.3947
209	0.0032	2.43503E-03	1.4680	1.42736E-03	1.2902
210	0.0037	2.86745E-03	1.1201	1.70834E-03	0.9989

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  211    0.0040                 3.08967E-03     1.3436
1.86615E-03     1.1622       0.00000E+00     0.0000
  212    0.0046                 3.51714E-03     1.2308
2.14157E-03     1.0559       0.00000E+00     0.0000
  213    0.0065                 4.98112E-03     0.9346
3.01464E-03     0.7876       0.00000E+00     0.0000
  214    0.0096                 7.36681E-03     0.8052
4.43620E-03     0.6862       0.00000E+00     0.0000
  215    0.0158                 1.21155E-02     0.5764
7.22358E-03     0.4880       0.00000E+00     0.0000
  216    0.0301                 2.30507E-02     0.4389
1.35919E-02     0.3719       0.00000E+00     0.0000
  217    0.0202                 1.54447E-02     0.5962
9.07342E-03     0.4950       0.00000E+00     0.0000
  218    0.0276                 2.11183E-02     0.3999
1.23782E-02     0.3397       0.00000E+00     0.0000
  219    0.0357                 2.73356E-02     0.4488
1.59513E-02     0.3807       0.00000E+00     0.0000
  220    0.0476                 3.64524E-02     0.3490
2.11813E-02     0.2976       0.00000E+00     0.0000
  221    0.0624                 4.78071E-02     0.3406
2.77304E-02     0.2894       0.00000E+00     0.0000
  222    0.0805                 6.17234E-02     0.2644
3.57217E-02     0.2240       0.00000E+00     0.0000
  223    0.1046                 8.01828E-02     0.2527
4.64956E-02     0.2147       0.00000E+00     0.0000
  224    0.0583                 4.46591E-02     0.3623
2.60135E-02     0.3062       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    0.2303                 1.76485E-01     0.1730
1.04521E-01     0.1477       0.00000E+00     0.0000
  226    0.0453                 3.47249E-02     0.3795
2.11431E-02     0.3135       0.00000E+00     0.0000
  227    0.0491                 3.76102E-02     0.3924
2.33391E-02     0.3134       0.00000E+00     0.0000
  228    0.0210                 1.61092E-02     0.5896
1.01906E-02     0.4630       0.00000E+00     0.0000
  229    0.0224                 1.71870E-02     0.5227
1.10307E-02     0.4170       0.00000E+00     0.0000
  230    0.0116                 8.87129E-03     0.7447
5.81806E-03     0.5818       0.00000E+00     0.0000
  231    0.0122                 9.38037E-03     0.7162
6.23216E-03     0.5487       0.00000E+00     0.0000
  232    0.0128                 9.80940E-03     0.6791
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6.70157E-03     0.4980       0.00000E+00     0.0000
  233    0.0083                 6.32345E-03     0.9259
4.45003E-03     0.6731       0.00000E+00     0.0000
  234    0.0058                 4.47042E-03     1.2306
3.23052E-03     0.8567       0.00000E+00     0.0000
  235    0.0024                 1.86973E-03     1.5870
1.23797E-03     1.2373       0.00000E+00     0.0000
  236    0.0019                 1.49103E-03     1.8143
9.99154E-04     1.3557       0.00000E+00     0.0000
  237    0.0017                 1.30837E-03     1.8958
9.31077E-04     1.3352       0.00000E+00     0.0000
  238    0.0001                 6.62124E-05     8.4743
6.02160E-05     4.7937       0.00000E+00     0.0000

 system total =                 7.66308E-01     0.0606
4.69140E-01     0.0520       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3110E-01  +
or -  0.0002



 elapsed time   3.10450 minutes

 random number=   AE804B2274D6A6E0
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	2.630E-08	30.66	1.707E-08	28.63	1.834E-08	27.48
3	9.897E-07	3.74	7.979E-07	3.28	8.544E-07	3.37
4	1.510E-06	3.04	1.222E-06	3.01	1.316E-06	3.02
5	2.297E-06	2.91	1.897E-06	2.62	2.012E-06	2.64
6	9.490E-06	1.40	7.560E-06	1.22	8.070E-06	1.23
7	1.250E-05	1.16	9.526E-06	1.00	1.016E-05	0.95
8	3.113E-05	0.74	2.290E-05	0.62	2.403E-05	0.59
9	8.147E-05	0.43	5.841E-05	0.42	6.090E-05	0.39
10	4.654E-05	0.57	3.285E-05	0.51	3.418E-05	0.53
11	2.197E-04	0.30	1.552E-04	0.27	1.608E-04	0.28
12	1.898E-04	0.33	1.373E-04	0.27	1.441E-04	0.27
13	5.687E-05	0.55	4.149E-05	0.48	4.333E-05	0.47
14	2.522E-04	0.27	1.826E-04	0.23	1.908E-04	0.24
15	2.200E-04	0.29	1.593E-04	0.23	1.662E-04	0.23
16	7.080E-05	0.52	5.149E-05	0.42	5.391E-05	0.41
17	3.245E-05	0.69	2.356E-05	0.55	2.445E-05	0.55
18	2.770E-05	0.74	2.033E-05	0.62	2.104E-05	0.62
19	5.034E-05	0.53	3.669E-05	0.47	3.813E-05	0.45
20	3.932E-05	0.64	2.879E-05	0.49	3.019E-05	0.44
21	8.041E-05	0.38	5.885E-05	0.31	6.149E-05	0.31
22	7.301E-05	0.45	5.327E-05	0.38	5.516E-05	0.36
23	7.643E-05	0.36	5.608E-05	0.32	5.820E-05	0.32
24	1.867E-05	0.93	1.369E-05	0.74	1.434E-05	0.69
25	2.349E-05	0.73	1.736E-05	0.61	1.824E-05	0.63
26	1.334E-05	1.04	9.855E-06	0.87	1.040E-05	0.82
27	4.177E-05	0.56	3.095E-05	0.44	3.276E-05	0.42
28	7.731E-05	0.38	5.727E-05	0.32	6.069E-05	0.32
29	7.925E-05	0.40	5.917E-05	0.33	6.206E-05	0.33
30	1.015E-05	1.04	7.570E-06	0.93	7.929E-06	0.80
31	7.877E-05	0.36	5.896E-05	0.31	6.197E-05	0.31
32	3.100E-05	0.67	2.324E-05	0.56	2.451E-05	0.53
33	2.672E-05	0.59	2.024E-05	0.52	2.132E-05	0.50
34	6.145E-05	0.37	4.644E-05	0.35	4.884E-05	0.31
35	3.600E-05	0.56	2.728E-05	0.48	2.873E-05	0.49
36	3.382E-05	0.56	2.557E-05	0.45	2.677E-05	0.43
37	2.210E-05	0.69	1.660E-05	0.53	1.740E-05	0.47
38	2.610E-05	0.54	1.988E-05	0.51	2.089E-05	0.46
39	9.757E-05	0.35	7.496E-05	0.31	7.906E-05	0.26
40	9.056E-05	0.30	6.985E-05	0.26	7.448E-05	0.24
41	1.136E-04	0.28	8.857E-05	0.27	9.451E-05	0.23
42	9.317E-05	0.30	7.369E-05	0.26	7.917E-05	0.23
43	5.088E-05	0.38	4.060E-05	0.38	4.280E-05	0.33
44	6.986E-05	0.33	5.603E-05	0.26	6.023E-05	0.24
45	3.543E-05	0.41	2.811E-05	0.40	3.116E-05	0.35
46	8.461E-06	0.85	6.636E-06	0.74	7.163E-06	0.68
47	2.360E-05	0.58	1.874E-05	0.48	1.951E-05	0.43

48	6.690E-06	0.97	5.312E-06	0.83	5.609E-06	0.74
49	4.334E-05	0.42	3.480E-05	0.36	3.728E-05	0.34
50	2.956E-05	0.47	2.378E-05	0.41	2.577E-05	0.37
51	7.900E-06	1.00	6.324E-06	0.89	6.901E-06	0.75
52	2.079E-05	0.57	1.674E-05	0.50	1.823E-05	0.44
53	7.630E-05	0.30	6.151E-05	0.25	6.694E-05	0.22
54	3.339E-05	0.44	2.708E-05	0.41	2.931E-05	0.34
55	6.644E-05	0.32	5.419E-05	0.29	5.892E-05	0.25
56	4.334E-05	0.38	3.529E-05	0.35	3.849E-05	0.25
57	4.942E-05	0.32	4.035E-05	0.30	4.400E-05	0.27
58	2.598E-05	0.45	2.130E-05	0.43	2.318E-05	0.33
59	4.440E-05	0.37	3.640E-05	0.34	3.964E-05	0.27
60	6.453E-05	0.37	5.295E-05	0.33	5.758E-05	0.29
61	6.021E-06	0.92	4.931E-06	0.82	5.408E-06	0.67
62	3.240E-05	0.43	2.656E-05	0.39	2.893E-05	0.33
63	2.167E-05	0.55	1.791E-05	0.47	1.934E-05	0.33
64	1.717E-05	0.57	1.406E-05	0.48	1.531E-05	0.38
65	5.643E-06	1.04	4.690E-06	0.99	5.085E-06	0.79
66	2.887E-05	0.46	2.375E-05	0.42	2.576E-05	0.34
67	2.116E-05	0.52	1.732E-05	0.42	1.893E-05	0.38
68	4.602E-06	1.17	3.819E-06	1.05	4.173E-06	0.81
69	3.758E-05	0.44	3.080E-05	0.39	3.344E-05	0.30
70	2.683E-05	0.44	2.213E-05	0.39	2.397E-05	0.33
71	4.619E-05	0.36	3.804E-05	0.34	4.126E-05	0.28
72	2.674E-06	1.48	2.219E-06	1.38	2.399E-06	1.22
73	2.711E-05	0.45	2.244E-05	0.40	2.434E-05	0.33
74	7.951E-05	0.26	6.594E-05	0.23	7.155E-05	0.20
75	9.108E-06	0.66	7.550E-06	0.61	8.159E-06	0.48
76	2.305E-05	0.49	1.904E-05	0.43	2.069E-05	0.36
77	1.750E-05	0.57	1.469E-05	0.52	1.587E-05	0.42
78	1.524E-06	1.91	1.276E-06	1.70	1.388E-06	1.29
79	9.988E-06	0.66	8.197E-06	0.60	8.967E-06	0.52
80	4.540E-06	1.09	3.814E-06	0.99	4.105E-06	0.77
81	5.555E-05	0.32	4.607E-05	0.27	4.992E-05	0.24
82	3.310E-06	1.42	2.725E-06	1.11	2.961E-06	0.89
83	4.419E-06	1.04	3.712E-06	1.05	4.020E-06	0.86
84	8.145E-06	0.84	6.795E-06	0.76	7.380E-06	0.60
85	1.002E-05	0.73	8.363E-06	0.62	9.051E-06	0.47
86	1.362E-05	0.60	1.134E-05	0.55	1.227E-05	0.45
87	1.192E-05	0.59	9.968E-06	0.53	1.080E-05	0.46
88	3.038E-06	1.22	2.590E-06	1.05	2.820E-06	0.95
89	6.642E-06	0.84	5.516E-06	0.71	5.975E-06	0.58
90	6.939E-06	0.88	5.766E-06	0.74	6.238E-06	0.63
91	8.293E-06	0.76	6.880E-06	0.61	7.449E-06	0.53
92	4.803E-06	0.98	4.033E-06	0.83	4.347E-06	0.64
93	8.165E-06	0.79	6.782E-06	0.72	7.349E-06	0.62
94	4.262E-06	1.07	3.565E-06	1.00	3.873E-06	0.78
95	1.259E-05	0.57	1.053E-05	0.52	1.141E-05	0.46
96	3.377E-06	1.20	2.846E-06	1.03	3.065E-06	0.82
97	3.495E-06	1.34	2.919E-06	1.07	3.152E-06	0.95
98	3.485E-06	1.16	2.935E-06	1.09	3.166E-06	0.79
99	2.327E-06	1.42	1.921E-06	1.24	2.110E-06	1.07

100	3.434E-06	1.26	2.887E-06	1.02	3.112E-06	0.86
101	4.975E-06	1.02	4.172E-06	0.93	4.476E-06	0.72
102	3.334E-06	1.13	2.844E-06	0.95	3.052E-06	0.89
103	4.663E-06	1.04	3.878E-06	0.90	4.233E-06	0.75
104	4.179E-06	0.93	3.497E-06	0.93	3.824E-06	0.76
105	4.301E-06	1.06	3.631E-06	0.86	3.921E-06	0.68
106	1.521E-06	1.38	1.270E-06	1.22	1.392E-06	1.23
107	3.551E-06	1.19	2.966E-06	1.00	3.225E-06	0.85
108	3.220E-06	1.10	2.748E-06	1.09	3.010E-06	0.89
109	5.102E-06	0.91	4.273E-06	0.87	4.669E-06	0.69
110	2.999E-06	1.12	2.534E-06	1.05	2.791E-06	1.02
111	3.026E-06	1.23	2.542E-06	1.11	2.766E-06	0.88
112	1.780E-06	1.57	1.533E-06	1.41	1.651E-06	1.12
113	5.886E-06	0.94	4.858E-06	0.83	5.283E-06	0.69
114	1.934E-06	1.65	1.630E-06	1.35	1.777E-06	1.22
115	5.096E-06	0.80	4.246E-06	0.76	4.591E-06	0.67
116	1.083E-05	0.67	9.090E-06	0.57	9.797E-06	0.50
117	1.194E-05	0.65	9.964E-06	0.58	1.073E-05	0.42
118	1.283E-05	0.64	1.077E-05	0.54	1.167E-05	0.45
119	8.261E-06	0.83	6.977E-06	0.71	7.560E-06	0.65
120	5.751E-06	0.76	4.897E-06	0.76	5.283E-06	0.63
121	6.084E-06	0.90	5.147E-06	0.81	5.612E-06	0.65
122	3.230E-06	1.34	2.728E-06	1.18	2.965E-06	0.97
123	1.044E-05	0.69	8.746E-06	0.58	9.420E-06	0.48
124	7.335E-06	0.81	6.162E-06	0.77	6.667E-06	0.61
125	6.975E-06	0.92	5.843E-06	0.84	6.322E-06	0.67
126	5.819E-06	0.85	4.856E-06	0.75	5.239E-06	0.58
127	5.601E-06	0.85	4.700E-06	0.79	5.120E-06	0.70
128	7.707E-06	0.79	6.519E-06	0.75	6.965E-06	0.59
129	9.648E-06	0.71	8.117E-06	0.61	8.784E-06	0.50
130	3.990E-06	1.10	3.370E-06	0.91	3.650E-06	0.82
131	1.695E-05	0.55	1.418E-05	0.51	1.536E-05	0.40
132	1.125E-05	0.58	9.439E-06	0.51	1.024E-05	0.41
133	1.339E-05	0.64	1.139E-05	0.63	1.236E-05	0.51
134	1.477E-05	0.50	1.239E-05	0.47	1.341E-05	0.40
135	2.390E-06	1.34	2.038E-06	1.29	2.231E-06	1.08
136	3.842E-06	0.95	3.345E-06	0.87	3.675E-06	0.75
137	2.532E-06	0.92	2.678E-06	0.90	2.985E-06	0.77
138	4.060E-06	0.86	3.528E-06	0.86	3.892E-06	0.66
139	4.580E-06	0.87	3.922E-06	0.85	4.275E-06	0.70
140	1.216E-05	0.67	1.025E-05	0.58	1.102E-05	0.52
141	8.858E-06	0.85	7.445E-06	0.74	8.087E-06	0.56
142	5.841E-06	0.91	4.959E-06	0.82	5.324E-06	0.65
143	1.997E-05	0.50	1.683E-05	0.43	1.809E-05	0.36
144	8.166E-06	0.82	6.856E-06	0.67	7.391E-06	0.55
145	7.111E-06	0.68	6.056E-06	0.66	6.519E-06	0.54
146	1.203E-05	0.54	1.017E-05	0.54	1.097E-05	0.39
147	3.722E-06	1.24	3.138E-06	0.96	3.366E-06	0.84
148	1.860E-06	1.56	1.586E-06	1.46	1.701E-06	1.21
149	1.206E-06	2.05	1.015E-06	1.71	1.072E-06	1.53
150	3.977E-06	1.31	3.368E-06	1.12	3.613E-06	0.93
151	4.117E-06	1.00	3.453E-06	0.92	3.744E-06	0.78

152	4.274E-06	1.01	3.630E-06	0.92	3.886E-06	0.70
153	4.487E-06	1.11	3.748E-06	0.91	4.100E-06	0.81
154	4.621E-06	0.96	3.906E-06	0.83	4.213E-06	0.63
155	4.359E-06	1.03	3.647E-06	0.95	3.910E-06	0.77
156	4.001E-06	0.99	3.376E-06	0.91	3.640E-06	0.70
157	4.715E-06	0.99	3.972E-06	0.92	4.265E-06	0.73
158	4.916E-06	1.04	4.152E-06	0.93	4.422E-06	0.79
159	6.734E-06	0.93	5.705E-06	0.87	6.177E-06	0.69
160	3.485E-06	1.04	2.976E-06	1.05	3.221E-06	0.85
161	4.942E-06	1.03	4.139E-06	0.88	4.481E-06	0.72
162	5.920E-06	1.04	4.946E-06	0.83	5.349E-06	0.67
163	6.209E-06	0.78	5.201E-06	0.69	5.606E-06	0.62
164	6.496E-06	0.70	5.486E-06	0.68	5.927E-06	0.56
165	6.922E-06	0.77	5.820E-06	0.68	6.252E-06	0.59
166	4.033E-06	1.04	3.410E-06	0.80	3.681E-06	0.76
167	4.213E-06	1.08	3.535E-06	0.97	3.813E-06	0.79
168	4.303E-06	1.06	3.611E-06	0.98	3.926E-06	0.89
169	4.456E-06	1.08	3.763E-06	0.91	4.029E-06	0.76
170	4.615E-06	0.94	3.896E-06	0.81	4.241E-06	0.72
171	2.368E-06	1.47	2.000E-06	1.18	2.163E-06	1.04
172	2.416E-06	1.29	2.056E-06	1.17	2.239E-06	0.92
173	2.502E-06	1.56	2.115E-06	1.29	2.274E-06	1.03
174	2.484E-06	1.34	2.116E-06	1.17	2.317E-06	0.95
175	9.836E-07	1.70	8.365E-07	1.57	9.181E-07	1.39
176	9.991E-07	2.09	8.477E-07	2.15	9.326E-07	1.48
177	1.047E-06	2.14	8.975E-07	2.03	9.630E-07	1.62
178	1.036E-06	2.17	8.869E-07	1.84	9.593E-07	1.58
179	1.028E-06	1.86	8.579E-07	1.58	9.502E-07	1.28
180	1.103E-06	1.91	9.256E-07	1.80	1.010E-06	1.58
181	1.076E-06	2.21	9.034E-07	1.93	9.841E-07	1.61
182	1.083E-06	1.94	9.194E-07	1.87	1.008E-06	1.62
183	1.070E-06	1.99	9.061E-07	1.93	9.860E-07	1.47
184	1.105E-06	1.88	9.307E-07	1.50	1.006E-06	1.22
185	1.126E-06	2.01	9.476E-07	1.90	1.025E-06	1.47
186	1.156E-06	2.11	9.966E-07	1.79	1.047E-06	1.48
187	1.158E-06	2.44	9.648E-07	2.09	1.054E-06	1.59
188	1.162E-06	2.12	9.886E-07	1.76	1.075E-06	1.43
189	1.185E-06	1.71	9.920E-07	1.51	1.086E-06	1.35
190	3.013E-06	1.40	2.536E-06	1.08	2.780E-06	0.82
191	3.061E-06	1.10	2.580E-06	0.94	2.821E-06	0.78
192	3.165E-06	1.24	2.678E-06	1.12	2.889E-06	0.82
193	3.309E-06	1.12	2.813E-06	1.05	3.006E-06	0.80
194	6.863E-06	0.85	5.812E-06	0.74	6.238E-06	0.58
195	7.309E-06	0.76	6.192E-06	0.62	6.677E-06	0.58
196	7.793E-06	0.74	6.573E-06	0.71	7.146E-06	0.60
197	8.598E-06	0.75	7.245E-06	0.62	7.811E-06	0.50
198	8.942E-06	0.70	7.581E-06	0.62	8.189E-06	0.55
199	4.795E-06	1.02	4.019E-06	0.86	4.376E-06	0.70
200	5.124E-06	0.92	4.336E-06	0.82	4.696E-06	0.71
201	1.069E-05	0.63	9.077E-06	0.54	9.773E-06	0.47
202	1.198E-05	0.60	1.011E-05	0.52	1.094E-05	0.46
203	1.289E-05	0.60	1.092E-05	0.50	1.183E-05	0.42

204	1.472E-05	0.56	1.246E-05	0.52	1.358E-05	0.44
205	8.606E-06	0.68	7.720E-06	0.61	8.130E-06	0.52
206	9.299E-06	0.60	8.381E-06	0.53	8.885E-06	0.41
207	9.581E-06	0.65	8.651E-06	0.59	9.153E-06	0.48
208	1.131E-05	0.59	1.016E-05	0.52	1.089E-05	0.43
209	1.166E-05	0.60	1.057E-05	0.49	1.121E-05	0.39
210	1.411E-05	0.54	1.279E-05	0.50	1.361E-05	0.42
211	1.615E-05	0.49	1.464E-05	0.46	1.555E-05	0.39
212	1.909E-05	0.46	1.720E-05	0.39	1.843E-05	0.30
213	2.608E-05	0.35	2.348E-05	0.32	2.518E-05	0.27
214	3.707E-05	0.33	3.339E-05	0.27	3.582E-05	0.24
215	5.527E-05	0.28	4.992E-05	0.23	5.383E-05	0.18
216	9.211E-05	0.20	8.393E-05	0.18	9.072E-05	0.14
217	5.531E-05	0.21	5.309E-05	0.19	5.614E-05	0.15
218	7.087E-05	0.22	6.796E-05	0.17	7.232E-05	0.14
219	8.444E-05	0.19	8.152E-05	0.18	8.677E-05	0.14
220	1.018E-04	0.17	9.928E-05	0.16	1.058E-04	0.13
221	1.202E-04	0.17	1.184E-04	0.15	1.265E-04	0.12
222	1.366E-04	0.16	1.367E-04	0.13	1.458E-04	0.11
223	1.537E-04	0.14	1.574E-04	0.12	1.676E-04	0.10
224	7.513E-05	0.20	7.982E-05	0.16	8.458E-05	0.12
225	2.333E-04	0.12	2.723E-04	0.10	2.824E-04	0.09
226	3.174E-05	0.25	4.488E-05	0.20	4.455E-05	0.15
227	2.896E-05	0.26	4.645E-05	0.19	4.446E-05	0.14
228	1.041E-05	0.38	1.905E-05	0.31	1.758E-05	0.18
229	9.704E-06	0.45	1.974E-05	0.35	1.751E-05	0.19
230	4.519E-06	0.57	1.023E-05	0.44	8.710E-06	0.22
231	4.248E-06	0.54	1.063E-05	0.48	8.758E-06	0.22
232	3.933E-06	0.65	1.121E-05	0.43	8.876E-06	0.22
233	2.232E-06	0.67	7.424E-06	0.53	5.502E-06	0.30
234	1.410E-06	0.82	5.293E-06	0.56	3.799E-06	0.30
235	5.217E-07	1.32	1.044E-06	1.00	1.118E-06	0.46
236	3.602E-07	1.73	7.525E-07	1.15	8.035E-07	0.58
237	2.289E-07	1.99	5.628E-07	1.24	6.167E-07	0.57
238	5.923E-09	9.30	2.263E-08	7.59	2.576E-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
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71	0.000E+00	0.00
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75	0.000E+00	0.00
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78	0.000E+00	0.00
79	0.000E+00	0.00
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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
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110	0.000E+00	0.00
111	0.000E+00	0.00
112	0.000E+00	0.00
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114	0.000E+00	0.00

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120	0.000E+00	0.00
121	0.000E+00	0.00
122	0.000E+00	0.00
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161	0.000E+00	0.00
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165	0.000E+00	0.00
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169	0.000E+00	0.00
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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

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  219   0.000E+00    0.00
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  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 0.7622     **************
 0.7622 to 0.7650     *****************
 0.7650 to 0.7678     ****************************
 0.7678 to 0.7706     *********************
 0.7706 to 0.7735     *****
 0.7735 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 0.7622     *******
 0.7622 to 0.7650     ***************
 0.7650 to 0.7678     **********************
 0.7678 to 0.7706     ****************
 0.7706 to 0.7735     *****
 0.7735 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 0.7622     *****
 0.7622 to 0.7650     *************
```

```
 0.7650 to 0.7678     **************
 0.7678 to 0.7706     **********
 0.7706 to 0.7735     ***
 0.7735 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 0.7622     ***
 0.7622 to 0.7650     ******
 0.7650 to 0.7678     ******
 0.7678 to 0.7706     *******
 0.7706 to 0.7735
 0.7735 to 0.7763     **
 0.7763 to 0.7791

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

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*********************************************
        ***
***
        ***                                     ******      final results
table      ******                                   ***
        ***
***
        ***        best estimate system k-eff
0.76640 + or - 0.00047                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.66490E-02 + or -  1.15649E-04            ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  9.44868E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52590E-01 + or -  1.53572E-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     3.10400 minutes


*********************************************************************
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1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999             //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22            //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22            //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
```

```
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                  11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                 11111111      66666666666



      0000000       666666666666                     0000000
33333333333                     22222222222     99999999999
     000000000     6666666666666                    000000000
3333333333333                   2222222222222   9999999999999
    00       00    66                    :::        00       00    33
33         :::       22         22   99         99
   00         00   66                    :::       00         00
33         :::                  22   99         99
   00         00   66                    :::       00         00
33         :::                  22   99         99
   00         00   666666666666                    00         00
333                             22     9999999999999
   00         00   6666666666666                   00         00
333                            22        999999999999
   00         00   66         66         :::       00         00
33         :::            22                     99
   00         00   66         66         :::       00         00
33         :::          22                       99
    00       00    66         66         :::        00       00    33
33         :::        22                         99
     000000000     6666666666666                    000000000
3333333333333                   2222222222222   9999999999999
      0000000       66666666666                      0000000
33333333333                    2222222222222   999999999999
1

    SSSSSSSSSS     CCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCC    AAAAAAAAAAA    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
   SSSSSSSSSSSS   CCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
```

```
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE




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

*********************************************************************
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*********************************************************************
************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
```

```
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:03:29.04
*****
        *****
*****
        *****
*****

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1

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

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

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        ***
***
        ***          unit
volume                                          ***
        ***         number               data set name
name        unit function                     ***
        ***         ------               -------------
----        -------------                     ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
```

```
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

*********************************************************************
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                                 ........ finished preparing input data
........
1
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****************************
                 ***
***
                 ***          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  5.62694E-12  1.69755E-12    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  6.04501E-08  1.81184E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  1.56834E-14  5.16847E-14    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  7.37712E-07  5.29651E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33934E-08  6.98509E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02826E-07  7.99741E-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  5.24103E-07  8.93225E-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  2.96839E-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  6.97053E-11  1.73004E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90810E-08  1.32086E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
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    1040091  1.12001E-08  3.04771E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.71429E-08  4.71611E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  8.45019E-10  2.35003E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.73882E-08  4.88779E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.91351E-10  8.27716E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.46017E-09  9.93381E-08   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  4.64449E-18  1.29165E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.45143E-10  4.12340E-09   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  1.16611E-08  3.31281E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39894E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  7.54498E-09  2.18862E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.78880E-08  5.24240E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75594E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.64806E-09  2.28724E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  7.63893E-10  2.26161E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  6.48304E-10  1.95819E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  5.35058E-10  1.63213E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  8.90561E-11  2.74326E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  2.36733E-10  7.36307E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  4.12354E-11  1.30725E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  2.90227E-10  8.94001E-09   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.11085E-12  3.48832E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  1.25193E-10  3.93131E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  1.89959E-11  6.07885E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
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    1046108  7.07748E-12  2.28601E-10   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  4.02056E-12  1.31067E-10   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  8.98703E-11  2.90279E-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  1.29450E-09  4.29745E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43802E-09  8.16658E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23521E-09  4.17459E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90270E-09  9.89694E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.57930E-10  2.62961E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.55786E-12  5.35828E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.50918E-11  2.23883E-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  1.47020E-09  5.14475E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63272E-09  1.63500E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64421E-09  5.85211E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23143E-09  2.23654E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.87321E-10  3.23786E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11055E-09  4.11898E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  7.04934E-12  2.65682E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  1.97518E-11  7.50319E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  6.95593E-11  2.68403E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25969E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
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    1054131  3.44749E-10  1.35090E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67705E-11  1.06503E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87635E-12  7.57724E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  8.09417E-10  3.22016E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.19199E-15  4.77790E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  8.69368E-10  3.51072E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  7.65509E-10  3.13717E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.37709E-08  1.39407E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99456E-11  2.51056E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  8.14354E-10  3.38608E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.49173E-10  6.29198E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  7.44152E-10  3.16107E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21018E-12  2.65666E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  5.20033E-10  2.24024E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  6.11167E-10  2.57784E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12955E-11  2.62214E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  6.76932E-10  2.89580E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  1.64638E-10  7.09225E-09   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  5.13071E-10  2.22559E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  3.76218E-10  1.64322E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87225E-11  8.23371E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  2.08849E-10  9.24725E-09   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  2.42225E-10  1.06524E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.87417E-17  8.29834E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84876E-12  8.24121E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  2.00725E-11  8.82732E-10   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
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    1062149  1.36319E-10  6.07662E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  5.91598E-14  2.65485E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.04462E-09  1.37544E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  3.39340E-11  1.54316E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32588E-13  1.06468E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.44329E-09  6.52021E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.57878E-09  7.22687E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  8.16576E-15  3.76237E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  3.89611E-12  1.80680E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81602E-13  8.47614E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.81546E-12  2.64460E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29365E-11  2.89976E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27219E-10  1.98120E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.93032E-10  2.76788E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51519E-10  2.12093E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.18630E-10  3.39716E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31138E-10  3.02140E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
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    1092235  1.76386E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22775E-06  6.52009E-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  6.82390E-12  4.84207E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  9.45081E-18  6.73439E-16   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  5.66319E-10  4.05243E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  1.46903E-15  1.05560E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.61719E-20  1.16692E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49928E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.03506E-20  7.46871E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.97636E-28  2.88118E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99983E-21  7.27563E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  6.65872E-21  4.82474E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.84620E-21  7.16385E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.75410E-21  7.12608E-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
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    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
                                  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:
  9378 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       ........

                                 ........     0.01600 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
0.01667 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 15902 independent fission points were generated for generation 1
          1       7.76509E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15639 independent fission points were generated for generation 2
          2       7.66203E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15769 independent fission points were generated for generation 3
          3       7.69023E-01      7.69023E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.69551E-01      7.69287E-01      2.63602E-04
0.00000E+00      0.00000E+00
          5       7.68614E-01      7.69063E-01      2.71191E-04
0.00000E+00      0.00000E+00
          6       7.61325E-01      7.67128E-01      1.94377E-03
0.00000E+00      0.00000E+00
          7       7.77621E-01      7.69227E-01      2.58281E-03
0.00000E+00      0.00000E+00
          8       7.73073E-01      7.69868E-01      2.20412E-03
0.00000E+00      0.00000E+00
          9       7.62155E-01      7.68766E-01      2.16427E-03
0.00000E+00      0.00000E+00
         10       7.55149E-01      7.67064E-01      2.53182E-03
0.00000E+00      0.00000E+00
         11       7.61669E-01      7.66465E-01      2.31193E-03
0.00000E+00      0.00000E+00
         12       7.62937E-01      7.66112E-01      2.09772E-03
0.00000E+00      0.00000E+00
         13       7.59391E-01      7.65501E-01      1.99341E-03
0.00000E+00      0.00000E+00
         14       7.63906E-01      7.65368E-01      1.82457E-03
0.00000E+00      0.00000E+00
         15       7.71035E-01      7.65804E-01      1.73406E-03
0.00000E+00      0.00000E+00
         16       7.64664E-01      7.65722E-01      1.60749E-03
0.00000E+00      0.00000E+00
         17       7.63994E-01      7.65607E-01      1.50093E-03
0.00000E+00      0.00000E+00
         18       7.59661E-01      7.65235E-01      1.45235E-03
0.00000E+00      0.00000E+00
         19       7.60357E-01      7.64948E-01      1.39410E-03
```

0.00000E+00	0.00000E+00				
20	7.68299E-01	7.65135E-01	1.32749E-03	0.00000E+00	0.00000E+00
21	7.64178E-01	7.65084E-01	1.25669E-03	0.00000E+00	0.00000E+00
22	7.67502E-01	7.65205E-01	1.19831E-03	0.00000E+00	0.00000E+00
23	7.60222E-01	7.64968E-01	1.16425E-03	0.00000E+00	0.00000E+00
24	7.65439E-01	7.64989E-01	1.11028E-03	0.00000E+00	0.00000E+00
25	7.70329E-01	7.65221E-01	1.08601E-03	0.00000E+00	0.00000E+00
26	7.65186E-01	7.65220E-01	1.03978E-03	0.00000E+00	0.00000E+00
27	7.66249E-01	7.66801E-01	3.01715E-03	0.00000E+00	0.00000E+00
28	7.63927E-01	7.66226E-01	2.37059E-03	0.00000E+00	0.00000E+00
29	7.66657E-01	7.66298E-01	1.65754E-03	0.00000E+00	0.00000E+00
30	7.66874E-01	7.66380E-01	1.22415E-03	0.00000E+00	0.00000E+00
31	7.61565E-01	7.65778E-01	1.02987E-03	0.00000E+00	0.00000E+00
32	7.74228E-01	7.66717E-01	2.09610E-03	0.00000E+00	0.00000E+00
33	7.64930E-01	7.66538E-01	1.88226E-03	0.00000E+00	0.00000E+00
34	7.66024E-01	7.66491E-01	1.60595E-03	0.00000E+00	0.00000E+00
35	7.68450E-01	7.66655E-01	1.55958E-03	0.00000E+00	0.00000E+00
36	7.68193E-01	7.66773E-01	1.37474E-03	0.00000E+00	0.00000E+00
37	7.69714E-01	7.66983E-01	1.30188E-03	0.00000E+00	0.00000E+00
38	7.60976E-01	7.66583E-01	1.15320E-03	0.00000E+00	0.00000E+00
39	7.63300E-01	7.66377E-01	8.96118E-04	0.00000E+00	0.00000E+00
40	7.62333E-01	7.66139E-01	1.00940E-03	0.00000E+00	0.00000E+00
41	7.68096E-01	7.66248E-01	9.25262E-04	0.00000E+00	0.00000E+00
42	7.71312E-01	7.66515E-01	8.32228E-04	0.00000E+00	0.00000E+00
43	7.64015E-01	7.66390E-01	7.98156E-04	0.00000E+00	0.00000E+00
44	7.63064E-01	7.66231E-01	7.75284E-04	0.00000E+00	0.00000E+00
45	7.68697E-01	7.66343E-01	7.46749E-04		

0.00000E+00	0.00000E+00				
46	7.66963E-01	7.66370E-01	7.12556E-04	0.00000E+00	0.00000E+00
47	7.69770E-01	7.66512E-01	6.96760E-04	0.00000E+00	0.00000E+00
48	7.63622E-01	7.66396E-01	6.77899E-04	0.00000E+00	0.00000E+00
49	7.70712E-01	7.66562E-01	6.72776E-04	0.00000E+00	0.00000E+00
50	7.70163E-01	7.66696E-01	6.61071E-04	0.00000E+00	0.00000E+00
51	7.65256E-01	7.66644E-01	6.38349E-04	0.00000E+00	0.00000E+00
52	7.68368E-01	7.66704E-01	6.18206E-04	0.00000E+00	0.00000E+00
53	7.70570E-01	7.66833E-01	6.11243E-04	0.00000E+00	0.00000E+00
54	7.57324E-01	7.66526E-01	6.70292E-04	0.00000E+00	0.00000E+00
55	7.69375E-01	7.66615E-01	6.54796E-04	0.00000E+00	0.00000E+00
56	7.70243E-01	7.66725E-01	6.44071E-04	0.00000E+00	0.00000E+00
57	7.62813E-01	7.66610E-01	6.35415E-04	0.00000E+00	0.00000E+00
58	7.64637E-01	7.66553E-01	6.19169E-04	0.00000E+00	0.00000E+00
59	7.65934E-01	7.66536E-01	6.01479E-04	0.00000E+00	0.00000E+00
60	7.69516E-01	7.66617E-01	5.90367E-04	0.00000E+00	0.00000E+00
61	7.68212E-01	7.66659E-01	5.75808E-04	0.00000E+00	0.00000E+00
62	7.62288E-01	7.66547E-01	5.72137E-04	0.00000E+00	0.00000E+00
63	7.63785E-01	7.66478E-01	5.61758E-04	0.00000E+00	0.00000E+00
64	7.66194E-01	7.66471E-01	5.47580E-04	0.00000E+00	0.00000E+00
65	7.63602E-01	7.66402E-01	5.38624E-04	0.00000E+00	0.00000E+00
66	7.67279E-01	7.66423E-01	5.26057E-04	0.00000E+00	0.00000E+00
67	7.62932E-01	7.66343E-01	5.20057E-04	0.00000E+00	0.00000E+00
68	7.72954E-01	7.66490E-01	5.29858E-04	0.00000E+00	0.00000E+00
69	7.69667E-01	7.66559E-01	5.22741E-04	0.00000E+00	0.00000E+00
70	7.63972E-01	7.66504E-01	5.14337E-04	0.00000E+00	0.00000E+00
71	7.70664E-01	7.66591E-01	5.11001E-04		

0.00000E+00	0.00000E+00				
72	7.59011E-01	7.66436E-01	5.24586E-04	0.00000E+00	0.00000E+00
73	7.67114E-01	7.66450E-01	5.13954E-04	0.00000E+00	0.00000E+00
74	7.69617E-01	7.66512E-01	5.07540E-04	0.00000E+00	0.00000E+00
75	7.64285E-01	7.66469E-01	4.99401E-04	0.00000E+00	0.00000E+00
76	7.61378E-01	7.66373E-01	4.99397E-04	0.00000E+00	0.00000E+00
77	7.71736E-01	7.66472E-01	5.00229E-04	0.00000E+00	0.00000E+00
78	7.66921E-01	7.66481E-01	4.90948E-04	0.00000E+00	0.00000E+00
79	7.65048E-01	7.66455E-01	4.82642E-04	0.00000E+00	0.00000E+00
80	7.62559E-01	7.66387E-01	4.79026E-04	0.00000E+00	0.00000E+00
81	7.67417E-01	7.66404E-01	4.70894E-04	0.00000E+00	0.00000E+00
82	7.67333E-01	7.66420E-01	4.62981E-04	0.00000E+00	0.00000E+00
83	7.66301E-01	7.66418E-01	4.55071E-04	0.00000E+00	0.00000E+00
84	7.74685E-01	7.66554E-01	4.68164E-04	0.00000E+00	0.00000E+00
85	7.64382E-01	7.66519E-01	4.61800E-04	0.00000E+00	0.00000E+00
86	7.63842E-01	7.66476E-01	4.56337E-04	0.00000E+00	0.00000E+00
87	7.62381E-01	7.66412E-01	4.53718E-04	0.00000E+00	0.00000E+00
88	7.70075E-01	7.66468E-01	4.50225E-04	0.00000E+00	0.00000E+00
89	7.64764E-01	7.66443E-01	4.44019E-04	0.00000E+00	0.00000E+00
90	7.67771E-01	7.66463E-01	4.37703E-04	0.00000E+00	0.00000E+00
91	7.69323E-01	7.66505E-01	4.33230E-04	0.00000E+00	0.00000E+00
92	7.62084E-01	7.66441E-01	4.31734E-04	0.00000E+00	0.00000E+00
93	7.69825E-01	7.66489E-01	4.28250E-04	0.00000E+00	0.00000E+00
94	7.71906E-01	7.66565E-01	4.29126E-04	0.00000E+00	0.00000E+00
95	7.63229E-01	7.66519E-01	4.25640E-04	0.00000E+00	0.00000E+00
96	7.65650E-01	7.66507E-01	4.19861E-04	0.00000E+00	0.00000E+00
97	7.64594E-01	7.66481E-01	4.14898E-04		

```
0.00000E+00      0.00000E+00
         98       7.71506E-01      7.66548E-01      4.14849E-04
0.00000E+00      0.00000E+00
         99       7.69919E-01      7.66592E-01      4.11742E-04
0.00000E+00      0.00000E+00
        100       7.67687E-01      7.66607E-01      4.06543E-04
0.00000E+00      0.00000E+00
        101       7.69745E-01      7.66647E-01      4.03294E-04
0.00000E+00      0.00000E+00
        102       7.69361E-01      7.66681E-01      3.99608E-04
0.00000E+00      0.00000E+00
        103       7.67926E-01      7.66697E-01      3.94832E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=2C7EBDC6F243BF63
        104       7.70693E-01      7.66746E-01      3.93053E-04
0.00000E+00      0.00000E+00
        105       7.62631E-01      7.66696E-01      3.91481E-04
0.00000E+00      0.00000E+00
        106       7.68567E-01      7.66718E-01      3.87350E-04
0.00000E+00      0.00000E+00
        107       7.66415E-01      7.66715E-01      3.82672E-04
0.00000E+00      0.00000E+00
        108       7.65333E-01      7.66699E-01      3.78447E-04
0.00000E+00      0.00000E+00
        109       7.71395E-01      7.66753E-01      3.78028E-04
0.00000E+00      0.00000E+00
        110       7.69318E-01      7.66783E-01      3.74795E-04
0.00000E+00      0.00000E+00
        111       7.63927E-01      7.66750E-01      3.71914E-04
0.00000E+00      0.00000E+00
        112       7.67692E-01      7.66761E-01      3.67819E-04
0.00000E+00      0.00000E+00
        113       7.69835E-01      7.66795E-01      3.65300E-04
0.00000E+00      0.00000E+00
        114       7.69652E-01      7.66826E-01      3.62610E-04
0.00000E+00      0.00000E+00
        115       7.59474E-01      7.66746E-01      3.67593E-04
0.00000E+00      0.00000E+00
        116       7.65800E-01      7.66736E-01      3.63721E-04
0.00000E+00      0.00000E+00
        117       7.69005E-01      7.66760E-01      3.60614E-04
0.00000E+00      0.00000E+00
        118       7.68109E-01      7.66775E-01      3.57046E-04
0.00000E+00      0.00000E+00
        119       7.66677E-01      7.66774E-01      3.53269E-04
0.00000E+00      0.00000E+00
        120       7.62405E-01      7.66729E-01      3.52519E-04
0.00000E+00      0.00000E+00
        121       7.62681E-01      7.66687E-01      3.51352E-04
0.00000E+00      0.00000E+00
        122       7.69752E-01      7.66718E-01      3.49152E-04
```

```
0.00000E+00      0.00000E+00
        123       7.64128E-01      7.66692E-01      3.46596E-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=AAE2A0ED408692C9
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.55179E-05 + or -  1.29379E-08             generation time
=  2.99405E-05 + or -  2.34048E-08
 nu bar   =  2.43895E+00 + or -  9.28090E-06       average fission group
=  2.17557E+02 + or -  1.04879E-02
                      energy(ev) of the average lethargy causing fission
=  5.65286E-02 + or -  1.17972E-04
                                                system mean free path (cm)
=  6.53007E-01 + or -  1.70087E-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          0.76669   + or - 0.00035     0.76635 to 0.76704
0.76600 to 0.76739    0.76565 to 0.76773    2000000      12.5834

      24          0.76670   + or - 0.00035     0.76636 to 0.76705
0.76601 to 0.76740    0.76566 to 0.76775    1980000      12.5799

      25          0.76667   + or - 0.00035     0.76632 to 0.76702
0.76596 to 0.76737    0.76561 to 0.76772    1960000      12.6957

      26          0.76668   + or - 0.00035     0.76633 to 0.76704
0.76597 to 0.76739    0.76562 to 0.76775    1940000      12.7038

      27          0.76669   + or - 0.00036     0.76633 to 0.76705
0.76597 to 0.76740    0.76561 to 0.76776    1920000      12.6682

      28          0.76672   + or - 0.00036     0.76636 to 0.76708
0.76599 to 0.76744    0.76563 to 0.76780    1900000      12.7721

      29          0.76672   + or - 0.00037     0.76635 to 0.76708
0.76599 to 0.76745    0.76562 to 0.76781    1880000      12.7285

      30          0.76672   + or - 0.00037     0.76635 to 0.76708
0.76598 to 0.76745    0.76561 to 0.76782    1860000      12.6822
```

31	0.76677	+ or - 0.00037	0.76640 to 0.76714	0.76603 to 0.76751	0.76567 to 0.76788	1840000	12.9738
32	0.76669	+ or - 0.00036	0.76633 to 0.76705	0.76596 to 0.76742	0.76560 to 0.76778	1820000	12.9137
37	0.76665	+ or - 0.00038	0.76626 to 0.76703	0.76588 to 0.76741	0.76550 to 0.76779	1720000	12.9459
42	0.76673	+ or - 0.00039	0.76635 to 0.76712	0.76596 to 0.76751	0.76557 to 0.76790	1620000	13.9767
47	0.76675	+ or - 0.00041	0.76634 to 0.76716	0.76594 to 0.76756	0.76553 to 0.76797	1520000	14.4144
52	0.76669	+ or - 0.00043	0.76626 to 0.76711	0.76584 to 0.76754	0.76541 to 0.76797	1420000	14.9208
57	0.76673	+ or - 0.00042	0.76631 to 0.76716	0.76589 to 0.76758	0.76547 to 0.76800	1320000	14.4489
62	0.76679	+ or - 0.00045	0.76634 to 0.76723	0.76589 to 0.76768	0.76545 to 0.76812	1220000	14.9583
67	0.76697	+ or - 0.00047	0.76649 to 0.76744	0.76602 to 0.76791	0.76554 to 0.76839	1120000	15.7288
72	0.76694	+ or - 0.00047	0.76647 to 0.76741	0.76600 to 0.76788	0.76553 to 0.76834	1020000	16.3098
77	0.76695	+ or - 0.00049	0.76646 to 0.76744	0.76598 to 0.76793	0.76549 to 0.76841	920000	17.7994
82	0.76708	+ or - 0.00053	0.76655 to 0.76762	0.76601 to 0.76815	0.76548 to 0.76869	820000	18.2302
87	0.76719	+ or - 0.00054	0.76665 to 0.76773	0.76611 to 0.76827	0.76557 to 0.76881	720000	19.0752
92	0.76725	+ or - 0.00059	0.76666 to 0.76784	0.76607 to 0.76843	0.76548 to 0.76902	620000	21.2168
97	0.76729	+ or - 0.00064	0.76665 to 0.76794	0.76601 to 0.76858	0.76536 to 0.76922	520000	25.2812
102	0.76673	+ or - 0.00074	0.76600 to 0.76747	0.76526 to 0.76821	0.76452 to 0.76894	420000	25.1178
107	0.76657	+ or - 0.00090	0.76568 to 0.76747	0.76478 to 0.76837	0.76389 to 0.76926	320000	27.7121
112	0.76614	+ or - 0.00118	0.76496 to 0.76732				

```
0.76377 to 0.76850    0.76259 to 0.76969     220000      29.0977
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)

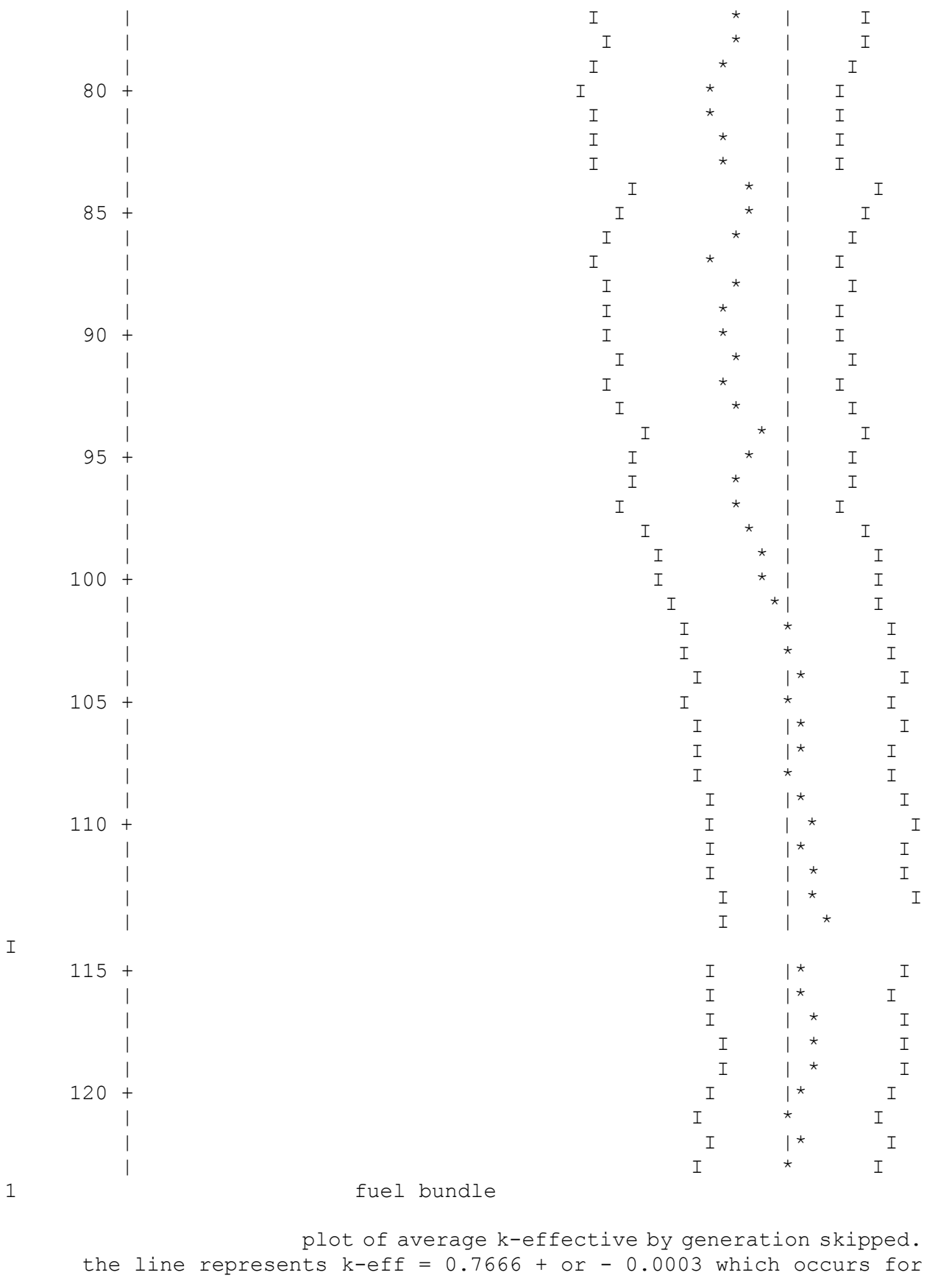
     117          0.76563   + or - 0.00151     0.76412 to 0.76713
0.76261 to 0.76864    0.76110 to 0.77015     120000      26.1638
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76669 + or - 0.00034 which occurs for
123 generations run.

                                0.7654                   0.7667
0.7679

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

```
          |                        I                   *         |
I
          |                                I                 *   |
I
          |                               I                *     |
I
          |                           I                *         |       I
       45 +                              I               *       |        I
          |                               I              *      |        I
          |                                  I              *   |
I
          |                                I              *      |        I
          |                                    I             *  |
I
       50 +                                        I             *
I
          |                                      I             *|
I
          |                                         I            *
I
          |                                            I          |  *
I
          |                                    I              *  |
I
       55 +                                      I              *|
I
          |                                         I            |*
I
          |                                      I             * |
I
          |                                      I            *  |
I
          |                                      I            *  |         I
       60 +                                        I            *|
I
          |                                         I           *|
I
          |                                      I            *  |         I
          |                                    I            *   |       I
          |                                    I            *   |       I
       65 +                                  I            *      |     I
          |                                   I           *     |     I
          |                                 I           *       |    I
          |                                      I           *   |       I
          |                                        I          *  |        I
       70 +                                       I          *   |       I
          |                                         I          * |         I
          |                                    I           *    |      I
          |                                     I          *    |      I
          |                                       I          *   |       I
       75 +                                      I           *   |      I
          |                                  I           *      |    I
```



plot of average k-effective by generation skipped.
the line represents k-eff = 0.7666 + or - 0.0003 which occurs for

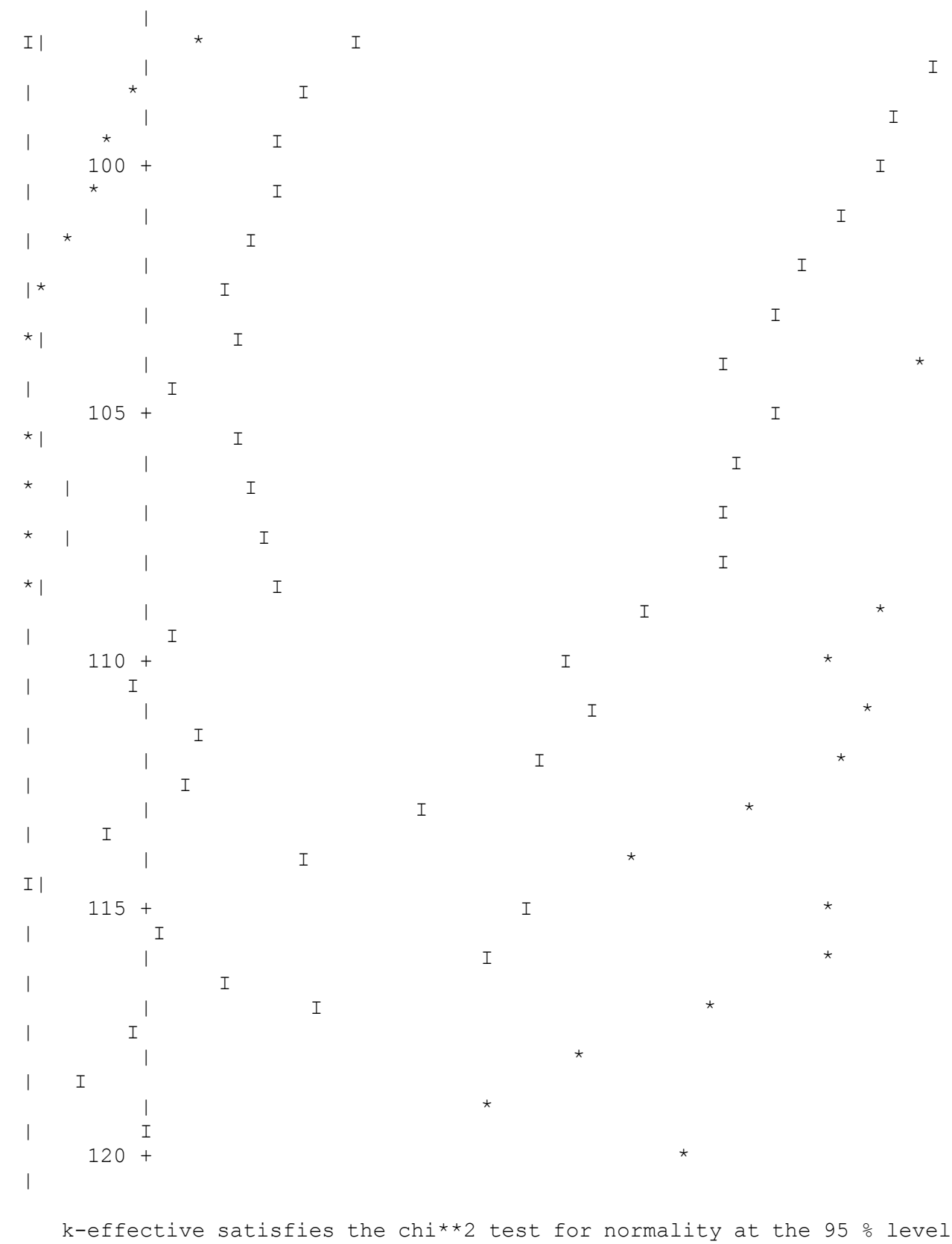
23 generations skipped.

```
                                0.7647                    0.7660
0.7673

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

```
      45 +                                                          I
| *      I
         |                                                          I
| *       I
         |                                                         I
|*       I
         |                                                          I
| *       I
         |                                                         I
|*       I
      50 +                                                        I
*       I
         |                                                        I
*       I
         |                                                       I
*       I
         |                                                     I
*|      I
         |                                                         I
|*       I
      55 +                                                        I
*        I
         |                                                       I
*|       I
         |                                                        I
|*       I
         |                                                         I
|*        I
         |                                                         I
|*        I
      60 +                                                        I
|*       I
         |                                                       I
*        I
         |                                                         I
| *       I
         |                                                          I
|  *       I
         |                                                          I
|  *        I
      65 +                                                          I
|   *        I
         |                                                          I
|   *        I
         |                                                            I
|    *        I
         |                                                          I
|  *        I
         |                                                         I
| *        I
      70 +                                                          I
|  *        I
```

```
          |                                                                I
| *        I
          |                                                                  I
|    *        I
          |                                                                  I
|   *         I
          |                                                                 I
|  *         I
      75 +                                                                  I
|   *         I
          |
I  |      *        I
          |                                                                  I
|    *        I
          |                                                                  I
|    *         I
          |                                                                   I
|     *         I
      80 +
I |       *         I
          |
I  |       *         I
          |
I  |      *          I
          |
I  |       *          I
          |                                                                 I
|   *         I
      85 +                                                                  I
|    *          I
          |                                                                   I
|      *          I
          |
I|        *          I
          |
I  |       *          I
          |
I |        *          I
      90 +
I |        *          I
          |                                                                   I
|       *          I
          |
I|          *          I
          |
I  |        *           I
          |                                                                 I
|     *           I
      95 +                                                                     I
|       *           I
          |
I  |         *           I
```



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                 4.64691E-07    70.3526
1.85873E-07    70.9347       0.00000E+00     0.0000
    3    0.0000                 1.32780E-05    10.9878
1.90285E-05     5.2463       0.00000E+00     0.0000
    4    0.0000                 1.82838E-05    10.1734
3.29361E-05     4.3395       0.00000E+00     0.0000
    5    0.0000                 2.69561E-05     6.8445
5.28609E-05     3.1325       0.00000E+00     0.0000
    6    0.0001                 9.57010E-05     3.8589
2.29571E-04     1.4862       0.00000E+00     0.0000
    7    0.0002                 1.17885E-04     3.1400
2.06922E-04     1.3096       0.00000E+00     0.0000
    8    0.0003                 2.49705E-04     2.0585
3.26547E-04     0.9040       0.00000E+00     0.0000
    9    0.0005                 3.85230E-04     1.1478
4.43667E-04     0.5588       0.00000E+00     0.0000
   10    0.0003                 2.06797E-04     1.5358
2.10279E-04     0.7076       0.00000E+00     0.0000
   11    0.0012                 9.20965E-04     0.7592
5.28635E-04     0.5066       0.00000E+00     0.0000
   12    0.0010                 7.70955E-04     0.6735
3.02208E-04     0.6632       0.00000E+00     0.0000
   13    0.0003                 2.25533E-04     1.4205
8.96015E-05     1.4071       0.00000E+00     0.0000
   14    0.0013                 1.01034E-03     0.6414
4.12941E-04     0.6363       0.00000E+00     0.0000
   15    0.0010                 7.61962E-04     0.6873
3.28524E-04     0.6791       0.00000E+00     0.0000
   16    0.0002                 1.90170E-04     1.2566
8.73928E-05     1.2386       0.00000E+00     0.0000
   17    0.0001                 6.68242E-05     1.6124
3.25109E-05     1.5804       0.00000E+00     0.0000
   18    0.0001                 5.17764E-05     2.0743
2.61595E-05     2.0356       0.00000E+00     0.0000
   19    0.0001                 7.98510E-05     1.4655
4.22271E-05     1.4351       0.00000E+00     0.0000
   20    0.0001                 5.99730E-05     1.5840
3.28497E-05     1.5451       0.00000E+00     0.0000
   21    0.0002                 1.21293E-04     1.1480
6.84394E-05     1.1210       0.00000E+00     0.0000
   22    0.0001                 1.04139E-04     1.2106
6.16684E-05     1.1785       0.00000E+00     0.0000
   23    0.0001                 1.05859E-04     0.9993
```

6.46385E-05	0.9764	0.00000E+00	0.0000		
24	0.0000	2.41392E-05	2.0130		
1.50032E-05	1.9661	0.00000E+00	0.0000		
25	0.0000	3.14560E-05	2.0742		
1.96266E-05	2.0262	0.00000E+00	0.0000		
26	0.0000	1.72957E-05	2.0873		
1.08750E-05	2.0297	0.00000E+00	0.0000		
27	0.0001	5.49055E-05	1.3477		
3.42305E-05	1.3213	0.00000E+00	0.0000		
28	0.0001	9.66189E-05	0.9559		
6.02718E-05	0.9381	0.00000E+00	0.0000		
29	0.0001	1.00730E-04	1.2591		
6.34305E-05	1.2426	0.00000E+00	0.0000		
30	0.0000	1.19635E-05	3.0910		
7.50632E-06	3.0679	0.00000E+00	0.0000		
31	0.0001	9.76161E-05	0.9382		
6.16608E-05	0.9270	0.00000E+00	0.0000		
32	0.0000	3.78902E-05	1.6460		
2.42221E-05	1.6132	0.00000E+00	0.0000		
33	0.0000	3.35005E-05	1.6142		
2.09659E-05	1.5961	0.00000E+00	0.0000		
34	0.0001	7.50092E-05	1.1379		
4.71231E-05	1.1214	0.00000E+00	0.0000		
35	0.0001	4.37542E-05	1.6207		
2.74774E-05	1.5947	0.00000E+00	0.0000		
36	0.0001	4.26371E-05	1.5029		
2.63955E-05	1.4890	0.00000E+00	0.0000		
37	0.0000	2.86879E-05	1.5908		
1.80029E-05	1.5558	0.00000E+00	0.0000		
38	0.0000	3.32959E-05	1.7991		
2.09798E-05	1.7523	0.00000E+00	0.0000		
39	0.0002	1.29267E-04	0.8128		
8.22623E-05	0.7949	0.00000E+00	0.0000		
40	0.0002	1.19227E-04	0.9586		
7.70986E-05	0.9399	0.00000E+00	0.0000		
41	0.0002	1.59749E-04	0.7896		
1.06729E-04	0.7628	0.00000E+00	0.0000		
42	0.0002	1.41939E-04	0.7462		
9.65087E-05	0.7277	0.00000E+00	0.0000		
43	0.0001	8.04447E-05	1.0892		
5.77783E-05	1.0424	0.00000E+00	0.0000		
44	0.0001	1.12937E-04	0.9877		
8.29619E-05	0.9466	0.00000E+00	0.0000		
45	0.0001	5.98348E-05	1.0194		
4.82213E-05	0.9427	0.00000E+00	0.0000		
46	0.0000	1.40909E-05	2.0029		
1.13620E-05	1.8665	0.00000E+00	0.0000		
47	0.0001	4.11246E-05	1.6900		
3.19227E-05	1.6191	0.00000E+00	0.0000		
48	0.0000	1.27542E-05	3.2749		
9.87921E-06	3.1920	0.00000E+00	0.0000		
49	0.0001	7.97911E-05	1.6530		

```
6.29636E-05     1.6146       0.00000E+00     0.0000
   50    0.0001                 5.65003E-05     1.7012
4.65290E-05     1.6667       0.00000E+00     0.0000
   51    0.0000                 1.53981E-05     3.2187
1.27911E-05     3.1517       0.00000E+00     0.0000
   52    0.0001                 3.88083E-05     1.8943
3.36047E-05     1.8440       0.00000E+00     0.0000
   53    0.0002                 1.59044E-04     0.8520
1.56095E-04     0.7937       0.00000E+00     0.0000
   54    0.0001                 7.56136E-05     1.9456
7.02338E-05     1.8803       0.00000E+00     0.0000
   55    0.0002                 1.62863E-04     1.4321
1.49313E-04     1.3946       0.00000E+00     0.0000
   56    0.0002                 1.15407E-04     1.7305
1.07089E-04     1.6863       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                 1.54294E-04     1.3031
1.39934E-04     1.2702       0.00000E+00     0.0000
   58    0.0001                 8.43390E-05     2.1698
7.38810E-05     2.1055       0.00000E+00     0.0000
   59    0.0002                 1.61012E-04     1.4077
1.44456E-04     1.3582       0.00000E+00     0.0000
   60    0.0004                 2.77674E-04     1.2204
2.51765E-04     1.1532       0.00000E+00     0.0000
   61    0.0000                 2.99215E-05     3.8413
2.29913E-05     3.7264       0.00000E+00     0.0000
   62    0.0002                 1.69323E-04     1.6979
1.41882E-04     1.6519       0.00000E+00     0.0000
   63    0.0002                 1.20655E-04     2.1609
9.93388E-05     2.0850       0.00000E+00     0.0000
   64    0.0001                 9.99786E-05     2.3155
8.05925E-05     2.2391       0.00000E+00     0.0000
   65    0.0000                 3.46516E-05     4.0966
3.42638E-05     3.9639       0.00000E+00     0.0000
   66    0.0002                 1.74111E-04     1.8494
1.54504E-04     1.7911       0.00000E+00     0.0000
   67    0.0002                 1.44349E-04     1.8828
1.18185E-04     1.8170       0.00000E+00     0.0000
   68    0.0000                 2.54699E-05     4.8331
2.20684E-05     4.6545       0.00000E+00     0.0000
   69    0.0004                 2.93137E-04     1.5656
2.30260E-04     1.5147       0.00000E+00     0.0000
   70    0.0003                 2.10303E-04     2.0201
1.91353E-04     1.9532       0.00000E+00     0.0000
```

71	0.0006	4.40703E-04	1.5137	3.64449E-04	1.4684	0.00000E+00	0.0000
72	0.0001	4.83801E-05	5.2278	2.85934E-05	5.1031	0.00000E+00	0.0000
73	0.0004	3.08534E-04	1.6551	2.36129E-04	1.5639	0.00000E+00	0.0000
74	0.0014	1.07353E-03	1.0896	7.80292E-04	1.0439	0.00000E+00	0.0000
75	0.0001	1.13114E-04	2.6810	8.69154E-05	2.5449	0.00000E+00	0.0000
76	0.0006	4.70302E-04	2.0109	2.98579E-04	1.9392	0.00000E+00	0.0000
77	0.0005	3.62012E-04	1.7710	2.59740E-04	1.7008	0.00000E+00	0.0000
78	0.0000	7.97843E-06	4.0632	7.79793E-05	4.0258	0.00000E+00	0.0000
79	0.0003	1.95342E-04	2.5583	1.31159E-04	2.4595	0.00000E+00	0.0000
80	0.0001	6.45431E-05	2.9213	8.59629E-05	2.8427	0.00000E+00	0.0000
81	0.0014	1.09134E-03	1.2689	8.01771E-04	1.2177	0.00000E+00	0.0000
82	0.0001	6.48492E-05	4.0282	3.89729E-05	3.8081	0.00000E+00	0.0000
83	0.0002	1.19789E-04	3.4546	1.32712E-04	3.3842	0.00000E+00	0.0000
84	0.0001	8.06566E-05	3.0005	8.17642E-05	2.7851	0.00000E+00	0.0000
85	0.0003	2.00078E-04	2.1289	2.46286E-04	2.0706	0.00000E+00	0.0000
86	0.0004	2.72059E-04	2.3000	2.18546E-04	2.1894	0.00000E+00	0.0000
87	0.0004	3.34210E-04	2.6647	2.07983E-04	2.5455	0.00000E+00	0.0000
88	0.0001	5.28622E-05	4.0235	9.61007E-05	3.9196	0.00000E+00	0.0000
89	0.0001	8.77747E-05	3.4633	6.12410E-05	3.1754	0.00000E+00	0.0000
90	0.0003	2.23472E-04	2.9872	1.31932E-04	2.8642	0.00000E+00	0.0000
91	0.0002	1.75508E-04	2.8429	1.11475E-04	2.6660	0.00000E+00	0.0000
92	0.0000	3.13154E-05	2.5493	2.04910E-04	2.4996	0.00000E+00	0.0000
93	0.0002	1.29304E-04	3.6299	1.05150E-04	3.3799	0.00000E+00	0.0000
94	0.0002	1.17532E-04	3.8741	6.58833E-05	3.6524	0.00000E+00	0.0000
95	0.0008	6.01241E-04	2.0693	3.70973E-04	2.0049	0.00000E+00	0.0000
96	0.0002	1.52986E-04	4.0303	7.75910E-05	3.8587	0.00000E+00	0.0000

```
   97    0.0004                 2.78050E-04     3.2837
1.59301E-04     3.2117       0.00000E+00     0.0000
   98    0.0001                 1.03866E-04     3.6378
9.95909E-05     3.5082       0.00000E+00     0.0000
   99    0.0001                 1.00079E-04     4.9637
6.71399E-05     4.7890       0.00000E+00     0.0000
  100    0.0002                 1.33366E-04     3.8908
8.90537E-05     3.7430       0.00000E+00     0.0000
  101    0.0001                 1.08986E-04     4.0234
6.94425E-05     3.7223       0.00000E+00     0.0000
  102    0.0002                 1.56722E-04     4.3480
8.74189E-05     4.1697       0.00000E+00     0.0000
  103    0.0001                 9.95234E-05     3.5146
9.69448E-05     3.3313       0.00000E+00     0.0000
  104    0.0002                 1.70738E-04     3.4652
1.35235E-04     3.3482       0.00000E+00     0.0000
  105    0.0001                 1.08227E-04     3.7950
7.21325E-05     3.5511       0.00000E+00     0.0000
  106    0.0002                 1.68690E-04     4.1839
1.25480E-04     4.1251       0.00000E+00     0.0000
  107    0.0001                 6.79097E-05     3.5500
6.83095E-05     3.3346       0.00000E+00     0.0000
  108    0.0000                 3.39181E-05     2.3009
1.46603E-04     2.2375       0.00000E+00     0.0000
  109    0.0002                 1.33011E-04     2.0802
4.41152E-04     2.0514       0.00000E+00     0.0000
  110    0.0008                 6.43297E-04     3.1382
3.96800E-04     3.1095       0.00000E+00     0.0000
  111    0.0002                 1.49712E-04     4.9377
1.37633E-04     4.8015       0.00000E+00     0.0000
  112    0.0002                 1.21125E-04     4.6883
1.27595E-04     4.6073       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                 1.23528E-04     3.8005
1.08197E-04     3.5497       0.00000E+00     0.0000
  114    0.0000                 1.00022E-05     8.0012
1.38497E-05     6.5573       0.00000E+00     0.0000
  115    0.0001                 7.08348E-05     3.9243
8.24885E-05     3.6125       0.00000E+00     0.0000
  116    0.0003                 1.97993E-04     2.6650
1.48407E-04     2.4088       0.00000E+00     0.0000
  117    0.0006                 4.80119E-04     2.3391
2.56532E-04     2.1885       0.00000E+00     0.0000
  118    0.0008                 5.87546E-04     2.0790
```

4.58728E-04 1.9967 0.00000E+00 0.0000
119 0.0002 1.48392E-04 1.7834
3.82471E-04 1.7249 0.00000E+00 0.0000
120 0.0002 1.70981E-04 2.3238
6.50410E-04 2.2920 0.00000E+00 0.0000
121 0.0007 5.15234E-04 2.3895
3.96446E-04 2.3310 0.00000E+00 0.0000
122 0.0001 9.95753E-05 3.7158
7.80479E-05 3.4666 0.00000E+00 0.0000
123 0.0003 2.14464E-04 3.1503
1.51966E-04 2.7878 0.00000E+00 0.0000
124 0.0003 2.33344E-04 2.9662
1.92536E-04 2.7690 0.00000E+00 0.0000
125 0.0002 1.37707E-04 3.5883
1.26829E-04 3.2434 0.00000E+00 0.0000
126 0.0001 1.02919E-04 3.8178
9.20165E-05 3.3813 0.00000E+00 0.0000
127 0.0005 4.04558E-04 3.4122
1.98372E-04 3.2307 0.00000E+00 0.0000
128 0.0003 2.19451E-04 3.0853
1.35397E-04 2.7427 0.00000E+00 0.0000
129 0.0006 4.66478E-04 2.2248
4.28878E-04 2.1212 0.00000E+00 0.0000
130 0.0001 1.14523E-04 2.9115
2.79411E-04 2.8237 0.00000E+00 0.0000
131 0.0004 2.97244E-04 2.0083
2.38483E-04 1.6950 0.00000E+00 0.0000
132 0.0007 5.12134E-04 2.4430
3.15270E-04 2.2397 0.00000E+00 0.0000
133 0.0013 1.03342E-03 1.7102
6.53408E-04 1.6208 0.00000E+00 0.0000
134 0.0001 8.71552E-05 2.0901
2.28508E-04 1.7456 0.00000E+00 0.0000
135 0.0002 1.74358E-04 3.0608
2.58700E-04 2.9840 0.00000E+00 0.0000
136 0.0001 4.73471E-05 2.0787
7.34307E-04 2.0478 0.00000E+00 0.0000
137 0.0000 1.96288E-05 1.0672
3.53196E-03 1.0643 0.00000E+00 0.0000
138 0.0004 3.29171E-04 1.8119
8.56983E-04 1.7874 0.00000E+00 0.0000
139 0.0003 1.92774E-04 2.9018
2.35973E-04 2.7378 0.00000E+00 0.0000
140 0.0003 2.18675E-04 2.3468
2.89657E-04 2.0623 0.00000E+00 0.0000
141 0.0001 7.99467E-05 2.4539
2.52385E-04 2.1821 0.00000E+00 0.0000
142 0.0001 6.87481E-05 2.7505
2.36730E-04 2.5338 0.00000E+00 0.0000
143 0.0001 8.28496E-05 1.8397
1.76442E-04 1.1725 0.00000E+00 0.0000
144 0.0000 3.41059E-05 3.9539

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7.45787E-05     2.4128       0.00000E+00     0.0000
  145    0.0005                 4.01440E-04     2.8611
3.13654E-04     2.6155       0.00000E+00     0.0000
  146    0.0004                 3.39093E-04     2.4647
2.48943E-04     1.9886       0.00000E+00     0.0000
  147    0.0002                 1.55165E-04     4.5088
1.01182E-04     3.8575       0.00000E+00     0.0000
  148    0.0001                 5.50845E-05     6.5763
3.73632E-05     5.1922       0.00000E+00     0.0000
  149    0.0000                 3.15295E-05     9.3848
2.17788E-05     7.2902       0.00000E+00     0.0000
  150    0.0001                 9.11087E-05     4.8780
6.56223E-05     3.6404       0.00000E+00     0.0000
  151    0.0001                 6.62268E-05     4.6698
5.67919E-05     3.2139       0.00000E+00     0.0000
  152    0.0000                 3.62008E-05     4.5129
4.31358E-05     2.6304       0.00000E+00     0.0000
  153    0.0001                 4.21852E-05     4.3415
4.71875E-05     2.4869       0.00000E+00     0.0000
  154    0.0001                 4.99270E-05     4.2530
5.17134E-05     2.6097       0.00000E+00     0.0000
  155    0.0001                 5.09971E-05     4.4497
4.98751E-05     2.7324       0.00000E+00     0.0000
  156    0.0001                 4.57834E-05     4.8398
4.53931E-05     2.8430       0.00000E+00     0.0000
  157    0.0001                 6.13727E-05     4.2429
5.89666E-05     2.6384       0.00000E+00     0.0000
  158    0.0001                 6.53534E-05     4.2858
6.62518E-05     2.8210       0.00000E+00     0.0000
  159    0.0002                 1.45556E-04     3.0049
2.03103E-04     2.5207       0.00000E+00     0.0000
  160    0.0001                 6.04593E-05     4.0220
7.21547E-05     3.0528       0.00000E+00     0.0000
  161    0.0001                 7.08058E-05     4.1763
7.10321E-05     2.6631       0.00000E+00     0.0000
  162    0.0001                 8.71903E-05     3.4519
8.14192E-05     2.2196       0.00000E+00     0.0000
  163    0.0001                 9.58688E-05     3.5875
8.80282E-05     2.2225       0.00000E+00     0.0000
  164    0.0001                 1.05369E-04     3.6533
9.63539E-05     2.2819       0.00000E+00     0.0000
  165    0.0001                 1.10223E-04     3.9175
1.03012E-04     2.4209       0.00000E+00     0.0000
  166    0.0001                 7.03014E-05     3.8461
6.41997E-05     2.4509       0.00000E+00     0.0000
  167    0.0001                 7.73203E-05     4.0738
7.03128E-05     2.6887       0.00000E+00     0.0000
  168    0.0001                 8.77025E-05     4.6629
7.80991E-05     3.1280       0.00000E+00     0.0000
1                            fuel bundle

skipping 23 generations
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group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
169	0.0001			1.07410E-04	3.4281	9.39680E-05	2.4352	0.00000E+00	0.0000
170	0.0002			1.33281E-04	3.8079	1.13851E-04	2.8232	0.00000E+00	0.0000
171	0.0001			9.88085E-05	4.8572	7.61144E-05	3.8968	0.00000E+00	0.0000
172	0.0002			1.37468E-04	4.8004	9.77500E-05	4.0219	0.00000E+00	0.0000
173	0.0003			2.01429E-04	3.8373	1.32115E-04	3.3686	0.00000E+00	0.0000
174	0.0003			2.67031E-04	3.8149	1.64732E-04	3.4442	0.00000E+00	0.0000
175	0.0001			1.12277E-04	6.3298	6.77549E-05	5.6644	0.00000E+00	0.0000
176	0.0001			1.10359E-04	5.1711	6.61197E-05	4.6346	0.00000E+00	0.0000
177	0.0002			1.16251E-04	5.5490	6.89040E-05	4.9998	0.00000E+00	0.0000
178	0.0001			1.11406E-04	6.1228	6.55194E-05	5.4630	0.00000E+00	0.0000
179	0.0001			1.11449E-04	5.8341	6.51391E-05	5.1955	0.00000E+00	0.0000
180	0.0002			1.19239E-04	5.5321	6.89407E-05	4.9534	0.00000E+00	0.0000
181	0.0001			9.64746E-05	6.8793	5.70766E-05	5.9551	0.00000E+00	0.0000
182	0.0001			1.07404E-04	7.0418	6.24066E-05	6.1752	0.00000E+00	0.0000
183	0.0001			1.02672E-04	6.1726	5.93875E-05	5.3826	0.00000E+00	0.0000
184	0.0001			9.57889E-05	5.7141	5.59297E-05	4.8965	0.00000E+00	0.0000
185	0.0001			1.11532E-04	5.7582	6.36232E-05	5.0677	0.00000E+00	0.0000
186	0.0001			1.03029E-04	6.1182	5.94361E-05	5.2654	0.00000E+00	0.0000
187	0.0001			9.02074E-05	7.6788	5.28245E-05	6.5293	0.00000E+00	0.0000
188	0.0001			8.72571E-05	6.4954	5.13414E-05	5.5088	0.00000E+00	0.0000
189	0.0001			8.71890E-05	6.9968	5.14185E-05	5.8288	0.00000E+00	0.0000
190	0.0003			1.92702E-04	4.6714	1.16648E-04	3.7891	0.00000E+00	0.0000
191	0.0003			2.01845E-04	3.8053	1.21390E-04	3.1079	0.00000E+00	0.0000

192	0.0002	1.82779E-04	4.0168	1.12511E-04	3.2035
0.00000E+00	0.0000				
193	0.0003	2.15819E-04	3.8192	1.29279E-04	3.0516
0.00000E+00	0.0000				
194	0.0005	3.93992E-04	3.3625	2.43658E-04	2.6556
0.00000E+00	0.0000				
195	0.0006	4.24558E-04	2.6076	2.63621E-04	2.0452
0.00000E+00	0.0000				
196	0.0006	4.61277E-04	2.8466	2.86238E-04	2.2217
0.00000E+00	0.0000				
197	0.0006	4.90368E-04	2.2884	3.08315E-04	1.7755
0.00000E+00	0.0000				
198	0.0007	5.70837E-04	2.5538	3.55032E-04	1.9690
0.00000E+00	0.0000				
199	0.0004	3.15073E-04	2.9919	1.95708E-04	2.3507
0.00000E+00	0.0000				
200	0.0005	3.53207E-04	3.2544	2.17924E-04	2.5860
0.00000E+00	0.0000				
201	0.0010	7.90360E-04	2.3329	4.83989E-04	1.8680
0.00000E+00	0.0000				
202	0.0012	9.57792E-04	1.8507	5.85384E-04	1.4868
0.00000E+00	0.0000				
203	0.0016	1.21103E-03	1.8807	7.25310E-04	1.5315
0.00000E+00	0.0000				
204	0.0022	1.66289E-03	1.5727	9.78323E-04	1.3099
0.00000E+00	0.0000				
205	0.0015	1.12019E-03	2.0106	6.58079E-04	1.6848
0.00000E+00	0.0000				
206	0.0018	1.41575E-03	1.6545	8.23616E-04	1.4457
0.00000E+00	0.0000				
207	0.0021	1.63853E-03	1.6632	9.53279E-04	1.4548
0.00000E+00	0.0000				
208	0.0029	2.24030E-03	1.5556	1.30178E-03	1.3768
0.00000E+00	0.0000				
209	0.0031	2.34041E-03	1.4437	1.37713E-03	1.2795
0.00000E+00	0.0000				
210	0.0037	2.83328E-03	1.4052	1.68933E-03	1.2387
0.00000E+00	0.0000				
211	0.0041	3.11496E-03	1.2483	1.87730E-03	1.0753
0.00000E+00	0.0000				
212	0.0047	3.60883E-03	1.1380	2.18879E-03	0.9701
0.00000E+00	0.0000				
213	0.0064	4.93054E-03	0.9882	2.99198E-03	0.8317
0.00000E+00	0.0000				
214	0.0096	7.32351E-03	0.7480	4.41420E-03	0.6389
0.00000E+00	0.0000				
215	0.0157	1.20641E-02	0.5653	7.19617E-03	0.4741
0.00000E+00	0.0000				
216	0.0304	2.32802E-02	0.4405	1.37133E-02	0.3775
0.00000E+00	0.0000				
217	0.0201	1.54415E-02	0.5722	9.07573E-03	0.4862
0.00000E+00	0.0000				

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  218    0.0276                 2.11905E-02     0.4645
1.24038E-02     0.3937       0.00000E+00     0.0000
  219    0.0359                 2.75278E-02     0.3585
1.60466E-02     0.3079       0.00000E+00     0.0000
  220    0.0473                 3.62758E-02     0.3998
2.10975E-02     0.3358       0.00000E+00     0.0000
  221    0.0622                 4.76858E-02     0.3062
2.76697E-02     0.2615       0.00000E+00     0.0000
  222    0.0803                 6.15553E-02     0.2605
3.56388E-02     0.2236       0.00000E+00     0.0000
  223    0.1045                 8.00979E-02     0.2264
4.64376E-02     0.1925       0.00000E+00     0.0000
  224    0.0584                 4.47620E-02     0.3107
2.60590E-02     0.2592       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                 1.76863E-01     0.1433
1.04711E-01     0.1228       0.00000E+00     0.0000
  226    0.0453                 3.46945E-02     0.3476
2.11255E-02     0.2887       0.00000E+00     0.0000
  227    0.0490                 3.75614E-02     0.3660
2.33010E-02     0.2971       0.00000E+00     0.0000
  228    0.0210                 1.61101E-02     0.5374
1.01839E-02     0.4303       0.00000E+00     0.0000
  229    0.0222                 1.70551E-02     0.6042
1.09465E-02     0.4776       0.00000E+00     0.0000
  230    0.0117                 8.97596E-03     0.6796
5.86698E-03     0.5188       0.00000E+00     0.0000
  231    0.0122                 9.38193E-03     0.7657
6.22985E-03     0.5860       0.00000E+00     0.0000
  232    0.0129                 9.92767E-03     0.7212
6.76317E-03     0.5381       0.00000E+00     0.0000
  233    0.0083                 6.39103E-03     0.8957
4.47190E-03     0.6381       0.00000E+00     0.0000
  234    0.0060                 4.58640E-03     1.0672
3.29445E-03     0.7460       0.00000E+00     0.0000
  235    0.0024                 1.83577E-03     1.6323
1.21934E-03     1.2172       0.00000E+00     0.0000
  236    0.0019                 1.44015E-03     2.1357
9.72516E-04     1.6016       0.00000E+00     0.0000
  237    0.0017                 1.27580E-03     2.3997
9.15362E-04     1.7103       0.00000E+00     0.0000
  238    0.0001                 7.21459E-05     8.2573
6.18648E-05     4.8177       0.00000E+00     0.0000
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 system total =                 7.66692E-01     0.0448
4.69423E-01     0.0413       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3076E-01  +
or -  0.0002



 elapsed time   3.10967 minutes

 random number=   76B7C75CBFA64E71
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.092E-03
0.04         7.667E-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     flux     percent     flux     percent
                deviation            deviation            deviation
    1   0.000E+00    0.00   0.000E+00    0.00   0.000E+00    0.00
    2   1.613E-08   32.74   1.249E-08   28.61   1.305E-08   28.98
    3   8.580E-07    4.07   7.123E-07    3.85   7.615E-07    3.90
    4   1.445E-06    3.49   1.190E-06    3.02   1.278E-06    3.12
    5   2.195E-06    2.33   1.795E-06    2.08   1.932E-06    2.12
    6   9.401E-06    1.20   7.567E-06    1.15   8.073E-06    1.13
    7   1.240E-05    1.14   9.432E-06    0.97   1.000E-05    1.01
    8   3.165E-05    0.72   2.300E-05    0.63   2.410E-05    0.65
    9   8.265E-05    0.49   5.903E-05    0.42   6.146E-05    0.43
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10	4.645E-05	0.58	3.322E-05	0.47	3.448E-05	0.48
11	2.199E-04	0.30	1.554E-04	0.27	1.611E-04	0.26
12	1.905E-04	0.30	1.382E-04	0.24	1.451E-04	0.24
13	5.650E-05	0.54	4.123E-05	0.47	4.312E-05	0.45
14	2.540E-04	0.25	1.837E-04	0.21	1.921E-04	0.21
15	2.208E-04	0.25	1.598E-04	0.22	1.669E-04	0.21
16	7.076E-05	0.41	5.142E-05	0.37	5.375E-05	0.36
17	3.242E-05	0.60	2.351E-05	0.46	2.452E-05	0.45
18	2.803E-05	0.60	2.047E-05	0.53	2.118E-05	0.52
19	5.028E-05	0.48	3.671E-05	0.39	3.820E-05	0.42
20	4.009E-05	0.51	2.942E-05	0.45	3.065E-05	0.43
21	8.006E-05	0.39	5.832E-05	0.32	6.100E-05	0.30
22	7.298E-05	0.42	5.337E-05	0.35	5.524E-05	0.34
23	7.694E-05	0.42	5.620E-05	0.33	5.827E-05	0.33
24	1.849E-05	0.87	1.359E-05	0.69	1.419E-05	0.73
25	2.318E-05	0.73	1.712E-05	0.65	1.801E-05	0.62
26	1.351E-05	0.80	9.894E-06	0.77	1.044E-05	0.74
27	4.168E-05	0.55	3.103E-05	0.50	3.280E-05	0.46
28	7.688E-05	0.40	5.730E-05	0.35	6.051E-05	0.33
29	7.917E-05	0.43	5.929E-05	0.37	6.213E-05	0.37
30	9.939E-06	1.05	7.430E-06	0.94	7.702E-06	0.91
31	7.863E-05	0.37	5.882E-05	0.36	6.179E-05	0.34
32	3.090E-05	0.64	2.321E-05	0.51	2.447E-05	0.50
33	2.651E-05	0.70	1.995E-05	0.61	2.098E-05	0.55
34	6.084E-05	0.41	4.602E-05	0.36	4.840E-05	0.34
35	3.633E-05	0.51	2.754E-05	0.44	2.891E-05	0.43
36	3.376E-05	0.54	2.552E-05	0.46	2.681E-05	0.44
37	2.222E-05	0.56	1.680E-05	0.48	1.754E-05	0.49
38	2.552E-05	0.66	1.952E-05	0.49	2.061E-05	0.42
39	9.743E-05	0.32	7.468E-05	0.26	7.909E-05	0.25
40	8.985E-05	0.34	6.936E-05	0.31	7.403E-05	0.30
41	1.134E-04	0.29	8.874E-05	0.26	9.478E-05	0.24
42	9.416E-05	0.32	7.397E-05	0.27	7.932E-05	0.26
43	5.131E-05	0.38	4.102E-05	0.35	4.308E-05	0.30
44	6.934E-05	0.35	5.574E-05	0.32	5.990E-05	0.27
45	3.525E-05	0.46	2.795E-05	0.40	3.108E-05	0.37
46	8.236E-06	0.93	6.505E-06	0.81	7.059E-06	0.71
47	2.351E-05	0.61	1.865E-05	0.54	1.955E-05	0.44
48	6.724E-06	0.87	5.411E-06	0.71	5.661E-06	0.72
49	4.381E-05	0.39	3.515E-05	0.36	3.784E-05	0.30
50	2.961E-05	0.44	2.379E-05	0.37	2.581E-05	0.32
51	7.860E-06	0.71	6.368E-06	0.61	6.906E-06	0.58
52	2.065E-05	0.59	1.659E-05	0.52	1.814E-05	0.48
53	7.639E-05	0.28	6.163E-05	0.24	6.697E-05	0.21
54	3.346E-05	0.46	2.693E-05	0.33	2.916E-05	0.29
55	6.609E-05	0.31	5.375E-05	0.27	5.871E-05	0.22
56	4.334E-05	0.36	3.539E-05	0.33	3.847E-05	0.29
57	4.947E-05	0.36	4.051E-05	0.32	4.395E-05	0.26
58	2.583E-05	0.52	2.111E-05	0.44	2.308E-05	0.36
59	4.435E-05	0.39	3.629E-05	0.36	3.944E-05	0.30
60	6.472E-05	0.37	5.287E-05	0.28	5.747E-05	0.23
61	6.172E-06	0.85	5.068E-06	0.88	5.539E-06	0.74

62	3.237E-05	0.39	2.653E-05	0.36	2.892E-05	0.31
63	2.173E-05	0.56	1.788E-05	0.49	1.941E-05	0.36
64	1.719E-05	0.60	1.412E-05	0.51	1.533E-05	0.42
65	5.731E-06	1.16	4.713E-06	1.01	5.144E-06	0.75
66	2.862E-05	0.53	2.360E-05	0.47	2.563E-05	0.36
67	2.136E-05	0.53	1.758E-05	0.48	1.906E-05	0.42
68	4.617E-06	1.04	3.817E-06	0.92	4.149E-06	0.75
69	3.727E-05	0.39	3.068E-05	0.33	3.338E-05	0.27
70	2.693E-05	0.50	2.215E-05	0.44	2.397E-05	0.38
71	4.598E-05	0.36	3.789E-05	0.31	4.118E-05	0.25
72	2.673E-06	1.54	2.210E-06	1.32	2.398E-06	1.01
73	2.705E-05	0.47	2.231E-05	0.43	2.429E-05	0.35
74	7.997E-05	0.31	6.618E-05	0.27	7.170E-05	0.22
75	9.095E-06	0.72	7.573E-06	0.67	8.181E-06	0.52
76	2.292E-05	0.52	1.900E-05	0.47	2.065E-05	0.39
77	1.760E-05	0.60	1.464E-05	0.50	1.587E-05	0.42
78	1.511E-06	1.68	1.272E-06	1.61	1.378E-06	1.40
79	9.935E-06	0.70	8.228E-06	0.60	8.940E-06	0.55
80	4.629E-06	1.01	3.857E-06	0.96	4.144E-06	0.76
81	5.534E-05	0.35	4.592E-05	0.31	4.985E-05	0.29
82	3.207E-06	1.31	2.681E-06	1.16	2.899E-06	1.02
83	4.396E-06	1.02	3.664E-06	0.88	3.964E-06	0.78
84	8.154E-06	0.74	6.728E-06	0.63	7.296E-06	0.56
85	9.968E-06	0.74	8.327E-06	0.67	8.970E-06	0.53
86	1.347E-05	0.67	1.124E-05	0.57	1.221E-05	0.49
87	1.193E-05	0.55	9.973E-06	0.55	1.077E-05	0.46
88	3.100E-06	1.34	2.566E-06	1.16	2.801E-06	0.93
89	6.567E-06	0.84	5.522E-06	0.69	5.946E-06	0.67
90	6.869E-06	0.84	5.680E-06	0.75	6.239E-06	0.70
91	8.065E-06	0.77	6.807E-06	0.66	7.363E-06	0.52
92	4.821E-06	1.02	4.003E-06	0.90	4.360E-06	0.72
93	8.237E-06	0.80	6.831E-06	0.71	7.376E-06	0.60
94	4.274E-06	1.10	3.568E-06	0.92	3.835E-06	0.76
95	1.249E-05	0.69	1.050E-05	0.62	1.136E-05	0.52
96	3.325E-06	1.15	2.762E-06	1.01	3.015E-06	0.80
97	3.394E-06	1.12	2.845E-06	1.02	3.113E-06	0.88
98	3.503E-06	1.03	2.963E-06	0.90	3.211E-06	0.73
99	2.305E-06	1.48	1.933E-06	1.27	2.097E-06	1.09
100	3.453E-06	1.22	2.891E-06	1.08	3.149E-06	0.88
101	5.016E-06	1.05	4.164E-06	0.96	4.504E-06	0.78
102	3.322E-06	1.22	2.802E-06	1.13	3.026E-06	0.86
103	4.720E-06	0.96	3.920E-06	0.88	4.230E-06	0.73
104	4.111E-06	0.92	3.490E-06	0.92	3.797E-06	0.71
105	4.427E-06	1.03	3.676E-06	0.88	3.967E-06	0.78
106	1.522E-06	1.70	1.284E-06	1.57	1.397E-06	1.26
107	3.531E-06	1.27	2.932E-06	1.15	3.215E-06	0.92
108	3.178E-06	1.14	2.721E-06	1.08	2.939E-06	0.88
109	5.107E-06	0.88	4.265E-06	0.82	4.626E-06	0.69
110	3.014E-06	1.23	2.595E-06	1.05	2.810E-06	0.94
111	3.066E-06	1.26	2.567E-06	1.08	2.779E-06	0.89
112	1.802E-06	1.69	1.521E-06	1.32	1.664E-06	1.09
113	5.703E-06	0.95	4.793E-06	0.84	5.209E-06	0.67

114	1.949E-06	1.64	1.647E-06	1.58	1.787E-06	1.30
115	5.144E-06	1.09	4.260E-06	0.92	4.655E-06	0.61
116	1.095E-05	0.70	9.125E-06	0.58	9.808E-06	0.43
117	1.186E-05	0.59	9.938E-06	0.55	1.068E-05	0.42
118	1.291E-05	0.70	1.079E-05	0.57	1.178E-05	0.45
119	8.248E-06	0.70	6.983E-06	0.67	7.606E-06	0.50
120	5.785E-06	0.78	4.881E-06	0.72	5.334E-06	0.57
121	6.032E-06	0.95	5.158E-06	0.82	5.570E-06	0.66
122	3.315E-06	1.19	2.781E-06	1.04	2.987E-06	0.81
123	1.032E-05	0.72	8.673E-06	0.57	9.344E-06	0.51
124	7.330E-06	0.86	6.142E-06	0.80	6.619E-06	0.69
125	7.104E-06	0.88	5.946E-06	0.74	6.399E-06	0.59
126	5.825E-06	1.01	4.840E-06	0.84	5.240E-06	0.63
127	5.594E-06	0.95	4.698E-06	0.87	5.079E-06	0.66
128	7.652E-06	0.72	6.402E-06	0.64	6.942E-06	0.56
129	9.624E-06	0.72	8.084E-06	0.64	8.814E-06	0.51
130	3.968E-06	1.15	3.396E-06	1.04	3.670E-06	0.82
131	1.691E-05	0.55	1.414E-05	0.44	1.522E-05	0.39
132	1.126E-05	0.66	9.475E-06	0.55	1.020E-05	0.50
133	1.368E-05	0.53	1.153E-05	0.50	1.251E-05	0.40
134	1.479E-05	0.58	1.245E-05	0.52	1.343E-05	0.41
135	2.363E-06	1.27	2.026E-06	1.22	2.207E-06	0.98
136	3.855E-06	1.06	3.363E-06	0.91	3.688E-06	0.77
137	2.511E-06	1.05	2.581E-06	0.97	2.961E-06	0.80
138	4.113E-06	0.95	3.606E-06	0.90	3.948E-06	0.76
139	4.680E-06	0.84	3.963E-06	0.85	4.275E-06	0.73
140	1.203E-05	0.62	1.022E-05	0.56	1.103E-05	0.45
141	8.908E-06	0.72	7.514E-06	0.57	8.104E-06	0.50
142	5.783E-06	0.82	4.895E-06	0.75	5.320E-06	0.64
143	1.998E-05	0.46	1.686E-05	0.46	1.814E-05	0.36
144	8.075E-06	0.77	6.823E-06	0.65	7.364E-06	0.55
145	7.209E-06	0.82	6.124E-06	0.72	6.596E-06	0.54
146	1.210E-05	0.63	1.022E-05	0.58	1.102E-05	0.45
147	3.623E-06	1.09	3.108E-06	1.20	3.310E-06	0.73
148	1.907E-06	1.71	1.607E-06	1.51	1.737E-06	1.16
149	1.190E-06	2.17	9.950E-07	1.81	1.086E-06	1.42
150	3.955E-06	1.29	3.324E-06	0.96	3.603E-06	0.87
151	4.301E-06	1.11	3.592E-06	0.90	3.797E-06	0.68
152	4.276E-06	1.06	3.599E-06	0.90	3.887E-06	0.76
153	4.443E-06	1.08	3.767E-06	0.99	4.052E-06	0.83
154	4.643E-06	1.01	3.907E-06	0.85	4.223E-06	0.76
155	4.346E-06	1.09	3.675E-06	0.92	3.966E-06	0.79
156	4.075E-06	1.15	3.410E-06	0.96	3.643E-06	0.76
157	4.717E-06	0.97	3.964E-06	0.81	4.282E-06	0.72
158	4.774E-06	0.92	4.059E-06	0.85	4.413E-06	0.66
159	6.786E-06	0.94	5.742E-06	0.84	6.162E-06	0.71
160	3.557E-06	1.32	3.001E-06	1.02	3.240E-06	0.87
161	4.901E-06	0.91	4.174E-06	0.79	4.511E-06	0.67
162	5.801E-06	0.90	4.913E-06	0.82	5.286E-06	0.68
163	6.138E-06	0.86	5.167E-06	0.76	5.559E-06	0.63
164	6.524E-06	0.83	5.483E-06	0.82	5.928E-06	0.63
165	6.864E-06	0.87	5.767E-06	0.68	6.249E-06	0.59

166	3.963E-06	0.99	3.356E-06	0.89	3.616E-06	0.72
167	4.134E-06	1.06	3.497E-06	0.99	3.798E-06	0.82
168	4.206E-06	1.02	3.537E-06	0.87	3.836E-06	0.72
169	4.500E-06	0.90	3.774E-06	0.86	4.096E-06	0.77
170	4.619E-06	1.04	3.896E-06	0.84	4.208E-06	0.75
171	2.411E-06	1.49	2.006E-06	1.33	2.185E-06	1.10
172	2.441E-06	1.52	2.059E-06	1.40	2.208E-06	1.09
173	2.501E-06	1.45	2.104E-06	1.38	2.273E-06	1.02
174	2.489E-06	1.30	2.125E-06	1.11	2.311E-06	0.96
175	9.935E-07	2.04	8.447E-07	2.01	9.191E-07	1.54
176	9.970E-07	2.09	8.319E-07	1.76	9.252E-07	1.41
177	1.061E-06	1.99	8.895E-07	1.82	9.833E-07	1.45
178	1.005E-06	1.90	8.451E-07	1.76	9.288E-07	1.47
179	1.018E-06	2.23	8.627E-07	2.09	9.402E-07	1.53
180	1.055E-06	1.96	8.997E-07	1.77	1.000E-06	1.51
181	1.070E-06	1.90	8.968E-07	1.64	9.721E-07	1.31
182	1.087E-06	1.90	9.239E-07	1.59	1.006E-06	1.41
183	1.100E-06	1.77	9.297E-07	1.43	1.017E-06	1.29
184	1.138E-06	1.87	9.346E-07	1.59	1.019E-06	1.31
185	1.116E-06	1.86	9.600E-07	1.87	1.033E-06	1.39
186	1.181E-06	2.04	9.799E-07	1.79	1.064E-06	1.42
187	1.134E-06	1.88	9.536E-07	1.69	1.042E-06	1.55
188	1.135E-06	1.96	9.819E-07	1.72	1.059E-06	1.55
189	1.180E-06	1.87	1.001E-06	1.67	1.070E-06	1.41
190	3.111E-06	1.31	2.627E-06	1.14	2.844E-06	0.92
191	3.085E-06	1.10	2.599E-06	0.95	2.808E-06	0.79
192	3.148E-06	1.19	2.680E-06	1.17	2.904E-06	0.89
193	3.260E-06	1.08	2.730E-06	1.04	2.963E-06	0.85
194	6.879E-06	0.83	5.774E-06	0.66	6.255E-06	0.59
195	7.296E-06	0.83	6.220E-06	0.70	6.686E-06	0.64
196	7.756E-06	0.75	6.568E-06	0.67	7.144E-06	0.53
197	8.451E-06	0.68	7.164E-06	0.64	7.754E-06	0.53
198	8.947E-06	0.80	7.581E-06	0.70	8.205E-06	0.50
199	4.764E-06	1.09	4.041E-06	0.96	4.385E-06	0.79
200	5.034E-06	0.95	4.242E-06	0.74	4.644E-06	0.66
201	1.074E-05	0.68	9.010E-06	0.59	9.760E-06	0.46
202	1.209E-05	0.53	1.027E-05	0.53	1.109E-05	0.45
203	1.300E-05	0.61	1.105E-05	0.55	1.195E-05	0.44
204	1.463E-05	0.50	1.244E-05	0.47	1.354E-05	0.38
205	8.567E-06	0.57	7.702E-06	0.53	8.188E-06	0.41
206	9.388E-06	0.65	8.414E-06	0.57	8.916E-06	0.48
207	9.634E-06	0.64	8.756E-06	0.63	9.222E-06	0.44
208	1.121E-05	0.62	1.012E-05	0.53	1.077E-05	0.41
209	1.157E-05	0.59	1.051E-05	0.55	1.111E-05	0.45
210	1.405E-05	0.52	1.269E-05	0.42	1.353E-05	0.37
211	1.612E-05	0.52	1.462E-05	0.41	1.556E-05	0.36
212	1.924E-05	0.44	1.732E-05	0.38	1.850E-05	0.31
213	2.629E-05	0.39	2.360E-05	0.32	2.531E-05	0.27
214	3.684E-05	0.35	3.307E-05	0.29	3.561E-05	0.25
215	5.535E-05	0.26	4.989E-05	0.23	5.384E-05	0.19
216	9.229E-05	0.21	8.392E-05	0.18	9.078E-05	0.16
217	5.550E-05	0.24	5.302E-05	0.19	5.615E-05	0.17

218	7.064E-05	0.20	6.774E-05	0.19	7.209E-05	0.16
219	8.425E-05	0.19	8.152E-05	0.17	8.656E-05	0.15
220	1.018E-04	0.18	9.930E-05	0.14	1.057E-04	0.13
221	1.203E-04	0.17	1.187E-04	0.15	1.266E-04	0.12
222	1.368E-04	0.15	1.367E-04	0.13	1.457E-04	0.11
223	1.538E-04	0.15	1.575E-04	0.13	1.675E-04	0.10
224	7.525E-05	0.20	7.969E-05	0.17	8.444E-05	0.14
225	2.339E-04	0.13	2.721E-04	0.11	2.823E-04	0.10
226	3.175E-05	0.24	4.494E-05	0.21	4.450E-05	0.14
227	2.889E-05	0.24	4.627E-05	0.21	4.438E-05	0.12
228	1.039E-05	0.39	1.900E-05	0.25	1.750E-05	0.16
229	9.648E-06	0.39	1.960E-05	0.29	1.742E-05	0.19
230	4.489E-06	0.57	1.012E-05	0.48	8.650E-06	0.21
231	4.252E-06	0.56	1.057E-05	0.38	8.725E-06	0.24
232	3.961E-06	0.57	1.130E-05	0.42	8.872E-06	0.20
233	2.225E-06	0.73	7.355E-06	0.50	5.485E-06	0.27
234	1.412E-06	0.77	5.401E-06	0.66	3.805E-06	0.31
235	5.128E-07	1.42	1.039E-06	1.03	1.111E-06	0.45
236	3.494E-07	1.74	7.352E-07	1.09	7.987E-07	0.49
237	2.277E-07	2.09	5.464E-07	1.31	6.171E-07	0.61
238	6.297E-09	9.91	2.142E-08	5.85	2.494E-08	1.85

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
 0.7568 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
 0.7568 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
 0.7568 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
 0.7568 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
*********************************************************************
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         ***
```

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

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        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76669 + or - 0.00034                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65286E-02 + or -  1.17972E-04            ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  9.28090E-06            ***
        ***
***
        ***        system mean free path (cm)
6.53007E-01 + or -  1.70087E-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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```

```
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           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.11467 minutes


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1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666



      0000000       666666666666                       0000000
666666666666                           44     5555555555555
     000000000     6666666666666                     000000000
6666666666666                          444     5555555555555
    00       00    66                   :::        00       00    66
:::              4444     55
   00         00   66                   :::       00         00   66
:::             44 44     55
   00         00   66                   :::       00         00   66
:::            44  44     55
   00         00   666666666666                   00         00
```

```
666666666666                        44   44     555555555555
   00         00   6666666666666                   00         00
6666666666666                      44    44     5555555555555
   00         00   66         66         :::       00         00   66
66         :::        444444444444              55
   00         00   66         66         :::       00         00   66
66         :::       4444444444444              55
    00       00    66         66         :::        00       00    66
66         :::                44     55         55
     000000000     6666666666666                     000000000
6666666666666                            44     5555555555555
      0000000       66666666666                      0000000
66666666666                            44      55555555555
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
```

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

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

**********************************************************************
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**********************************************************************
************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:06:45.19
*****
        *****
*****
        *****
*****
```

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

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

```
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***             8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***            10      unknown
xsec mixing direct access          ***
        ***
***

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                                 ........ finished preparing input data
........
1
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****************************
                 ***
***
```

```
                  ***          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  6.21671E-12  1.87547E-12    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  6.04498E-08  1.81183E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  1.73383E-14  5.71383E-14    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  7.37713E-07  5.29651E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33935E-08  6.98510E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02827E-07  7.99741E-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
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    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  5.24103E-07  8.93226E-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  2.96839E-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  7.69813E-11  1.91063E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90822E-08  1.32090E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.12754E-08  3.06821E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.72245E-08  4.73857E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  9.36218E-10  2.60366E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.74733E-08  4.91171E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.97044E-10  8.43891E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.54326E-09  1.01724E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  5.77598E-18  1.60632E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.51275E-10  4.29760E-09   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  1.17347E-08  3.33369E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
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    1042096  1.18397E-08  3.39894E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  7.62505E-09  2.21185E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.79635E-08  5.26454E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75595E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.73060E-09  2.31192E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  8.46216E-10  2.50534E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  7.16417E-10  2.16393E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  5.91383E-10  1.80394E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.95434E-11  2.75828E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  2.61590E-10  8.13619E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  4.46107E-11  1.41425E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  3.29668E-10  1.01549E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.11089E-12  3.48845E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.38429E-10  4.34696E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.09898E-11  6.71688E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  7.82255E-12  2.52666E-10   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  4.44518E-12  1.44910E-10   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  8.98716E-11  2.90284E-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  1.29473E-09  4.29824E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43821E-09  8.16720E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23536E-09  4.17510E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90291E-09  9.89765E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58109E-10  2.63024E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
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    1049115  1.72616E-12  5.93714E-11   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  6.51002E-11  2.23912E-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  1.47038E-09  5.14536E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63288E-09  1.63506E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64438E-09  5.85273E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23160E-09  2.23660E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.87531E-10  3.23863E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11091E-09  4.12031E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  7.79137E-12  2.93648E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.19209E-11  8.32718E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  7.68468E-11  2.96522E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25970E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  3.82833E-10  1.50012E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67705E-11  1.06503E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87635E-12  7.57726E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  8.97663E-10  3.57123E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.34112E-15  5.37568E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  9.62680E-10  3.88754E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  8.45382E-10  3.46450E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.38601E-08  1.39775E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99458E-11  2.51056E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  8.99526E-10  3.74022E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.49536E-10  6.30731E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
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    1058142  8.21932E-10  3.49147E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21018E-12  2.65666E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  5.59263E-10  2.40924E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  6.90300E-10  2.91162E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12958E-11  2.62215E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  7.55140E-10  3.23036E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  1.97473E-10  8.50670E-09   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  5.67600E-10  2.46212E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  4.15690E-10  1.81562E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87226E-11  8.23374E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  2.30827E-10  1.02203E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  2.67145E-10  1.17483E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  2.07585E-17  9.19132E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84877E-12  8.24126E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  2.46790E-11  1.08531E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.50749E-10  6.71985E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  7.19133E-14  3.22718E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.04848E-09  1.37718E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  3.75047E-11  1.70554E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32593E-13  1.06470E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.44488E-09  6.52738E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.58087E-09  7.23644E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  9.00728E-15  4.15010E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  4.28389E-12  1.98662E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81615E-13  8.47674E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.81992E-12  2.64663E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
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    1064154  6.29365E-11  2.89976E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27234E-10  1.98127E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.93274E-10  2.76901E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51488E-10  2.12079E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.18789E-10  3.39791E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31142E-10  3.02142E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76386E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22800E-06  6.52026E-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  7.57215E-12  5.37301E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.16578E-17  8.30701E-16   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  6.26623E-10  4.48395E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  1.79690E-15  1.29120E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  1.84350E-20  1.33022E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17300E-20  8.49928E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.04067E-20  7.50924E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.99604E-28  2.89543E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
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    1095243  9.99981E-21  7.27562E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  5.98637E-21  4.33757E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.83015E-21  7.15217E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.72857E-21  7.10742E-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
```

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    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

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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
```

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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

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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:
  9390 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

                                          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       ........

                                 ........     0.01550 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
0.01600 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 15533 independent fission points were generated for generation 1
          1       7.64306E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15521 independent fission points were generated for generation 2
          2       7.54881E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15569 independent fission points were generated for generation 3
          3       7.61032E-01      7.61032E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.65062E-01      7.63047E-01      2.01523E-03
```

0.00000E+00	0.00000E+00				
5	7.70758E-01	7.65618E-01	2.82146E-03	0.00000E+00	0.00000E+00
6	7.57015E-01	7.63467E-01	2.93357E-03	0.00000E+00	0.00000E+00
7	7.65971E-01	7.63968E-01	2.32688E-03	0.00000E+00	0.00000E+00
8	7.72129E-01	7.65328E-01	2.33657E-03	0.00000E+00	0.00000E+00
9	7.63217E-01	7.65026E-01	1.99766E-03	0.00000E+00	0.00000E+00
10	7.57719E-01	7.64113E-01	1.95634E-03	0.00000E+00	0.00000E+00
11	7.69404E-01	7.64701E-01	1.82275E-03	0.00000E+00	0.00000E+00
12	7.70214E-01	7.65252E-01	1.72101E-03	0.00000E+00	0.00000E+00
13	7.60766E-01	7.64844E-01	1.60924E-03	0.00000E+00	0.00000E+00
14	7.64875E-01	7.64847E-01	1.46903E-03	0.00000E+00	0.00000E+00
15	7.57814E-01	7.64306E-01	1.45558E-03	0.00000E+00	0.00000E+00
16	7.61583E-01	7.64111E-01	1.36156E-03	0.00000E+00	0.00000E+00
17	7.68770E-01	7.64422E-01	1.30504E-03	0.00000E+00	0.00000E+00
18	7.68920E-01	7.64703E-01	1.25269E-03	0.00000E+00	0.00000E+00
19	7.65598E-01	7.64756E-01	1.17788E-03	0.00000E+00	0.00000E+00
20	7.68932E-01	7.64988E-01	1.13449E-03	0.00000E+00	0.00000E+00
21	7.70520E-01	7.65279E-01	1.11193E-03	0.00000E+00	0.00000E+00
22	7.63931E-01	7.65212E-01	1.05702E-03	0.00000E+00	0.00000E+00
23	7.66382E-01	7.65267E-01	1.00697E-03	0.00000E+00	0.00000E+00
24	7.55922E-01	7.64843E-01	1.04988E-03	0.00000E+00	0.00000E+00
25	7.64980E-01	7.64848E-01	1.00321E-03	0.00000E+00	0.00000E+00
26	7.67996E-01	7.64980E-01	9.69416E-04	0.00000E+00	0.00000E+00
27	7.66997E-01	7.63974E-01	7.59673E-03	0.00000E+00	0.00000E+00
28	7.67453E-01	7.64670E-01	4.73024E-03	0.00000E+00	0.00000E+00
29	7.64989E-01	7.64723E-01	3.33303E-03	0.00000E+00	0.00000E+00
30	7.67858E-01	7.65171E-01	2.57394E-03		

0.00000E+00	0.00000E+00				
31	7.63667E-01	7.64983E-01	2.06871E-03	0.00000E+00	0.00000E+00
32	7.60852E-01	7.64524E-01	1.97997E-03	0.00000E+00	0.00000E+00
33	7.67080E-01	7.64779E-01	1.60203E-03	0.00000E+00	0.00000E+00
34	7.64650E-01	7.64768E-01	1.41015E-03	0.00000E+00	0.00000E+00
35	7.69185E-01	7.65136E-01	1.30106E-03	0.00000E+00	0.00000E+00
36	7.71684E-01	7.65640E-01	1.47428E-03	0.00000E+00	0.00000E+00
37	7.69954E-01	7.65948E-01	1.52213E-03	0.00000E+00	0.00000E+00
38	7.71701E-01	7.66331E-01	1.78073E-03	0.00000E+00	0.00000E+00
39	7.63711E-01	7.66167E-01	1.55910E-03	0.00000E+00	0.00000E+00
40	7.70478E-01	7.66421E-01	1.50292E-03	0.00000E+00	0.00000E+00
41	7.65656E-01	7.66379E-01	1.39816E-03	0.00000E+00	0.00000E+00
42	7.57419E-01	7.65907E-01	1.52550E-03	0.00000E+00	0.00000E+00
43	7.68296E-01	7.66026E-01	1.30434E-03	0.00000E+00	0.00000E+00
44	7.64932E-01	7.65974E-01	1.32944E-03	0.00000E+00	0.00000E+00
45	7.61059E-01	7.65751E-01	1.39131E-03	0.00000E+00	0.00000E+00
46	7.66747E-01	7.65794E-01	1.24169E-03	0.00000E+00	0.00000E+00
47	7.61463E-01	7.65614E-01	1.31215E-03	0.00000E+00	0.00000E+00
48	7.66734E-01	7.65659E-01	1.22847E-03	0.00000E+00	0.00000E+00
49	7.65533E-01	7.65654E-01	1.17164E-03	0.00000E+00	0.00000E+00
50	7.67165E-01	7.65710E-01	1.10918E-03	0.00000E+00	0.00000E+00
51	7.67990E-01	7.65791E-01	1.07138E-03	0.00000E+00	0.00000E+00
52	7.66836E-01	7.65827E-01	1.03258E-03	0.00000E+00	0.00000E+00
53	7.61739E-01	7.65691E-01	9.79924E-04	0.00000E+00	0.00000E+00
54	7.59462E-01	7.65490E-01	9.85679E-04	0.00000E+00	0.00000E+00
55	7.70570E-01	7.65649E-01	8.77696E-04	0.00000E+00	0.00000E+00
56	7.60128E-01	7.65481E-01	9.12441E-04		

0.00000E+00	0.00000E+00				
57	7.59981E-01	7.65320E-01	9.35421E-04	0.00000E+00	0.00000E+00
58	7.60411E-01	7.65179E-01	9.83727E-04	0.00000E+00	0.00000E+00
59	7.72182E-01	7.65374E-01	8.37303E-04	0.00000E+00	0.00000E+00
60	7.70294E-01	7.65507E-01	8.30456E-04	0.00000E+00	0.00000E+00
61	7.66914E-01	7.65544E-01	8.06614E-04	0.00000E+00	0.00000E+00
62	7.65284E-01	7.65537E-01	7.81773E-04	0.00000E+00	0.00000E+00
63	7.62667E-01	7.65465E-01	7.52264E-04	0.00000E+00	0.00000E+00
64	7.64722E-01	7.65447E-01	7.33784E-04	0.00000E+00	0.00000E+00
65	7.70100E-01	7.65558E-01	7.18405E-04	0.00000E+00	0.00000E+00
66	7.70306E-01	7.65669E-01	7.09423E-04	0.00000E+00	0.00000E+00
67	7.57817E-01	7.65490E-01	6.87743E-04	0.00000E+00	0.00000E+00
68	7.71612E-01	7.65626E-01	6.41855E-04	0.00000E+00	0.00000E+00
69	7.60788E-01	7.65521E-01	6.36581E-04	0.00000E+00	0.00000E+00
70	7.73270E-01	7.65686E-01	6.78716E-04	0.00000E+00	0.00000E+00
71	7.63123E-01	7.65632E-01	6.75478E-04	0.00000E+00	0.00000E+00
72	7.66940E-01	7.65659E-01	6.68377E-04	0.00000E+00	0.00000E+00
73	7.78317E-01	7.65912E-01	7.05289E-04	0.00000E+00	0.00000E+00
74	7.66616E-01	7.65926E-01	6.89829E-04	0.00000E+00	0.00000E+00
75	7.65733E-01	7.65922E-01	6.73956E-04	0.00000E+00	0.00000E+00
76	7.66156E-01	7.65927E-01	6.62222E-04	0.00000E+00	0.00000E+00
77	7.62612E-01	7.65865E-01	6.52070E-04	0.00000E+00	0.00000E+00
78	7.66609E-01	7.65879E-01	6.39423E-04	0.00000E+00	0.00000E+00
79	7.63334E-01	7.65833E-01	6.34092E-04	0.00000E+00	0.00000E+00
80	7.67888E-01	7.65869E-01	6.20026E-04	0.00000E+00	0.00000E+00
81	7.62904E-01	7.65818E-01	6.14516E-04	0.00000E+00	0.00000E+00
82	7.62138E-01	7.65756E-01	6.08612E-04		

```
0.00000E+00      0.00000E+00
         83       7.64267E-01      7.65731E-01      5.99358E-04
0.00000E+00      0.00000E+00
         84       7.65271E-01      7.65724E-01      5.90624E-04
0.00000E+00      0.00000E+00
         85       7.67485E-01      7.65752E-01      5.76417E-04
0.00000E+00      0.00000E+00
         86       7.63284E-01      7.65713E-01      5.70975E-04
0.00000E+00      0.00000E+00
         87       7.63365E-01      7.65676E-01      5.61701E-04
0.00000E+00      0.00000E+00
         88       7.67419E-01      7.65703E-01      5.52450E-04
0.00000E+00      0.00000E+00
         89       7.57289E-01      7.65575E-01      5.79053E-04
0.00000E+00      0.00000E+00
         90       7.63650E-01      7.65547E-01      5.71446E-04
0.00000E+00      0.00000E+00
         91       7.58992E-01      7.65450E-01      5.90333E-04
0.00000E+00      0.00000E+00
         92       7.59481E-01      7.65364E-01      6.12823E-04
0.00000E+00      0.00000E+00
         93       7.65946E-01      7.65372E-01      6.01750E-04
0.00000E+00      0.00000E+00
         94       7.63837E-01      7.65351E-01      6.00454E-04
0.00000E+00      0.00000E+00
         95       7.65110E-01      7.65347E-01      5.92170E-04
0.00000E+00      0.00000E+00
         96       7.65487E-01      7.65349E-01      5.83579E-04
0.00000E+00      0.00000E+00
         97       7.71641E-01      7.65434E-01      5.77681E-04
0.00000E+00      0.00000E+00
         98       7.64528E-01      7.65422E-01      5.69834E-04
0.00000E+00      0.00000E+00
         99       7.63253E-01      7.65394E-01      5.58181E-04
0.00000E+00      0.00000E+00
        100       7.65702E-01      7.65398E-01      5.51126E-04
0.00000E+00      0.00000E+00
        101       7.62283E-01      7.65358E-01      5.48683E-04
0.00000E+00      0.00000E+00
        102       7.59639E-01      7.65285E-01      5.50400E-04
0.00000E+00      0.00000E+00
        103       7.66495E-01      7.65300E-01      5.42274E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=2B9494D600FC1917
        104       7.72283E-01      7.65387E-01      5.22968E-04
0.00000E+00      0.00000E+00
        105       7.69423E-01      7.65436E-01      5.52282E-04
0.00000E+00      0.00000E+00
        106       7.58225E-01      7.65349E-01      4.96306E-04
0.00000E+00      0.00000E+00
        107       7.60226E-01      7.65288E-01      4.86306E-04
```

```
0.00000E+00      0.00000E+00
        108       7.59109E-01      7.65215E-01      5.05293E-04
0.00000E+00      0.00000E+00
        109       7.72371E-01      7.65298E-01      4.76281E-04
0.00000E+00      0.00000E+00
        110       7.69031E-01      7.65341E-01      4.80417E-04
0.00000E+00      0.00000E+00
        111       7.68590E-01      7.65378E-01      4.79666E-04
0.00000E+00      0.00000E+00
        112       7.67349E-01      7.65400E-01      4.83810E-04
0.00000E+00      0.00000E+00
        113       7.68532E-01      7.65435E-01      4.83912E-04
0.00000E+00      0.00000E+00
        114       7.66671E-01      7.65449E-01      4.80230E-04
0.00000E+00      0.00000E+00
        115       7.61721E-01      7.65408E-01      4.72479E-04
0.00000E+00      0.00000E+00
        116       7.70631E-01      7.65464E-01      4.67030E-04
0.00000E+00      0.00000E+00
        117       7.63223E-01      7.65441E-01      4.61764E-04
0.00000E+00      0.00000E+00
        118       7.69139E-01      7.65479E-01      4.61146E-04
0.00000E+00      0.00000E+00
        119       7.66163E-01      7.65487E-01      4.56437E-04
0.00000E+00      0.00000E+00
        120       7.61693E-01      7.65447E-01      4.49336E-04
0.00000E+00      0.00000E+00
        121       7.55518E-01      7.65346E-01      4.64689E-04
0.00000E+00      0.00000E+00
        122       7.61064E-01      7.65303E-01      4.75915E-04
0.00000E+00      0.00000E+00
        123       7.74044E-01      7.65390E-01      4.57768E-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=7D3C297502FC5C1F
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55117E-05 + or -  1.13711E-08             generation time
=  2.99481E-05 + or -  2.04208E-08
 nu bar   =  2.43897E+00 + or -  1.00440E-05       average fission group
=  2.17561E+02 + or -  1.06571E-02
                      energy(ev) of the average lethargy causing fission
=  5.65358E-02 + or -  1.21843E-04
                                                 system mean free path (cm)
=  6.52558E-01 + or -  1.63427E-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 0.76539 + or - 0.00046 0.76493 to 0.76585
0.76447 to 0.76631 0.76402 to 0.76676 2000000 12.5291

24 0.76549 + or - 0.00045 0.76504 to 0.76594
0.76458 to 0.76639 0.76413 to 0.76684 1980000 12.6173

25 0.76549 + or - 0.00046 0.76504 to 0.76595
0.76458 to 0.76640 0.76412 to 0.76686 1960000 12.5629

26 0.76547 + or - 0.00046 0.76501 to 0.76592
0.76455 to 0.76638 0.76409 to 0.76684 1940000 12.6513

27 0.76545 + or - 0.00046 0.76499 to 0.76591
0.76452 to 0.76637 0.76406 to 0.76684 1920000 12.6873

28 0.76543 + or - 0.00047 0.76496 to 0.76590
0.76449 to 0.76636 0.76403 to 0.76683 1900000 12.6885

29 0.76543 + or - 0.00047 0.76496 to 0.76591
0.76449 to 0.76638 0.76401 to 0.76685 1880000 12.6322

30 0.76541 + or - 0.00048 0.76493 to 0.76589
0.76445 to 0.76636 0.76397 to 0.76684 1860000 12.6081

31 0.76543 + or - 0.00048 0.76494 to 0.76591
0.76446 to 0.76639 0.76398 to 0.76687 1840000 12.6966

32 0.76548 + or - 0.00049 0.76499 to 0.76596
0.76450 to 0.76645 0.76402 to 0.76693 1820000 12.7063

37 0.76530 + or - 0.00048 0.76482 to 0.76578
0.76434 to 0.76626 0.76386 to 0.76674 1720000 14.4979

42 0.76527 + or - 0.00050 0.76477 to 0.76577
0.76426 to 0.76628 0.76376 to 0.76678 1620000 14.5781

47 0.76532 + or - 0.00054 0.76478 to 0.76586
0.76425 to 0.76639 0.76371 to 0.76693 1520000 14.4832

52 0.76521 + or - 0.00057 0.76464 to 0.76578
0.76407 to 0.76635 0.76350 to 0.76692 1420000 14.6087

57 0.76543 + or - 0.00058 0.76484 to 0.76601
0.76426 to 0.76659 0.76368 to 0.76717 1320000 16.0102

62 0.76530 + or - 0.00060 0.76469 to 0.76590

0.76409 to 0.76651 0.76348 to 0.76711 1220000 17.3085

67 0.76531 + or - 0.00067 0.76465 to 0.76598
0.76398 to 0.76664 0.76332 to 0.76731 1120000 16.6990

72 0.76513 + or - 0.00073 0.76440 to 0.76586
0.76367 to 0.76659 0.76294 to 0.76732 1020000 16.4855

77 0.76483 + or - 0.00073 0.76410 to 0.76557
0.76336 to 0.76630 0.76263 to 0.76704 920000 13.7142

82 0.76486 + or - 0.00083 0.76404 to 0.76569
0.76321 to 0.76652 0.76239 to 0.76734 820000 13.4890

87 0.76488 + or - 0.00095 0.76393 to 0.76583
0.76299 to 0.76678 0.76204 to 0.76773 720000 12.8666

92 0.76545 + or - 0.00100 0.76445 to 0.76645
0.76345 to 0.76745 0.76245 to 0.76845 620000 14.8088

97 0.76527 + or - 0.00119 0.76408 to 0.76645
0.76289 to 0.76764 0.76170 to 0.76883 520000 14.1678

102 0.76579 + or - 0.00144 0.76435 to 0.76723
0.76291 to 0.76867 0.76146 to 0.77011 420000 14.8330

107 0.76593 + or - 0.00148 0.76445 to 0.76740
0.76297 to 0.76888 0.76150 to 0.77036 320000 23.7572

112 0.76531 + or - 0.00197 0.76334 to 0.76728
0.76137 to 0.76925 0.75940 to 0.77122 220000 27.1144
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 0.76460 + or - 0.00487 0.75973 to 0.76948
0.75486 to 0.77435 0.74998 to 0.77922 120000 16.8258
1 fuel bundle

plot of average k-effective by generation run.
the line represents k-eff = 0.76544 + or - 0.00044 which occurs for
120 generations run.

0.7559 0.7612
0.7664

|----------|----------|----------

```
------|------------------------
        |
      25 +                          I                     *
I |
        |                              I                              *
|                 I
        |                            I
*      |                            I
        |                                                  I
*   |                  I
        |                                                         I
*   |           I
      30 +                                                            I
*|          I
        |                                                              I
* |       I
        |                                                            I
*    |    I
        |                                                               I
*  |   I
        |
I      *  |  I
      35 +
I     * |    I
        |
I     |*      I
        |
I    | *      I
        |
I   |   *         I
        |
I   |  *       I
      40 +
I  |    *      I
        |
I |   *      I
        |
I    | *      I
        |
I   |  *     I
        |
I   | *      I
      45 +
I    |*      I
        |
I   | *    I
        |
I     |*     I
        |
I    |*     I
        |
I    |*    I
```

```
      50 +
I   |*    I
         |
I   | *    I
         |
I  | *    I
         |
I   |*    I
         |
I    *    I
      55 +
I  |*   I
         |
I   *   I
         |
I   *|   I
         |
I    *|  I
         |
I   *   I
      60 +
I   *   I
         |
I   *   I
         |
I  *   I
         |
I   *   I
         |
I   *  I
      65 +
I  *   I
         |
I |*  I
         |
I  *  I
         |
I |*  I
         |
I  *  I
      70 +
I |*  I
         |
I |*  I
         |
I |*  I
         |
I| *  I
         |
I| *  I
      75 +
I| *  I
```

```
          |
I| *  I
          |
I| *  I
          |
I| *  I
          |
I| *  I
      80 +
I| *  I
          |
I| *  I
          |
I |*  I
          |
I |*  I
          |
I |*  I
      85 +
I|*  I
          |
I |*  I
          |
I |*  I
          |
I |*  I
          |
I *  I
      90 +
I *  I
          |
I  *  I
          |
I *| I
          |
I  * I
          |
I *| I
      95 +
I *| I
          |
I *| I
          |
I  *  I
          |
I  * I
          |
I  * I
     100 +
I  * I
          |
I *| I
```

```
          |
I  *| I
          |
I *| I
          |
I  * I
     105 +
I  * I
          |
I *| I
          |
I *|I
          |
I  *|I
          |
I *|I
     110 +
I *| I
          |
I  * I
          |
I  * I
          |
I * I
          |
I * I
     115 +
I  * I
          |
I * I
          |
I * I
          |
I * I
          |
I * I
     120 +
I * I
          |
I *| I
          |
I *|I
          |
I  * I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7654 + or - 0.0004 which occurs for 24 generations skipped.

```
                                0.7631                    0.7653
0.7676
```

```
|-------------------------|-------------------------|------------------
------|-------------------------
         |
         |                                                 I    *|   I
         |                                                  I    *    I
      25 +                                                  I    *     I
         |                                                  I    *    I
         |                                                  I    *    I
         |                                                  I    *    I
         |                                                  I    *    I
      30 +                                                 I     *    I
         |                                                 I     *    I
         |                                                  I    *     I
         |                                                  I    *     I
         |                                                  I    *     I
      35 +                                                 I     *    I
         |                                               I     *|   I
         |                                               I    * |   I
         |                                             I    *  |  I
         |                                             I     * |  I
      40 +                                             I    *  | I
         |                                            I     *  | I
         |                                             I     * |   I
         |                                             I     * |  I
         |                                             I     * |  I
      45 +                                             I     * |   I
         |                                             I     * |   I
         |                                               I     *|    I
         |                                             I     * |   I
         |                                             I     * |   I
      50 +                                             I     * |   I
         |                                            I      * |   I
         |                                            I     *  |   I
         |                                             I     * |   I
         |                                             I      *|    I
      55 +                                            I      * |    I
         |                                             I      *|    I
         |                                              I      *     I
         |                                               I     |*     I
         |                                              I     *|     I
      60 +                                             I      *|    I
         |                                             I     * |    I
         |                                             I     * |    I
         |                                             I      *|     I
         |                                             I      *|     I
      65 +                                            I      * |    I
         |                                           I      *  |   I
         |                                            I      * |     I
         |                                           I      *  |    I
         |                                           I       * |     I
      70 +                                        I       *   |   I
```

```
         |                                          I        *  |    I
         |                                        I        *   |    I
         |                                      I       *      |I
         |                                    I        *      |I
      75 +                                    I        *      |I
         |                                    I        *      |I
         |                                    I        *      |I
         |                                   I         *      |I
         |                                   I         *      | I
      80 +                                 I         *       |I
         |                                 I         *       | I
         |                                 I         *       |  I
         |                                 I          *      |  I
         |                                 I         *       |  I
      85 +                                I          *       |  I
         |                                I          *       |  I
         |                                I           *      |   I
         |                              I            *       |   I
         |                                I           *     |     I
      90 +                                I            *   |      I
         |                                   I           * |        I
         |                                      I           *
I
         |                                        I            *
I
         |                                        I            *
I
      95 +                                        I            |*
I
         |                                        I            |*
I
         |                                    I             * |
I
         |                                   I              * |
I
         |                                    I              *|
I
     100 +                                   I               *|
I
         |                                    I               |*
I
         |                                        I            |   *
I
         |                                      I              |  *
I
         |                                  I                  *
I
     105 +                            I                  *  |
I
         |                                   I                | *
I
         |                                      I           |    *
```

```
I
         |                                          I        |
*                  I
         |                                     I            |     *
I
     110 +                                 I                |  *
I
         |                              I                   *
I
         |                           I                     * |
I
         |                        I                     *    |
I
         |                    I                       *      |
I
     115 +             I                                 *  |
I
         |                                        *          |
I
         |                                           *       |
I
         |                               *                  |
I
         |                         *                        |
     120 +                              *                   |

   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                 0.00000E+00     0.0000
2.47585E-07    41.4874       0.00000E+00     0.0000
    3    0.0000                 1.14507E-05    12.5095
2.07575E-05     4.7028       0.00000E+00     0.0000
    4    0.0000                 1.99105E-05     7.4757
3.48239E-05     3.5843       0.00000E+00     0.0000
    5    0.0000                 2.65411E-05     7.2903
5.40287E-05     2.9342       0.00000E+00     0.0000
    6    0.0001                 9.99855E-05     3.4927
2.26913E-04     1.3420       0.00000E+00     0.0000
    7    0.0002                 1.25150E-04     3.5456
2.16082E-04     1.3681       0.00000E+00     0.0000
    8    0.0003                 2.49352E-04     1.9974
3.27345E-04     0.9795       0.00000E+00     0.0000
```

9	0.0005	3.79452E-04	1.3124	4.41842E-04	0.5826
10	0.0003	2.06927E-04	1.5216	2.08760E-04	0.6949
11	0.0012	9.20396E-04	0.7958	5.27798E-04	0.5475
12	0.0010	7.60390E-04	0.6896	2.98075E-04	0.6796
13	0.0003	2.27458E-04	1.4067	9.03677E-05	1.3921
14	0.0013	9.96203E-04	0.6514	4.07202E-04	0.6447
15	0.0010	7.62622E-04	0.7192	3.28777E-04	0.7113
16	0.0002	1.89451E-04	1.2185	8.70625E-05	1.2010
17	0.0001	6.66644E-05	1.9089	3.24317E-05	1.8721
18	0.0001	5.20915E-05	2.0316	2.63286E-05	1.9892
19	0.0001	8.00349E-05	1.2930	4.23300E-05	1.2633
20	0.0001	6.09887E-05	1.3416	3.33857E-05	1.3141
21	0.0002	1.20832E-04	1.2392	6.82147E-05	1.2105
22	0.0001	1.04948E-04	1.2785	6.21457E-05	1.2479
23	0.0001	1.07978E-04	1.0936	6.59181E-05	1.0681
24	0.0000	2.56952E-05	2.3268	1.59392E-05	2.2745
25	0.0000	3.13604E-05	1.9103	1.95858E-05	1.8583
26	0.0000	1.69768E-05	2.7497	1.06644E-05	2.6804
27	0.0001	5.20593E-05	1.2931	3.25005E-05	1.2638
28	0.0001	9.75517E-05	0.9866	6.08498E-05	0.9691
29	0.0001	9.82669E-05	1.1606	6.18924E-05	1.1457
30	0.0000	1.18891E-05	3.3873	7.45974E-06	3.3599
31	0.0001	9.56454E-05	1.0810	6.04302E-05	1.0685
32	0.0000	3.74488E-05	1.5084	2.39426E-05	1.4727
33	0.0000	3.34807E-05	1.5900	2.09605E-05	1.5701
34	0.0001	7.54400E-05	1.1622	4.73851E-05	1.1465

```
   35    0.0001                 4.50927E-05     1.6675
2.83004E-05     1.6410       0.00000E+00     0.0000
   36    0.0001                 4.44740E-05     1.3615
2.75203E-05     1.3501       0.00000E+00     0.0000
   37    0.0000                 2.87381E-05     1.7194
1.80342E-05     1.6883       0.00000E+00     0.0000
   38    0.0000                 3.26453E-05     1.6999
2.05798E-05     1.6560       0.00000E+00     0.0000
   39    0.0002                 1.28990E-04     0.9342
8.20939E-05     0.9132       0.00000E+00     0.0000
   40    0.0002                 1.21130E-04     0.9506
7.82842E-05     0.9309       0.00000E+00     0.0000
   41    0.0002                 1.59319E-04     0.8402
1.06469E-04     0.8147       0.00000E+00     0.0000
   42    0.0002                 1.40397E-04     0.6669
9.54791E-05     0.6524       0.00000E+00     0.0000
   43    0.0001                 8.14904E-05     1.1902
5.84998E-05     1.1429       0.00000E+00     0.0000
   44    0.0001                 1.13527E-04     1.0570
8.33745E-05     1.0139       0.00000E+00     0.0000
   45    0.0001                 5.92429E-05     1.0408
4.77326E-05     0.9603       0.00000E+00     0.0000
   46    0.0000                 1.44223E-05     2.1344
1.15876E-05     1.9914       0.00000E+00     0.0000
   47    0.0001                 4.05305E-05     1.9244
3.14876E-05     1.8566       0.00000E+00     0.0000
   48    0.0000                 1.21340E-05     3.3439
9.41224E-06     3.2623       0.00000E+00     0.0000
   49    0.0001                 8.12866E-05     1.3667
6.40784E-05     1.3353       0.00000E+00     0.0000
   50    0.0001                 5.75930E-05     1.7593
4.74148E-05     1.7249       0.00000E+00     0.0000
   51    0.0000                 1.53016E-05     3.6659
1.27115E-05     3.5948       0.00000E+00     0.0000
   52    0.0001                 3.88838E-05     2.1248
3.36546E-05     2.0697       0.00000E+00     0.0000
   53    0.0002                 1.58356E-04     0.7779
1.55586E-04     0.7282       0.00000E+00     0.0000
   54    0.0001                 7.63587E-05     1.6009
7.08885E-05     1.5416       0.00000E+00     0.0000
   55    0.0002                 1.63153E-04     1.4156
1.49519E-04     1.3817       0.00000E+00     0.0000
   56    0.0002                 1.19922E-04     1.6536
1.11196E-04     1.6129       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	1.49482E-04	1.6754	1.35647E-04	1.6337	0.00000E+00	0.0000
58	0.0001	8.70314E-05	1.9909	7.61786E-05	1.9367	0.00000E+00	0.0000
59	0.0002	1.60085E-04	1.6145	1.43807E-04	1.5491	0.00000E+00	0.0000
60	0.0004	2.74127E-04	1.3395	2.48601E-04	1.2670	0.00000E+00	0.0000
61	0.0000	2.81102E-05	3.9579	2.16290E-05	3.8316	0.00000E+00	0.0000
62	0.0002	1.65791E-04	1.5731	1.39012E-04	1.5291	0.00000E+00	0.0000
63	0.0001	1.14547E-04	2.2056	9.44571E-05	2.1165	0.00000E+00	0.0000
64	0.0001	9.98490E-05	2.2365	8.04966E-05	2.1548	0.00000E+00	0.0000
65	0.0000	3.39007E-05	3.2480	3.35525E-05	3.1415	0.00000E+00	0.0000
66	0.0002	1.78050E-04	1.9185	1.57827E-04	1.8587	0.00000E+00	0.0000
67	0.0002	1.44244E-04	2.2120	1.18096E-04	2.1381	0.00000E+00	0.0000
68	0.0000	2.35525E-05	4.5124	2.04641E-05	4.3354	0.00000E+00	0.0000
69	0.0004	3.06835E-04	1.5360	2.40658E-04	1.4881	0.00000E+00	0.0000
70	0.0003	2.14881E-04	1.6987	1.95433E-04	1.6402	0.00000E+00	0.0000
71	0.0006	4.46631E-04	1.3396	3.69212E-04	1.3008	0.00000E+00	0.0000
72	0.0001	4.86832E-05	6.0819	2.87687E-05	5.9355	0.00000E+00	0.0000
73	0.0004	3.25334E-04	1.6515	2.47758E-04	1.5621	0.00000E+00	0.0000
74	0.0014	1.04960E-03	1.0943	7.63830E-04	1.0471	0.00000E+00	0.0000
75	0.0001	1.12753E-04	2.7430	8.66922E-05	2.6174	0.00000E+00	0.0000
76	0.0006	4.79890E-04	2.0897	3.04443E-04	2.0190	0.00000E+00	0.0000
77	0.0005	3.71483E-04	1.9259	2.66303E-04	1.8570	0.00000E+00	0.0000
78	0.0000	6.99978E-06	4.7076	6.85088E-05	4.6540	0.00000E+00	0.0000
79	0.0002	1.86264E-04	2.6656	1.25305E-04	2.5621	0.00000E+00	0.0000
80	0.0001	6.14267E-05	3.2736	8.19496E-05	3.1815	0.00000E+00	0.0000
81	0.0014	1.06096E-03	1.2792	7.80212E-04	1.2275	0.00000E+00	0.0000
82	0.0001	7.04393E-05	3.6513				

4.21401E-05	3.4667	0.00000E+00	0.0000	83	0.0002	1.25034E-04	3.2513
1.38402E-04	3.1833	0.00000E+00	0.0000	84	0.0001	8.28702E-05	2.8183
8.40021E-05	2.6207	0.00000E+00	0.0000	85	0.0003	1.97458E-04	2.2658
2.43098E-04	2.2045	0.00000E+00	0.0000	86	0.0004	2.72796E-04	2.3916
2.19297E-04	2.2744	0.00000E+00	0.0000	87	0.0004	3.40637E-04	2.7613
2.11728E-04	2.6410	0.00000E+00	0.0000	88	0.0001	5.65197E-05	4.7162
1.02553E-04	4.6033	0.00000E+00	0.0000	89	0.0001	1.02026E-04	3.1413
7.04128E-05	2.9020	0.00000E+00	0.0000	90	0.0003	2.08031E-04	3.1103
1.23191E-04	2.9620	0.00000E+00	0.0000	91	0.0002	1.84493E-04	3.2564
1.16922E-04	3.0641	0.00000E+00	0.0000	92	0.0000	2.96750E-05	3.1797
1.94364E-04	3.1090	0.00000E+00	0.0000	93	0.0002	1.29179E-04	3.1311
1.05027E-04	2.9147	0.00000E+00	0.0000	94	0.0001	1.08468E-04	4.4486
6.09739E-05	4.1703	0.00000E+00	0.0000	95	0.0008	5.92838E-04	2.0549
3.65937E-04	1.9892	0.00000E+00	0.0000	96	0.0002	1.54350E-04	4.5988
7.82705E-05	4.4167	0.00000E+00	0.0000	97	0.0004	2.83010E-04	3.5628
1.62012E-04	3.4898	0.00000E+00	0.0000	98	0.0001	1.04378E-04	4.0594
1.00083E-04	3.9200	0.00000E+00	0.0000	99	0.0001	8.94627E-05	5.0470
6.02216E-05	4.8416	0.00000E+00	0.0000	100	0.0002	1.19335E-04	4.0675
8.00084E-05	3.8952	0.00000E+00	0.0000	101	0.0001	1.09150E-04	3.8748
6.95314E-05	3.5795	0.00000E+00	0.0000	102	0.0002	1.53184E-04	3.3913
8.55448E-05	3.2538	0.00000E+00	0.0000	103	0.0001	9.47244E-05	3.5512
9.26018E-05	3.3541	0.00000E+00	0.0000	104	0.0002	1.71356E-04	3.5389
1.35792E-04	3.4210	0.00000E+00	0.0000	105	0.0002	1.21094E-04	3.3396
8.01018E-05	3.1508	0.00000E+00	0.0000	106	0.0002	1.76115E-04	4.2449
1.30888E-04	4.1891	0.00000E+00	0.0000	107	0.0001	6.04652E-05	3.2665
6.12699E-05	3.0498	0.00000E+00	0.0000	108	0.0000	3.42709E-05	2.4025

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1.48123E-04     2.3429       0.00000E+00     0.0000
  109    0.0002                1.30275E-04     2.3923
4.32320E-04     2.3581       0.00000E+00     0.0000
  110    0.0008                5.99846E-04     3.4324
3.70211E-04     3.3981       0.00000E+00     0.0000
  111    0.0002                1.59172E-04     4.7853
1.46184E-04     4.6607       0.00000E+00     0.0000
  112    0.0002                1.26921E-04     4.7955
1.33593E-04     4.7141       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                1.28442E-04     4.0440
1.12089E-04     3.7858       0.00000E+00     0.0000
  114    0.0000                1.04839E-05     6.7588
1.43446E-05     5.6259       0.00000E+00     0.0000
  115    0.0001                7.51889E-05     4.1026
8.71438E-05     3.8034       0.00000E+00     0.0000
  116    0.0002                1.85299E-04     2.4560
1.39926E-04     2.2052       0.00000E+00     0.0000
  117    0.0006                4.48820E-04     2.3452
2.40836E-04     2.1792       0.00000E+00     0.0000
  118    0.0008                5.77308E-04     1.8065
4.50960E-04     1.7316       0.00000E+00     0.0000
  119    0.0002                1.40002E-04     1.9334
3.61344E-04     1.8651       0.00000E+00     0.0000
  120    0.0002                1.73621E-04     2.0604
6.60566E-04     2.0325       0.00000E+00     0.0000
  121    0.0007                5.28059E-04     2.5452
4.06144E-04     2.4830       0.00000E+00     0.0000
  122    0.0001                9.89392E-05     5.3848
7.75586E-05     5.0111       0.00000E+00     0.0000
  123    0.0003                2.14690E-04     2.5992
1.52193E-04     2.3176       0.00000E+00     0.0000
  124    0.0003                2.27884E-04     3.2055
1.88299E-04     2.9839       0.00000E+00     0.0000
  125    0.0002                1.45441E-04     3.5386
1.33076E-04     3.2109       0.00000E+00     0.0000
  126    0.0001                1.01401E-04     3.6451
9.09714E-05     3.2208       0.00000E+00     0.0000
  127    0.0005                3.88198E-04     3.3632
1.90794E-04     3.1782       0.00000E+00     0.0000
  128    0.0003                2.29056E-04     3.0616
1.40806E-04     2.7203       0.00000E+00     0.0000
  129    0.0006                4.65364E-04     2.1407
4.28103E-04     2.0413       0.00000E+00     0.0000
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130	0.0001	1.14377E-04	2.9897	2.79252E-04	2.9013
0.00000E+00	0.0000				
131	0.0004	2.96804E-04	2.0690	2.38560E-04	1.7498
0.00000E+00	0.0000				
132	0.0007	5.16029E-04	2.3304	3.17407E-04	2.1334
0.00000E+00	0.0000				
133	0.0014	1.04940E-03	1.8343	6.63185E-04	1.7416
0.00000E+00	0.0000				
134	0.0001	9.14833E-05	2.2946	2.38117E-04	1.9234
0.00000E+00	0.0000				
135	0.0002	1.76978E-04	3.2136	2.62294E-04	3.1368
0.00000E+00	0.0000				
136	0.0001	4.64208E-05	2.0405	7.20148E-04	2.0100
0.00000E+00	0.0000				
137	0.0000	1.95041E-05	1.0444	3.50930E-03	1.0415
0.00000E+00	0.0000				
138	0.0004	3.03690E-04	2.1658	7.91479E-04	2.1307
0.00000E+00	0.0000				
139	0.0002	1.79756E-04	3.5435	2.20662E-04	3.3319
0.00000E+00	0.0000				
140	0.0003	2.07341E-04	2.4054	2.76492E-04	2.0974
0.00000E+00	0.0000				
141	0.0001	7.69926E-05	2.3250	2.43499E-04	2.0630
0.00000E+00	0.0000				
142	0.0001	6.47115E-05	2.7469	2.23989E-04	2.5172
0.00000E+00	0.0000				
143	0.0001	8.08183E-05	2.0270	1.73564E-04	1.2502
0.00000E+00	0.0000				
144	0.0000	3.38443E-05	3.9634	7.40571E-05	2.4099
0.00000E+00	0.0000				
145	0.0005	3.85026E-04	2.7457	3.01990E-04	2.4990
0.00000E+00	0.0000				
146	0.0005	3.52389E-04	2.1596	2.56161E-04	1.7617
0.00000E+00	0.0000				
147	0.0002	1.81672E-04	3.8968	1.15947E-04	3.3789
0.00000E+00	0.0000				
148	0.0001	5.92070E-05	6.0516	3.96106E-05	4.8346
0.00000E+00	0.0000				
149	0.0000	2.76860E-05	8.1105	1.95593E-05	6.1714
0.00000E+00	0.0000				
150	0.0001	8.65800E-05	4.1563	6.32204E-05	3.0543
0.00000E+00	0.0000				
151	0.0001	6.57939E-05	4.4401	5.61599E-05	3.0247
0.00000E+00	0.0000				
152	0.0001	3.84098E-05	4.7805	4.52181E-05	2.7841
0.00000E+00	0.0000				
153	0.0001	4.22895E-05	3.9081	4.69588E-05	2.3579
0.00000E+00	0.0000				
154	0.0001	4.41325E-05	4.6572	4.75630E-05	2.6207
0.00000E+00	0.0000				
155	0.0001	4.84431E-05	4.8936	4.86652E-05	2.9068
0.00000E+00	0.0000				

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  156    0.0001                 4.80894E-05     4.7210
4.69722E-05     2.8231       0.00000E+00     0.0000
  157    0.0001                 5.48088E-05     4.7709
5.46552E-05     2.8956       0.00000E+00     0.0000
  158    0.0001                 6.52487E-05     4.1388
6.62870E-05     2.7290       0.00000E+00     0.0000
  159    0.0002                 1.51570E-04     3.1168
2.10075E-04     2.6197       0.00000E+00     0.0000
  160    0.0001                 5.85753E-05     4.2263
7.06016E-05     3.1383       0.00000E+00     0.0000
  161    0.0001                 7.13460E-05     3.8148
7.09155E-05     2.4579       0.00000E+00     0.0000
  162    0.0001                 8.66710E-05     3.5903
8.10366E-05     2.2650       0.00000E+00     0.0000
  163    0.0001                 9.18950E-05     3.9526
8.55285E-05     2.4245       0.00000E+00     0.0000
  164    0.0001                 1.02371E-04     3.6538
9.39728E-05     2.2434       0.00000E+00     0.0000
  165    0.0001                 1.13959E-04     3.4839
1.04473E-04     2.2119       0.00000E+00     0.0000
  166    0.0001                 6.71404E-05     4.3544
6.24217E-05     2.7391       0.00000E+00     0.0000
  167    0.0001                 7.81817E-05     4.4792
7.05429E-05     2.9190       0.00000E+00     0.0000
  168    0.0001                 8.49608E-05     4.3641
7.63205E-05     2.9244       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                 1.10629E-04     4.0918
9.55143E-05     2.8619       0.00000E+00     0.0000
  170    0.0002                 1.33591E-04     4.2750
1.14954E-04     3.1569       0.00000E+00     0.0000
  171    0.0001                 9.18355E-05     5.6110
7.17721E-05     4.4153       0.00000E+00     0.0000
  172    0.0002                 1.27104E-04     4.8316
9.11575E-05     4.0334       0.00000E+00     0.0000
  173    0.0002                 1.88822E-04     3.5969
1.25338E-04     3.1136       0.00000E+00     0.0000
  174    0.0003                 2.52629E-04     4.0621
1.56926E-04     3.6305       0.00000E+00     0.0000
  175    0.0001                 1.04492E-04     5.5415
6.37616E-05     4.9303       0.00000E+00     0.0000
  176    0.0001                 1.12960E-04     6.0789
6.75614E-05     5.4497       0.00000E+00     0.0000
  177    0.0002                 1.21804E-04     5.6534
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7.17977E-05	5.0780	0.00000E+00	0.0000	178	0.0002	1.28393E-04	6.1841
7.46112E-05	5.6111	0.00000E+00	0.0000	179	0.0002	1.16722E-04	6.4456
6.78769E-05	5.8123	0.00000E+00	0.0000	180	0.0001	1.11455E-04	6.0482
6.48274E-05	5.3515	0.00000E+00	0.0000	181	0.0002	1.16218E-04	5.6852
6.69018E-05	5.0854	0.00000E+00	0.0000	182	0.0001	1.03984E-04	5.8911
6.02481E-05	5.1693	0.00000E+00	0.0000	183	0.0001	1.12129E-04	5.8157
6.42230E-05	5.1096	0.00000E+00	0.0000	184	0.0001	9.05439E-05	5.6361
5.33211E-05	4.8010	0.00000E+00	0.0000	185	0.0001	9.69477E-05	6.7799
5.62614E-05	5.8444	0.00000E+00	0.0000	186	0.0001	1.01991E-04	5.2992
5.88201E-05	4.5363	0.00000E+00	0.0000	187	0.0001	9.83005E-05	6.4331
5.69501E-05	5.4862	0.00000E+00	0.0000	188	0.0001	8.47949E-05	7.2601
5.03435E-05	6.0529	0.00000E+00	0.0000	189	0.0001	8.47607E-05	6.6482
5.03294E-05	5.5362	0.00000E+00	0.0000	190	0.0003	2.11255E-04	4.2166
1.24947E-04	3.5009	0.00000E+00	0.0000	191	0.0003	2.16560E-04	3.9367
1.28094E-04	3.2159	0.00000E+00	0.0000	192	0.0003	2.10689E-04	3.7887
1.25982E-04	3.1231	0.00000E+00	0.0000	193	0.0002	1.90002E-04	3.9000
1.16853E-04	3.1053	0.00000E+00	0.0000	194	0.0005	4.00577E-04	2.8544
2.46510E-04	2.2812	0.00000E+00	0.0000	195	0.0006	4.32945E-04	2.7413
2.67636E-04	2.1257	0.00000E+00	0.0000	196	0.0006	4.50604E-04	2.5977
2.81778E-04	2.0082	0.00000E+00	0.0000	197	0.0007	5.31482E-04	2.7141
3.28923E-04	2.1281	0.00000E+00	0.0000	198	0.0007	5.58881E-04	2.4568
3.48454E-04	1.9200	0.00000E+00	0.0000	199	0.0004	3.22841E-04	3.1167
1.98931E-04	2.4574	0.00000E+00	0.0000	200	0.0004	3.43857E-04	3.1602
2.12976E-04	2.4799	0.00000E+00	0.0000	201	0.0010	7.65417E-04	2.0453
4.71586E-04	1.6163	0.00000E+00	0.0000	202	0.0013	9.79174E-04	2.0958
5.93751E-04	1.6926	0.00000E+00	0.0000	203	0.0016	1.25741E-03	1.8065

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7.46274E-04     1.4884       0.00000E+00     0.0000
  204    0.0021                 1.64398E-03     1.6070
9.69855E-04     1.3456       0.00000E+00     0.0000
  205    0.0015                 1.11298E-03     1.8323
6.55232E-04     1.5408       0.00000E+00     0.0000
  206    0.0018                 1.37629E-03     1.8693
8.03814E-04     1.6146       0.00000E+00     0.0000
  207    0.0021                 1.62599E-03     1.4601
9.46553E-04     1.2773       0.00000E+00     0.0000
  208    0.0029                 2.19666E-03     1.6164
1.27930E-03     1.4274       0.00000E+00     0.0000
  209    0.0031                 2.40426E-03     1.3522
1.41085E-03     1.2057       0.00000E+00     0.0000
  210    0.0037                 2.82657E-03     1.3630
1.68609E-03     1.1948       0.00000E+00     0.0000
  211    0.0041                 3.12554E-03     1.1308
1.88442E-03     0.9768       0.00000E+00     0.0000
  212    0.0046                 3.54470E-03     1.2739
2.15779E-03     1.0929       0.00000E+00     0.0000
  213    0.0063                 4.83564E-03     0.9063
2.93850E-03     0.7657       0.00000E+00     0.0000
  214    0.0095                 7.29629E-03     0.6884
4.39813E-03     0.5798       0.00000E+00     0.0000
  215    0.0157                 1.20301E-02     0.6266
7.17455E-03     0.5397       0.00000E+00     0.0000
  216    0.0303                 2.31793E-02     0.4549
1.36557E-02     0.3827       0.00000E+00     0.0000
  217    0.0201                 1.53609E-02     0.5291
9.04104E-03     0.4480       0.00000E+00     0.0000
  218    0.0275                 2.10554E-02     0.4511
1.23336E-02     0.3829       0.00000E+00     0.0000
  219    0.0357                 2.73486E-02     0.4621
1.59562E-02     0.3898       0.00000E+00     0.0000
  220    0.0476                 3.64362E-02     0.3354
2.11662E-02     0.2868       0.00000E+00     0.0000
  221    0.0623                 4.76977E-02     0.3633
2.76711E-02     0.3084       0.00000E+00     0.0000
  222    0.0804                 6.15710E-02     0.2675
3.56599E-02     0.2248       0.00000E+00     0.0000
  223    0.1043                 7.97997E-02     0.2244
4.62893E-02     0.1909       0.00000E+00     0.0000
  224    0.0585                 4.48122E-02     0.3095
2.60755E-02     0.2612       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    0.2303                 1.76252E-01     0.1623
1.04438E-01     0.1367       0.00000E+00     0.0000
  226    0.0452                 3.46298E-02     0.3445
2.11034E-02     0.2814       0.00000E+00     0.0000
  227    0.0495                 3.78526E-02     0.3664
2.34574E-02     0.2993       0.00000E+00     0.0000
  228    0.0211                 1.61816E-02     0.5714
1.02347E-02     0.4622       0.00000E+00     0.0000
  229    0.0223                 1.70321E-02     0.5228
1.09489E-02     0.4017       0.00000E+00     0.0000
  230    0.0116                 8.86148E-03     0.7807
5.81198E-03     0.5945       0.00000E+00     0.0000
  231    0.0120                 9.21686E-03     0.7452
6.15951E-03     0.5623       0.00000E+00     0.0000
  232    0.0130                 9.95970E-03     0.7420
6.79538E-03     0.5451       0.00000E+00     0.0000
  233    0.0084                 6.43403E-03     0.9054
4.49967E-03     0.6714       0.00000E+00     0.0000
  234    0.0058                 4.47366E-03     1.2639
3.23256E-03     0.8916       0.00000E+00     0.0000
  235    0.0025                 1.89678E-03     1.8602
1.24896E-03     1.4133       0.00000E+00     0.0000
  236    0.0020                 1.51494E-03     1.8969
1.01039E-03     1.4240       0.00000E+00     0.0000
  237    0.0018                 1.37503E-03     1.9405
9.60246E-04     1.3702       0.00000E+00     0.0000
  238    0.0001                 6.92242E-05     8.6353
6.07151E-05     4.9481       0.00000E+00     0.0000

 system total =                 7.65390E-01     0.0567
4.68713E-01     0.0475       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3125E-01  +
or -  0.0002



 elapsed time   3.11483 minutes

 random number=   101D7FB245F1B0BA
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                          unit  region   density
```

deviation 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

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	1.312E-08	29.52	9.168E-09	29.09	1.048E-08	29.22
3	8.674E-07	3.58	7.164E-07	3.41	7.737E-07	3.37
4	1.505E-06	2.76	1.236E-06	2.52	1.328E-06	2.57
5	2.295E-06	2.56	1.891E-06	2.44	2.017E-06	2.47
6	9.483E-06	1.21	7.556E-06	1.13	8.093E-06	1.12
7	1.265E-05	1.12	9.563E-06	0.94	1.012E-05	1.01
8	3.117E-05	0.78	2.271E-05	0.66	2.382E-05	0.67
9	8.175E-05	0.46	5.885E-05	0.37	6.144E-05	0.37
10	4.701E-05	0.76	3.336E-05	0.66	3.477E-05	0.65
11	2.206E-04	0.28	1.558E-04	0.22	1.613E-04	0.24
12	1.904E-04	0.27	1.381E-04	0.23	1.444E-04	0.24
13	5.640E-05	0.51	4.120E-05	0.44	4.311E-05	0.40
14	2.520E-04	0.24	1.823E-04	0.21	1.905E-04	0.21
15	2.202E-04	0.27	1.596E-04	0.22	1.663E-04	0.23
16	7.152E-05	0.45	5.180E-05	0.33	5.422E-05	0.35
17	3.167E-05	0.65	2.321E-05	0.61	2.420E-05	0.55
18	2.820E-05	0.68	2.057E-05	0.63	2.123E-05	0.56
19	5.063E-05	0.49	3.694E-05	0.39	3.838E-05	0.38
20	3.988E-05	0.61	2.904E-05	0.55	3.041E-05	0.53
21	8.044E-05	0.41	5.868E-05	0.35	6.123E-05	0.35
22	7.262E-05	0.37	5.319E-05	0.34	5.511E-05	0.32
23	7.753E-05	0.39	5.672E-05	0.32	5.879E-05	0.33
24	1.873E-05	0.79	1.377E-05	0.69	1.438E-05	0.65
25	2.345E-05	0.58	1.733E-05	0.53	1.817E-05	0.51
26	1.312E-05	0.88	9.780E-06	0.81	1.030E-05	0.73
27	4.212E-05	0.56	3.117E-05	0.47	3.308E-05	0.44
28	7.759E-05	0.40	5.742E-05	0.36	6.071E-05	0.35
29	7.892E-05	0.46	5.945E-05	0.37	6.214E-05	0.34
30	1.002E-05	1.06	7.493E-06	0.90	7.872E-06	0.95
31	7.830E-05	0.40	5.868E-05	0.32	6.179E-05	0.31
32	3.123E-05	0.66	2.347E-05	0.52	2.461E-05	0.51

33	2.669E-05	0.62	2.022E-05	0.52	2.129E-05	0.52
34	6.071E-05	0.43	4.580E-05	0.38	4.835E-05	0.36
35	3.614E-05	0.50	2.736E-05	0.44	2.884E-05	0.41
36	3.421E-05	0.54	2.567E-05	0.43	2.691E-05	0.40
37	2.206E-05	0.68	1.670E-05	0.54	1.751E-05	0.50
38	2.564E-05	0.59	1.956E-05	0.53	2.058E-05	0.50
39	9.764E-05	0.37	7.474E-05	0.31	7.893E-05	0.29
40	8.970E-05	0.31	6.923E-05	0.25	7.383E-05	0.24
41	1.133E-04	0.30	8.865E-05	0.27	9.451E-05	0.23
42	9.377E-05	0.29	7.409E-05	0.29	7.940E-05	0.25
43	5.173E-05	0.44	4.112E-05	0.36	4.326E-05	0.33
44	7.014E-05	0.36	5.602E-05	0.31	6.028E-05	0.28
45	3.522E-05	0.38	2.787E-05	0.33	3.094E-05	0.29
46	8.414E-06	0.84	6.640E-06	0.70	7.148E-06	0.60
47	2.354E-05	0.61	1.859E-05	0.55	1.940E-05	0.48
48	6.795E-06	1.09	5.444E-06	0.97	5.700E-06	0.83
49	4.357E-05	0.44	3.494E-05	0.35	3.768E-05	0.36
50	2.961E-05	0.52	2.377E-05	0.45	2.582E-05	0.35
51	7.957E-06	0.96	6.357E-06	0.80	6.946E-06	0.67
52	2.068E-05	0.61	1.662E-05	0.51	1.820E-05	0.47
53	7.646E-05	0.32	6.165E-05	0.28	6.680E-05	0.24
54	3.332E-05	0.47	2.704E-05	0.40	2.912E-05	0.30
55	6.653E-05	0.32	5.397E-05	0.29	5.893E-05	0.25
56	4.365E-05	0.39	3.543E-05	0.30	3.862E-05	0.29
57	4.918E-05	0.34	4.008E-05	0.30	4.373E-05	0.26
58	2.597E-05	0.52	2.119E-05	0.47	2.311E-05	0.32
59	4.445E-05	0.41	3.629E-05	0.34	3.953E-05	0.29
60	6.416E-05	0.38	5.267E-05	0.31	5.729E-05	0.26
61	6.160E-06	0.98	5.008E-06	0.79	5.491E-06	0.67
62	3.255E-05	0.45	2.660E-05	0.43	2.892E-05	0.33
63	2.165E-05	0.50	1.776E-05	0.44	1.931E-05	0.37
64	1.719E-05	0.53	1.408E-05	0.48	1.536E-05	0.44
65	5.738E-06	1.12	4.753E-06	1.04	5.085E-06	0.82
66	2.866E-05	0.42	2.364E-05	0.39	2.558E-05	0.29
67	2.129E-05	0.54	1.760E-05	0.45	1.912E-05	0.42
68	4.522E-06	1.14	3.744E-06	1.06	4.081E-06	0.88
69	3.723E-05	0.43	3.076E-05	0.39	3.339E-05	0.31
70	2.657E-05	0.46	2.197E-05	0.37	2.384E-05	0.32
71	4.561E-05	0.31	3.766E-05	0.30	4.095E-05	0.25
72	2.668E-06	1.40	2.200E-06	1.34	2.401E-06	1.06
73	2.712E-05	0.46	2.241E-05	0.39	2.430E-05	0.30
74	7.951E-05	0.28	6.586E-05	0.24	7.150E-05	0.22
75	9.084E-06	0.92	7.544E-06	0.76	8.181E-06	0.63
76	2.293E-05	0.51	1.906E-05	0.46	2.070E-05	0.37
77	1.768E-05	0.49	1.473E-05	0.44	1.594E-05	0.36
78	1.482E-06	2.08	1.250E-06	1.79	1.360E-06	1.39
79	9.930E-06	0.70	8.266E-06	0.72	8.960E-06	0.54
80	4.635E-06	1.08	3.801E-06	0.93	4.120E-06	0.73
81	5.510E-05	0.36	4.586E-05	0.29	4.970E-05	0.24
82	3.279E-06	1.13	2.684E-06	1.07	2.917E-06	0.86
83	4.398E-06	1.22	3.664E-06	1.07	3.975E-06	0.83
84	8.228E-06	0.91	6.839E-06	0.66	7.409E-06	0.61

85	9.998E-06	0.75	8.218E-06	0.66	8.933E-06	0.54
86	1.365E-05	0.68	1.139E-05	0.58	1.228E-05	0.48
87	1.192E-05	0.65	9.886E-06	0.53	1.080E-05	0.42
88	3.167E-06	1.32	2.651E-06	1.34	2.845E-06	0.81
89	6.598E-06	0.90	5.484E-06	0.82	5.974E-06	0.64
90	6.787E-06	0.78	5.659E-06	0.71	6.177E-06	0.61
91	8.294E-06	0.62	6.938E-06	0.56	7.494E-06	0.49
92	4.828E-06	0.96	4.035E-06	0.85	4.348E-06	0.72
93	7.981E-06	0.86	6.699E-06	0.76	7.276E-06	0.65
94	4.202E-06	1.08	3.531E-06	0.94	3.784E-06	0.80
95	1.255E-05	0.58	1.052E-05	0.58	1.137E-05	0.47
96	3.363E-06	1.14	2.822E-06	1.06	3.036E-06	0.90
97	3.373E-06	1.15	2.855E-06	0.98	3.091E-06	0.88
98	3.532E-06	1.34	2.953E-06	1.14	3.195E-06	0.86
99	2.322E-06	1.46	1.936E-06	1.38	2.106E-06	1.10
100	3.375E-06	1.07	2.870E-06	0.90	3.098E-06	0.77
101	4.917E-06	1.05	4.100E-06	1.05	4.422E-06	0.80
102	3.386E-06	1.19	2.831E-06	1.04	3.090E-06	0.78
103	4.718E-06	1.09	3.953E-06	0.95	4.242E-06	0.67
104	4.199E-06	1.07	3.507E-06	0.97	3.794E-06	0.77
105	4.303E-06	1.03	3.597E-06	0.91	3.930E-06	0.80
106	1.527E-06	1.38	1.294E-06	1.39	1.416E-06	1.19
107	3.533E-06	1.07	2.971E-06	0.96	3.228E-06	0.79
108	3.178E-06	1.06	2.715E-06	1.15	2.932E-06	0.91
109	5.096E-06	0.88	4.292E-06	0.83	4.643E-06	0.65
110	2.956E-06	1.22	2.507E-06	1.07	2.782E-06	0.87
111	3.059E-06	1.32	2.583E-06	1.15	2.793E-06	0.96
112	1.783E-06	1.29	1.500E-06	1.27	1.638E-06	1.16
113	5.668E-06	0.94	4.814E-06	0.86	5.222E-06	0.65
114	1.965E-06	1.55	1.633E-06	1.51	1.759E-06	1.23
115	5.136E-06	0.86	4.286E-06	0.75	4.611E-06	0.59
116	1.078E-05	0.57	9.071E-06	0.54	9.747E-06	0.48
117	1.169E-05	0.56	9.910E-06	0.54	1.067E-05	0.49
118	1.284E-05	0.57	1.085E-05	0.57	1.173E-05	0.42
119	8.295E-06	0.80	7.018E-06	0.67	7.601E-06	0.54
120	5.850E-06	0.90	4.933E-06	0.81	5.357E-06	0.66
121	6.051E-06	0.84	5.146E-06	0.76	5.599E-06	0.62
122	3.244E-06	1.15	2.763E-06	1.05	2.974E-06	0.87
123	1.029E-05	0.67	8.606E-06	0.59	9.333E-06	0.48
124	7.354E-06	0.82	6.202E-06	0.83	6.668E-06	0.63
125	7.054E-06	0.87	5.941E-06	0.71	6.397E-06	0.65
126	5.773E-06	0.92	4.843E-06	0.92	5.249E-06	0.67
127	5.602E-06	0.80	4.706E-06	0.70	5.072E-06	0.62
128	7.763E-06	0.75	6.506E-06	0.67	7.041E-06	0.56
129	9.727E-06	0.66	8.160E-06	0.55	8.869E-06	0.49
130	3.969E-06	1.08	3.385E-06	1.05	3.652E-06	0.87
131	1.688E-05	0.52	1.421E-05	0.51	1.533E-05	0.38
132	1.129E-05	0.60	9.497E-06	0.55	1.024E-05	0.48
133	1.360E-05	0.59	1.150E-05	0.58	1.245E-05	0.48
134	1.486E-05	0.59	1.249E-05	0.50	1.348E-05	0.42
135	2.376E-06	1.26	2.043E-06	1.19	2.221E-06	0.98
136	3.887E-06	0.88	3.362E-06	0.85	3.692E-06	0.74

137	2.500E-06	1.00	2.611E-06	1.08	2.951E-06	0.76
138	4.043E-06	0.93	3.538E-06	0.98	3.904E-06	0.78
139	4.556E-06	0.98	3.872E-06	0.93	4.207E-06	0.72
140	1.217E-05	0.71	1.028E-05	0.62	1.110E-05	0.52
141	8.708E-06	0.62	7.422E-06	0.53	7.978E-06	0.49
142	5.767E-06	0.86	4.848E-06	0.81	5.274E-06	0.65
143	1.987E-05	0.56	1.671E-05	0.48	1.805E-05	0.41
144	8.125E-06	0.87	6.871E-06	0.83	7.365E-06	0.64
145	7.076E-06	0.83	6.041E-06	0.76	6.512E-06	0.54
146	1.203E-05	0.67	1.020E-05	0.57	1.093E-05	0.50
147	3.739E-06	1.18	3.149E-06	1.06	3.386E-06	0.86
148	1.891E-06	1.42	1.584E-06	1.11	1.714E-06	1.05
149	1.189E-06	1.76	1.000E-06	1.70	1.067E-06	1.31
150	3.948E-06	0.89	3.337E-06	0.92	3.625E-06	0.75
151	4.110E-06	1.03	3.473E-06	0.91	3.772E-06	0.76
152	4.334E-06	1.04	3.659E-06	0.85	3.957E-06	0.81
153	4.465E-06	0.90	3.801E-06	0.92	4.067E-06	0.63
154	4.536E-06	1.01	3.872E-06	0.89	4.166E-06	0.74
155	4.337E-06	0.98	3.670E-06	0.94	3.943E-06	0.68
156	3.993E-06	1.07	3.399E-06	0.87	3.656E-06	0.80
157	4.626E-06	0.95	3.940E-06	0.90	4.256E-06	0.75
158	4.868E-06	0.98	4.106E-06	0.87	4.400E-06	0.66
159	6.710E-06	0.92	5.676E-06	0.79	6.181E-06	0.68
160	3.531E-06	1.11	2.972E-06	0.97	3.233E-06	0.81
161	4.931E-06	0.93	4.195E-06	0.85	4.517E-06	0.63
162	5.860E-06	0.95	4.945E-06	0.89	5.269E-06	0.69
163	6.114E-06	0.74	5.167E-06	0.67	5.570E-06	0.56
164	6.456E-06	0.79	5.443E-06	0.70	5.859E-06	0.61
165	6.817E-06	0.80	5.752E-06	0.74	6.227E-06	0.62
166	4.032E-06	1.07	3.399E-06	0.99	3.668E-06	0.76
167	4.112E-06	1.12	3.484E-06	1.09	3.761E-06	0.81
168	4.233E-06	1.03	3.608E-06	1.05	3.894E-06	0.76
169	4.507E-06	0.98	3.788E-06	0.84	4.079E-06	0.71
170	4.619E-06	1.00	3.898E-06	0.87	4.201E-06	0.70
171	2.365E-06	1.39	2.016E-06	1.29	2.187E-06	1.04
172	2.413E-06	1.31	2.071E-06	1.27	2.222E-06	0.99
173	2.530E-06	1.23	2.135E-06	1.11	2.327E-06	1.01
174	2.519E-06	1.32	2.141E-06	1.23	2.316E-06	0.98
175	1.011E-06	2.01	8.625E-07	1.97	9.242E-07	1.50
176	1.012E-06	1.96	8.769E-07	1.92	9.420E-07	1.46
177	1.017E-06	1.85	8.693E-07	1.60	9.518E-07	1.37
178	1.022E-06	1.97	8.883E-07	1.61	9.528E-07	1.42
179	1.047E-06	2.33	8.837E-07	1.79	9.605E-07	1.42
180	1.058E-06	2.10	9.003E-07	1.81	9.828E-07	1.54
181	1.083E-06	2.24	9.212E-07	1.96	9.871E-07	1.53
182	1.070E-06	2.09	9.149E-07	1.79	1.010E-06	1.45
183	1.077E-06	1.96	9.327E-07	1.79	1.008E-06	1.40
184	1.082E-06	2.01	9.329E-07	1.78	1.002E-06	1.37
185	1.087E-06	1.88	9.393E-07	2.00	9.953E-07	1.35
186	1.105E-06	1.78	9.444E-07	1.55	1.029E-06	1.31
187	1.169E-06	2.00	9.983E-07	1.86	1.048E-06	1.37
188	1.188E-06	1.77	9.973E-07	1.49	1.078E-06	1.34

189	1.178E-06	2.23	9.901E-07	1.87	1.071E-06	1.43
190	2.968E-06	1.19	2.539E-06	1.05	2.746E-06	0.93
191	3.040E-06	1.21	2.593E-06	1.12	2.815E-06	0.90
192	3.120E-06	1.16	2.667E-06	1.02	2.866E-06	0.87
193	3.219E-06	1.10	2.764E-06	0.99	2.954E-06	0.85
194	6.948E-06	0.84	5.833E-06	0.86	6.280E-06	0.68
195	7.279E-06	0.80	6.189E-06	0.71	6.675E-06	0.57
196	7.820E-06	0.75	6.563E-06	0.60	7.120E-06	0.51
197	8.437E-06	0.70	7.145E-06	0.64	7.705E-06	0.50
198	9.027E-06	0.66	7.604E-06	0.63	8.193E-06	0.53
199	4.765E-06	0.99	4.023E-06	0.93	4.370E-06	0.79
200	5.050E-06	1.08	4.261E-06	0.95	4.641E-06	0.74
201	1.063E-05	0.69	9.041E-06	0.59	9.675E-06	0.50
202	1.187E-05	0.64	1.005E-05	0.54	1.090E-05	0.51
203	1.282E-05	0.58	1.090E-05	0.50	1.183E-05	0.42
204	1.473E-05	0.54	1.251E-05	0.49	1.354E-05	0.38
205	8.567E-06	0.75	7.748E-06	0.61	8.152E-06	0.54
206	9.282E-06	0.67	8.383E-06	0.54	8.937E-06	0.45
207	9.573E-06	0.65	8.676E-06	0.67	9.181E-06	0.52
208	1.128E-05	0.60	1.022E-05	0.56	1.088E-05	0.43
209	1.151E-05	0.57	1.055E-05	0.53	1.113E-05	0.44
210	1.395E-05	0.50	1.263E-05	0.45	1.349E-05	0.34
211	1.613E-05	0.43	1.466E-05	0.41	1.560E-05	0.34
212	1.915E-05	0.49	1.729E-05	0.40	1.842E-05	0.30
213	2.602E-05	0.35	2.342E-05	0.35	2.514E-05	0.28
214	3.689E-05	0.36	3.306E-05	0.30	3.564E-05	0.24
215	5.511E-05	0.28	4.986E-05	0.22	5.373E-05	0.18
216	9.217E-05	0.16	8.406E-05	0.15	9.074E-05	0.11
217	5.563E-05	0.23	5.315E-05	0.20	5.642E-05	0.17
218	7.077E-05	0.22	6.789E-05	0.19	7.228E-05	0.16
219	8.420E-05	0.20	8.143E-05	0.17	8.651E-05	0.13
220	1.018E-04	0.17	9.925E-05	0.15	1.056E-04	0.13
221	1.204E-04	0.17	1.187E-04	0.17	1.265E-04	0.13
222	1.367E-04	0.17	1.368E-04	0.13	1.457E-04	0.13
223	1.531E-04	0.14	1.571E-04	0.12	1.673E-04	0.11
224	7.502E-05	0.19	7.968E-05	0.14	8.441E-05	0.11
225	2.335E-04	0.12	2.720E-04	0.10	2.824E-04	0.08
226	3.165E-05	0.25	4.476E-05	0.18	4.442E-05	0.13
227	2.904E-05	0.25	4.650E-05	0.19	4.445E-05	0.12
228	1.043E-05	0.37	1.897E-05	0.31	1.753E-05	0.18
229	9.678E-06	0.37	1.964E-05	0.26	1.749E-05	0.17
230	4.470E-06	0.57	1.012E-05	0.45	8.735E-06	0.20
231	4.234E-06	0.64	1.063E-05	0.40	8.771E-06	0.23
232	3.957E-06	0.53	1.125E-05	0.41	8.922E-06	0.20
233	2.257E-06	0.67	7.336E-06	0.54	5.511E-06	0.22
234	1.427E-06	0.93	5.418E-06	0.63	3.826E-06	0.28
235	5.156E-07	1.38	1.050E-06	1.18	1.111E-06	0.52
236	3.584E-07	1.67	7.432E-07	1.25	8.009E-07	0.64
237	2.245E-07	2.07	5.574E-07	1.39	6.142E-07	0.56
238	5.986E-09	9.91	2.177E-08	6.01	2.575E-08	1.87

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
 0.7528 to 0.7556     *
 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     **
 0.7754 to 0.7782
 0.7782 to 0.7810     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
```

```
 0.7528 to 0.7556     *
 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     **
 0.7754 to 0.7782
 0.7782 to 0.7810     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7528 to 0.7556     *
 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     *
 0.7754 to 0.7782
 0.7782 to 0.7810

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7528 to 0.7556     *
 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     *
 0.7754 to 0.7782
 0.7782 to 0.7810

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

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        ***
***
        ***                                     ******      final results
```

```
table      ******                                   ***
        ***
***
        ***        best estimate system k-eff
0.76548 + or - 0.00045                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65358E-02 + or -  1.21843E-04            ***
        ***
***
        ***        system nu bar
2.43897E+00 + or -  1.00440E-05            ***
        ***
***
        ***        system mean free path (cm)
6.52558E-01 + or -  1.63427E-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     3.11467 minutes


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```

1

```
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


      0000000       666666666666                        11
0000000                        0000000            11
     000000000     6666666666666                      111
000000000                       000000000          111
    00       00    66                    :::           1111         00
00          :::        00       00        1111
   00         00   66                    :::             11        00
00         :::       00         00         11
   00         00   66                    :::             11        00
00         :::       00         00         11
   00         00   666666666666                         11        00
00                   00         00         11
   00         00   6666666666666                        11        00
00                   00         00         11
   00         00   66         66         :::             11        00
00         :::       00         00         11
   00         00   66         66         :::             11        00
00         :::       00         00         11
    00       00    66         66         :::             11         00
00          :::        00       00          11
     000000000     6666666666666                     11111111
000000000                       000000000        11111111
```

```
      0000000       66666666666                       11111111
0000000                          0000000         11111111
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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
EEEEEEEE
    SSSSSSSSSSSS   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     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE




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

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```

```
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:10:01.53
*****
        *****
*****
        *****
*****

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

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*********************************************
        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                ------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                   ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                  ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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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  6.81186E-12  2.05502E-12    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  6.04495E-08  1.81182E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  1.89934E-14  6.25929E-14    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
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endf/b7 rel8 rev7 mod0                  12/17/09
    1012024  7.37713E-07  5.29651E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33936E-08  6.98510E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02827E-07  7.99742E-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  5.24104E-07  8.93226E-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
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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  2.96840E-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  8.42573E-11  2.09121E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90836E-08  1.32093E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.13519E-08  3.08902E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.73061E-08  4.76103E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  1.02742E-09  2.85729E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.75584E-08  4.93562E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  3.01388E-10  8.56231E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.62636E-09  1.04109E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  7.06069E-18  1.96361E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.56065E-10  4.43367E-09   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  1.18109E-08  3.35534E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                  12/17/09
    1042096  1.18397E-08  3.39894E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                  12/17/09
    1042097  7.70512E-09  2.23507E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                  12/17/09
    1042098  1.80391E-08  5.28668E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                  12/17/09
    1042099  1.26861E-11  3.75595E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                  12/17/09
    1042100  7.81315E-09  2.33661E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  9.28540E-10  2.74907E-08   43099    98.9062     tc99 4325
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endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  7.84529E-10  2.36966E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  6.47707E-10  1.97575E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.98566E-11  2.76792E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  2.86446E-10  8.90929E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  4.78327E-11  1.51640E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  3.69284E-10  1.13753E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.11089E-12  3.48843E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.51665E-10  4.76260E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.29835E-11  7.35488E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  8.56759E-12  2.76731E-10   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  4.86980E-12  1.58752E-10   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  8.98728E-11  2.90288E-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  1.29497E-09  4.29902E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43839E-09  8.16782E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23551E-09  4.17560E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90312E-09  9.89837E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58289E-10  2.63086E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  1.89453E-12  6.51627E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51086E-11  2.23941E-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  1.47055E-09  5.14597E-08   50117   116.9029     sn117 5040
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endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63304E-09  1.63511E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64456E-09  5.85336E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23177E-09  2.23666E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.87741E-10  3.23940E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11127E-09  4.12164E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  8.53344E-12  3.21616E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.40933E-11  9.15242E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  8.41344E-11  3.24642E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25970E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  4.20916E-10  1.64935E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67706E-11  1.06503E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87636E-12  7.57726E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  9.85909E-10  3.92231E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.49499E-15  5.99243E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.05599E-09  4.26436E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  9.25128E-10  3.79131E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.39492E-08  1.40143E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99458E-11  2.51057E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  9.84698E-10  4.09437E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.49750E-10  6.31632E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  8.99712E-10  3.82187E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21019E-12  2.65666E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  5.96178E-10  2.56827E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  7.69583E-10  3.24603E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12959E-11  2.62215E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  8.33347E-10  3.56492E-08   60143   142.9098     nd143 6028
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endf/b7 rel0 rev7 mod1                12/17/09
    1060144  2.32623E-10  1.00209E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  6.22128E-10  2.69866E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  4.55162E-10  1.98803E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87226E-11  8.23374E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  2.52804E-10  1.11934E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  2.91618E-10  1.28246E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  2.26548E-17  1.00310E-15   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84877E-12  8.24126E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  2.97321E-11  1.30754E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.65177E-10  7.36303E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  8.59171E-14  3.85561E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.05234E-09  1.37893E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  4.10754E-11  1.86792E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32593E-13  1.06470E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.44647E-09  6.53457E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.58296E-09  7.24600E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  9.84389E-15  4.53557E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  4.66780E-12  2.16466E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81619E-13  8.47694E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.82439E-12  2.64866E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29366E-11  2.89976E-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
    1064156  5.93516E-10  2.77014E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51457E-10  2.12064E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.18947E-10  3.39865E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31147E-10  3.02144E-08   64160   159.9270     gd160 6449
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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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76386E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22824E-06  6.52043E-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  8.32609E-12  5.90799E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.40954E-17  1.00440E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  6.86949E-10  4.91563E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  2.15771E-15  1.55047E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  2.11341E-20  1.52498E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49929E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.04711E-20  7.55568E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  4.01811E-28  2.91143E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99980E-21  7.27560E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  5.38192E-21  3.89960E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.81413E-21  7.14051E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.70310E-21  7.08882E-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							
		3048116	cd116	4855	endf/b7	rel0	rev7	
mod1	12/17/09							

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                                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
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                                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:
  9338 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

                                            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

   0.00100 minutes were required for starting.   total elapsed time is
0.01633 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 15846 independent fission points were generated for generation 1
          1       7.72415E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15708 independent fission points were generated for generation 2
          2       7.68532E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15610 independent fission points were generated for generation 3
          3       7.64147E-01      7.64147E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.71097E-01      7.67622E-01      3.47498E-03
0.00000E+00      0.00000E+00
          5       7.60404E-01      7.65216E-01      3.13278E-03
0.00000E+00      0.00000E+00
          6       7.65407E-01      7.65264E-01      2.21572E-03
0.00000E+00      0.00000E+00
          7       7.64225E-01      7.65056E-01      1.72882E-03
0.00000E+00      0.00000E+00
          8       7.71502E-01      7.66130E-01      1.77387E-03
0.00000E+00      0.00000E+00
          9       7.62515E-01      7.65614E-01      1.58565E-03
0.00000E+00      0.00000E+00
```

10	7.63180E-01	7.65310E-01	1.40651E-03	0.00000E+00	0.00000E+00
11	7.75270E-01	7.66416E-01	1.66237E-03	0.00000E+00	0.00000E+00
12	7.66302E-01	7.66405E-01	1.48691E-03	0.00000E+00	0.00000E+00
13	7.69497E-01	7.66686E-01	1.37402E-03	0.00000E+00	0.00000E+00
14	7.62604E-01	7.66346E-01	1.29962E-03	0.00000E+00	0.00000E+00
15	7.66738E-01	7.66376E-01	1.19585E-03	0.00000E+00	0.00000E+00
16	7.71704E-01	7.66757E-01	1.17073E-03	0.00000E+00	0.00000E+00
17	7.65332E-01	7.66662E-01	1.09402E-03	0.00000E+00	0.00000E+00
18	7.71734E-01	7.66979E-01	1.07134E-03	0.00000E+00	0.00000E+00
19	7.64836E-01	7.66853E-01	1.01421E-03	0.00000E+00	0.00000E+00
20	7.57657E-01	7.66342E-01	1.08412E-03	0.00000E+00	0.00000E+00
21	7.70683E-01	7.66570E-01	1.05062E-03	0.00000E+00	0.00000E+00
22	7.71232E-01	7.66803E-01	1.02360E-03	0.00000E+00	0.00000E+00
23	7.59605E-01	7.66461E-01	1.03222E-03	0.00000E+00	0.00000E+00
24	7.63322E-01	7.66318E-01	9.94469E-04	0.00000E+00	0.00000E+00
25	7.70214E-01	7.66487E-01	9.65231E-04	0.00000E+00	0.00000E+00
26	7.66342E-01	7.66481E-01	9.24158E-04	0.00000E+00	0.00000E+00
27	7.67166E-01	7.66761E-01	4.20911E-03	0.00000E+00	0.00000E+00
28	7.63222E-01	7.66053E-01	2.68253E-03	0.00000E+00	0.00000E+00
29	7.65764E-01	7.66005E-01	1.86083E-03	0.00000E+00	0.00000E+00
30	7.64455E-01	7.65783E-01	1.62756E-03	0.00000E+00	0.00000E+00
31	7.59213E-01	7.64962E-01	1.69200E-03	0.00000E+00	0.00000E+00
32	7.64063E-01	7.64862E-01	1.80327E-03	0.00000E+00	0.00000E+00
33	7.64977E-01	7.64874E-01	1.50794E-03	0.00000E+00	0.00000E+00
34	7.69591E-01	7.65303E-01	1.39481E-03	0.00000E+00	0.00000E+00
35	7.59073E-01	7.64783E-01	1.20644E-03	0.00000E+00	0.00000E+00

36	7.68208E-01	7.65047E-01	1.26752E-03	0.00000E+00
37	7.71149E-01	7.65483E-01	1.06203E-03	0.00000E+00
38	7.63535E-01	7.65353E-01	9.93094E-04	0.00000E+00
39	7.62023E-01	7.65145E-01	9.50909E-04	0.00000E+00
40	7.70917E-01	7.65484E-01	9.60144E-04	0.00000E+00
41	7.58792E-01	7.65113E-01	9.84343E-04	0.00000E+00
42	7.63411E-01	7.65023E-01	9.32868E-04	0.00000E+00
43	7.64737E-01	7.65009E-01	8.82529E-04	0.00000E+00
44	7.66526E-01	7.65081E-01	8.40680E-04	0.00000E+00
45	7.70671E-01	7.65335E-01	8.42879E-04	0.00000E+00
46	7.68202E-01	7.65460E-01	8.14176E-04	0.00000E+00
47	7.60746E-01	7.65263E-01	8.04563E-04	0.00000E+00
48	7.61171E-01	7.65100E-01	7.88985E-04	0.00000E+00
49	7.63987E-01	7.65057E-01	7.58078E-04	0.00000E+00
50	7.67757E-01	7.65157E-01	7.35713E-04	0.00000E+00
51	7.63312E-01	7.65091E-01	7.11234E-04	0.00000E+00
52	7.65071E-01	7.65090E-01	6.85363E-04	0.00000E+00
53	7.68142E-01	7.65192E-01	6.69640E-04	0.00000E+00
54	7.58569E-01	7.64978E-01	6.83601E-04	0.00000E+00
55	7.61006E-01	7.64854E-01	6.73498E-04	0.00000E+00
56	7.67515E-01	7.64935E-01	6.57398E-04	0.00000E+00
57	7.68316E-01	7.65034E-01	6.45360E-04	0.00000E+00
58	7.66671E-01	7.65081E-01	6.27939E-04	0.00000E+00
59	7.67519E-01	7.65149E-01	6.13705E-04	0.00000E+00
60	7.79425E-01	7.65535E-01	8.52334E-04	0.00000E+00
61	7.69167E-01	7.65630E-01	9.05729E-04	0.00000E+00

62	7.70758E-01	7.65762E-01	9.28091E-04	0.00000E+00
63	7.62065E-01	7.65669E-01	8.33941E-04	0.00000E+00
64	7.60625E-01	7.65546E-01	7.63362E-04	0.00000E+00
65	7.60621E-01	7.65429E-01	7.75170E-04	0.00000E+00
66	7.71745E-01	7.65576E-01	7.46267E-04	0.00000E+00
67	7.66318E-01	7.65593E-01	7.32165E-04	0.00000E+00
68	7.59561E-01	7.65459E-01	7.25366E-04	0.00000E+00
69	7.62665E-01	7.65398E-01	7.24009E-04	0.00000E+00
70	7.66337E-01	7.65418E-01	7.06113E-04	0.00000E+00
71	7.65056E-01	7.65410E-01	6.90384E-04	0.00000E+00
72	7.64746E-01	7.65397E-01	6.75844E-04	0.00000E+00
73	7.66952E-01	7.65428E-01	6.61648E-04	0.00000E+00
74	7.63344E-01	7.65387E-01	6.47310E-04	0.00000E+00
75	7.65902E-01	7.65397E-01	6.33592E-04	0.00000E+00
76	7.64902E-01	7.65388E-01	6.20954E-04	0.00000E+00
77	7.66286E-01	7.65404E-01	6.08827E-04	0.00000E+00
78	7.58384E-01	7.65277E-01	6.08134E-04	0.00000E+00
79	7.60935E-01	7.65199E-01	6.19663E-04	0.00000E+00
80	7.58881E-01	7.65088E-01	6.33882E-04	0.00000E+00
81	7.57847E-01	7.64963E-01	6.92257E-04	0.00000E+00
82	7.64604E-01	7.64957E-01	6.82820E-04	0.00000E+00
83	7.62212E-01	7.64912E-01	6.86465E-04	0.00000E+00
84	7.68178E-01	7.64965E-01	6.26629E-04	0.00000E+00
85	7.61223E-01	7.64905E-01	6.13669E-04	0.00000E+00
86	7.65679E-01	7.64917E-01	6.02318E-04	0.00000E+00
87	7.69499E-01	7.64989E-01	6.34545E-04	0.00000E+00

```
         88       7.66943E-01      7.65019E-01      6.28486E-04
0.00000E+00      0.00000E+00
         89       7.61290E-01      7.64962E-01      6.22535E-04
0.00000E+00      0.00000E+00
         90       7.64551E-01      7.64956E-01      6.12281E-04
0.00000E+00      0.00000E+00
         91       7.61863E-01      7.64911E-01      5.69460E-04
0.00000E+00      0.00000E+00
         92       7.59684E-01      7.64835E-01      6.02591E-04
0.00000E+00      0.00000E+00
         93       7.57082E-01      7.64724E-01      6.31707E-04
0.00000E+00      0.00000E+00
         94       7.62506E-01      7.64693E-01      6.35714E-04
0.00000E+00      0.00000E+00
         95       7.63044E-01      7.64670E-01      6.37068E-04
0.00000E+00      0.00000E+00
         96       7.62732E-01      7.64643E-01      6.39184E-04
0.00000E+00      0.00000E+00
         97       7.68874E-01      7.64701E-01      6.14147E-04
0.00000E+00      0.00000E+00
         98       7.63416E-01      7.64684E-01      6.06261E-04
0.00000E+00      0.00000E+00
         99       7.63554E-01      7.64669E-01      5.98121E-04
0.00000E+00      0.00000E+00
        100       7.55976E-01      7.64556E-01      6.01432E-04
0.00000E+00      0.00000E+00
        101       7.74643E-01      7.64685E-01      5.90756E-04
0.00000E+00      0.00000E+00
        102       7.61408E-01      7.64644E-01      5.84194E-04
0.00000E+00      0.00000E+00
        103       7.61650E-01      7.64606E-01      5.78684E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=157134EBBF89F6C7
        104       7.66437E-01      7.64629E-01      5.69048E-04
0.00000E+00      0.00000E+00
        105       7.65117E-01      7.64635E-01      5.62575E-04
0.00000E+00      0.00000E+00
        106       7.71924E-01      7.64723E-01      5.55076E-04
0.00000E+00      0.00000E+00
        107       7.62107E-01      7.64691E-01      5.43905E-04
0.00000E+00      0.00000E+00
        108       7.70080E-01      7.64755E-01      5.52168E-04
0.00000E+00      0.00000E+00
        109       7.68135E-01      7.64794E-01      5.56831E-04
0.00000E+00      0.00000E+00
        110       7.62815E-01      7.64771E-01      5.43346E-04
0.00000E+00      0.00000E+00
        111       7.69920E-01      7.64830E-01      5.46229E-04
0.00000E+00      0.00000E+00
        112       7.63353E-01      7.64813E-01      5.35376E-04
0.00000E+00      0.00000E+00
```

```
        113       7.66424E-01      7.64831E-01      5.31615E-04
0.00000E+00      0.00000E+00
        114       7.59793E-01      7.64776E-01      5.24194E-04
0.00000E+00      0.00000E+00
        115       7.63160E-01      7.64758E-01      5.18347E-04
0.00000E+00      0.00000E+00
        116       7.68039E-01      7.64794E-01      5.08609E-04
0.00000E+00      0.00000E+00
        117       7.71223E-01      7.64862E-01      5.05438E-04
0.00000E+00      0.00000E+00
        118       7.60923E-01      7.64820E-01      4.98627E-04
0.00000E+00      0.00000E+00
        119       7.65962E-01      7.64832E-01      4.94519E-04
0.00000E+00      0.00000E+00
        120       7.66099E-01      7.64845E-01      4.91491E-04
0.00000E+00      0.00000E+00
        121       7.72744E-01      7.64926E-01      5.02599E-04
0.00000E+00      0.00000E+00
        122       7.66261E-01      7.64939E-01      4.99423E-04
0.00000E+00      0.00000E+00
        123       7.74017E-01      7.65030E-01      5.25926E-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=78EC686C9B4AB9DF
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55209E-05 + or -  1.09609E-08             generation time
=  2.99588E-05 + or -  2.01884E-08
 nu bar   =  2.43895E+00 + or -  1.05322E-05       average fission group
=  2.17554E+02 + or -  9.38153E-03
                      energy(ev) of the average lethargy causing fission
=  5.64766E-02 + or -  1.19729E-04
                                                 system mean free path (cm)
=  6.52528E-01 + or -  1.63889E-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          0.76503   + or - 0.00053     0.76450 to 0.76556
0.76398 to 0.76608    0.76345 to 0.76661    2000000      10.0336

      24          0.76505   + or - 0.00053     0.76451 to 0.76558
0.76398 to 0.76612    0.76345 to 0.76665    1980000       9.9046
```

25	0.76499	+ or - 0.00053	0.76446 to 0.76553	0.76393 to 0.76606	0.76340 to 0.76659	1960000	10.1786
26	0.76498	+ or - 0.00054	0.76444 to 0.76552	0.76390 to 0.76606	0.76337 to 0.76660	1940000	10.1883
27	0.76496	+ or - 0.00055	0.76441 to 0.76551	0.76386 to 0.76605	0.76332 to 0.76660	1920000	10.0893
28	0.76498	+ or - 0.00055	0.76443 to 0.76553	0.76388 to 0.76608	0.76333 to 0.76663	1900000	10.1449
29	0.76497	+ or - 0.00056	0.76441 to 0.76553	0.76385 to 0.76608	0.76329 to 0.76664	1880000	10.0816
30	0.76497	+ or - 0.00056	0.76441 to 0.76554	0.76385 to 0.76610	0.76328 to 0.76667	1860000	10.0530
31	0.76504	+ or - 0.00056	0.76447 to 0.76560	0.76391 to 0.76616	0.76334 to 0.76673	1840000	10.1950
32	0.76505	+ or - 0.00057	0.76448 to 0.76562	0.76390 to 0.76619	0.76333 to 0.76676	1820000	10.1390
37	0.76496	+ or - 0.00060	0.76435 to 0.76556	0.76375 to 0.76617	0.76314 to 0.76677	1720000	10.1433
42	0.76503	+ or - 0.00065	0.76438 to 0.76568	0.76373 to 0.76634	0.76308 to 0.76699	1620000	9.6954
47	0.76496	+ or - 0.00069	0.76426 to 0.76565	0.76357 to 0.76634	0.76288 to 0.76704	1520000	9.7750
52	0.76501	+ or - 0.00074	0.76426 to 0.76575	0.76352 to 0.76649	0.76277 to 0.76724	1420000	9.6001
57	0.76503	+ or - 0.00080	0.76423 to 0.76583	0.76343 to 0.76663	0.76263 to 0.76743	1320000	9.5496
62	0.76456	+ or - 0.00075	0.76381 to 0.76532	0.76306 to 0.76607	0.76230 to 0.76682	1220000	8.8322
67	0.76459	+ or - 0.00082	0.76377 to 0.76541	0.76295 to 0.76623	0.76213 to 0.76704	1120000	8.6550
72	0.76468	+ or - 0.00091	0.76377 to 0.76559	0.76286 to 0.76650	0.76194 to 0.76741	1020000	8.2444
77	0.76459	+ or - 0.00106	0.76354 to 0.76565	0.76248 to 0.76670	0.76143 to 0.76776	920000	7.4695

```
      82          0.76514   + or - 0.00104     0.76410 to 0.76617
0.76306 to 0.76721    0.76203 to 0.76824     820000       8.9765

      87          0.76510   + or - 0.00124     0.76386 to 0.76635
0.76262 to 0.76759    0.76138 to 0.76883     720000       8.0730

      92          0.76547   + or - 0.00103     0.76444 to 0.76649
0.76341 to 0.76752    0.76238 to 0.76855     620000      15.4012

      97          0.76597   + or - 0.00112     0.76484 to 0.76709
0.76372 to 0.76822    0.76259 to 0.76934     520000      16.5547

     102          0.76648   + or - 0.00115     0.76533 to 0.76764
0.76418 to 0.76879    0.76302 to 0.76995     420000      14.2295

     107          0.76681   + or - 0.00136     0.76545 to 0.76816
0.76410 to 0.76952    0.76274 to 0.77088     320000      17.0210

     112          0.76679   + or - 0.00177     0.76502 to 0.76855
0.76325 to 0.77032    0.76148 to 0.77209     220000      22.0534
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          0.76767   + or - 0.00424     0.76343 to 0.77191
0.75918 to 0.77615    0.75494 to 0.78039     120000      11.4032
1                           fuel bundle

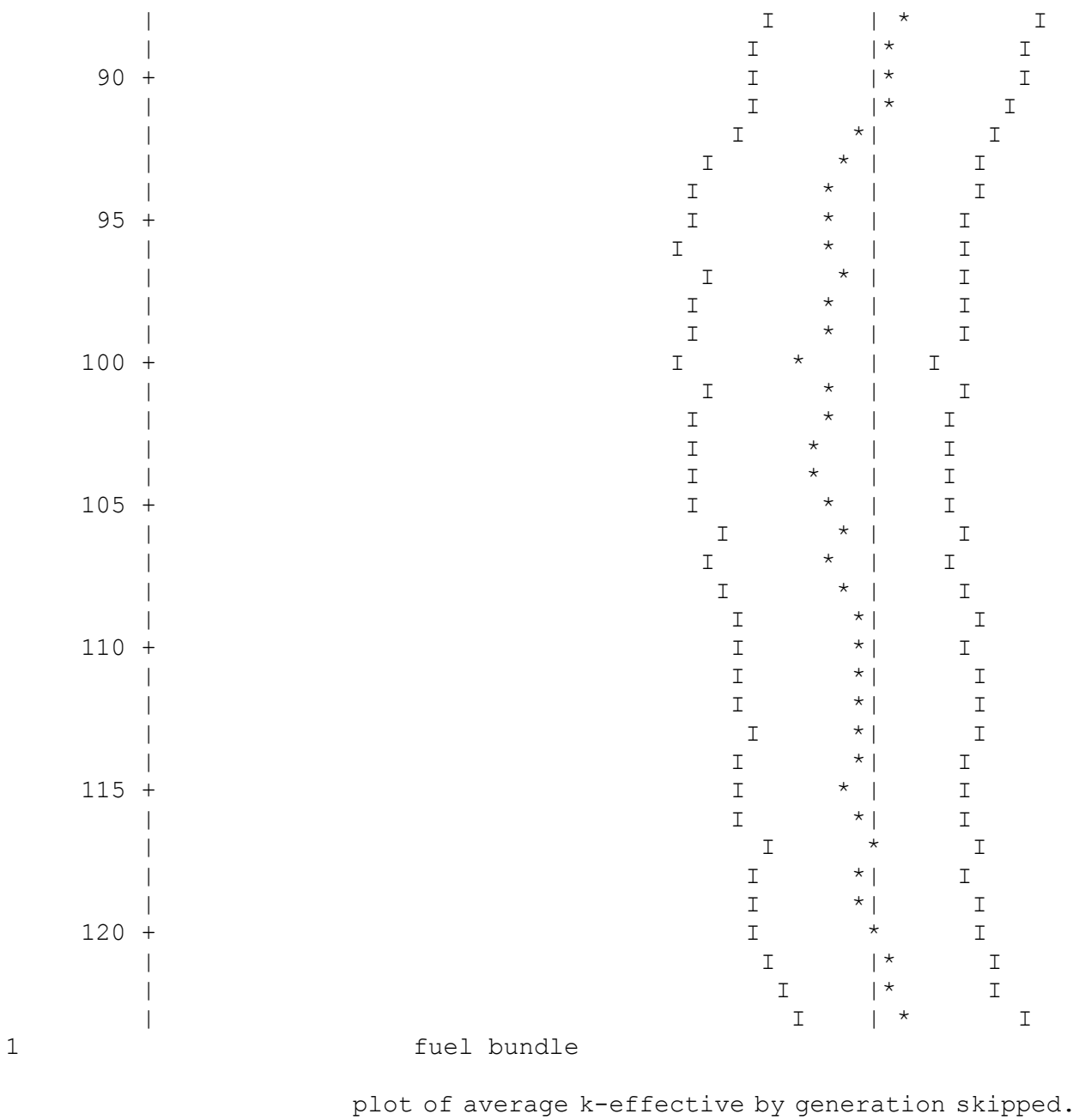
                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76484 + or - 0.00049 which occurs for
120 generations run.

                                0.7633                   0.7650
0.7668

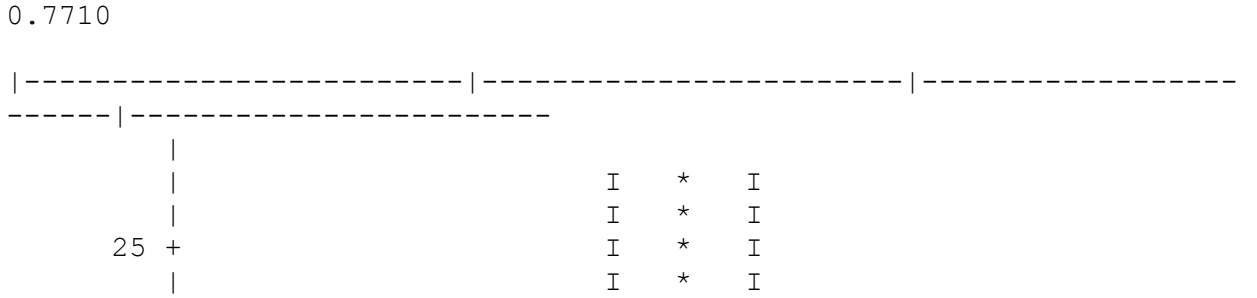
|-------------------------|------------------------|------------------
------|------------------------
         |
      25 +                          I                      |
*
         |                      I                          |
*
         |             I                                   |
*
         |                          I                      |
*
         |                                     I           |
```

```
*                           I
      30 +                                      I          |             *
I
         |                        I                        |*
I
         |                     I                           *
I
         |                        I                        *
I
         |                                I                |     *
I
      35 +                            I                  *|
I
         |                               I                 |  *
I
         |                                          I      |        *
I
         |                                          I      |      *
I
         |                                      I          |   *
I
      40 +                                          I     |        *
I
         |                                     I           |  *
I
         |                                     I           | *
I
         |                                     I           | *
I
         |                                       I         |  *
I
      45 +                                          I     |      *
I
         |                                             I  |        *
I
         |                                          I     |     *
I
         |                                        I       |  *
I
         |                                        I       |  *
I
      50 +                                          I      |   *
I
         |                                          I      |  *
I
         |                                          I      |  *
I
         |                                            I    |    *
I
         |                                        I       | *         I
      55 +                                      I          *          I
         |                                       I        |*         I
```

```
          |                                          I       | *          I
          |                                           I      |  *         I
          |                                            I     |   *
I
       60 +                                              I  |          *
I
          |                                               I |           *
I
          |                                                I|
*            I
          |                                                I|            *
I
          |                                                I|          *
I
       65 +                                              I  |        *
I
          |                                                I|          *
I
          |                                                 I          *
I
          |                                               I |         *
I
          |                                              I  |        *
I
       70 +                                               I |        *
I
          |                                               I |        *
I
          |                                               I |        *
I
          |                                               I |        *
I
          |                                               I |       *
I
       75 +                                               I |        *
I
          |                                               I |       *
I
          |                                                I|        *
I
          |                                              I  |      *
I
          |                                             I   |    *
I
       80 +                                           I      |  *         I
          |                                        I         |*          I
          |                                        I         |*          I
          |                                        I         |*          I
          |                                         I        |*         I
       85 +                                         I        *         I
          |                                         I        |*        I
          |                                         I        | *         I
```



plot of average k-effective by generation skipped.
the line represents k-eff = 0.7650 + or - 0.0005 which occurs for 23 generations skipped.



```
   |                        I    *   I
   |                        I    *   I
   |                        I    *   I
30 +                        I    *   I
   |                         I   *    I
   |                         I   *    I
   |                         I   *    I
   |                        I    *   I
35 +                         I   *    I
   |                         I   *    I
   |                        I    *   I
   |                        I    *   I
   |                        I    *    I
40 +                        I   *|   I
   |                        I    *    I
   |                        I    *    I
   |                        I    *    I
   |                        I    *    I
45 +                       I    *|    I
   |                       I    *|   I
   |                       I     *    I
   |                        I    *    I
   |                        I    *     I
50 +                       I     *    I
   |                       I     *     I
   |                       I     *     I
   |                       I     *    I
   |                       I     *     I
55 +                       I     |*     I
   |                       I     *      I
   |                       I     *     I
   |                       I     *     I
   |                      I      *     I
60 +                     I     * |   I
   |                      I   *  | I
   |                    I     *  | I
   |                    I     *  |  I
   |                    I     *  |  I
65 +                     I     * |   I
   |                    I     *  |  I
   |                   I      *  |  I
   |                    I     *  |   I
   |                    I      * |   I
70 +                    I     *  |   I
   |                   I      *  |   I
   |                   I      *  |   I
   |                   I      *  |   I
   |                   I      *  |    I
75 +                  I       *  |    I
   |                  I       *  |    I
   |                  I       *  |    I
   |                   I       * |     I
```

```
         |                    I      * |     I
      80 +                      I      *     I
         |                      I      |*       I
         |                      I      |*       I
         |                      I      | *       I
         |                    I        |*       I
      85 +                      I      | *       I
         |                      I      | *        I
         |                  I          |*        I
         |                 I           *         I
         |                      I      |*       I
      90 +                      I      |*       I
         |                       I     | *       I
         |                         I   |   *      I
         |                           I |     *      I
         |                            I|      *      I
      95 +                            I|      *       I
         |                             I       *        I
         |                            I|      *        I
         |                            I|       *        I
         |                             I        *        I
     100 +                             |   I       *        I
         |                             |I        *       I
         |                             | I        *        I
         |                             |   I        *        I
         |                             |   I        *         I
     105 +                             |   I         *         I
         |                             | I         *         I
         |                             |  I          *         I
         |                             |I          *           I
         |                            I|           *           I
     110 +                             |I            *           I
         |                           I |            *            I
         |                             I              *            I
         |                            I|              *              I
         |                             |   I                *
I
     115 +                             |   I                    *
I
         |                             I                        *
I
         |                I            |                     *
I
         |                           I |                                *
I
         |                             |
*
     120 +                             |             I
*

   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                 4.64690E-07    70.3526
2.84917E-07    43.7031       0.00000E+00     0.0000
    3    0.0000                 1.26118E-05    11.6684
1.82413E-05     5.3617       0.00000E+00     0.0000
    4    0.0000                 1.84127E-05     9.6111
3.41516E-05     4.1307       0.00000E+00     0.0000
    5    0.0000                 2.97282E-05     7.4044
5.52147E-05     2.9123       0.00000E+00     0.0000
    6    0.0001                 9.46899E-05     4.1883
2.28421E-04     1.5615       0.00000E+00     0.0000
    7    0.0002                 1.20967E-04     3.1572
2.11744E-04     1.4187       0.00000E+00     0.0000
    8    0.0003                 2.43903E-04     2.3208
3.23982E-04     0.9925       0.00000E+00     0.0000
    9    0.0005                 3.81507E-04     1.3377
4.38800E-04     0.5512       0.00000E+00     0.0000
   10    0.0003                 2.04862E-04     1.7775
2.07750E-04     0.8167       0.00000E+00     0.0000
   11    0.0012                 9.20434E-04     0.8584
5.27798E-04     0.5801       0.00000E+00     0.0000
   12    0.0010                 7.68146E-04     0.7768
3.01083E-04     0.7652       0.00000E+00     0.0000
   13    0.0003                 2.31020E-04     1.4113
9.17696E-05     1.3956       0.00000E+00     0.0000
   14    0.0013                 9.99814E-04     0.6357
4.08678E-04     0.6302       0.00000E+00     0.0000
   15    0.0010                 7.61451E-04     0.6713
3.28274E-04     0.6635       0.00000E+00     0.0000
   16    0.0002                 1.87072E-04     1.0658
8.59940E-05     1.0495       0.00000E+00     0.0000
   17    0.0001                 6.67239E-05     1.9527
3.24583E-05     1.9144       0.00000E+00     0.0000
   18    0.0001                 4.98155E-05     2.1126
2.51900E-05     2.0688       0.00000E+00     0.0000
   19    0.0001                 8.03755E-05     1.2774
4.25119E-05     1.2459       0.00000E+00     0.0000
   20    0.0001                 6.10097E-05     1.4364
3.34166E-05     1.4018       0.00000E+00     0.0000
   21    0.0002                 1.20814E-04     1.0746
6.81989E-05     1.0516       0.00000E+00     0.0000
   22    0.0001                 1.04143E-04     1.1180
6.16837E-05     1.0918       0.00000E+00     0.0000
```

23	0.0001	1.05850E-04	1.2556	6.46089E-05	1.2279
0.00000E+00	0.0000				
24	0.0000	2.46639E-05	2.3080	1.53163E-05	2.2490
0.00000E+00	0.0000				
25	0.0000	3.14656E-05	2.0470	1.96391E-05	1.9990
0.00000E+00	0.0000				
26	0.0000	1.73471E-05	2.3363	1.09027E-05	2.2665
0.00000E+00	0.0000				
27	0.0001	5.23687E-05	1.2703	3.26936E-05	1.2417
0.00000E+00	0.0000				
28	0.0001	9.61674E-05	1.0028	5.99985E-05	0.9858
0.00000E+00	0.0000				
29	0.0001	9.81835E-05	1.0771	6.18570E-05	1.0627
0.00000E+00	0.0000				
30	0.0000	1.23761E-05	3.2213	7.76357E-06	3.1973
0.00000E+00	0.0000				
31	0.0001	9.57883E-05	1.2421	6.05311E-05	1.2256
0.00000E+00	0.0000				
32	0.0000	3.67165E-05	1.5889	2.34903E-05	1.5551
0.00000E+00	0.0000				
33	0.0000	3.29330E-05	1.6024	2.06198E-05	1.5836
0.00000E+00	0.0000				
34	0.0001	7.51296E-05	1.2641	4.71955E-05	1.2450
0.00000E+00	0.0000				
35	0.0001	4.43463E-05	1.4187	2.78403E-05	1.3962
0.00000E+00	0.0000				
36	0.0001	4.22410E-05	1.5587	2.61513E-05	1.5440
0.00000E+00	0.0000				
37	0.0000	2.82266E-05	1.8278	1.77170E-05	1.7901
0.00000E+00	0.0000				
38	0.0000	3.28637E-05	1.5426	2.07129E-05	1.5118
0.00000E+00	0.0000				
39	0.0002	1.27696E-04	1.0354	8.12690E-05	1.0111
0.00000E+00	0.0000				
40	0.0002	1.19844E-04	0.9248	7.74816E-05	0.9077
0.00000E+00	0.0000				
41	0.0002	1.62511E-04	0.7910	1.08511E-04	0.7657
0.00000E+00	0.0000				
42	0.0002	1.40546E-04	0.7717	9.55907E-05	0.7539
0.00000E+00	0.0000				
43	0.0001	8.02463E-05	1.1178	5.76262E-05	1.0682
0.00000E+00	0.0000				
44	0.0002	1.14888E-04	1.2038	8.43351E-05	1.1515
0.00000E+00	0.0000				
45	0.0001	5.94410E-05	1.0148	4.79412E-05	0.9379
0.00000E+00	0.0000				
46	0.0000	1.53256E-05	1.8734	1.22719E-05	1.7708
0.00000E+00	0.0000				
47	0.0001	4.18709E-05	1.7786	3.24976E-05	1.7068
0.00000E+00	0.0000				
48	0.0000	1.24480E-05	3.8596	9.65007E-06	3.7502
0.00000E+00	0.0000				

```
   49    0.0001                 7.94281E-05     1.5721
6.26519E-05     1.5383       0.00000E+00     0.0000
   50    0.0001                 5.64489E-05     1.8203
4.64996E-05     1.7826       0.00000E+00     0.0000
   51    0.0000                 1.54374E-05     2.9036
1.28332E-05     2.8473       0.00000E+00     0.0000
   52    0.0001                 4.09631E-05     1.7964
3.54040E-05     1.7525       0.00000E+00     0.0000
   53    0.0002                 1.58798E-04     0.8992
1.55935E-04     0.8459       0.00000E+00     0.0000
   54    0.0001                 7.49898E-05     1.6093
6.96529E-05     1.5527       0.00000E+00     0.0000
   55    0.0002                 1.64396E-04     1.3024
1.50635E-04     1.2689       0.00000E+00     0.0000
   56    0.0002                 1.17667E-04     1.4880
1.09113E-04     1.4520       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                 1.50619E-04     1.4958
1.36627E-04     1.4599       0.00000E+00     0.0000
   58    0.0001                 8.13155E-05     2.1494
7.12874E-05     2.0918       0.00000E+00     0.0000
   59    0.0002                 1.60632E-04     1.5737
1.44198E-04     1.5139       0.00000E+00     0.0000
   60    0.0004                 2.70464E-04     1.0668
2.45470E-04     1.0067       0.00000E+00     0.0000
   61    0.0000                 2.75387E-05     4.2938
2.12159E-05     4.1482       0.00000E+00     0.0000
   62    0.0002                 1.57804E-04     1.7105
1.32478E-04     1.6645       0.00000E+00     0.0000
   63    0.0002                 1.18206E-04     1.8949
9.73461E-05     1.8285       0.00000E+00     0.0000
   64    0.0001                 1.03384E-04     2.5665
8.32274E-05     2.4837       0.00000E+00     0.0000
   65    0.0000                 3.50548E-05     3.5943
3.46216E-05     3.4888       0.00000E+00     0.0000
   66    0.0002                 1.67123E-04     1.7087
1.48433E-04     1.6561       0.00000E+00     0.0000
   67    0.0002                 1.46523E-04     2.1964
1.19859E-04     2.1251       0.00000E+00     0.0000
   68    0.0000                 2.86772E-05     4.5894
2.47292E-05     4.4378       0.00000E+00     0.0000
   69    0.0004                 2.91512E-04     1.5067
2.28966E-04     1.4584       0.00000E+00     0.0000
   70    0.0003                 2.08016E-04     1.7225
```

1.89301E-04	1.6560	0.00000E+00	0.0000	71	0.0006	4.36154E-04	1.4822
3.60838E-04	1.4373	0.00000E+00	0.0000	72	0.0001	4.63463E-05	6.1925
2.74102E-05	6.0371	0.00000E+00	0.0000	73	0.0004	3.10437E-04	1.5437
2.37088E-04	1.4705	0.00000E+00	0.0000	74	0.0014	1.06270E-03	1.0081
7.72828E-04	0.9640	0.00000E+00	0.0000	75	0.0001	1.07491E-04	3.1907
8.28236E-05	3.0311	0.00000E+00	0.0000	76	0.0006	4.57350E-04	1.9337
2.90533E-04	1.8640	0.00000E+00	0.0000	77	0.0005	3.55518E-04	1.9172
2.55453E-04	1.8359	0.00000E+00	0.0000	78	0.0000	6.97199E-06	4.1230
6.82269E-05	4.0785	0.00000E+00	0.0000	79	0.0002	1.82960E-04	2.7631
1.23121E-04	2.6526	0.00000E+00	0.0000	80	0.0001	6.14320E-05	3.5397
8.19259E-05	3.4370	0.00000E+00	0.0000	81	0.0014	1.04782E-03	1.2045
7.70753E-04	1.1556	0.00000E+00	0.0000	82	0.0001	6.23038E-05	5.0506
3.75242E-05	4.7698	0.00000E+00	0.0000	83	0.0002	1.31076E-04	3.0748
1.44968E-04	3.0157	0.00000E+00	0.0000	84	0.0001	7.68839E-05	3.4594
7.83505E-05	3.1870	0.00000E+00	0.0000	85	0.0003	1.96302E-04	2.0986
2.41827E-04	2.0364	0.00000E+00	0.0000	86	0.0003	2.64984E-04	2.4178
2.13228E-04	2.2996	0.00000E+00	0.0000	87	0.0004	3.42864E-04	2.6284
2.13109E-04	2.5134	0.00000E+00	0.0000	88	0.0001	5.65822E-05	4.2336
1.02679E-04	4.1284	0.00000E+00	0.0000	89	0.0001	8.90977E-05	3.7187
6.20772E-05	3.4070	0.00000E+00	0.0000	90	0.0003	2.32436E-04	2.8229
1.37035E-04	2.7058	0.00000E+00	0.0000	91	0.0002	1.78895E-04	2.8858
1.13415E-04	2.7076	0.00000E+00	0.0000	92	0.0000	3.20682E-05	2.7907
2.09643E-04	2.7332	0.00000E+00	0.0000	93	0.0002	1.27458E-04	3.3892
1.03716E-04	3.1551	0.00000E+00	0.0000	94	0.0002	1.21464E-04	4.5153
6.78525E-05	4.2545	0.00000E+00	0.0000	95	0.0008	6.27719E-04	2.1608
3.86836E-04	2.0922	0.00000E+00	0.0000	96	0.0002	1.62679E-04	4.1238

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8.23638E-05     3.9605       0.00000E+00     0.0000
   97    0.0004                 2.72251E-04     3.5221
1.55996E-04     3.4422       0.00000E+00     0.0000
   98    0.0001                 9.16242E-05     4.0561
8.82512E-05     3.8927       0.00000E+00     0.0000
   99    0.0001                 9.50961E-05     4.6271
6.39466E-05     4.4540       0.00000E+00     0.0000
  100    0.0002                 1.40212E-04     3.8610
9.34628E-05     3.7177       0.00000E+00     0.0000
  101    0.0002                 1.19717E-04     3.4070
7.57713E-05     3.1859       0.00000E+00     0.0000
  102    0.0002                 1.59306E-04     3.3976
8.88369E-05     3.2599       0.00000E+00     0.0000
  103    0.0001                 1.00406E-04     3.7271
9.77839E-05     3.5398       0.00000E+00     0.0000
  104    0.0002                 1.54834E-04     3.1343
1.23072E-04     3.0138       0.00000E+00     0.0000
  105    0.0002                 1.20882E-04     3.0647
8.00553E-05     2.8652       0.00000E+00     0.0000
  106    0.0002                 1.76046E-04     4.3782
1.30845E-04     4.3171       0.00000E+00     0.0000
  107    0.0001                 6.93596E-05     3.4297
6.98157E-05     3.2319       0.00000E+00     0.0000
  108    0.0000                 3.60189E-05     2.6953
1.55443E-04     2.6355       0.00000E+00     0.0000
  109    0.0002                 1.30149E-04     2.2331
4.31920E-04     2.2036       0.00000E+00     0.0000
  110    0.0008                 6.18974E-04     2.8948
3.81822E-04     2.8684       0.00000E+00     0.0000
  111    0.0002                 1.49988E-04     4.0962
1.37991E-04     3.9865       0.00000E+00     0.0000
  112    0.0002                 1.28303E-04     4.1522
1.34979E-04     4.0837       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                 1.22965E-04     4.2383
1.07711E-04     3.9527       0.00000E+00     0.0000
  114    0.0000                 1.08090E-05     6.4551
1.47776E-05     5.3823       0.00000E+00     0.0000
  115    0.0001                 6.82703E-05     4.2529
7.97575E-05     3.8948       0.00000E+00     0.0000
  116    0.0002                 1.85543E-04     2.9162
1.39930E-04     2.6334       0.00000E+00     0.0000
  117    0.0006                 4.74796E-04     2.3609
2.53837E-04     2.2064       0.00000E+00     0.0000
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118	0.0008	5.98911E-04	1.7509	4.67104E-04	1.6854
0.00000E+00	0.0000				
119	0.0002	1.46985E-04	1.9434	3.78951E-04	1.8750
0.00000E+00	0.0000				
120	0.0002	1.69028E-04	2.0727	6.43321E-04	2.0436
0.00000E+00	0.0000				
121	0.0007	5.26598E-04	2.8633	4.04981E-04	2.7916
0.00000E+00	0.0000				
122	0.0001	1.06969E-04	4.9847	8.33645E-05	4.6544
0.00000E+00	0.0000				
123	0.0003	2.21081E-04	2.9649	1.56125E-04	2.6343
0.00000E+00	0.0000				
124	0.0003	2.26695E-04	3.4266	1.87423E-04	3.1937
0.00000E+00	0.0000				
125	0.0002	1.37700E-04	3.2965	1.26794E-04	2.9682
0.00000E+00	0.0000				
126	0.0001	9.77786E-05	3.4637	8.80679E-05	3.0445
0.00000E+00	0.0000				
127	0.0005	3.95439E-04	2.8610	1.94248E-04	2.7029
0.00000E+00	0.0000				
128	0.0003	2.21466E-04	3.1895	1.36503E-04	2.8327
0.00000E+00	0.0000				
129	0.0006	4.49031E-04	2.3308	4.13341E-04	2.2242
0.00000E+00	0.0000				
130	0.0002	1.17246E-04	2.9536	2.85860E-04	2.8675
0.00000E+00	0.0000				
131	0.0004	3.05773E-04	2.0068	2.44090E-04	1.7184
0.00000E+00	0.0000				
132	0.0007	5.25018E-04	2.4910	3.22603E-04	2.2997
0.00000E+00	0.0000				
133	0.0014	1.05546E-03	1.9637	6.66502E-04	1.8629
0.00000E+00	0.0000				
134	0.0001	9.06853E-05	1.8245	2.36155E-04	1.5464
0.00000E+00	0.0000				
135	0.0002	1.80933E-04	3.0368	2.68100E-04	2.9642
0.00000E+00	0.0000				
136	0.0001	4.55559E-05	2.0824	7.06976E-04	2.0507
0.00000E+00	0.0000				
137	0.0000	1.95512E-05	1.0821	3.51787E-03	1.0792
0.00000E+00	0.0000				
138	0.0004	3.08729E-04	2.2324	8.04411E-04	2.1965
0.00000E+00	0.0000				
139	0.0002	1.82552E-04	3.1981	2.23991E-04	3.0060
0.00000E+00	0.0000				
140	0.0003	2.09012E-04	2.4145	2.78269E-04	2.1140
0.00000E+00	0.0000				
141	0.0001	8.00207E-05	2.8165	2.52508E-04	2.4894
0.00000E+00	0.0000				
142	0.0001	6.86853E-05	3.4241	2.36441E-04	3.1465
0.00000E+00	0.0000				
143	0.0001	7.94110E-05	2.0482	1.71778E-04	1.2779
0.00000E+00	0.0000				

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  144    0.0000                 3.39198E-05     3.1743
7.43441E-05     1.9287       0.00000E+00     0.0000
  145    0.0005                 3.90065E-04     2.9966
3.05556E-04     2.7334       0.00000E+00     0.0000
  146    0.0005                 3.46390E-04     2.1207
2.52974E-04     1.7270       0.00000E+00     0.0000
  147    0.0002                 1.65262E-04     3.9054
1.06655E-04     3.3791       0.00000E+00     0.0000
  148    0.0001                 5.49071E-05     5.4771
3.71583E-05     4.3348       0.00000E+00     0.0000
  149    0.0000                 2.98458E-05     8.2731
2.08362E-05     6.2760       0.00000E+00     0.0000
  150    0.0001                 8.45476E-05     4.8292
6.18481E-05     3.5950       0.00000E+00     0.0000
  151    0.0001                 6.69911E-05     4.0408
5.65443E-05     2.8159       0.00000E+00     0.0000
  152    0.0001                 3.91591E-05     4.8398
4.54262E-05     2.8142       0.00000E+00     0.0000
  153    0.0001                 4.42439E-05     4.6684
4.82719E-05     2.7810       0.00000E+00     0.0000
  154    0.0001                 4.74933E-05     3.9355
4.98005E-05     2.3222       0.00000E+00     0.0000
  155    0.0001                 5.10816E-05     4.4932
5.01219E-05     2.7279       0.00000E+00     0.0000
  156    0.0001                 4.76604E-05     4.8564
4.65595E-05     2.9264       0.00000E+00     0.0000
  157    0.0001                 5.16692E-05     3.8161
5.28966E-05     2.2927       0.00000E+00     0.0000
  158    0.0001                 6.67854E-05     4.2787
6.78293E-05     2.7810       0.00000E+00     0.0000
  159    0.0002                 1.49391E-04     2.9342
2.07625E-04     2.4643       0.00000E+00     0.0000
  160    0.0001                 6.28838E-05     4.0379
7.40877E-05     3.0943       0.00000E+00     0.0000
  161    0.0001                 7.32947E-05     3.4952
7.19874E-05     2.3049       0.00000E+00     0.0000
  162    0.0001                 8.94723E-05     4.1670
8.31099E-05     2.6154       0.00000E+00     0.0000
  163    0.0001                 9.18708E-05     3.3513
8.65284E-05     2.0435       0.00000E+00     0.0000
  164    0.0001                 1.07204E-04     3.5661
9.71805E-05     2.2512       0.00000E+00     0.0000
  165    0.0002                 1.14878E-04     3.0885
1.05251E-04     1.9567       0.00000E+00     0.0000
  166    0.0001                 7.25848E-05     4.2687
6.50526E-05     2.8107       0.00000E+00     0.0000
  167    0.0001                 7.77502E-05     4.1105
7.07491E-05     2.6477       0.00000E+00     0.0000
  168    0.0001                 8.29677E-05     3.8562
7.52211E-05     2.5324       0.00000E+00     0.0000
1                           fuel bundle
```

skipping 23 generations

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

  169    0.0001                 1.03142E-04     4.3598
9.10137E-05     3.0510       0.00000E+00     0.0000
  170    0.0002                 1.32889E-04     3.6664
1.14014E-04     2.6707       0.00000E+00     0.0000
  171    0.0001                 1.06975E-04     4.6834
8.10229E-05     3.7787       0.00000E+00     0.0000
  172    0.0002                 1.44639E-04     4.0798
1.01521E-04     3.4548       0.00000E+00     0.0000
  173    0.0003                 1.95533E-04     4.0944
1.28514E-04     3.5709       0.00000E+00     0.0000
  174    0.0003                 2.64381E-04     3.8159
1.63877E-04     3.4019       0.00000E+00     0.0000
  175    0.0001                 1.03909E-04     6.1865
6.32633E-05     5.5359       0.00000E+00     0.0000
  176    0.0002                 1.24533E-04     5.5409
7.37733E-05     5.0488       0.00000E+00     0.0000
  177    0.0002                 1.19631E-04     6.0614
7.04768E-05     5.4462       0.00000E+00     0.0000
  178    0.0002                 1.17348E-04     5.7749
6.87829E-05     5.1924       0.00000E+00     0.0000
  179    0.0001                 1.10989E-04     5.9468
6.50404E-05     5.2761       0.00000E+00     0.0000
  180    0.0002                 1.23622E-04     5.8805
7.12415E-05     5.2463       0.00000E+00     0.0000
  181    0.0001                 1.10879E-04     7.0113
6.41235E-05     6.2284       0.00000E+00     0.0000
  182    0.0001                 1.06707E-04     5.8875
6.17333E-05     5.2087       0.00000E+00     0.0000
  183    0.0001                 1.05000E-04     6.0238
6.08528E-05     5.2721       0.00000E+00     0.0000
  184    0.0001                 9.93516E-05     5.8082
5.76216E-05     5.0061       0.00000E+00     0.0000
  185    0.0001                 9.88127E-05     5.9730
5.69989E-05     5.1534       0.00000E+00     0.0000
  186    0.0001                 8.79762E-05     6.0844
5.14907E-05     5.2179       0.00000E+00     0.0000
  187    0.0001                 9.15175E-05     6.1129
5.35500E-05     5.1850       0.00000E+00     0.0000
  188    0.0001                 8.67723E-05     6.5996
5.13312E-05     5.4716       0.00000E+00     0.0000
  189    0.0001                 8.47400E-05     6.9126
5.04070E-05     5.7235       0.00000E+00     0.0000
  190    0.0003                 2.12133E-04     4.9194
1.25800E-04     4.0801       0.00000E+00     0.0000
  191    0.0003                 2.04056E-04     4.2837
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1.22419E-04	3.4792	0.00000E+00	0.0000	192	0.0003	2.00175E-04	3.8285
1.21600E-04	3.0968	0.00000E+00	0.0000	193	0.0002	1.81491E-04	4.3218
1.12765E-04	3.3622	0.00000E+00	0.0000	194	0.0005	4.06827E-04	2.9564
2.49832E-04	2.3546	0.00000E+00	0.0000	195	0.0006	4.24348E-04	2.7858
2.63134E-04	2.1973	0.00000E+00	0.0000	196	0.0006	4.54140E-04	2.8078
2.82567E-04	2.1889	0.00000E+00	0.0000	197	0.0007	5.29295E-04	2.7463
3.27186E-04	2.1262	0.00000E+00	0.0000	198	0.0008	5.94244E-04	2.3605
3.66298E-04	1.8760	0.00000E+00	0.0000	199	0.0004	3.33483E-04	3.3309
2.04628E-04	2.6245	0.00000E+00	0.0000	200	0.0004	3.39297E-04	2.7029
2.10376E-04	2.0837	0.00000E+00	0.0000	201	0.0010	7.81029E-04	2.1786
4.79164E-04	1.7190	0.00000E+00	0.0000	202	0.0013	9.97766E-04	1.9643
6.03224E-04	1.5690	0.00000E+00	0.0000	203	0.0016	1.22024E-03	1.8813
7.29276E-04	1.5468	0.00000E+00	0.0000	204	0.0021	1.62712E-03	1.6957
9.62219E-04	1.4172	0.00000E+00	0.0000	205	0.0015	1.15995E-03	2.1315
6.77049E-04	1.8231	0.00000E+00	0.0000	206	0.0019	1.43127E-03	1.7617
8.31300E-04	1.5258	0.00000E+00	0.0000	207	0.0022	1.68391E-03	1.5151
9.74942E-04	1.3323	0.00000E+00	0.0000	208	0.0029	2.20007E-03	1.4941
1.28028E-03	1.3224	0.00000E+00	0.0000	209	0.0031	2.35355E-03	1.4623
1.38471E-03	1.2876	0.00000E+00	0.0000	210	0.0037	2.83951E-03	1.1961
1.68981E-03	1.0532	0.00000E+00	0.0000	211	0.0041	3.12927E-03	1.1926
1.88578E-03	1.0365	0.00000E+00	0.0000	212	0.0047	3.62161E-03	1.1020
2.19395E-03	0.9499	0.00000E+00	0.0000	213	0.0064	4.92143E-03	0.9433
2.98529E-03	0.7965	0.00000E+00	0.0000	214	0.0097	7.41791E-03	0.7012
4.45825E-03	0.5907	0.00000E+00	0.0000	215	0.0157	1.19810E-02	0.6403
7.15681E-03	0.5390	0.00000E+00	0.0000	216	0.0301	2.30279E-02	0.4659
1.35809E-02	0.3905	0.00000E+00	0.0000	217	0.0200	1.53360E-02	0.6015

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9.02592E-03     0.5024       0.00000E+00     0.0000
  218    0.0277                 2.11893E-02     0.4913
1.24067E-02     0.4140       0.00000E+00     0.0000
  219    0.0358                 2.73720E-02     0.4169
1.59679E-02     0.3587       0.00000E+00     0.0000
  220    0.0473                 3.61841E-02     0.3546
2.10565E-02     0.3022       0.00000E+00     0.0000
  221    0.0625                 4.77806E-02     0.3306
2.77120E-02     0.2793       0.00000E+00     0.0000
  222    0.0802                 6.13584E-02     0.2962
3.55482E-02     0.2509       0.00000E+00     0.0000
  223    0.1047                 8.01360E-02     0.2470
4.64758E-02     0.2113       0.00000E+00     0.0000
  224    0.0583                 4.46040E-02     0.2817
2.59935E-02     0.2369       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    0.2308                 1.76581E-01     0.1536
1.04606E-01     0.1319       0.00000E+00     0.0000
  226    0.0452                 3.45978E-02     0.3596
2.10885E-02     0.2905       0.00000E+00     0.0000
  227    0.0487                 3.72615E-02     0.3818
2.31488E-02     0.3153       0.00000E+00     0.0000
  228    0.0213                 1.63154E-02     0.6302
1.02871E-02     0.5021       0.00000E+00     0.0000
  229    0.0222                 1.69622E-02     0.5477
1.09181E-02     0.4125       0.00000E+00     0.0000
  230    0.0115                 8.76455E-03     0.8082
5.76532E-03     0.6223       0.00000E+00     0.0000
  231    0.0122                 9.32755E-03     0.7451
6.20543E-03     0.5425       0.00000E+00     0.0000
  232    0.0128                 9.82463E-03     0.7479
6.71265E-03     0.5653       0.00000E+00     0.0000
  233    0.0083                 6.34875E-03     0.9473
4.46612E-03     0.6532       0.00000E+00     0.0000
  234    0.0060                 4.56295E-03     1.1318
3.28845E-03     0.8032       0.00000E+00     0.0000
  235    0.0025                 1.87690E-03     1.5545
1.24100E-03     1.1986       0.00000E+00     0.0000
  236    0.0019                 1.45348E-03     1.6969
9.79074E-04     1.2932       0.00000E+00     0.0000
  237    0.0017                 1.29943E-03     2.0648
9.25004E-04     1.4300       0.00000E+00     0.0000
  238    0.0001                 7.42612E-05     7.8300
6.24979E-05     4.9485       0.00000E+00     0.0000
```

system total = 7.65030E-01 0.0553
4.68592E-01 0.0440 0.00000E+00 0.0000

the weight lost in the albedo portion of the problem = 5.3155E-01 +
or - 0.0002

elapsed time 3.10833 minutes

random number= 51946B1C341FA1A1
1 fuel bundle

**** fission
densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.086E-03	0.06	7.650E-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	2.295E-08	43.74	1.241E-08	35.78	1.259E-08	33.85
3	8.636E-07	4.13	7.151E-07	3.71	7.745E-07	3.79
4	1.501E-06	3.29	1.217E-06	3.00	1.309E-06	2.98
5	2.312E-06	2.60	1.890E-06	2.25	2.015E-06	2.30
6	9.379E-06	1.27	7.483E-06	1.14	7.985E-06	1.13
7	1.233E-05	1.05	9.422E-06	0.84	9.994E-06	0.86
8	3.106E-05	0.72	2.279E-05	0.60	2.385E-05	0.62

9	8.172E-05	0.49	5.852E-05	0.43	6.103E-05	0.42
10	4.641E-05	0.66	3.313E-05	0.56	3.441E-05	0.53
11	2.201E-04	0.26	1.551E-04	0.22	1.608E-04	0.22
12	1.898E-04	0.27	1.376E-04	0.23	1.443E-04	0.24
13	5.663E-05	0.52	4.143E-05	0.49	4.323E-05	0.52
14	2.545E-04	0.24	1.839E-04	0.23	1.917E-04	0.23
15	2.190E-04	0.25	1.593E-04	0.20	1.662E-04	0.19
16	7.141E-05	0.52	5.204E-05	0.41	5.444E-05	0.41
17	3.234E-05	0.55	2.355E-05	0.47	2.453E-05	0.48
18	2.757E-05	0.69	2.013E-05	0.61	2.085E-05	0.59
19	5.002E-05	0.53	3.666E-05	0.44	3.813E-05	0.41
20	4.008E-05	0.61	2.920E-05	0.49	3.040E-05	0.47
21	8.003E-05	0.40	5.884E-05	0.34	6.143E-05	0.33
22	7.271E-05	0.42	5.346E-05	0.36	5.516E-05	0.37
23	7.629E-05	0.43	5.609E-05	0.36	5.827E-05	0.35
24	1.863E-05	0.77	1.371E-05	0.68	1.431E-05	0.68
25	2.354E-05	0.82	1.722E-05	0.68	1.812E-05	0.65
26	1.323E-05	0.86	9.831E-06	0.82	1.038E-05	0.77
27	4.194E-05	0.51	3.114E-05	0.45	3.293E-05	0.45
28	7.723E-05	0.42	5.732E-05	0.37	6.078E-05	0.37
29	7.910E-05	0.43	5.940E-05	0.36	6.218E-05	0.33
30	9.902E-06	1.04	7.499E-06	0.80	7.917E-06	0.74
31	7.818E-05	0.34	5.871E-05	0.30	6.185E-05	0.30
32	3.101E-05	0.56	2.335E-05	0.48	2.471E-05	0.44
33	2.666E-05	0.74	2.013E-05	0.58	2.120E-05	0.56
34	6.080E-05	0.40	4.603E-05	0.33	4.867E-05	0.32
35	3.617E-05	0.49	2.738E-05	0.46	2.880E-05	0.44
36	3.379E-05	0.55	2.566E-05	0.43	2.689E-05	0.42
37	2.187E-05	0.80	1.650E-05	0.66	1.720E-05	0.58
38	2.584E-05	0.58	1.965E-05	0.47	2.065E-05	0.46
39	9.769E-05	0.33	7.498E-05	0.28	7.929E-05	0.26
40	9.018E-05	0.36	6.942E-05	0.29	7.414E-05	0.28
41	1.134E-04	0.28	8.881E-05	0.23	9.472E-05	0.19
42	9.327E-05	0.31	7.354E-05	0.26	7.894E-05	0.26
43	5.120E-05	0.39	4.083E-05	0.34	4.298E-05	0.30
44	6.983E-05	0.35	5.592E-05	0.29	6.008E-05	0.24
45	3.536E-05	0.46	2.803E-05	0.39	3.117E-05	0.35
46	8.303E-06	0.84	6.598E-06	0.70	7.126E-06	0.63
47	2.360E-05	0.60	1.877E-05	0.48	1.967E-05	0.40
48	6.726E-06	1.19	5.365E-06	1.02	5.653E-06	0.80
49	4.338E-05	0.38	3.482E-05	0.33	3.758E-05	0.30
50	2.939E-05	0.43	2.368E-05	0.40	2.570E-05	0.33
51	7.919E-06	0.82	6.443E-06	0.76	6.982E-06	0.66
52	2.054E-05	0.57	1.664E-05	0.47	1.815E-05	0.43
53	7.629E-05	0.33	6.151E-05	0.27	6.685E-05	0.24
54	3.337E-05	0.46	2.715E-05	0.42	2.918E-05	0.34
55	6.641E-05	0.30	5.397E-05	0.29	5.876E-05	0.26
56	4.350E-05	0.40	3.534E-05	0.35	3.854E-05	0.30
57	4.930E-05	0.35	4.016E-05	0.30	4.380E-05	0.28
58	2.574E-05	0.52	2.103E-05	0.49	2.289E-05	0.38
59	4.408E-05	0.37	3.618E-05	0.31	3.940E-05	0.28
60	6.419E-05	0.33	5.262E-05	0.29	5.717E-05	0.24

61	6.234E-06	1.04	5.090E-06	0.90	5.553E-06	0.73
62	3.202E-05	0.44	2.638E-05	0.34	2.878E-05	0.32
63	2.171E-05	0.59	1.782E-05	0.51	1.932E-05	0.43
64	1.720E-05	0.59	1.412E-05	0.46	1.533E-05	0.37
65	5.693E-06	1.02	4.655E-06	0.89	5.083E-06	0.69
66	2.858E-05	0.42	2.352E-05	0.37	2.559E-05	0.33
67	2.107E-05	0.48	1.745E-05	0.45	1.896E-05	0.35
68	4.666E-06	1.03	3.819E-06	0.83	4.139E-06	0.80
69	3.672E-05	0.41	3.049E-05	0.34	3.319E-05	0.29
70	2.645E-05	0.43	2.187E-05	0.44	2.372E-05	0.34
71	4.575E-05	0.34	3.762E-05	0.31	4.098E-05	0.28
72	2.586E-06	1.36	2.148E-06	1.15	2.356E-06	0.90
73	2.725E-05	0.50	2.238E-05	0.46	2.430E-05	0.36
74	7.937E-05	0.28	6.582E-05	0.25	7.144E-05	0.19
75	9.119E-06	0.70	7.602E-06	0.66	8.218E-06	0.58
76	2.291E-05	0.50	1.901E-05	0.44	2.057E-05	0.34
77	1.775E-05	0.51	1.475E-05	0.48	1.597E-05	0.38
78	1.467E-06	1.60	1.258E-06	1.60	1.381E-06	1.28
79	9.823E-06	0.68	8.161E-06	0.63	8.883E-06	0.51
80	4.551E-06	1.03	3.763E-06	0.90	4.076E-06	0.80
81	5.501E-05	0.36	4.583E-05	0.33	4.953E-05	0.28
82	3.185E-06	1.23	2.669E-06	1.14	2.922E-06	0.89
83	4.417E-06	1.07	3.663E-06	0.90	3.987E-06	0.80
84	8.112E-06	0.77	6.766E-06	0.67	7.325E-06	0.60
85	1.004E-05	0.76	8.413E-06	0.61	9.079E-06	0.55
86	1.358E-05	0.65	1.138E-05	0.61	1.224E-05	0.47
87	1.188E-05	0.57	9.938E-06	0.49	1.076E-05	0.43
88	3.211E-06	1.40	2.682E-06	1.18	2.898E-06	0.98
89	6.600E-06	0.84	5.493E-06	0.71	5.954E-06	0.60
90	6.972E-06	0.85	5.787E-06	0.73	6.255E-06	0.59
91	8.212E-06	0.75	6.857E-06	0.67	7.432E-06	0.50
92	4.787E-06	1.01	4.029E-06	0.97	4.356E-06	0.75
93	8.008E-06	0.67	6.715E-06	0.59	7.283E-06	0.52
94	4.195E-06	1.08	3.506E-06	1.01	3.804E-06	0.82
95	1.265E-05	0.61	1.062E-05	0.57	1.148E-05	0.47
96	3.373E-06	1.22	2.845E-06	0.99	3.043E-06	0.86
97	3.393E-06	1.08	2.826E-06	0.82	3.073E-06	0.73
98	3.482E-06	1.12	2.919E-06	1.04	3.169E-06	0.98
99	2.298E-06	1.65	1.921E-06	1.53	2.086E-06	1.22
100	3.476E-06	1.08	2.904E-06	1.01	3.121E-06	0.90
101	5.036E-06	1.02	4.174E-06	0.93	4.488E-06	0.72
102	3.388E-06	1.19	2.849E-06	1.11	3.082E-06	0.90
103	4.726E-06	0.96	3.951E-06	0.90	4.276E-06	0.72
104	4.146E-06	1.24	3.505E-06	0.99	3.780E-06	0.73
105	4.354E-06	1.01	3.648E-06	0.90	3.977E-06	0.78
106	1.551E-06	1.63	1.309E-06	1.69	1.408E-06	1.10
107	3.674E-06	1.12	3.054E-06	1.04	3.288E-06	0.79
108	3.264E-06	1.12	2.717E-06	0.96	2.970E-06	0.77
109	5.106E-06	0.96	4.247E-06	0.99	4.624E-06	0.70
110	2.965E-06	1.22	2.533E-06	1.16	2.779E-06	0.96
111	3.073E-06	1.14	2.592E-06	1.02	2.821E-06	0.89
112	1.757E-06	1.43	1.477E-06	1.30	1.626E-06	1.14

113	5.672E-06	0.87	4.781E-06	0.90	5.199E-06	0.73
114	2.023E-06	1.42	1.694E-06	1.28	1.791E-06	1.04
115	5.076E-06	1.14	4.281E-06	0.95	4.614E-06	0.79
116	1.078E-05	0.62	9.064E-06	0.63	9.756E-06	0.45
117	1.177E-05	0.64	9.860E-06	0.51	1.068E-05	0.47
118	1.295E-05	0.57	1.087E-05	0.53	1.175E-05	0.49
119	8.250E-06	0.83	7.039E-06	0.76	7.649E-06	0.59
120	5.828E-06	0.75	4.916E-06	0.77	5.352E-06	0.60
121	6.084E-06	0.95	5.176E-06	0.93	5.598E-06	0.72
122	3.160E-06	1.22	2.679E-06	1.08	2.884E-06	0.77
123	1.037E-05	0.77	8.671E-06	0.62	9.326E-06	0.54
124	7.379E-06	0.84	6.190E-06	0.70	6.689E-06	0.57
125	7.042E-06	0.85	5.929E-06	0.74	6.372E-06	0.67
126	5.797E-06	0.85	4.884E-06	0.80	5.235E-06	0.59
127	5.504E-06	0.86	4.658E-06	0.77	5.031E-06	0.64
128	7.678E-06	0.71	6.462E-06	0.65	6.959E-06	0.54
129	9.603E-06	0.65	8.162E-06	0.53	8.798E-06	0.46
130	3.900E-06	1.07	3.323E-06	1.02	3.638E-06	0.73
131	1.689E-05	0.57	1.421E-05	0.48	1.523E-05	0.40
132	1.116E-05	0.63	9.411E-06	0.55	1.015E-05	0.44
133	1.359E-05	0.56	1.145E-05	0.53	1.240E-05	0.39
134	1.477E-05	0.62	1.246E-05	0.51	1.349E-05	0.42
135	2.359E-06	1.41	2.018E-06	1.24	2.193E-06	0.88
136	3.862E-06	1.10	3.362E-06	1.01	3.666E-06	0.77
137	2.495E-06	1.00	2.607E-06	0.94	2.971E-06	0.71
138	4.096E-06	1.05	3.571E-06	0.91	3.877E-06	0.75
139	4.478E-06	0.96	3.819E-06	0.88	4.164E-06	0.76
140	1.197E-05	0.60	1.016E-05	0.56	1.094E-05	0.50
141	8.867E-06	0.83	7.503E-06	0.68	8.062E-06	0.56
142	5.898E-06	0.94	5.012E-06	0.80	5.330E-06	0.62
143	1.971E-05	0.53	1.672E-05	0.44	1.800E-05	0.34
144	7.956E-06	0.71	6.778E-06	0.68	7.294E-06	0.54
145	7.186E-06	0.91	6.081E-06	0.78	6.579E-06	0.65
146	1.202E-05	0.56	1.019E-05	0.49	1.097E-05	0.45
147	3.696E-06	1.30	3.121E-06	1.05	3.328E-06	0.85
148	1.870E-06	1.53	1.555E-06	1.26	1.687E-06	1.04
149	1.198E-06	2.04	1.006E-06	1.70	1.087E-06	1.46
150	3.961E-06	1.11	3.346E-06	1.04	3.590E-06	0.87
151	4.103E-06	0.98	3.468E-06	0.87	3.729E-06	0.70
152	4.273E-06	1.06	3.624E-06	0.93	3.880E-06	0.81
153	4.465E-06	1.00	3.747E-06	0.83	4.056E-06	0.65
154	4.668E-06	1.13	3.951E-06	0.91	4.195E-06	0.80
155	4.336E-06	1.04	3.667E-06	0.99	3.961E-06	0.79
156	3.911E-06	0.99	3.331E-06	0.89	3.584E-06	0.80
157	4.726E-06	1.10	3.957E-06	0.93	4.222E-06	0.74
158	4.856E-06	1.03	4.086E-06	0.91	4.366E-06	0.75
159	6.624E-06	0.99	5.611E-06	0.79	6.041E-06	0.69
160	3.523E-06	1.14	2.988E-06	0.94	3.198E-06	0.91
161	4.956E-06	0.90	4.181E-06	0.85	4.511E-06	0.64
162	5.815E-06	0.98	4.915E-06	0.86	5.305E-06	0.72
163	6.101E-06	1.03	5.176E-06	0.86	5.591E-06	0.65
164	6.456E-06	0.95	5.436E-06	0.78	5.888E-06	0.69

165	6.865E-06	0.91	5.807E-06	0.76	6.255E-06	0.63
166	4.009E-06	1.29	3.359E-06	1.04	3.653E-06	0.89
167	4.174E-06	1.44	3.505E-06	0.92	3.787E-06	0.74
168	4.309E-06	1.04	3.634E-06	0.93	3.897E-06	0.73
169	4.352E-06	1.07	3.695E-06	0.97	3.995E-06	0.70
170	4.543E-06	0.97	3.887E-06	0.87	4.204E-06	0.70
171	2.341E-06	1.45	1.977E-06	1.28	2.155E-06	1.08
172	2.419E-06	1.39	2.054E-06	1.27	2.187E-06	0.99
173	2.431E-06	1.15	2.088E-06	1.14	2.289E-06	0.96
174	2.504E-06	1.30	2.158E-06	1.14	2.314E-06	0.90
175	9.814E-07	1.94	8.478E-07	1.79	9.277E-07	1.53
176	1.053E-06	2.31	8.855E-07	1.94	9.601E-07	1.46
177	9.850E-07	2.14	8.671E-07	1.75	9.326E-07	1.40
178	1.019E-06	2.14	8.603E-07	1.95	9.297E-07	1.54
179	1.063E-06	1.97	8.996E-07	1.97	9.809E-07	1.42
180	1.005E-06	1.83	8.716E-07	1.73	9.567E-07	1.53
181	1.048E-06	2.18	8.983E-07	1.82	9.769E-07	1.54
182	1.105E-06	2.13	9.190E-07	1.78	1.006E-06	1.53
183	1.061E-06	1.81	9.080E-07	1.81	1.000E-06	1.37
184	1.115E-06	2.07	9.296E-07	1.76	1.006E-06	1.28
185	1.093E-06	2.05	9.323E-07	1.73	1.005E-06	1.42
186	1.135E-06	1.96	9.466E-07	1.53	1.024E-06	1.30
187	1.154E-06	1.97	9.621E-07	1.67	1.060E-06	1.37
188	1.170E-06	2.05	9.764E-07	1.82	1.072E-06	1.48
189	1.198E-06	2.09	1.003E-06	1.71	1.071E-06	1.50
190	2.992E-06	1.13	2.503E-06	1.05	2.729E-06	0.87
191	3.065E-06	1.20	2.624E-06	1.06	2.799E-06	0.87
192	3.193E-06	1.35	2.713E-06	1.06	2.928E-06	0.93
193	3.266E-06	1.18	2.783E-06	0.97	3.013E-06	0.82
194	6.944E-06	0.85	5.861E-06	0.78	6.295E-06	0.65
195	7.222E-06	0.91	6.131E-06	0.84	6.621E-06	0.70
196	7.644E-06	0.72	6.487E-06	0.63	7.021E-06	0.53
197	8.399E-06	0.83	7.120E-06	0.67	7.710E-06	0.58
198	8.971E-06	0.70	7.626E-06	0.66	8.218E-06	0.50
199	4.799E-06	0.93	4.044E-06	0.78	4.380E-06	0.69
200	5.077E-06	0.89	4.286E-06	0.86	4.647E-06	0.71
201	1.070E-05	0.74	8.986E-06	0.62	9.726E-06	0.53
202	1.194E-05	0.64	1.009E-05	0.58	1.095E-05	0.39
203	1.294E-05	0.59	1.091E-05	0.56	1.179E-05	0.45
204	1.469E-05	0.50	1.251E-05	0.48	1.358E-05	0.42
205	8.635E-06	0.72	7.758E-06	0.66	8.178E-06	0.54
206	9.268E-06	0.66	8.366E-06	0.53	8.866E-06	0.48
207	9.644E-06	0.63	8.690E-06	0.56	9.199E-06	0.43
208	1.125E-05	0.59	1.013E-05	0.53	1.080E-05	0.46
209	1.145E-05	0.60	1.046E-05	0.49	1.108E-05	0.39
210	1.401E-05	0.45	1.268E-05	0.45	1.351E-05	0.35
211	1.607E-05	0.46	1.457E-05	0.46	1.556E-05	0.34
212	1.914E-05	0.46	1.736E-05	0.42	1.842E-05	0.33
213	2.615E-05	0.41	2.357E-05	0.33	2.526E-05	0.27
214	3.687E-05	0.31	3.320E-05	0.28	3.569E-05	0.24
215	5.542E-05	0.28	4.998E-05	0.22	5.388E-05	0.18
216	9.202E-05	0.23	8.401E-05	0.19	9.076E-05	0.16

217	5.531E-05	0.25	5.299E-05	0.19	5.617E-05	0.17
218	7.081E-05	0.21	6.793E-05	0.17	7.234E-05	0.15
219	8.406E-05	0.18	8.125E-05	0.18	8.660E-05	0.13
220	1.016E-04	0.18	9.903E-05	0.14	1.057E-04	0.12
221	1.204E-04	0.16	1.186E-04	0.14	1.264E-04	0.11
222	1.364E-04	0.15	1.367E-04	0.13	1.457E-04	0.10
223	1.537E-04	0.14	1.577E-04	0.12	1.675E-04	0.09
224	7.507E-05	0.20	8.001E-05	0.18	8.448E-05	0.13
225	2.335E-04	0.11	2.725E-04	0.11	2.824E-04	0.09
226	3.167E-05	0.24	4.485E-05	0.20	4.459E-05	0.11
227	2.896E-05	0.24	4.642E-05	0.19	4.446E-05	0.12
228	1.042E-05	0.35	1.913E-05	0.32	1.760E-05	0.19
229	9.621E-06	0.41	1.968E-05	0.32	1.749E-05	0.15
230	4.470E-06	0.55	1.026E-05	0.47	8.729E-06	0.23
231	4.174E-06	0.58	1.053E-05	0.40	8.713E-06	0.23
232	3.959E-06	0.64	1.136E-05	0.50	8.898E-06	0.24
233	2.225E-06	0.70	7.441E-06	0.52	5.508E-06	0.25
234	1.437E-06	0.84	5.414E-06	0.61	3.830E-06	0.28
235	5.225E-07	1.39	1.034E-06	1.13	1.120E-06	0.50
236	3.450E-07	1.90	7.372E-07	1.33	8.022E-07	0.59
237	2.249E-07	2.17	5.514E-07	1.45	6.171E-07	0.53
238	5.319E-09	11.12	2.039E-08	6.53	2.529E-08	2.14

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
 0.7551 to 0.7580     ***
 0.7580 to 0.7608     ************
 0.7608 to 0.7636     ****************************
 0.7636 to 0.7664     ************************
 0.7664 to 0.7693     *****************
 0.7693 to 0.7721     ************
 0.7721 to 0.7749     ***
 0.7749 to 0.7778
 0.7778 to 0.7806     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7551 to 0.7580     ***
 0.7580 to 0.7608     ********
 0.7608 to 0.7636     **********************
 0.7636 to 0.7664     ******************
 0.7664 to 0.7693     *************
 0.7693 to 0.7721     *******
 0.7721 to 0.7749     ***
 0.7749 to 0.7778
 0.7778 to 0.7806     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7551 to 0.7580     ***
 0.7580 to 0.7608     ****
 0.7608 to 0.7636     ******************
 0.7636 to 0.7664     ************
 0.7664 to 0.7693     *****
 0.7693 to 0.7721     *****
 0.7721 to 0.7749     ***
 0.7749 to 0.7778
 0.7778 to 0.7806

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7551 to 0.7580     *
 0.7580 to 0.7608     *
 0.7608 to 0.7636     ********
 0.7636 to 0.7664     ******
 0.7664 to 0.7693     **
```

```
 0.7693 to 0.7721     ****
 0.7721 to 0.7749     ***
 0.7749 to 0.7778
 0.7778 to 0.7806

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                 ***
        ***
***
        ***        best estimate system k-eff
0.76503 + or - 0.00052                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.64766E-02 + or -  1.19729E-04            ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  1.05322E-05            ***
        ***
***
        ***        system mean free path (cm)
6.52528E-01 + or -  1.63889E-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     3.11433 minutes


**********************************************************************
************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666


      0000000       666666666666                         11
33333333333                          11        7777777777777
```

```
     000000000     6666666666666                        111
3333333333333                        111        777777777777
    00       00    66                    :::           1111        33
33         :::           1111        77        77
   00         00   66                    :::             11
33         :::             11                 77
   00         00   66                    :::             11
33         :::             11                77
   00         00   666666666666                          11
333                          11                77
   00         00   6666666666666                         11
333                          11                77
   00         00   66         66         :::             11
33         :::             11              77
   00         00   66         66         :::             11
33         :::             11              77
    00       00    66         66         :::             11        33
33         :::             11             77
     000000000     6666666666666                      11111111
3333333333333                      11111111          77
      0000000       66666666666                       11111111
33333333333                      11111111          77
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
```

```
*****
        *****
*****
        *****    time of execution:  06:13:17.72
*****
        *****
*****
        *****
*****

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

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

*************************************************************************
*********************************************
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.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***            8
->Data\Local\Temp\scale.David.40724\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  7.40129E-12  2.23283E-12    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  6.04492E-08  1.81182E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.06444E-14  6.80336E-14    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  7.37713E-07  5.29651E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33936E-08  6.98511E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99743E-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  5.24104E-07  8.93226E-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  2.96840E-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  9.15332E-11  2.27180E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90851E-08  1.32097E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.14291E-08  3.11004E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.73877E-08  4.78349E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  1.11862E-09  3.11092E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.76435E-08  4.95954E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  3.04702E-10  8.65645E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.70945E-09  1.06495E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  8.50643E-18  2.36567E-16   41093    92.9064     nb93 4125
```

```
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.59787E-10  4.53942E-09   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  1.18891E-08  3.37758E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18397E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  7.78519E-09  2.25830E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.81146E-08  5.30881E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26861E-11  3.75595E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  7.89569E-09  2.36129E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.01086E-09  2.99280E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  8.52642E-10  2.57539E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  7.04031E-10  2.14756E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  9.00581E-11  2.77413E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.11303E-10  9.68240E-09   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.09087E-11  1.61391E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  4.09012E-10  1.25990E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.11088E-12  3.48842E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.64901E-10  5.17825E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.49771E-11  7.99287E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  9.31259E-12  3.00794E-10   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  5.29438E-12  1.72593E-10   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  8.98741E-11  2.90292E-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  1.29521E-09  4.29981E-08   48111   110.9042     cd111 4840
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43858E-09  8.16844E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23566E-09  4.17611E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90333E-09  9.89908E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58468E-10  2.63148E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.06292E-12  7.09542E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51169E-11  2.23969E-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  1.47072E-09  5.14658E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63319E-09  1.63517E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64473E-09  5.85398E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23195E-09  2.23673E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.87951E-10  3.24016E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11163E-09  4.12297E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  9.27544E-12  3.49582E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.62684E-11  9.97867E-10   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  9.14218E-11  3.52762E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25971E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  4.58999E-10  1.79858E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67706E-11  1.06504E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87636E-12  7.57727E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.07415E-09  4.27338E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.65220E-15  6.62256E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.14930E-09  4.64117E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.00475E-09  4.11761E-08   55137   136.9071     cs137 5537
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.40384E-08  1.40511E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99459E-11  2.51057E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.06987E-09  4.44852E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.49875E-10  6.32160E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  9.77492E-10  4.15227E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21020E-12  2.65667E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  6.30915E-10  2.71791E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  8.48955E-10  3.58081E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12960E-11  2.62216E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  9.11556E-10  3.89948E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  2.69952E-10  1.16289E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  6.76657E-10  2.93519E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  4.94634E-10  2.16043E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87226E-11  8.23375E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  2.74781E-10  1.21665E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.15653E-10  1.38815E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  2.46686E-17  1.09226E-15   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84878E-12  8.24127E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  3.52239E-11  1.54905E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.79604E-10  8.00615E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.01154E-13  4.53940E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.05619E-09  1.38067E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  4.46463E-11  2.03030E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32593E-13  1.06470E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.44806E-09  6.54176E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.58504E-09  7.25556E-08   63153   152.9212     eu153 6331
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endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.06774E-14  4.91963E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  5.04789E-12  2.34092E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81621E-13  8.47701E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.82888E-12  2.65070E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29366E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27276E-10  1.98146E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.93757E-10  2.77127E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51426E-10  2.12050E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19105E-10  3.39940E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31151E-10  3.02146E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76386E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22848E-06  6.52060E-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  9.07198E-12  6.43725E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.67659E-17  1.19469E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  7.47224E-10  5.34694E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  2.55171E-15  1.83359E-13   94240   240.0538     pu240 9440
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endf/b7 rel2 rev7 mod0                12/17/09
    1094241  2.43810E-20  1.75927E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49930E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.05454E-20  7.60926E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  4.04553E-28  2.93130E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99978E-21  7.27559E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  4.83850E-21  3.50585E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.79813E-21  7.12887E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.67771E-21  7.07027E-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
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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

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                                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
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                                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:
  9391 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

                                          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       ........

                                  ........     0.01450 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
0.01533 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 15760 independent fission points were generated for generation 1
          1       7.64754E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
```

```
  keno message number k6-132 follows:
 only 15672 independent fission points were generated for generation 2
          2       7.64046E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15688 independent fission points were generated for generation 3
          3       7.67648E-01      7.67648E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.63327E-01      7.65487E-01      2.16052E-03
0.00000E+00      0.00000E+00
          5       7.66249E-01      7.65741E-01      1.27295E-03
0.00000E+00      0.00000E+00
          6       7.60213E-01      7.64359E-01      1.64929E-03
0.00000E+00      0.00000E+00
          7       7.61486E-01      7.63785E-01      1.40087E-03
0.00000E+00      0.00000E+00
          8       7.64140E-01      7.63844E-01      1.14534E-03
0.00000E+00      0.00000E+00
          9       7.63641E-01      7.63815E-01      9.68425E-04
0.00000E+00      0.00000E+00
         10       7.59557E-01      7.63283E-01      9.93283E-04
0.00000E+00      0.00000E+00
         11       7.67778E-01      7.63782E-01      1.00839E-03
0.00000E+00      0.00000E+00
         12       7.68662E-01      7.64270E-01      1.02547E-03
0.00000E+00      0.00000E+00
         13       7.63258E-01      7.64178E-01      9.32124E-04
0.00000E+00      0.00000E+00
         14       7.80112E-01      7.65506E-01      1.57705E-03
0.00000E+00      0.00000E+00
         15       7.63377E-01      7.65342E-01      1.45989E-03
0.00000E+00      0.00000E+00
         16       7.67401E-01      7.65489E-01      1.35957E-03
0.00000E+00      0.00000E+00
         17       7.68280E-01      7.65675E-01      1.27930E-03
0.00000E+00      0.00000E+00
         18       7.75730E-01      7.66304E-01      1.35163E-03
0.00000E+00      0.00000E+00
         19       7.59976E-01      7.65932E-01      1.32307E-03
0.00000E+00      0.00000E+00
         20       7.62986E-01      7.65768E-01      1.25809E-03
0.00000E+00      0.00000E+00
         21       7.69147E-01      7.65946E-01      1.20325E-03
0.00000E+00      0.00000E+00
         22       7.62982E-01      7.65798E-01      1.15108E-03
0.00000E+00      0.00000E+00
         23       7.66185E-01      7.65816E-01      1.09505E-03
0.00000E+00      0.00000E+00
         24       7.69449E-01      7.65981E-01      1.05707E-03
0.00000E+00      0.00000E+00
         25       7.57401E-01      7.65608E-01      1.07676E-03
0.00000E+00      0.00000E+00
```

26	7.64058E-01	7.65543E-01	1.03294E-03	0.00000E+00
27	7.69747E-01	7.65164E-01	4.09979E-03	0.00000E+00
28	7.55431E-01	7.63217E-01	3.83646E-03	0.00000E+00
29	7.68341E-01	7.64071E-01	3.15043E-03	0.00000E+00
30	7.69913E-01	7.64906E-01	2.75535E-03	0.00000E+00
31	7.70794E-01	7.65642E-01	2.47894E-03	0.00000E+00
32	7.56156E-01	7.64588E-01	2.45703E-03	0.00000E+00
33	7.68898E-01	7.65019E-01	2.21984E-03	0.00000E+00
34	7.66502E-01	7.65154E-01	1.99108E-03	0.00000E+00
35	7.62421E-01	7.64926E-01	1.81820E-03	0.00000E+00
36	7.64192E-01	7.64869E-01	1.66091E-03	0.00000E+00
37	7.65089E-01	7.64885E-01	1.52791E-03	0.00000E+00
38	7.72125E-01	7.65368E-01	1.50658E-03	0.00000E+00
39	7.66297E-01	7.65426E-01	1.40392E-03	0.00000E+00
40	7.67534E-01	7.65550E-01	1.31987E-03	0.00000E+00
41	7.69377E-01	7.65763E-01	1.26015E-03	0.00000E+00
42	7.63290E-01	7.65632E-01	1.19602E-03	0.00000E+00
43	7.65293E-01	7.65615E-01	1.13146E-03	0.00000E+00
44	7.64113E-01	7.65544E-01	1.07603E-03	0.00000E+00
45	7.69702E-01	7.65733E-01	1.04253E-03	0.00000E+00
46	7.66539E-01	7.65768E-01	9.94686E-04	0.00000E+00
47	7.59889E-01	7.65523E-01	9.84289E-04	0.00000E+00
48	7.60600E-01	7.65326E-01	9.64489E-04	0.00000E+00
49	7.61148E-01	7.65165E-01	9.40105E-04	0.00000E+00
50	7.62853E-01	7.65080E-01	9.07598E-04	0.00000E+00
51	7.60817E-01	7.64927E-01	8.87512E-04	0.00000E+00

52	7.70686E-01	7.65126E-01	8.79636E-04	0.00000E+00	0.00000E+00
53	7.71170E-01	7.65327E-01	8.74002E-04	0.00000E+00	0.00000E+00
54	7.69154E-01	7.65451E-01	8.53959E-04	0.00000E+00	0.00000E+00
55	7.66328E-01	7.65478E-01	8.26437E-04	0.00000E+00	0.00000E+00
56	7.64730E-01	7.65456E-01	8.00536E-04	0.00000E+00	0.00000E+00
57	7.58623E-01	7.65255E-01	8.03074E-04	0.00000E+00	0.00000E+00
58	7.64575E-01	7.65235E-01	7.79353E-04	0.00000E+00	0.00000E+00
59	7.70670E-01	7.65386E-01	7.72536E-04	0.00000E+00	0.00000E+00
60	7.64516E-01	7.65363E-01	7.51160E-04	0.00000E+00	0.00000E+00
61	7.66947E-01	7.65404E-01	7.31830E-04	0.00000E+00	0.00000E+00
62	7.63139E-01	7.65346E-01	7.14802E-04	0.00000E+00	0.00000E+00
63	7.62071E-01	7.65264E-01	7.01281E-04	0.00000E+00	0.00000E+00
64	7.66160E-01	7.65286E-01	6.83891E-04	0.00000E+00	0.00000E+00
65	7.68786E-01	7.65370E-01	6.72444E-04	0.00000E+00	0.00000E+00
66	7.61349E-01	7.65276E-01	6.63186E-04	0.00000E+00	0.00000E+00
67	7.68162E-01	7.65342E-01	6.51050E-04	0.00000E+00	0.00000E+00
68	7.68805E-01	7.65419E-01	6.40935E-04	0.00000E+00	0.00000E+00
69	7.61902E-01	7.65342E-01	6.31388E-04	0.00000E+00	0.00000E+00
70	7.67179E-01	7.65381E-01	6.18800E-04	0.00000E+00	0.00000E+00
71	7.66793E-01	7.65411E-01	6.06236E-04	0.00000E+00	0.00000E+00
72	7.61018E-01	7.65321E-01	6.00490E-04	0.00000E+00	0.00000E+00
73	7.73951E-01	7.65494E-01	6.13921E-04	0.00000E+00	0.00000E+00
74	7.64562E-01	7.65475E-01	6.01806E-04	0.00000E+00	0.00000E+00
75	7.70651E-01	7.65575E-01	5.98558E-04	0.00000E+00	0.00000E+00
76	7.68499E-01	7.65630E-01	5.89624E-04	0.00000E+00	0.00000E+00
77	7.66267E-01	7.65642E-01	5.78517E-04	0.00000E+00	0.00000E+00

78	7.69717E-01	7.65716E-01	5.72698E-04	0.00000E+00	0.00000E+00
79	7.59811E-01	7.65610E-01	5.72351E-04	0.00000E+00	0.00000E+00
80	7.61898E-01	7.65545E-01	5.65936E-04	0.00000E+00	0.00000E+00
81	7.65611E-01	7.65546E-01	5.55919E-04	0.00000E+00	0.00000E+00
82	7.66754E-01	7.65567E-01	5.46647E-04	0.00000E+00	0.00000E+00
83	7.66280E-01	7.65579E-01	5.37438E-04	0.00000E+00	0.00000E+00
84	7.60683E-01	7.65499E-01	5.34668E-04	0.00000E+00	0.00000E+00
85	7.65766E-01	7.65503E-01	5.25848E-04	0.00000E+00	0.00000E+00
86	7.67125E-01	7.65529E-01	5.17959E-04	0.00000E+00	0.00000E+00
87	7.69524E-01	7.65591E-01	5.13602E-04	0.00000E+00	0.00000E+00
88	7.60912E-01	7.65519E-01	5.10774E-04	0.00000E+00	0.00000E+00
89	7.66295E-01	7.65531E-01	5.02996E-04	0.00000E+00	0.00000E+00
90	7.67728E-01	7.65564E-01	4.96434E-04	0.00000E+00	0.00000E+00
91	7.71435E-01	7.65650E-01	4.96761E-04	0.00000E+00	0.00000E+00
92	7.68146E-01	7.65686E-01	4.90776E-04	0.00000E+00	0.00000E+00
93	7.68669E-01	7.65729E-01	4.85540E-04	0.00000E+00	0.00000E+00
94	7.69718E-01	7.65785E-01	4.81935E-04	0.00000E+00	0.00000E+00
95	7.64443E-01	7.65766E-01	4.75474E-04	0.00000E+00	0.00000E+00
96	7.66847E-01	7.65781E-01	4.69064E-04	0.00000E+00	0.00000E+00
97	7.61522E-01	7.65724E-01	4.66260E-04	0.00000E+00	0.00000E+00
98	7.69260E-01	7.65771E-01	4.62392E-04	0.00000E+00	0.00000E+00
99	7.64990E-01	7.65760E-01	4.56304E-04	0.00000E+00	0.00000E+00
100	7.64201E-01	7.65740E-01	4.50728E-04	0.00000E+00	0.00000E+00
101	7.63473E-01	7.65711E-01	4.45809E-04	0.00000E+00	0.00000E+00
102	7.68620E-01	7.65748E-01	4.41634E-04	0.00000E+00	0.00000E+00
103	7.68216E-01	7.65779E-01	4.37126E-04	0.00000E+00	0.00000E+00

```
                                    restart data was written for
generation  103       random number=35DCF3CE007CD5C9
        104       7.65751E-01      7.65778E-01      4.31627E-04
0.00000E+00      0.00000E+00
        105       7.64470E-01      7.65762E-01      4.26571E-04
0.00000E+00      0.00000E+00
        106       7.63126E-01      7.65731E-01      4.22563E-04
0.00000E+00      0.00000E+00
        107       7.68444E-01      7.65763E-01      4.18719E-04
0.00000E+00      0.00000E+00
        108       7.64896E-01      7.65753E-01      4.13833E-04
0.00000E+00      0.00000E+00
        109       7.61799E-01      7.65707E-01      4.11573E-04
0.00000E+00      0.00000E+00
        110       7.58923E-01      7.65629E-01      4.14337E-04
0.00000E+00      0.00000E+00
        111       7.62354E-01      7.65592E-01      4.11274E-04
0.00000E+00      0.00000E+00
        112       7.60661E-01      7.65536E-01      4.10416E-04
0.00000E+00      0.00000E+00
        113       7.65515E-01      7.65536E-01      4.05779E-04
0.00000E+00      0.00000E+00
        114       7.70021E-01      7.65585E-01      4.04328E-04
0.00000E+00      0.00000E+00
        115       7.63951E-01      7.65568E-01      4.00263E-04
0.00000E+00      0.00000E+00
        116       7.69841E-01      7.65613E-01      3.98605E-04
0.00000E+00      0.00000E+00
        117       7.56839E-01      7.65520E-01      4.05427E-04
0.00000E+00      0.00000E+00
        118       7.75188E-01      7.65622E-01      4.18659E-04
0.00000E+00      0.00000E+00
        119       7.67513E-01      7.65642E-01      4.10172E-04
0.00000E+00      0.00000E+00
        120       7.60148E-01      7.65585E-01      4.09891E-04
0.00000E+00      0.00000E+00
        121       7.68737E-01      7.65617E-01      4.06944E-04
0.00000E+00      0.00000E+00
        122       7.72534E-01      7.65687E-01      4.08907E-04
0.00000E+00      0.00000E+00
        123       7.68144E-01      7.65712E-01      4.05516E-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=714C8F825531A8F0
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55188E-05 + or -  1.24202E-08             generation time
```

```
=  2.99532E-05 + or -  2.26241E-08
 nu bar   =  2.43897E+00 + or -  1.07661E-05       average fission group
=  2.17554E+02 + or -  1.03304E-02
                      energy(ev) of the average lethargy causing fission
=  5.65608E-02 + or -  1.27555E-04
                                                 system mean free path (cm)
=  6.52838E-01 + or -  1.74586E-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          0.76571   + or - 0.00041     0.76531 to 0.76612
0.76490 to 0.76652    0.76450 to 0.76693    2000000      13.0383

      24          0.76567   + or - 0.00041     0.76527 to 0.76608
0.76486 to 0.76649    0.76445 to 0.76690    1980000      13.1100

      25          0.76576   + or - 0.00040     0.76536 to 0.76616
0.76495 to 0.76656    0.76455 to 0.76697    1960000      13.3465

      26          0.76578   + or - 0.00041     0.76537 to 0.76618
0.76496 to 0.76659    0.76456 to 0.76700    1940000      13.3653

      27          0.76573   + or - 0.00041     0.76533 to 0.76614
0.76492 to 0.76655    0.76451 to 0.76696    1920000      13.4616

      28          0.76584   + or - 0.00040     0.76544 to 0.76624
0.76505 to 0.76664    0.76465 to 0.76704    1900000      13.0168

      29          0.76582   + or - 0.00040     0.76541 to 0.76622
0.76501 to 0.76662    0.76461 to 0.76702    1880000      13.0423

      30          0.76577   + or - 0.00040     0.76537 to 0.76618
0.76497 to 0.76658    0.76456 to 0.76698    1860000      13.1737

      31          0.76572   + or - 0.00040     0.76531 to 0.76612
0.76491 to 0.76653    0.76451 to 0.76693    1840000      13.3673

      32          0.76582   + or - 0.00039     0.76543 to 0.76622
0.76503 to 0.76661    0.76464 to 0.76701    1820000      12.9688

      37          0.76585   + or - 0.00042     0.76542 to 0.76627
0.76500 to 0.76669    0.76457 to 0.76712    1720000      12.4533

      42          0.76573   + or - 0.00043     0.76530 to 0.76616
0.76487 to 0.76659    0.76445 to 0.76701    1620000      13.4965

      47          0.76577   + or - 0.00045     0.76533 to 0.76622
```

0.76488 to 0.76666 0.76443 to 0.76711 1520000 13.8826

52 0.76595 + or - 0.00045 0.76550 to 0.76640
0.76504 to 0.76686 0.76459 to 0.76731 1420000 15.2845

57 0.76595 + or - 0.00051 0.76543 to 0.76646
0.76492 to 0.76697 0.76441 to 0.76749 1320000 13.2134

62 0.76595 + or - 0.00055 0.76539 to 0.76650
0.76484 to 0.76706 0.76428 to 0.76761 1220000 13.1306

67 0.76600 + or - 0.00069 0.76531 to 0.76669
0.76462 to 0.76739 0.76392 to 0.76808 1120000 9.9638

72 0.76609 + or - 0.00076 0.76533 to 0.76685
0.76457 to 0.76761 0.76381 to 0.76837 1020000 9.8941

77 0.76579 + or - 0.00058 0.76521 to 0.76638
0.76463 to 0.76696 0.76405 to 0.76754 920000 19.0500

82 0.76592 + or - 0.00065 0.76527 to 0.76657
0.76462 to 0.76721 0.76398 to 0.76786 820000 19.1277

87 0.76593 + or - 0.00090 0.76503 to 0.76682
0.76413 to 0.76772 0.76323 to 0.76862 720000 12.6888

92 0.76577 + or - 0.00076 0.76501 to 0.76652
0.76426 to 0.76728 0.76350 to 0.76804 620000 23.6667

97 0.76568 + or - 0.00087 0.76481 to 0.76655
0.76394 to 0.76741 0.76307 to 0.76828 520000 25.4637

102 0.76557 + or - 0.00106 0.76452 to 0.76663
0.76346 to 0.76769 0.76241 to 0.76874 420000 26.1999

107 0.76544 + or - 0.00234 0.76310 to 0.76778
0.76077 to 0.77012 0.75843 to 0.77245 320000 9.0031

112 0.76713 + or - 0.00177 0.76536 to 0.76890
0.76360 to 0.77066 0.76183 to 0.77243 220000 36.7451
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)

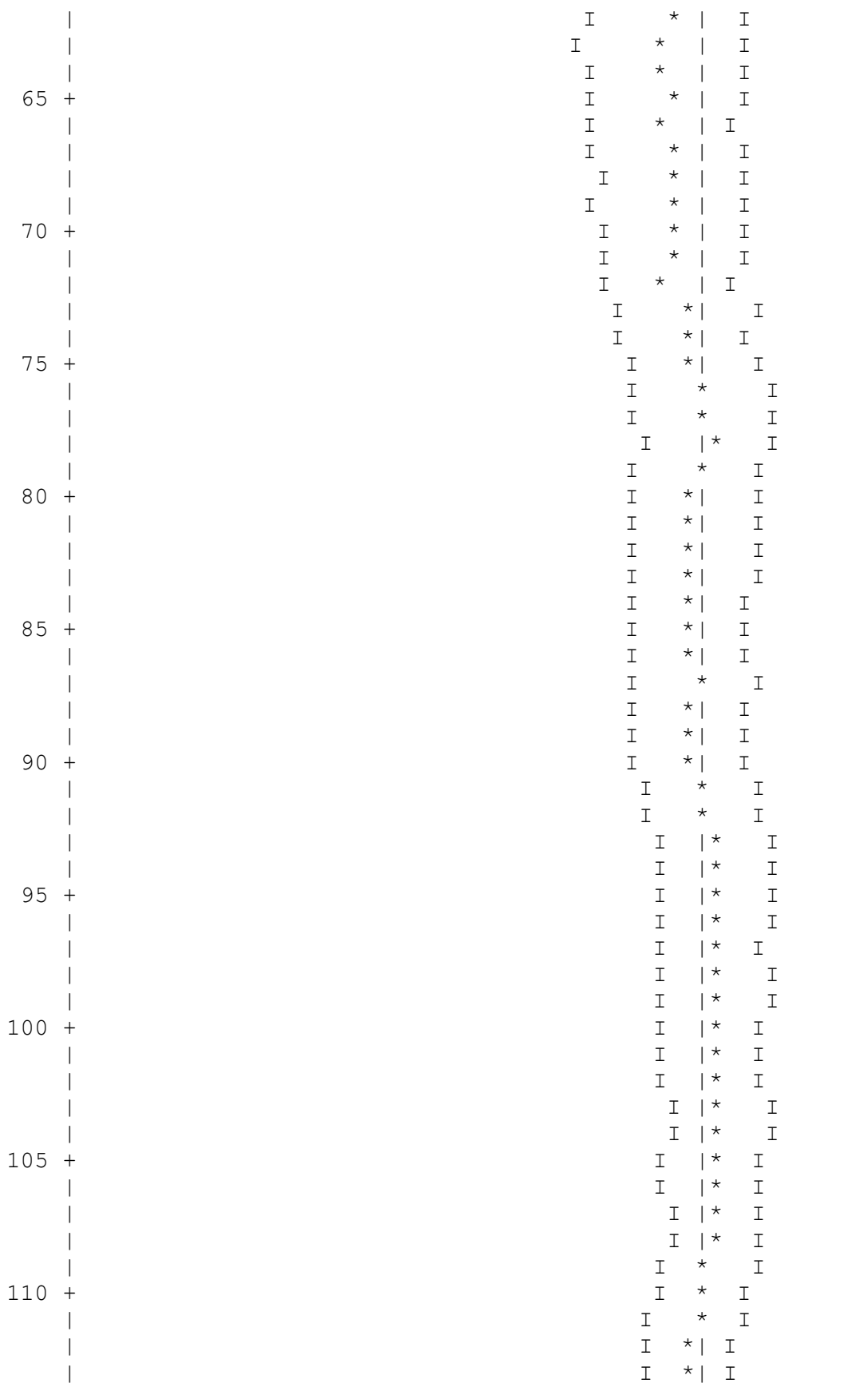
117 0.76871 + or - 0.01068 0.75803 to 0.77939
0.74734 to 0.79008 0.73666 to 0.80076 120000 2.6716
1 fuel bundle

plot of average k-effective by generation run.

the line represents k-eff = 0.76561 + or - 0.00039 which occurs for 116 generations run.

```
                                0.7632                    0.7663
0.7694

|-------------------------|------------------------|------------------
------|------------------------
         |
      25 +                          *                  |
I
         |                             *               |
I
         |       I                                 *   |
I
         |                          *                  |           I
         |      I                        *             |             I
      30 +                 I                      *     |                I
         |                        I                    *
I
         |                 I                   *         |           I
         |                      I                 *    |             I
         |                         I                *   |            I
      35 +                         I              *     |        I
         |                         I              *     |      I
         |                           I            *     |     I
         |                               I            * |          I
         |                                I           * |         I
      40 +                                  I          *|          I
         |                                    I         |*          I
         |                                   I          *         I
         |                                    I         *         I
         |                                    I        *|        I
      45 +                                     I        |*        I
         |                                      I       |*        I
         |                                    I        *|      I
         |                                   I       *  |    I
         |                                  I       *   |   I
      50 +                                 I       *    |  I
         |                                I       *     |I
         |                                  I       *   |  I
         |                                   I       *  |   I
         |                                     I     * |    I
      55 +                                     I       *|    I
         |                                     I     * |    I
         |                                   I       *  |  I
         |                                   I       *  |  I
         |                                     I     * |   I
      60 +                                     I     * |   I
         |                                     I     * |   I
```


65
70
75
80
85
90
95
100
105
110

```
         |                                          I  *|  I
     115 +                                          I  *|  I
         |                                           I  *  I
         |                                          I  *| I
         |                                          I   *  I
         |                                           I  *  I
     120 +                                          I  *|  I
         |                                          I   *  I
         |                                           I  *   I
         |                                           I  |*  I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7658 + or - 0.0003 which occurs for 32 generations skipped.

```
                                 0.7654                    0.7679
0.7703

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                        I   * |  I
         |                        I   * | I
      25 +                         I   *|  I
         |                         I   *|  I
         |                        I    *|  I
         |                          I   *   I
         |                         I   *|   I
      30 +                         I   *|  I
         |                        I   * |  I
         |                          I   *   I
         |                         I   *|  I
         |                         I   *|  I
      35 +                         I   *|   I
         |                         I    *   I
         |                         I    *   I
         |                         I   *|  I
         |                         I   *|  I
      40 +                        I    *|  I
         |                        I   * |  I
         |                        I    *|  I
         |                        I    *|  I
         |                        I    *|  I
      45 +                        I   * |  I
         |                       I    * |  I
         |                        I    *|   I
         |                         I    *   I
         |                          I   *    I
      50 +                          I   |*   I
         |                           I  | *   I
         |                          I   |*   I
```

```
    |                        I    *    I
    |                        I    *   I
 55 +                        I    *   I
    |                        I    *   I
    |                         I   |*    I
    |                         I   |*    I
    |                       I     *     I
 60 +                       I     *      I
    |                       I     *      I
    |                        I    |*    I
    |                        I    |*      I
    |                        I    |*      I
 65 +                       I     |*      I
    |                        I    | *      I
    |                       I     |*      I
    |                       I     |*      I
    |                         I   | *    I
 70 +                        I    |*     I
    |                        I    |*     I
    |                       I     | *       I
    |                        I    |*    I
    |                        I    |*     I
 75 +                       I     *     I
    |                       I    *|    I
    |                     I     *|    I
    |                   I     * |   I
    |                       I     *     I
 80 +                       I     |*     I
    |                       I     |*     I
    |                       I     |*     I
    |                       I     *      I
    |                     I      | *        I
 85 +                     I      | *        I
    |                   I        | *        I
    |                  I         |*        I
    |                   I        | *         I
    |                   I        | *         I
 90 +                  I         |*          I
    |                I           *         I
    |                 I        *|      I
    |                I        * |     I
    |               I        *  |    I
 95 +               I        *  |    I
    |              I        *   |    I
    |               I         * |      I
    |              I         *  |     I
    |             I          *  |     I
100 +              I         *  |      I
    |              I          * |        I
    |            I           *  |       I
    |          I            *   |      I
    |          I            *   |      I
```

```
     105 +            I            *   |        I
         |             I            *  |          I
         | I                       *   |                  I
         |                         *   |                     I
         |            I               *|              I
     110 +                 I           |   *               I
         |                   I         |      *                 I
         |                        I    |            *
I
         |                       I     |             *
I
         |                  I          |          *
I
     115 +                   I         |              *
I
         |           I                 |           *
I
         |                             |                            *
         |       I                     |               *
I
         |                             |              *
     120 +                             |               I
*                       I

   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                 4.64690E-07    70.3526
5.34793E-07    29.4663       0.00000E+00     0.0000
    3    0.0000                 1.15354E-05    12.2612
2.04741E-05     4.5105       0.00000E+00     0.0000
    4    0.0000                 2.26783E-05     7.2272
3.62504E-05     3.8729       0.00000E+00     0.0000
    5    0.0000                 2.83695E-05     7.5877
5.43908E-05     2.8187       0.00000E+00     0.0000
    6    0.0001                 1.00562E-04     3.1856
2.32253E-04     1.5015       0.00000E+00     0.0000
    7    0.0002                 1.21313E-04     3.4268
2.12936E-04     1.5086       0.00000E+00     0.0000
    8    0.0003                 2.44511E-04     2.1551
3.28396E-04     1.0056       0.00000E+00     0.0000
    9    0.0005                 3.89596E-04     1.3287
4.46553E-04     0.6733       0.00000E+00     0.0000
```

10	0.0003	2.06535E-04	1.6634	2.09893E-04	0.7568
0.00000E+00	0.0000				
11	0.0012	9.19278E-04	0.6304	5.27777E-04	0.4368
0.00000E+00	0.0000				
12	0.0010	7.65899E-04	0.7912	3.00227E-04	0.7800
0.00000E+00	0.0000				
13	0.0003	2.26482E-04	1.3845	8.99914E-05	1.3689
0.00000E+00	0.0000				
14	0.0013	1.02432E-03	0.6615	4.18583E-04	0.6558
0.00000E+00	0.0000				
15	0.0010	7.71080E-04	0.6943	3.32404E-04	0.6864
0.00000E+00	0.0000				
16	0.0002	1.90005E-04	1.1923	8.73343E-05	1.1736
0.00000E+00	0.0000				
17	0.0001	6.59869E-05	2.1285	3.20972E-05	2.0869
0.00000E+00	0.0000				
18	0.0001	4.97012E-05	2.0982	2.51183E-05	2.0498
0.00000E+00	0.0000				
19	0.0001	8.28540E-05	1.4259	4.37984E-05	1.3944
0.00000E+00	0.0000				
20	0.0001	6.05857E-05	1.3572	3.31819E-05	1.3185
0.00000E+00	0.0000				
21	0.0002	1.21300E-04	1.1196	6.84627E-05	1.0940
0.00000E+00	0.0000				
22	0.0001	1.03629E-04	1.0279	6.13500E-05	1.0018
0.00000E+00	0.0000				
23	0.0001	1.07795E-04	1.1360	6.57655E-05	1.1112
0.00000E+00	0.0000				
24	0.0000	2.47151E-05	2.1291	1.53546E-05	2.0667
0.00000E+00	0.0000				
25	0.0000	3.05749E-05	1.8580	1.91109E-05	1.8077
0.00000E+00	0.0000				
26	0.0000	1.67162E-05	2.5675	1.05191E-05	2.4951
0.00000E+00	0.0000				
27	0.0001	5.34843E-05	1.2447	3.33686E-05	1.2179
0.00000E+00	0.0000				
28	0.0001	9.65279E-05	1.1530	6.02099E-05	1.1362
0.00000E+00	0.0000				
29	0.0001	9.99934E-05	1.1385	6.29686E-05	1.1247
0.00000E+00	0.0000				
30	0.0000	1.21424E-05	3.1782	7.61786E-06	3.1549
0.00000E+00	0.0000				
31	0.0001	9.74065E-05	1.1426	6.15364E-05	1.1300
0.00000E+00	0.0000				
32	0.0001	3.84458E-05	1.6566	2.45694E-05	1.6229
0.00000E+00	0.0000				
33	0.0000	3.16999E-05	1.4367	1.98566E-05	1.4178
0.00000E+00	0.0000				
34	0.0001	7.60260E-05	1.1386	4.77522E-05	1.1216
0.00000E+00	0.0000				
35	0.0001	4.48362E-05	1.4833	2.81453E-05	1.4626
0.00000E+00	0.0000				

```
   36    0.0001                 4.30781E-05     1.4030
2.66661E-05     1.3899       0.00000E+00     0.0000
   37    0.0000                 2.92458E-05     1.6499
1.83407E-05     1.6139       0.00000E+00     0.0000
   38    0.0000                 3.30530E-05     1.7031
2.08281E-05     1.6671       0.00000E+00     0.0000
   39    0.0002                 1.29445E-04     1.0580
8.23843E-05     1.0346       0.00000E+00     0.0000
   40    0.0002                 1.20292E-04     0.8435
7.77635E-05     0.8268       0.00000E+00     0.0000
   41    0.0002                 1.59392E-04     0.8349
1.06540E-04     0.8110       0.00000E+00     0.0000
   42    0.0002                 1.40709E-04     0.7552
9.56642E-05     0.7362       0.00000E+00     0.0000
   43    0.0001                 7.78778E-05     1.1102
5.60027E-05     1.0611       0.00000E+00     0.0000
   44    0.0001                 1.14321E-04     1.0473
8.39304E-05     1.0023       0.00000E+00     0.0000
   45    0.0001                 6.00699E-05     0.8681
4.84153E-05     0.7913       0.00000E+00     0.0000
   46    0.0000                 1.45298E-05     2.1194
1.16660E-05     1.9664       0.00000E+00     0.0000
   47    0.0001                 4.01826E-05     1.6348
3.12459E-05     1.5708       0.00000E+00     0.0000
   48    0.0000                 1.13529E-05     4.0108
8.82450E-06     3.8894       0.00000E+00     0.0000
   49    0.0001                 8.07957E-05     1.6995
6.36919E-05     1.6630       0.00000E+00     0.0000
   50    0.0001                 5.62030E-05     1.7261
4.62869E-05     1.6905       0.00000E+00     0.0000
   51    0.0000                 1.45578E-05     3.4025
1.21087E-05     3.3299       0.00000E+00     0.0000
   52    0.0001                 4.05271E-05     1.8087
3.50569E-05     1.7626       0.00000E+00     0.0000
   53    0.0002                 1.58432E-04     0.8180
1.55641E-04     0.7618       0.00000E+00     0.0000
   54    0.0001                 7.62407E-05     1.8906
7.07928E-05     1.8292       0.00000E+00     0.0000
   55    0.0002                 1.64724E-04     1.2719
1.50981E-04     1.2378       0.00000E+00     0.0000
   56    0.0002                 1.17946E-04     1.6931
1.09404E-04     1.6529       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                 1.53302E-04     1.5584
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1.39044E-04	1.5222	0.00000E+00	0.0000	58	0.0001	8.25378E-05	1.9820
7.23176E-05	1.9307	0.00000E+00	0.0000	59	0.0002	1.57808E-04	1.5145
1.41780E-04	1.4564	0.00000E+00	0.0000	60	0.0004	2.72525E-04	1.2893
2.47168E-04	1.2134	0.00000E+00	0.0000	61	0.0000	2.95358E-05	3.8496
2.26914E-05	3.7287	0.00000E+00	0.0000	62	0.0002	1.63393E-04	1.8062
1.37039E-04	1.7576	0.00000E+00	0.0000	63	0.0002	1.20706E-04	1.8475
9.94176E-05	1.7889	0.00000E+00	0.0000	64	0.0001	1.02590E-04	2.1089
8.26440E-05	2.0443	0.00000E+00	0.0000	65	0.0000	3.65988E-05	3.8893
3.61410E-05	3.7557	0.00000E+00	0.0000	66	0.0002	1.74199E-04	1.7677
1.54504E-04	1.7134	0.00000E+00	0.0000	67	0.0002	1.43244E-04	2.2603
1.17257E-04	2.1881	0.00000E+00	0.0000	68	0.0000	2.75553E-05	4.6777
2.38025E-05	4.5160	0.00000E+00	0.0000	69	0.0004	2.94492E-04	1.5255
2.31308E-04	1.4758	0.00000E+00	0.0000	70	0.0003	2.10149E-04	1.8318
1.91194E-04	1.7620	0.00000E+00	0.0000	71	0.0006	4.28809E-04	1.4294
3.54984E-04	1.3844	0.00000E+00	0.0000	72	0.0001	4.96890E-05	4.5956
2.93419E-05	4.4883	0.00000E+00	0.0000	73	0.0004	3.16826E-04	1.8961
2.41835E-04	1.7907	0.00000E+00	0.0000	74	0.0014	1.06218E-03	1.0443
7.72347E-04	1.0018	0.00000E+00	0.0000	75	0.0001	1.12025E-04	3.1248
8.60453E-05	2.9827	0.00000E+00	0.0000	76	0.0006	4.79024E-04	1.9582
3.03878E-04	1.8911	0.00000E+00	0.0000	77	0.0005	3.76522E-04	1.8223
2.69818E-04	1.7587	0.00000E+00	0.0000	78	0.0000	7.50362E-06	4.3283
7.33853E-05	4.2848	0.00000E+00	0.0000	79	0.0002	1.89092E-04	2.5869
1.27124E-04	2.4874	0.00000E+00	0.0000	80	0.0001	6.19910E-05	3.5988
8.26876E-05	3.4960	0.00000E+00	0.0000	81	0.0014	1.05685E-03	1.2587
7.77413E-04	1.2068	0.00000E+00	0.0000	82	0.0001	7.09456E-05	4.2492
4.24442E-05	4.0355	0.00000E+00	0.0000	83	0.0002	1.36173E-04	3.1559

1.50471E-04	3.0958	0.00000E+00	0.0000	84	0.0001	7.96011E-05	3.3813
8.08266E-05	3.1332	0.00000E+00	0.0000	85	0.0003	1.91939E-04	2.2617
2.36558E-04	2.1963	0.00000E+00	0.0000	86	0.0003	2.65729E-04	2.2379
2.13907E-04	2.1337	0.00000E+00	0.0000	87	0.0004	3.35874E-04	2.5661
2.08894E-04	2.4531	0.00000E+00	0.0000	88	0.0001	5.34546E-05	4.4855
9.71324E-05	4.3681	0.00000E+00	0.0000	89	0.0001	9.41421E-05	3.5624
6.53604E-05	3.2808	0.00000E+00	0.0000	90	0.0003	2.22652E-04	2.9365
1.31534E-04	2.8063	0.00000E+00	0.0000	91	0.0002	1.90207E-04	2.6330
1.20174E-04	2.4801	0.00000E+00	0.0000	92	0.0000	2.92134E-05	3.0422
1.91450E-04	2.9733	0.00000E+00	0.0000	93	0.0002	1.34681E-04	2.9711
1.09248E-04	2.7813	0.00000E+00	0.0000	94	0.0002	1.16656E-04	3.9736
6.54087E-05	3.7377	0.00000E+00	0.0000	95	0.0008	6.15367E-04	2.0874
3.79441E-04	2.0220	0.00000E+00	0.0000	96	0.0002	1.61568E-04	4.0694
8.17824E-05	3.9019	0.00000E+00	0.0000	97	0.0004	2.80981E-04	3.7858
1.60943E-04	3.7041	0.00000E+00	0.0000	98	0.0001	1.01594E-04	3.8615
9.74409E-05	3.7229	0.00000E+00	0.0000	99	0.0001	1.06423E-04	4.6519
7.12273E-05	4.4912	0.00000E+00	0.0000	100	0.0002	1.22444E-04	3.9423
8.20761E-05	3.7745	0.00000E+00	0.0000	101	0.0001	1.09395E-04	4.1649
6.96368E-05	3.8636	0.00000E+00	0.0000	102	0.0002	1.63532E-04	3.9138
9.10561E-05	3.7585	0.00000E+00	0.0000	103	0.0001	9.63146E-05	3.9825
9.40752E-05	3.7644	0.00000E+00	0.0000	104	0.0002	1.68049E-04	3.5272
1.33223E-04	3.4029	0.00000E+00	0.0000	105	0.0002	1.23556E-04	3.3570
8.17475E-05	3.1509	0.00000E+00	0.0000	106	0.0002	1.85610E-04	4.1028
1.37868E-04	4.0545	0.00000E+00	0.0000	107	0.0001	6.68105E-05	4.0117
6.73524E-05	3.7656	0.00000E+00	0.0000	108	0.0000	3.57990E-05	2.3227
1.54506E-04	2.2656	0.00000E+00	0.0000	109	0.0002	1.31521E-04	1.9767

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4.36398E-04     1.9502       0.00000E+00     0.0000
  110    0.0008                 6.13401E-04     2.7395
3.78469E-04     2.7095       0.00000E+00     0.0000
  111    0.0002                 1.46665E-04     4.7903
1.35009E-04     4.6551       0.00000E+00     0.0000
  112    0.0002                 1.29027E-04     4.1849
1.35820E-04     4.1195       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                 1.22528E-04     3.9082
1.07328E-04     3.6548       0.00000E+00     0.0000
  114    0.0000                 1.01981E-05     6.6980
1.40741E-05     5.4886       0.00000E+00     0.0000
  115    0.0001                 6.96810E-05     4.5999
8.12392E-05     4.2373       0.00000E+00     0.0000
  116    0.0002                 1.90614E-04     2.8852
1.43572E-04     2.5959       0.00000E+00     0.0000
  117    0.0006                 4.58543E-04     2.3811
2.45841E-04     2.2226       0.00000E+00     0.0000
  118    0.0008                 5.84588E-04     2.0579
4.56605E-04     1.9719       0.00000E+00     0.0000
  119    0.0002                 1.35879E-04     1.8369
3.51188E-04     1.7669       0.00000E+00     0.0000
  120    0.0002                 1.65134E-04     2.2875
6.28526E-04     2.2547       0.00000E+00     0.0000
  121    0.0007                 5.53752E-04     2.6272
4.25400E-04     2.5648       0.00000E+00     0.0000
  122    0.0001                 9.88024E-05     5.0638
7.74554E-05     4.7026       0.00000E+00     0.0000
  123    0.0003                 2.25227E-04     2.7525
1.58909E-04     2.4408       0.00000E+00     0.0000
  124    0.0003                 2.18998E-04     2.9905
1.81461E-04     2.7783       0.00000E+00     0.0000
  125    0.0002                 1.29407E-04     3.3321
1.20057E-04     2.9672       0.00000E+00     0.0000
  126    0.0001                 1.03836E-04     3.7238
9.26728E-05     3.2862       0.00000E+00     0.0000
  127    0.0005                 4.07181E-04     3.2104
1.99537E-04     3.0450       0.00000E+00     0.0000
  128    0.0003                 2.24213E-04     2.8558
1.38029E-04     2.5430       0.00000E+00     0.0000
  129    0.0006                 4.34004E-04     2.3045
4.00630E-04     2.1909       0.00000E+00     0.0000
  130    0.0002                 1.18662E-04     2.7351
2.89313E-04     2.6550       0.00000E+00     0.0000
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131	0.0004	2.83347E-04	2.0329	2.28920E-04	1.7187
132	0.0007	5.46764E-04	1.9410	3.34834E-04	1.7940
133	0.0014	1.04333E-03	1.7255	6.59120E-04	1.6385
134	0.0001	9.25073E-05	1.9273	2.40326E-04	1.6289
135	0.0002	1.75044E-04	3.3938	2.59668E-04	3.3067
136	0.0001	4.46389E-05	2.0840	6.92922E-04	2.0537
137	0.0000	1.93587E-05	1.0056	3.48342E-03	1.0028
138	0.0004	3.11807E-04	1.8517	8.12392E-04	1.8235
139	0.0002	1.84670E-04	3.2541	2.26444E-04	3.0583
140	0.0003	2.05758E-04	2.4677	2.74846E-04	2.1317
141	0.0001	7.88844E-05	2.5301	2.49065E-04	2.2542
142	0.0001	6.71286E-05	3.2200	2.31655E-04	2.9587
143	0.0001	8.10057E-05	2.3872	1.73719E-04	1.4903
144	0.0000	3.35124E-05	4.0647	7.33957E-05	2.4951
145	0.0005	3.93183E-04	2.7863	3.07621E-04	2.5383
146	0.0004	3.37080E-04	2.4821	2.47853E-04	1.9830
147	0.0002	1.70108E-04	4.0209	1.09679E-04	3.4597
148	0.0001	5.73941E-05	6.4156	3.83861E-05	5.1603
149	0.0000	3.29404E-05	7.9364	2.23995E-05	6.2050
150	0.0001	8.68487E-05	4.4885	6.33635E-05	3.3335
151	0.0001	6.70793E-05	4.6188	5.66553E-05	3.2087
152	0.0001	4.19357E-05	4.3824	4.72695E-05	2.6089
153	0.0001	4.24874E-05	4.2242	4.75305E-05	2.4803
154	0.0001	4.97392E-05	4.3065	5.08824E-05	2.6019
155	0.0001	4.82946E-05	4.0152	4.87028E-05	2.5130
156	0.0001	4.97564E-05	4.8834	4.80014E-05	2.9898
		0.00000E+00	0.0000		

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  157    0.0001                 6.01805E-05     4.7672
5.81692E-05     3.0342       0.00000E+00     0.0000
  158    0.0001                 6.43215E-05     4.3647
6.61061E-05     2.8210       0.00000E+00     0.0000
  159    0.0002                 1.54946E-04     3.0223
2.14301E-04     2.5427       0.00000E+00     0.0000
  160    0.0001                 6.05501E-05     4.9926
7.23478E-05     3.7366       0.00000E+00     0.0000
  161    0.0001                 7.69340E-05     3.9524
7.50396E-05     2.5841       0.00000E+00     0.0000
  162    0.0001                 7.91554E-05     4.2604
7.71699E-05     2.5995       0.00000E+00     0.0000
  163    0.0001                 9.97071E-05     3.4089
8.99239E-05     2.1716       0.00000E+00     0.0000
  164    0.0001                 1.01235E-04     3.4494
9.35665E-05     2.1268       0.00000E+00     0.0000
  165    0.0002                 1.15852E-04     3.0926
1.05256E-04     1.9536       0.00000E+00     0.0000
  166    0.0001                 6.50330E-05     4.4729
6.12025E-05     2.7542       0.00000E+00     0.0000
  167    0.0001                 7.51788E-05     4.3877
6.86967E-05     2.7868       0.00000E+00     0.0000
  168    0.0001                 8.35628E-05     4.7557
7.57550E-05     3.1735       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                 1.10597E-04     3.7393
9.56334E-05     2.6558       0.00000E+00     0.0000
  170    0.0002                 1.40446E-04     3.9602
1.18305E-04     3.0069       0.00000E+00     0.0000
  171    0.0001                 1.03650E-04     4.8974
7.91224E-05     3.9540       0.00000E+00     0.0000
  172    0.0002                 1.38631E-04     4.1380
9.83813E-05     3.4875       0.00000E+00     0.0000
  173    0.0003                 1.99595E-04     4.1371
1.30832E-04     3.6375       0.00000E+00     0.0000
  174    0.0004                 2.68821E-04     3.7518
1.65732E-04     3.3917       0.00000E+00     0.0000
  175    0.0001                 1.08122E-04     5.5183
6.55978E-05     4.9561       0.00000E+00     0.0000
  176    0.0001                 1.14589E-04     6.7154
6.83578E-05     6.0360       0.00000E+00     0.0000
  177    0.0001                 1.11753E-04     6.0478
6.61051E-05     5.4123       0.00000E+00     0.0000
  178    0.0002                 1.25997E-04     6.3114
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7.33430E-05	5.7124	0.00000E+00	0.0000	179	0.0002	1.23985E-04	7.0634
7.16505E-05	6.3714	0.00000E+00	0.0000	180	0.0001	1.10016E-04	5.7226
6.39062E-05	5.1004	0.00000E+00	0.0000	181	0.0001	1.11042E-04	5.4891
6.42640E-05	4.8634	0.00000E+00	0.0000	182	0.0001	1.05612E-04	6.5612
6.12995E-05	5.7304	0.00000E+00	0.0000	183	0.0001	1.04420E-04	6.5431
6.04916E-05	5.7071	0.00000E+00	0.0000	184	0.0001	9.63140E-05	6.2108
5.60130E-05	5.3825	0.00000E+00	0.0000	185	0.0001	9.83999E-05	5.7114
5.70075E-05	4.9288	0.00000E+00	0.0000	186	0.0001	9.32987E-05	6.5108
5.44358E-05	5.5401	0.00000E+00	0.0000	187	0.0001	9.36645E-05	6.2183
5.44440E-05	5.3332	0.00000E+00	0.0000	188	0.0001	8.36177E-05	5.9941
4.94005E-05	5.0384	0.00000E+00	0.0000	189	0.0001	8.58339E-05	6.5816
5.06264E-05	5.5204	0.00000E+00	0.0000	190	0.0003	2.08391E-04	4.0420
1.24375E-04	3.3439	0.00000E+00	0.0000	191	0.0003	1.96756E-04	4.0033
1.18509E-04	3.2682	0.00000E+00	0.0000	192	0.0002	1.86000E-04	4.6206
1.14086E-04	3.6662	0.00000E+00	0.0000	193	0.0003	1.96428E-04	3.8677
1.20122E-04	3.0916	0.00000E+00	0.0000	194	0.0005	4.13417E-04	2.8061
2.53313E-04	2.2285	0.00000E+00	0.0000	195	0.0006	4.34538E-04	2.4814
2.69068E-04	1.9326	0.00000E+00	0.0000	196	0.0006	4.63933E-04	3.0286
2.88036E-04	2.3708	0.00000E+00	0.0000	197	0.0007	5.46099E-04	2.6035
3.35382E-04	2.0607	0.00000E+00	0.0000	198	0.0007	5.70249E-04	2.6238
3.54522E-04	2.0464	0.00000E+00	0.0000	199	0.0004	3.14611E-04	3.2239
1.95949E-04	2.4898	0.00000E+00	0.0000	200	0.0005	3.45888E-04	3.0721
2.14590E-04	2.3965	0.00000E+00	0.0000	201	0.0010	7.83147E-04	2.0636
4.79907E-04	1.6267	0.00000E+00	0.0000	202	0.0013	9.92054E-04	1.8841
5.99909E-04	1.5069	0.00000E+00	0.0000	203	0.0016	1.19834E-03	1.8209
7.19271E-04	1.4834	0.00000E+00	0.0000	204	0.0021	1.64319E-03	1.7854

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9.69529E-04     1.4838       0.00000E+00     0.0000
  205    0.0015                 1.14019E-03     1.9342
6.67630E-04     1.6291       0.00000E+00     0.0000
  206    0.0018                 1.41286E-03     1.5551
8.21651E-04     1.3336       0.00000E+00     0.0000
  207    0.0021                 1.62578E-03     1.6696
9.47290E-04     1.4650       0.00000E+00     0.0000
  208    0.0029                 2.21366E-03     1.4983
1.28742E-03     1.3260       0.00000E+00     0.0000
  209    0.0031                 2.33887E-03     1.5311
1.37809E-03     1.3448       0.00000E+00     0.0000
  210    0.0037                 2.85215E-03     1.3100
1.69901E-03     1.1423       0.00000E+00     0.0000
  211    0.0041                 3.14020E-03     1.1855
1.89308E-03     1.0229       0.00000E+00     0.0000
  212    0.0047                 3.59731E-03     1.0856
2.18107E-03     0.9388       0.00000E+00     0.0000
  213    0.0065                 4.93957E-03     0.9848
2.99192E-03     0.8198       0.00000E+00     0.0000
  214    0.0095                 7.28704E-03     0.7554
4.39502E-03     0.6395       0.00000E+00     0.0000
  215    0.0157                 1.20114E-02     0.5887
7.16750E-03     0.4933       0.00000E+00     0.0000
  216    0.0299                 2.29178E-02     0.4795
1.35271E-02     0.4005       0.00000E+00     0.0000
  217    0.0201                 1.53661E-02     0.6026
9.03614E-03     0.5046       0.00000E+00     0.0000
  218    0.0276                 2.11054E-02     0.4653
1.23648E-02     0.3918       0.00000E+00     0.0000
  219    0.0357                 2.73157E-02     0.4005
1.59359E-02     0.3381       0.00000E+00     0.0000
  220    0.0471                 3.60708E-02     0.3966
2.09958E-02     0.3372       0.00000E+00     0.0000
  221    0.0622                 4.76564E-02     0.2936
2.76665E-02     0.2554       0.00000E+00     0.0000
  222    0.0801                 6.13603E-02     0.2897
3.55635E-02     0.2455       0.00000E+00     0.0000
  223    0.1042                 7.98117E-02     0.2398
4.63087E-02     0.2092       0.00000E+00     0.0000
  224    0.0582                 4.45922E-02     0.3320
2.59891E-02     0.2780       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    0.2310                 1.76859E-01     0.1482
1.04745E-01     0.1243       0.00000E+00     0.0000
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  226    0.0453                 3.46887E-02     0.3190
2.11461E-02     0.2612       0.00000E+00     0.0000
  227    0.0494                 3.78499E-02     0.3750
2.34712E-02     0.3040       0.00000E+00     0.0000
  228    0.0211                 1.61507E-02     0.5383
1.02140E-02     0.4385       0.00000E+00     0.0000
  229    0.0223                 1.70422E-02     0.5607
1.09511E-02     0.4497       0.00000E+00     0.0000
  230    0.0119                 9.07615E-03     0.8455
5.91751E-03     0.6512       0.00000E+00     0.0000
  231    0.0123                 9.41877E-03     0.7573
6.25882E-03     0.5739       0.00000E+00     0.0000
  232    0.0130                 9.95979E-03     0.7635
6.77916E-03     0.5679       0.00000E+00     0.0000
  233    0.0085                 6.49864E-03     0.8752
4.53612E-03     0.6370       0.00000E+00     0.0000
  234    0.0058                 4.47104E-03     1.0831
3.24133E-03     0.7528       0.00000E+00     0.0000
  235    0.0025                 1.90227E-03     1.7089
1.24978E-03     1.3022       0.00000E+00     0.0000
  236    0.0019                 1.46561E-03     2.0310
9.86554E-04     1.4713       0.00000E+00     0.0000
  237    0.0017                 1.33014E-03     2.3047
9.43626E-04     1.7049       0.00000E+00     0.0000
  238    0.0001                 8.09908E-05     7.1884
6.61830E-05     4.6596       0.00000E+00     0.0000

 system total =                 7.65712E-01     0.0524
4.68932E-01     0.0422       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3116E-01  +
or -  0.0002



 elapsed time   3.10683 minutes

 random number=   2C8FCA10A50A92D6
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                          unit  region   density
deviation      fissions
```

```
                                                  1      1    3.088E-03
0.05         7.657E-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	2.892E-08	25.83	1.894E-08	25.96	2.187E-08	25.60
3	9.031E-07	3.47	7.582E-07	3.35	8.062E-07	3.45
4	1.528E-06	3.06	1.239E-06	2.90	1.338E-06	2.92
5	2.386E-06	2.23	1.973E-06	2.09	2.104E-06	2.08
6	9.351E-06	1.30	7.476E-06	1.14	7.982E-06	1.15
7	1.233E-05	1.16	9.403E-06	0.98	9.927E-06	0.96
8	3.123E-05	0.70	2.298E-05	0.63	2.415E-05	0.63
9	8.278E-05	0.50	5.912E-05	0.45	6.173E-05	0.47
10	4.628E-05	0.67	3.281E-05	0.60	3.408E-05	0.58
11	2.198E-04	0.23	1.556E-04	0.22	1.613E-04	0.22
12	1.902E-04	0.30	1.378E-04	0.25	1.444E-04	0.25
13	5.659E-05	0.53	4.133E-05	0.41	4.330E-05	0.40
14	2.537E-04	0.27	1.834E-04	0.22	1.915E-04	0.23
15	2.207E-04	0.24	1.602E-04	0.20	1.671E-04	0.21
16	7.151E-05	0.42	5.186E-05	0.36	5.422E-05	0.36
17	3.222E-05	0.73	2.353E-05	0.57	2.447E-05	0.55
18	2.790E-05	0.69	2.034E-05	0.60	2.108E-05	0.61
19	5.081E-05	0.53	3.697E-05	0.44	3.844E-05	0.42
20	3.959E-05	0.57	2.902E-05	0.49	3.029E-05	0.49
21	7.996E-05	0.43	5.853E-05	0.33	6.106E-05	0.34
22	7.258E-05	0.43	5.323E-05	0.34	5.519E-05	0.34
23	7.695E-05	0.42	5.627E-05	0.36	5.833E-05	0.34
24	1.836E-05	0.83	1.361E-05	0.69	1.415E-05	0.68
25	2.349E-05	0.84	1.749E-05	0.69	1.837E-05	0.63
26	1.347E-05	0.96	9.925E-06	0.81	1.044E-05	0.86
27	4.184E-05	0.54	3.105E-05	0.46	3.288E-05	0.46
28	7.706E-05	0.39	5.724E-05	0.34	6.065E-05	0.35
29	7.933E-05	0.41	5.944E-05	0.37	6.238E-05	0.34
30	9.847E-06	1.17	7.409E-06	0.86	7.793E-06	0.87
31	7.856E-05	0.35	5.910E-05	0.28	6.224E-05	0.31
32	3.109E-05	0.62	2.346E-05	0.56	2.473E-05	0.52
33	2.632E-05	0.61	1.997E-05	0.54	2.112E-05	0.54
34	6.110E-05	0.40	4.612E-05	0.32	4.858E-05	0.30

35	3.635E-05	0.53	2.754E-05	0.48	2.900E-05	0.39
36	3.426E-05	0.55	2.578E-05	0.45	2.695E-05	0.41
37	2.215E-05	0.78	1.673E-05	0.55	1.749E-05	0.52
38	2.609E-05	0.68	1.982E-05	0.53	2.073E-05	0.55
39	9.770E-05	0.34	7.495E-05	0.30	7.915E-05	0.28
40	9.015E-05	0.36	6.953E-05	0.34	7.437E-05	0.32
41	1.134E-04	0.32	8.866E-05	0.25	9.464E-05	0.26
42	9.343E-05	0.31	7.369E-05	0.30	7.917E-05	0.28
43	5.122E-05	0.37	4.075E-05	0.33	4.282E-05	0.31
44	6.974E-05	0.36	5.587E-05	0.31	6.009E-05	0.26
45	3.521E-05	0.40	2.798E-05	0.38	3.107E-05	0.33
46	8.337E-06	0.85	6.589E-06	0.77	7.158E-06	0.65
47	2.351E-05	0.57	1.872E-05	0.46	1.942E-05	0.40
48	6.772E-06	1.06	5.393E-06	0.81	5.664E-06	0.74
49	4.363E-05	0.41	3.496E-05	0.37	3.761E-05	0.31
50	2.951E-05	0.51	2.377E-05	0.46	2.586E-05	0.37
51	7.823E-06	0.99	6.259E-06	0.88	6.806E-06	0.70
52	2.076E-05	0.50	1.673E-05	0.36	1.818E-05	0.37
53	7.648E-05	0.30	6.175E-05	0.27	6.693E-05	0.23
54	3.351E-05	0.44	2.713E-05	0.40	2.929E-05	0.31
55	6.659E-05	0.33	5.419E-05	0.29	5.899E-05	0.24
56	4.334E-05	0.38	3.534E-05	0.35	3.850E-05	0.26
57	4.916E-05	0.35	4.011E-05	0.30	4.379E-05	0.29
58	2.592E-05	0.49	2.116E-05	0.41	2.307E-05	0.38
59	4.412E-05	0.37	3.614E-05	0.35	3.941E-05	0.29
60	6.437E-05	0.34	5.263E-05	0.33	5.728E-05	0.26
61	6.222E-06	0.87	5.089E-06	0.78	5.535E-06	0.69
62	3.237E-05	0.37	2.654E-05	0.37	2.890E-05	0.33
63	2.153E-05	0.44	1.782E-05	0.41	1.937E-05	0.34
64	1.710E-05	0.55	1.410E-05	0.51	1.531E-05	0.38
65	5.757E-06	0.99	4.763E-06	0.94	5.139E-06	0.76
66	2.853E-05	0.45	2.347E-05	0.37	2.549E-05	0.33
67	2.104E-05	0.54	1.732E-05	0.44	1.889E-05	0.38
68	4.612E-06	1.19	3.764E-06	1.00	4.119E-06	0.79
69	3.726E-05	0.36	3.078E-05	0.33	3.348E-05	0.26
70	2.675E-05	0.48	2.203E-05	0.43	2.385E-05	0.35
71	4.588E-05	0.34	3.780E-05	0.31	4.108E-05	0.24
72	2.635E-06	1.39	2.170E-06	1.37	2.369E-06	1.10
73	2.703E-05	0.49	2.233E-05	0.44	2.423E-05	0.37
74	7.984E-05	0.27	6.617E-05	0.23	7.156E-05	0.22
75	9.138E-06	0.81	7.553E-06	0.72	8.176E-06	0.62
76	2.299E-05	0.49	1.899E-05	0.43	2.061E-05	0.36
77	1.763E-05	0.59	1.465E-05	0.52	1.595E-05	0.38
78	1.538E-06	1.66	1.289E-06	1.57	1.414E-06	1.35
79	9.929E-06	0.65	8.290E-06	0.58	8.930E-06	0.50
80	4.521E-06	1.07	3.779E-06	0.95	4.089E-06	0.78
81	5.529E-05	0.35	4.593E-05	0.31	4.992E-05	0.25
82	3.138E-06	1.19	2.621E-06	1.08	2.874E-06	0.87
83	4.451E-06	1.16	3.708E-06	1.00	3.975E-06	0.74
84	8.315E-06	0.90	6.895E-06	0.73	7.478E-06	0.60
85	1.004E-05	0.81	8.316E-06	0.78	8.993E-06	0.55
86	1.345E-05	0.66	1.133E-05	0.55	1.232E-05	0.42

87	1.195E-05	0.68	9.997E-06	0.61	1.081E-05	0.52
88	3.141E-06	1.26	2.614E-06	1.15	2.857E-06	0.99
89	6.740E-06	1.00	5.565E-06	0.84	6.001E-06	0.67
90	6.973E-06	0.83	5.797E-06	0.70	6.247E-06	0.56
91	8.150E-06	0.75	6.833E-06	0.64	7.399E-06	0.55
92	4.857E-06	1.01	4.079E-06	0.91	4.400E-06	0.74
93	8.099E-06	0.72	6.754E-06	0.64	7.326E-06	0.51
94	4.240E-06	0.99	3.554E-06	0.98	3.825E-06	0.72
95	1.256E-05	0.64	1.052E-05	0.55	1.142E-05	0.44
96	3.354E-06	1.30	2.779E-06	1.10	3.031E-06	0.89
97	3.446E-06	0.98	2.878E-06	1.00	3.110E-06	0.84
98	3.531E-06	1.09	2.986E-06	0.99	3.209E-06	0.76
99	2.242E-06	1.53	1.926E-06	1.26	2.071E-06	1.16
100	3.488E-06	1.12	2.912E-06	1.05	3.169E-06	0.90
101	4.937E-06	0.88	4.100E-06	0.83	4.450E-06	0.68
102	3.336E-06	1.17	2.816E-06	1.05	3.046E-06	0.92
103	4.661E-06	0.92	3.884E-06	0.98	4.239E-06	0.77
104	4.143E-06	1.08	3.543E-06	1.07	3.812E-06	0.80
105	4.414E-06	1.00	3.686E-06	0.89	3.978E-06	0.79
106	1.529E-06	1.68	1.318E-06	1.49	1.410E-06	1.22
107	3.614E-06	1.06	3.024E-06	0.99	3.260E-06	0.80
108	3.228E-06	1.03	2.739E-06	0.96	2.965E-06	0.91
109	5.139E-06	0.87	4.271E-06	0.74	4.679E-06	0.65
110	2.997E-06	1.27	2.533E-06	1.24	2.796E-06	0.94
111	3.081E-06	1.33	2.580E-06	1.07	2.802E-06	0.89
112	1.804E-06	1.41	1.540E-06	1.32	1.659E-06	1.12
113	5.769E-06	0.89	4.839E-06	0.84	5.252E-06	0.65
114	1.965E-06	1.59	1.624E-06	1.31	1.783E-06	1.11
115	5.159E-06	1.04	4.304E-06	0.93	4.591E-06	0.70
116	1.083E-05	0.76	9.040E-06	0.68	9.739E-06	0.57
117	1.179E-05	0.64	9.911E-06	0.56	1.070E-05	0.42
118	1.288E-05	0.65	1.085E-05	0.61	1.177E-05	0.47
119	8.288E-06	0.64	7.012E-06	0.55	7.620E-06	0.49
120	5.791E-06	0.81	4.880E-06	0.77	5.306E-06	0.59
121	6.056E-06	0.99	5.147E-06	0.84	5.582E-06	0.63
122	3.249E-06	1.36	2.713E-06	1.10	2.954E-06	0.88
123	1.043E-05	0.64	8.731E-06	0.58	9.427E-06	0.46
124	7.272E-06	0.86	6.151E-06	0.77	6.652E-06	0.62
125	6.972E-06	0.82	5.879E-06	0.74	6.350E-06	0.64
126	5.747E-06	0.89	4.840E-06	0.85	5.211E-06	0.71
127	5.451E-06	1.09	4.625E-06	0.94	4.984E-06	0.78
128	7.748E-06	0.81	6.528E-06	0.69	7.051E-06	0.61
129	9.630E-06	0.67	8.130E-06	0.62	8.846E-06	0.51
130	3.979E-06	1.04	3.375E-06	0.95	3.645E-06	0.75
131	1.684E-05	0.54	1.424E-05	0.47	1.529E-05	0.39
132	1.118E-05	0.65	9.442E-06	0.54	1.020E-05	0.48
133	1.363E-05	0.52	1.153E-05	0.48	1.247E-05	0.40
134	1.491E-05	0.53	1.258E-05	0.51	1.356E-05	0.41
135	2.407E-06	1.27	2.062E-06	1.23	2.253E-06	1.02
136	3.892E-06	0.93	3.389E-06	0.93	3.686E-06	0.76
137	2.530E-06	0.96	2.642E-06	0.92	2.993E-06	0.70
138	4.071E-06	0.94	3.586E-06	0.85	3.904E-06	0.75

139	4.548E-06	1.13	3.909E-06	0.93	4.236E-06	0.76
140	1.201E-05	0.63	1.016E-05	0.51	1.099E-05	0.46
141	8.769E-06	0.78	7.423E-06	0.67	8.055E-06	0.51
142	5.873E-06	0.95	5.002E-06	0.81	5.380E-06	0.70
143	1.973E-05	0.53	1.667E-05	0.45	1.794E-05	0.38
144	8.063E-06	0.82	6.822E-06	0.71	7.313E-06	0.57
145	7.216E-06	0.77	6.135E-06	0.70	6.605E-06	0.57
146	1.214E-05	0.72	1.021E-05	0.58	1.100E-05	0.41
147	3.618E-06	1.13	3.054E-06	1.04	3.299E-06	0.74
148	1.845E-06	1.48	1.563E-06	1.44	1.684E-06	1.08
149	1.148E-06	2.15	9.784E-07	1.83	1.051E-06	1.50
150	4.063E-06	1.12	3.418E-06	0.99	3.665E-06	0.81
151	4.085E-06	1.03	3.491E-06	0.90	3.728E-06	0.74
152	4.336E-06	0.97	3.681E-06	0.96	3.938E-06	0.70
153	4.436E-06	0.98	3.769E-06	0.85	4.090E-06	0.79
154	4.625E-06	1.12	3.903E-06	0.93	4.225E-06	0.81
155	4.327E-06	1.08	3.633E-06	0.93	3.946E-06	0.75
156	3.988E-06	1.19	3.354E-06	1.17	3.602E-06	0.96
157	4.729E-06	1.17	3.974E-06	0.95	4.257E-06	0.80
158	4.908E-06	1.01	4.167E-06	0.87	4.483E-06	0.68
159	6.774E-06	0.75	5.730E-06	0.66	6.198E-06	0.62
160	3.633E-06	1.13	3.015E-06	0.97	3.259E-06	0.77
161	5.057E-06	0.99	4.270E-06	0.92	4.577E-06	0.78
162	5.821E-06	0.94	4.906E-06	0.81	5.277E-06	0.63
163	6.098E-06	0.90	5.134E-06	0.76	5.554E-06	0.64
164	6.568E-06	0.90	5.503E-06	0.84	5.934E-06	0.68
165	6.870E-06	0.93	5.797E-06	0.75	6.252E-06	0.64
166	3.943E-06	1.02	3.346E-06	0.84	3.603E-06	0.72
167	4.157E-06	1.08	3.530E-06	0.96	3.819E-06	0.76
168	4.299E-06	1.23	3.628E-06	1.02	3.901E-06	0.87
169	4.404E-06	0.88	3.739E-06	0.96	4.026E-06	0.69
170	4.655E-06	1.02	3.896E-06	0.85	4.184E-06	0.63
171	2.389E-06	1.42	2.021E-06	1.29	2.167E-06	0.93
172	2.398E-06	1.45	2.027E-06	1.27	2.219E-06	1.02
173	2.428E-06	1.28	2.087E-06	1.14	2.270E-06	0.96
174	2.492E-06	1.49	2.107E-06	1.30	2.272E-06	1.15
175	1.015E-06	1.93	8.655E-07	1.91	9.293E-07	1.49
176	1.004E-06	1.99	8.552E-07	1.83	9.332E-07	1.46
177	1.030E-06	1.96	8.881E-07	2.01	9.373E-07	1.30
178	1.038E-06	1.89	8.844E-07	1.76	9.560E-07	1.44
179	1.036E-06	1.84	8.772E-07	1.65	9.670E-07	1.44
180	1.056E-06	1.87	8.957E-07	1.79	9.672E-07	1.50
181	1.084E-06	2.09	9.082E-07	1.77	9.847E-07	1.34
182	1.049E-06	1.91	9.026E-07	1.75	9.777E-07	1.45
183	1.088E-06	1.98	9.217E-07	1.88	1.010E-06	1.34
184	1.067E-06	2.03	8.935E-07	1.83	9.827E-07	1.51
185	1.101E-06	1.93	9.450E-07	1.90	1.016E-06	1.46
186	1.133E-06	2.00	9.522E-07	1.59	1.041E-06	1.25
187	1.168E-06	1.86	9.861E-07	1.74	1.059E-06	1.54
188	1.155E-06	1.98	9.777E-07	1.83	1.071E-06	1.51
189	1.153E-06	1.81	9.845E-07	1.87	1.061E-06	1.39
190	3.011E-06	1.23	2.529E-06	1.11	2.743E-06	0.90

191	3.040E-06	1.22	2.590E-06	1.17	2.784E-06	0.93
192	3.133E-06	1.10	2.645E-06	0.97	2.891E-06	0.76
193	3.184E-06	1.14	2.742E-06	1.03	2.973E-06	0.82
194	6.836E-06	0.78	5.796E-06	0.74	6.252E-06	0.66
195	7.344E-06	0.87	6.215E-06	0.76	6.654E-06	0.62
196	7.708E-06	0.81	6.570E-06	0.76	7.101E-06	0.58
197	8.430E-06	0.77	7.123E-06	0.69	7.737E-06	0.54
198	9.018E-06	0.66	7.598E-06	0.54	8.302E-06	0.50
199	4.828E-06	0.88	4.064E-06	0.84	4.399E-06	0.68
200	5.167E-06	0.92	4.379E-06	0.88	4.719E-06	0.67
201	1.054E-05	0.66	8.918E-06	0.59	9.683E-06	0.51
202	1.192E-05	0.65	1.002E-05	0.53	1.094E-05	0.45
203	1.298E-05	0.55	1.097E-05	0.51	1.191E-05	0.41
204	1.474E-05	0.54	1.245E-05	0.42	1.358E-05	0.35
205	8.585E-06	0.73	7.714E-06	0.66	8.171E-06	0.53
206	9.240E-06	0.59	8.338E-06	0.60	8.839E-06	0.50
207	9.609E-06	0.56	8.713E-06	0.54	9.183E-06	0.45
208	1.127E-05	0.61	1.020E-05	0.60	1.084E-05	0.49
209	1.172E-05	0.55	1.062E-05	0.48	1.125E-05	0.40
210	1.417E-05	0.53	1.286E-05	0.47	1.362E-05	0.37
211	1.624E-05	0.50	1.466E-05	0.43	1.564E-05	0.34
212	1.922E-05	0.45	1.739E-05	0.39	1.848E-05	0.30
213	2.611E-05	0.42	2.347E-05	0.34	2.509E-05	0.27
214	3.677E-05	0.32	3.300E-05	0.29	3.553E-05	0.23
215	5.525E-05	0.26	4.966E-05	0.22	5.365E-05	0.21
216	9.208E-05	0.23	8.387E-05	0.18	9.061E-05	0.16
217	5.546E-05	0.24	5.312E-05	0.22	5.630E-05	0.17
218	7.077E-05	0.20	6.784E-05	0.18	7.223E-05	0.16
219	8.390E-05	0.19	8.129E-05	0.15	8.654E-05	0.13
220	1.012E-04	0.20	9.900E-05	0.18	1.055E-04	0.16
221	1.205E-04	0.16	1.189E-04	0.16	1.266E-04	0.13
222	1.367E-04	0.17	1.368E-04	0.13	1.457E-04	0.11
223	1.536E-04	0.13	1.575E-04	0.12	1.675E-04	0.10
224	7.515E-05	0.18	7.998E-05	0.16	8.460E-05	0.13
225	2.337E-04	0.12	2.724E-04	0.11	2.828E-04	0.10
226	3.175E-05	0.21	4.487E-05	0.19	4.449E-05	0.13
227	2.893E-05	0.25	4.643E-05	0.20	4.455E-05	0.12
228	1.040E-05	0.38	1.909E-05	0.30	1.757E-05	0.19
229	9.685E-06	0.39	1.976E-05	0.35	1.749E-05	0.20
230	4.509E-06	0.58	1.020E-05	0.40	8.697E-06	0.25
231	4.231E-06	0.51	1.052E-05	0.40	8.736E-06	0.24
232	3.959E-06	0.61	1.139E-05	0.46	8.902E-06	0.22
233	2.257E-06	0.74	7.458E-06	0.49	5.492E-06	0.28
234	1.455E-06	0.92	5.403E-06	0.63	3.829E-06	0.28
235	5.274E-07	1.36	1.059E-06	1.03	1.124E-06	0.50
236	3.520E-07	1.83	7.228E-07	1.15	7.954E-07	0.50
237	2.318E-07	1.97	5.503E-07	1.34	6.190E-07	0.61
238	5.144E-09	8.72	2.011E-08	6.18	2.555E-08	1.98

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
 0.7531 to 0.7559     *
 0.7559 to 0.7588     ****
 0.7588 to 0.7616     *************
 0.7616 to 0.7644     ****************
 0.7644 to 0.7672     ****************************
 0.7672 to 0.7701     ****************************
 0.7701 to 0.7729     ********
 0.7729 to 0.7757     **

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7531 to 0.7559
 0.7559 to 0.7588     **
 0.7588 to 0.7616     ***********
 0.7616 to 0.7644     ***********
```

```
 0.7644 to 0.7672     ************************
 0.7672 to 0.7701     ********************
 0.7701 to 0.7729     ******
 0.7729 to 0.7757     **

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7531 to 0.7559
 0.7559 to 0.7588     *
 0.7588 to 0.7616     *******
 0.7616 to 0.7644     *******
 0.7644 to 0.7672     ***************
 0.7672 to 0.7701     ****************
 0.7701 to 0.7729     ***
 0.7729 to 0.7757     *

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7531 to 0.7559
 0.7559 to 0.7588     *
 0.7588 to 0.7616     ***
 0.7616 to 0.7644     ******
 0.7644 to 0.7672     *****
 0.7672 to 0.7701     ********
 0.7701 to 0.7729     *
 0.7729 to 0.7757     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76582 + or - 0.00039                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65608E-02 + or -  1.27555E-04           ***
        ***
```

```
***
        ***        system nu bar
2.43897E+00 + or -  1.07661E-05           ***
        ***
***
        ***        system mean free path (cm)
6.52838E-01 + or -  1.74586E-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     3.10367 minutes


*********************************************************************
*********************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
```

```
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666



      0000000       666666666666                         11
666666666666                    33333333333     33333333333
     000000000     6666666666666                        111
6666666666666                   3333333333333   3333333333333
    00       00    66                    :::           1111        66
:::       33         33   33         33
   00         00   66                    :::             11        66
:::                  33             33
   00         00   66                    :::             11        66
:::                  33             33
   00         00   666666666666                         11
666666666666                              333             333
   00         00   6666666666666                        11
6666666666666                             333             333
   00         00   66         66         :::             11        66
66         :::                  33             33
   00         00   66         66         :::             11        66
66         :::                  33             33
    00       00    66         66         :::             11        66
66         :::       33         33   33         33
     000000000     6666666666666                     11111111
6666666666666                   3333333333333   3333333333333
      0000000       66666666666                     11111111
66666666666                     33333333333     33333333333
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   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
    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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
```

```
*********************************************************************
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*********************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:16:33.88
*****
        *****
*****
        *****
*****

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1

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

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```

```
*********************************************
        ***                                  ******       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
***
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*********************************************************************
*********************************************
        ***                                 ******      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.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
```

```
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                  ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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

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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  7.99813E-12  2.41289E-12    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  6.04489E-08  1.81181E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.22964E-14  7.34779E-14    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  7.37713E-07  5.29651E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33937E-08  6.98511E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99744E-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  5.24104E-07  8.93226E-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  1.55121E-08  2.96840E-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  9.88092E-11  2.45238E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90866E-08  1.32101E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.15070E-08  3.13122E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.74694E-08  4.80594E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  1.20982E-09  3.36455E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.77286E-08  4.98346E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  3.07229E-10  8.72825E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.79254E-09  1.08880E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  1.01211E-17  2.81471E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.62668E-10  4.62127E-09   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  1.19691E-08  3.40028E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                  12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                  12/17/09
    1042097  7.86526E-09  2.28153E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                  12/17/09
    1042098  1.81901E-08  5.33095E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                  12/17/09
    1042099  1.26860E-11  3.75593E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                  12/17/09
    1042100  7.97824E-09  2.38598E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.09319E-09  3.23653E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                  12/17/09
    1044101  9.20753E-10  2.78112E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  7.60355E-10  2.31937E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  9.01875E-11  2.77812E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  3.36159E-10  1.04555E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  5.38454E-11  1.70701E-09   44106   105.9073     ru106 4455
```

```
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  4.48811E-10  1.38250E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.11089E-12  3.48844E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.78138E-10  5.59389E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.69709E-11  8.63088E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.00577E-11  3.24859E-10   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  5.71902E-12  1.86436E-10   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  8.98753E-11  2.90296E-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  1.29545E-09  4.30060E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43876E-09  8.16906E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23581E-09  4.17661E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90354E-09  9.89980E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58648E-10  2.63211E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.23136E-12  7.67477E-11   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  6.51253E-11  2.23998E-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  1.47090E-09  5.14719E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63335E-09  1.63522E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64491E-09  5.85460E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23212E-09  2.23679E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88161E-10  3.24093E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11199E-09  4.12430E-08   50124   123.9053     sn124 5061
```

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endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.00175E-11  3.77549E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  2.84459E-11  1.08058E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  9.87093E-11  3.80881E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30243E-12  5.25968E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  4.97082E-10  1.94781E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67704E-11  1.06503E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.87635E-12  7.57722E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.16240E-09  4.62445E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  1.81387E-15  7.27059E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.24262E-09  5.01799E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.08424E-09  4.44339E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.41275E-08  1.40879E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99456E-11  2.51056E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.15504E-09  4.80266E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.49948E-10  6.32468E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.05527E-09  4.48267E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.21015E-12  2.65665E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  6.63601E-10  2.85872E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  9.28378E-10  3.91581E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.12956E-11  2.62214E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  9.89763E-10  4.23404E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  3.09330E-10  1.33252E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  7.31185E-10  3.17172E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  5.34106E-10  2.33283E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.87225E-11  8.23371E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  2.96758E-10  1.31396E-08   60148   147.9169     nd148 6043
```

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endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.39256E-10  1.49196E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  2.65158E-17  1.17405E-15   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.84877E-12  8.24123E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  4.11464E-11  1.80950E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  1.94030E-10  8.64921E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.17614E-13  5.27804E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06005E-09  1.38241E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  4.82172E-11  2.19269E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.32593E-13  1.06470E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.44966E-09  6.54897E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.58713E-09  7.26513E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.15085E-14  5.30254E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  5.42421E-12  2.51544E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.81625E-13  8.47721E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.83338E-12  2.65275E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29367E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27303E-10  1.98158E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.93999E-10  2.77240E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51396E-10  2.12035E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19263E-10  3.40015E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31156E-10  3.02148E-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
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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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24101E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22872E-06  6.52077E-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  9.81941E-12  6.96761E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  1.96670E-17  1.40141E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  8.07814E-10  5.78051E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  2.97955E-15  2.14102E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  2.81719E-20  2.03281E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49931E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.06312E-20  7.67124E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  4.08302E-28  2.95846E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99976E-21  7.27558E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  4.34995E-21  3.15186E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.78215E-21  7.11725E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.65238E-21  7.05176E-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
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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

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                                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:
  9384 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       ........

                                 ........     0.01467 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

   0.00133 minutes were required for starting.   total elapsed time is
0.01600 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 15703 independent fission points were generated for generation 1
          1       7.70106E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15656 independent fission points were generated for generation 2
          2       7.66539E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15350 independent fission points were generated for generation 3
          3       7.50116E-01      7.50116E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.66298E-01      7.58207E-01      8.09106E-03
0.00000E+00      0.00000E+00
          5       7.65731E-01      7.60715E-01      5.30217E-03
0.00000E+00      0.00000E+00
          6       7.69378E-01      7.62881E-01      4.32976E-03
0.00000E+00      0.00000E+00
          7       7.71242E-01      7.64553E-01      3.74764E-03
0.00000E+00      0.00000E+00
          8       7.67401E-01      7.65028E-01      3.09653E-03
0.00000E+00      0.00000E+00
          9       7.69023E-01      7.65598E-01      2.67857E-03
0.00000E+00      0.00000E+00
         10       7.69151E-01      7.66042E-01      2.36184E-03
0.00000E+00      0.00000E+00
         11       7.68635E-01      7.66330E-01      2.10277E-03
0.00000E+00      0.00000E+00
         12       7.66250E-01      7.66322E-01      1.88079E-03
0.00000E+00      0.00000E+00
         13       7.66457E-01      7.66335E-01      1.70128E-03
0.00000E+00      0.00000E+00
         14       7.60925E-01      7.65884E-01      1.61715E-03
0.00000E+00      0.00000E+00
```

15	7.67752E-01	7.66028E-01	1.49449E-03	0.00000E+00
16	7.66517E-01	7.66063E-01	1.38407E-03	0.00000E+00
17	7.70157E-01	7.66335E-01	1.31709E-03	0.00000E+00
18	7.68089E-01	7.66445E-01	1.23689E-03	0.00000E+00
19	7.62892E-01	7.66236E-01	1.18051E-03	0.00000E+00
20	7.66356E-01	7.66243E-01	1.11301E-03	0.00000E+00
21	7.69660E-01	7.66423E-01	1.06806E-03	0.00000E+00
22	7.66551E-01	7.66429E-01	1.01327E-03	0.00000E+00
23	7.61516E-01	7.66195E-01	9.91801E-04	0.00000E+00
24	7.68200E-01	7.66286E-01	9.50028E-04	0.00000E+00
25	7.66035E-01	7.66275E-01	9.07849E-04	0.00000E+00
26	7.67255E-01	7.66316E-01	8.70157E-04	0.00000E+00
27	7.67163E-01	7.67163E-01	1.17016E-03	0.00000E+00
28	7.65010E-01	7.66732E-01	7.11041E-04	0.00000E+00
29	7.68027E-01	7.66948E-01	6.10866E-04	0.00000E+00
30	7.67735E-01	7.67061E-01	5.16181E-04	0.00000E+00
31	7.64286E-01	7.66714E-01	5.92178E-04	0.00000E+00
32	7.66190E-01	7.66656E-01	5.17062E-04	0.00000E+00
33	7.64585E-01	7.66448E-01	5.11399E-04	0.00000E+00
34	7.69433E-01	7.66720E-01	5.46967E-04	0.00000E+00
35	7.65676E-01	7.66633E-01	5.65076E-04	0.00000E+00
36	7.61815E-01	7.66262E-01	6.11456E-04	0.00000E+00
37	7.60672E-01	7.65863E-01	9.27144E-04	0.00000E+00
38	7.61183E-01	7.65551E-01	1.25046E-03	0.00000E+00
39	7.64169E-01	7.65465E-01	1.22676E-03	0.00000E+00
40	7.63685E-01	7.65360E-01	1.52872E-03	0.00000E+00

41	7.69508E-01	7.65590E-01	1.09004E-03	0.00000E+00
42	7.69840E-01	7.65814E-01	1.09631E-03	0.00000E+00
43	7.68043E-01	7.65925E-01	1.10336E-03	0.00000E+00
44	7.62990E-01	7.65786E-01	9.89027E-04	0.00000E+00
45	7.67115E-01	7.65846E-01	9.35666E-04	0.00000E+00
46	7.67293E-01	7.65909E-01	8.84117E-04	0.00000E+00
47	7.68995E-01	7.66038E-01	8.78482E-04	0.00000E+00
48	7.70573E-01	7.66219E-01	9.14066E-04	0.00000E+00
49	7.65114E-01	7.66177E-01	8.54728E-04	0.00000E+00
50	7.66608E-01	7.66192E-01	8.21623E-04	0.00000E+00
51	7.59003E-01	7.65936E-01	8.45989E-04	0.00000E+00
52	7.63528E-01	7.65853E-01	8.47037E-04	0.00000E+00
53	7.59608E-01	7.65645E-01	9.40667E-04	0.00000E+00
54	7.67941E-01	7.65719E-01	8.81161E-04	0.00000E+00
55	7.66166E-01	7.65733E-01	8.47667E-04	0.00000E+00
56	7.69582E-01	7.65849E-01	8.44040E-04	0.00000E+00
57	7.70158E-01	7.65976E-01	8.52342E-04	0.00000E+00
58	7.62316E-01	7.65871E-01	7.95401E-04	0.00000E+00
59	7.73444E-01	7.66082E-01	8.11149E-04	0.00000E+00
60	7.55898E-01	7.65807E-01	7.88214E-04	0.00000E+00
61	7.62406E-01	7.65717E-01	7.89069E-04	0.00000E+00
62	7.69729E-01	7.65820E-01	7.17416E-04	0.00000E+00
63	7.75190E-01	7.66054E-01	7.49091E-04	0.00000E+00
64	7.62660E-01	7.65971E-01	6.88780E-04	0.00000E+00
65	7.61409E-01	7.65863E-01	6.63549E-04	0.00000E+00
66	7.67307E-01	7.65896E-01	6.41951E-04	0.00000E+00

```
         67       7.53634E-01      7.65618E-01      7.11981E-04
0.00000E+00      0.00000E+00
         68       7.58416E-01      7.65458E-01      7.75516E-04
0.00000E+00      0.00000E+00
         69       7.66297E-01      7.65476E-01      7.45532E-04
0.00000E+00      0.00000E+00
         70       7.67989E-01      7.65529E-01      7.14743E-04
0.00000E+00      0.00000E+00
         71       7.57936E-01      7.65371E-01      7.04981E-04
0.00000E+00      0.00000E+00
         72       7.73245E-01      7.65532E-01      6.70081E-04
0.00000E+00      0.00000E+00
         73       7.68177E-01      7.65585E-01      6.72258E-04
0.00000E+00      0.00000E+00
         74       7.65797E-01      7.65589E-01      6.58772E-04
0.00000E+00      0.00000E+00
         75       7.69140E-01      7.65657E-01      6.49938E-04
0.00000E+00      0.00000E+00
         76       7.65992E-01      7.65664E-01      6.37835E-04
0.00000E+00      0.00000E+00
         77       7.63259E-01      7.65619E-01      6.26595E-04
0.00000E+00      0.00000E+00
         78       7.67660E-01      7.65656E-01      6.13016E-04
0.00000E+00      0.00000E+00
         79       7.60431E-01      7.65563E-01      6.02998E-04
0.00000E+00      0.00000E+00
         80       7.61247E-01      7.65487E-01      6.21341E-04
0.00000E+00      0.00000E+00
         81       7.61639E-01      7.65421E-01      6.24500E-04
0.00000E+00      0.00000E+00
         82       7.71923E-01      7.65531E-01      5.98416E-04
0.00000E+00      0.00000E+00
         83       7.65317E-01      7.65527E-01      5.87294E-04
0.00000E+00      0.00000E+00
         84       7.67463E-01      7.65559E-01      5.78016E-04
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 19974 independent fission points were generated for generation 85
         85       7.51728E-01      7.65336E-01      6.00527E-04
0.00000E+00      0.00000E+00
         86       7.67149E-01      7.65365E-01      5.81237E-04
0.00000E+00      0.00000E+00
         87       7.72158E-01      7.65471E-01      5.82014E-04
0.00000E+00      0.00000E+00
         88       7.64328E-01      7.65453E-01      5.73126E-04
0.00000E+00      0.00000E+00
         89       7.67031E-01      7.65477E-01      5.64762E-04
0.00000E+00      0.00000E+00
         90       7.66009E-01      7.65485E-01      5.56198E-04
0.00000E+00      0.00000E+00
         91       7.66278E-01      7.65497E-01      5.47961E-04
0.00000E+00      0.00000E+00
```

```
         92       7.72255E-01      7.65595E-01      5.48917E-04
0.00000E+00      0.00000E+00
         93       7.67741E-01      7.65625E-01      5.50106E-04
0.00000E+00      0.00000E+00
         94       7.69824E-01      7.65685E-01      5.49049E-04
0.00000E+00      0.00000E+00
         95       7.62894E-01      7.65646E-01      5.31194E-04
0.00000E+00      0.00000E+00
         96       7.60064E-01      7.65569E-01      5.41988E-04
0.00000E+00      0.00000E+00
         97       7.64971E-01      7.65561E-01      5.35685E-04
0.00000E+00      0.00000E+00
         98       7.60754E-01      7.65497E-01      5.33349E-04
0.00000E+00      0.00000E+00
         99       7.62242E-01      7.65454E-01      5.33345E-04
0.00000E+00      0.00000E+00
        100       7.66240E-01      7.65465E-01      5.25421E-04
0.00000E+00      0.00000E+00
        101       7.63414E-01      7.65438E-01      5.18592E-04
0.00000E+00      0.00000E+00
        102       7.73161E-01      7.65536E-01      5.16422E-04
0.00000E+00      0.00000E+00
        103       7.63623E-01      7.65512E-01      5.05483E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=A924641C7C10FAB1
        104       7.67672E-01      7.65539E-01      4.93402E-04
0.00000E+00      0.00000E+00
        105       7.64613E-01      7.65527E-01      4.87406E-04
0.00000E+00      0.00000E+00
        106       7.62996E-01      7.65497E-01      4.82414E-04
0.00000E+00      0.00000E+00
        107       7.68596E-01      7.65534E-01      4.78027E-04
0.00000E+00      0.00000E+00
        108       7.63139E-01      7.65506E-01      4.73162E-04
0.00000E+00      0.00000E+00
        109       7.56149E-01      7.65397E-01      4.87090E-04
0.00000E+00      0.00000E+00
        110       7.60584E-01      7.65342E-01      4.97447E-04
0.00000E+00      0.00000E+00
        111       7.68586E-01      7.65378E-01      4.88750E-04
0.00000E+00      0.00000E+00
        112       7.68491E-01      7.65413E-01      4.87226E-04
0.00000E+00      0.00000E+00
        113       7.67798E-01      7.65440E-01      4.84443E-04
0.00000E+00      0.00000E+00
        114       7.64314E-01      7.65428E-01      4.78409E-04
0.00000E+00      0.00000E+00
        115       7.66665E-01      7.65441E-01      4.72904E-04
0.00000E+00      0.00000E+00
        116       7.59614E-01      7.65378E-01      4.70125E-04
0.00000E+00      0.00000E+00
```

```
        117       7.60593E-01      7.65327E-01      4.74913E-04
0.00000E+00      0.00000E+00
        118       7.69771E-01      7.65374E-01      4.66942E-04
0.00000E+00      0.00000E+00
        119       7.66034E-01      7.65381E-01      4.62730E-04
0.00000E+00      0.00000E+00
        120       7.69585E-01      7.65424E-01      4.60670E-04
0.00000E+00      0.00000E+00
        121       7.65924E-01      7.65430E-01      4.56383E-04
0.00000E+00      0.00000E+00
        122       7.54558E-01      7.65320E-01      4.64025E-04
0.00000E+00      0.00000E+00
        123       7.66831E-01      7.65335E-01      4.55756E-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=05458AB868ADB9EA
                                     A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.55208E-05 + or -  1.22740E-08             generation time
=  2.99549E-05 + or -  2.13503E-08
 nu bar   =  2.43896E+00 + or -  9.71556E-06       average fission group
=  2.17542E+02 + or -  9.96418E-03
                      energy(ev) of the average lethargy causing fission
=  5.65808E-02 + or -  1.28382E-04
                                                 system mean free path (cm)
=  6.52720E-01 + or -  1.63977E-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 - 0.00046     0.76488 to 0.76579
0.76442 to 0.76625    0.76397 to 0.76670    2000000      14.9897

      24          0.76531   + or - 0.00046     0.76485 to 0.76576
0.76439 to 0.76622    0.76393 to 0.76668    1980000      15.0282

      25          0.76530   + or - 0.00046     0.76484 to 0.76576
0.76437 to 0.76623    0.76391 to 0.76669    1960000      15.0105

      26          0.76528   + or - 0.00047     0.76481 to 0.76575
0.76434 to 0.76621    0.76388 to 0.76668    1940000      15.0442

      27          0.76526   + or - 0.00047     0.76479 to 0.76573
```

0.76432 to 0.76620 0.76384 to 0.76667 1920000 15.0104

28 0.76526 + or - 0.00048 0.76478 to 0.76574
0.76431 to 0.76621 0.76383 to 0.76669 1900000 14.9667

29 0.76523 + or - 0.00048 0.76475 to 0.76571
0.76427 to 0.76619 0.76379 to 0.76667 1880000 15.0776

30 0.76520 + or - 0.00048 0.76472 to 0.76569
0.76424 to 0.76617 0.76375 to 0.76666 1860000 15.0323

31 0.76521 + or - 0.00049 0.76472 to 0.76570
0.76423 to 0.76619 0.76375 to 0.76668 1840000 15.0014

32 0.76520 + or - 0.00050 0.76471 to 0.76570
0.76421 to 0.76620 0.76372 to 0.76669 1820000 14.9471

37 0.76525 + or - 0.00051 0.76474 to 0.76575
0.76424 to 0.76626 0.76373 to 0.76677 1720000 16.0502

42 0.76522 + or - 0.00053 0.76469 to 0.76575
0.76416 to 0.76628 0.76363 to 0.76681 1620000 16.4619

47 0.76511 + or - 0.00056 0.76455 to 0.76567
0.76400 to 0.76623 0.76344 to 0.76679 1520000 16.5035

52 0.76512 + or - 0.00059 0.76454 to 0.76571
0.76395 to 0.76630 0.76336 to 0.76688 1420000 17.0546

57 0.76500 + or - 0.00062 0.76439 to 0.76562
0.76377 to 0.76624 0.76316 to 0.76685 1320000 17.6994

62 0.76502 + or - 0.00063 0.76440 to 0.76565
0.76377 to 0.76628 0.76315 to 0.76690 1220000 19.3243

67 0.76511 + or - 0.00062 0.76450 to 0.76573
0.76388 to 0.76635 0.76326 to 0.76696 1120000 20.5844

72 0.76515 + or - 0.00062 0.76452 to 0.76577
0.76390 to 0.76639 0.76327 to 0.76702 1020000 23.3922

77 0.76500 + or - 0.00068 0.76432 to 0.76568
0.76363 to 0.76637 0.76295 to 0.76705 920000 23.4896

82 0.76505 + or - 0.00073 0.76433 to 0.76578
0.76360 to 0.76651 0.76287 to 0.76723 820000 26.2221

87 0.76509 + or - 0.00078 0.76431 to 0.76587
0.76353 to 0.76665 0.76275 to 0.76743 720000 19.7211

92 0.76476 + or - 0.00082 0.76393 to 0.76558
0.76311 to 0.76640 0.76229 to 0.76723 620000 21.9253

```
      97          0.76469   + or - 0.00092     0.76377 to 0.76561
0.76286 to 0.76652    0.76194 to 0.76744     520000      24.8656

     102          0.76458   + or - 0.00108     0.76350 to 0.76566
0.76242 to 0.76674    0.76133 to 0.76782     420000      24.2903

     107          0.76429   + or - 0.00148     0.76281 to 0.76577
0.76133 to 0.76725    0.75985 to 0.76873     320000      20.7861

     112          0.76470   + or - 0.00155     0.76315 to 0.76625
0.76160 to 0.76780    0.76004 to 0.76935     220000      40.8917
1                                                fuel bundle

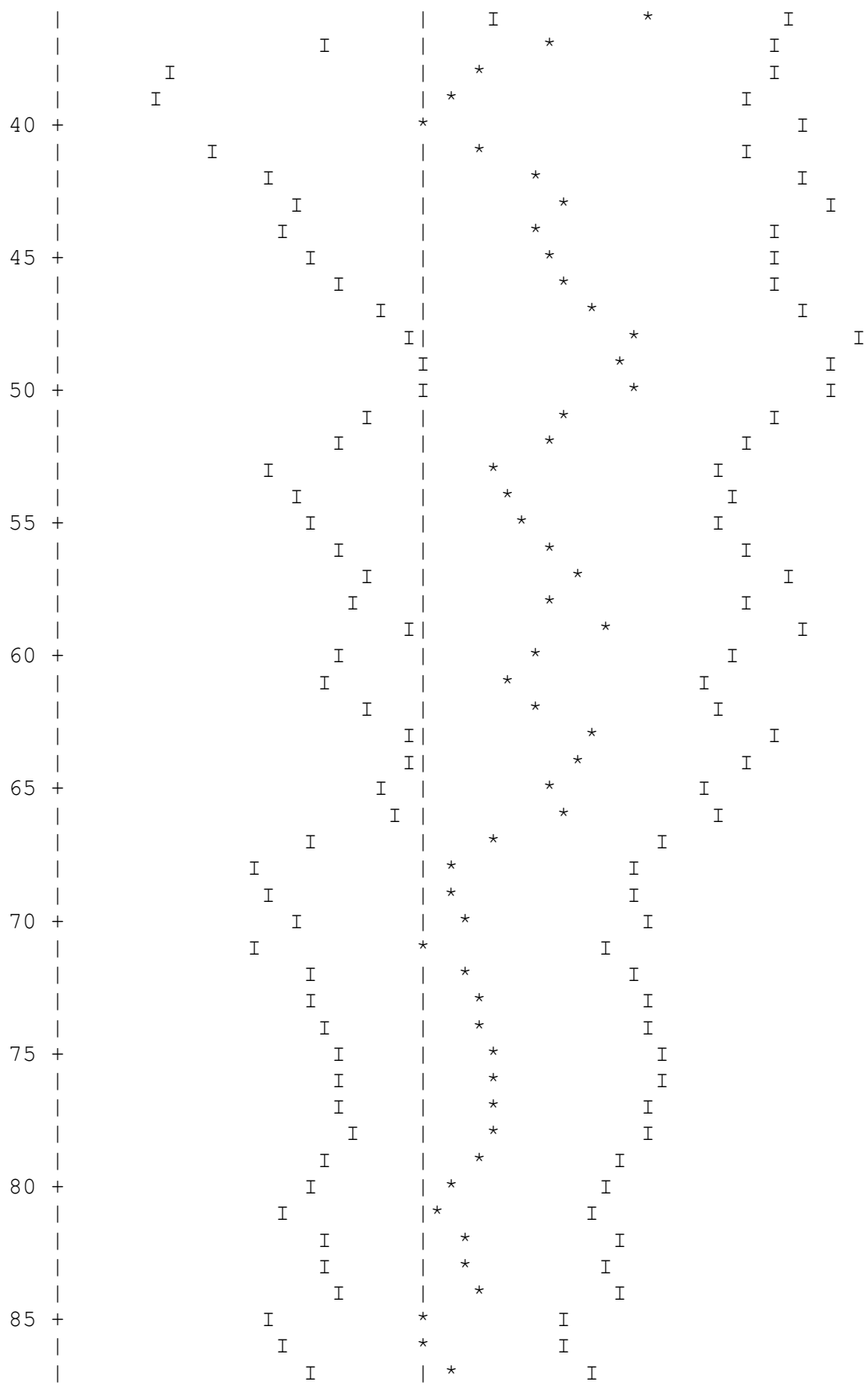
 no. of initial
deviation of
  generations      average                         67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76545   + or - 0.00280     0.76265 to 0.76825
0.75985 to 0.77105    0.75705 to 0.77385     120000      59.9663
1                          fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76533 + or - 0.00045 which occurs for
123 generations run.

                                0.7653                   0.7668
0.7682

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


40
45
50
55
60
65
70
75
80
85

```
         |                  I        | *          I
         |                  I        | *          I
      90 +                   I       | *          I
         |                   I       |  *         I
         |                     I     |   *          I
         |                     I     |    *         I
         |                      I    |     *         I
      95 +                      I    |    *         I
         |                    I      |   *         I
         |                    I      |   *         I
         |                   I       |  *         I
         |                   I       | *         I
     100 +                   I       | *         I
         |                   I       | *         I
         |                    I      |  *         I
         |                    I      |  *         I
         |                     I     |  *         I
     105 +                     I     |  *         I
         |                    I      |  *        I
         |                     I     |  *         I
         |                     I     |  *        I
         |                  I        |*        I
     110 +                 I         *         I
         |                  I        |*        I
         |                   I       |*         I
         |                   I       | *        I
         |                   I       |*         I
     115 +                   I       | *        I
         |                  I        |*        I
         |                 I         *        I
         |                  I        *         I
         |                   I       |*        I
     120 +                   I       |*        I
         |                   I       |*        I
         |                 I         *        I
         |                  I        *        I
1                            fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7653 + or - 0.0004 which occurs for 23 generations skipped.

```
                                0.7607                   0.7631
0.7655

|-------------------------|------------------------|------------------
------|------------------------
         |
         |
I    *    I
         |
I    *    I
```

```
      25 +
I    *    I
         |
I    *    I
         |
I   *|   I
         |
I     *    I
         |
I    *|   I
      30 +
I    *|   I
         |
I    *|   I
         |
I    *|   I
         |
I    *|   I
         |
I    * |   I
      35 +
I    * |   I
         |
I     *|   I
         |
I    *|    I
         |
I    *    I
         |
I    *    I
      40 +
I    *     I
         |
I     *    I
         |
I    *|    I
         |
I     *|   I
         |
I     *|    I
      45 +
I     *|    I
         |
I    * |   I
         |
I     * |   I
         |
I     *  |  I
         |
I     *  |  I
      50 +
I     *  |  I
```

```
          |
I     * |   I
          |
I     * |   I
          |
I     *|    I
          |
I     * |    I
      55 +
I     * |    I
          |
I      * |   I
          |
I      *  |  I
          |
I     *  |   I
          |
I      *   |  I
      60 +
I     *  |   I
          |
I      * |    I
          |
I      *  |   I
          |
I     *    | I
          |
I      *   | I
      65 +
I     *   |  I
          |
I      *   |  I
          |
I      * |   I
          |
I     *|     I
          |
I      *|     I
      70 +
I     * |    I
          |
I      *      I
          |
I     * |    I
          |
I      * |   I
          |
I      * |   I
      75 +
I      *  |   I
          |
I      *   |  I
```

```
          |
I      *  |   I
          |
I      *   |   I
          |
I      *  |    I
      80 +
I      * |     I
          |
I       *|      I
          |
I      *  |    I
          |
I       *  |    I
          |
I        *  |    I
      85 +
I       *       I
          |
I       *       I
          |
I       * |     I
          |
I       * |     I
          |
I       *  |     I
      90 +
I        *  |     I
          |
I        *  |     I
          |                                                          I
*     |  I
          |                                                        I
*      | I
          |                                                     I
*        I
      95 +                                                      I
*       |I
          |                                                        I
*     | I
          |                                                       I
*     |  I
          |                                                          I
*    |    I
          |                                                          I
*   |     I
     100 +                                                        I
*   |     I
          |                                                        I
*   |       I
          |                                                   I
*       |   I
```

```
         |                                                          I
*      |    I
         |                                                     I
*        |   I
     105 +                                                     I
*        |    I
         |                                                   I
*       |      I
         |                                              I
*          |    I
         |                                              I
*         |     I
         |                                                        I
*   |         I
     110 +                                                           I
*             I
         |                                                     I
*  |           I
         |                                                   I
*     |         I
         |                                                I
*         |       I
         |                                            I
*         |          I
     115 +                                       I                      *
|         I
         |                                          I
*     |                   I
         |                                             I
| *
         |                              I
*       |
         |            I
*          |
     120 +                                          *
|

   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                 0.00000E+00     0.0000
2.70718E-07    38.5157       0.00000E+00     0.0000
    3    0.0000                 1.20472E-05    11.4190
```

2.06010E-05	4.9895	0.00000E+00	0.0000	4	0.0000	1.81411E-05	11.0259
3.13816E-05	4.2938	0.00000E+00	0.0000	5	0.0000	2.66764E-05	8.3603
5.41249E-05	3.1752	0.00000E+00	0.0000	6	0.0001	9.17673E-05	4.0170
2.27543E-04	1.5029	0.00000E+00	0.0000	7	0.0001	1.12324E-04	3.5282
2.04842E-04	1.4757	0.00000E+00	0.0000	8	0.0003	2.58709E-04	1.8339
3.29051E-04	0.9749	0.00000E+00	0.0000	9	0.0005	3.86417E-04	1.2129
4.44817E-04	0.5769	0.00000E+00	0.0000	10	0.0003	2.04142E-04	1.5947
2.07041E-04	0.7539	0.00000E+00	0.0000	11	0.0012	9.22116E-04	0.6903
5.28135E-04	0.4975	0.00000E+00	0.0000	12	0.0010	7.66775E-04	0.8258
3.00541E-04	0.8135	0.00000E+00	0.0000	13	0.0003	2.29843E-04	1.6479
9.13053E-05	1.6320	0.00000E+00	0.0000	14	0.0013	1.00296E-03	0.5975
4.09968E-04	0.5914	0.00000E+00	0.0000	15	0.0010	7.62407E-04	0.7611
3.28726E-04	0.7532	0.00000E+00	0.0000	16	0.0002	1.87300E-04	1.1491
8.61003E-05	1.1304	0.00000E+00	0.0000	17	0.0001	6.70173E-05	1.7848
3.25888E-05	1.7496	0.00000E+00	0.0000	18	0.0001	5.02246E-05	1.9446
2.53734E-05	1.9065	0.00000E+00	0.0000	19	0.0001	8.09397E-05	1.4896
4.27940E-05	1.4537	0.00000E+00	0.0000	20	0.0001	5.83649E-05	1.7495
3.19806E-05	1.7067	0.00000E+00	0.0000	21	0.0002	1.18390E-04	0.9928
6.68524E-05	0.9716	0.00000E+00	0.0000	22	0.0001	1.05154E-04	1.3141
6.22479E-05	1.2829	0.00000E+00	0.0000	23	0.0001	1.08175E-04	1.0602
6.60050E-05	1.0370	0.00000E+00	0.0000	24	0.0000	2.46419E-05	2.3388
1.52996E-05	2.2814	0.00000E+00	0.0000	25	0.0000	3.02197E-05	1.9247
1.88826E-05	1.8708	0.00000E+00	0.0000	26	0.0000	1.77103E-05	2.3118
1.11207E-05	2.2534	0.00000E+00	0.0000	27	0.0001	5.34259E-05	1.5321
3.33270E-05	1.4981	0.00000E+00	0.0000	28	0.0001	9.62579E-05	0.9927
6.00368E-05	0.9772	0.00000E+00	0.0000	29	0.0001	9.89770E-05	1.1938

6.23408E-05 1.1789 0.00000E+00 0.0000
30 0.0000 1.23049E-05 2.9445
7.71877E-06 2.9226 0.00000E+00 0.0000
31 0.0001 9.62387E-05 1.0660
6.08001E-05 1.0517 0.00000E+00 0.0000
32 0.0001 3.84318E-05 1.5515
2.45653E-05 1.5166 0.00000E+00 0.0000
33 0.0000 3.27047E-05 1.4870
2.04741E-05 1.4699 0.00000E+00 0.0000
34 0.0001 7.46199E-05 1.0318
4.68802E-05 1.0171 0.00000E+00 0.0000
35 0.0001 4.64543E-05 1.4218
2.91474E-05 1.4008 0.00000E+00 0.0000
36 0.0001 4.28747E-05 1.2518
2.65433E-05 1.2403 0.00000E+00 0.0000
37 0.0000 2.90387E-05 1.7405
1.82162E-05 1.7042 0.00000E+00 0.0000
38 0.0000 3.38129E-05 1.7533
2.12940E-05 1.7138 0.00000E+00 0.0000
39 0.0002 1.29184E-04 0.9618
8.22099E-05 0.9448 0.00000E+00 0.0000
40 0.0002 1.18427E-04 0.7558
7.65883E-05 0.7405 0.00000E+00 0.0000
41 0.0002 1.59325E-04 0.8304
1.06473E-04 0.8082 0.00000E+00 0.0000
42 0.0002 1.40987E-04 0.8964
9.58579E-05 0.8782 0.00000E+00 0.0000
43 0.0001 7.91653E-05 1.3751
5.68603E-05 1.3147 0.00000E+00 0.0000
44 0.0001 1.14682E-04 1.0332
8.42017E-05 0.9946 0.00000E+00 0.0000
45 0.0001 5.85535E-05 0.8897
4.73200E-05 0.8178 0.00000E+00 0.0000
46 0.0000 1.44432E-05 1.8138
1.16165E-05 1.6958 0.00000E+00 0.0000
47 0.0001 4.15107E-05 1.5368
3.22237E-05 1.4877 0.00000E+00 0.0000
48 0.0000 1.11195E-05 3.9625
8.65011E-06 3.8467 0.00000E+00 0.0000
49 0.0001 8.04095E-05 1.5945
6.34076E-05 1.5596 0.00000E+00 0.0000
50 0.0001 5.63279E-05 1.6794
4.63894E-05 1.6481 0.00000E+00 0.0000
51 0.0000 1.51363E-05 3.4899
1.25795E-05 3.4215 0.00000E+00 0.0000
52 0.0001 4.20410E-05 1.8301
3.63179E-05 1.7872 0.00000E+00 0.0000
53 0.0002 1.59381E-04 0.8091
1.56672E-04 0.7548 0.00000E+00 0.0000
54 0.0001 7.23639E-05 1.8360
6.73631E-05 1.7618 0.00000E+00 0.0000
55 0.0002 1.60655E-04 1.1917

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1.47332E-04     1.1581       0.00000E+00     0.0000
   56    0.0002                1.19742E-04     1.6055
1.11011E-04     1.5654       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                1.55939E-04     1.5634
1.41397E-04     1.5269       0.00000E+00     0.0000
   58    0.0001                8.70753E-05     2.0821
7.62033E-05     2.0280       0.00000E+00     0.0000
   59    0.0002                1.59235E-04     1.5498
1.43026E-04     1.4871       0.00000E+00     0.0000
   60    0.0004                2.71306E-04     1.2674
2.46139E-04     1.2008       0.00000E+00     0.0000
   61    0.0000                2.90122E-05     4.2232
2.23115E-05     4.0922       0.00000E+00     0.0000
   62    0.0002                1.61287E-04     1.6748
1.35337E-04     1.6274       0.00000E+00     0.0000
   63    0.0002                1.22239E-04     2.0898
1.00686E-04     2.0180       0.00000E+00     0.0000
   64    0.0001                9.43444E-05     2.5523
7.62252E-05     2.4590       0.00000E+00     0.0000
   65    0.0000                3.38051E-05     4.1630
3.34662E-05     4.0185       0.00000E+00     0.0000
   66    0.0002                1.71621E-04     1.8314
1.52315E-04     1.7735       0.00000E+00     0.0000
   67    0.0002                1.40391E-04     1.8912
1.14991E-04     1.8299       0.00000E+00     0.0000
   68    0.0000                2.51304E-05     4.4661
2.17723E-05     4.2963       0.00000E+00     0.0000
   69    0.0004                2.99460E-04     1.5085
2.35001E-04     1.4599       0.00000E+00     0.0000
   70    0.0003                2.04674E-04     1.6993
1.86404E-04     1.6345       0.00000E+00     0.0000
   71    0.0006                4.26569E-04     1.4007
3.53099E-04     1.3558       0.00000E+00     0.0000
   72    0.0001                5.03815E-05     4.7561
2.97435E-05     4.6439       0.00000E+00     0.0000
   73    0.0004                3.18497E-04     1.7078
2.43233E-04     1.6164       0.00000E+00     0.0000
   74    0.0014                1.05457E-03     1.2183
7.66998E-04     1.1688       0.00000E+00     0.0000
   75    0.0001                1.14545E-04     2.5056
8.79786E-05     2.3827       0.00000E+00     0.0000
   76    0.0006                4.63369E-04     1.6628
2.94360E-04     1.6077       0.00000E+00     0.0000
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77	0.0005	3.73473E-04	1.8534	2.67836E-04	1.7838
0.00000E+00	0.0000				
78	0.0000	7.68656E-06	4.3719	7.51601E-05	4.3300
0.00000E+00	0.0000				
79	0.0003	1.95656E-04	2.3669	1.31379E-04	2.2815
0.00000E+00	0.0000				
80	0.0001	6.21516E-05	3.2461	8.28761E-05	3.1573
0.00000E+00	0.0000				
81	0.0014	1.06250E-03	1.3132	7.81230E-04	1.2598
0.00000E+00	0.0000				
82	0.0001	7.15045E-05	4.1544	4.27279E-05	3.9553
0.00000E+00	0.0000				
83	0.0002	1.27941E-04	3.7090	1.41576E-04	3.6334
0.00000E+00	0.0000				
84	0.0001	8.19686E-05	3.0205	8.29809E-05	2.8125
0.00000E+00	0.0000				
85	0.0003	2.02884E-04	2.1105	2.49679E-04	2.0543
0.00000E+00	0.0000				
86	0.0004	2.70208E-04	2.1322	2.17255E-04	2.0325
0.00000E+00	0.0000				
87	0.0004	3.33252E-04	2.4686	2.07435E-04	2.3578
0.00000E+00	0.0000				
88	0.0001	5.42662E-05	3.8093	9.85533E-05	3.7100
0.00000E+00	0.0000				
89	0.0001	9.21121E-05	3.6191	6.41162E-05	3.3219
0.00000E+00	0.0000				
90	0.0003	2.23256E-04	2.8089	1.31853E-04	2.6875
0.00000E+00	0.0000				
91	0.0002	1.89316E-04	2.7964	1.19763E-04	2.6369
0.00000E+00	0.0000				
92	0.0000	2.93171E-05	3.0066	1.91956E-04	2.9439
0.00000E+00	0.0000				
93	0.0002	1.33015E-04	3.3782	1.07964E-04	3.1493
0.00000E+00	0.0000				
94	0.0001	1.12144E-04	4.0489	6.29751E-05	3.7980
0.00000E+00	0.0000				
95	0.0009	6.57734E-04	1.9826	4.04633E-04	1.9254
0.00000E+00	0.0000				
96	0.0002	1.48179E-04	3.9708	7.52275E-05	3.8027
0.00000E+00	0.0000				
97	0.0004	2.82522E-04	3.6884	1.61801E-04	3.6098
0.00000E+00	0.0000				
98	0.0001	1.05681E-04	3.8630	1.01282E-04	3.7288
0.00000E+00	0.0000				
99	0.0002	1.16040E-04	4.1138	7.74741E-05	3.9871
0.00000E+00	0.0000				
100	0.0002	1.29091E-04	4.0338	8.63598E-05	3.8655
0.00000E+00	0.0000				
101	0.0002	1.19981E-04	3.2757	7.59363E-05	3.0474
0.00000E+00	0.0000				
102	0.0002	1.57836E-04	3.5629	8.80545E-05	3.4123
0.00000E+00	0.0000				

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  103    0.0001                 9.78687E-05     3.4200
9.55281E-05     3.2346       0.00000E+00     0.0000
  104    0.0002                 1.65903E-04     3.0375
1.31581E-04     2.9344       0.00000E+00     0.0000
  105    0.0002                 1.29175E-04     3.3895
8.51960E-05     3.1988       0.00000E+00     0.0000
  106    0.0002                 1.81052E-04     4.8369
1.34525E-04     4.7735       0.00000E+00     0.0000
  107    0.0001                 6.17127E-05     3.3237
6.24529E-05     3.1115       0.00000E+00     0.0000
  108    0.0000                 3.54383E-05     2.4461
1.52958E-04     2.3884       0.00000E+00     0.0000
  109    0.0002                 1.29586E-04     2.1023
4.30093E-04     2.0732       0.00000E+00     0.0000
  110    0.0009                 6.59241E-04     2.9397
4.06480E-04     2.9141       0.00000E+00     0.0000
  111    0.0002                 1.51361E-04     4.4156
1.39219E-04     4.2911       0.00000E+00     0.0000
  112    0.0002                 1.18497E-04     5.0205
1.24886E-04     4.9341       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                 1.26471E-04     3.3164
1.10598E-04     3.1041       0.00000E+00     0.0000
  114    0.0000                 1.13165E-05     6.4779
1.52979E-05     5.4331       0.00000E+00     0.0000
  115    0.0001                 7.26880E-05     3.9078
8.44896E-05     3.6015       0.00000E+00     0.0000
  116    0.0003                 1.92422E-04     3.0277
1.44796E-04     2.7306       0.00000E+00     0.0000
  117    0.0006                 4.81254E-04     2.2767
2.57092E-04     2.1352       0.00000E+00     0.0000
  118    0.0008                 5.88197E-04     1.8768
4.59351E-04     1.8033       0.00000E+00     0.0000
  119    0.0002                 1.46338E-04     1.9654
3.77215E-04     1.8957       0.00000E+00     0.0000
  120    0.0002                 1.67429E-04     2.3078
6.37273E-04     2.2751       0.00000E+00     0.0000
  121    0.0007                 5.10077E-04     2.6721
3.92808E-04     2.6036       0.00000E+00     0.0000
  122    0.0001                 1.05565E-04     4.5726
8.22785E-05     4.2841       0.00000E+00     0.0000
  123    0.0003                 2.22914E-04     3.1982
1.57354E-04     2.8460       0.00000E+00     0.0000
  124    0.0003                 2.36795E-04     3.0213
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1.95178E-04	2.8210	0.00000E+00	0.0000	125	0.0002	1.29854E-04	3.3440
1.20255E-04	3.0022	0.00000E+00	0.0000	126	0.0001	1.00064E-04	3.6341
8.98013E-05	3.1996	0.00000E+00	0.0000	127	0.0005	4.06279E-04	3.4988
1.99150E-04	3.3143	0.00000E+00	0.0000	128	0.0003	2.11834E-04	2.8958
1.31248E-04	2.5558	0.00000E+00	0.0000	129	0.0006	4.27262E-04	2.3414
3.94517E-04	2.2266	0.00000E+00	0.0000	130	0.0002	1.17732E-04	3.3197
2.87177E-04	3.2173	0.00000E+00	0.0000	131	0.0004	2.98999E-04	2.2982
2.39678E-04	1.9493	0.00000E+00	0.0000	132	0.0007	5.30928E-04	2.5401
3.25981E-04	2.3290	0.00000E+00	0.0000	133	0.0014	1.04550E-03	1.7945
6.60821E-04	1.7003	0.00000E+00	0.0000	134	0.0001	9.11555E-05	2.2268
2.37170E-04	1.8817	0.00000E+00	0.0000	135	0.0002	1.62268E-04	2.9213
2.41004E-04	2.8500	0.00000E+00	0.0000	136	0.0001	4.61018E-05	2.0735
7.15464E-04	2.0429	0.00000E+00	0.0000	137	0.0000	1.92591E-05	1.0380
3.46547E-03	1.0358	0.00000E+00	0.0000	138	0.0004	3.22855E-04	2.1445
8.40632E-04	2.1128	0.00000E+00	0.0000	139	0.0002	1.80089E-04	3.5779
2.21329E-04	3.3525	0.00000E+00	0.0000	140	0.0003	2.15495E-04	2.7455
2.86053E-04	2.3905	0.00000E+00	0.0000	141	0.0001	8.33856E-05	2.6193
2.61907E-04	2.3468	0.00000E+00	0.0000	142	0.0001	6.48753E-05	3.3909
2.24343E-04	3.0953	0.00000E+00	0.0000	143	0.0001	8.00521E-05	2.3752
1.72779E-04	1.4528	0.00000E+00	0.0000	144	0.0000	3.44867E-05	3.3117
7.50672E-05	2.0132	0.00000E+00	0.0000	145	0.0005	3.62878E-04	2.3426
2.86108E-04	2.1246	0.00000E+00	0.0000	146	0.0005	3.45300E-04	2.4255
2.52076E-04	1.9676	0.00000E+00	0.0000	147	0.0002	1.80008E-04	3.7546
1.15080E-04	3.2728	0.00000E+00	0.0000	148	0.0001	4.98640E-05	7.0519
3.45654E-05	5.4474	0.00000E+00	0.0000	149	0.0000	2.74327E-05	8.6973
1.94064E-05	6.5523	0.00000E+00	0.0000	150	0.0001	8.01473E-05	5.0873

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5.95864E-05     3.6214       0.00000E+00     0.0000
  151    0.0001                 6.83232E-05     4.5653
5.73296E-05     3.2075       0.00000E+00     0.0000
  152    0.0001                 4.00462E-05     4.6243
4.57836E-05     2.7695       0.00000E+00     0.0000
  153    0.0001                 4.21207E-05     4.2070
4.71975E-05     2.4645       0.00000E+00     0.0000
  154    0.0001                 4.76484E-05     4.8394
5.00176E-05     2.8092       0.00000E+00     0.0000
  155    0.0001                 5.08171E-05     4.2356
5.01702E-05     2.6194       0.00000E+00     0.0000
  156    0.0001                 4.70322E-05     4.7598
4.62907E-05     2.8477       0.00000E+00     0.0000
  157    0.0001                 5.71109E-05     4.2087
5.63957E-05     2.5974       0.00000E+00     0.0000
  158    0.0001                 6.20411E-05     3.9810
6.47658E-05     2.4886       0.00000E+00     0.0000
  159    0.0002                 1.48875E-04     3.1451
2.07030E-04     2.6605       0.00000E+00     0.0000
  160    0.0001                 6.69447E-05     3.5414
7.80991E-05     2.7526       0.00000E+00     0.0000
  161    0.0001                 7.77440E-05     4.0088
7.50250E-05     2.6266       0.00000E+00     0.0000
  162    0.0001                 8.84261E-05     3.8576
8.27894E-05     2.3801       0.00000E+00     0.0000
  163    0.0001                 9.45067E-05     3.6435
8.70549E-05     2.2765       0.00000E+00     0.0000
  164    0.0001                 1.04379E-04     3.4712
9.56512E-05     2.2072       0.00000E+00     0.0000
  165    0.0002                 1.22616E-04     3.1668
1.09890E-04     2.0526       0.00000E+00     0.0000
  166    0.0001                 7.38731E-05     4.0985
6.66594E-05     2.7181       0.00000E+00     0.0000
  167    0.0001                 7.79474E-05     4.0712
7.04961E-05     2.6179       0.00000E+00     0.0000
  168    0.0001                 8.12978E-05     4.6120
7.46226E-05     2.9552       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                 1.07433E-04     3.9552
9.31922E-05     2.8602       0.00000E+00     0.0000
  170    0.0002                 1.32228E-04     3.8541
1.13956E-04     2.8853       0.00000E+00     0.0000
  171    0.0001                 9.58693E-05     5.1549
7.43538E-05     4.0911       0.00000E+00     0.0000
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172	0.0002	1.48404E-04	4.3051	1.04025E-04	3.6586
0.00000E+00	0.0000				
173	0.0003	1.98153E-04	3.9033	1.30079E-04	3.4091
0.00000E+00	0.0000				
174	0.0003	2.49123E-04	3.8230	1.55034E-04	3.4192
0.00000E+00	0.0000				
175	0.0002	1.20433E-04	6.0787	7.23615E-05	5.4932
0.00000E+00	0.0000				
176	0.0002	1.21269E-04	6.4662	7.21746E-05	5.8119
0.00000E+00	0.0000				
177	0.0002	1.15747E-04	5.4529	6.84948E-05	4.8801
0.00000E+00	0.0000				
178	0.0002	1.19427E-04	5.2632	6.96791E-05	4.7575
0.00000E+00	0.0000				
179	0.0001	1.14331E-04	6.6363	6.66645E-05	5.9438
0.00000E+00	0.0000				
180	0.0001	1.09294E-04	6.8968	6.37573E-05	6.1029
0.00000E+00	0.0000				
181	0.0001	1.03035E-04	6.0259	6.03076E-05	5.3076
0.00000E+00	0.0000				
182	0.0001	1.07463E-04	7.0496	6.23405E-05	6.1939
0.00000E+00	0.0000				
183	0.0001	9.80611E-05	6.0352	5.73511E-05	5.2554
0.00000E+00	0.0000				
184	0.0001	9.63301E-05	6.8294	5.61803E-05	5.9205
0.00000E+00	0.0000				
185	0.0001	9.64451E-05	6.9413	5.65094E-05	5.9455
0.00000E+00	0.0000				
186	0.0001	9.06611E-05	6.6921	5.34331E-05	5.5987
0.00000E+00	0.0000				
187	0.0001	8.33529E-05	6.0242	4.96852E-05	5.0356
0.00000E+00	0.0000				
188	0.0001	8.49023E-05	6.5959	5.03910E-05	5.4749
0.00000E+00	0.0000				
189	0.0001	8.91018E-05	7.4221	5.24376E-05	6.1849
0.00000E+00	0.0000				
190	0.0003	2.10124E-04	4.2450	1.24915E-04	3.5298
0.00000E+00	0.0000				
191	0.0003	2.03452E-04	3.7955	1.22074E-04	3.0686
0.00000E+00	0.0000				
192	0.0003	1.97192E-04	4.0262	1.19419E-04	3.2423
0.00000E+00	0.0000				
193	0.0003	2.11385E-04	3.4197	1.27218E-04	2.7611
0.00000E+00	0.0000				
194	0.0005	4.11249E-04	2.7667	2.51471E-04	2.1997
0.00000E+00	0.0000				
195	0.0006	4.28622E-04	2.8855	2.65254E-04	2.2955
0.00000E+00	0.0000				
196	0.0006	4.53345E-04	2.3185	2.82612E-04	1.7919
0.00000E+00	0.0000				
197	0.0007	5.08025E-04	2.7668	3.17111E-04	2.1568
0.00000E+00	0.0000				

198	0.0008	5.98257E-04	2.2007	3.67396E-04	1.7573
0.00000E+00	0.0000				
199	0.0004	3.31277E-04	2.8158	2.03089E-04	2.2464
0.00000E+00	0.0000				
200	0.0005	3.56221E-04	3.1384	2.20207E-04	2.4683
0.00000E+00	0.0000				
201	0.0010	7.96102E-04	2.1128	4.86672E-04	1.6894
0.00000E+00	0.0000				
202	0.0013	9.85445E-04	1.7532	5.96723E-04	1.3890
0.00000E+00	0.0000				
203	0.0016	1.20139E-03	1.8942	7.20502E-04	1.5485
0.00000E+00	0.0000				
204	0.0022	1.64934E-03	1.4625	9.72171E-04	1.2063
0.00000E+00	0.0000				
205	0.0015	1.12084E-03	1.7934	6.57361E-04	1.5138
0.00000E+00	0.0000				
206	0.0018	1.37761E-03	1.7657	8.04986E-04	1.5251
0.00000E+00	0.0000				
207	0.0021	1.63012E-03	1.6988	9.49259E-04	1.4724
0.00000E+00	0.0000				
208	0.0029	2.18272E-03	1.3116	1.27288E-03	1.1500
0.00000E+00	0.0000				
209	0.0032	2.42414E-03	1.2887	1.42272E-03	1.1437
0.00000E+00	0.0000				
210	0.0037	2.84088E-03	1.3076	1.69484E-03	1.1476
0.00000E+00	0.0000				
211	0.0041	3.12015E-03	1.2480	1.87984E-03	1.0874
0.00000E+00	0.0000				
212	0.0048	3.68192E-03	1.1052	2.22327E-03	0.9466
0.00000E+00	0.0000				
213	0.0064	4.92738E-03	0.9114	2.98693E-03	0.7711
0.00000E+00	0.0000				
214	0.0096	7.33374E-03	0.7824	4.41742E-03	0.6664
0.00000E+00	0.0000				
215	0.0157	1.19971E-02	0.6836	7.16004E-03	0.5719
0.00000E+00	0.0000				
216	0.0301	2.29988E-02	0.4338	1.35744E-02	0.3707
0.00000E+00	0.0000				
217	0.0201	1.53880E-02	0.4854	9.04581E-03	0.4113
0.00000E+00	0.0000				
218	0.0275	2.10291E-02	0.4720	1.23313E-02	0.3909
0.00000E+00	0.0000				
219	0.0356	2.72751E-02	0.3821	1.59190E-02	0.3264
0.00000E+00	0.0000				
220	0.0475	3.63324E-02	0.3002	2.11233E-02	0.2571
0.00000E+00	0.0000				
221	0.0622	4.76385E-02	0.3403	2.76529E-02	0.2897
0.00000E+00	0.0000				
222	0.0803	6.14802E-02	0.2926	3.56142E-02	0.2546
0.00000E+00	0.0000				
223	0.1047	8.01532E-02	0.2574	4.64837E-02	0.2212
0.00000E+00	0.0000				

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  224    0.0582                 4.45641E-02     0.3128
2.59678E-02     0.2702       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                 1.77035E-01     0.1532
1.04842E-01     0.1320       0.00000E+00     0.0000
  226    0.0454                 3.47112E-02     0.3414
2.11459E-02     0.2857       0.00000E+00     0.0000
  227    0.0488                 3.73336E-02     0.3666
2.32019E-02     0.2934       0.00000E+00     0.0000
  228    0.0209                 1.59962E-02     0.5968
1.01333E-02     0.4807       0.00000E+00     0.0000
  229    0.0222                 1.70285E-02     0.5860
1.09428E-02     0.4632       0.00000E+00     0.0000
  230    0.0116                 8.89992E-03     0.8352
5.83585E-03     0.6332       0.00000E+00     0.0000
  231    0.0122                 9.31464E-03     0.7284
6.20448E-03     0.5482       0.00000E+00     0.0000
  232    0.0129                 9.87679E-03     0.7134
6.74871E-03     0.5384       0.00000E+00     0.0000
  233    0.0082                 6.31138E-03     1.0290
4.44614E-03     0.7353       0.00000E+00     0.0000
  234    0.0059                 4.51041E-03     1.1358
3.25846E-03     0.7960       0.00000E+00     0.0000
  235    0.0024                 1.83665E-03     1.5993
1.21905E-03     1.1796       0.00000E+00     0.0000
  236    0.0019                 1.44949E-03     1.8615
9.76017E-04     1.3842       0.00000E+00     0.0000
  237    0.0017                 1.28666E-03     2.1965
9.18060E-04     1.6001       0.00000E+00     0.0000
  238    0.0001                 7.43125E-05     7.7186
6.22646E-05     4.6926       0.00000E+00     0.0000

 system total =                  7.65335E-01     0.0574
4.68756E-01     0.0506       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3132E-01  +
or -  0.0002



 elapsed time   3.11700 minutes
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random number= 71BC7419148C4ED1

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	2.176E-08	29.64	1.572E-08	29.83	1.745E-08	30.69
3	8.798E-07	3.77	7.211E-07	3.66	7.780E-07	3.67
4	1.490E-06	3.15	1.234E-06	2.91	1.311E-06	2.92
5	2.287E-06	2.50	1.863E-06	2.20	2.009E-06	2.30
6	9.640E-06	1.28	7.720E-06	1.14	8.251E-06	1.17
7	1.227E-05	1.28	9.312E-06	1.14	9.862E-06	1.11
8	3.105E-05	0.76	2.277E-05	0.67	2.380E-05	0.67
9	8.251E-05	0.42	5.899E-05	0.36	6.145E-05	0.37
10	4.588E-05	0.71	3.263E-05	0.56	3.390E-05	0.53
11	2.198E-04	0.31	1.555E-04	0.27	1.612E-04	0.28
12	1.902E-04	0.28	1.379E-04	0.26	1.447E-04	0.26
13	5.637E-05	0.54	4.099E-05	0.51	4.302E-05	0.48
14	2.532E-04	0.24	1.835E-04	0.21	1.915E-04	0.21
15	2.204E-04	0.26	1.598E-04	0.24	1.664E-04	0.23
16	7.114E-05	0.45	5.171E-05	0.40	5.409E-05	0.41
17	3.211E-05	0.65	2.356E-05	0.56	2.450E-05	0.51
18	2.781E-05	0.71	2.035E-05	0.55	2.106E-05	0.52
19	5.011E-05	0.51	3.674E-05	0.44	3.822E-05	0.41
20	3.906E-05	0.60	2.881E-05	0.54	3.020E-05	0.52
21	7.947E-05	0.42	5.829E-05	0.35	6.092E-05	0.33

22	7.288E-05	0.37	5.325E-05	0.33	5.522E-05	0.29
23	7.685E-05	0.37	5.646E-05	0.31	5.845E-05	0.29
24	1.853E-05	0.93	1.361E-05	0.73	1.431E-05	0.68
25	2.353E-05	0.69	1.742E-05	0.62	1.831E-05	0.59
26	1.347E-05	0.91	9.858E-06	0.89	1.041E-05	0.89
27	4.189E-05	0.51	3.098E-05	0.47	3.279E-05	0.42
28	7.705E-05	0.34	5.743E-05	0.30	6.081E-05	0.31
29	7.893E-05	0.38	5.891E-05	0.33	6.184E-05	0.33
30	9.848E-06	1.18	7.452E-06	0.93	7.909E-06	0.93
31	7.868E-05	0.35	5.916E-05	0.31	6.194E-05	0.29
32	3.114E-05	0.62	2.339E-05	0.50	2.472E-05	0.48
33	2.668E-05	0.63	2.006E-05	0.50	2.117E-05	0.48
34	6.085E-05	0.41	4.583E-05	0.37	4.846E-05	0.38
35	3.645E-05	0.57	2.762E-05	0.49	2.909E-05	0.49
36	3.390E-05	0.50	2.574E-05	0.41	2.696E-05	0.41
37	2.216E-05	0.64	1.667E-05	0.52	1.737E-05	0.42
38	2.625E-05	0.59	1.991E-05	0.53	2.087E-05	0.47
39	9.729E-05	0.34	7.476E-05	0.29	7.890E-05	0.27
40	9.036E-05	0.32	6.966E-05	0.32	7.433E-05	0.29
41	1.135E-04	0.29	8.862E-05	0.24	9.478E-05	0.23
42	9.387E-05	0.31	7.410E-05	0.25	7.952E-05	0.24
43	5.152E-05	0.43	4.082E-05	0.33	4.290E-05	0.29
44	7.015E-05	0.34	5.621E-05	0.28	6.035E-05	0.26
45	3.559E-05	0.42	2.830E-05	0.34	3.131E-05	0.34
46	8.459E-06	0.82	6.650E-06	0.68	7.253E-06	0.62
47	2.362E-05	0.58	1.870E-05	0.50	1.949E-05	0.45
48	6.782E-06	1.07	5.370E-06	0.92	5.675E-06	0.84
49	4.372E-05	0.44	3.521E-05	0.37	3.774E-05	0.32
50	2.977E-05	0.50	2.387E-05	0.43	2.584E-05	0.40
51	7.863E-06	0.93	6.305E-06	0.87	6.864E-06	0.69
52	2.063E-05	0.58	1.659E-05	0.52	1.804E-05	0.42
53	7.654E-05	0.33	6.181E-05	0.30	6.710E-05	0.25
54	3.337E-05	0.50	2.704E-05	0.43	2.922E-05	0.38
55	6.615E-05	0.32	5.387E-05	0.28	5.877E-05	0.24
56	4.338E-05	0.41	3.542E-05	0.33	3.848E-05	0.31
57	4.964E-05	0.38	4.052E-05	0.34	4.403E-05	0.26
58	2.584E-05	0.56	2.117E-05	0.47	2.296E-05	0.39
59	4.416E-05	0.38	3.622E-05	0.34	3.947E-05	0.29
60	6.408E-05	0.31	5.240E-05	0.27	5.717E-05	0.24
61	6.175E-06	0.95	5.059E-06	0.85	5.523E-06	0.67
62	3.220E-05	0.46	2.641E-05	0.41	2.884E-05	0.36
63	2.172E-05	0.53	1.795E-05	0.45	1.945E-05	0.35
64	1.727E-05	0.64	1.417E-05	0.53	1.533E-05	0.43
65	5.693E-06	0.99	4.677E-06	0.86	5.118E-06	0.78
66	2.851E-05	0.45	2.349E-05	0.38	2.554E-05	0.28
67	2.106E-05	0.49	1.735E-05	0.37	1.888E-05	0.35
68	4.591E-06	0.97	3.784E-06	0.88	4.125E-06	0.77
69	3.719E-05	0.43	3.058E-05	0.36	3.332E-05	0.31
70	2.653E-05	0.48	2.181E-05	0.42	2.372E-05	0.34
71	4.563E-05	0.33	3.758E-05	0.31	4.094E-05	0.27
72	2.653E-06	1.46	2.194E-06	1.34	2.394E-06	1.02
73	2.724E-05	0.45	2.243E-05	0.40	2.434E-05	0.31

74	7.936E-05	0.29	6.569E-05	0.24	7.131E-05	0.20
75	9.077E-06	0.82	7.530E-06	0.68	8.203E-06	0.63
76	2.287E-05	0.49	1.906E-05	0.47	2.063E-05	0.36
77	1.765E-05	0.62	1.466E-05	0.52	1.594E-05	0.41
78	1.509E-06	1.50	1.266E-06	1.48	1.365E-06	1.24
79	1.004E-05	0.83	8.312E-06	0.70	8.974E-06	0.61
80	4.587E-06	1.17	3.816E-06	1.06	4.123E-06	0.79
81	5.514E-05	0.35	4.598E-05	0.31	4.978E-05	0.26
82	3.264E-06	1.26	2.735E-06	1.08	2.934E-06	0.89
83	4.448E-06	0.96	3.700E-06	0.97	4.006E-06	0.76
84	8.218E-06	0.72	6.805E-06	0.64	7.337E-06	0.56
85	1.005E-05	0.68	8.346E-06	0.62	9.046E-06	0.51
86	1.372E-05	0.62	1.139E-05	0.53	1.229E-05	0.44
87	1.190E-05	0.61	9.950E-06	0.50	1.081E-05	0.41
88	3.111E-06	1.13	2.609E-06	0.98	2.848E-06	0.86
89	6.587E-06	0.86	5.492E-06	0.80	5.961E-06	0.67
90	6.887E-06	0.83	5.768E-06	0.76	6.238E-06	0.64
91	8.251E-06	0.81	6.904E-06	0.69	7.457E-06	0.59
92	4.716E-06	1.14	3.984E-06	0.95	4.262E-06	0.74
93	8.169E-06	0.77	6.799E-06	0.69	7.373E-06	0.58
94	4.201E-06	1.06	3.495E-06	0.96	3.826E-06	0.70
95	1.270E-05	0.65	1.062E-05	0.55	1.145E-05	0.42
96	3.295E-06	1.21	2.762E-06	1.03	3.012E-06	0.86
97	3.370E-06	1.13	2.835E-06	1.00	3.080E-06	0.92
98	3.499E-06	1.15	2.917E-06	1.10	3.166E-06	0.89
99	2.257E-06	1.48	1.901E-06	1.47	2.077E-06	1.13
100	3.489E-06	1.15	2.926E-06	1.05	3.137E-06	0.80
101	4.952E-06	0.95	4.121E-06	0.85	4.438E-06	0.80
102	3.333E-06	1.02	2.775E-06	0.94	3.034E-06	0.80
103	4.715E-06	0.93	3.972E-06	0.89	4.311E-06	0.76
104	4.089E-06	1.11	3.411E-06	0.92	3.744E-06	0.85
105	4.315E-06	1.12	3.598E-06	1.00	3.933E-06	0.81
106	1.557E-06	1.74	1.308E-06	1.60	1.426E-06	1.43
107	3.543E-06	1.24	2.975E-06	0.95	3.215E-06	0.83
108	3.160E-06	1.29	2.676E-06	0.99	2.895E-06	0.95
109	5.159E-06	0.93	4.345E-06	0.81	4.707E-06	0.67
110	3.021E-06	1.13	2.578E-06	1.03	2.819E-06	0.84
111	3.048E-06	1.35	2.581E-06	1.18	2.800E-06	0.91
112	1.798E-06	1.49	1.519E-06	1.26	1.650E-06	1.12
113	5.674E-06	1.00	4.753E-06	0.89	5.177E-06	0.72
114	2.017E-06	1.48	1.677E-06	1.26	1.823E-06	1.05
115	5.117E-06	1.04	4.284E-06	0.87	4.613E-06	0.65
116	1.094E-05	0.76	9.164E-06	0.64	9.860E-06	0.53
117	1.182E-05	0.68	9.920E-06	0.55	1.074E-05	0.49
118	1.295E-05	0.61	1.089E-05	0.56	1.177E-05	0.40
119	8.267E-06	0.73	7.011E-06	0.70	7.572E-06	0.53
120	5.809E-06	0.83	4.900E-06	0.77	5.326E-06	0.63
121	6.087E-06	0.83	5.176E-06	0.72	5.620E-06	0.61
122	3.195E-06	1.22	2.675E-06	1.13	2.890E-06	0.94
123	1.038E-05	0.71	8.698E-06	0.63	9.422E-06	0.54
124	7.253E-06	0.84	6.120E-06	0.73	6.659E-06	0.67
125	7.003E-06	0.69	5.917E-06	0.67	6.368E-06	0.53

126	5.658E-06	0.89	4.818E-06	0.91	5.192E-06	0.68
127	5.487E-06	0.93	4.632E-06	0.86	5.048E-06	0.66
128	7.807E-06	0.88	6.567E-06	0.73	7.068E-06	0.57
129	9.571E-06	0.74	8.097E-06	0.64	8.780E-06	0.51
130	3.974E-06	1.09	3.398E-06	0.90	3.672E-06	0.79
131	1.697E-05	0.54	1.424E-05	0.50	1.533E-05	0.40
132	1.121E-05	0.63	9.525E-06	0.52	1.026E-05	0.40
133	1.357E-05	0.61	1.152E-05	0.51	1.249E-05	0.43
134	1.486E-05	0.58	1.251E-05	0.49	1.344E-05	0.39
135	2.313E-06	1.25	1.992E-06	1.06	2.203E-06	0.92
136	3.936E-06	1.03	3.405E-06	0.88	3.729E-06	0.76
137	2.480E-06	0.95	2.620E-06	1.07	2.954E-06	0.80
138	4.062E-06	0.91	3.547E-06	0.90	3.877E-06	0.68
139	4.672E-06	1.04	3.981E-06	0.96	4.275E-06	0.81
140	1.214E-05	0.60	1.023E-05	0.53	1.104E-05	0.45
141	8.880E-06	0.78	7.438E-06	0.72	8.070E-06	0.58
142	5.848E-06	0.83	4.973E-06	0.72	5.369E-06	0.62
143	1.989E-05	0.56	1.676E-05	0.45	1.808E-05	0.35
144	8.103E-06	0.90	6.794E-06	0.74	7.363E-06	0.58
145	7.129E-06	0.81	6.039E-06	0.69	6.546E-06	0.61
146	1.190E-05	0.64	1.013E-05	0.57	1.093E-05	0.42
147	3.745E-06	1.23	3.171E-06	0.96	3.386E-06	0.75
148	1.848E-06	1.48	1.592E-06	1.31	1.722E-06	1.04
149	1.170E-06	1.87	9.795E-07	1.43	1.064E-06	1.35
150	3.950E-06	1.02	3.341E-06	1.00	3.595E-06	0.74
151	4.166E-06	1.18	3.517E-06	1.02	3.795E-06	0.80
152	4.273E-06	1.01	3.634E-06	0.95	3.903E-06	0.70
153	4.457E-06	1.10	3.766E-06	1.00	4.041E-06	0.77
154	4.637E-06	1.20	3.902E-06	0.95	4.210E-06	0.83
155	4.325E-06	1.04	3.668E-06	0.99	3.936E-06	0.89
156	4.014E-06	1.06	3.344E-06	0.95	3.602E-06	0.84
157	4.659E-06	1.10	3.931E-06	1.01	4.218E-06	0.67
158	4.867E-06	1.02	4.107E-06	0.87	4.389E-06	0.72
159	6.790E-06	0.89	5.751E-06	0.79	6.148E-06	0.65
160	3.566E-06	1.25	2.986E-06	1.06	3.241E-06	0.84
161	4.895E-06	0.82	4.159E-06	0.71	4.470E-06	0.57
162	5.865E-06	0.84	4.944E-06	0.70	5.311E-06	0.65
163	6.084E-06	0.89	5.134E-06	0.81	5.568E-06	0.68
164	6.460E-06	0.81	5.489E-06	0.74	5.914E-06	0.59
165	6.975E-06	0.89	5.849E-06	0.83	6.262E-06	0.62
166	4.073E-06	1.21	3.409E-06	0.93	3.645E-06	0.78
167	4.196E-06	0.97	3.501E-06	0.84	3.805E-06	0.73
168	4.256E-06	1.05	3.611E-06	0.97	3.879E-06	0.72
169	4.420E-06	1.14	3.756E-06	1.04	4.042E-06	0.83
170	4.650E-06	1.11	3.888E-06	1.02	4.207E-06	0.79
171	2.387E-06	1.30	2.027E-06	1.18	2.171E-06	1.06
172	2.411E-06	1.34	2.030E-06	1.10	2.226E-06	0.94
173	2.486E-06	1.37	2.097E-06	1.13	2.271E-06	1.00
174	2.523E-06	1.18	2.100E-06	1.09	2.312E-06	0.95
175	1.058E-06	2.31	9.003E-07	2.13	9.528E-07	1.63
176	1.008E-06	1.89	8.683E-07	1.65	9.397E-07	1.43
177	1.005E-06	1.92	8.634E-07	1.91	9.448E-07	1.49

178	1.023E-06	2.24	8.562E-07	1.91	9.403E-07	1.49
179	1.009E-06	1.93	8.616E-07	1.72	9.272E-07	1.47
180	1.052E-06	1.84	8.915E-07	1.80	9.769E-07	1.33
181	1.042E-06	1.85	8.953E-07	1.91	9.708E-07	1.38
182	1.090E-06	1.85	9.206E-07	1.66	1.016E-06	1.44
183	1.103E-06	1.68	9.383E-07	1.71	1.002E-06	1.33
184	1.095E-06	1.73	9.199E-07	1.65	1.018E-06	1.39
185	1.114E-06	1.96	9.415E-07	1.81	1.028E-06	1.42
186	1.131E-06	2.03	9.559E-07	1.80	1.037E-06	1.38
187	1.150E-06	1.84	9.684E-07	1.74	1.055E-06	1.42
188	1.193E-06	2.23	9.859E-07	1.74	1.063E-06	1.42
189	1.175E-06	1.86	9.905E-07	1.60	1.071E-06	1.39
190	3.028E-06	1.18	2.577E-06	1.00	2.784E-06	0.82
191	3.093E-06	1.30	2.614E-06	1.14	2.806E-06	0.99
192	3.151E-06	1.33	2.655E-06	1.10	2.878E-06	0.90
193	3.216E-06	1.14	2.740E-06	1.03	2.986E-06	0.79
194	6.708E-06	0.71	5.696E-06	0.67	6.222E-06	0.53
195	7.213E-06	0.79	6.093E-06	0.74	6.596E-06	0.61
196	7.747E-06	0.74	6.566E-06	0.68	7.064E-06	0.55
197	8.525E-06	0.70	7.171E-06	0.68	7.710E-06	0.58
198	8.968E-06	0.74	7.561E-06	0.67	8.207E-06	0.53
199	4.851E-06	0.98	4.088E-06	0.81	4.396E-06	0.61
200	5.166E-06	0.92	4.342E-06	0.76	4.699E-06	0.61
201	1.070E-05	0.73	9.045E-06	0.65	9.822E-06	0.53
202	1.203E-05	0.57	1.020E-05	0.50	1.100E-05	0.40
203	1.307E-05	0.55	1.094E-05	0.52	1.189E-05	0.46
204	1.483E-05	0.56	1.253E-05	0.51	1.362E-05	0.43
205	8.486E-06	0.68	7.632E-06	0.60	8.143E-06	0.49
206	9.385E-06	0.62	8.427E-06	0.49	8.945E-06	0.39
207	9.495E-06	0.59	8.645E-06	0.58	9.151E-06	0.44
208	1.137E-05	0.61	1.029E-05	0.53	1.092E-05	0.41
209	1.157E-05	0.53	1.053E-05	0.49	1.114E-05	0.34
210	1.404E-05	0.50	1.273E-05	0.44	1.355E-05	0.40
211	1.619E-05	0.45	1.464E-05	0.43	1.558E-05	0.36
212	1.921E-05	0.43	1.732E-05	0.40	1.841E-05	0.31
213	2.609E-05	0.39	2.350E-05	0.33	2.515E-05	0.26
214	3.693E-05	0.34	3.328E-05	0.29	3.567E-05	0.26
215	5.495E-05	0.25	4.975E-05	0.23	5.351E-05	0.19
216	9.222E-05	0.18	8.403E-05	0.15	9.082E-05	0.13
217	5.520E-05	0.23	5.300E-05	0.19	5.614E-05	0.15
218	7.066E-05	0.19	6.785E-05	0.18	7.213E-05	0.15
219	8.403E-05	0.21	8.121E-05	0.18	8.649E-05	0.16
220	1.016E-04	0.17	9.909E-05	0.14	1.056E-04	0.11
221	1.200E-04	0.16	1.183E-04	0.14	1.264E-04	0.12
222	1.365E-04	0.16	1.367E-04	0.14	1.458E-04	0.12
223	1.537E-04	0.16	1.576E-04	0.14	1.677E-04	0.12
224	7.513E-05	0.19	8.000E-05	0.16	8.452E-05	0.13
225	2.339E-04	0.12	2.728E-04	0.09	2.828E-04	0.09
226	3.183E-05	0.22	4.495E-05	0.19	4.460E-05	0.13
227	2.891E-05	0.24	4.625E-05	0.17	4.443E-05	0.12
228	1.044E-05	0.41	1.898E-05	0.30	1.756E-05	0.18
229	9.641E-06	0.35	1.967E-05	0.34	1.749E-05	0.18

230	4.467E-06	0.57	1.022E-05	0.46	8.709E-06	0.24
231	4.226E-06	0.58	1.059E-05	0.43	8.736E-06	0.25
232	3.960E-06	0.53	1.131E-05	0.44	8.900E-06	0.23
233	2.202E-06	0.70	7.467E-06	0.53	5.499E-06	0.25
234	1.439E-06	0.94	5.303E-06	0.64	3.833E-06	0.26
235	5.150E-07	1.46	1.038E-06	1.14	1.116E-06	0.55
236	3.393E-07	1.77	7.347E-07	1.13	7.943E-07	0.62
237	2.190E-07	2.28	5.589E-07	1.63	6.142E-07	0.58
238	6.263E-09	9.92	2.080E-08	5.92	2.503E-08	1.89

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
 0.7498 to 0.7526     *
 0.7526 to 0.7554     **
```

```
 0.7554 to 0.7583     ***
 0.7583 to 0.7611     **********
 0.7611 to 0.7639     ******************
 0.7639 to 0.7667     ************************
 0.7667 to 0.7696     ***************************
 0.7696 to 0.7724     ***********
 0.7724 to 0.7752     ****

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7498 to 0.7526     *
 0.7526 to 0.7554     **
 0.7554 to 0.7583     ***
 0.7583 to 0.7611     *********
 0.7611 to 0.7639     **************
 0.7639 to 0.7667     *****************
 0.7667 to 0.7696     ****************
 0.7696 to 0.7724     *********
 0.7724 to 0.7752     ****

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7498 to 0.7526     *
 0.7526 to 0.7554     *
 0.7554 to 0.7583     *
 0.7583 to 0.7611     ******
 0.7611 to 0.7639     *********
 0.7639 to 0.7667     *************
 0.7667 to 0.7696     ************
 0.7696 to 0.7724     ******
 0.7724 to 0.7752     *

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7498 to 0.7526
 0.7526 to 0.7554     *
 0.7554 to 0.7583     *
 0.7583 to 0.7611     ***
 0.7611 to 0.7639     *****
 0.7639 to 0.7667     ******
 0.7667 to 0.7696     ******
 0.7696 to 0.7724     **
 0.7724 to 0.7752     *

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

```
***

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76533 + or - 0.00045                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65808E-02 + or -  1.28382E-04            ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.71556E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52720E-01 + or -  1.63977E-04            ***
        ***
***
        ***        number of warning messages
8                                          ***
        ***
***
        ***        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 3.11467 minutes

```
*****************************************************************
*********************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666



      0000000       666666666666                        11
99999999999                    5555555555555         11
     000000000     6666666666666                       111
9999999999999                   5555555555555        111
    00       00    66                   :::           1111        99
99         :::       55                 1111
   00         00   66                   :::             11        99
99         :::       55                   11
   00         00   66                   :::             11        99
99         :::       55                   11
   00         00   666666666666                        11
9999999999999                   555555555555          11
   00         00   6666666666666                       11
999999999999                   5555555555555         11
   00         00   66         66         :::             11
```

```
99         :::                  55         11
   00         00   66         66         :::             11
99         :::                  55         11
    00       00    66         66         :::             11
99         :::       55         55         11
     000000000     6666666666666                     11111111
9999999999999                  5555555555555      11111111
      0000000       66666666666                     11111111
999999999999                    55555555555       11111111
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:19:51.26
*****
        *****
*****
        *****
*****

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

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

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

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

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        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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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  8.70945E-12  2.62748E-12    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  6.04485E-08  1.81180E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
```

```
    1005011  2.42761E-14  8.00019E-14    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  7.37713E-07  5.29651E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.07515E-10  2.66846E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90887E-08  1.32107E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.16012E-08  3.15687E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.75668E-08  4.83274E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.32567E-09  3.68674E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.78306E-08  5.01214E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  3.09458E-10  8.79158E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.89225E-09  1.11743E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.22944E-17  3.41912E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.65269E-10  4.69518E-09   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  1.20666E-08  3.42800E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  7.96125E-09  2.30937E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
```

```
    1042098  1.82808E-08  5.35752E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.26857E-11  3.75584E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.07729E-09  2.41560E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.19196E-09  3.52897E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.00246E-09  3.02791E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.27943E-10  2.52555E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  9.02824E-11  2.78104E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.65972E-10  1.13828E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.71940E-11  1.81317E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  4.96630E-10  1.52979E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.09467E-12  3.43751E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  1.93958E-10  6.09069E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  2.93618E-11  9.39601E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.09516E-11  3.53735E-10   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  6.22851E-12  2.03045E-10   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  8.98768E-11  2.90301E-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  1.29573E-09  4.30155E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43898E-09  8.16981E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23599E-09  4.17721E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90379E-09  9.90065E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58863E-10  2.63285E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.43338E-12  8.36964E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51354E-11  2.24033E-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  1.47111E-09  5.14792E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63354E-09  1.63529E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64512E-09  5.85535E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23232E-09  2.23686E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88413E-10  3.24185E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11242E-09  4.12590E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.09079E-11  4.11109E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.10978E-11  1.18132E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.07438E-10  4.14563E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.30198E-12  5.25786E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.42775E-10  2.12686E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.67176E-11  1.06293E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.88711E-12  7.62070E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.26828E-09  5.04566E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.01370E-15  8.07161E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.35589E-09  5.47543E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.17946E-09  4.83361E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42344E-08  1.41321E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.99438E-11  2.51048E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.25702E-09  5.22670E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.49450E-10  6.30369E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.14838E-09  4.87820E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.20413E-12  2.65407E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
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    1058144  7.00288E-10  3.01676E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                 12/17/09
    1059141  1.02369E-09  4.31784E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                 12/17/09
    1059143  6.12691E-11  2.62101E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                 12/17/09
    1060143  1.08361E-09  4.63551E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                 12/17/09
    1060144  3.59120E-10  1.54701E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                 12/17/09
    1060145  7.96026E-10  3.45299E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                 12/17/09
    1060146  5.81442E-10  2.53959E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                 12/17/09
    1060147  1.87122E-11  8.22919E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                 12/17/09
    1060148  3.23129E-10  1.43072E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                 12/17/09
    1061147  3.67020E-10  1.61406E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                 12/17/09
    1061148  2.88952E-17  1.27940E-15   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                 12/17/09
    1061149  1.83335E-12  8.17250E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                 12/17/09
    1062147  4.88111E-11  2.14658E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                 12/17/09
    1062149  2.11308E-10  9.41940E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                 12/17/09
    1062150  1.39012E-13  6.23832E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                 12/17/09
    1062151  3.06467E-09  1.38450E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                 12/17/09
    1062152  5.25020E-11  2.38755E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                 12/17/09
    1062153  2.32499E-13  1.06427E-11   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                 12/17/09
    1063151  1.45157E-09  6.55763E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                 12/17/09
    1063153  1.58964E-09  7.27660E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                 12/17/09
    1063154  1.25005E-14  5.75961E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                 12/17/09
    1063155  5.87054E-12  2.72242E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                 12/17/09
    1063156  1.91443E-13  8.93545E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                 12/17/09
    1064152  5.83881E-12  2.65522E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                 12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                 12/17/09
    1064155  4.27339E-10  1.98175E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                 12/17/09
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    1064156  5.94294E-10  2.77377E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51359E-10  2.12018E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19452E-10  3.40104E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31161E-10  3.02151E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22901E-06  6.52098E-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  1.07213E-11  7.60754E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.34656E-17  1.67209E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  8.79982E-10  6.29692E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.53580E-15  2.54073E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.35826E-20  2.42324E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49932E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.07526E-20  7.75878E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  4.13148E-28  2.99357E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99974E-21  7.27556E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.82836E-21  2.77393E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
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    1096243  9.76302E-21  7.10333E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.62207E-21  7.02962E-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
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1026056 fe56 2631 endf/b7 rel8 rev7 mod4
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3026056 fe56 2631 endf/b7 rel8 rev7 mod4
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1026057 fe57 2634 endf/b7 rel8 rev7 mod4
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3026057 fe57 2634 endf/b7 rel8 rev7 mod4
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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:
  9342 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

                                             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 +/- 4.35452E+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       ........

                                 ........     0.01517 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
0.01600 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 15749 independent fission points were generated for generation 1
          1       7.69123E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15611 independent fission points were generated for generation 2
          2       7.63520E-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       7.70962E-01      7.70962E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.67004E-01      7.68983E-01      1.97947E-03
0.00000E+00      0.00000E+00
          5       7.66776E-01      7.68247E-01      1.35923E-03
0.00000E+00      0.00000E+00
          6       7.70401E-01      7.68786E-01      1.10167E-03
```

```
0.00000E+00      0.00000E+00
          7       7.64687E-01      7.67966E-01      1.18331E-03
0.00000E+00      0.00000E+00
          8       7.65527E-01      7.67559E-01      1.04821E-03
0.00000E+00      0.00000E+00
          9       7.66161E-01      7.67360E-01      9.08130E-04
0.00000E+00      0.00000E+00
         10       7.59207E-01      7.66341E-01      1.28730E-03
0.00000E+00      0.00000E+00
         11       7.68866E-01      7.66621E-01      1.16946E-03
0.00000E+00      0.00000E+00
         12       7.70231E-01      7.66982E-01      1.10654E-03
0.00000E+00      0.00000E+00
         13       7.66767E-01      7.66963E-01      1.00109E-03
0.00000E+00      0.00000E+00
         14       7.65112E-01      7.66808E-01      9.26794E-04
0.00000E+00      0.00000E+00
         15       7.63885E-01      7.66583E-01      8.81687E-04
0.00000E+00      0.00000E+00
         16       7.67681E-01      7.66662E-01      8.20043E-04
0.00000E+00      0.00000E+00
         17       7.69511E-01      7.66852E-01      7.86692E-04
0.00000E+00      0.00000E+00
         18       7.67922E-01      7.66919E-01      7.38915E-04
0.00000E+00      0.00000E+00
         19       7.68849E-01      7.67032E-01      7.03316E-04
0.00000E+00      0.00000E+00
         20       7.64983E-01      7.66918E-01      6.72795E-04
0.00000E+00      0.00000E+00
         21       7.65293E-01      7.66833E-01      6.42125E-04
0.00000E+00      0.00000E+00
         22       7.65610E-01      7.66772E-01      6.12232E-04
0.00000E+00      0.00000E+00
         23       7.65675E-01      7.66719E-01      5.84683E-04
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 19958 independent fission points were generated for generation 24
         24       7.48099E-01      7.65873E-01      1.01347E-03
0.00000E+00      0.00000E+00
         25       7.58349E-01      7.65546E-01      1.02216E-03
0.00000E+00      0.00000E+00
         26       7.62305E-01      7.65411E-01      9.87924E-04
0.00000E+00      0.00000E+00
         27       7.68434E-01      7.59297E-01      1.27357E-02
0.00000E+00      0.00000E+00
         28       7.69549E-01      7.61347E-01      9.78209E-03
0.00000E+00      0.00000E+00
         29       7.66149E-01      7.62148E-01      1.03865E-02
0.00000E+00      0.00000E+00
         30       7.67340E-01      7.62889E-01      7.89826E-03
0.00000E+00      0.00000E+00
         31       7.59137E-01      7.62420E-01      5.96646E-03
```

0.00000E+00	0.00000E+00				
32	7.59482E-01	7.62094E-01	4.92216E-03	0.00000E+00	0.00000E+00
33	7.70316E-01	7.62916E-01	3.46964E-03	0.00000E+00	0.00000E+00
34	7.61051E-01	7.62747E-01	3.00261E-03	0.00000E+00	0.00000E+00
35	7.64776E-01	7.62916E-01	2.66169E-03	0.00000E+00	0.00000E+00
36	7.60376E-01	7.62720E-01	2.40796E-03	0.00000E+00	0.00000E+00
37	7.73873E-01	7.63517E-01	2.48368E-03	0.00000E+00	0.00000E+00
38	7.60675E-01	7.63327E-01	2.22170E-03	0.00000E+00	0.00000E+00
39	7.74098E-01	7.64001E-01	2.24012E-03	0.00000E+00	0.00000E+00
40	7.66144E-01	7.64127E-01	2.23831E-03	0.00000E+00	0.00000E+00
41	7.64006E-01	7.64120E-01	2.07964E-03	0.00000E+00	0.00000E+00
42	7.72778E-01	7.64576E-01	1.89812E-03	0.00000E+00	0.00000E+00
43	7.55867E-01	7.64140E-01	1.87370E-03	0.00000E+00	0.00000E+00
44	7.64955E-01	7.64179E-01	1.78240E-03	0.00000E+00	0.00000E+00
45	7.62575E-01	7.64106E-01	1.71642E-03	0.00000E+00	0.00000E+00
46	7.69180E-01	7.64327E-01	1.64856E-03	0.00000E+00	0.00000E+00
47	7.67044E-01	7.64440E-01	1.56649E-03	0.00000E+00	0.00000E+00
48	7.67295E-01	7.64554E-01	1.51700E-03	0.00000E+00	0.00000E+00
49	7.69513E-01	7.64745E-01	1.47762E-03	0.00000E+00	0.00000E+00
50	7.69976E-01	7.64939E-01	1.44410E-03	0.00000E+00	0.00000E+00
51	7.68980E-01	7.65083E-01	1.41384E-03	0.00000E+00	0.00000E+00
52	7.69991E-01	7.65252E-01	1.39434E-03	0.00000E+00	0.00000E+00
53	7.71836E-01	7.65472E-01	1.46186E-03	0.00000E+00	0.00000E+00
54	7.66944E-01	7.65519E-01	1.42322E-03	0.00000E+00	0.00000E+00
55	7.67577E-01	7.65583E-01	1.38710E-03	0.00000E+00	0.00000E+00
56	7.65694E-01	7.65587E-01	1.34001E-03	0.00000E+00	0.00000E+00
57	7.70954E-01	7.65745E-01	1.31122E-03		

0.00000E+00	0.00000E+00				
58	7.71728E-01	7.65916E-01	1.30267E-03	0.00000E+00	0.00000E+00
59	7.59758E-01	7.65745E-01	1.22900E-03	0.00000E+00	0.00000E+00
60	7.65643E-01	7.65742E-01	1.19225E-03	0.00000E+00	0.00000E+00
61	7.68428E-01	7.65812E-01	1.14556E-03	0.00000E+00	0.00000E+00
62	7.70492E-01	7.65932E-01	1.12551E-03	0.00000E+00	0.00000E+00
63	7.61372E-01	7.65818E-01	1.08186E-03	0.00000E+00	0.00000E+00
64	7.63753E-01	7.65768E-01	1.05563E-03	0.00000E+00	0.00000E+00
65	7.63017E-01	7.65703E-01	1.04425E-03	0.00000E+00	0.00000E+00
66	7.69831E-01	7.65799E-01	1.13950E-03	0.00000E+00	0.00000E+00
67	7.67883E-01	7.65846E-01	9.84578E-04	0.00000E+00	0.00000E+00
68	7.68353E-01	7.65902E-01	9.70511E-04	0.00000E+00	0.00000E+00
69	7.62901E-01	7.65836E-01	9.43799E-04	0.00000E+00	0.00000E+00
70	7.65226E-01	7.65823E-01	9.22642E-04	0.00000E+00	0.00000E+00
71	7.65861E-01	7.65824E-01	9.01754E-04	0.00000E+00	0.00000E+00
72	7.66564E-01	7.65839E-01	8.81431E-04	0.00000E+00	0.00000E+00
73	7.66190E-01	7.65846E-01	8.62436E-04	0.00000E+00	0.00000E+00
74	7.68306E-01	7.65895E-01	8.46079E-04	0.00000E+00	0.00000E+00
75	7.70349E-01	7.65980E-01	8.38000E-04	0.00000E+00	0.00000E+00
76	7.64219E-01	7.65947E-01	8.16448E-04	0.00000E+00	0.00000E+00
77	7.64114E-01	7.65913E-01	7.99361E-04	0.00000E+00	0.00000E+00
78	7.69747E-01	7.65983E-01	7.79150E-04	0.00000E+00	0.00000E+00
79	7.66090E-01	7.65985E-01	7.64341E-04	0.00000E+00	0.00000E+00
80	7.60738E-01	7.65893E-01	8.24004E-04	0.00000E+00	0.00000E+00
81	7.62014E-01	7.65826E-01	8.29297E-04	0.00000E+00	0.00000E+00
82	7.71007E-01	7.65914E-01	7.99942E-04	0.00000E+00	0.00000E+00
83	7.69388E-01	7.65971E-01	7.93201E-04		

```
0.00000E+00      0.00000E+00
         84       7.75064E-01      7.66121E-01      7.43830E-04
0.00000E+00      0.00000E+00
         85       7.66803E-01      7.66132E-01      7.34406E-04
0.00000E+00      0.00000E+00
         86       7.66390E-01      7.66136E-01      7.22968E-04
0.00000E+00      0.00000E+00
         87       7.70808E-01      7.66209E-01      7.15542E-04
0.00000E+00      0.00000E+00
         88       7.63095E-01      7.66161E-01      7.00709E-04
0.00000E+00      0.00000E+00
         89       7.67991E-01      7.66188E-01      6.90689E-04
0.00000E+00      0.00000E+00
         90       7.53058E-01      7.65993E-01      7.18953E-04
0.00000E+00      0.00000E+00
         91       7.70617E-01      7.66061E-01      6.88834E-04
0.00000E+00      0.00000E+00
         92       7.67935E-01      7.66088E-01      6.70549E-04
0.00000E+00      0.00000E+00
         93       7.66351E-01      7.66091E-01      6.60984E-04
0.00000E+00      0.00000E+00
         94       7.68916E-01      7.66131E-01      6.53994E-04
0.00000E+00      0.00000E+00
         95       7.64935E-01      7.66115E-01      6.44836E-04
0.00000E+00      0.00000E+00
         96       7.67504E-01      7.66134E-01      6.37062E-04
0.00000E+00      0.00000E+00
         97       7.63516E-01      7.66098E-01      6.30451E-04
0.00000E+00      0.00000E+00
         98       7.65670E-01      7.66093E-01      6.21634E-04
0.00000E+00      0.00000E+00
         99       7.61801E-01      7.66036E-01      6.19708E-04
0.00000E+00      0.00000E+00
        100       7.62170E-01      7.65986E-01      6.23267E-04
0.00000E+00      0.00000E+00
        101       7.63322E-01      7.65952E-01      6.22673E-04
0.00000E+00      0.00000E+00
        102       7.68723E-01      7.65987E-01      6.09873E-04
0.00000E+00      0.00000E+00
        103       7.63296E-01      7.65953E-01      5.96098E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=46A09E022A937007
        104       7.65962E-01      7.65953E-01      5.88500E-04
0.00000E+00      0.00000E+00
        105       7.61057E-01      7.65894E-01      5.88272E-04
0.00000E+00      0.00000E+00
        106       7.64366E-01      7.65875E-01      5.90448E-04
0.00000E+00      0.00000E+00
        107       7.64202E-01      7.65855E-01      5.86532E-04
0.00000E+00      0.00000E+00
        108       7.64135E-01      7.65835E-01      5.81361E-04
```

```
0.00000E+00      0.00000E+00
        109       7.60993E-01      7.65779E-01      6.36686E-04
0.00000E+00      0.00000E+00
        110       7.67842E-01      7.65802E-01      6.22397E-04
0.00000E+00      0.00000E+00
        111       7.67625E-01      7.65823E-01      5.64097E-04
0.00000E+00      0.00000E+00
        112       7.68349E-01      7.65852E-01      5.60362E-04
0.00000E+00      0.00000E+00
        113       7.62370E-01      7.65813E-01      6.02101E-04
0.00000E+00      0.00000E+00
        114       7.64980E-01      7.65804E-01      5.96034E-04
0.00000E+00      0.00000E+00
        115       7.63099E-01      7.65774E-01      5.90824E-04
0.00000E+00      0.00000E+00
        116       7.63882E-01      7.65754E-01      5.84527E-04
0.00000E+00      0.00000E+00
        117       7.61647E-01      7.65710E-01      5.85613E-04
0.00000E+00      0.00000E+00
        118       7.71163E-01      7.65768E-01      5.68893E-04
0.00000E+00      0.00000E+00
        119       7.67412E-01      7.65785E-01      5.61760E-04
0.00000E+00      0.00000E+00
        120       7.63978E-01      7.65766E-01      5.55356E-04
0.00000E+00      0.00000E+00
        121       7.64627E-01      7.65755E-01      5.51196E-04
0.00000E+00      0.00000E+00
        122       7.57796E-01      7.65674E-01      5.18929E-04
0.00000E+00      0.00000E+00
        123       7.66428E-01      7.65682E-01      5.12100E-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=19327AB7B59C6227
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55043E-05 + or -  1.10174E-08             generation time
=  2.99231E-05 + or -  2.00911E-08
 nu bar   =  2.43894E+00 + or -  9.26751E-06       average fission group
=  2.17576E+02 + or -  8.84615E-03
                      energy(ev) of the average lethargy causing fission
=  5.65797E-02 + or -  1.23854E-04
                                              system mean free path (cm)
=  6.52935E-01 + or -  1.65960E-04

 no. of initial
deviation of
  generations      average                         67 per cent
```

skipped	k-effective	deviation	95 per cent confidence interval	99 per cent confidence interval	number of histories	variance confidence interval (per cent)
23	0.76568	+ or - 0.00051	0.76517 to 0.76619	0.76466 to 0.76671	0.76415 to 0.76722	2000000	14.6753
24	0.76586	+ or - 0.00046	0.76540 to 0.76632	0.76494 to 0.76678	0.76448 to 0.76723	1980000	11.9053
25	0.76594	+ or - 0.00046	0.76548 to 0.76640	0.76501 to 0.76686	0.76455 to 0.76732	1960000	11.9155
26	0.76597	+ or - 0.00047	0.76551 to 0.76644	0.76504 to 0.76691	0.76457 to 0.76737	1940000	11.8658
27	0.76595	+ or - 0.00047	0.76548 to 0.76642	0.76500 to 0.76689	0.76453 to 0.76736	1920000	11.8720
28	0.76591	+ or - 0.00047	0.76544 to 0.76638	0.76496 to 0.76686	0.76449 to 0.76733	1900000	11.9781
29	0.76591	+ or - 0.00048	0.76543 to 0.76639	0.76495 to 0.76687	0.76447 to 0.76735	1880000	11.9245
30	0.76589	+ or - 0.00049	0.76541 to 0.76638	0.76492 to 0.76687	0.76443 to 0.76735	1860000	11.7820
31	0.76597	+ or - 0.00049	0.76547 to 0.76646	0.76498 to 0.76695	0.76448 to 0.76745	1840000	11.6676
32	0.76604	+ or - 0.00049	0.76555 to 0.76652	0.76507 to 0.76701	0.76458 to 0.76749	1820000	12.3329
37	0.76603	+ or - 0.00046	0.76557 to 0.76650	0.76511 to 0.76696	0.76465 to 0.76742	1720000	14.8498
42	0.76594	+ or - 0.00058	0.76536 to 0.76652	0.76478 to 0.76710	0.76420 to 0.76768	1620000	10.1011
47	0.76607	+ or - 0.00059	0.76548 to 0.76667	0.76489 to 0.76726	0.76429 to 0.76785	1520000	10.1423
52	0.76586	+ or - 0.00046	0.76540 to 0.76632	0.76494 to 0.76677	0.76448 to 0.76723	1420000	19.0862
57	0.76565	+ or - 0.00048	0.76517 to 0.76613	0.76468 to 0.76662	0.76420 to 0.76710	1320000	19.3383
62	0.76552	+ or - 0.00052	0.76500 to 0.76604	0.76449 to 0.76656	0.76397 to 0.76707	1220000	19.2840

```
      67          0.76555   + or - 0.00055     0.76500 to 0.76610
0.76446 to 0.76665    0.76391 to 0.76720    1120000      20.4495

      72          0.76553   + or - 0.00060     0.76493 to 0.76613
0.76433 to 0.76673    0.76373 to 0.76733    1020000      20.5674

      77          0.76541   + or - 0.00066     0.76475 to 0.76607
0.76408 to 0.76674    0.76342 to 0.76740     920000      20.3025

      82          0.76535   + or - 0.00072     0.76463 to 0.76607
0.76391 to 0.76679    0.76319 to 0.76750     820000      21.6705

      87          0.76474   + or - 0.00068     0.76407 to 0.76542
0.76339 to 0.76610    0.76271 to 0.76678     720000      25.7921

      92          0.76478   + or - 0.00058     0.76420 to 0.76536
0.76362 to 0.76593    0.76304 to 0.76651     620000      20.7317

      97          0.76450   + or - 0.00060     0.76390 to 0.76509
0.76330 to 0.76569    0.76270 to 0.76629     520000      27.2809

     102          0.76453   + or - 0.00069     0.76384 to 0.76522
0.76315 to 0.76591    0.76246 to 0.76660     420000      31.2277

     107          0.76477   + or - 0.00088     0.76389 to 0.76565
0.76300 to 0.76654    0.76212 to 0.76742     320000      32.6945

     112          0.76431   + or - 0.00114     0.76317 to 0.76545
0.76203 to 0.76658    0.76089 to 0.76772     220000      44.3787
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          0.76523   + or - 0.00310     0.76214 to 0.76833
0.75904 to 0.77143    0.75595 to 0.77452     120000      24.7666
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76568 + or - 0.00051 which occurs for
123 generations run.

                                 0.7481                   0.7572
0.7662

|-------------------------|------------------------|------------------
------|------------------------
          |
```

```
      25 +                          I             *             I
|
         |                            I                   *
I     |
         |                     I                                 *
|                 I
         |                                   I
*           |               I
         |                                    I
*         |                  I
      30 +                                            I
*       |             I
         |                                                I
*        |        I
         |                                                  I
*         |   I
         |                                                        I
*       | I
         |                                                          I
*       I
      35 +                                                            I
*       I
         |                                                            I
*      I|
         |
I      *     |I
         |
I      *     I
         |
I     *    | I
      40 +
I     *   | I
         |
I     *   |I
         |
I    *  | I
         |
I    *   |I
         |
I    *   |I
      45 +
I    *   I
         |
I   *   |I
         |
I    *  |I
         |
I   *  |I
         |
I   *  | I
      50 +
I   * | I
```

```
          |
I   * | I
          |
I   *|  I
          |
I   *|   I
          |
I   *   I
      55 +
I   *   I
          |
I   *  I
          |
I  *   I
          |
I  |*  I
          |
I  *   I
      60 +
I  *   I
          |
I  *   I
          |
I |*  I
          |
I  *  I
          |
I  *  I
      65 +
I  *  I
          |
I  *   I
          |
I *  I
          |
I |* I
          |
I *  I
      70 +
I *  I
          |
I *  I
          |
I *  I
          |
I *  I
          |
I |* I
      75 +
I|* I
          |
I|* I
```

```
          |
I |* I
          |
I|* I
          |
I|* I
      80 +
I |* I
          |
I *  I
          |
I |* I
          |
I|* I
          |
I|* I
      85 +
I|* I
          |
I|* I
          |
I *I
          |
I|* I
          |
I* I
      90 +
I|* I
          |
I|* I
          |
I|* I
          |
I|* I
          |
I|* I
      95 +
I|* I
          |
I* I
          |
I|* I
          |
I|* I
          |
I|* I
     100 +
I|* I
          |
I|* I
          |
I|* I
```

```
         |
I|*I
         |
I|*I
     105 +
I|*I
         |
I|*I
         |
I|*I
         |
I* I
         |
I* I
     110 +
I* I
         |
I* I
         |
I|*I
         |
I* I
         |
I* I
     115 +
I* I
         |
I* I
         |
I* I
         |
I* I
         |
I* I
     120 +
I* I
         |
I* I
         |
I*I
         |
I*I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7657 + or - 0.0004 which occurs for 53 generations skipped.

```
                                 0.7621                   0.7641
0.7661

|-------------------------|------------------------|------------------
```

```
------|------------------------
          |
          |
I     *|    I
          |
I    |*     I
      25 +
I   | *     I
          |
I  |  *    I
          |
I   | *     I
          |
I   | *     I
          |
I   | *     I
      30 +
I   | *     I
          |
I   | *      I
          |
I  |  *     I
          |
I  |  *     I
          |
I  |  *      I
      35 +
I |   *     I
          |
I |   *      I
          |
I |  *     I
          |
I |   *     I
          |
I  |  *     I
      40 +
I  |  *     I
          |
I   |  *      I
          |
I    | *      I
          |
I  |   *      I
          |
I  |   *      I
      45 +
I  |    *      I
          |
I  |   *      I
          |
I   |   *      I
```

```
          |
I   |   *      I
          |
I   |  *      I
      50 +
I    | *       I
          |
I    | *      I
          |
I    |*     I
          |
I     *     I
          |
I     *     I
      55 +
I     *    I
          |
I     *    I
          |
I     *|    I
          |
I     *  |  I
          |
I      *|    I
      60 +
I      *|    I
          |
I     * |   I
          |
I     *  |  I
          |
I      * |   I
          |
I     * |    I
      65 +
I      *|    I
          |
I      * |    I
          |
I     *  |   I
          |
I      *  |   I
          |
I      *  |   I
      70 +                                                                I
*  |    I
          |
I      *  |    I
          |
I      *  |    I
          |                                                              I
*  |   I
```

```
          |                                                                I
*   |   I
      75 +                                                              I
*    |  I
          |                                                              I
*    |  I
          |                                                              I
*   |   I
          |                                                            I
*     |  I
          |                                                          I
*     |  I
      80 +                                                            I
*    |    I
          |                                                              I
*   |     I
          |                                                            I
*    |   I
          |                                                          I
*     |  I
          |                                                      I
*        I|
      85 +                                                     I         *
I |
          |                                                     I        *
I |
          |                                                  I        *
I   |
          |                                                   I        *
I   |
          |                                                  I        *
I    |
      90 +                                                       I
*       I|
          |                                                      I      *
I   |
          |                                                     I      *
I    |
          |                                                    I      *
I     |
          |                                                 I      *
I       |
      95 +                                                  I      *
I       |
          |                                                I      *
I         |
          |                                                I      *
I       |
          |                                              I        *
I         |
          |                                               I        *
I      |
```

```
     100 +                                                   I       *
I    |
         |                                                   I        *
I   |
         |                                               I        *
I      |
         |                                               I        *
I     |
         |                                              I         *
I     |
     105 +                                                I         *
I  |
         |                                                I         *
I |
         |                                                I          *
I|
         |                                               I           *
I
         |                                                  I
*       |   I
     110 +                                               I            *
| I
         |                                           I             *
I
         |                                        I             *
I   |
         |                                         I              *
I
         |                                     I                 *
|I
     115 +                                     I                   *
|     I
         |                                 I                       *
|          I
         |                         I
*      |
         |       I                                          *
|                   I
         |                                        *
|                         I
     120 +                                     *
|                     I

   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
2	0.0000	2.32345E-07	100.0000	3.78970E-07	35.1010
3	0.0000	1.62663E-05	10.2048	2.02185E-05	4.6230
4	0.0000	2.41808E-05	7.9795	3.42563E-05	3.6066
5	0.0000	2.62034E-05	7.8639	5.35272E-05	2.9086
6	0.0001	9.29807E-05	4.0416	2.25418E-04	1.4097
7	0.0001	1.13017E-04	2.8704	2.07992E-04	1.2717
8	0.0003	2.47832E-04	2.3157	3.26820E-04	1.0514
9	0.0005	3.82756E-04	1.2150	4.43382E-04	0.6094
10	0.0003	1.99732E-04	1.6175	2.07191E-04	0.6817
11	0.0012	9.14512E-04	0.7761	5.25042E-04	0.5370
12	0.0010	7.67231E-04	0.7171	3.00760E-04	0.7058
13	0.0003	2.29767E-04	1.2837	9.12905E-05	1.2715
14	0.0013	9.92973E-04	0.6391	4.05908E-04	0.6329
15	0.0010	7.62562E-04	0.7204	3.28755E-04	0.7119
16	0.0002	1.85193E-04	1.1929	8.51082E-05	1.1746
17	0.0001	6.83223E-05	1.8055	3.32161E-05	1.7731
18	0.0001	5.08368E-05	1.5421	2.56842E-05	1.5135
19	0.0001	7.88490E-05	1.4274	4.17128E-05	1.3952
20	0.0001	5.88790E-05	1.6445	3.22694E-05	1.6016
21	0.0002	1.20363E-04	0.9205	6.79580E-05	0.8991
22	0.0001	1.04608E-04	1.1238	6.19407E-05	1.0957
23	0.0001	1.05413E-04	1.1965	6.43559E-05	1.1696
24	0.0000	2.45769E-05	2.2995	1.52575E-05	2.2387
25	0.0000	3.10961E-05	1.7931	1.94277E-05	1.7426
26	0.0000	1.78664E-05	2.2091		

1.12122E-05	2.1563	0.00000E+00	0.0000	27	0.0001	5.28929E-05	1.4208
3.30164E-05	1.3891	0.00000E+00	0.0000	28	0.0001	9.65084E-05	0.8460
6.02108E-05	0.8313	0.00000E+00	0.0000	29	0.0001	9.79907E-05	1.1850
6.17192E-05	1.1681	0.00000E+00	0.0000	30	0.0000	1.20961E-05	3.1142
7.58935E-06	3.0905	0.00000E+00	0.0000	31	0.0001	9.58591E-05	0.9717
6.05632E-05	0.9592	0.00000E+00	0.0000	32	0.0000	3.66315E-05	1.6398
2.34320E-05	1.6042	0.00000E+00	0.0000	33	0.0000	3.27033E-05	1.6340
2.04761E-05	1.6148	0.00000E+00	0.0000	34	0.0001	7.47958E-05	0.9803
4.69910E-05	0.9667	0.00000E+00	0.0000	35	0.0001	4.70199E-05	1.4732
2.94885E-05	1.4508	0.00000E+00	0.0000	36	0.0001	4.25804E-05	1.2090
2.63589E-05	1.1977	0.00000E+00	0.0000	37	0.0000	2.85360E-05	1.7828
1.79072E-05	1.7464	0.00000E+00	0.0000	38	0.0000	3.44771E-05	1.6822
2.17000E-05	1.6408	0.00000E+00	0.0000	39	0.0002	1.28003E-04	0.8019
8.14835E-05	0.7846	0.00000E+00	0.0000	40	0.0002	1.20625E-04	0.8762
7.79716E-05	0.8602	0.00000E+00	0.0000	41	0.0002	1.60270E-04	0.8287
1.07093E-04	0.8042	0.00000E+00	0.0000	42	0.0002	1.40651E-04	0.7909
9.56516E-05	0.7712	0.00000E+00	0.0000	43	0.0001	7.93692E-05	1.1895
5.69741E-05	1.1409	0.00000E+00	0.0000	44	0.0001	1.12047E-04	0.9569
8.23820E-05	0.9205	0.00000E+00	0.0000	45	0.0001	5.90141E-05	1.0285
4.76552E-05	0.9454	0.00000E+00	0.0000	46	0.0000	1.41818E-05	2.2295
1.14181E-05	2.0688	0.00000E+00	0.0000	47	0.0001	4.09634E-05	1.6820
3.18123E-05	1.6218	0.00000E+00	0.0000	48	0.0000	1.15389E-05	3.6497
8.96944E-06	3.5494	0.00000E+00	0.0000	49	0.0001	8.14449E-05	1.5574
6.42124E-05	1.5270	0.00000E+00	0.0000	50	0.0001	5.63444E-05	1.8514
4.64000E-05	1.8143	0.00000E+00	0.0000	51	0.0000	1.51831E-05	3.5242
1.26159E-05	3.4562	0.00000E+00	0.0000	52	0.0001	4.00067E-05	1.9536

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3.46251E-05     1.9007       0.00000E+00     0.0000
   53    0.0002                 1.55819E-04     0.8892
1.53311E-04     0.8293       0.00000E+00     0.0000
   54    0.0001                 7.67586E-05     1.7845
7.12398E-05     1.7189       0.00000E+00     0.0000
   55    0.0002                 1.60284E-04     1.4770
1.46984E-04     1.4397       0.00000E+00     0.0000
   56    0.0002                 1.18957E-04     1.5704
1.10270E-04     1.5345       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                 1.48918E-04     1.6170
1.35168E-04     1.5773       0.00000E+00     0.0000
   58    0.0001                 8.56226E-05     1.9326
7.49976E-05     1.8789       0.00000E+00     0.0000
   59    0.0002                 1.61722E-04     1.4671
1.45138E-04     1.4074       0.00000E+00     0.0000
   60    0.0004                 2.73951E-04     1.1899
2.48362E-04     1.1227       0.00000E+00     0.0000
   61    0.0000                 2.89525E-05     3.8573
2.22607E-05     3.7295       0.00000E+00     0.0000
   62    0.0002                 1.58544E-04     1.7102
1.33090E-04     1.6622       0.00000E+00     0.0000
   63    0.0002                 1.17849E-04     2.0294
9.70719E-05     1.9633       0.00000E+00     0.0000
   64    0.0001                 1.05734E-04     2.1668
8.51176E-05     2.1027       0.00000E+00     0.0000
   65    0.0000                 3.17721E-05     3.8138
3.14744E-05     3.6871       0.00000E+00     0.0000
   66    0.0002                 1.65852E-04     1.8995
1.47321E-04     1.8368       0.00000E+00     0.0000
   67    0.0002                 1.48129E-04     2.1614
1.21081E-04     2.0937       0.00000E+00     0.0000
   68    0.0000                 2.74707E-05     4.4844
2.37641E-05     4.3228       0.00000E+00     0.0000
   69    0.0004                 2.99676E-04     1.4631
2.35261E-04     1.4154       0.00000E+00     0.0000
   70    0.0003                 2.07109E-04     1.7728
1.88539E-04     1.7066       0.00000E+00     0.0000
   71    0.0006                 4.36918E-04     1.3294
3.61346E-04     1.2883       0.00000E+00     0.0000
   72    0.0001                 4.66204E-05     5.3282
2.75870E-05     5.1912       0.00000E+00     0.0000
   73    0.0004                 3.16226E-04     1.5191
2.41499E-04     1.4377       0.00000E+00     0.0000
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74	0.0014	1.05078E-03	0.9981	7.64461E-04	0.9565
0.00000E+00	0.0000				
75	0.0001	1.12373E-04	3.0808	8.62662E-05	2.9393
0.00000E+00	0.0000				
76	0.0006	4.61926E-04	1.7589	2.93338E-04	1.6974
0.00000E+00	0.0000				
77	0.0005	3.71457E-04	1.9637	2.66347E-04	1.8875
0.00000E+00	0.0000				
78	0.0000	6.86347E-06	4.6965	6.71913E-05	4.6445
0.00000E+00	0.0000				
79	0.0002	1.81460E-04	2.3982	1.22137E-04	2.3038
0.00000E+00	0.0000				
80	0.0001	6.46661E-05	3.2240	8.61396E-05	3.1392
0.00000E+00	0.0000				
81	0.0014	1.08126E-03	1.2154	7.94549E-04	1.1636
0.00000E+00	0.0000				
82	0.0001	6.23429E-05	4.6040	3.75660E-05	4.3427
0.00000E+00	0.0000				
83	0.0002	1.28700E-04	3.0926	1.42352E-04	3.0306
0.00000E+00	0.0000				
84	0.0001	7.86312E-05	2.5261	7.97985E-05	2.3464
0.00000E+00	0.0000				
85	0.0003	1.95257E-04	2.3081	2.40539E-04	2.2434
0.00000E+00	0.0000				
86	0.0003	2.66751E-04	2.5168	2.14670E-04	2.3914
0.00000E+00	0.0000				
87	0.0004	3.27842E-04	2.3503	2.04121E-04	2.2464
0.00000E+00	0.0000				
88	0.0001	5.35485E-05	4.1566	9.72727E-05	4.0484
0.00000E+00	0.0000				
89	0.0001	9.37825E-05	3.5035	6.50610E-05	3.2340
0.00000E+00	0.0000				
90	0.0003	2.30356E-04	2.7145	1.35855E-04	2.5987
0.00000E+00	0.0000				
91	0.0002	1.86579E-04	2.8052	1.18107E-04	2.6347
0.00000E+00	0.0000				
92	0.0000	3.11048E-05	2.3498	2.03505E-04	2.3044
0.00000E+00	0.0000				
93	0.0002	1.22850E-04	3.5447	1.00287E-04	3.2850
0.00000E+00	0.0000				
94	0.0001	1.08298E-04	3.8807	6.09291E-05	3.6334
0.00000E+00	0.0000				
95	0.0008	6.22196E-04	2.2858	3.83556E-04	2.2142
0.00000E+00	0.0000				
96	0.0002	1.43132E-04	4.6356	7.28842E-05	4.4219
0.00000E+00	0.0000				
97	0.0004	2.94579E-04	3.9738	1.68482E-04	3.8958
0.00000E+00	0.0000				
98	0.0001	1.00083E-04	4.0130	9.60503E-05	3.8677
0.00000E+00	0.0000				
99	0.0001	9.83519E-05	4.3664	6.60213E-05	4.2107
0.00000E+00	0.0000				

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  100    0.0002                 1.23799E-04     4.4087
8.28873E-05     4.2201       0.00000E+00     0.0000
  101    0.0001                 1.10048E-04     3.9371
7.01552E-05     3.6409       0.00000E+00     0.0000
  102    0.0002                 1.64621E-04     3.6192
9.17236E-05     3.4719       0.00000E+00     0.0000
  103    0.0001                 9.75310E-05     3.5433
9.50275E-05     3.3585       0.00000E+00     0.0000
  104    0.0002                 1.71129E-04     3.1968
1.35500E-04     3.0945       0.00000E+00     0.0000
  105    0.0001                 1.14478E-04     3.4772
7.60245E-05     3.2611       0.00000E+00     0.0000
  106    0.0002                 1.85757E-04     4.0380
1.37992E-04     3.9884       0.00000E+00     0.0000
  107    0.0001                 6.37783E-05     3.1429
6.44579E-05     2.9390       0.00000E+00     0.0000
  108    0.0000                 3.32630E-05     2.6652
1.43891E-04     2.5937       0.00000E+00     0.0000
  109    0.0002                 1.35128E-04     2.1892
4.48179E-04     2.1598       0.00000E+00     0.0000
  110    0.0008                 6.24202E-04     2.9225
3.85056E-04     2.8942       0.00000E+00     0.0000
  111    0.0002                 1.49223E-04     4.7184
1.37273E-04     4.5898       0.00000E+00     0.0000
  112    0.0002                 1.22604E-04     4.3465
1.29095E-04     4.2716       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                 1.31000E-04     3.8803
1.14245E-04     3.6412       0.00000E+00     0.0000
  114    0.0000                 8.61064E-06     7.5160
1.23101E-05     5.9636       0.00000E+00     0.0000
  115    0.0001                 7.51666E-05     4.3374
8.71272E-05     4.0182       0.00000E+00     0.0000
  116    0.0003                 1.97063E-04     3.0585
1.47911E-04     2.7712       0.00000E+00     0.0000
  117    0.0006                 4.71744E-04     2.1789
2.52343E-04     2.0402       0.00000E+00     0.0000
  118    0.0007                 5.66840E-04     2.1027
4.43168E-04     2.0177       0.00000E+00     0.0000
  119    0.0002                 1.32862E-04     1.7666
3.43605E-04     1.7059       0.00000E+00     0.0000
  120    0.0002                 1.71585E-04     1.9613
6.52797E-04     1.9327       0.00000E+00     0.0000
  121    0.0007                 5.30143E-04     2.4265
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4.07773E-04 2.3704 0.00000E+00 0.0000
122 0.0001 1.09002E-04 4.2823
8.49509E-05 4.0150 0.00000E+00 0.0000
123 0.0003 2.18834E-04 2.8174
1.54811E-04 2.5135 0.00000E+00 0.0000
124 0.0003 2.39642E-04 3.1226
1.97433E-04 2.9211 0.00000E+00 0.0000
125 0.0002 1.41113E-04 3.3644
1.29673E-04 3.0295 0.00000E+00 0.0000
126 0.0001 9.20811E-05 4.0276
8.34702E-05 3.5113 0.00000E+00 0.0000
127 0.0005 4.08202E-04 3.3051
2.00090E-04 3.1328 0.00000E+00 0.0000
128 0.0003 2.21769E-04 3.2136
1.36674E-04 2.8599 0.00000E+00 0.0000
129 0.0006 4.52371E-04 2.5319
4.16472E-04 2.4128 0.00000E+00 0.0000
130 0.0002 1.17793E-04 2.7837
2.87255E-04 2.6979 0.00000E+00 0.0000
131 0.0004 3.01152E-04 2.1953
2.41311E-04 1.8575 0.00000E+00 0.0000
132 0.0007 5.31938E-04 2.2937
3.26318E-04 2.1132 0.00000E+00 0.0000
133 0.0013 1.01514E-03 1.8726
6.42276E-04 1.7735 0.00000E+00 0.0000
134 0.0001 8.84162E-05 2.3315
2.31010E-04 1.9556 0.00000E+00 0.0000
135 0.0002 1.80972E-04 2.8005
2.68201E-04 2.7305 0.00000E+00 0.0000
136 0.0001 4.51022E-05 1.8739
6.99862E-04 1.8430 0.00000E+00 0.0000
137 0.0000 1.92471E-05 1.0315
3.46339E-03 1.0286 0.00000E+00 0.0000
138 0.0004 3.04455E-04 1.9109
7.93604E-04 1.8833 0.00000E+00 0.0000
139 0.0002 1.86367E-04 3.3347
2.28458E-04 3.1460 0.00000E+00 0.0000
140 0.0003 2.23615E-04 2.5659
2.95394E-04 2.2533 0.00000E+00 0.0000
141 0.0001 8.29288E-05 2.4039
2.60312E-04 2.1521 0.00000E+00 0.0000
142 0.0001 6.79917E-05 3.0311
2.34403E-04 2.7908 0.00000E+00 0.0000
143 0.0001 8.29693E-05 2.3539
1.76335E-04 1.4690 0.00000E+00 0.0000
144 0.0000 3.31051E-05 3.4668
7.27468E-05 2.1418 0.00000E+00 0.0000
145 0.0005 3.78544E-04 2.6848
2.97077E-04 2.4385 0.00000E+00 0.0000
146 0.0005 3.62310E-04 2.2228
2.62211E-04 1.8241 0.00000E+00 0.0000
147 0.0002 1.62802E-04 3.5726

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1.05428E-04     3.0631       0.00000E+00     0.0000
  148    0.0001                 5.22313E-05     5.9467
3.58356E-05     4.6405       0.00000E+00     0.0000
  149    0.0000                 3.12953E-05     7.8548
2.15528E-05     6.0897       0.00000E+00     0.0000
  150    0.0001                 9.24832E-05     4.4913
6.64671E-05     3.3523       0.00000E+00     0.0000
  151    0.0001                 6.77565E-05     4.2698
5.73036E-05     2.9762       0.00000E+00     0.0000
  152    0.0001                 4.08567E-05     4.4323
4.67526E-05     2.6034       0.00000E+00     0.0000
  153    0.0001                 4.09041E-05     3.9698
4.60915E-05     2.3368       0.00000E+00     0.0000
  154    0.0001                 5.25992E-05     4.3199
5.31456E-05     2.6257       0.00000E+00     0.0000
  155    0.0001                 4.76316E-05     4.1755
4.80514E-05     2.4328       0.00000E+00     0.0000
  156    0.0001                 4.65597E-05     4.9598
4.59118E-05     2.9926       0.00000E+00     0.0000
  157    0.0001                 5.16960E-05     4.9597
5.31190E-05     2.8576       0.00000E+00     0.0000
  158    0.0001                 6.89217E-05     4.0881
6.92972E-05     2.7304       0.00000E+00     0.0000
  159    0.0002                 1.55522E-04     2.4045
2.15266E-04     2.0449       0.00000E+00     0.0000
  160    0.0001                 6.05208E-05     4.3277
7.23097E-05     3.2253       0.00000E+00     0.0000
  161    0.0001                 7.13673E-05     4.1173
7.12831E-05     2.6885       0.00000E+00     0.0000
  162    0.0001                 8.64735E-05     3.5155
8.10906E-05     2.2134       0.00000E+00     0.0000
  163    0.0001                 9.22811E-05     3.7293
8.61074E-05     2.2270       0.00000E+00     0.0000
  164    0.0001                 9.88650E-05     3.7852
9.25007E-05     2.3034       0.00000E+00     0.0000
  165    0.0001                 1.09940E-04     3.5445
1.02435E-04     2.1617       0.00000E+00     0.0000
  166    0.0001                 7.27665E-05     4.3833
6.53841E-05     2.9053       0.00000E+00     0.0000
  167    0.0001                 7.93002E-05     4.4471
7.12078E-05     2.9023       0.00000E+00     0.0000
  168    0.0001                 8.87685E-05     4.3810
7.85490E-05     2.9632       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
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169	0.0001	1.01800E-04	4.1100	9.03442E-05	2.8297
0.00000E+00	0.0000				
170	0.0002	1.31553E-04	4.2292	1.12494E-04	3.1296
0.00000E+00	0.0000				
171	0.0001	9.17545E-05	4.7559	7.17416E-05	3.7742
0.00000E+00	0.0000				
172	0.0002	1.35817E-04	4.6419	9.65460E-05	3.8938
0.00000E+00	0.0000				
173	0.0003	1.92810E-04	4.0418	1.27391E-04	3.5062
0.00000E+00	0.0000				
174	0.0003	2.32158E-04	4.1928	1.45659E-04	3.7195
0.00000E+00	0.0000				
175	0.0002	1.17066E-04	6.1310	7.02353E-05	5.5577
0.00000E+00	0.0000				
176	0.0001	1.06748E-04	6.3759	6.43855E-05	5.7001
0.00000E+00	0.0000				
177	0.0002	1.20433E-04	6.0374	7.10570E-05	5.4238
0.00000E+00	0.0000				
178	0.0001	1.12946E-04	6.0667	6.63653E-05	5.4493
0.00000E+00	0.0000				
179	0.0001	1.10546E-04	6.8694	6.48183E-05	6.1568
0.00000E+00	0.0000				
180	0.0001	1.06442E-04	7.0302	6.23326E-05	6.1551
0.00000E+00	0.0000				
181	0.0001	1.07700E-04	6.6325	6.24805E-05	5.8877
0.00000E+00	0.0000				
182	0.0001	9.68794E-05	5.7109	5.69187E-05	4.9068
0.00000E+00	0.0000				
183	0.0001	1.00540E-04	6.0785	5.83855E-05	5.2859
0.00000E+00	0.0000				
184	0.0001	9.94230E-05	6.1351	5.78843E-05	5.2948
0.00000E+00	0.0000				
185	0.0001	9.56298E-05	6.2912	5.56318E-05	5.4297
0.00000E+00	0.0000				
186	0.0001	8.74549E-05	6.7712	5.15522E-05	5.7060
0.00000E+00	0.0000				
187	0.0001	9.10716E-05	6.2798	5.31485E-05	5.3174
0.00000E+00	0.0000				
188	0.0001	8.93486E-05	6.2965	5.25046E-05	5.2794
0.00000E+00	0.0000				
189	0.0001	8.89422E-05	6.1465	5.22564E-05	5.1411
0.00000E+00	0.0000				
190	0.0003	2.19367E-04	4.0464	1.29284E-04	3.3667
0.00000E+00	0.0000				
191	0.0003	2.12342E-04	3.8112	1.26706E-04	3.1263
0.00000E+00	0.0000				
192	0.0002	1.90362E-04	4.0775	1.16122E-04	3.2187
0.00000E+00	0.0000				
193	0.0003	2.02160E-04	3.9677	1.22389E-04	3.2161
0.00000E+00	0.0000				
194	0.0005	4.12942E-04	2.7337	2.53556E-04	2.1537
0.00000E+00	0.0000				

195	0.0005	4.12418E-04	2.6871	2.57015E-04	2.1144
196	0.0006	4.55263E-04	2.7256	2.84152E-04	2.1144
197	0.0007	5.16002E-04	2.4725	3.21340E-04	1.9270
198	0.0007	5.55377E-04	2.4500	3.46894E-04	1.9038
199	0.0004	3.38989E-04	2.9901	2.07119E-04	2.4032
200	0.0004	3.33654E-04	2.9903	2.07943E-04	2.3517
201	0.0010	8.00369E-04	2.2279	4.89605E-04	1.7768
202	0.0012	9.51587E-04	1.8623	5.80273E-04	1.4983
203	0.0016	1.22994E-03	1.7899	7.33564E-04	1.4517
204	0.0022	1.66765E-03	1.6925	9.80517E-04	1.4245
205	0.0015	1.17590E-03	2.2448	6.86287E-04	1.9109
206	0.0018	1.39936E-03	1.8470	8.14283E-04	1.5934
207	0.0022	1.67053E-03	1.6750	9.69390E-04	1.4457
208	0.0029	2.22433E-03	1.5340	1.29317E-03	1.3537
209	0.0031	2.40827E-03	1.3953	1.41436E-03	1.2274
210	0.0037	2.82138E-03	1.3863	1.68185E-03	1.2167
211	0.0041	3.11180E-03	1.2051	1.87486E-03	1.0587
212	0.0047	3.57842E-03	1.3193	2.16821E-03	1.1341
213	0.0064	4.86926E-03	0.9262	2.95820E-03	0.7798
214	0.0097	7.41011E-03	0.8716	4.46132E-03	0.7264
215	0.0157	1.19832E-02	0.5508	7.15566E-03	0.4637
216	0.0300	2.29619E-02	0.4491	1.35419E-02	0.3785
217	0.0200	1.53234E-02	0.6346	9.02495E-03	0.5273
218	0.0277	2.11893E-02	0.5451	1.24063E-02	0.4630
219	0.0358	2.74099E-02	0.3863	1.59855E-02	0.3280
220	0.0475	3.63895E-02	0.3350	2.11413E-02	0.2843
		0.00000E+00	0.0000		

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  221    0.0623                 4.76799E-02     0.3142
2.76619E-02     0.2656       0.00000E+00     0.0000
  222    0.0802                 6.14104E-02     0.2879
3.55653E-02     0.2439       0.00000E+00     0.0000
  223    0.1046                 8.01086E-02     0.2357
4.64587E-02     0.1999       0.00000E+00     0.0000
  224    0.0585                 4.48228E-02     0.3321
2.60968E-02     0.2778       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    0.2303                 1.76348E-01     0.1552
1.04451E-01     0.1353       0.00000E+00     0.0000
  226    0.0456                 3.49159E-02     0.4017
2.12429E-02     0.3289       0.00000E+00     0.0000
  227    0.0490                 3.75382E-02     0.3688
2.32973E-02     0.3008       0.00000E+00     0.0000
  228    0.0209                 1.59722E-02     0.5347
1.01182E-02     0.4342       0.00000E+00     0.0000
  229    0.0224                 1.71252E-02     0.6067
1.10096E-02     0.4757       0.00000E+00     0.0000
  230    0.0118                 9.06628E-03     0.7387
5.91324E-03     0.5746       0.00000E+00     0.0000
  231    0.0122                 9.34854E-03     0.8058
6.21325E-03     0.6061       0.00000E+00     0.0000
  232    0.0129                 9.84256E-03     0.7004
6.73684E-03     0.5164       0.00000E+00     0.0000
  233    0.0082                 6.24666E-03     0.8323
4.41067E-03     0.5973       0.00000E+00     0.0000
  234    0.0060                 4.62935E-03     0.9998
3.31187E-03     0.7196       0.00000E+00     0.0000
  235    0.0025                 1.92185E-03     1.8135
1.26029E-03     1.3846       0.00000E+00     0.0000
  236    0.0019                 1.47507E-03     2.1726
9.92872E-04     1.6616       0.00000E+00     0.0000
  237    0.0017                 1.28679E-03     2.3266
9.17174E-04     1.6229       0.00000E+00     0.0000
  238    0.0001                 6.75474E-05     8.7506
5.93666E-05     5.4664       0.00000E+00     0.0000

 system total =                  7.65682E-01     0.0574
4.68789E-01     0.0470       0.00000E+00     0.0000
```

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 the weight lost in the albedo portion of the problem =   5.3121E-01  +
or -  0.0002



 elapsed time   3.11133 minutes

 random number=   38AFAA1252042F7A
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                              fission
percent         total
                                                unit  region   density
deviation      fissions

                                                   1      1    3.088E-03
0.06         7.657E-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     flux     percent     flux     percent
                 deviation            deviation            deviation
    1   0.000E+00    0.00   0.000E+00    0.00   0.000E+00    0.00
    2   1.643E-08   24.66   1.331E-08   25.20   1.466E-08   24.63
    3   9.113E-07    4.31   7.478E-07    3.97   8.057E-07    4.02
    4   1.483E-06    3.00   1.216E-06    2.80   1.313E-06    2.80
    5   2.257E-06    2.26   1.881E-06    2.15   2.010E-06    2.13
    6   9.333E-06    1.21   7.486E-06    1.10   7.977E-06    1.05
    7   1.253E-05    1.17   9.507E-06    1.02   1.008E-05    1.03
    8   3.119E-05    0.72   2.282E-05    0.65   2.393E-05    0.66
    9   8.246E-05    0.46   5.923E-05    0.40   6.164E-05    0.38
   10   4.652E-05    0.61   3.299E-05    0.52   3.433E-05    0.50
   11   2.200E-04    0.29   1.556E-04    0.25   1.609E-04    0.23
   12   1.896E-04    0.32   1.383E-04    0.27   1.449E-04    0.27
   13   5.703E-05    0.53   4.143E-05    0.45   4.334E-05    0.43
   14   2.528E-04    0.25   1.830E-04    0.22   1.909E-04    0.21
   15   2.185E-04    0.25   1.586E-04    0.21   1.654E-04    0.21
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16	7.044E-05	0.48	5.139E-05	0.39	5.369E-05	0.39
17	3.217E-05	0.67	2.355E-05	0.59	2.450E-05	0.53
18	2.783E-05	0.81	2.028E-05	0.62	2.095E-05	0.55
19	5.002E-05	0.51	3.671E-05	0.44	3.814E-05	0.45
20	3.990E-05	0.63	2.916E-05	0.55	3.056E-05	0.53
21	7.949E-05	0.35	5.824E-05	0.31	6.091E-05	0.32
22	7.289E-05	0.41	5.344E-05	0.35	5.540E-05	0.34
23	7.710E-05	0.39	5.644E-05	0.35	5.856E-05	0.32
24	1.852E-05	0.85	1.371E-05	0.68	1.432E-05	0.64
25	2.386E-05	0.68	1.752E-05	0.57	1.830E-05	0.53
26	1.359E-05	0.97	1.005E-05	0.81	1.052E-05	0.73
27	4.194E-05	0.51	3.106E-05	0.43	3.293E-05	0.42
28	7.752E-05	0.35	5.761E-05	0.30	6.094E-05	0.29
29	7.914E-05	0.38	5.928E-05	0.32	6.205E-05	0.30
30	9.938E-06	1.00	7.479E-06	0.79	7.880E-06	0.77
31	7.873E-05	0.37	5.904E-05	0.30	6.217E-05	0.28
32	3.095E-05	0.58	2.326E-05	0.51	2.464E-05	0.45
33	2.676E-05	0.66	2.005E-05	0.62	2.120E-05	0.56
34	6.072E-05	0.40	4.598E-05	0.31	4.843E-05	0.32
35	3.625E-05	0.55	2.749E-05	0.54	2.890E-05	0.46
36	3.400E-05	0.47	2.564E-05	0.46	2.711E-05	0.44
37	2.191E-05	0.71	1.652E-05	0.52	1.732E-05	0.47
38	2.582E-05	0.55	1.966E-05	0.50	2.061E-05	0.43
39	9.666E-05	0.35	7.439E-05	0.30	7.855E-05	0.27
40	9.007E-05	0.32	6.945E-05	0.26	7.407E-05	0.25
41	1.134E-04	0.34	8.847E-05	0.29	9.468E-05	0.27
42	9.380E-05	0.32	7.396E-05	0.29	7.924E-05	0.25
43	5.098E-05	0.48	4.063E-05	0.43	4.272E-05	0.38
44	6.976E-05	0.37	5.608E-05	0.31	6.013E-05	0.28
45	3.548E-05	0.41	2.813E-05	0.35	3.120E-05	0.32
46	8.365E-06	0.94	6.595E-06	0.69	7.160E-06	0.60
47	2.361E-05	0.66	1.884E-05	0.55	1.962E-05	0.44
48	6.704E-06	1.03	5.350E-06	0.86	5.631E-06	0.77
49	4.410E-05	0.42	3.526E-05	0.38	3.781E-05	0.30
50	2.952E-05	0.50	2.378E-05	0.42	2.565E-05	0.36
51	7.838E-06	0.94	6.325E-06	0.82	6.886E-06	0.67
52	2.089E-05	0.55	1.676E-05	0.54	1.825E-05	0.47
53	7.631E-05	0.30	6.163E-05	0.26	6.695E-05	0.22
54	3.353E-05	0.39	2.705E-05	0.38	2.926E-05	0.32
55	6.623E-05	0.36	5.377E-05	0.30	5.869E-05	0.25
56	4.342E-05	0.37	3.536E-05	0.33	3.832E-05	0.28
57	4.927E-05	0.34	4.040E-05	0.31	4.381E-05	0.29
58	2.577E-05	0.45	2.112E-05	0.39	2.296E-05	0.32
59	4.428E-05	0.37	3.608E-05	0.34	3.929E-05	0.25
60	6.466E-05	0.33	5.281E-05	0.28	5.735E-05	0.25
61	6.196E-06	1.02	5.077E-06	0.96	5.543E-06	0.70
62	3.247E-05	0.44	2.655E-05	0.37	2.889E-05	0.31
63	2.161E-05	0.52	1.777E-05	0.49	1.933E-05	0.38
64	1.730E-05	0.60	1.421E-05	0.53	1.545E-05	0.44
65	5.633E-06	0.79	4.630E-06	0.74	5.056E-06	0.59
66	2.857E-05	0.36	2.356E-05	0.33	2.549E-05	0.32
67	2.116E-05	0.53	1.733E-05	0.47	1.891E-05	0.39

68	4.646E-06	0.96	3.821E-06	0.85	4.177E-06	0.78
69	3.736E-05	0.39	3.070E-05	0.34	3.337E-05	0.30
70	2.654E-05	0.54	2.193E-05	0.44	2.372E-05	0.36
71	4.555E-05	0.35	3.759E-05	0.29	4.085E-05	0.23
72	2.659E-06	1.32	2.223E-06	1.31	2.394E-06	0.95
73	2.703E-05	0.43	2.230E-05	0.36	2.426E-05	0.31
74	7.941E-05	0.28	6.572E-05	0.25	7.129E-05	0.22
75	8.967E-06	0.76	7.415E-06	0.66	8.102E-06	0.53
76	2.292E-05	0.53	1.895E-05	0.46	2.057E-05	0.37
77	1.769E-05	0.58	1.468E-05	0.48	1.595E-05	0.41
78	1.494E-06	1.67	1.239E-06	1.48	1.378E-06	1.32
79	9.923E-06	0.78	8.210E-06	0.70	8.907E-06	0.57
80	4.558E-06	0.97	3.759E-06	0.81	4.080E-06	0.73
81	5.549E-05	0.33	4.611E-05	0.27	4.988E-05	0.23
82	3.254E-06	1.10	2.690E-06	1.03	2.912E-06	0.83
83	4.407E-06	1.19	3.682E-06	0.99	4.005E-06	0.85
84	8.164E-06	0.83	6.738E-06	0.68	7.347E-06	0.60
85	9.879E-06	0.81	8.203E-06	0.68	8.926E-06	0.63
86	1.360E-05	0.58	1.136E-05	0.54	1.233E-05	0.43
87	1.191E-05	0.72	9.948E-06	0.65	1.075E-05	0.50
88	3.041E-06	1.24	2.590E-06	1.11	2.817E-06	0.87
89	6.580E-06	0.88	5.506E-06	0.81	5.993E-06	0.66
90	6.967E-06	0.90	5.827E-06	0.80	6.229E-06	0.65
91	8.313E-06	0.75	6.875E-06	0.67	7.489E-06	0.60
92	4.777E-06	0.95	3.946E-06	0.87	4.304E-06	0.77
93	8.080E-06	0.80	6.764E-06	0.71	7.350E-06	0.58
94	4.244E-06	1.23	3.551E-06	1.05	3.845E-06	0.87
95	1.259E-05	0.64	1.054E-05	0.56	1.139E-05	0.46
96	3.360E-06	1.25	2.797E-06	1.08	3.051E-06	0.98
97	3.309E-06	1.27	2.813E-06	1.08	3.053E-06	0.89
98	3.515E-06	1.27	2.938E-06	1.06	3.218E-06	0.76
99	2.325E-06	1.55	1.965E-06	1.43	2.092E-06	1.15
100	3.357E-06	1.25	2.838E-06	1.09	3.075E-06	0.91
101	5.049E-06	1.12	4.173E-06	0.98	4.481E-06	0.81
102	3.431E-06	1.40	2.849E-06	1.13	3.081E-06	0.96
103	4.683E-06	1.03	3.915E-06	0.86	4.247E-06	0.69
104	4.196E-06	1.10	3.502E-06	1.04	3.797E-06	0.81
105	4.411E-06	1.15	3.662E-06	0.97	3.951E-06	0.78
106	1.515E-06	1.47	1.285E-06	1.42	1.402E-06	1.24
107	3.573E-06	1.08	2.984E-06	0.99	3.243E-06	0.87
108	3.138E-06	1.13	2.646E-06	1.08	2.904E-06	0.88
109	5.161E-06	0.95	4.293E-06	0.83	4.683E-06	0.64
110	2.934E-06	1.31	2.552E-06	1.17	2.814E-06	1.02
111	3.020E-06	1.29	2.535E-06	1.19	2.762E-06	0.93
112	1.767E-06	1.55	1.487E-06	1.48	1.625E-06	1.15
113	5.797E-06	0.86	4.840E-06	0.75	5.194E-06	0.67
114	1.966E-06	1.63	1.659E-06	1.39	1.797E-06	1.13
115	5.121E-06	1.12	4.253E-06	0.92	4.613E-06	0.71
116	1.088E-05	0.70	9.089E-06	0.64	9.789E-06	0.50
117	1.181E-05	0.73	9.969E-06	0.64	1.070E-05	0.50
118	1.283E-05	0.59	1.081E-05	0.50	1.171E-05	0.45
119	8.139E-06	0.63	6.917E-06	0.52	7.511E-06	0.46

120	5.831E-06	0.88	4.916E-06	0.85	5.321E-06	0.73
121	6.101E-06	0.87	5.170E-06	0.79	5.601E-06	0.71
122	3.246E-06	1.27	2.723E-06	1.03	2.937E-06	0.92
123	1.035E-05	0.67	8.646E-06	0.64	9.324E-06	0.52
124	7.309E-06	0.86	6.146E-06	0.80	6.681E-06	0.63
125	7.043E-06	0.84	5.937E-06	0.72	6.401E-06	0.53
126	5.785E-06	0.82	4.833E-06	0.70	5.182E-06	0.59
127	5.595E-06	0.94	4.735E-06	0.85	5.110E-06	0.74
128	7.857E-06	0.85	6.554E-06	0.75	7.035E-06	0.61
129	9.676E-06	0.80	8.191E-06	0.68	8.873E-06	0.59
130	4.029E-06	1.00	3.406E-06	0.84	3.739E-06	0.73
131	1.702E-05	0.58	1.426E-05	0.49	1.539E-05	0.41
132	1.120E-05	0.71	9.432E-06	0.67	1.022E-05	0.52
133	1.353E-05	0.61	1.143E-05	0.51	1.237E-05	0.46
134	1.471E-05	0.55	1.238E-05	0.50	1.331E-05	0.42
135	2.345E-06	1.29	2.014E-06	1.14	2.194E-06	1.10
136	3.879E-06	0.89	3.342E-06	0.94	3.683E-06	0.70
137	2.514E-06	0.92	2.603E-06	0.97	2.977E-06	0.69
138	4.056E-06	1.01	3.559E-06	1.07	3.892E-06	0.80
139	4.546E-06	0.91	3.905E-06	0.83	4.245E-06	0.70
140	1.225E-05	0.65	1.034E-05	0.56	1.107E-05	0.48
141	8.815E-06	0.70	7.449E-06	0.66	8.028E-06	0.53
142	5.942E-06	0.88	4.934E-06	0.83	5.345E-06	0.67
143	2.003E-05	0.48	1.680E-05	0.41	1.801E-05	0.32
144	8.019E-06	0.73	6.822E-06	0.72	7.313E-06	0.60
145	7.206E-06	0.79	6.115E-06	0.78	6.618E-06	0.60
146	1.209E-05	0.65	1.020E-05	0.56	1.104E-05	0.44
147	3.719E-06	1.21	3.124E-06	1.11	3.382E-06	0.84
148	1.949E-06	1.69	1.615E-06	1.39	1.718E-06	1.10
149	1.171E-06	2.16	9.908E-07	2.09	1.076E-06	1.60
150	4.016E-06	0.98	3.371E-06	0.85	3.617E-06	0.74
151	4.134E-06	1.08	3.505E-06	0.96	3.774E-06	0.79
152	4.320E-06	0.98	3.665E-06	0.89	3.934E-06	0.66
153	4.420E-06	1.08	3.757E-06	0.99	4.018E-06	0.77
154	4.729E-06	1.04	3.942E-06	0.84	4.257E-06	0.69
155	4.240E-06	1.08	3.600E-06	0.98	3.863E-06	0.72
156	4.093E-06	1.42	3.383E-06	0.95	3.652E-06	0.80
157	4.700E-06	1.09	3.971E-06	0.98	4.230E-06	0.80
158	4.875E-06	0.98	4.114E-06	0.85	4.451E-06	0.67
159	6.792E-06	0.87	5.757E-06	0.70	6.181E-06	0.63
160	3.540E-06	1.04	3.002E-06	0.98	3.220E-06	0.86
161	5.002E-06	1.02	4.214E-06	0.89	4.511E-06	0.76
162	5.742E-06	0.86	4.854E-06	0.78	5.228E-06	0.65
163	6.125E-06	0.83	5.148E-06	0.70	5.574E-06	0.61
164	6.339E-06	0.77	5.387E-06	0.73	5.834E-06	0.57
165	6.843E-06	0.94	5.725E-06	0.80	6.167E-06	0.68
166	3.981E-06	1.14	3.327E-06	0.98	3.585E-06	0.92
167	4.143E-06	1.19	3.499E-06	0.99	3.743E-06	0.79
168	4.280E-06	1.03	3.632E-06	0.91	3.918E-06	0.78
169	4.513E-06	1.07	3.802E-06	1.09	4.067E-06	0.86
170	4.658E-06	0.93	3.914E-06	0.84	4.245E-06	0.68
171	2.351E-06	1.46	1.998E-06	1.28	2.159E-06	1.04

172	2.409E-06	1.36	2.021E-06	1.18	2.195E-06	1.02
173	2.429E-06	1.38	2.073E-06	1.20	2.254E-06	0.95
174	2.463E-06	1.17	2.085E-06	1.06	2.281E-06	0.78
175	9.884E-07	2.12	8.417E-07	2.08	9.242E-07	1.66
176	1.039E-06	1.92	8.899E-07	1.74	9.651E-07	1.40
177	1.022E-06	2.02	8.807E-07	1.95	9.534E-07	1.55
178	1.026E-06	1.87	8.532E-07	1.61	9.445E-07	1.40
179	1.029E-06	2.11	8.688E-07	1.93	9.463E-07	1.56
180	1.089E-06	1.89	9.110E-07	1.68	9.887E-07	1.44
181	1.079E-06	2.13	9.178E-07	1.97	9.774E-07	1.42
182	1.081E-06	1.72	9.326E-07	1.85	9.950E-07	1.55
183	1.094E-06	1.88	9.176E-07	1.61	9.982E-07	1.28
184	1.134E-06	1.85	9.513E-07	1.66	1.027E-06	1.41
185	1.112E-06	1.73	9.272E-07	1.60	1.027E-06	1.39
186	1.122E-06	1.97	9.503E-07	1.67	1.034E-06	1.42
187	1.156E-06	1.52	9.854E-07	1.51	1.054E-06	1.29
188	1.168E-06	1.79	9.924E-07	1.66	1.067E-06	1.41
189	1.184E-06	1.93	1.004E-06	1.82	1.082E-06	1.53
190	3.053E-06	1.18	2.577E-06	1.08	2.797E-06	0.82
191	3.172E-06	1.24	2.681E-06	1.05	2.880E-06	0.90
192	3.147E-06	1.17	2.704E-06	1.13	2.903E-06	0.85
193	3.250E-06	1.24	2.755E-06	1.11	2.967E-06	0.88
194	6.876E-06	0.73	5.832E-06	0.68	6.284E-06	0.58
195	7.178E-06	0.80	6.093E-06	0.79	6.613E-06	0.60
196	7.847E-06	0.70	6.579E-06	0.66	7.110E-06	0.53
197	8.432E-06	0.69	7.116E-06	0.64	7.716E-06	0.57
198	8.930E-06	0.78	7.598E-06	0.66	8.157E-06	0.51
199	4.802E-06	1.02	4.045E-06	0.90	4.366E-06	0.76
200	5.060E-06	0.88	4.261E-06	0.76	4.651E-06	0.65
201	1.057E-05	0.66	8.987E-06	0.61	9.759E-06	0.49
202	1.187E-05	0.63	1.005E-05	0.54	1.093E-05	0.47
203	1.286E-05	0.60	1.091E-05	0.52	1.185E-05	0.47
204	1.467E-05	0.55	1.245E-05	0.49	1.352E-05	0.40
205	8.783E-06	0.72	7.797E-06	0.69	8.221E-06	0.52
206	9.251E-06	0.64	8.319E-06	0.60	8.853E-06	0.49
207	9.627E-06	0.65	8.747E-06	0.58	9.208E-06	0.53
208	1.129E-05	0.64	1.015E-05	0.54	1.082E-05	0.45
209	1.158E-05	0.66	1.052E-05	0.49	1.115E-05	0.46
210	1.401E-05	0.55	1.269E-05	0.47	1.354E-05	0.38
211	1.604E-05	0.49	1.456E-05	0.46	1.551E-05	0.39
212	1.922E-05	0.52	1.733E-05	0.42	1.842E-05	0.36
213	2.633E-05	0.38	2.361E-05	0.35	2.522E-05	0.29
214	3.697E-05	0.32	3.317E-05	0.30	3.565E-05	0.23
215	5.521E-05	0.28	4.979E-05	0.23	5.363E-05	0.19
216	9.186E-05	0.21	8.383E-05	0.19	9.061E-05	0.15
217	5.549E-05	0.26	5.305E-05	0.19	5.624E-05	0.15
218	7.083E-05	0.19	6.799E-05	0.18	7.225E-05	0.15
219	8.402E-05	0.20	8.125E-05	0.15	8.638E-05	0.12
220	1.015E-04	0.17	9.881E-05	0.16	1.053E-04	0.13
221	1.204E-04	0.16	1.185E-04	0.14	1.263E-04	0.12
222	1.368E-04	0.16	1.367E-04	0.14	1.457E-04	0.10
223	1.535E-04	0.14	1.573E-04	0.13	1.675E-04	0.10

224	7.547E-05	0.18	7.992E-05	0.15	8.464E-05	0.10
225	2.335E-04	0.14	2.721E-04	0.10	2.823E-04	0.10
226	3.178E-05	0.26	4.487E-05	0.20	4.447E-05	0.14
227	2.871E-05	0.25	4.624E-05	0.20	4.435E-05	0.14
228	1.042E-05	0.41	1.903E-05	0.30	1.755E-05	0.17
229	9.673E-06	0.42	1.973E-05	0.34	1.746E-05	0.19
230	4.500E-06	0.53	1.021E-05	0.38	8.722E-06	0.21
231	4.227E-06	0.53	1.057E-05	0.42	8.732E-06	0.22
232	3.929E-06	0.48	1.132E-05	0.44	8.869E-06	0.22
233	2.201E-06	0.78	7.338E-06	0.52	5.486E-06	0.28
234	1.435E-06	0.83	5.339E-06	0.60	3.818E-06	0.29
235	5.280E-07	1.53	1.059E-06	1.08	1.126E-06	0.50
236	3.418E-07	1.54	7.481E-07	1.14	8.031E-07	0.53
237	2.262E-07	2.13	5.340E-07	1.33	6.132E-07	0.61
238	4.983E-09	10.60	2.031E-08	6.44	2.482E-08	1.83

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
 0.7474 to 0.7502     *
 0.7502 to 0.7530
 0.7530 to 0.7559     **
 0.7559 to 0.7587     **
 0.7587 to 0.7615     **********
 0.7615 to 0.7644     **********************
 0.7644 to 0.7672     ***********************
 0.7672 to 0.7700     **************************
 0.7700 to 0.7728     ***********
 0.7728 to 0.7757     ***

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7474 to 0.7502
 0.7502 to 0.7530
 0.7530 to 0.7559     *
 0.7559 to 0.7587     *
 0.7587 to 0.7615     *****
 0.7615 to 0.7644     *******************
 0.7644 to 0.7672     ******************
 0.7672 to 0.7700     *********************
 0.7700 to 0.7728     *********
 0.7728 to 0.7757     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7474 to 0.7502
 0.7502 to 0.7530
 0.7530 to 0.7559     *
 0.7559 to 0.7587     *
 0.7587 to 0.7615     ***
 0.7615 to 0.7644     ****************
 0.7644 to 0.7672     ***********
 0.7672 to 0.7700     ************
 0.7700 to 0.7728     *****
 0.7728 to 0.7757     *

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7474 to 0.7502
 0.7502 to 0.7530
 0.7530 to 0.7559
 0.7559 to 0.7587     *
 0.7587 to 0.7615     **
 0.7615 to 0.7644     ***********
 0.7644 to 0.7672     *****
 0.7672 to 0.7700     *****
 0.7700 to 0.7728     *
```

```
 0.7728 to 0.7757

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

*********************************************************************
*******************************************
        ***
***
        ***                                     ******      final results
table      ******                                   ***
        ***
***
        ***        best estimate system k-eff
0.76577 + or - 0.00045                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65797E-02 + or -  1.23854E-04            ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  9.26751E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52935E-01 + or -  1.65960E-04            ***
        ***
***
        ***        number of warning messages
8                                          ***
        ***
***
        ***        number of error messages
0                                          ***
        ***
***
        ***        k-effective satisfies the chi**2 test for normality at
the 95 % level                                   ***
        ***
***
        ***
***

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

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

           Congratulations!  You have  successfully traversed the
perilous path through Keno-VI in     3.11467 minutes


*********************************************************************
*************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666


      0000000       666666666666                    22222222222
33333333333                       0000000      7777777777777
     000000000     6666666666666                   2222222222222
3333333333333                     000000000     777777777777
    00       00    66                   :::       22         22   33
```

```
33         :::        00       00    77        77
   00         00   66                    :::                  22
33         :::       00         00            77
   00         00   66                    :::                  22
33         :::       00         00           77
   00         00   666666666666                           22
333                    00         00          77
   00         00   6666666666666                         22
333                    00         00          77
   00         00   66         66         :::            22
33         :::       00         00         77
   00         00   66         66         :::          22
33         :::       00         00         77
    00       00    66         66         :::        22             33
33         :::        00       00         77
     000000000     6666666666666                   2222222222222
3333333333333                      000000000          77
      0000000       66666666666                    2222222222222
33333333333                        0000000           77
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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     CCCCCCCCCCC    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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
```

```
        *****    time of execution:  06:23:07.19
*****
        *****
*****
        *****
*****

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

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

*************************************************************************
*********************************************
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.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12593E-10  2.79448E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90900E-08  1.32111E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.16575E-08  3.17220E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.76230E-08  4.84822E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.38497E-09  3.85165E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  3.08749E-10  8.77143E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.37214E-17  3.81597E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.66466E-10  4.72916E-09   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  1.21258E-08  3.44481E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.01804E-09  2.32584E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.83337E-08  5.37301E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.11831E-11  3.31097E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.25070E-09  3.70286E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.95249E-11  2.75771E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.90079E-11  1.87067E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  5.25337E-10  1.61822E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  9.59796E-13  3.01398E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  2.03202E-10  6.38096E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53200E-12  2.12939E-10   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  8.98777E-11  2.90303E-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  1.29590E-09  4.30211E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43911E-09  8.17024E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
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    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.55307E-12  8.78133E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51413E-11  2.24053E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.26378E-11  1.23982E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.12565E-10  4.34343E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  3.67247E-13  1.48308E-11   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.70121E-10  2.23401E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.63605E-11  1.04872E-09   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.31924E-12  5.32745E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.33162E-09  5.29766E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.13129E-15  8.54294E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41744E-09  5.72397E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23487E-09  5.06067E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
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    1056140  5.83354E-11  2.44312E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.47036E-10  6.20185E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  4.85462E-12  2.07676E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.19606E-10  3.09998E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.08042E-09  4.55710E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  6.10274E-11  2.61067E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.13987E-09  4.87617E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  3.90244E-10  1.68109E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32681E-10  3.61199E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.81263E-11  7.97151E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.83361E-10  1.68592E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  2.83434E-17  1.25497E-15   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.60623E-12  7.16008E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.36968E-11  2.36143E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.21526E-10  9.87488E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06742E-09  1.38574E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50023E-11  2.50125E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  1.94582E-13  8.90705E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45272E-09  6.56283E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59114E-09  7.28347E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30758E-14  6.02469E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
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    1063155  6.12672E-12  2.84122E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.82475E-13  8.51687E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84205E-12  2.65669E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27365E-10  1.98187E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94462E-10  2.77456E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51350E-10  2.12014E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.12629E-11  7.99190E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.58878E-17  1.84469E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.23304E-10  6.60692E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88247E-15  2.78984E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.72005E-20  2.68430E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
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    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08364E-20  7.81927E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  2.47726E-28  1.79496E-26   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.54592E-21  2.56928E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.75156E-21  7.09499E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.60393E-21  7.01637E-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
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    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
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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:
  9299 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

                                          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       ........

                                 ........     0.01550 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
0.01600 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 15728 independent fission points were generated for generation 1
          1       7.71110E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15530 independent fission points were generated for generation 2
          2       7.65150E-01      1.00000E+00      0.00000E+00
```

```
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15351 independent fission points were generated for generation 3
          3       7.52657E-01      7.52657E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.65018E-01      7.58838E-01      6.18020E-03
0.00000E+00      0.00000E+00
          5       7.63510E-01      7.60395E-01      3.89317E-03
0.00000E+00      0.00000E+00
          6       7.64019E-01      7.61301E-01      2.89811E-03
0.00000E+00      0.00000E+00
          7       7.66486E-01      7.62338E-01      2.47281E-03
0.00000E+00      0.00000E+00
          8       7.63048E-01      7.62456E-01      2.02252E-03
0.00000E+00      0.00000E+00
          9       7.63028E-01      7.62538E-01      1.71128E-03
0.00000E+00      0.00000E+00
         10       7.67098E-01      7.63108E-01      1.58787E-03
0.00000E+00      0.00000E+00
         11       7.62740E-01      7.63067E-01      1.40097E-03
0.00000E+00      0.00000E+00
         12       7.61108E-01      7.62871E-01      1.26828E-03
0.00000E+00      0.00000E+00
         13       7.61943E-01      7.62787E-01      1.15030E-03
0.00000E+00      0.00000E+00
         14       7.66734E-01      7.63116E-01      1.10039E-03
0.00000E+00      0.00000E+00
         15       7.66554E-01      7.63380E-01      1.04620E-03
0.00000E+00      0.00000E+00
         16       7.69550E-01      7.63821E-01      1.06414E-03
0.00000E+00      0.00000E+00
         17       7.60970E-01      7.63631E-01      1.00873E-03
0.00000E+00      0.00000E+00
         18       7.62598E-01      7.63566E-01      9.45783E-04
0.00000E+00      0.00000E+00
         19       7.64009E-01      7.63592E-01      8.88789E-04
0.00000E+00      0.00000E+00
         20       7.64848E-01      7.63662E-01      8.40859E-04
0.00000E+00      0.00000E+00
         21       7.62198E-01      7.63585E-01      7.99097E-04
0.00000E+00      0.00000E+00
         22       7.76955E-01      7.64254E-01      1.01072E-03
0.00000E+00      0.00000E+00
         23       7.65616E-01      7.64318E-01      9.63576E-04
0.00000E+00      0.00000E+00
         24       7.71215E-01      7.64632E-01      9.70737E-04
0.00000E+00      0.00000E+00
         25       7.62822E-01      7.64553E-01      9.30903E-04
0.00000E+00      0.00000E+00
         26       7.62878E-01      7.64483E-01      8.94000E-04
0.00000E+00      0.00000E+00
         27       7.64647E-01      7.65390E-01      2.81007E-03
```

```
0.00000E+00      0.00000E+00
         28       7.70757E-01      7.66464E-01      2.42246E-03
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 19888 independent fission points were generated for generation 29
         29       7.49113E-01      7.63572E-01      4.00806E-03
0.00000E+00      0.00000E+00
         30       7.63659E-01      7.63584E-01      3.27261E-03
0.00000E+00      0.00000E+00
         31       7.66445E-01      7.63942E-01      2.79651E-03
0.00000E+00      0.00000E+00
         32       7.67556E-01      7.64344E-01      2.46426E-03
0.00000E+00      0.00000E+00
         33       7.68718E-01      7.64781E-01      2.22763E-03
0.00000E+00      0.00000E+00
         34       7.70888E-01      7.65336E-01      2.08487E-03
0.00000E+00      0.00000E+00
         35       7.59274E-01      7.64831E-01      1.96536E-03
0.00000E+00      0.00000E+00
         36       7.67339E-01      7.65024E-01      1.80633E-03
0.00000E+00      0.00000E+00
         37       7.65378E-01      7.65049E-01      1.66181E-03
0.00000E+00      0.00000E+00
         38       7.62571E-01      7.64884E-01      1.54874E-03
0.00000E+00      0.00000E+00
         39       7.70543E-01      7.65238E-01      1.49055E-03
0.00000E+00      0.00000E+00
         40       7.63736E-01      7.65149E-01      1.39745E-03
0.00000E+00      0.00000E+00
         41       7.72050E-01      7.65533E-01      1.37422E-03
0.00000E+00      0.00000E+00
         42       7.65807E-01      7.65547E-01      1.29571E-03
0.00000E+00      0.00000E+00
         43       7.65886E-01      7.65564E-01      1.22575E-03
0.00000E+00      0.00000E+00
         44       7.63674E-01      7.65474E-01      1.16669E-03
0.00000E+00      0.00000E+00
         45       7.64840E-01      7.65445E-01      1.11016E-03
0.00000E+00      0.00000E+00
         46       7.68751E-01      7.65589E-01      1.06913E-03
0.00000E+00      0.00000E+00
         47       7.67327E-01      7.65661E-01      1.02438E-03
0.00000E+00      0.00000E+00
         48       7.58717E-01      7.65384E-01      1.02263E-03
0.00000E+00      0.00000E+00
         49       7.64109E-01      7.65335E-01      9.82202E-04
0.00000E+00      0.00000E+00
         50       7.64714E-01      7.65312E-01      9.43971E-04
0.00000E+00      0.00000E+00
         51       7.68000E-01      7.65408E-01      9.13786E-04
0.00000E+00      0.00000E+00
         52       7.64614E-01      7.65380E-01      8.81003E-04
```

0.00000E+00	0.00000E+00				
53	7.59641E-01	7.65189E-01	8.72839E-04	0.00000E+00	0.00000E+00
54	7.59439E-01	7.65003E-01	8.64771E-04	0.00000E+00	0.00000E+00
55	7.58562E-01	7.64802E-01	8.61858E-04	0.00000E+00	0.00000E+00
56	7.61883E-01	7.64714E-01	8.73435E-04	0.00000E+00	0.00000E+00
57	7.67218E-01	7.64787E-01	8.17165E-04	0.00000E+00	0.00000E+00
58	7.64639E-01	7.64783E-01	7.92779E-04	0.00000E+00	0.00000E+00
59	7.63948E-01	7.64760E-01	7.70165E-04	0.00000E+00	0.00000E+00
60	7.69321E-01	7.64883E-01	7.59123E-04	0.00000E+00	0.00000E+00
61	7.60441E-01	7.64766E-01	7.48025E-04	0.00000E+00	0.00000E+00
62	7.65775E-01	7.64792E-01	7.28558E-04	0.00000E+00	0.00000E+00
63	7.62368E-01	7.64732E-01	7.37131E-04	0.00000E+00	0.00000E+00
64	7.64936E-01	7.64737E-01	7.18213E-04	0.00000E+00	0.00000E+00
65	7.61626E-01	7.64662E-01	7.10843E-04	0.00000E+00	0.00000E+00
66	7.61282E-01	7.64584E-01	6.97215E-04	0.00000E+00	0.00000E+00
67	7.67163E-01	7.64642E-01	6.76574E-04	0.00000E+00	0.00000E+00
68	7.68863E-01	7.64736E-01	6.48869E-04	0.00000E+00	0.00000E+00
69	7.59025E-01	7.64612E-01	6.46865E-04	0.00000E+00	0.00000E+00
70	7.72961E-01	7.64790E-01	6.81545E-04	0.00000E+00	0.00000E+00
71	7.61743E-01	7.64726E-01	6.82085E-04	0.00000E+00	0.00000E+00
72	7.63396E-01	7.64699E-01	6.60180E-04	0.00000E+00	0.00000E+00
73	7.59434E-01	7.64594E-01	6.65933E-04	0.00000E+00	0.00000E+00
74	7.69232E-01	7.64685E-01	6.55334E-04	0.00000E+00	0.00000E+00
75	7.67409E-01	7.64737E-01	6.35396E-04	0.00000E+00	0.00000E+00
76	7.59663E-01	7.64641E-01	6.10477E-04	0.00000E+00	0.00000E+00
77	7.65232E-01	7.64652E-01	5.98952E-04	0.00000E+00	0.00000E+00
78	7.68496E-01	7.64722E-01	5.92050E-04		

```
0.00000E+00      0.00000E+00
         79       7.64153E-01      7.64712E-01      5.81278E-04
0.00000E+00      0.00000E+00
         80       7.62770E-01      7.64678E-01      5.71857E-04
0.00000E+00      0.00000E+00
         81       7.61531E-01      7.64624E-01      5.64441E-04
0.00000E+00      0.00000E+00
         82       7.62958E-01      7.64596E-01      5.55368E-04
0.00000E+00      0.00000E+00
         83       7.65815E-01      7.64616E-01      5.46265E-04
0.00000E+00      0.00000E+00
         84       7.69679E-01      7.64699E-01      5.43673E-04
0.00000E+00      0.00000E+00
         85       7.64371E-01      7.64694E-01      5.34713E-04
0.00000E+00      0.00000E+00
         86       7.71112E-01      7.64795E-01      5.36112E-04
0.00000E+00      0.00000E+00
         87       7.68862E-01      7.64859E-01      5.31469E-04
0.00000E+00      0.00000E+00
         88       7.65381E-01      7.64867E-01      5.23162E-04
0.00000E+00      0.00000E+00
         89       7.70638E-01      7.64954E-01      5.62563E-04
0.00000E+00      0.00000E+00
         90       7.59096E-01      7.64867E-01      5.35648E-04
0.00000E+00      0.00000E+00
         91       7.69202E-01      7.64931E-01      5.42526E-04
0.00000E+00      0.00000E+00
         92       7.65914E-01      7.64945E-01      5.32148E-04
0.00000E+00      0.00000E+00
         93       7.69104E-01      7.65004E-01      5.35363E-04
0.00000E+00      0.00000E+00
         94       7.73651E-01      7.65126E-01      5.55439E-04
0.00000E+00      0.00000E+00
         95       7.64421E-01      7.65116E-01      5.45989E-04
0.00000E+00      0.00000E+00
         96       7.62076E-01      7.65075E-01      5.20815E-04
0.00000E+00      0.00000E+00
         97       7.59690E-01      7.65002E-01      5.20264E-04
0.00000E+00      0.00000E+00
         98       7.54606E-01      7.64863E-01      5.43447E-04
0.00000E+00      0.00000E+00
         99       7.74384E-01      7.64989E-01      5.33975E-04
0.00000E+00      0.00000E+00
        100       7.64284E-01      7.64979E-01      5.29378E-04
0.00000E+00      0.00000E+00
        101       7.64724E-01      7.64976E-01      5.21553E-04
0.00000E+00      0.00000E+00
        102       7.65739E-01      7.64986E-01      5.14664E-04
0.00000E+00      0.00000E+00
        103       7.65233E-01      7.64989E-01      5.08015E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
```

```
generation  103       random number=DFD721D606B2783F
        104       7.74881E-01      7.65111E-01      5.19451E-04
0.00000E+00      0.00000E+00
        105       7.72890E-01      7.65206E-01      5.22733E-04
0.00000E+00      0.00000E+00
        106       7.72573E-01      7.65295E-01      5.45306E-04
0.00000E+00      0.00000E+00
        107       7.62346E-01      7.65260E-01      5.33341E-04
0.00000E+00      0.00000E+00
        108       7.62750E-01      7.65230E-01      5.22536E-04
0.00000E+00      0.00000E+00
        109       7.64491E-01      7.65221E-01      5.16947E-04
0.00000E+00      0.00000E+00
        110       7.62550E-01      7.65191E-01      5.13592E-04
0.00000E+00      0.00000E+00
        111       7.63519E-01      7.65172E-01      5.08268E-04
0.00000E+00      0.00000E+00
        112       7.66290E-01      7.65184E-01      5.01772E-04
0.00000E+00      0.00000E+00
        113       7.75413E-01      7.65298E-01      5.05171E-04
0.00000E+00      0.00000E+00
        114       7.65133E-01      7.65296E-01      4.99416E-04
0.00000E+00      0.00000E+00
        115       7.62471E-01      7.65265E-01      4.87458E-04
0.00000E+00      0.00000E+00
        116       7.69258E-01      7.65308E-01      4.83935E-04
0.00000E+00      0.00000E+00
        117       7.67713E-01      7.65334E-01      4.77684E-04
0.00000E+00      0.00000E+00
        118       7.61453E-01      7.65293E-01      4.66210E-04
0.00000E+00      0.00000E+00
        119       7.66454E-01      7.65305E-01      4.61438E-04
0.00000E+00      0.00000E+00
        120       7.66914E-01      7.65322E-01      4.56914E-04
0.00000E+00      0.00000E+00
        121       7.63082E-01      7.65299E-01      4.52768E-04
0.00000E+00      0.00000E+00
        122       7.55794E-01      7.65203E-01      4.58502E-04
0.00000E+00      0.00000E+00
        123       7.60631E-01      7.65157E-01      4.61719E-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=9D39DC2141E7ABEE
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55114E-05 + or -  1.16202E-08             generation time
=  2.99625E-05 + or -  1.89311E-08
```

```
 nu bar   =  2.43896E+00 + or -  9.64614E-06       average fission group
=  2.17539E+02 + or -  1.11817E-02
                      energy(ev) of the average lethargy causing fission
=  5.64958E-02 + or -  1.20699E-04
                                                 system mean free path (cm)
=  6.52697E-01 + or -  1.59701E-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          0.76516   + or - 0.00046     0.76470 to 0.76562
0.76423 to 0.76608    0.76377 to 0.76654    2000000      16.2992

      24          0.76510   + or - 0.00047     0.76463 to 0.76557
0.76416 to 0.76604    0.76368 to 0.76651    1980000      15.9725

      25          0.76512   + or - 0.00047     0.76465 to 0.76559
0.76418 to 0.76606    0.76371 to 0.76652    1960000      16.4305

      26          0.76514   + or - 0.00048     0.76466 to 0.76562
0.76418 to 0.76610    0.76370 to 0.76658    1940000      15.9605

      27          0.76515   + or - 0.00048     0.76466 to 0.76563
0.76418 to 0.76612    0.76369 to 0.76660    1920000      16.0136

      28          0.76509   + or - 0.00051     0.76458 to 0.76560
0.76407 to 0.76611    0.76356 to 0.76662    1900000      14.7040

      29          0.76526   + or - 0.00048     0.76478 to 0.76574
0.76430 to 0.76622    0.76381 to 0.76670    1880000      11.8819

      30          0.76528   + or - 0.00049     0.76479 to 0.76576
0.76430 to 0.76625    0.76381 to 0.76674    1860000      11.7909

      31          0.76526   + or - 0.00049     0.76477 to 0.76575
0.76428 to 0.76625    0.76379 to 0.76674    1840000      11.8526

      32          0.76524   + or - 0.00049     0.76475 to 0.76573
0.76426 to 0.76622    0.76376 to 0.76671    1820000      12.1460

      37          0.76517   + or - 0.00052     0.76465 to 0.76570
0.76413 to 0.76622    0.76361 to 0.76674    1720000      12.0369

      42          0.76507   + or - 0.00053     0.76453 to 0.76560
0.76400 to 0.76613    0.76347 to 0.76666    1620000      12.8620

      47          0.76500   + or - 0.00058     0.76442 to 0.76558
0.76383 to 0.76616    0.76325 to 0.76675    1520000      12.1552
```

```
      52          0.76507   + or - 0.00062     0.76445 to 0.76569
0.76383 to 0.76631    0.76321 to 0.76692    1420000      12.1066

      57          0.76535   + or - 0.00059     0.76476 to 0.76593
0.76418 to 0.76652    0.76359 to 0.76710    1320000      15.2507

      62          0.76539   + or - 0.00064     0.76475 to 0.76603
0.76411 to 0.76667    0.76348 to 0.76731    1220000      14.8455

      67          0.76556   + or - 0.00068     0.76489 to 0.76624
0.76421 to 0.76691    0.76353 to 0.76759    1120000      15.4512

      72          0.76560   + or - 0.00075     0.76484 to 0.76635
0.76409 to 0.76711    0.76333 to 0.76786    1020000      14.7036

      77          0.76575   + or - 0.00083     0.76492 to 0.76658
0.76409 to 0.76741    0.76327 to 0.76823     920000      14.7733

      82          0.76597   + or - 0.00090     0.76507 to 0.76686
0.76417 to 0.76776    0.76327 to 0.76866     820000      15.6780

      87          0.76569   + or - 0.00101     0.76468 to 0.76670
0.76367 to 0.76771    0.76266 to 0.76871     720000      16.0332

      92          0.76563   + or - 0.00120     0.76442 to 0.76683
0.76322 to 0.76804    0.76202 to 0.76924     620000      15.0268

      97          0.76560   + or - 0.00123     0.76437 to 0.76682
0.76315 to 0.76805    0.76192 to 0.76927     520000      20.2845

     102          0.76580   + or - 0.00158     0.76423 to 0.76738
0.76265 to 0.76895    0.76107 to 0.77053     420000      14.6948

     107          0.76462   + or - 0.00214     0.76248 to 0.76676
0.76035 to 0.76889    0.75821 to 0.77103     320000      12.6956

     112          0.76494   + or - 0.00379     0.76115 to 0.76873
0.75736 to 0.77252    0.75357 to 0.77631     220000       8.5919
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          0.76239   + or - 0.00350     0.75889 to 0.76589
0.75539 to 0.76938    0.75189 to 0.77288     120000      13.9189
1                           fuel bundle
```

plot of average k-effective by generation run.

the line represents k-eff = 0.76529 + or - 0.00045 which occurs for 121 generations run.

```
                                0.7636                    0.7674
0.7712

|-------------------------|-------------------------|------------------
------|-------------------------
         |
      25 +                     I                |          *
I
         |      I                                | *
I
         |                   I                   *                   I
         |                             I        |      *                I
         |                          *           |               I
      30 +   I                     *            |          I
         |         I                  *         |         I
         |              I                 *     |          I
         |                   I              *   |           I
         |                       I              *              I
      35 +                     I             *  |          I
         |                       I            * |          I
         |                        I           * |         I
         |                        I          *  |       I
         |                           I         *|         I
      40 +                           I         *|        I
         |                             I        |*         I
         |                              I       |*         I
         |                               I      | *        I
         |                              I       |*        I
      45 +                              I       |*       I
         |                                I     | *       I
         |                                I     | *       I
         |                               I      *       I
         |                               I      *     I
      50 +                               I      *     I
         |                                I     |*    I
         |                                I     *     I
         |                              I      *|    I
         |                             I      * |   I
      55 +                            I     *  | I
         |                           I     *   | I
         |                            I    *   | I
         |                            I    *   | I
         |                            I    *   |I
      60 +                             I    *  | I
         |                            I    *   |I
         |                             I   *   |I
         |                            I    *   |I
         |                            I    *   |I
```

```
 65 +                              I    *   I
    |                              I   *    I
    |                              I    *   I
    |                               I   *   I
    |                              I   *    I
 70 +                               I   *   |I
    |                               I   *   |I
    |                               I   *   I
    |                              I   *    I
    |                              I    *   I
 75 +                               I   *   I
    |                               I  *   I|
    |                               I   *  I|
    |                               I   *   I
    |                               I   *   I
 80 +                               I   *  I|
    |                               I  *   I|
    |                               I  *   I|
    |                               I  *   I|
    |                               I   *  I|
 85 +                               I   *  I|
    |                                I   *  I
    |                                I   *  I
    |                                 I  *  I
    |                                 I   * |I
 90 +                                I   *  I
    |                                 I  *  |I
    |                                 I  *  |I
    |                                 I   * |I
    |                                  I   *| I
 95 +                                  I   *| I
    |                                  I  * | I
    |                                 I   * |I
    |                                I   *  |I
    |                                 I   * |I
100 +                                 I   * |I
    |                                 I   * |I
    |                                 I   * |I
    |                                 I   * |I
    |                                  I   *| I
105 +                                   I  *|  I
    |                                   I   *  I
    |                                   I   *  I
    |                                   I  *|  I
    |                                   I  *|  I
110 +                                   I  *| I
    |                                   I  *| I
    |                                   I  *| I
    |                                   I   *  I
    |                                    I  *  I
115 +                                   I   *  I
    |                                    I  *  I
```

```
         |                                I  *  I
         |                                I  *  I
         |                                I  *  I
     120 +                                I  *  I
         |                                I  *  I
         |                               I  *| I
         |                               I  *| I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7651 + or - 0.0004 which occurs for 23 generations skipped.

```
                                0.7582                   0.7621
0.7660

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

```
I   *  I
      40 +
I  *  I
         |
I  *|  I
         |
I  *|  I
         |
I  *|  I
         |
I  *|  I
      45 +
I  *|  I
         |
I   *|  I
         |
I   *|  I
         |
I  *|  I
         |
I  *|  I
      50 +
I   *  I
         |
I   *|  I
         |
I   *|  I
         |
I   *   I
         |
I  *   I
      55 +
I  |*   I
         |
I |*   I
         |
I  |*   I
         |
I  |*   I
         |
I  |*   I
      60 +
I  |*   I
         |
I  |*   I
         |
I  |*   I
         |
I | *   I
         |
I | *   I
      65 +
```

```
I | *   I
          |
I |  *   I
          |
I | *    I
          |
I | *    I
          |
I |  *   I
      70 +
I  | *    I
          |
I | *    I
          |
I |  *   I
          |
I|  *    I
          |
I |  *    I
      75 +
I |  *    I
          |
I |   *    I
          |
I |   *    I
          |
I |  *     I
          |
I |  *     I
      80 +
I |   *     I
          |
I|    *    I
          |
I|    *     I
          |
I|    *     I
          |
I |   *     I
      85 +
I |    *     I
          |
I |   *     I
          |
I  |  *      I
          |
I  |  *      I
          |
I    | *      I
      90 +
I   |   *      I
          |
```

```
I   |  *      I
         |
I    |  *       I
         |
I     | *       I
         |
I      *       I
      95 +
I       |*       I
         |
I      |*        I
         |
I    |  *       I
         |
I  |     *       I
         |
I    |  *        I
     100 +
I    |   *        I
         |
I     |   *         I
         |
I     |   *         I
         |
I      |   *          I
         |                                                          I
|*           I
     105 +                                                        I
* |         I
         |                                                       I
*   |        I
         |                                                       I
*   |         I
         |                                                     I
*  |           I
         |                                                   I
*  |             I
     110 +                                                  I
* |                I
         |                                                I
*|                     I
         |                                             I
* |                      I
         |                                          I
*       |          I
         |                                   I
*        |               I
     115 +                                             I
*       |         I
         |                                        I                 *
|    I
         |                               I                     *
```

```
|    I
         |                   I                                  *
|               I
         |      I                                        *
|                 I
     120 +           I                       *                       I
|
```

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 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			2.32345E-07	100.0000	4.77649E-07	35.3342	0.00000E+00	0.0000
3	0.0000			1.43407E-05	11.3068	2.00106E-05	4.8698	0.00000E+00	0.0000
4	0.0000			2.16441E-05	9.5509	3.59875E-05	3.9961	0.00000E+00	0.0000
5	0.0000			2.71847E-05	7.4636	5.32107E-05	2.7268	0.00000E+00	0.0000
6	0.0001			9.69869E-05	3.6544	2.27385E-04	1.3579	0.00000E+00	0.0000
7	0.0002			1.17107E-04	2.9903	2.05826E-04	1.4590	0.00000E+00	0.0000
8	0.0003			2.47031E-04	2.0386	3.24526E-04	0.9675	0.00000E+00	0.0000
9	0.0005			3.82397E-04	1.2600	4.40908E-04	0.5453	0.00000E+00	0.0000
10	0.0003			2.05355E-04	1.4810	2.08662E-04	0.7001	0.00000E+00	0.0000
11	0.0012			9.23039E-04	0.6917	5.29478E-04	0.4859	0.00000E+00	0.0000
12	0.0010			7.72018E-04	0.8302	3.02551E-04	0.8172	0.00000E+00	0.0000
13	0.0003			2.29624E-04	1.2740	9.12186E-05	1.2608	0.00000E+00	0.0000
14	0.0013			1.00142E-03	0.6398	4.09323E-04	0.6336	0.00000E+00	0.0000
15	0.0010			7.64046E-04	0.7215	3.29377E-04	0.7144	0.00000E+00	0.0000
16	0.0002			1.87342E-04	1.0646	8.61246E-05	1.0483	0.00000E+00	0.0000
17	0.0001			6.66325E-05	1.7133	3.24226E-05	1.6799	0.00000E+00	0.0000

18	0.0001	5.18043E-05	1.9771	2.61503E-05	1.9351
0.00000E+00	0.0000				
19	0.0001	8.19426E-05	1.4150	4.33009E-05	1.3851
0.00000E+00	0.0000				
20	0.0001	6.03722E-05	1.5449	3.30647E-05	1.5087
0.00000E+00	0.0000				
21	0.0002	1.20906E-04	1.0953	6.82473E-05	1.0718
0.00000E+00	0.0000				
22	0.0001	1.07261E-04	1.1053	6.34706E-05	1.0815
0.00000E+00	0.0000				
23	0.0001	1.05617E-04	1.1615	6.44973E-05	1.1321
0.00000E+00	0.0000				
24	0.0000	2.46134E-05	2.3845	1.52938E-05	2.3230
0.00000E+00	0.0000				
25	0.0000	3.11576E-05	1.8499	1.94636E-05	1.7946
0.00000E+00	0.0000				
26	0.0000	1.73180E-05	2.7325	1.08898E-05	2.6572
0.00000E+00	0.0000				
27	0.0001	5.33375E-05	1.3211	3.32787E-05	1.2935
0.00000E+00	0.0000				
28	0.0001	9.78243E-05	0.8970	6.10215E-05	0.8837
0.00000E+00	0.0000				
29	0.0001	9.99330E-05	1.0422	6.29345E-05	1.0293
0.00000E+00	0.0000				
30	0.0000	1.29171E-05	2.9502	8.10001E-06	2.9296
0.00000E+00	0.0000				
31	0.0001	9.66163E-05	0.9933	6.10351E-05	0.9805
0.00000E+00	0.0000				
32	0.0000	3.77664E-05	1.6541	2.41452E-05	1.6162
0.00000E+00	0.0000				
33	0.0000	3.31976E-05	1.5441	2.07804E-05	1.5263
0.00000E+00	0.0000				
34	0.0001	7.49901E-05	1.0634	4.71084E-05	1.0480
0.00000E+00	0.0000				
35	0.0001	4.50098E-05	1.7391	2.82557E-05	1.7148
0.00000E+00	0.0000				
36	0.0001	4.30261E-05	1.5181	2.66346E-05	1.5055
0.00000E+00	0.0000				
37	0.0000	2.85543E-05	1.5500	1.79141E-05	1.5192
0.00000E+00	0.0000				
38	0.0000	3.41537E-05	1.9291	2.15037E-05	1.8851
0.00000E+00	0.0000				
39	0.0002	1.29817E-04	1.0235	8.25885E-05	0.9992
0.00000E+00	0.0000				
40	0.0002	1.20570E-04	0.9698	7.79440E-05	0.9510
0.00000E+00	0.0000				
41	0.0002	1.58221E-04	0.8406	1.05730E-04	0.8122
0.00000E+00	0.0000				
42	0.0002	1.39145E-04	0.8234	9.46491E-05	0.8032
0.00000E+00	0.0000				
43	0.0001	7.89828E-05	1.2534	5.67149E-05	1.1964
0.00000E+00	0.0000				

```
   44    0.0001                 1.14336E-04     1.1039
8.40005E-05     1.0572       0.00000E+00     0.0000
   45    0.0001                 6.01478E-05     0.9964
4.84783E-05     0.9232       0.00000E+00     0.0000
   46    0.0000                 1.36697E-05     1.8057
1.10385E-05     1.6793       0.00000E+00     0.0000
   47    0.0001                 4.06008E-05     1.7915
3.15279E-05     1.7203       0.00000E+00     0.0000
   48    0.0000                 1.29636E-05     3.5928
1.00373E-05     3.5044       0.00000E+00     0.0000
   49    0.0001                 8.28062E-05     1.3591
6.52581E-05     1.3309       0.00000E+00     0.0000
   50    0.0001                 5.65484E-05     1.6934
4.65759E-05     1.6595       0.00000E+00     0.0000
   51    0.0000                 1.54864E-05     3.4792
1.28698E-05     3.4102       0.00000E+00     0.0000
   52    0.0001                 3.91606E-05     2.0209
3.39133E-05     1.9682       0.00000E+00     0.0000
   53    0.0002                 1.55712E-04     0.9084
1.53167E-04     0.8421       0.00000E+00     0.0000
   54    0.0001                 7.39759E-05     1.9881
6.87806E-05     1.9203       0.00000E+00     0.0000
   55    0.0002                 1.64967E-04     1.2334
1.51231E-04     1.1963       0.00000E+00     0.0000
   56    0.0002                 1.17288E-04     1.7521
1.08800E-04     1.7081       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                 1.44594E-04     1.4736
1.31333E-04     1.4391       0.00000E+00     0.0000
   58    0.0001                 8.48616E-05     2.1125
7.43266E-05     2.0536       0.00000E+00     0.0000
   59    0.0002                 1.67889E-04     1.3473
1.50316E-04     1.2981       0.00000E+00     0.0000
   60    0.0004                 2.77554E-04     1.1476
2.51422E-04     1.0887       0.00000E+00     0.0000
   61    0.0000                 2.80841E-05     3.3338
2.15981E-05     3.2245       0.00000E+00     0.0000
   62    0.0002                 1.63017E-04     1.9941
1.36724E-04     1.9394       0.00000E+00     0.0000
   63    0.0002                 1.21972E-04     2.0337
1.00383E-04     1.9677       0.00000E+00     0.0000
   64    0.0001                 1.02153E-04     2.3924
8.22880E-05     2.3151       0.00000E+00     0.0000
   65    0.0000                 3.24545E-05     3.4094
```

3.21780E-05	3.2877	0.00000E+00	0.0000	66	0.0002	1.69003E-04	1.8081
1.50018E-04	1.7510	0.00000E+00	0.0000	67	0.0002	1.46338E-04	1.7824
1.19733E-04	1.7237	0.00000E+00	0.0000	68	0.0000	2.93691E-05	4.3938
2.53176E-05	4.2562	0.00000E+00	0.0000	69	0.0004	2.94755E-04	1.4963
2.31486E-04	1.4486	0.00000E+00	0.0000	70	0.0003	2.03900E-04	1.8137
1.85737E-04	1.7506	0.00000E+00	0.0000	71	0.0006	4.32577E-04	1.5902
3.57861E-04	1.5423	0.00000E+00	0.0000	72	0.0001	4.35647E-05	5.6770
2.58246E-05	5.5179	0.00000E+00	0.0000	73	0.0004	3.23851E-04	1.8456
2.46901E-04	1.7422	0.00000E+00	0.0000	74	0.0014	1.06969E-03	1.0673
7.77598E-04	1.0209	0.00000E+00	0.0000	75	0.0001	1.07878E-04	2.9456
8.30326E-05	2.7948	0.00000E+00	0.0000	76	0.0006	4.64498E-04	2.0746
2.94996E-04	2.0016	0.00000E+00	0.0000	77	0.0005	3.68617E-04	2.0898
2.64443E-04	2.0080	0.00000E+00	0.0000	78	0.0000	7.39050E-06	3.6271
7.22856E-05	3.5909	0.00000E+00	0.0000	79	0.0002	1.90078E-04	2.3642
1.27715E-04	2.2739	0.00000E+00	0.0000	80	0.0001	6.17249E-05	3.1080
8.23167E-05	3.0252	0.00000E+00	0.0000	81	0.0014	1.05799E-03	1.0503
7.78246E-04	1.0074	0.00000E+00	0.0000	82	0.0001	6.63821E-05	3.9654
3.98006E-05	3.7531	0.00000E+00	0.0000	83	0.0002	1.36112E-04	3.4883
1.50407E-04	3.4211	0.00000E+00	0.0000	84	0.0001	7.95727E-05	3.3156
8.08553E-05	3.0674	0.00000E+00	0.0000	85	0.0003	1.91797E-04	2.4340
2.36411E-04	2.3611	0.00000E+00	0.0000	86	0.0003	2.62675E-04	2.4318
2.11535E-04	2.3125	0.00000E+00	0.0000	87	0.0004	3.34079E-04	2.3962
2.07868E-04	2.2921	0.00000E+00	0.0000	88	0.0001	5.18904E-05	4.4961
9.43371E-05	4.3830	0.00000E+00	0.0000	89	0.0001	9.56081E-05	3.3423
6.62996E-05	3.0656	0.00000E+00	0.0000	90	0.0003	2.07935E-04	2.9887
1.23194E-04	2.8536	0.00000E+00	0.0000	91	0.0002	1.90981E-04	2.6691

```
1.20736E-04     2.5130       0.00000E+00     0.0000
   92    0.0000                 3.00150E-05     2.7629
1.96527E-04     2.7073       0.00000E+00     0.0000
   93    0.0002                 1.27940E-04     3.4034
1.04161E-04     3.1697       0.00000E+00     0.0000
   94    0.0002                 1.20718E-04     4.5804
6.74968E-05     4.3163       0.00000E+00     0.0000
   95    0.0008                 6.16699E-04     2.1450
3.80260E-04     2.0772       0.00000E+00     0.0000
   96    0.0002                 1.58026E-04     3.8963
8.00890E-05     3.7395       0.00000E+00     0.0000
   97    0.0004                 2.83356E-04     3.5557
1.62185E-04     3.4776       0.00000E+00     0.0000
   98    0.0001                 1.04094E-04     3.9660
9.97398E-05     3.8295       0.00000E+00     0.0000
   99    0.0001                 9.59339E-05     4.7068
6.44433E-05     4.5286       0.00000E+00     0.0000
  100    0.0002                 1.25349E-04     4.4310
8.38671E-05     4.2517       0.00000E+00     0.0000
  101    0.0001                 1.12876E-04     3.6837
7.17640E-05     3.4105       0.00000E+00     0.0000
  102    0.0002                 1.55563E-04     4.0059
8.68331E-05     3.8421       0.00000E+00     0.0000
  103    0.0001                 9.91656E-05     3.1900
9.65420E-05     3.0290       0.00000E+00     0.0000
  104    0.0002                 1.73487E-04     2.9742
1.37392E-04     2.8793       0.00000E+00     0.0000
  105    0.0002                 1.21065E-04     3.4441
8.01584E-05     3.2347       0.00000E+00     0.0000
  106    0.0002                 1.86333E-04     4.2574
1.38467E-04     4.1988       0.00000E+00     0.0000
  107    0.0001                 6.75452E-05     3.3267
6.80412E-05     3.1303       0.00000E+00     0.0000
  108    0.0000                 3.42304E-05     2.5443
1.47961E-04     2.4798       0.00000E+00     0.0000
  109    0.0002                 1.32204E-04     2.0437
4.38583E-04     2.0164       0.00000E+00     0.0000
  110    0.0008                 6.42019E-04     2.4724
3.95954E-04     2.4486       0.00000E+00     0.0000
  111    0.0002                 1.55823E-04     4.3398
1.43208E-04     4.2240       0.00000E+00     0.0000
  112    0.0002                 1.23292E-04     4.3828
1.29897E-04     4.3049       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	1.23520E-04	4.0279	1.08120E-04	3.7623
0.00000E+00	0.0000				
114	0.0000	1.07669E-05	6.9677	1.47124E-05	5.7540
0.00000E+00	0.0000				
115	0.0001	7.34845E-05	4.0260	8.53128E-05	3.7226
0.00000E+00	0.0000				
116	0.0002	1.90349E-04	2.5738	1.43428E-04	2.3118
0.00000E+00	0.0000				
117	0.0006	4.78021E-04	2.1074	2.55376E-04	1.9676
0.00000E+00	0.0000				
118	0.0008	6.07200E-04	1.8609	4.73499E-04	1.7894
0.00000E+00	0.0000				
119	0.0002	1.38145E-04	2.0624	3.56835E-04	1.9936
0.00000E+00	0.0000				
120	0.0002	1.68126E-04	1.9401	6.39708E-04	1.9140
0.00000E+00	0.0000				
121	0.0006	4.95229E-04	2.7462	3.81485E-04	2.6776
0.00000E+00	0.0000				
122	0.0001	1.06790E-04	3.8482	8.32590E-05	3.6028
0.00000E+00	0.0000				
123	0.0003	2.27558E-04	2.6778	1.60153E-04	2.4019
0.00000E+00	0.0000				
124	0.0003	2.39158E-04	3.1642	1.97080E-04	2.9633
0.00000E+00	0.0000				
125	0.0002	1.38088E-04	3.1011	1.27144E-04	2.7812
0.00000E+00	0.0000				
126	0.0001	1.06079E-04	3.7009	9.47251E-05	3.2666
0.00000E+00	0.0000				
127	0.0005	3.87048E-04	2.9809	1.90466E-04	2.8121
0.00000E+00	0.0000				
128	0.0003	2.20735E-04	3.0929	1.36224E-04	2.7483
0.00000E+00	0.0000				
129	0.0006	4.50118E-04	2.1093	4.14370E-04	2.0096
0.00000E+00	0.0000				
130	0.0002	1.18665E-04	2.7110	2.89184E-04	2.6301
0.00000E+00	0.0000				
131	0.0004	2.94735E-04	2.0546	2.36578E-04	1.7535
0.00000E+00	0.0000				
132	0.0007	5.17288E-04	2.4555	3.18234E-04	2.2603
0.00000E+00	0.0000				
133	0.0014	1.03351E-03	1.8768	6.53177E-04	1.7851
0.00000E+00	0.0000				
134	0.0001	9.05194E-05	1.9195	2.35826E-04	1.6133
0.00000E+00	0.0000				
135	0.0002	1.77137E-04	2.9031	2.62662E-04	2.8311
0.00000E+00	0.0000				
136	0.0001	4.60922E-05	2.2461	7.15159E-04	2.2150
0.00000E+00	0.0000				
137	0.0000	1.94305E-05	0.9391	3.49634E-03	0.9370
0.00000E+00	0.0000				
138	0.0004	3.17063E-04	1.8174	8.25924E-04	1.7898
0.00000E+00	0.0000				

139	0.0002	1.78866E-04	3.6814	2.20006E-04	3.4433
0.00000E+00	0.0000				
140	0.0003	2.16116E-04	2.3903	2.86424E-04	2.0776
0.00000E+00	0.0000				
141	0.0001	7.75141E-05	2.7761	2.45273E-04	2.4755
0.00000E+00	0.0000				
142	0.0001	6.73958E-05	2.8128	2.32430E-04	2.5881
0.00000E+00	0.0000				
143	0.0001	8.45307E-05	2.1960	1.78571E-04	1.3803
0.00000E+00	0.0000				
144	0.0000	3.32887E-05	3.0475	7.34047E-05	1.8185
0.00000E+00	0.0000				
145	0.0005	4.07544E-04	2.6673	3.17981E-04	2.4351
0.00000E+00	0.0000				
146	0.0005	3.48926E-04	2.4984	2.54726E-04	2.0421
0.00000E+00	0.0000				
147	0.0002	1.59978E-04	4.1514	1.03717E-04	3.5462
0.00000E+00	0.0000				
148	0.0001	5.57763E-05	6.5113	3.76183E-05	5.1871
0.00000E+00	0.0000				
149	0.0000	2.91999E-05	8.1687	2.04534E-05	6.2212
0.00000E+00	0.0000				
150	0.0001	9.01857E-05	4.4584	6.51062E-05	3.3283
0.00000E+00	0.0000				
151	0.0001	6.28270E-05	4.0867	5.43426E-05	2.7677
0.00000E+00	0.0000				
152	0.0001	4.11820E-05	4.4092	4.64735E-05	2.7742
0.00000E+00	0.0000				
153	0.0001	4.01137E-05	4.8282	4.57353E-05	2.8764
0.00000E+00	0.0000				
154	0.0001	4.59197E-05	4.2550	4.84713E-05	2.4674
0.00000E+00	0.0000				
155	0.0001	4.74961E-05	4.1359	4.80674E-05	2.4249
0.00000E+00	0.0000				
156	0.0001	4.89759E-05	4.6691	4.74721E-05	2.8681
0.00000E+00	0.0000				
157	0.0001	6.10718E-05	3.9462	5.84874E-05	2.4685
0.00000E+00	0.0000				
158	0.0001	6.47724E-05	4.1050	6.64436E-05	2.6654
0.00000E+00	0.0000				
159	0.0002	1.41907E-04	2.6644	1.99228E-04	2.2205
0.00000E+00	0.0000				
160	0.0001	6.57640E-05	4.1982	7.68590E-05	3.1773
0.00000E+00	0.0000				
161	0.0001	7.23657E-05	3.6193	7.18941E-05	2.3664
0.00000E+00	0.0000				
162	0.0001	8.88407E-05	3.2102	8.31451E-05	2.0742
0.00000E+00	0.0000				
163	0.0001	8.87611E-05	3.6409	8.39998E-05	2.1769
0.00000E+00	0.0000				
164	0.0001	1.07152E-04	3.5969	9.71482E-05	2.2984
0.00000E+00	0.0000				

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  165    0.0001                 1.13694E-04     3.1653
1.04983E-04     1.9291       0.00000E+00     0.0000
  166    0.0001                 6.91424E-05     4.0247
6.36034E-05     2.5541       0.00000E+00     0.0000
  167    0.0001                 7.89557E-05     3.8930
7.07746E-05     2.5683       0.00000E+00     0.0000
  168    0.0001                 9.40428E-05     4.1510
8.19359E-05     2.7948       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                 1.14546E-04     3.3413
9.78437E-05     2.4400       0.00000E+00     0.0000
  170    0.0002                 1.32819E-04     3.7441
1.13932E-04     2.7916       0.00000E+00     0.0000
  171    0.0001                 9.68367E-05     5.2287
7.48695E-05     4.2016       0.00000E+00     0.0000
  172    0.0002                 1.47466E-04     5.1427
1.03256E-04     4.3944       0.00000E+00     0.0000
  173    0.0002                 1.89452E-04     4.1191
1.25437E-04     3.5918       0.00000E+00     0.0000
  174    0.0003                 2.51287E-04     3.7253
1.56179E-04     3.3283       0.00000E+00     0.0000
  175    0.0002                 1.15476E-04     6.2854
6.97090E-05     5.7241       0.00000E+00     0.0000
  176    0.0002                 1.16004E-04     6.4070
6.90287E-05     5.7751       0.00000E+00     0.0000
  177    0.0002                 1.24815E-04     6.4971
7.31494E-05     5.9081       0.00000E+00     0.0000
  178    0.0002                 1.25725E-04     5.9794
7.30206E-05     5.4315       0.00000E+00     0.0000
  179    0.0002                 1.22378E-04     6.2770
7.10000E-05     5.6670       0.00000E+00     0.0000
  180    0.0001                 1.10675E-04     6.4545
6.47880E-05     5.6972       0.00000E+00     0.0000
  181    0.0001                 1.04125E-04     5.8554
6.08651E-05     5.1130       0.00000E+00     0.0000
  182    0.0001                 9.70512E-05     6.1980
5.69476E-05     5.3764       0.00000E+00     0.0000
  183    0.0001                 1.01258E-04     5.8598
5.86179E-05     5.0954       0.00000E+00     0.0000
  184    0.0001                 1.12053E-04     5.1741
6.41449E-05     4.5372       0.00000E+00     0.0000
  185    0.0001                 9.28413E-05     6.0191
5.41121E-05     5.1128       0.00000E+00     0.0000
  186    0.0001                 9.00756E-05     6.6962
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5.27943E-05	5.7238	0.00000E+00	0.0000	187	0.0001	9.02657E-05	6.1031
5.28068E-05	5.1867	0.00000E+00	0.0000	188	0.0001	8.13094E-05	6.8842
4.82214E-05	5.7499	0.00000E+00	0.0000	189	0.0001	7.84302E-05	6.8690
4.69970E-05	5.6657	0.00000E+00	0.0000	190	0.0003	2.13912E-04	4.0962
1.26873E-04	3.4100	0.00000E+00	0.0000	191	0.0003	2.03924E-04	4.2427
1.21878E-04	3.4525	0.00000E+00	0.0000	192	0.0003	2.07646E-04	4.1503
1.24633E-04	3.3964	0.00000E+00	0.0000	193	0.0003	2.15861E-04	3.7394
1.29612E-04	3.0640	0.00000E+00	0.0000	194	0.0005	4.16552E-04	3.1646
2.55352E-04	2.5072	0.00000E+00	0.0000	195	0.0005	4.16639E-04	3.3738
2.59242E-04	2.6446	0.00000E+00	0.0000	196	0.0006	4.65886E-04	2.5919
2.88681E-04	2.0357	0.00000E+00	0.0000	197	0.0007	5.08593E-04	2.4053
3.18385E-04	1.8889	0.00000E+00	0.0000	198	0.0008	5.74703E-04	2.4045
3.56080E-04	1.8938	0.00000E+00	0.0000	199	0.0004	3.32760E-04	3.6619
2.03418E-04	2.9116	0.00000E+00	0.0000	200	0.0005	3.51686E-04	2.5417
2.16969E-04	2.0135	0.00000E+00	0.0000	201	0.0010	7.86621E-04	2.1515
4.81778E-04	1.7030	0.00000E+00	0.0000	202	0.0013	9.87671E-04	2.0569
5.98125E-04	1.6642	0.00000E+00	0.0000	203	0.0016	1.23745E-03	1.7841
7.39022E-04	1.4666	0.00000E+00	0.0000	204	0.0022	1.69573E-03	1.6329
9.94507E-04	1.3664	0.00000E+00	0.0000	205	0.0015	1.12132E-03	2.2611
6.57946E-04	1.9188	0.00000E+00	0.0000	206	0.0018	1.38707E-03	1.8208
8.09488E-04	1.5599	0.00000E+00	0.0000	207	0.0021	1.63916E-03	1.6264
9.54298E-04	1.4167	0.00000E+00	0.0000	208	0.0029	2.22256E-03	1.4783
1.29190E-03	1.3033	0.00000E+00	0.0000	209	0.0031	2.38995E-03	1.5159
1.40473E-03	1.3330	0.00000E+00	0.0000	210	0.0038	2.86991E-03	1.5000
1.70898E-03	1.3169	0.00000E+00	0.0000	211	0.0040	3.09488E-03	1.2566
1.86939E-03	1.0854	0.00000E+00	0.0000	212	0.0046	3.49815E-03	1.1234

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2.12989E-03     0.9638       0.00000E+00     0.0000
  213    0.0064                 4.93493E-03     0.9254
2.99082E-03     0.7832       0.00000E+00     0.0000
  214    0.0097                 7.41684E-03     0.8038
4.45698E-03     0.6783       0.00000E+00     0.0000
  215    0.0157                 1.19796E-02     0.6044
7.14823E-03     0.5128       0.00000E+00     0.0000
  216    0.0300                 2.29705E-02     0.4061
1.35593E-02     0.3441       0.00000E+00     0.0000
  217    0.0202                 1.54704E-02     0.6662
9.09056E-03     0.5624       0.00000E+00     0.0000
  218    0.0278                 2.12341E-02     0.4483
1.24339E-02     0.3796       0.00000E+00     0.0000
  219    0.0356                 2.72224E-02     0.3766
1.58983E-02     0.3188       0.00000E+00     0.0000
  220    0.0473                 3.61590E-02     0.3190
2.10334E-02     0.2675       0.00000E+00     0.0000
  221    0.0626                 4.78964E-02     0.3755
2.77753E-02     0.3200       0.00000E+00     0.0000
  222    0.0801                 6.13015E-02     0.2713
3.55253E-02     0.2315       0.00000E+00     0.0000
  223    0.1042                 7.97420E-02     0.2406
4.62839E-02     0.2046       0.00000E+00     0.0000
  224    0.0584                 4.47108E-02     0.3561
2.60415E-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    0.2305                 1.76345E-01     0.1492
1.04488E-01     0.1258       0.00000E+00     0.0000
  226    0.0454                 3.47650E-02     0.3553
2.11611E-02     0.2980       0.00000E+00     0.0000
  227    0.0492                 3.76710E-02     0.3382
2.33683E-02     0.2725       0.00000E+00     0.0000
  228    0.0209                 1.60053E-02     0.6141
1.01307E-02     0.4922       0.00000E+00     0.0000
  229    0.0222                 1.69853E-02     0.5673
1.09198E-02     0.4448       0.00000E+00     0.0000
  230    0.0118                 9.00798E-03     0.8212
5.88415E-03     0.6402       0.00000E+00     0.0000
  231    0.0121                 9.24208E-03     0.7341
6.17013E-03     0.5571       0.00000E+00     0.0000
  232    0.0129                 9.86104E-03     0.6723
6.74112E-03     0.4932       0.00000E+00     0.0000
  233    0.0085                 6.46745E-03     0.9717
4.52133E-03     0.6852       0.00000E+00     0.0000
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  234    0.0060                 4.60180E-03     0.9923
3.30899E-03     0.6994       0.00000E+00     0.0000
  235    0.0024                 1.85140E-03     1.6404
1.22837E-03     1.2433       0.00000E+00     0.0000
  236    0.0019                 1.48662E-03     1.9000
9.97372E-04     1.4519       0.00000E+00     0.0000
  237    0.0017                 1.29814E-03     2.0167
9.23507E-04     1.4299       0.00000E+00     0.0000
  238    0.0001                 7.38326E-05     7.6628
6.21699E-05     4.8359       0.00000E+00     0.0000

 system total =                 7.65157E-01     0.0590
4.68658E-01     0.0492       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3144E-01  +
or -  0.0002



 elapsed time   3.11250 minutes

 random number=   2DB81CB008B08535
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.086E-03
0.06         7.652E-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	2.625E-08	26.04	1.936E-08	26.06	1.924E-08	27.37
3	8.754E-07	4.24	7.251E-07	3.94	7.803E-07	3.94
4	1.507E-06	3.22	1.223E-06	2.79	1.318E-06	2.94
5	2.268E-06	2.22	1.873E-06	2.04	2.009E-06	2.10
6	9.552E-06	1.24	7.557E-06	1.11	8.055E-06	1.09
7	1.240E-05	1.26	9.351E-06	1.12	9.838E-06	1.09
8	3.099E-05	0.76	2.269E-05	0.68	2.387E-05	0.65
9	8.141E-05	0.45	5.841E-05	0.38	6.103E-05	0.39
10	4.634E-05	0.59	3.287E-05	0.49	3.404E-05	0.48
11	2.209E-04	0.29	1.560E-04	0.25	1.617E-04	0.24
12	1.901E-04	0.26	1.377E-04	0.22	1.444E-04	0.23
13	5.680E-05	0.55	4.153E-05	0.48	4.338E-05	0.46
14	2.533E-04	0.23	1.833E-04	0.21	1.914E-04	0.22
15	2.195E-04	0.26	1.596E-04	0.23	1.665E-04	0.22
16	7.127E-05	0.45	5.167E-05	0.38	5.401E-05	0.36
17	3.228E-05	0.66	2.358E-05	0.59	2.456E-05	0.57
18	2.783E-05	0.76	2.025E-05	0.62	2.091E-05	0.56
19	5.016E-05	0.59	3.677E-05	0.52	3.827E-05	0.49
20	3.929E-05	0.54	2.881E-05	0.49	3.024E-05	0.47
21	8.013E-05	0.39	5.867E-05	0.39	6.114E-05	0.35
22	7.324E-05	0.45	5.345E-05	0.39	5.524E-05	0.36
23	7.665E-05	0.40	5.632E-05	0.31	5.833E-05	0.31
24	1.845E-05	0.81	1.360E-05	0.65	1.424E-05	0.62
25	2.338E-05	0.72	1.731E-05	0.55	1.811E-05	0.55
26	1.351E-05	0.94	1.005E-05	0.76	1.050E-05	0.74
27	4.188E-05	0.54	3.116E-05	0.45	3.301E-05	0.44
28	7.712E-05	0.38	5.738E-05	0.34	6.052E-05	0.32
29	7.946E-05	0.40	5.930E-05	0.33	6.214E-05	0.32
30	1.007E-05	1.01	7.604E-06	0.92	7.924E-06	0.76
31	7.817E-05	0.39	5.860E-05	0.33	6.167E-05	0.32
32	3.090E-05	0.58	2.325E-05	0.54	2.449E-05	0.52
33	2.654E-05	0.64	2.000E-05	0.54	2.111E-05	0.51
34	6.069E-05	0.38	4.593E-05	0.36	4.829E-05	0.34
35	3.610E-05	0.64	2.746E-05	0.52	2.897E-05	0.49
36	3.408E-05	0.54	2.572E-05	0.41	2.705E-05	0.40
37	2.178E-05	0.68	1.652E-05	0.55	1.721E-05	0.51
38	2.584E-05	0.67	1.973E-05	0.56	2.078E-05	0.53
39	9.739E-05	0.34	7.475E-05	0.29	7.896E-05	0.29
40	8.963E-05	0.35	6.931E-05	0.33	7.391E-05	0.31
41	1.132E-04	0.30	8.860E-05	0.25	9.455E-05	0.22
42	9.346E-05	0.29	7.385E-05	0.24	7.911E-05	0.23
43	5.103E-05	0.44	4.057E-05	0.38	4.273E-05	0.34
44	7.025E-05	0.30	5.615E-05	0.27	6.038E-05	0.23
45	3.534E-05	0.42	2.810E-05	0.37	3.114E-05	0.32
46	8.202E-06	0.90	6.491E-06	0.77	7.070E-06	0.73
47	2.339E-05	0.55	1.861E-05	0.54	1.947E-05	0.47
48	6.913E-06	1.06	5.451E-06	0.87	5.762E-06	0.79
49	4.363E-05	0.39	3.498E-05	0.30	3.765E-05	0.28
50	2.957E-05	0.49	2.367E-05	0.38	2.573E-05	0.35

51	7.935E-06	0.85	6.389E-06	0.75	6.926E-06	0.61
52	2.072E-05	0.60	1.663E-05	0.50	1.823E-05	0.42
53	7.610E-05	0.32	6.158E-05	0.28	6.664E-05	0.25
54	3.332E-05	0.46	2.702E-05	0.42	2.920E-05	0.34
55	6.647E-05	0.33	5.408E-05	0.29	5.883E-05	0.25
56	4.331E-05	0.33	3.532E-05	0.32	3.844E-05	0.27
57	4.934E-05	0.37	4.025E-05	0.32	4.384E-05	0.27
58	2.577E-05	0.49	2.104E-05	0.46	2.295E-05	0.37
59	4.416E-05	0.34	3.602E-05	0.31	3.923E-05	0.27
60	6.419E-05	0.30	5.254E-05	0.29	5.718E-05	0.23
61	6.061E-06	0.91	4.976E-06	0.88	5.415E-06	0.73
62	3.229E-05	0.39	2.645E-05	0.38	2.879E-05	0.28
63	2.184E-05	0.58	1.784E-05	0.49	1.938E-05	0.40
64	1.717E-05	0.63	1.414E-05	0.51	1.529E-05	0.39
65	5.651E-06	1.03	4.712E-06	0.88	5.101E-06	0.71
66	2.862E-05	0.49	2.349E-05	0.41	2.557E-05	0.34
67	2.110E-05	0.58	1.740E-05	0.50	1.893E-05	0.40
68	4.658E-06	1.19	3.843E-06	1.00	4.134E-06	0.85
69	3.736E-05	0.43	3.068E-05	0.37	3.342E-05	0.31
70	2.671E-05	0.46	2.196E-05	0.43	2.381E-05	0.32
71	4.549E-05	0.39	3.750E-05	0.34	4.089E-05	0.28
72	2.659E-06	1.60	2.173E-06	1.29	2.377E-06	1.00
73	2.710E-05	0.45	2.238E-05	0.39	2.425E-05	0.29
74	7.966E-05	0.28	6.588E-05	0.24	7.145E-05	0.22
75	9.080E-06	0.78	7.534E-06	0.64	8.162E-06	0.51
76	2.290E-05	0.49	1.892E-05	0.43	2.048E-05	0.36
77	1.779E-05	0.53	1.468E-05	0.48	1.597E-05	0.41
78	1.488E-06	1.67	1.264E-06	1.56	1.387E-06	1.26
79	9.940E-06	0.76	8.235E-06	0.67	8.937E-06	0.55
80	4.579E-06	1.12	3.788E-06	1.06	4.117E-06	0.79
81	5.509E-05	0.34	4.579E-05	0.31	4.974E-05	0.25
82	3.205E-06	1.14	2.699E-06	1.14	2.903E-06	0.88
83	4.415E-06	1.00	3.694E-06	0.86	4.019E-06	0.81
84	8.164E-06	0.70	6.797E-06	0.58	7.399E-06	0.47
85	1.009E-05	0.69	8.353E-06	0.65	9.034E-06	0.53
86	1.369E-05	0.58	1.138E-05	0.46	1.237E-05	0.41
87	1.200E-05	0.77	1.006E-05	0.65	1.077E-05	0.48
88	3.095E-06	1.24	2.600E-06	1.14	2.836E-06	0.90
89	6.659E-06	0.88	5.559E-06	0.82	6.016E-06	0.65
90	6.865E-06	0.91	5.710E-06	0.83	6.194E-06	0.70
91	8.303E-06	0.78	6.938E-06	0.69	7.520E-06	0.55
92	4.804E-06	0.90	4.030E-06	0.82	4.376E-06	0.71
93	8.135E-06	0.83	6.759E-06	0.68	7.325E-06	0.59
94	4.211E-06	1.16	3.506E-06	0.94	3.799E-06	0.82
95	1.258E-05	0.62	1.051E-05	0.53	1.144E-05	0.43
96	3.355E-06	1.22	2.837E-06	1.04	3.038E-06	0.86
97	3.308E-06	1.12	2.779E-06	1.00	3.049E-06	0.90
98	3.516E-06	1.15	2.948E-06	0.92	3.194E-06	0.85
99	2.308E-06	1.40	1.930E-06	1.28	2.109E-06	1.02
100	3.379E-06	1.14	2.858E-06	0.93	3.096E-06	0.86
101	4.967E-06	1.02	4.144E-06	0.86	4.485E-06	0.70
102	3.332E-06	1.02	2.795E-06	0.86	3.054E-06	0.77

103	4.671E-06	1.01	3.953E-06	0.94	4.259E-06	0.78
104	4.163E-06	1.20	3.487E-06	1.01	3.794E-06	0.86
105	4.365E-06	1.13	3.656E-06	0.91	3.938E-06	0.76
106	1.534E-06	1.86	1.301E-06	1.52	1.415E-06	1.37
107	3.569E-06	1.19	2.972E-06	1.11	3.227E-06	0.86
108	3.236E-06	1.18	2.747E-06	1.12	2.971E-06	0.86
109	5.213E-06	0.93	4.346E-06	0.83	4.677E-06	0.73
110	3.021E-06	1.14	2.569E-06	1.10	2.816E-06	0.89
111	3.081E-06	1.33	2.586E-06	1.09	2.787E-06	1.00
112	1.779E-06	1.25	1.522E-06	1.29	1.656E-06	0.96
113	5.815E-06	1.06	4.848E-06	0.80	5.189E-06	0.61
114	1.952E-06	1.50	1.667E-06	1.51	1.758E-06	1.08
115	5.235E-06	1.07	4.324E-06	0.98	4.642E-06	0.76
116	1.076E-05	0.76	9.043E-06	0.61	9.739E-06	0.50
117	1.162E-05	0.62	9.823E-06	0.58	1.063E-05	0.47
118	1.288E-05	0.58	1.083E-05	0.47	1.170E-05	0.41
119	8.167E-06	0.77	6.925E-06	0.69	7.502E-06	0.58
120	5.784E-06	0.94	4.886E-06	0.74	5.320E-06	0.64
121	6.010E-06	0.85	5.139E-06	0.79	5.586E-06	0.64
122	3.258E-06	1.20	2.749E-06	0.99	2.975E-06	0.89
123	1.033E-05	0.74	8.654E-06	0.67	9.370E-06	0.52
124	7.406E-06	0.83	6.201E-06	0.68	6.718E-06	0.66
125	6.992E-06	0.80	5.866E-06	0.71	6.381E-06	0.62
126	5.841E-06	0.97	4.921E-06	0.77	5.278E-06	0.64
127	5.580E-06	0.90	4.679E-06	0.77	5.089E-06	0.63
128	7.635E-06	0.90	6.444E-06	0.73	7.028E-06	0.68
129	9.554E-06	0.71	8.106E-06	0.61	8.760E-06	0.54
130	4.036E-06	1.15	3.397E-06	1.03	3.712E-06	0.80
131	1.674E-05	0.60	1.411E-05	0.51	1.522E-05	0.45
132	1.121E-05	0.58	9.504E-06	0.54	1.023E-05	0.47
133	1.360E-05	0.66	1.152E-05	0.61	1.243E-05	0.46
134	1.485E-05	0.58	1.254E-05	0.52	1.348E-05	0.41
135	2.381E-06	1.17	2.017E-06	1.11	2.210E-06	0.91
136	3.889E-06	1.07	3.397E-06	0.92	3.691E-06	0.76
137	2.491E-06	0.99	2.614E-06	0.96	2.965E-06	0.75
138	4.119E-06	1.00	3.575E-06	0.87	3.919E-06	0.75
139	4.649E-06	0.88	3.978E-06	0.80	4.310E-06	0.66
140	1.206E-05	0.69	1.017E-05	0.59	1.093E-05	0.45
141	8.803E-06	0.80	7.485E-06	0.64	8.105E-06	0.50
142	5.807E-06	0.82	4.962E-06	0.76	5.340E-06	0.60
143	1.992E-05	0.52	1.691E-05	0.45	1.813E-05	0.35
144	8.177E-06	0.73	6.832E-06	0.66	7.401E-06	0.54
145	7.315E-06	0.84	6.194E-06	0.85	6.625E-06	0.58
146	1.207E-05	0.67	1.021E-05	0.61	1.097E-05	0.51
147	3.658E-06	1.02	3.096E-06	0.97	3.338E-06	0.81
148	1.828E-06	1.66	1.575E-06	1.48	1.699E-06	1.26
149	1.159E-06	1.92	9.969E-07	1.96	1.046E-06	1.37
150	3.972E-06	1.01	3.352E-06	0.92	3.616E-06	0.70
151	4.160E-06	1.03	3.507E-06	0.93	3.779E-06	0.77
152	4.310E-06	1.03	3.655E-06	1.08	3.928E-06	0.74
153	4.419E-06	1.09	3.725E-06	1.03	4.038E-06	0.83
154	4.650E-06	1.08	3.909E-06	0.95	4.202E-06	0.84

155	4.434E-06	1.12	3.680E-06	0.86	3.969E-06	0.67
156	4.017E-06	1.15	3.354E-06	0.99	3.612E-06	0.75
157	4.585E-06	0.94	3.926E-06	0.90	4.213E-06	0.63
158	4.816E-06	1.05	4.051E-06	0.83	4.404E-06	0.69
159	6.774E-06	0.77	5.705E-06	0.67	6.160E-06	0.57
160	3.500E-06	1.05	3.000E-06	0.97	3.212E-06	0.84
161	4.935E-06	1.05	4.175E-06	0.88	4.533E-06	0.71
162	5.795E-06	0.91	4.913E-06	0.78	5.309E-06	0.59
163	6.228E-06	0.92	5.240E-06	0.70	5.614E-06	0.62
164	6.558E-06	0.93	5.500E-06	0.79	5.953E-06	0.66
165	6.935E-06	0.77	5.849E-06	0.73	6.304E-06	0.58
166	3.982E-06	0.97	3.382E-06	0.85	3.649E-06	0.74
167	4.171E-06	1.15	3.538E-06	0.97	3.797E-06	0.82
168	4.314E-06	1.00	3.651E-06	0.99	3.945E-06	0.79
169	4.423E-06	1.15	3.746E-06	0.99	4.042E-06	0.82
170	4.602E-06	1.11	3.866E-06	0.94	4.197E-06	0.74
171	2.388E-06	1.46	1.994E-06	1.31	2.154E-06	1.04
172	2.415E-06	1.32	2.046E-06	1.30	2.193E-06	0.92
173	2.494E-06	1.35	2.120E-06	1.22	2.286E-06	1.03
174	2.517E-06	1.46	2.108E-06	1.10	2.292E-06	0.88
175	1.038E-06	2.01	8.624E-07	1.83	9.418E-07	1.65
176	1.000E-06	2.30	8.549E-07	2.17	9.308E-07	1.65
177	1.011E-06	2.01	8.603E-07	1.96	9.334E-07	1.59
178	1.026E-06	1.97	8.855E-07	1.66	9.600E-07	1.46
179	1.018E-06	1.98	8.871E-07	1.87	9.521E-07	1.58
180	1.079E-06	1.89	9.227E-07	1.74	9.980E-07	1.33
181	1.067E-06	2.25	8.944E-07	2.02	9.700E-07	1.43
182	1.086E-06	2.18	9.187E-07	1.79	9.919E-07	1.47
183	1.080E-06	1.87	9.240E-07	1.94	1.001E-06	1.57
184	1.134E-06	1.93	9.578E-07	1.70	1.033E-06	1.39
185	1.116E-06	1.94	9.366E-07	1.91	1.018E-06	1.48
186	1.131E-06	2.21	9.577E-07	1.92	1.043E-06	1.56
187	1.150E-06	1.92	9.784E-07	1.73	1.031E-06	1.45
188	1.117E-06	2.00	9.431E-07	1.73	1.023E-06	1.41
189	1.154E-06	2.06	9.918E-07	1.91	1.068E-06	1.67
190	3.014E-06	1.06	2.534E-06	0.98	2.754E-06	0.85
191	3.061E-06	1.28	2.599E-06	1.08	2.807E-06	0.89
192	3.130E-06	1.28	2.664E-06	1.04	2.869E-06	0.88
193	3.250E-06	1.24	2.754E-06	1.09	2.980E-06	0.85
194	6.763E-06	0.84	5.771E-06	0.76	6.209E-06	0.62
195	7.271E-06	0.74	6.167E-06	0.66	6.701E-06	0.50
196	7.723E-06	0.82	6.503E-06	0.72	7.028E-06	0.63
197	8.472E-06	0.75	7.176E-06	0.59	7.732E-06	0.54
198	9.012E-06	0.70	7.577E-06	0.62	8.189E-06	0.50
199	4.808E-06	1.09	4.032E-06	0.98	4.345E-06	0.79
200	5.065E-06	1.04	4.311E-06	0.88	4.647E-06	0.69
201	1.069E-05	0.64	9.065E-06	0.61	9.732E-06	0.54
202	1.200E-05	0.57	1.010E-05	0.55	1.099E-05	0.41
203	1.294E-05	0.60	1.093E-05	0.56	1.188E-05	0.48
204	1.480E-05	0.56	1.249E-05	0.52	1.355E-05	0.42
205	8.589E-06	0.59	7.672E-06	0.63	8.139E-06	0.44
206	9.387E-06	0.71	8.433E-06	0.63	8.925E-06	0.46

207	9.538E-06	0.63	8.621E-06	0.57	9.155E-06	0.48
208	1.124E-05	0.63	1.011E-05	0.51	1.081E-05	0.42
209	1.164E-05	0.57	1.056E-05	0.53	1.116E-05	0.44
210	1.418E-05	0.50	1.285E-05	0.42	1.356E-05	0.36
211	1.621E-05	0.53	1.459E-05	0.46	1.560E-05	0.37
212	1.912E-05	0.41	1.730E-05	0.41	1.844E-05	0.31
213	2.598E-05	0.36	2.341E-05	0.33	2.509E-05	0.26
214	3.677E-05	0.31	3.300E-05	0.31	3.553E-05	0.24
215	5.498E-05	0.26	4.964E-05	0.23	5.363E-05	0.19
216	9.211E-05	0.20	8.381E-05	0.18	9.061E-05	0.15
217	5.559E-05	0.20	5.321E-05	0.18	5.635E-05	0.14
218	7.096E-05	0.24	6.805E-05	0.19	7.231E-05	0.15
219	8.408E-05	0.19	8.148E-05	0.17	8.659E-05	0.14
220	1.013E-04	0.17	9.877E-05	0.16	1.054E-04	0.13
221	1.205E-04	0.16	1.187E-04	0.14	1.266E-04	0.12
222	1.367E-04	0.16	1.368E-04	0.13	1.457E-04	0.11
223	1.536E-04	0.13	1.575E-04	0.11	1.677E-04	0.10
224	7.519E-05	0.18	7.993E-05	0.16	8.459E-05	0.14
225	2.342E-04	0.11	2.727E-04	0.09	2.828E-04	0.09
226	3.179E-05	0.22	4.477E-05	0.20	4.446E-05	0.13
227	2.894E-05	0.26	4.643E-05	0.19	4.436E-05	0.12
228	1.036E-05	0.40	1.896E-05	0.28	1.750E-05	0.17
229	9.663E-06	0.34	1.966E-05	0.30	1.743E-05	0.16
230	4.542E-06	0.56	1.012E-05	0.39	8.698E-06	0.23
231	4.206E-06	0.61	1.052E-05	0.44	8.734E-06	0.21
232	3.958E-06	0.48	1.138E-05	0.44	8.865E-06	0.19
233	2.239E-06	0.74	7.444E-06	0.52	5.509E-06	0.26
234	1.433E-06	0.92	5.392E-06	0.63	3.822E-06	0.29
235	5.269E-07	1.44	1.055E-06	1.07	1.123E-06	0.57
236	3.554E-07	1.74	7.493E-07	1.37	7.961E-07	0.56
237	2.247E-07	1.89	5.476E-07	1.37	6.122E-07	0.57
238	4.619E-09	9.71	2.213E-08	6.66	2.453E-08	2.03

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
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55	0.000E+00	0.00
56	0.000E+00	0.00
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58	0.000E+00	0.00
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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
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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
 0.7468 to 0.7496     *
 0.7496 to 0.7524
 0.7524 to 0.7553     *
 0.7553 to 0.7581     *
 0.7581 to 0.7609     ************
 0.7609 to 0.7637     ************************
 0.7637 to 0.7666     ****************************
 0.7666 to 0.7694     *******************
 0.7694 to 0.7722     ********
 0.7722 to 0.7751     ******
 0.7751 to 0.7779     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7468 to 0.7496
 0.7496 to 0.7524
 0.7524 to 0.7553     *
 0.7553 to 0.7581     *
 0.7581 to 0.7609     **********
 0.7609 to 0.7637     *****************
 0.7637 to 0.7666     **********************
 0.7666 to 0.7694     **************
 0.7694 to 0.7722     ***
 0.7722 to 0.7751     ******
 0.7751 to 0.7779     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7468 to 0.7496
 0.7496 to 0.7524
 0.7524 to 0.7553     *
```

```
 0.7553 to 0.7581     *
 0.7581 to 0.7609     ****
 0.7609 to 0.7637     ***********
 0.7637 to 0.7666     ***************
 0.7666 to 0.7694     *********
 0.7694 to 0.7722     ***
 0.7722 to 0.7751     *****
 0.7751 to 0.7779     *

                               frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7468 to 0.7496
 0.7496 to 0.7524
 0.7524 to 0.7553
 0.7553 to 0.7581     *
 0.7581 to 0.7609     *
 0.7609 to 0.7637     *******
 0.7637 to 0.7666     ********
 0.7666 to 0.7694     ***
 0.7694 to 0.7722
 0.7722 to 0.7751     ****
 0.7751 to 0.7779     *

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

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*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76515 + or - 0.00046                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.64958E-02 + or -  1.20699E-04           ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.64614E-06           ***
        ***
```

```
***
        ***        system mean free path (cm)
6.52697E-01 + or -  1.59701E-04           ***
        ***
***
        ***        number of warning messages
8                                         ***
        ***
***
        ***        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     3.11467 minutes


*********************************************************************
************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   EEEEEEEEEEEE   NN         NNN  OOOOOOOOOOOOO
VVV       IIIIIIIIIIII
   KK          KK  EEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
```

```
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //               11        66         66
    00       00               99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666



      0000000       666666666666                    22222222222
666666666666                    22222222222     33333333333
     000000000     6666666666666                   2222222222222
6666666666666                   2222222222222   3333333333333
    00       00    66                   :::       22         22   66
:::       22         22   33         33
   00         00   66                   :::                  22   66
:::                  22             33
   00         00   66                   :::                  22   66
:::                  22             33
   00         00   666666666666                            22
666666666666                            22              333
   00         00   6666666666666                          22
6666666666666                          22                333
   00         00   66         66         :::            22         66
66         :::            22                     33
   00         00   66         66         :::         22            66
66         :::          22                       33
    00       00    66         66         :::        22             66
66         :::        22             33         33
     000000000     6666666666666                   2222222222222
6666666666666                   2222222222222   3333333333333
      0000000       66666666666                    2222222222222
66666666666                   2222222222222    33333333333
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
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE




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

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**********************************************************************
************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
```

```
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:26:23.76
*****
        *****
*****
        *****
*****

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1

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

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        ***
***
        ***          unit
volume                                          ***
        ***         number                data set name
name        unit function                     ***
        ***         ------                -------------
----        -------------                     ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
```

```
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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                                 ........ finished preparing input data
........
1
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****************************
                 ***
***
                 ***          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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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
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endf/b7 rel0 rev7 mod0                    12/17/09
    1036083  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90901E-08  1.32111E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.16607E-08  3.17304E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  1.38570E-09  3.85369E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  3.05425E-10  8.67699E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  1.38016E-17  3.83829E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.66490E-10  4.72986E-09   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  1.21291E-08  3.44575E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                  12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                  12/17/09
    1042097  8.01935E-09  2.32623E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                  12/17/09
    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                  12/17/09
    1042099  8.68956E-12  2.57270E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                  12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.25339E-09  3.71083E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                  12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  8.79582E-11  2.70944E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  5.88985E-11  1.86721E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  5.26905E-10  1.62305E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  6.14532E-13  1.92977E-11   45105   104.9057     rh105 4531
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endf/b7 rel0 rev7 mod1                12/17/09
    1046105  2.03568E-10  6.39247E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53738E-12  2.13114E-10   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  8.98777E-11  2.90303E-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  1.29591E-09  4.30214E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43912E-09  8.17025E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.55840E-12  8.79965E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51416E-11  2.24054E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.27152E-11  1.24276E-09   53127   126.9045     i127 5325
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endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.12580E-10  4.34403E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  2.91952E-14  1.17901E-12   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.71529E-10  2.23953E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                 12/17/09
    1054133  2.46579E-11  9.80983E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                 12/17/09
    1054135  3.21771E-13  1.29940E-11   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                 12/17/09
    1055133  1.33500E-09  5.31112E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                 12/17/09
    1055134  2.12936E-15  8.53520E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                 12/17/09
    1055135  1.41878E-09  5.72937E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                 12/17/09
    1055137  1.23479E-09  5.06035E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                 12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                 12/17/09
    1056140  5.52491E-11  2.31387E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                 12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                 12/17/09
    1058141  1.44025E-10  6.07485E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                 12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                 12/17/09
    1058143  2.93412E-12  1.25519E-10   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                 12/17/09
    1058144  7.17858E-10  3.09245E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                 12/17/09
    1059141  1.08352E-09  4.57019E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                 12/17/09
    1059143  5.98567E-11  2.56059E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                 12/17/09
    1060143  1.14296E-09  4.88939E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                 12/17/09
    1060144  3.91993E-10  1.68862E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                 12/17/09
    1060145  8.32857E-10  3.61275E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                 12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                 12/17/09
    1060147  1.70174E-11  7.48384E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                 12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                 12/17/09
    1061147  3.84193E-10  1.68957E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                 12/17/09
    1061148  2.50215E-17  1.10788E-15   61148   147.9175     pm148 6152
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endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.17445E-12  5.23535E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.39744E-11  2.37364E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.21959E-10  9.89415E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06748E-09  1.38577E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50023E-11  2.50125E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  1.35833E-13  6.21781E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45279E-09  6.56312E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59120E-09  7.28374E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30729E-14  6.02336E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.12427E-12  2.84009E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.75825E-13  8.20647E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84209E-12  2.65671E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27367E-10  1.98188E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94470E-10  2.77460E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51351E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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  8.13855E-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
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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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.12901E-11  8.01118E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.59874E-17  1.85179E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.25116E-10  6.61989E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88247E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71956E-20  2.68394E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08413E-20  7.82280E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  8.78467E-29  6.36516E-27   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.53086E-21  2.55837E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.75092E-21  7.09453E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.60292E-21  7.01563E-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
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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
```

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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
```

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                                        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:
```

```
  9269 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       ........

                                 ........     0.01617 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
0.01683 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 15423 independent fission points were generated for generation 1
          1       7.56928E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15815 independent fission points were generated for generation 2
          2       7.69616E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15603 independent fission points were generated for generation 3
          3       7.60717E-01      7.60717E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.67232E-01      7.63974E-01      3.25727E-03
0.00000E+00      0.00000E+00
          5       7.61267E-01      7.63072E-01      2.08585E-03
0.00000E+00      0.00000E+00
          6       7.74741E-01      7.65989E-01      3.26892E-03
0.00000E+00      0.00000E+00
          7       7.69145E-01      7.66620E-01      2.60958E-03
0.00000E+00      0.00000E+00
          8       7.65708E-01      7.66468E-01      2.13613E-03
0.00000E+00      0.00000E+00
          9       7.70716E-01      7.67075E-01      1.90459E-03
0.00000E+00      0.00000E+00
         10       7.70585E-01      7.67514E-01      1.70677E-03
0.00000E+00      0.00000E+00
         11       7.67791E-01      7.67545E-01      1.50554E-03
0.00000E+00      0.00000E+00
         12       7.65269E-01      7.67317E-01      1.36569E-03
0.00000E+00      0.00000E+00
         13       7.61179E-01      7.66759E-01      1.35549E-03
0.00000E+00      0.00000E+00
         14       7.58488E-01      7.66070E-01      1.41641E-03
0.00000E+00      0.00000E+00
         15       7.68911E-01      7.66288E-01      1.32110E-03
0.00000E+00      0.00000E+00
         16       7.67807E-01      7.66397E-01      1.22791E-03
0.00000E+00      0.00000E+00
```

17	7.71839E-01	7.66760E-01	1.19932E-03	0.00000E+00
18	7.66002E-01	7.66712E-01	1.12286E-03	0.00000E+00
19	7.61886E-01	7.66428E-01	1.09228E-03	0.00000E+00
20	7.78732E-01	7.67112E-01	1.23603E-03	0.00000E+00
21	7.67703E-01	7.67143E-01	1.16958E-03	0.00000E+00
22	7.63766E-01	7.66974E-01	1.12233E-03	0.00000E+00
23	7.71840E-01	7.67206E-01	1.09241E-03	0.00000E+00
24	7.68041E-01	7.67244E-01	1.04226E-03	0.00000E+00
25	7.65728E-01	7.67178E-01	9.98094E-04	0.00000E+00
26	7.66958E-01	7.67169E-01	9.55646E-04	0.00000E+00
27	7.59000E-01	7.64932E-01	5.28525E-03	0.00000E+00
28	7.65672E-01	7.65080E-01	3.11477E-03	0.00000E+00
29	7.73559E-01	7.66493E-01	2.34449E-03	0.00000E+00
30	7.64688E-01	7.66235E-01	1.93842E-03	0.00000E+00
31	7.61603E-01	7.65656E-01	1.76945E-03	0.00000E+00
32	7.64797E-01	7.65561E-01	1.53619E-03	0.00000E+00
33	7.60893E-01	7.65094E-01	1.45183E-03	0.00000E+00
34	7.66439E-01	7.65216E-01	1.30558E-03	0.00000E+00
35	7.77596E-01	7.66248E-01	1.84065E-03	0.00000E+00
36	7.67093E-01	7.66313E-01	1.72327E-03	0.00000E+00
37	7.71512E-01	7.66684E-01	1.65470E-03	0.00000E+00
38	7.60971E-01	7.66303E-01	1.38702E-03	0.00000E+00
39	7.64286E-01	7.66177E-01	1.40108E-03	0.00000E+00
40	7.63561E-01	7.66023E-01	1.33380E-03	0.00000E+00
41	7.62229E-01	7.65813E-01	1.30062E-03	0.00000E+00
42	7.64256E-01	7.65731E-01	1.24200E-03	0.00000E+00

43	7.69066E-01	7.65897E-01	1.17210E-03	0.00000E+00
44	7.65876E-01	7.65896E-01	1.10838E-03	0.00000E+00
45	7.64997E-01	7.65856E-01	1.05218E-03	0.00000E+00
46	7.59635E-01	7.65585E-01	1.05495E-03	0.00000E+00
47	7.65601E-01	7.65586E-01	1.00554E-03	0.00000E+00
48	7.59193E-01	7.65330E-01	9.98650E-04	0.00000E+00
49	7.72119E-01	7.65591E-01	9.20308E-04	0.00000E+00
50	7.70425E-01	7.65770E-01	9.59574E-04	0.00000E+00
51	7.55494E-01	7.65403E-01	9.49217E-04	0.00000E+00
52	7.68203E-01	7.65500E-01	9.20145E-04	0.00000E+00
53	7.69928E-01	7.65647E-01	9.00903E-04	0.00000E+00
54	7.60249E-01	7.65473E-01	8.88784E-04	0.00000E+00
55	7.58088E-01	7.65242E-01	8.92064E-04	0.00000E+00
56	7.64071E-01	7.65207E-01	8.64514E-04	0.00000E+00
57	7.64125E-01	7.65175E-01	8.38549E-04	0.00000E+00
58	7.63565E-01	7.65129E-01	8.14892E-04	0.00000E+00
59	7.67976E-01	7.65208E-01	7.95438E-04	0.00000E+00
60	7.59738E-01	7.65060E-01	7.87830E-04	0.00000E+00
61	7.63609E-01	7.65022E-01	7.67246E-04	0.00000E+00
62	7.67623E-01	7.65089E-01	7.49915E-04	0.00000E+00
63	7.63323E-01	7.65045E-01	7.31836E-04	0.00000E+00
64	7.61141E-01	7.64949E-01	7.19956E-04	0.00000E+00
65	7.65046E-01	7.64952E-01	7.02181E-04	0.00000E+00
66	7.59363E-01	7.64822E-01	6.98062E-04	0.00000E+00
67	7.62717E-01	7.64774E-01	6.83390E-04	0.00000E+00
68	7.60353E-01	7.64676E-01	6.75198E-04	0.00000E+00

69	7.74099E-01	7.64881E-01	6.92463E-04	0.00000E+00	0.00000E+00
70	7.66953E-01	7.64925E-01	6.78740E-04	0.00000E+00	0.00000E+00
71	7.61864E-01	7.64861E-01	6.67329E-04	0.00000E+00	0.00000E+00
72	7.66892E-01	7.64902E-01	6.54648E-04	0.00000E+00	0.00000E+00
73	7.68158E-01	7.64967E-01	6.44585E-04	0.00000E+00	0.00000E+00
74	7.68562E-01	7.65038E-01	6.35642E-04	0.00000E+00	0.00000E+00
75	7.57047E-01	7.64884E-01	6.42460E-04	0.00000E+00	0.00000E+00
76	7.71266E-01	7.65005E-01	6.41832E-04	0.00000E+00	0.00000E+00
77	7.66578E-01	7.65034E-01	6.30306E-04	0.00000E+00	0.00000E+00
78	7.62913E-01	7.64995E-01	6.19770E-04	0.00000E+00	0.00000E+00
79	7.67131E-01	7.65033E-01	6.09635E-04	0.00000E+00	0.00000E+00
80	7.63858E-01	7.65013E-01	5.99017E-04	0.00000E+00	0.00000E+00
81	7.72073E-01	7.65135E-01	6.01313E-04	0.00000E+00	0.00000E+00
82	7.68173E-01	7.65186E-01	5.93173E-04	0.00000E+00	0.00000E+00
83	7.66359E-01	7.65206E-01	5.83371E-04	0.00000E+00	0.00000E+00
84	7.71539E-01	7.65309E-01	5.83202E-04	0.00000E+00	0.00000E+00
85	7.57163E-01	7.65178E-01	5.88908E-04	0.00000E+00	0.00000E+00
86	7.64171E-01	7.65162E-01	5.79559E-04	0.00000E+00	0.00000E+00
87	7.59356E-01	7.65071E-01	5.77686E-04	0.00000E+00	0.00000E+00
88	7.66237E-01	7.65089E-01	5.68880E-04	0.00000E+00	0.00000E+00
89	7.68849E-01	7.65146E-01	5.63040E-04	0.00000E+00	0.00000E+00
90	7.74115E-01	7.65280E-01	5.70857E-04	0.00000E+00	0.00000E+00
91	7.66932E-01	7.65304E-01	5.62812E-04	0.00000E+00	0.00000E+00
92	7.66825E-01	7.65326E-01	5.54925E-04	0.00000E+00	0.00000E+00
93	7.61596E-01	7.65273E-01	5.49491E-04	0.00000E+00	0.00000E+00
94	7.62008E-01	7.65227E-01	5.43589E-04	0.00000E+00	0.00000E+00

```
         95       7.67448E-01      7.65258E-01      5.36791E-04
0.00000E+00      0.00000E+00
         96       7.64321E-01      7.65245E-01      5.29443E-04
0.00000E+00      0.00000E+00
         97       7.67190E-01      7.65271E-01      5.22819E-04
0.00000E+00      0.00000E+00
         98       7.67320E-01      7.65299E-01      5.16448E-04
0.00000E+00      0.00000E+00
         99       7.68663E-01      7.65343E-01      5.11487E-04
0.00000E+00      0.00000E+00
        100       7.67249E-01      7.65368E-01      5.05335E-04
0.00000E+00      0.00000E+00
        101       7.65313E-01      7.65367E-01      4.98729E-04
0.00000E+00      0.00000E+00
        102       7.63814E-01      7.65347E-01      4.92696E-04
0.00000E+00      0.00000E+00
        103       7.68218E-01      7.65383E-01      4.87775E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=F71EEAC8BBBF0346
        104       7.65534E-01      7.65385E-01      4.81643E-04
0.00000E+00      0.00000E+00
        105       7.76130E-01      7.65516E-01      4.93812E-04
0.00000E+00      0.00000E+00
        106       7.68895E-01      7.65557E-01      4.89490E-04
0.00000E+00      0.00000E+00
        107       7.72371E-01      7.65638E-01      4.90478E-04
0.00000E+00      0.00000E+00
        108       7.64513E-01      7.65625E-01      4.84789E-04
0.00000E+00      0.00000E+00
        109       7.64812E-01      7.65615E-01      4.79147E-04
0.00000E+00      0.00000E+00
        110       7.65880E-01      7.65618E-01      4.73552E-04
0.00000E+00      0.00000E+00
        111       7.71088E-01      7.65681E-01      4.72281E-04
0.00000E+00      0.00000E+00
        112       7.63065E-01      7.65651E-01      4.67828E-04
0.00000E+00      0.00000E+00
        113       7.69920E-01      7.65699E-01      4.65023E-04
0.00000E+00      0.00000E+00
        114       7.71016E-01      7.65757E-01      4.63608E-04
0.00000E+00      0.00000E+00
        115       7.72436E-01      7.65830E-01      4.73733E-04
0.00000E+00      0.00000E+00
        116       7.62372E-01      7.65792E-01      4.60783E-04
0.00000E+00      0.00000E+00
        117       7.66066E-01      7.65795E-01      4.55811E-04
0.00000E+00      0.00000E+00
        118       7.69591E-01      7.65835E-01      4.52740E-04
0.00000E+00      0.00000E+00
        119       7.72367E-01      7.65903E-01      4.62493E-04
0.00000E+00      0.00000E+00
```

```
        120       7.64606E-01      7.65890E-01      4.55717E-04
0.00000E+00      0.00000E+00
        121       7.70045E-01      7.65932E-01      4.51733E-04
0.00000E+00      0.00000E+00
        122       7.68159E-01      7.65955E-01      4.49865E-04
0.00000E+00      0.00000E+00
        123       7.74122E-01      7.66036E-01      4.57225E-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=05013BB73EF83100
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.55310E-05 + or -  1.07959E-08             generation time
=  2.99765E-05 + or -  1.99154E-08
 nu bar   =  2.43894E+00 + or -  9.22108E-06       average fission group
=  2.17575E+02 + or -  1.00636E-02
                      energy(ev) of the average lethargy causing fission
=  5.65353E-02 + or -  1.25317E-04
                                                 system mean free path (cm)
=  6.52495E-01 + or -  1.71886E-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          0.76604   + or - 0.00046     0.76558 to 0.76649
0.76512 to 0.76695    0.76466 to 0.76741    2000000      12.7624

      24          0.76602   + or - 0.00046     0.76555 to 0.76648
0.76509 to 0.76694    0.76463 to 0.76740    1980000      12.7637

      25          0.76602   + or - 0.00047     0.76555 to 0.76649
0.76509 to 0.76695    0.76462 to 0.76742    1960000      12.7204

      26          0.76601   + or - 0.00047     0.76554 to 0.76648
0.76506 to 0.76696    0.76459 to 0.76743    1940000      12.6078

      27          0.76608   + or - 0.00049     0.76560 to 0.76657
0.76511 to 0.76705    0.76463 to 0.76754    1920000      12.0997

      28          0.76609   + or - 0.00049     0.76560 to 0.76658
0.76510 to 0.76707    0.76461 to 0.76756    1900000      12.0266

      29          0.76601   + or - 0.00051     0.76549 to 0.76652
```

0.76498 to 0.76703	0.76447 to 0.76754	1880000	11.2154			
30	0.76602	+ or - 0.00052	0.76551 to 0.76654			
0.76499 to 0.76705	0.76447 to 0.76757	1860000	11.2578			
31	0.76607	+ or - 0.00053	0.76554 to 0.76660			
0.76502 to 0.76712	0.76449 to 0.76765	1840000	11.0863			
32	0.76608	+ or - 0.00053	0.76555 to 0.76661			
0.76502 to 0.76714	0.76449 to 0.76768	1820000	11.1023			
37	0.76593	+ or - 0.00057	0.76536 to 0.76650			
0.76479 to 0.76708	0.76421 to 0.76765	1720000	9.4194			
42	0.76611	+ or - 0.00058	0.76552 to 0.76669			
0.76494 to 0.76728	0.76436 to 0.76786	1620000	10.2186			
47	0.76618	+ or - 0.00063	0.76555 to 0.76680			
0.76493 to 0.76743	0.76430 to 0.76805	1520000	9.9853			
52	0.76626	+ or - 0.00066	0.76560 to 0.76691			
0.76494 to 0.76757	0.76428 to 0.76823	1420000	9.1585			
57	0.76648	+ or - 0.00065	0.76583 to 0.76714			
0.76517 to 0.76779	0.76452 to 0.76845	1320000	10.2259			
62	0.76664	+ or - 0.00068	0.76596 to 0.76732			
0.76528 to 0.76800	0.76460 to 0.76868	1220000	10.8885			
67	0.76703	+ or - 0.00061	0.76642 to 0.76764			
0.76581 to 0.76825	0.76520 to 0.76886	1120000	15.9172			
72	0.76713	+ or - 0.00066	0.76647 to 0.76779			
0.76581 to 0.76845	0.76514 to 0.76911	1020000	15.7819			
77	0.76721	+ or - 0.00074	0.76648 to 0.76795			
0.76574 to 0.76869	0.76500 to 0.76943	920000	13.3100			
82	0.76726	+ or - 0.00086	0.76640 to 0.76812			
0.76554 to 0.76898	0.76467 to 0.76985	820000	12.2033			
87	0.76775	+ or - 0.00081	0.76694 to 0.76857			
0.76612 to 0.76938	0.76531 to 0.77019	720000	11.7053			
92	0.76762	+ or - 0.00099	0.76662 to 0.76861			
0.76563 to 0.76960	0.76464 to 0.77059	620000	10.0715			
97	0.76821	+ or - 0.00079	0.76743 to 0.76900			
0.76664 to 0.76979	0.76586 to 0.77057	520000	19.0168			
102	0.76863	+ or - 0.00087	0.76776 to 0.76950			
0.76689 to 0.77037	0.76602 to 0.77124	420000	22.2039			

```
     107          0.76813   + or - 0.00098     0.76715 to 0.76911
0.76616 to 0.77010    0.76518 to 0.77108     320000      20.2132

     112          0.76915   + or - 0.00119     0.76796 to 0.77035
0.76677 to 0.77154    0.76558 to 0.77273     220000      33.2279
1                                                fuel bundle

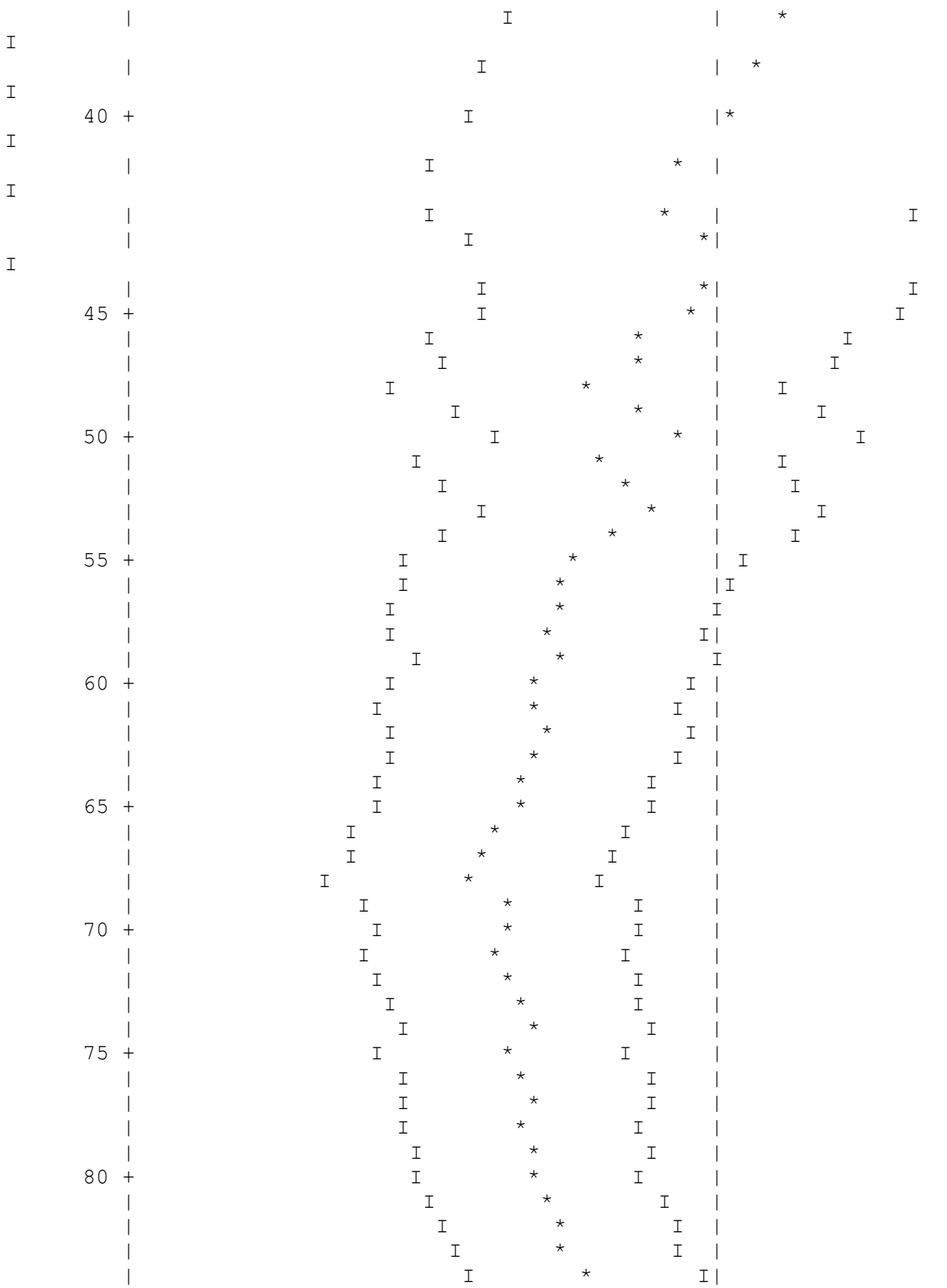
 no. of initial
deviation of
  generations      average                         67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76981   + or - 0.00267     0.76715 to 0.77248
0.76448 to 0.77515    0.76181 to 0.77782     120000      16.0473
1                          fuel bundle
```

plot of average k-effective by generation run.
the line represents k-eff = 0.76595 + or - 0.00044 which occurs for 122 generations run.

```
                                0.7647                   0.7664
0.7680

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

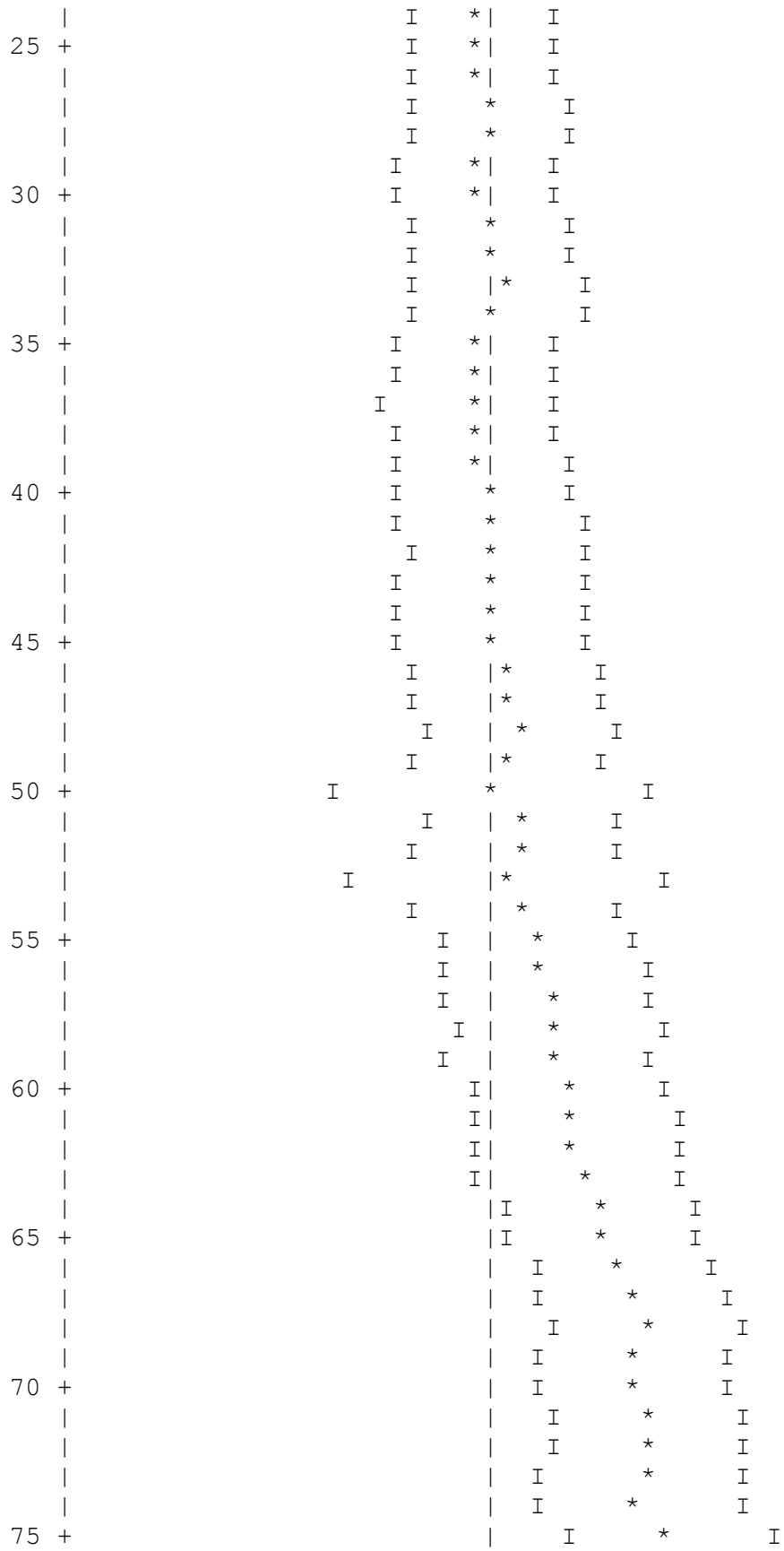


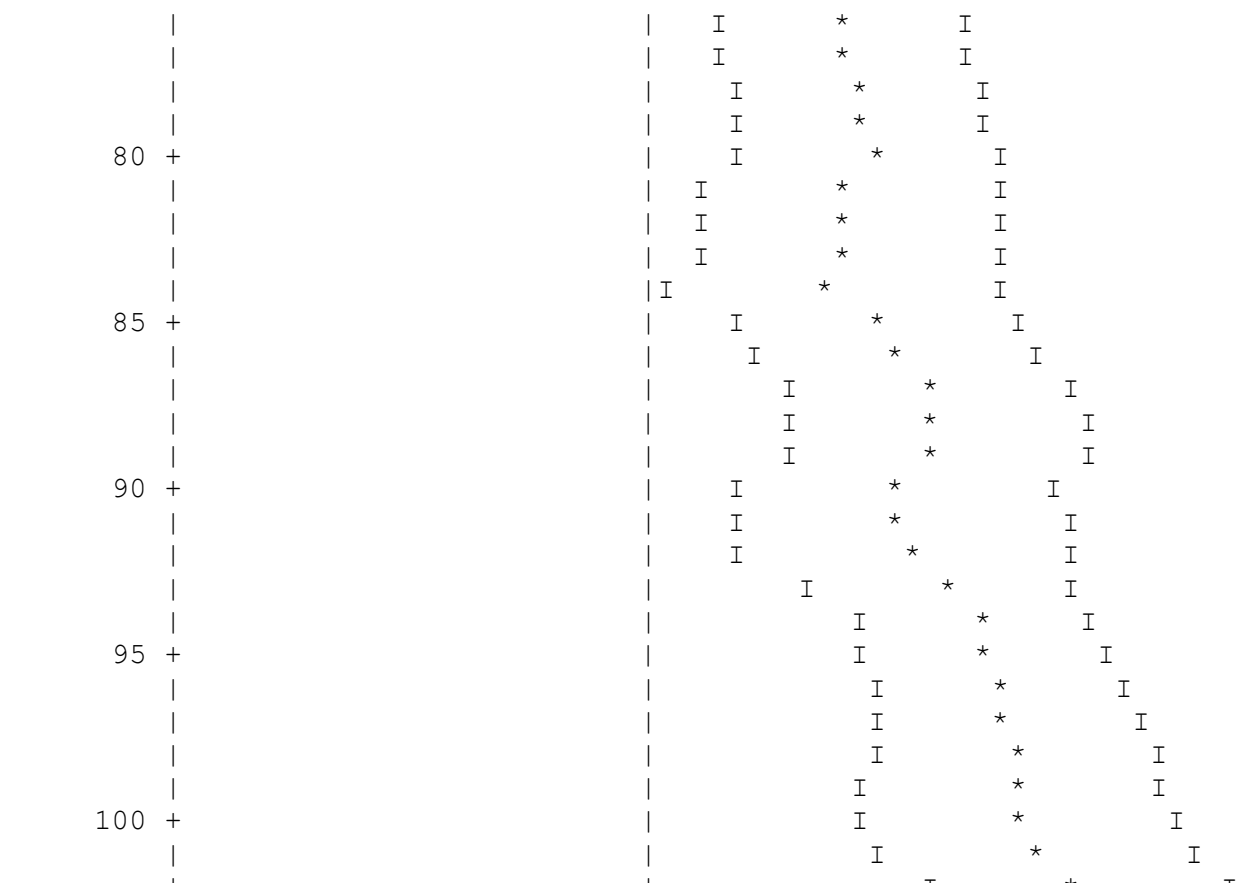
```
     85 +                        I        *        I  |
        |                        I        *       I   |
        |                       I       *        I    |
        |                       I        *       I    |
        |                        I       *       I    |
     90 +                          I       *        I |
        |                          I        *       I |
        |                           I       *       I |
        |                          I       *        I |
        |                          I       *       I  |
     95 +                          I       *       I  |
        |                          I       *       I  |
        |                           I      *       I  |
        |                           I       *      I  |
        |                            I      *       I |
    100 +                            I       *      I |
        |                            I       *      I |
        |                            I      *       I |
        |                             I      *      I |
        |                             I      *      I |
    105 +                               I      *      I
        |                               I       *     |I
        |                                I      *     | I
        |                               I       *     | I
        |                               I      *      | I
    110 +                               I       *     | I
        |                                I      *     | I
        |                                I      *     | I
        |                                 I      *    |  I
        |                                  I      *   |  I
    115 +                                   I      * |    I
        |                                  I      *  |   I
        |                                  I      *  |   I
        |                                   I      * |   I
        |                                    I      *|     I
    120 +                                    I      *|    I
        |                                    I      *|     I
        |                                     I      *     I
        |                                      I     |*      I
1                           fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7660 + or - 0.0004 which occurs for 23 generations skipped.

```
                                0.7659                    0.7685
0.7711

|-------------------------|-----------------------|------------------
------|------------------------
        |
        |                     I    *   I
```





```
         |                          I
*                                   I
         |                          |                              *
     120 +                          |               I
*                           I

   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                 2.32345E-07   100.0000
1.53532E-07    62.9085       0.00000E+00     0.0000
    3    0.0000                 1.34496E-05    10.7336
1.97180E-05     4.9467       0.00000E+00     0.0000
    4    0.0000                 2.11665E-05     9.0382
3.57493E-05     4.0719       0.00000E+00     0.0000
    5    0.0000                 2.71407E-05     6.5952
5.49196E-05     2.7164       0.00000E+00     0.0000
    6    0.0001                 9.95318E-05     3.5149
2.26854E-04     1.6369       0.00000E+00     0.0000
    7    0.0001                 1.11742E-04     3.5611
2.03577E-04     1.5355       0.00000E+00     0.0000
    8    0.0003                 2.35814E-04     2.1120
3.24727E-04     0.9978       0.00000E+00     0.0000
    9    0.0005                 3.83291E-04     1.2990
4.44124E-04     0.6063       0.00000E+00     0.0000
   10    0.0003                 2.05195E-04     1.6945
2.08335E-04     0.8380       0.00000E+00     0.0000
   11    0.0012                 9.18563E-04     0.7338
5.27092E-04     0.5237       0.00000E+00     0.0000
   12    0.0010                 7.60974E-04     0.6894
2.98337E-04     0.6800       0.00000E+00     0.0000
   13    0.0003                 2.31686E-04     1.4399
9.20536E-05     1.4245       0.00000E+00     0.0000
   14    0.0013                 9.96006E-04     0.5999
4.07172E-04     0.5933       0.00000E+00     0.0000
   15    0.0010                 7.56771E-04     0.7404
3.26325E-04     0.7311       0.00000E+00     0.0000
   16    0.0002                 1.85552E-04     1.2008
8.52955E-05     1.1839       0.00000E+00     0.0000
   17    0.0001                 6.80797E-05     1.8791
3.31204E-05     1.8446       0.00000E+00     0.0000
   18    0.0001                 5.26306E-05     2.1502
2.65770E-05     2.1083       0.00000E+00     0.0000
```

19	0.0001	8.09356E-05	1.3230	4.27857E-05	1.2923	0.00000E+00	0.0000
20	0.0001	5.78889E-05	1.4813	3.17242E-05	1.4425	0.00000E+00	0.0000
21	0.0002	1.20879E-04	1.1029	6.82101E-05	1.0783	0.00000E+00	0.0000
22	0.0001	1.03595E-04	1.0912	6.13776E-05	1.0628	0.00000E+00	0.0000
23	0.0001	1.05728E-04	1.1405	6.45443E-05	1.1131	0.00000E+00	0.0000
24	0.0000	2.57284E-05	2.3542	1.59603E-05	2.2966	0.00000E+00	0.0000
25	0.0000	2.94325E-05	1.9932	1.84178E-05	1.9387	0.00000E+00	0.0000
26	0.0000	1.67577E-05	2.2891	1.05403E-05	2.2176	0.00000E+00	0.0000
27	0.0001	5.30051E-05	1.4604	3.30791E-05	1.4322	0.00000E+00	0.0000
28	0.0001	9.57469E-05	1.0552	5.97488E-05	1.0381	0.00000E+00	0.0000
29	0.0001	9.60247E-05	1.1433	6.05112E-05	1.1278	0.00000E+00	0.0000
30	0.0000	1.27979E-05	2.9531	8.02654E-06	2.9315	0.00000E+00	0.0000
31	0.0001	9.67860E-05	1.1135	6.11416E-05	1.1005	0.00000E+00	0.0000
32	0.0001	3.87211E-05	1.6701	2.47339E-05	1.6348	0.00000E+00	0.0000
33	0.0000	3.26271E-05	1.6410	2.04335E-05	1.6214	0.00000E+00	0.0000
34	0.0001	7.59752E-05	0.9835	4.77168E-05	0.9692	0.00000E+00	0.0000
35	0.0001	4.54837E-05	1.4021	2.85461E-05	1.3818	0.00000E+00	0.0000
36	0.0001	4.42128E-05	1.5057	2.73625E-05	1.4925	0.00000E+00	0.0000
37	0.0000	2.73788E-05	1.7392	1.71933E-05	1.6990	0.00000E+00	0.0000
38	0.0000	3.39985E-05	1.9137	2.14161E-05	1.8708	0.00000E+00	0.0000
39	0.0002	1.29739E-04	0.9743	8.25438E-05	0.9523	0.00000E+00	0.0000
40	0.0002	1.20344E-04	0.8196	7.77853E-05	0.8048	0.00000E+00	0.0000
41	0.0002	1.60759E-04	0.7800	1.07402E-04	0.7562	0.00000E+00	0.0000
42	0.0002	1.40577E-04	0.7098	9.55813E-05	0.6924	0.00000E+00	0.0000
43	0.0001	8.02572E-05	1.1734	5.75826E-05	1.1244	0.00000E+00	0.0000
44	0.0001	1.11576E-04	1.0734	8.20026E-05	1.0266	0.00000E+00	0.0000

```
   45    0.0001                 5.88973E-05     0.9828
4.75598E-05     0.9099       0.00000E+00     0.0000
   46    0.0000                 1.40820E-05     1.8692
1.13254E-05     1.7471       0.00000E+00     0.0000
   47    0.0001                 4.14046E-05     1.8116
3.21410E-05     1.7365       0.00000E+00     0.0000
   48    0.0000                 1.16441E-05     3.9533
9.04378E-06     3.8447       0.00000E+00     0.0000
   49    0.0001                 7.85702E-05     1.7511
6.19861E-05     1.7113       0.00000E+00     0.0000
   50    0.0001                 5.74157E-05     1.6266
4.72702E-05     1.5934       0.00000E+00     0.0000
   51    0.0000                 1.58270E-05     3.0033
1.31351E-05     2.9503       0.00000E+00     0.0000
   52    0.0001                 4.00481E-05     1.7179
3.46449E-05     1.6774       0.00000E+00     0.0000
   53    0.0002                 1.56671E-04     0.7187
1.54142E-04     0.6684       0.00000E+00     0.0000
   54    0.0001                 7.44547E-05     1.6652
6.92465E-05     1.6033       0.00000E+00     0.0000
   55    0.0002                 1.62535E-04     1.2906
1.48983E-04     1.2576       0.00000E+00     0.0000
   56    0.0002                 1.16868E-04     1.7602
1.08404E-04     1.7174       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                 1.49480E-04     1.6356
1.35628E-04     1.5978       0.00000E+00     0.0000
   58    0.0001                 8.35793E-05     1.8960
7.32331E-05     1.8442       0.00000E+00     0.0000
   59    0.0002                 1.61993E-04     1.4221
1.45278E-04     1.3701       0.00000E+00     0.0000
   60    0.0004                 2.79775E-04     1.1647
2.53429E-04     1.0978       0.00000E+00     0.0000
   61    0.0000                 2.84280E-05     3.8634
2.18661E-05     3.7382       0.00000E+00     0.0000
   62    0.0002                 1.66650E-04     1.6906
1.39674E-04     1.6468       0.00000E+00     0.0000
   63    0.0002                 1.20345E-04     1.6859
9.91187E-05     1.6315       0.00000E+00     0.0000
   64    0.0001                 1.04680E-04     2.1978
8.42790E-05     2.1298       0.00000E+00     0.0000
   65    0.0000                 3.44575E-05     3.4148
3.41069E-05     3.2954       0.00000E+00     0.0000
   66    0.0002                 1.71719E-04     1.5514
```

1.52356E-04	1.5037	0.00000E+00	0.0000	67	0.0002	1.52123E-04	2.0631
1.24341E-04	1.9964	0.00000E+00	0.0000	68	0.0000	2.86676E-05	4.6897
2.47275E-05	4.5380	0.00000E+00	0.0000	69	0.0004	3.01063E-04	1.5012
2.36274E-04	1.4546	0.00000E+00	0.0000	70	0.0003	2.11579E-04	1.8148
1.92469E-04	1.7510	0.00000E+00	0.0000	71	0.0006	4.29585E-04	1.3394
3.55525E-04	1.2973	0.00000E+00	0.0000	72	0.0001	5.24459E-05	5.1624
3.09378E-05	5.0429	0.00000E+00	0.0000	73	0.0004	3.22355E-04	1.7263
2.45733E-04	1.6391	0.00000E+00	0.0000	74	0.0014	1.05336E-03	1.0067
7.66169E-04	0.9637	0.00000E+00	0.0000	75	0.0002	1.16436E-04	2.8130
8.93080E-05	2.6877	0.00000E+00	0.0000	76	0.0006	4.64284E-04	1.5831
2.94856E-04	1.5284	0.00000E+00	0.0000	77	0.0005	3.61186E-04	1.9416
2.59147E-04	1.8681	0.00000E+00	0.0000	78	0.0000	6.52128E-06	4.4316
6.38873E-05	4.3795	0.00000E+00	0.0000	79	0.0002	1.78795E-04	2.5539
1.20413E-04	2.4487	0.00000E+00	0.0000	80	0.0001	5.83231E-05	3.7437
7.79217E-05	3.6316	0.00000E+00	0.0000	81	0.0014	1.05858E-03	1.2041
7.78538E-04	1.1529	0.00000E+00	0.0000	82	0.0001	6.75565E-05	4.1575
4.04970E-05	3.9423	0.00000E+00	0.0000	83	0.0002	1.28142E-04	3.2154
1.41724E-04	3.1492	0.00000E+00	0.0000	84	0.0001	7.80919E-05	2.9669
7.93149E-05	2.7551	0.00000E+00	0.0000	85	0.0003	2.02885E-04	2.0065
2.49615E-04	1.9531	0.00000E+00	0.0000	86	0.0003	2.65488E-04	2.2493
2.13536E-04	2.1426	0.00000E+00	0.0000	87	0.0004	3.34176E-04	2.8025
2.07924E-04	2.6850	0.00000E+00	0.0000	88	0.0001	5.86957E-05	3.7593
1.06403E-04	3.6735	0.00000E+00	0.0000	89	0.0001	8.98407E-05	3.4876
6.26083E-05	3.1896	0.00000E+00	0.0000	90	0.0003	2.19452E-04	3.0952
1.29695E-04	2.9570	0.00000E+00	0.0000	91	0.0002	1.91127E-04	2.7983
1.20847E-04	2.6342	0.00000E+00	0.0000	92	0.0000	2.99043E-05	2.7724

```
1.95849E-04     2.7153       0.00000E+00     0.0000
   93    0.0002                 1.26454E-04     3.3693
1.02996E-04     3.1250       0.00000E+00     0.0000
   94    0.0001                 1.05010E-04     4.3503
5.92274E-05     4.0644       0.00000E+00     0.0000
   95    0.0008                 6.06748E-04     1.7988
3.74275E-04     1.7419       0.00000E+00     0.0000
   96    0.0002                 1.35672E-04     4.2165
6.91844E-05     4.0221       0.00000E+00     0.0000
   97    0.0004                 2.79126E-04     3.7184
1.59803E-04     3.6408       0.00000E+00     0.0000
   98    0.0001                 1.01948E-04     3.6457
9.78807E-05     3.5048       0.00000E+00     0.0000
   99    0.0001                 9.91725E-05     5.0544
6.65393E-05     4.8768       0.00000E+00     0.0000
  100    0.0002                 1.31591E-04     3.9687
8.79186E-05     3.8070       0.00000E+00     0.0000
  101    0.0002                 1.15548E-04     3.6686
7.32691E-05     3.4220       0.00000E+00     0.0000
  102    0.0002                 1.67559E-04     4.0859
9.31902E-05     3.9365       0.00000E+00     0.0000
  103    0.0001                 9.85281E-05     3.9058
9.60518E-05     3.7117       0.00000E+00     0.0000
  104    0.0002                 1.70092E-04     3.6926
1.34828E-04     3.5698       0.00000E+00     0.0000
  105    0.0002                 1.27621E-04     3.1512
8.41545E-05     2.9616       0.00000E+00     0.0000
  106    0.0002                 1.90292E-04     3.6265
1.41324E-04     3.5836       0.00000E+00     0.0000
  107    0.0001                 6.60840E-05     3.4289
6.65368E-05     3.2284       0.00000E+00     0.0000
  108    0.0000                 3.72601E-05     2.4920
1.60698E-04     2.4321       0.00000E+00     0.0000
  109    0.0002                 1.28238E-04     2.1826
4.25688E-04     2.1532       0.00000E+00     0.0000
  110    0.0008                 5.92807E-04     2.8768
3.65889E-04     2.8467       0.00000E+00     0.0000
  111    0.0002                 1.56682E-04     4.0266
1.43978E-04     3.9181       0.00000E+00     0.0000
  112    0.0002                 1.19088E-04     5.0503
1.25463E-04     4.9615       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                 1.22146E-04     3.5256
1.07006E-04     3.2804       0.00000E+00     0.0000
```

114	0.0000	1.09819E-05	6.6105	1.50319E-05	5.4324
115	0.0001	7.27396E-05	3.9378	8.44924E-05	3.6484
116	0.0003	2.02100E-04	2.5024	1.51416E-04	2.2579
117	0.0006	4.68513E-04	2.4074	2.50792E-04	2.2501
118	0.0008	5.81863E-04	1.9156	4.54508E-04	1.8356
119	0.0002	1.35323E-04	1.8709	3.49830E-04	1.8001
120	0.0002	1.67712E-04	2.1606	6.38278E-04	2.1300
121	0.0007	5.29784E-04	2.6933	4.07475E-04	2.6282
122	0.0001	1.10830E-04	4.3226	8.61516E-05	4.0533
123	0.0003	2.10731E-04	2.8026	1.49864E-04	2.4851
124	0.0003	2.34778E-04	3.1662	1.93835E-04	2.9541
125	0.0002	1.38225E-04	3.4350	1.27393E-04	3.0805
126	0.0001	9.31356E-05	4.0134	8.44652E-05	3.5082
127	0.0005	3.86919E-04	3.3917	1.90243E-04	3.1976
128	0.0003	2.17228E-04	2.7221	1.34118E-04	2.4230
129	0.0006	4.69367E-04	2.0916	4.31317E-04	1.9944
130	0.0002	1.15522E-04	3.1383	2.81971E-04	3.0444
131	0.0004	2.89751E-04	2.3218	2.33384E-04	1.9497
132	0.0007	5.22403E-04	2.4750	3.20821E-04	2.2811
133	0.0014	1.06884E-03	1.8596	6.74758E-04	1.7725
134	0.0001	9.08824E-05	2.1915	2.36651E-04	1.8343
135	0.0002	1.66532E-04	3.4105	2.47252E-04	3.3228
136	0.0001	4.49935E-05	1.9727	6.98485E-04	1.9429
137	0.0000	1.90711E-05	1.1018	3.43186E-03	1.0986
138	0.0004	3.00737E-04	2.1315	7.83805E-04	2.0977
139	0.0002	1.79783E-04	3.3159	2.20736E-04	3.1130

140	0.0003	2.14247E-04	2.1244	2.84456E-04	1.8592
0.00000E+00	0.0000				
141	0.0001	7.97916E-05	2.1938	2.51983E-04	1.9601
0.00000E+00	0.0000				
142	0.0001	6.33949E-05	3.1478	2.19812E-04	2.8767
0.00000E+00	0.0000				
143	0.0001	8.38003E-05	1.9026	1.77557E-04	1.1799
0.00000E+00	0.0000				
144	0.0000	3.36357E-05	3.3455	7.38946E-05	2.0186
0.00000E+00	0.0000				
145	0.0005	3.85970E-04	2.6980	3.02489E-04	2.4519
0.00000E+00	0.0000				
146	0.0004	3.38896E-04	2.3723	2.48520E-04	1.9385
0.00000E+00	0.0000				
147	0.0002	1.68626E-04	3.4431	1.08844E-04	2.9668
0.00000E+00	0.0000				
148	0.0001	6.00894E-05	6.1231	4.01182E-05	4.9560
0.00000E+00	0.0000				
149	0.0000	3.06149E-05	7.4578	2.13619E-05	5.7002
0.00000E+00	0.0000				
150	0.0001	8.59555E-05	4.6871	6.26666E-05	3.5028
0.00000E+00	0.0000				
151	0.0001	6.24294E-05	4.0937	5.39081E-05	2.7925
0.00000E+00	0.0000				
152	0.0000	3.81759E-05	4.0028	4.48406E-05	2.3042
0.00000E+00	0.0000				
153	0.0001	3.96235E-05	4.4546	4.51888E-05	2.5744
0.00000E+00	0.0000				
154	0.0001	4.96086E-05	3.6483	5.10754E-05	2.1829
0.00000E+00	0.0000				
155	0.0001	4.81810E-05	4.0597	4.83975E-05	2.4421
0.00000E+00	0.0000				
156	0.0001	4.77859E-05	4.3749	4.64104E-05	2.6853
0.00000E+00	0.0000				
157	0.0001	5.93978E-05	4.9042	5.73438E-05	3.0071
0.00000E+00	0.0000				
158	0.0001	6.32774E-05	4.0706	6.55184E-05	2.6123
0.00000E+00	0.0000				
159	0.0002	1.49153E-04	3.2957	2.07738E-04	2.7442
0.00000E+00	0.0000				
160	0.0001	6.08053E-05	4.2407	7.26529E-05	3.1649
0.00000E+00	0.0000				
161	0.0001	7.08041E-05	3.9171	7.12642E-05	2.5080
0.00000E+00	0.0000				
162	0.0001	8.70580E-05	3.6859	8.17570E-05	2.3464
0.00000E+00	0.0000				
163	0.0001	8.55103E-05	3.9706	8.24330E-05	2.4012
0.00000E+00	0.0000				
164	0.0001	1.01799E-04	3.5336	9.39498E-05	2.2160
0.00000E+00	0.0000				
165	0.0001	1.08759E-04	3.2222	1.01114E-04	2.0012
0.00000E+00	0.0000				

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  166    0.0001                 6.77323E-05     4.6269
6.23618E-05     2.8868       0.00000E+00     0.0000
  167    0.0001                 7.68601E-05     4.1009
7.01129E-05     2.6550       0.00000E+00     0.0000
  168    0.0001                 9.18757E-05     3.8728
8.04030E-05     2.6166       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                 1.04304E-04     4.3946
9.16166E-05     3.0825       0.00000E+00     0.0000
  170    0.0002                 1.36641E-04     3.5071
1.16092E-04     2.6416       0.00000E+00     0.0000
  171    0.0001                 1.11762E-04     4.5935
8.42965E-05     3.7789       0.00000E+00     0.0000
  172    0.0002                 1.31875E-04     4.6550
9.41983E-05     3.8893       0.00000E+00     0.0000
  173    0.0003                 2.04019E-04     4.1540
1.33413E-04     3.6403       0.00000E+00     0.0000
  174    0.0003                 2.45500E-04     3.9981
1.53008E-04     3.5371       0.00000E+00     0.0000
  175    0.0002                 1.16487E-04     6.0091
7.01096E-05     5.4123       0.00000E+00     0.0000
  176    0.0002                 1.21009E-04     5.8266
7.16735E-05     5.2452       0.00000E+00     0.0000
  177    0.0001                 1.10600E-04     6.9342
6.56116E-05     6.2170       0.00000E+00     0.0000
  178    0.0001                 1.11744E-04     5.8942
6.59094E-05     5.2682       0.00000E+00     0.0000
  179    0.0002                 1.17446E-04     5.4381
6.84683E-05     4.8538       0.00000E+00     0.0000
  180    0.0002                 1.20585E-04     5.5470
6.94576E-05     4.9800       0.00000E+00     0.0000
  181    0.0001                 1.10986E-04     5.7606
6.43101E-05     5.0734       0.00000E+00     0.0000
  182    0.0001                 1.14579E-04     6.2721
6.59281E-05     5.5199       0.00000E+00     0.0000
  183    0.0001                 1.02506E-04     5.8431
5.95210E-05     5.0819       0.00000E+00     0.0000
  184    0.0001                 9.73560E-05     6.2226
5.66751E-05     5.3662       0.00000E+00     0.0000
  185    0.0001                 9.18468E-05     6.6232
5.38068E-05     5.6599       0.00000E+00     0.0000
  186    0.0001                 9.68948E-05     7.2572
5.63038E-05     6.2315       0.00000E+00     0.0000
  187    0.0001                 9.73231E-05     6.6090
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5.64471E-05	5.6640	0.00000E+00	0.0000	188	0.0001	9.13684E-05	6.0178
5.32979E-05	5.1199	0.00000E+00	0.0000	189	0.0001	8.16174E-05	6.8516
4.84735E-05	5.6918	0.00000E+00	0.0000	190	0.0003	1.97703E-04	3.8439
1.18572E-04	3.1527	0.00000E+00	0.0000	191	0.0003	1.93563E-04	3.6980
1.17222E-04	2.9882	0.00000E+00	0.0000	192	0.0003	2.00854E-04	3.9185
1.21336E-04	3.1459	0.00000E+00	0.0000	193	0.0003	2.07206E-04	3.6458
1.25002E-04	2.9406	0.00000E+00	0.0000	194	0.0005	3.97323E-04	2.8749
2.45379E-04	2.2368	0.00000E+00	0.0000	195	0.0005	4.18248E-04	2.7169
2.60921E-04	2.1022	0.00000E+00	0.0000	196	0.0006	4.47619E-04	2.7574
2.80128E-04	2.1314	0.00000E+00	0.0000	197	0.0007	5.33219E-04	2.5198
3.28786E-04	1.9700	0.00000E+00	0.0000	198	0.0007	5.68522E-04	2.5002
3.54149E-04	1.9394	0.00000E+00	0.0000	199	0.0004	3.33193E-04	2.5701
2.04419E-04	2.0280	0.00000E+00	0.0000	200	0.0004	3.37978E-04	3.0000
2.10044E-04	2.3527	0.00000E+00	0.0000	201	0.0010	7.73266E-04	2.1797
4.75308E-04	1.7146	0.00000E+00	0.0000	202	0.0013	9.64092E-04	2.0850
5.86427E-04	1.6666	0.00000E+00	0.0000	203	0.0016	1.22262E-03	1.9549
7.30560E-04	1.5904	0.00000E+00	0.0000	204	0.0021	1.64546E-03	1.6154
9.69891E-04	1.3422	0.00000E+00	0.0000	205	0.0015	1.15695E-03	1.9383
6.75100E-04	1.6570	0.00000E+00	0.0000	206	0.0019	1.46691E-03	1.6272
8.47695E-04	1.4157	0.00000E+00	0.0000	207	0.0021	1.62367E-03	1.7837
9.45367E-04	1.5476	0.00000E+00	0.0000	208	0.0028	2.17681E-03	1.6760
1.26757E-03	1.4810	0.00000E+00	0.0000	209	0.0031	2.33739E-03	1.5037
1.37826E-03	1.3250	0.00000E+00	0.0000	210	0.0037	2.80237E-03	1.4164
1.67388E-03	1.2462	0.00000E+00	0.0000	211	0.0040	3.10084E-03	1.3304
1.87068E-03	1.1507	0.00000E+00	0.0000	212	0.0047	3.57384E-03	1.1382
2.16938E-03	0.9713	0.00000E+00	0.0000	213	0.0064	4.91360E-03	0.8866

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2.98277E-03     0.7525       0.00000E+00     0.0000
  214    0.0096                 7.35885E-03     0.7934
4.43027E-03     0.6626       0.00000E+00     0.0000
  215    0.0159                 1.21773E-02     0.5941
7.25606E-03     0.5015       0.00000E+00     0.0000
  216    0.0300                 2.29711E-02     0.3809
1.35584E-02     0.3191       0.00000E+00     0.0000
  217    0.0202                 1.54503E-02     0.5260
9.07187E-03     0.4445       0.00000E+00     0.0000
  218    0.0277                 2.11916E-02     0.5120
1.24092E-02     0.4274       0.00000E+00     0.0000
  219    0.0355                 2.72227E-02     0.3480
1.58940E-02     0.2948       0.00000E+00     0.0000
  220    0.0474                 3.63019E-02     0.3754
2.11099E-02     0.3189       0.00000E+00     0.0000
  221    0.0626                 4.79390E-02     0.3157
2.78006E-02     0.2699       0.00000E+00     0.0000
  222    0.0800                 6.13152E-02     0.2917
3.55324E-02     0.2481       0.00000E+00     0.0000
  223    0.1047                 8.01796E-02     0.2594
4.65014E-02     0.2237       0.00000E+00     0.0000
  224    0.0583                 4.46698E-02     0.2992
2.60266E-02     0.2568       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    0.2306                 1.76613E-01     0.1534
1.04601E-01     0.1323       0.00000E+00     0.0000
  226    0.0456                 3.49200E-02     0.3877
2.12389E-02     0.3282       0.00000E+00     0.0000
  227    0.0493                 3.77361E-02     0.3756
2.34045E-02     0.3086       0.00000E+00     0.0000
  228    0.0212                 1.62282E-02     0.5722
1.02555E-02     0.4661       0.00000E+00     0.0000
  229    0.0222                 1.70317E-02     0.5414
1.09464E-02     0.4336       0.00000E+00     0.0000
  230    0.0118                 9.06048E-03     0.8237
5.91171E-03     0.6439       0.00000E+00     0.0000
  231    0.0121                 9.30252E-03     0.7051
6.19300E-03     0.5282       0.00000E+00     0.0000
  232    0.0129                 9.86861E-03     0.7858
6.73284E-03     0.5810       0.00000E+00     0.0000
  233    0.0083                 6.34167E-03     0.9641
4.46942E-03     0.7032       0.00000E+00     0.0000
  234    0.0058                 4.46985E-03     1.1833
3.23064E-03     0.8185       0.00000E+00     0.0000
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  235    0.0024                 1.82977E-03     1.6425
1.21731E-03     1.2468       0.00000E+00     0.0000
  236    0.0019                 1.42386E-03     1.9501
9.66546E-04     1.4691       0.00000E+00     0.0000
  237    0.0017                 1.29688E-03     1.8395
9.23466E-04     1.3073       0.00000E+00     0.0000
  238    0.0001                 7.11119E-05     9.1803
6.08874E-05     5.6051       0.00000E+00     0.0000

 system total =                 7.66036E-01     0.0575
4.68949E-01     0.0490       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3141E-01  +
or -  0.0002



 elapsed time   3.09617 minutes

 random number=   4549431807A1F090
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                              fission
percent         total
                                                unit  region   density
deviation      fissions

                                                   1      1    3.090E-03
0.06         7.660E-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     flux     percent     flux     percent
                 deviation            deviation            deviation
```

1	0.000E+00	0.00	0.000E+00	0.00	0.000E+00	0.00
2	1.474E-08	26.57	1.161E-08	28.03	1.331E-08	27.17
3	8.552E-07	4.11	7.080E-07	3.87	7.634E-07	3.88
4	1.467E-06	3.08	1.201E-06	2.81	1.283E-06	2.82
5	2.316E-06	2.24	1.889E-06	1.90	2.021E-06	2.06
6	9.344E-06	1.15	7.469E-06	1.04	7.991E-06	1.06
7	1.227E-05	1.09	9.434E-06	1.03	9.905E-06	1.00
8	3.103E-05	0.77	2.280E-05	0.69	2.391E-05	0.68
9	8.155E-05	0.46	5.835E-05	0.41	6.084E-05	0.41
10	4.632E-05	0.68	3.290E-05	0.59	3.419E-05	0.58
11	2.200E-04	0.31	1.554E-04	0.25	1.612E-04	0.24
12	1.907E-04	0.29	1.382E-04	0.25	1.450E-04	0.25
13	5.677E-05	0.52	4.146E-05	0.46	4.349E-05	0.47
14	2.537E-04	0.26	1.834E-04	0.21	1.916E-04	0.21
15	2.198E-04	0.22	1.596E-04	0.20	1.663E-04	0.20
16	7.079E-05	0.42	5.144E-05	0.36	5.393E-05	0.36
17	3.237E-05	0.68	2.375E-05	0.61	2.469E-05	0.54
18	2.774E-05	0.72	2.025E-05	0.58	2.091E-05	0.56
19	5.077E-05	0.58	3.699E-05	0.48	3.847E-05	0.48
20	3.955E-05	0.52	2.893E-05	0.46	3.033E-05	0.45
21	8.037E-05	0.42	5.864E-05	0.36	6.125E-05	0.36
22	7.251E-05	0.39	5.312E-05	0.32	5.515E-05	0.31
23	7.659E-05	0.42	5.616E-05	0.35	5.815E-05	0.32
24	1.862E-05	0.80	1.371E-05	0.64	1.425E-05	0.63
25	2.337E-05	0.79	1.726E-05	0.67	1.800E-05	0.64
26	1.330E-05	0.90	9.905E-06	0.81	1.052E-05	0.79
27	4.211E-05	0.53	3.118E-05	0.47	3.292E-05	0.44
28	7.749E-05	0.40	5.756E-05	0.36	6.087E-05	0.35
29	7.937E-05	0.41	5.943E-05	0.37	6.229E-05	0.35
30	1.013E-05	0.99	7.530E-06	0.92	7.979E-06	0.84
31	7.808E-05	0.43	5.871E-05	0.35	6.175E-05	0.33
32	3.093E-05	0.69	2.339E-05	0.54	2.465E-05	0.50
33	2.666E-05	0.63	2.018E-05	0.57	2.123E-05	0.51
34	6.088E-05	0.41	4.595E-05	0.34	4.843E-05	0.33
35	3.643E-05	0.59	2.750E-05	0.47	2.888E-05	0.42
36	3.427E-05	0.49	2.574E-05	0.42	2.706E-05	0.38
37	2.191E-05	0.73	1.651E-05	0.53	1.722E-05	0.50
38	2.582E-05	0.66	1.962E-05	0.60	2.065E-05	0.52
39	9.734E-05	0.32	7.477E-05	0.27	7.888E-05	0.24
40	8.966E-05	0.35	6.920E-05	0.31	7.375E-05	0.28
41	1.137E-04	0.29	8.867E-05	0.27	9.460E-05	0.24
42	9.377E-05	0.33	7.400E-05	0.27	7.939E-05	0.25
43	5.106E-05	0.38	4.049E-05	0.32	4.268E-05	0.28
44	6.967E-05	0.36	5.584E-05	0.31	5.988E-05	0.26
45	3.509E-05	0.44	2.796E-05	0.38	3.103E-05	0.33
46	8.321E-06	0.92	6.621E-06	0.77	7.192E-06	0.69
47	2.344E-05	0.58	1.867E-05	0.47	1.940E-05	0.41
48	6.730E-06	0.96	5.445E-06	0.98	5.674E-06	0.70
49	4.359E-05	0.40	3.485E-05	0.33	3.754E-05	0.29
50	2.936E-05	0.44	2.355E-05	0.41	2.558E-05	0.33
51	7.770E-06	0.85	6.258E-06	0.71	6.810E-06	0.63
52	2.071E-05	0.56	1.669E-05	0.48	1.818E-05	0.43

53	7.594E-05	0.29	6.149E-05	0.28	6.670E-05	0.23
54	3.352E-05	0.42	2.713E-05	0.38	2.926E-05	0.29
55	6.636E-05	0.35	5.405E-05	0.32	5.888E-05	0.27
56	4.341E-05	0.39	3.534E-05	0.35	3.836E-05	0.27
57	4.893E-05	0.31	4.003E-05	0.28	4.366E-05	0.23
58	2.595E-05	0.51	2.116E-05	0.46	2.307E-05	0.36
59	4.434E-05	0.43	3.617E-05	0.38	3.952E-05	0.30
60	6.449E-05	0.32	5.271E-05	0.25	5.726E-05	0.23
61	6.209E-06	0.99	5.104E-06	0.89	5.569E-06	0.62
62	3.224E-05	0.44	2.644E-05	0.40	2.883E-05	0.32
63	2.179E-05	0.53	1.793E-05	0.50	1.946E-05	0.35
64	1.719E-05	0.54	1.405E-05	0.51	1.532E-05	0.41
65	5.736E-06	0.98	4.767E-06	0.85	5.168E-06	0.76
66	2.867E-05	0.53	2.353E-05	0.44	2.567E-05	0.36
67	2.111E-05	0.54	1.737E-05	0.46	1.889E-05	0.40
68	4.597E-06	1.14	3.797E-06	1.01	4.084E-06	0.85
69	3.725E-05	0.40	3.064E-05	0.33	3.342E-05	0.30
70	2.669E-05	0.51	2.190E-05	0.41	2.395E-05	0.35
71	4.574E-05	0.35	3.769E-05	0.30	4.094E-05	0.25
72	2.697E-06	1.55	2.204E-06	1.32	2.405E-06	1.08
73	2.730E-05	0.43	2.253E-05	0.35	2.444E-05	0.34
74	7.960E-05	0.28	6.584E-05	0.25	7.139E-05	0.22
75	9.104E-06	0.67	7.518E-06	0.61	8.138E-06	0.53
76	2.300E-05	0.43	1.898E-05	0.42	2.067E-05	0.34
77	1.760E-05	0.58	1.461E-05	0.46	1.590E-05	0.41
78	1.496E-06	1.80	1.301E-06	1.72	1.396E-06	1.32
79	9.924E-06	0.78	8.266E-06	0.66	8.870E-06	0.55
80	4.501E-06	1.05	3.753E-06	0.86	4.060E-06	0.77
81	5.541E-05	0.34	4.609E-05	0.31	4.997E-05	0.24
82	3.334E-06	1.37	2.750E-06	1.11	2.964E-06	0.93
83	4.485E-06	1.03	3.701E-06	0.96	4.022E-06	0.78
84	8.088E-06	0.77	6.760E-06	0.68	7.369E-06	0.58
85	1.003E-05	0.69	8.302E-06	0.60	8.983E-06	0.52
86	1.355E-05	0.63	1.132E-05	0.54	1.220E-05	0.43
87	1.191E-05	0.68	9.959E-06	0.52	1.074E-05	0.45
88	3.131E-06	1.14	2.619E-06	1.03	2.843E-06	0.83
89	6.522E-06	0.86	5.482E-06	0.78	5.909E-06	0.57
90	6.970E-06	0.90	5.774E-06	0.81	6.269E-06	0.58
91	8.151E-06	0.81	6.821E-06	0.73	7.392E-06	0.62
92	4.788E-06	1.13	4.017E-06	0.84	4.368E-06	0.73
93	8.129E-06	0.73	6.792E-06	0.63	7.366E-06	0.52
94	4.223E-06	1.24	3.526E-06	1.13	3.830E-06	0.84
95	1.246E-05	0.72	1.052E-05	0.62	1.138E-05	0.49
96	3.346E-06	1.21	2.790E-06	1.09	3.024E-06	0.94
97	3.410E-06	1.20	2.836E-06	1.11	3.099E-06	0.91
98	3.525E-06	1.22	2.990E-06	1.10	3.201E-06	0.88
99	2.378E-06	1.77	1.961E-06	1.46	2.105E-06	1.14
100	3.417E-06	1.20	2.877E-06	1.09	3.110E-06	0.83
101	4.872E-06	1.06	4.058E-06	0.97	4.426E-06	0.84
102	3.357E-06	1.22	2.802E-06	1.07	3.040E-06	0.89
103	4.663E-06	0.96	3.902E-06	0.94	4.199E-06	0.77
104	4.270E-06	1.11	3.559E-06	0.98	3.881E-06	0.87

105	4.355E-06	1.04	3.663E-06	0.93	3.965E-06	0.72
106	1.539E-06	1.54	1.287E-06	1.20	1.422E-06	1.19
107	3.470E-06	1.22	2.933E-06	1.07	3.204E-06	0.88
108	3.166E-06	1.19	2.718E-06	1.16	2.934E-06	0.94
109	5.115E-06	0.87	4.298E-06	0.85	4.645E-06	0.71
110	2.970E-06	1.25	2.532E-06	1.17	2.778E-06	0.94
111	3.078E-06	1.22	2.575E-06	1.11	2.805E-06	0.87
112	1.766E-06	1.45	1.515E-06	1.47	1.657E-06	1.15
113	5.698E-06	0.90	4.790E-06	0.82	5.194E-06	0.68
114	2.023E-06	1.36	1.676E-06	1.11	1.825E-06	0.91
115	5.126E-06	1.11	4.249E-06	0.89	4.622E-06	0.71
116	1.098E-05	0.74	9.138E-06	0.60	9.905E-06	0.52
117	1.180E-05	0.67	9.907E-06	0.56	1.071E-05	0.48
118	1.287E-05	0.67	1.084E-05	0.58	1.170E-05	0.49
119	8.225E-06	0.78	6.918E-06	0.72	7.560E-06	0.59
120	5.821E-06	0.91	4.916E-06	0.80	5.326E-06	0.68
121	6.091E-06	0.98	5.153E-06	0.85	5.596E-06	0.67
122	3.253E-06	1.11	2.753E-06	1.07	2.970E-06	0.73
123	1.031E-05	0.67	8.640E-06	0.58	9.374E-06	0.47
124	7.348E-06	0.81	6.225E-06	0.69	6.771E-06	0.59
125	6.999E-06	0.87	5.909E-06	0.75	6.396E-06	0.64
126	5.832E-06	0.88	4.883E-06	0.80	5.273E-06	0.69
127	5.539E-06	1.06	4.706E-06	1.00	5.074E-06	0.77
128	7.663E-06	0.86	6.491E-06	0.71	6.997E-06	0.52
129	9.675E-06	0.72	8.142E-06	0.57	8.790E-06	0.50
130	3.957E-06	1.13	3.385E-06	1.02	3.678E-06	0.84
131	1.674E-05	0.54	1.406E-05	0.46	1.521E-05	0.40
132	1.121E-05	0.73	9.448E-06	0.68	1.021E-05	0.48
133	1.367E-05	0.64	1.161E-05	0.53	1.251E-05	0.41
134	1.485E-05	0.61	1.247E-05	0.49	1.341E-05	0.42
135	2.337E-06	1.32	2.016E-06	1.22	2.183E-06	1.00
136	3.895E-06	1.08	3.388E-06	0.96	3.692E-06	0.75
137	2.517E-06	0.89	2.618E-06	0.92	2.982E-06	0.77
138	4.009E-06	0.93	3.505E-06	0.91	3.862E-06	0.71
139	4.548E-06	0.87	3.864E-06	0.82	4.183E-06	0.70
140	1.198E-05	0.51	1.012E-05	0.51	1.099E-05	0.42
141	8.830E-06	0.69	7.494E-06	0.63	8.113E-06	0.52
142	5.830E-06	0.84	4.931E-06	0.76	5.331E-06	0.59
143	1.978E-05	0.49	1.666E-05	0.45	1.795E-05	0.32
144	8.010E-06	0.73	6.802E-06	0.68	7.309E-06	0.48
145	7.159E-06	0.82	6.069E-06	0.71	6.567E-06	0.56
146	1.196E-05	0.60	1.014E-05	0.51	1.092E-05	0.43
147	3.620E-06	1.15	3.088E-06	0.99	3.285E-06	0.78
148	1.885E-06	1.56	1.614E-06	1.45	1.720E-06	1.08
149	1.180E-06	2.09	9.927E-07	1.83	1.064E-06	1.56
150	3.925E-06	1.08	3.373E-06	1.00	3.610E-06	0.82
151	4.119E-06	1.11	3.463E-06	1.03	3.745E-06	0.82
152	4.315E-06	0.96	3.638E-06	0.82	3.925E-06	0.66
153	4.415E-06	1.08	3.694E-06	1.04	4.033E-06	0.76
154	4.574E-06	1.06	3.869E-06	0.82	4.175E-06	0.70
155	4.382E-06	1.11	3.700E-06	0.94	3.933E-06	0.81
156	3.943E-06	1.30	3.322E-06	1.02	3.578E-06	0.85

157	4.592E-06	0.93	3.863E-06	0.86	4.188E-06	0.71
158	4.866E-06	1.03	4.095E-06	0.95	4.431E-06	0.78
159	6.716E-06	0.81	5.696E-06	0.67	6.108E-06	0.58
160	3.579E-06	1.21	3.023E-06	1.12	3.206E-06	0.89
161	4.953E-06	0.99	4.145E-06	0.89	4.508E-06	0.73
162	5.940E-06	0.94	4.951E-06	0.82	5.322E-06	0.67
163	6.135E-06	0.82	5.136E-06	0.72	5.520E-06	0.56
164	6.570E-06	0.95	5.508E-06	0.81	5.910E-06	0.67
165	6.831E-06	0.80	5.758E-06	0.74	6.238E-06	0.63
166	3.930E-06	1.15	3.300E-06	0.97	3.601E-06	0.82
167	4.115E-06	1.02	3.479E-06	0.94	3.747E-06	0.79
168	4.327E-06	1.17	3.669E-06	0.95	3.953E-06	0.79
169	4.409E-06	1.05	3.715E-06	0.98	4.030E-06	0.70
170	4.662E-06	0.85	3.906E-06	0.78	4.224E-06	0.64
171	2.413E-06	1.44	2.028E-06	1.14	2.194E-06	1.07
172	2.422E-06	1.30	2.035E-06	1.14	2.222E-06	0.98
173	2.470E-06	1.33	2.090E-06	1.21	2.254E-06	0.96
174	2.499E-06	1.22	2.178E-06	1.23	2.340E-06	0.96
175	1.047E-06	2.14	8.785E-07	2.11	9.445E-07	1.50
176	1.005E-06	2.18	8.495E-07	1.92	9.184E-07	1.54
177	1.027E-06	2.14	8.837E-07	2.06	9.446E-07	1.55
178	1.069E-06	1.89	8.925E-07	1.83	9.642E-07	1.45
179	1.060E-06	1.81	9.014E-07	1.49	9.787E-07	1.27
180	1.060E-06	2.00	9.115E-07	1.77	9.742E-07	1.58
181	1.107E-06	1.92	9.127E-07	1.74	9.842E-07	1.45
182	1.071E-06	2.02	9.099E-07	1.81	9.884E-07	1.48
183	1.090E-06	1.70	9.415E-07	1.55	1.009E-06	1.22
184	1.097E-06	2.07	9.366E-07	1.96	9.989E-07	1.36
185	1.141E-06	1.72	9.757E-07	1.66	1.056E-06	1.38
186	1.140E-06	1.78	9.623E-07	1.73	1.037E-06	1.46
187	1.140E-06	2.01	9.716E-07	1.78	1.049E-06	1.39
188	1.155E-06	1.97	9.823E-07	1.72	1.065E-06	1.39
189	1.193E-06	2.01	1.010E-06	1.60	1.085E-06	1.32
190	3.029E-06	1.29	2.529E-06	1.18	2.735E-06	0.93
191	3.052E-06	1.08	2.590E-06	0.94	2.819E-06	0.85
192	3.107E-06	1.17	2.668E-06	0.97	2.867E-06	0.79
193	3.285E-06	1.26	2.759E-06	1.14	2.973E-06	0.89
194	6.734E-06	0.76	5.731E-06	0.64	6.261E-06	0.55
195	7.334E-06	0.74	6.200E-06	0.69	6.689E-06	0.53
196	7.761E-06	0.74	6.540E-06	0.77	7.060E-06	0.65
197	8.386E-06	0.74	7.127E-06	0.69	7.726E-06	0.56
198	8.992E-06	0.74	7.596E-06	0.63	8.257E-06	0.59
199	4.853E-06	0.95	4.136E-06	0.88	4.411E-06	0.72
200	5.054E-06	0.90	4.257E-06	0.75	4.625E-06	0.69
201	1.076E-05	0.64	9.021E-06	0.54	9.793E-06	0.48
202	1.192E-05	0.66	1.011E-05	0.57	1.094E-05	0.48
203	1.297E-05	0.58	1.095E-05	0.54	1.184E-05	0.44
204	1.480E-05	0.55	1.252E-05	0.50	1.355E-05	0.40
205	8.572E-06	0.71	7.733E-06	0.61	8.149E-06	0.50
206	9.304E-06	0.66	8.328E-06	0.58	8.838E-06	0.43
207	9.546E-06	0.61	8.657E-06	0.53	9.176E-06	0.47
208	1.121E-05	0.58	1.012E-05	0.53	1.075E-05	0.43

209	1.154E-05	0.51	1.053E-05	0.53	1.112E-05	0.39
210	1.393E-05	0.58	1.260E-05	0.52	1.345E-05	0.45
211	1.609E-05	0.47	1.449E-05	0.39	1.545E-05	0.34
212	1.914E-05	0.37	1.740E-05	0.32	1.848E-05	0.26
213	2.622E-05	0.36	2.352E-05	0.31	2.517E-05	0.25
214	3.690E-05	0.31	3.313E-05	0.29	3.561E-05	0.23
215	5.526E-05	0.27	4.991E-05	0.24	5.372E-05	0.20
216	9.207E-05	0.19	8.388E-05	0.18	9.074E-05	0.15
217	5.518E-05	0.22	5.277E-05	0.22	5.609E-05	0.16
218	7.094E-05	0.17	6.807E-05	0.18	7.233E-05	0.13
219	8.401E-05	0.22	8.131E-05	0.17	8.669E-05	0.13
220	1.014E-04	0.16	9.895E-05	0.14	1.056E-04	0.12
221	1.206E-04	0.16	1.188E-04	0.14	1.267E-04	0.11
222	1.370E-04	0.17	1.369E-04	0.14	1.460E-04	0.12
223	1.539E-04	0.14	1.575E-04	0.12	1.677E-04	0.10
224	7.534E-05	0.18	7.994E-05	0.14	8.465E-05	0.10
225	2.338E-04	0.12	2.723E-04	0.10	2.826E-04	0.10
226	3.196E-05	0.27	4.489E-05	0.22	4.453E-05	0.15
227	2.902E-05	0.26	4.632E-05	0.18	4.447E-05	0.13
228	1.047E-05	0.43	1.906E-05	0.35	1.757E-05	0.17
229	9.705E-06	0.42	1.971E-05	0.31	1.750E-05	0.15
230	4.517E-06	0.48	1.020E-05	0.40	8.734E-06	0.21
231	4.248E-06	0.51	1.056E-05	0.38	8.737E-06	0.23
232	3.948E-06	0.62	1.138E-05	0.41	8.881E-06	0.21
233	2.236E-06	0.64	7.421E-06	0.48	5.530E-06	0.27
234	1.439E-06	0.83	5.342E-06	0.70	3.838E-06	0.28
235	5.356E-07	1.41	1.063E-06	1.05	1.125E-06	0.48
236	3.479E-07	1.66	7.559E-07	1.34	8.025E-07	0.58
237	2.285E-07	1.83	5.509E-07	1.31	6.097E-07	0.58
238	5.518E-09	10.31	2.031E-08	6.30	2.570E-08	1.71

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
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57	0.000E+00	0.00
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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
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76	0.000E+00	0.00
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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
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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
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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
 0.7533 to 0.7561     *
 0.7561 to 0.7590     ***
 0.7590 to 0.7618     *************
 0.7618 to 0.7646     *********************
 0.7646 to 0.7675     ****************************
 0.7675 to 0.7703     *****************
 0.7703 to 0.7731     ***********
 0.7731 to 0.7759     ****
 0.7759 to 0.7788     **

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7533 to 0.7561     *
 0.7561 to 0.7590     ***
 0.7590 to 0.7618     *******
 0.7618 to 0.7646     *****************
 0.7646 to 0.7675     ******************
 0.7675 to 0.7703     ***************
 0.7703 to 0.7731     **********
 0.7731 to 0.7759     ***
 0.7759 to 0.7788     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7533 to 0.7561
 0.7561 to 0.7590     **
 0.7590 to 0.7618     **
 0.7618 to 0.7646     **********
 0.7646 to 0.7675     ***************
 0.7675 to 0.7703     **********
 0.7703 to 0.7731     ********
 0.7731 to 0.7759     **
 0.7759 to 0.7788     *
```

```
                                 frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7533 to 0.7561
 0.7561 to 0.7590
 0.7590 to 0.7618
 0.7618 to 0.7646     *****
 0.7646 to 0.7675     ******
 0.7675 to 0.7703     *******
 0.7703 to 0.7731     *****
 0.7731 to 0.7759     *
 0.7759 to 0.7788     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76603 + or - 0.00045                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65353E-02 + or -  1.25317E-04            ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  9.22108E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52495E-01 + or -  1.71886E-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     3.09300 minutes


*********************************************************************
************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
```

```
V        IIIIIIIIIIII


   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22            //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22            //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
```

```
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                 11111111      66666666666



      0000000       666666666666                    22222222222
99999999999                              44        0000000
     000000000     6666666666666                   2222222222222
9999999999999                            444       000000000
    00       00    66                    :::       22         22   99
99         :::              4444      00       00
   00         00   66                    :::                  22   99
99         :::             44 44     00         00
   00         00   66                    :::                  22   99
99         :::            44  44     00         00
   00         00   666666666666                            22
9999999999999                         44   44     00         00
   00         00   6666666666666                          22
999999999999                        44    44     00         00
   00         00   66         66         :::            22
99         :::        444444444444   00         00
   00         00   66         66         :::          22
99         :::       4444444444444   00         00
    00       00    66         66         :::        22
99         :::                44      00       00
     000000000     6666666666666                   2222222222222
9999999999999                            44       000000000
      0000000       66666666666                    2222222222222
999999999999                             44        0000000
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
   SSSSSSSSSSSS   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
```

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

*********************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
```

```
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:29:40.25
*****
        *****
*****
        *****
*****

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

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

**********************************************************************
*******************************************
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.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90902E-08  1.32111E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.16637E-08  3.17388E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  1.38584E-09  3.85408E-08   40093    92.9065     zr93 4034
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endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  3.02136E-10  8.58357E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.38821E-17  3.86066E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.66479E-10  4.72954E-09   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  1.21324E-08  3.44669E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.01984E-09  2.32637E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  6.75199E-12  1.99905E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.25549E-09  3.71707E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  8.64189E-11  2.66203E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  5.87894E-11  1.86375E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  5.28446E-10  1.62780E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  3.84254E-13  1.20664E-11   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  2.03799E-10  6.39972E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53897E-12  2.13166E-10   47109   108.9047     ag109 4731
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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  8.98777E-11  2.90303E-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  1.29592E-09  4.30217E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43912E-09  8.17026E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.56242E-12  8.81345E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51418E-11  2.24055E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.27817E-11  1.24529E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.12580E-10  4.34405E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  2.32096E-15  9.37289E-14   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.72826E-10  2.24461E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  2.23180E-11  8.87895E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  6.07201E-14  2.45205E-12   54135   134.9072     xe135 5458
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endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.33811E-09  5.32349E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.12740E-15  8.52736E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41906E-09  5.73054E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23471E-09  5.06003E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  5.23262E-11  2.19145E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.40988E-10  5.94674E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  1.77337E-12  7.58631E-11   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.16114E-10  3.08493E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.08656E-09  4.58301E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  5.80052E-11  2.48138E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.14597E-09  4.90228E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  3.93737E-10  1.69613E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32867E-10  3.61280E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.59763E-11  7.02599E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.84955E-10  1.69293E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  2.21001E-17  9.78533E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  8.58473E-13  3.82681E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.42526E-11  2.38588E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.22275E-10  9.90824E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06748E-09  1.38577E-07   62151   150.9199     sm151 6246
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endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50023E-11  2.50125E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  9.48219E-14  4.34051E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45285E-09  6.56341E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59124E-09  7.28392E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30701E-14  6.02203E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.12183E-12  2.83896E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.68235E-13  7.85225E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84210E-12  2.65672E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27370E-10  1.98189E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94478E-10  2.77463E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51352E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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
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endf/b7 rel6 rev7 mod5                 12/17/09
    1093237  1.13146E-11  8.02857E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.60591E-17  1.85690E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.26467E-10  6.62956E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88247E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71907E-20  2.68358E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08462E-20  7.82633E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  3.12473E-29  2.26410E-27   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.51586E-21  2.54750E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.75029E-21  7.09406E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.60192E-21  7.01490E-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
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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

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                                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:
  9275 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       ........

                                ........     0.01567 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
0.01633 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 15740 independent fission points were generated for generation 1
          1       7.67606E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15533 independent fission points were generated for generation 2
          2       7.60872E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15665 independent fission points were generated for generation 3
          3       7.63786E-01      7.63786E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.66960E-01      7.65373E-01      1.58703E-03
0.00000E+00      0.00000E+00
          5       7.69510E-01      7.66752E-01      1.65587E-03
0.00000E+00      0.00000E+00
          6       7.66233E-01      7.66622E-01      1.17802E-03
0.00000E+00      0.00000E+00
          7       7.68209E-01      7.66940E-01      9.66135E-04
0.00000E+00      0.00000E+00
          8       7.66006E-01      7.66784E-01      8.04038E-04
0.00000E+00      0.00000E+00
          9       7.72975E-01      7.67669E-01      1.11535E-03
0.00000E+00      0.00000E+00
         10       7.66725E-01      7.67551E-01      9.73102E-04
0.00000E+00      0.00000E+00
         11       7.60677E-01      7.66787E-01      1.14883E-03
0.00000E+00      0.00000E+00
         12       7.68017E-01      7.66910E-01      1.03489E-03
0.00000E+00      0.00000E+00
         13       7.66174E-01      7.66843E-01      9.38479E-04
0.00000E+00      0.00000E+00
         14       7.74201E-01      7.67456E-01      1.05351E-03
0.00000E+00      0.00000E+00
         15       7.59574E-01      7.66850E-01      1.14315E-03
0.00000E+00      0.00000E+00
         16       7.65678E-01      7.66766E-01      1.06165E-03
0.00000E+00      0.00000E+00
         17       7.71580E-01      7.67087E-01      1.03914E-03
0.00000E+00      0.00000E+00
         18       7.67282E-01      7.67099E-01      9.72100E-04
0.00000E+00      0.00000E+00
         19       7.66579E-01      7.67069E-01      9.13641E-04
0.00000E+00      0.00000E+00
         20       7.70928E-01      7.67283E-01      8.87674E-04
0.00000E+00      0.00000E+00
         21       7.71015E-01      7.67479E-01      8.62317E-04
0.00000E+00      0.00000E+00
```

22	7.65263E-01	7.67369E-01	8.25535E-04	0.00000E+00
23	7.62390E-01	7.67132E-01	8.20254E-04	0.00000E+00
24	7.64702E-01	7.67021E-01	7.89838E-04	0.00000E+00
25	7.74284E-01	7.67337E-01	8.18108E-04	0.00000E+00
26	7.71146E-01	7.67496E-01	7.99199E-04	0.00000E+00
27	7.64528E-01	7.68665E-01	3.42866E-03	0.00000E+00
28	7.64813E-01	7.67895E-01	2.62055E-03	0.00000E+00
29	7.55088E-01	7.65760E-01	5.18723E-03	0.00000E+00
30	7.58383E-01	7.64706E-01	5.26473E-03	0.00000E+00
31	7.75716E-01	7.66083E-01	4.02298E-03	0.00000E+00
32	7.65039E-01	7.65967E-01	3.31491E-03	0.00000E+00
33	7.65548E-01	7.65925E-01	2.87006E-03	0.00000E+00
34	7.68549E-01	7.66163E-01	2.53722E-03	0.00000E+00
35	7.64999E-01	7.66066E-01	2.25604E-03	0.00000E+00
36	7.63659E-01	7.65881E-01	2.06457E-03	0.00000E+00
37	7.65470E-01	7.65852E-01	1.88795E-03	0.00000E+00
38	7.65618E-01	7.65836E-01	1.73627E-03	0.00000E+00
39	7.68038E-01	7.65974E-01	1.61210E-03	0.00000E+00
40	7.73210E-01	7.66399E-01	1.62162E-03	0.00000E+00
41	7.74264E-01	7.66836E-01	1.73450E-03	0.00000E+00
42	7.71578E-01	7.67086E-01	1.73194E-03	0.00000E+00
43	7.69103E-01	7.67187E-01	1.65432E-03	0.00000E+00
44	7.69751E-01	7.67309E-01	1.70882E-03	0.00000E+00
45	7.68531E-01	7.67364E-01	1.63340E-03	0.00000E+00
46	7.71165E-01	7.67530E-01	1.58236E-03	0.00000E+00
47	7.61896E-01	7.67295E-01	1.46940E-03	0.00000E+00

48	7.60650E-01	7.67029E-01	1.47369E-03	0.00000E+00
49	7.72870E-01	7.67254E-01	1.40979E-03	0.00000E+00
50	7.68975E-01	7.67318E-01	1.35228E-03	0.00000E+00
51	7.59078E-01	7.67023E-01	1.38558E-03	0.00000E+00
52	7.71869E-01	7.67190E-01	1.33188E-03	0.00000E+00
53	7.65591E-01	7.67137E-01	1.27053E-03	0.00000E+00
54	7.64928E-01	7.67066E-01	1.24932E-03	0.00000E+00
55	7.64960E-01	7.67000E-01	1.20122E-03	0.00000E+00
56	7.68133E-01	7.67034E-01	1.15696E-03	0.00000E+00
57	7.69214E-01	7.67098E-01	1.11919E-03	0.00000E+00
58	7.63009E-01	7.66982E-01	1.08998E-03	0.00000E+00
59	7.67146E-01	7.66986E-01	1.05587E-03	0.00000E+00
60	7.70286E-01	7.67075E-01	1.03601E-03	0.00000E+00
61	7.69771E-01	7.67146E-01	1.00737E-03	0.00000E+00
62	7.62612E-01	7.67030E-01	9.75863E-04	0.00000E+00
63	7.56369E-01	7.66763E-01	1.00016E-03	0.00000E+00
64	7.76724E-01	7.67006E-01	9.51983E-04	0.00000E+00
65	7.63243E-01	7.66917E-01	7.94133E-04	0.00000E+00
66	7.69868E-01	7.66985E-01	7.78174E-04	0.00000E+00
67	7.62684E-01	7.66888E-01	7.66420E-04	0.00000E+00
68	7.65889E-01	7.66865E-01	7.49143E-04	0.00000E+00
69	7.66589E-01	7.66859E-01	7.32332E-04	0.00000E+00
70	7.65183E-01	7.66824E-01	7.17162E-04	0.00000E+00
71	7.63661E-01	7.66758E-01	7.04958E-04	0.00000E+00
72	7.63287E-01	7.66687E-01	6.93895E-04	0.00000E+00
73	7.64770E-01	7.66649E-01	6.80712E-04	0.00000E+00

74	7.61976E-01	7.66557E-01	7.46821E-04	0.00000E+00	0.00000E+00
75	7.69970E-01	7.66623E-01	6.63523E-04	0.00000E+00	0.00000E+00
76	7.56995E-01	7.66441E-01	6.76477E-04	0.00000E+00	0.00000E+00
77	7.67556E-01	7.66462E-01	6.63924E-04	0.00000E+00	0.00000E+00
78	7.63957E-01	7.66416E-01	6.53163E-04	0.00000E+00	0.00000E+00
79	7.67716E-01	7.66439E-01	6.41613E-04	0.00000E+00	0.00000E+00
80	7.68561E-01	7.66477E-01	6.31191E-04	0.00000E+00	0.00000E+00
81	7.59307E-01	7.66353E-01	6.32653E-04	0.00000E+00	0.00000E+00
82	7.70406E-01	7.66422E-01	6.25566E-04	0.00000E+00	0.00000E+00
83	7.66071E-01	7.66416E-01	6.14901E-04	0.00000E+00	0.00000E+00
84	7.66753E-01	7.66421E-01	6.04592E-04	0.00000E+00	0.00000E+00
85	7.66281E-01	7.66419E-01	5.94602E-04	0.00000E+00	0.00000E+00
86	7.64679E-01	7.66392E-01	5.85607E-04	0.00000E+00	0.00000E+00
87	7.63603E-01	7.66348E-01	5.77934E-04	0.00000E+00	0.00000E+00
88	7.56406E-01	7.66195E-01	5.89667E-04	0.00000E+00	0.00000E+00
89	7.63202E-01	7.66150E-01	5.82347E-04	0.00000E+00	0.00000E+00
90	7.70761E-01	7.66218E-01	5.77698E-04	0.00000E+00	0.00000E+00
91	7.66545E-01	7.66223E-01	5.69032E-04	0.00000E+00	0.00000E+00
92	7.60573E-01	7.66141E-01	5.66727E-04	0.00000E+00	0.00000E+00
93	7.61107E-01	7.66069E-01	5.63201E-04	0.00000E+00	0.00000E+00
94	7.70470E-01	7.66131E-01	5.58645E-04	0.00000E+00	0.00000E+00
95	7.62839E-01	7.66086E-01	5.52670E-04	0.00000E+00	0.00000E+00
96	7.62924E-01	7.66042E-01	5.46707E-04	0.00000E+00	0.00000E+00
97	7.60031E-01	7.65961E-01	5.45418E-04	0.00000E+00	0.00000E+00
98	7.66771E-01	7.65972E-01	5.38109E-04	0.00000E+00	0.00000E+00
99	7.71606E-01	7.66046E-01	5.36175E-04	0.00000E+00	0.00000E+00

```
        100       7.70629E-01      7.66106E-01      5.32498E-04
0.00000E+00      0.00000E+00
        101       7.69755E-01      7.66152E-01      6.17926E-04
0.00000E+00      0.00000E+00
        102       7.63525E-01      7.66119E-01      5.29104E-04
0.00000E+00      0.00000E+00
        103       7.65689E-01      7.66114E-01      5.22668E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=6D8940D158036C68
        104       7.58898E-01      7.66025E-01      5.25029E-04
0.00000E+00      0.00000E+00
        105       7.66099E-01      7.66026E-01      5.18262E-04
0.00000E+00      0.00000E+00
        106       7.68656E-01      7.66057E-01      5.12899E-04
0.00000E+00      0.00000E+00
        107       7.65848E-01      7.66055E-01      5.06449E-04
0.00000E+00      0.00000E+00
        108       7.68188E-01      7.66080E-01      5.00827E-04
0.00000E+00      0.00000E+00
        109       7.64047E-01      7.66056E-01      4.88423E-04
0.00000E+00      0.00000E+00
        110       7.59881E-01      7.65985E-01      4.97276E-04
0.00000E+00      0.00000E+00
        111       7.66789E-01      7.65994E-01      4.90161E-04
0.00000E+00      0.00000E+00
        112       7.64986E-01      7.65983E-01      4.84413E-04
0.00000E+00      0.00000E+00
        113       7.68393E-01      7.66010E-01      4.78987E-04
0.00000E+00      0.00000E+00
        114       7.67342E-01      7.66024E-01      4.74670E-04
0.00000E+00      0.00000E+00
        115       7.60515E-01      7.65965E-01      4.66216E-04
0.00000E+00      0.00000E+00
        116       7.61317E-01      7.65915E-01      4.75639E-04
0.00000E+00      0.00000E+00
        117       7.66244E-01      7.65918E-01      4.70063E-04
0.00000E+00      0.00000E+00
        118       7.68889E-01      7.65949E-01      4.66313E-04
0.00000E+00      0.00000E+00
        119       7.62698E-01      7.65916E-01      4.60235E-04
0.00000E+00      0.00000E+00
        120       7.71086E-01      7.65969E-01      4.50060E-04
0.00000E+00      0.00000E+00
        121       7.69602E-01      7.66006E-01      4.55828E-04
0.00000E+00      0.00000E+00
        122       7.63559E-01      7.65981E-01      4.49698E-04
0.00000E+00      0.00000E+00
        123       7.63195E-01      7.65953E-01      4.47606E-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=88DC8E8B8F6A8DAA
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.55210E-05 + or -  1.15611E-08             generation time
=  2.99446E-05 + or -  1.88440E-08
 nu bar   =  2.43895E+00 + or -  9.04193E-06       average fission group
=  2.17554E+02 + or -  1.06600E-02
                      energy(ev) of the average lethargy causing fission
=  5.64537E-02 + or -  1.17199E-04
                                                 system mean free path (cm)
=  6.52910E-01 + or -  1.70449E-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          0.76595   + or - 0.00045     0.76551 to 0.76640
0.76506 to 0.76685    0.76461 to 0.76730    2000000      13.1861

      24          0.76597   + or - 0.00045     0.76551 to 0.76642
0.76506 to 0.76688    0.76460 to 0.76733    1980000      13.0227

      25          0.76588   + or - 0.00044     0.76544 to 0.76632
0.76500 to 0.76676    0.76456 to 0.76720    1960000      13.8761

      26          0.76583   + or - 0.00044     0.76539 to 0.76627
0.76494 to 0.76671    0.76450 to 0.76715    1940000      14.0650

      27          0.76584   + or - 0.00045     0.76539 to 0.76629
0.76495 to 0.76673    0.76450 to 0.76718    1920000      14.0511

      28          0.76585   + or - 0.00045     0.76540 to 0.76630
0.76495 to 0.76675    0.76450 to 0.76720    1900000      14.0284

      29          0.76597   + or - 0.00044     0.76553 to 0.76641
0.76509 to 0.76685    0.76465 to 0.76728    1880000      13.8222

      30          0.76605   + or - 0.00044     0.76561 to 0.76648
0.76517 to 0.76692    0.76474 to 0.76736    1860000      14.1042

      31          0.76594   + or - 0.00043     0.76551 to 0.76637
0.76509 to 0.76680    0.76466 to 0.76723    1840000      14.0573

      32          0.76595   + or - 0.00043     0.76552 to 0.76638
0.76509 to 0.76682    0.76465 to 0.76725    1820000      14.0298
```

37	0.76597	+ or - 0.00046	0.76551 to 0.76643	0.76506 to 0.76688	0.76460 to 0.76734
1720000	13.9915				
42	0.76569	+ or - 0.00046	0.76523 to 0.76615	0.76477 to 0.76660	0.76431 to 0.76706
1620000	14.6359				
47	0.76553	+ or - 0.00047	0.76506 to 0.76600	0.76458 to 0.76648	0.76411 to 0.76695
1520000	15.4753				
52	0.76545	+ or - 0.00047	0.76498 to 0.76592	0.76451 to 0.76639	0.76404 to 0.76686
1420000	17.2280				
57	0.76536	+ or - 0.00050	0.76486 to 0.76587	0.76436 to 0.76637	0.76386 to 0.76687
1320000	17.3648				
62	0.76527	+ or - 0.00053	0.76474 to 0.76579	0.76421 to 0.76632	0.76368 to 0.76685
1220000	18.2829				
67	0.76522	+ or - 0.00050	0.76472 to 0.76572	0.76422 to 0.76622	0.76372 to 0.76672
1120000	16.3043				
72	0.76525	+ or - 0.00055	0.76470 to 0.76580	0.76415 to 0.76634	0.76360 to 0.76689
1020000	16.1203				
77	0.76536	+ or - 0.00061	0.76474 to 0.76597	0.76413 to 0.76659	0.76351 to 0.76720
920000	14.0598				
82	0.76528	+ or - 0.00070	0.76458 to 0.76598	0.76388 to 0.76667	0.76319 to 0.76737
820000	13.1940				
87	0.76525	+ or - 0.00078	0.76447 to 0.76603	0.76370 to 0.76681	0.76292 to 0.76759
720000	13.2953				
92	0.76553	+ or - 0.00077	0.76477 to 0.76630	0.76400 to 0.76707	0.76324 to 0.76783
620000	13.2856				
97	0.76593	+ or - 0.00087	0.76506 to 0.76680	0.76419 to 0.76767	0.76333 to 0.76854
520000	14.4709				
102	0.76533	+ or - 0.00083	0.76450 to 0.76616	0.76367 to 0.76699	0.76284 to 0.76782
420000	20.0528				
107	0.76542	+ or - 0.00101	0.76441 to 0.76643	0.76340 to 0.76744	0.76239 to 0.76845
320000	18.3554				
112	0.76571	+ or - 0.00146	0.76425 to 0.76717	0.76279 to 0.76863	0.76133 to 0.77009
220000	15.0766				

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          0.76651   + or - 0.00188     0.76463 to 0.76838
0.76275 to 0.77026    0.76088 to 0.77213     120000      15.5850
1                          fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76595 + or - 0.00044 which occurs for
123 generations run.

                                0.7647                   0.7674
0.7700

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

```
I
      45 +                                    I |            *
I
         |                                      I              *
I
         |                                     I|            *
I
         |                                  I   |          *
I
         |                                     I|           *
I
      50 +                                      I            *
I
         |                                  I  |          *            I
         |                                     I|           *
I
         |                                     I|          *           I
         |                                     I|          *          I
      55 +                                     I|          *          I
         |                                     I|          *          I
         |                                      I          *         I
         |                                      I         *         I
         |                                      I         *         I
      60 +                                      |I         *        I
         |                                      | I        *         I
         |                                      |I        *        I
         |                                   I |       *        I
         |                                      |I        *        I
      65 +                                      | I      *       I
         |                                      |  I      *      I
         |                                      | I      *      I
         |                                      | I      *      I
         |                                      | I      *      I
      70 +                                      | I     *      I
         |                                      |I      *     I
         |                                      |I     *      I
         |                                      I      *     I
         |                                     I|     *      I
      75 +                                      I     *      I
         |                                   I |    *     I
         |                                    I|    *     I
         |                                   I |    *     I
         |                                    I|    *     I
      80 +                                    I|    *     I
         |                                   I |   *     I
         |                                    I|    *    I
         |                                    I|    *    I
         |                                    I|    *    I
      85 +                                    I|    *    I
         |                                    I|   *     I
         |                                   I |   *    I
         |                                  I  | *     I
```

```
         |                                  I  | *    I
      90 +                                  I  |  *    I
         |                                  I  |  *    I
         |                                  I  | *    I
         |                                 I   |*     I
         |                                  I  | *    I
      95 +                                 I   |*     I
         |                                 I   |*    I
         |                               I    *    I
         |                               I    *    I
         |                                 I   |*    I
     100 +                                  I  | *    I
         |                                 I   | *     I
         |                                  I  | *    I
         |                                  I  | *    I
         |                                 I   |*    I
     105 +                                 I   |*    I
         |                                 I   |*    I
         |                                 I   |*    I
         |                                  I  |*    I
         |                                  I  |*    I
     110 +                                 I   |*   I
         |                                 I   |*   I
         |                                 I   *    I
         |                                 I   |*   I
         |                                 I   |*   I
     115 +                                 I   *    I
         |                               I    *   I
         |                               I    *   I
         |                                 I   *    I
         |                                 I   *   I
     120 +                                 I   *    I
         |                                 I   |*   I
         |                                 I   *    I
         |                                 I   *   I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7659 + or - 0.0004 which occurs for 31 generations skipped.

```
                                 0.7634                   0.7651
0.7669

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                                                          I
*      I
         |                                                          I
|*     I
      25 +                                                        I
```

```
*|     I
         |                                                          I
*|    I
         |                                                          I
*|    I
         |                                                           I
*|    I
         |                                                            I
|*     I
      30 +                                                             I
| *     I
         |                                                            I
*     I
         |                                                            I
*      I
         |                                                            I
|*     I
         |                                                            I
*     I
      35 +                                                            I
*      I
         |                                                            I
|*     I
         |                                                            I
|*     I
         |                                                            I
|*     I
         |                                                            I
*      I
      40 +                                                           I
*|     I
         |                                                        I      *
|   I
         |                                                       I      *
|  I
         |                                                     I      *
|  I
         |                                                     I     *
| I
      45 +                                                   I      *
|I
         |                                                 I      *
I
         |                                                  I     *
|I
         |                                                   I     *
| I
         |                                                 I      *
|I
      50 +                                              I      *
I
         |                                                  I      *
```

```
|I
         |                                                  I      *
I
         |                                                  I      *
I
         |                                                  I      *
I
      55 +                                                  I      *
I
         |                                                  I      *
I
         |                                                 I      *
I|
         |                                                 I       *
I
         |                                                 I      *
I
      60 +                                                I      *      I
|
         |                                               I      *      I
|
         |                                               I       *      I
|
         |                                                 I       *
I
         |                                               I      *      I
|
      65 +                                               I      *       I
|
         |                                              I      *      I
|
         |                                               I      *      I
|
         |                                              I       *      I
|
         |                                              I      *       I
|
      70 +                                              I      *       I
|
         |                                              I       *       I
|
         |                                              I       *       I
|
         |                                              I       *
I|
         |                                               I       *
I
      75 +                                             I        *
I|
         |                                                I        *
|I
         |                                               I        *
```

```
|I                                                                  I         *
|I                                                                 I          *
|I
      80 +                                                       I          *
I
         |                                                         I          *
|  I
         |                                                       I          *
|I
         |                                                      I           *
|I
         |                                                   I           *
I
      85 +                                                   I           *
I
         |                                                   I           *
|I
         |                                                   I           *
| I
         |                                                        I          *
|   I
         |                                                        I           *
|     I
      90 +                                                     I           *
|   I
         |                                                     I           *
|   I
         |                                                       I           *
|    I
         |                                                         I            *
|       I
         |                                                     I            *
|     I
      95 +                                                       I             *
|       I
         |                                                         I            *
|        I
         |                                                             I
*             I
         |                                                           I
*             I
         |                                                        I            *
|       I
     100 +                                                       I          *
|   I
         |                                                   I           *
| I
         |                                                    I            *
|  I
         |                                                   I            *
```

```
|   I
         |                                                I           *
|       I
     105 +                                              I             *
|        I
         |                                                I            *
|      I
         |                                                I              *
|      I
         |                                            I              *
|     I
         |                                            I               *
|       I
     110 +                                                I               *
|             I
         |                                                I                 *
|              I
         |                                             I                    *
|                 I
         |                                                I                *
|                   I
         |                  I                                            *
|                        I
     115 +                                          I
*|                    I
         |                                                      I
|       *                    I
         |                                                I
|       *                          I
         |                               I
| *                                I
         |
|             *
     120 +   I                                                        *
|

   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  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                 2.32345E-07   100.0000
1.54734E-07    58.6108       0.00000E+00     0.0000
    3    0.0000                 1.41539E-05    10.8995
```

1.96359E-05	5.4706	0.00000E+00	0.0000	4	0.0000	1.96683E-05	9.6483
3.16853E-05	3.8537	0.00000E+00	0.0000	5	0.0000	2.54289E-05	8.0293
5.39961E-05	2.7625	0.00000E+00	0.0000	6	0.0001	9.51670E-05	3.6051
2.28559E-04	1.5456	0.00000E+00	0.0000	7	0.0002	1.15378E-04	3.9473
1.98866E-04	1.5165	0.00000E+00	0.0000	8	0.0003	2.49406E-04	1.9948
3.27919E-04	0.9214	0.00000E+00	0.0000	9	0.0005	3.78960E-04	1.2506
4.42288E-04	0.6503	0.00000E+00	0.0000	10	0.0003	2.05663E-04	1.6881
2.07502E-04	0.7689	0.00000E+00	0.0000	11	0.0012	9.13312E-04	0.7851
5.25910E-04	0.5477	0.00000E+00	0.0000	12	0.0010	7.67423E-04	0.7732
3.00798E-04	0.7616	0.00000E+00	0.0000	13	0.0003	2.34117E-04	1.4854
9.29950E-05	1.4709	0.00000E+00	0.0000	14	0.0013	1.00331E-03	0.6637
4.10107E-04	0.6571	0.00000E+00	0.0000	15	0.0010	7.67468E-04	0.7648
3.30892E-04	0.7556	0.00000E+00	0.0000	16	0.0002	1.91061E-04	1.1181
8.77780E-05	1.1026	0.00000E+00	0.0000	17	0.0001	6.55415E-05	1.7283
3.18926E-05	1.6962	0.00000E+00	0.0000	18	0.0001	5.14361E-05	2.0111
2.59879E-05	1.9728	0.00000E+00	0.0000	19	0.0001	8.19544E-05	1.3311
4.33163E-05	1.3044	0.00000E+00	0.0000	20	0.0001	5.96642E-05	1.6528
3.26938E-05	1.6193	0.00000E+00	0.0000	21	0.0002	1.20006E-04	1.0757
6.77357E-05	1.0508	0.00000E+00	0.0000	22	0.0001	1.05737E-04	1.1780
6.26027E-05	1.1483	0.00000E+00	0.0000	23	0.0001	1.08362E-04	1.0872
6.61112E-05	1.0642	0.00000E+00	0.0000	24	0.0000	2.46481E-05	2.3553
1.53028E-05	2.2873	0.00000E+00	0.0000	25	0.0000	3.08820E-05	2.0188
1.92934E-05	1.9681	0.00000E+00	0.0000	26	0.0000	1.75636E-05	2.4663
1.10305E-05	2.3960	0.00000E+00	0.0000	27	0.0001	5.29076E-05	1.3766
3.30189E-05	1.3499	0.00000E+00	0.0000	28	0.0001	9.74218E-05	0.8897
6.07688E-05	0.8756	0.00000E+00	0.0000	29	0.0001	9.77267E-05	1.1310

6.15681E-05	1.1150	0.00000E+00	0.0000	30	0.0000	1.19846E-05	3.4794
7.51978E-06	3.4537	0.00000E+00	0.0000	31	0.0001	9.71160E-05	1.1397
6.13527E-05	1.1271	0.00000E+00	0.0000	32	0.0000	3.79169E-05	1.7188
2.42404E-05	1.6800	0.00000E+00	0.0000	33	0.0000	3.27661E-05	1.7447
2.05119E-05	1.7235	0.00000E+00	0.0000	34	0.0001	7.34858E-05	1.1679
4.61766E-05	1.1508	0.00000E+00	0.0000	35	0.0001	4.55260E-05	1.5640
2.85695E-05	1.5401	0.00000E+00	0.0000	36	0.0001	4.32306E-05	1.3680
2.67630E-05	1.3549	0.00000E+00	0.0000	37	0.0000	2.89413E-05	1.6048
1.81607E-05	1.5714	0.00000E+00	0.0000	38	0.0000	3.39622E-05	1.6469
2.13939E-05	1.6066	0.00000E+00	0.0000	39	0.0002	1.30692E-04	0.9473
8.31585E-05	0.9261	0.00000E+00	0.0000	40	0.0002	1.20341E-04	0.9148
7.77798E-05	0.8974	0.00000E+00	0.0000	41	0.0002	1.58303E-04	0.9091
1.05779E-04	0.8807	0.00000E+00	0.0000	42	0.0002	1.40092E-04	0.8250
9.52659E-05	0.8050	0.00000E+00	0.0000	43	0.0001	7.99910E-05	1.1427
5.74420E-05	1.0889	0.00000E+00	0.0000	44	0.0001	1.12636E-04	1.1015
8.27347E-05	1.0516	0.00000E+00	0.0000	45	0.0001	5.86814E-05	1.0773
4.74232E-05	0.9980	0.00000E+00	0.0000	46	0.0000	1.46665E-05	1.7426
1.17899E-05	1.6256	0.00000E+00	0.0000	47	0.0001	4.12578E-05	1.8713
3.20245E-05	1.8004	0.00000E+00	0.0000	48	0.0000	1.24737E-05	3.7781
9.67393E-06	3.6887	0.00000E+00	0.0000	49	0.0001	8.27453E-05	1.4092
6.52287E-05	1.3799	0.00000E+00	0.0000	50	0.0001	5.80223E-05	1.6455
4.77617E-05	1.6144	0.00000E+00	0.0000	51	0.0000	1.47409E-05	3.1955
1.22536E-05	3.1292	0.00000E+00	0.0000	52	0.0001	4.10848E-05	2.2116
3.55131E-05	2.1570	0.00000E+00	0.0000	53	0.0002	1.55411E-04	0.8435
1.52886E-04	0.7817	0.00000E+00	0.0000	54	0.0001	7.36377E-05	1.8707
6.84584E-05	1.7966	0.00000E+00	0.0000	55	0.0002	1.64297E-04	1.3681

```
1.50569E-04     1.3327       0.00000E+00     0.0000
   56    0.0002                1.20824E-04     1.7739
1.11982E-04     1.7318       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                1.49615E-04     1.5744
1.35734E-04     1.5371       0.00000E+00     0.0000
   58    0.0001                8.41641E-05     1.9720
7.37459E-05     1.9182       0.00000E+00     0.0000
   59    0.0002                1.59769E-04     1.5263
1.43519E-04     1.4655       0.00000E+00     0.0000
   60    0.0003                2.65501E-04     1.2604
2.41243E-04     1.1790       0.00000E+00     0.0000
   61    0.0000                2.93177E-05     3.8298
2.25230E-05     3.7129       0.00000E+00     0.0000
   62    0.0002                1.63749E-04     1.6061
1.37336E-04     1.5616       0.00000E+00     0.0000
   63    0.0002                1.20067E-04     2.0346
9.88534E-05     1.9601       0.00000E+00     0.0000
   64    0.0001                9.97540E-05     2.2930
8.04377E-05     2.2127       0.00000E+00     0.0000
   65    0.0000                3.59698E-05     3.5446
3.55093E-05     3.4392       0.00000E+00     0.0000
   66    0.0002                1.72882E-04     1.7840
1.53385E-04     1.7279       0.00000E+00     0.0000
   67    0.0002                1.44930E-04     2.1679
1.18626E-04     2.0991       0.00000E+00     0.0000
   68    0.0000                2.63082E-05     4.5784
2.27697E-05     4.4105       0.00000E+00     0.0000
   69    0.0004                3.05392E-04     1.5860
2.39568E-04     1.5383       0.00000E+00     0.0000
   70    0.0003                2.09923E-04     1.7805
1.91029E-04     1.7166       0.00000E+00     0.0000
   71    0.0006                4.23722E-04     1.4093
3.50846E-04     1.3626       0.00000E+00     0.0000
   72    0.0001                4.66316E-05     4.9691
2.75920E-05     4.8431       0.00000E+00     0.0000
   73    0.0004                3.13459E-04     1.6791
2.39201E-04     1.5806       0.00000E+00     0.0000
   74    0.0014                1.04010E-03     1.0110
7.57072E-04     0.9690       0.00000E+00     0.0000
   75    0.0001                1.06281E-04     2.6664
8.19620E-05     2.5325       0.00000E+00     0.0000
   76    0.0006                4.59977E-04     1.7062
2.92222E-04     1.6433       0.00000E+00     0.0000
```

77	0.0005	3.74007E-04	1.7055	2.68099E-04	1.6360
0.00000E+00	0.0000				
78	0.0000	7.10919E-06	4.0394	6.95595E-05	3.9958
0.00000E+00	0.0000				
79	0.0002	1.85231E-04	2.7659	1.24531E-04	2.6581
0.00000E+00	0.0000				
80	0.0001	6.31291E-05	3.4395	8.41495E-05	3.3478
0.00000E+00	0.0000				
81	0.0014	1.05735E-03	1.1922	7.77765E-04	1.1441
0.00000E+00	0.0000				
82	0.0001	6.40966E-05	4.2689	3.85386E-05	4.0498
0.00000E+00	0.0000				
83	0.0002	1.35872E-04	3.5349	1.50138E-04	3.4665
0.00000E+00	0.0000				
84	0.0001	7.56725E-05	2.8865	7.71213E-05	2.6657
0.00000E+00	0.0000				
85	0.0003	1.92101E-04	2.4239	2.36741E-04	2.3546
0.00000E+00	0.0000				
86	0.0003	2.64714E-04	2.7613	2.12970E-04	2.6277
0.00000E+00	0.0000				
87	0.0004	3.42496E-04	2.2745	2.12909E-04	2.1742
0.00000E+00	0.0000				
88	0.0001	5.62376E-05	3.9788	1.02105E-04	3.8804
0.00000E+00	0.0000				
89	0.0001	9.81923E-05	3.5316	6.79784E-05	3.2603
0.00000E+00	0.0000				
90	0.0003	2.16252E-04	3.1794	1.27864E-04	3.0436
0.00000E+00	0.0000				
91	0.0002	1.86515E-04	2.8464	1.18107E-04	2.6792
0.00000E+00	0.0000				
92	0.0000	3.11634E-05	2.8088	2.03937E-04	2.7526
0.00000E+00	0.0000				
93	0.0002	1.25429E-04	3.1739	1.02279E-04	2.9610
0.00000E+00	0.0000				
94	0.0001	1.09670E-04	4.0817	6.16940E-05	3.8075
0.00000E+00	0.0000				
95	0.0008	5.93805E-04	1.9089	3.66541E-04	1.8481
0.00000E+00	0.0000				
96	0.0002	1.55585E-04	3.9601	7.89082E-05	3.7872
0.00000E+00	0.0000				
97	0.0004	2.88463E-04	3.7512	1.65095E-04	3.6770
0.00000E+00	0.0000				
98	0.0001	1.02907E-04	4.0654	9.87442E-05	3.9231
0.00000E+00	0.0000				
99	0.0001	1.03716E-04	4.8845	6.94683E-05	4.7204
0.00000E+00	0.0000				
100	0.0002	1.33869E-04	3.5933	8.93699E-05	3.4538
0.00000E+00	0.0000				
101	0.0002	1.17639E-04	3.7652	7.44797E-05	3.5103
0.00000E+00	0.0000				
102	0.0002	1.64839E-04	3.8454	9.17808E-05	3.7011
0.00000E+00	0.0000				

```
  103    0.0001                 9.73578E-05     3.3209
9.50522E-05     3.1491       0.00000E+00     0.0000
  104    0.0002                 1.63601E-04     3.3876
1.29837E-04     3.2655       0.00000E+00     0.0000
  105    0.0002                 1.26844E-04     3.3060
8.38300E-05     3.1142       0.00000E+00     0.0000
  106    0.0002                 1.84693E-04     4.1219
1.37214E-04     4.0638       0.00000E+00     0.0000
  107    0.0001                 5.97490E-05     3.1131
6.06590E-05     2.9098       0.00000E+00     0.0000
  108    0.0000                 3.71166E-05     2.9442
1.60050E-04     2.8732       0.00000E+00     0.0000
  109    0.0002                 1.30183E-04     2.1298
4.32061E-04     2.1011       0.00000E+00     0.0000
  110    0.0008                 6.37593E-04     3.0677
3.93262E-04     3.0388       0.00000E+00     0.0000
  111    0.0002                 1.47933E-04     4.9463
1.36054E-04     4.8123       0.00000E+00     0.0000
  112    0.0002                 1.19260E-04     4.6866
1.25636E-04     4.6086       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                 1.28710E-04     3.6013
1.12531E-04     3.3651       0.00000E+00     0.0000
  114    0.0000                 1.12116E-05     6.6058
1.52103E-05     5.5173       0.00000E+00     0.0000
  115    0.0001                 7.42099E-05     3.7278
8.60960E-05     3.4485       0.00000E+00     0.0000
  116    0.0002                 1.83505E-04     2.9601
1.38773E-04     2.6506       0.00000E+00     0.0000
  117    0.0006                 4.76925E-04     2.5021
2.54919E-04     2.3449       0.00000E+00     0.0000
  118    0.0008                 5.96367E-04     2.1827
4.65366E-04     2.0956       0.00000E+00     0.0000
  119    0.0002                 1.41816E-04     2.3018
3.66045E-04     2.2228       0.00000E+00     0.0000
  120    0.0002                 1.66050E-04     2.0919
6.32065E-04     2.0607       0.00000E+00     0.0000
  121    0.0007                 5.14802E-04     2.6802
3.96255E-04     2.6152       0.00000E+00     0.0000
  122    0.0001                 1.03011E-04     5.1903
8.05224E-05     4.8478       0.00000E+00     0.0000
  123    0.0003                 2.10597E-04     2.8043
1.49834E-04     2.4872       0.00000E+00     0.0000
  124    0.0003                 2.30602E-04     2.9714
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1.90570E-04	2.7768	0.00000E+00	0.0000	125	0.0002	1.36204E-04	3.4023
1.25754E-04	3.0388	0.00000E+00	0.0000	126	0.0001	1.03997E-04	3.5706
9.28047E-05	3.1538	0.00000E+00	0.0000	127	0.0005	3.94926E-04	3.4526
1.93867E-04	3.2758	0.00000E+00	0.0000	128	0.0003	2.24022E-04	3.2762
1.37958E-04	2.9198	0.00000E+00	0.0000	129	0.0006	4.62146E-04	2.0604
4.25122E-04	1.9640	0.00000E+00	0.0000	130	0.0002	1.15625E-04	2.9244
2.82272E-04	2.8353	0.00000E+00	0.0000	131	0.0004	2.98149E-04	2.2296
2.39346E-04	1.8783	0.00000E+00	0.0000	132	0.0007	5.59956E-04	2.3741
3.42082E-04	2.2002	0.00000E+00	0.0000	133	0.0014	1.05551E-03	1.7958
6.66847E-04	1.7009	0.00000E+00	0.0000	134	0.0001	9.47078E-05	2.1083
2.45034E-04	1.7841	0.00000E+00	0.0000	135	0.0002	1.72713E-04	3.4006
2.56169E-04	3.3148	0.00000E+00	0.0000	136	0.0001	4.41823E-05	2.1145
6.85978E-04	2.0783	0.00000E+00	0.0000	137	0.0000	1.93143E-05	1.0009
3.47548E-03	0.9984	0.00000E+00	0.0000	138	0.0004	3.09629E-04	2.2343
8.06712E-04	2.2007	0.00000E+00	0.0000	139	0.0002	1.89988E-04	3.2808
2.32422E-04	3.0936	0.00000E+00	0.0000	140	0.0003	2.20021E-04	2.3827
2.91165E-04	2.0727	0.00000E+00	0.0000	141	0.0001	8.04182E-05	2.1675
2.53625E-04	1.9392	0.00000E+00	0.0000	142	0.0001	6.71942E-05	3.4222
2.31775E-04	3.1442	0.00000E+00	0.0000	143	0.0001	8.24648E-05	2.1942
1.75865E-04	1.3548	0.00000E+00	0.0000	144	0.0000	3.24520E-05	3.8878
7.21414E-05	2.3114	0.00000E+00	0.0000	145	0.0005	3.94876E-04	2.5431
3.08751E-04	2.3185	0.00000E+00	0.0000	146	0.0004	3.37340E-04	2.8133
2.47841E-04	2.2834	0.00000E+00	0.0000	147	0.0002	1.74444E-04	4.2435
1.11731E-04	3.6933	0.00000E+00	0.0000	148	0.0001	5.65149E-05	5.9435
3.82308E-05	4.7156	0.00000E+00	0.0000	149	0.0000	3.02027E-05	8.0451
2.11414E-05	6.1314	0.00000E+00	0.0000	150	0.0001	9.71168E-05	3.7285

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6.86457E-05     2.8645       0.00000E+00     0.0000
  151    0.0001                 6.85511E-05     3.9592
5.76512E-05     2.7323       0.00000E+00     0.0000
  152    0.0001                 4.11609E-05     3.7093
4.66143E-05     2.2495       0.00000E+00     0.0000
  153    0.0001                 4.33335E-05     4.4780
4.76363E-05     2.6679       0.00000E+00     0.0000
  154    0.0001                 4.68809E-05     4.2841
4.94757E-05     2.4850       0.00000E+00     0.0000
  155    0.0001                 4.98369E-05     4.4600
4.91434E-05     2.7629       0.00000E+00     0.0000
  156    0.0001                 4.26207E-05     4.9840
4.36649E-05     2.8659       0.00000E+00     0.0000
  157    0.0001                 6.01384E-05     4.2159
5.76416E-05     2.6040       0.00000E+00     0.0000
  158    0.0001                 6.99904E-05     4.0145
7.01879E-05     2.6529       0.00000E+00     0.0000
  159    0.0002                 1.50330E-04     2.9927
2.08879E-04     2.5324       0.00000E+00     0.0000
  160    0.0001                 6.12204E-05     4.4005
7.28755E-05     3.3227       0.00000E+00     0.0000
  161    0.0001                 7.07172E-05     3.9319
7.07078E-05     2.5452       0.00000E+00     0.0000
  162    0.0001                 8.44572E-05     2.9885
8.02966E-05     1.8778       0.00000E+00     0.0000
  163    0.0001                 9.71767E-05     3.8829
8.89603E-05     2.4387       0.00000E+00     0.0000
  164    0.0001                 1.07277E-04     3.9850
9.74615E-05     2.5844       0.00000E+00     0.0000
  165    0.0002                 1.17041E-04     3.5057
1.06191E-04     2.2468       0.00000E+00     0.0000
  166    0.0001                 6.40933E-05     4.6675
6.04644E-05     2.8689       0.00000E+00     0.0000
  167    0.0001                 7.65868E-05     4.0549
6.95409E-05     2.6331       0.00000E+00     0.0000
  168    0.0001                 8.55520E-05     4.3576
7.69282E-05     2.8963       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                 1.02290E-04     4.1342
9.03510E-05     2.9630       0.00000E+00     0.0000
  170    0.0002                 1.28305E-04     4.1200
1.11282E-04     3.0260       0.00000E+00     0.0000
  171    0.0001                 9.40032E-05     4.4041
7.34088E-05     3.4754       0.00000E+00     0.0000
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172	0.0002	1.34251E-04	4.3925	9.54071E-05	3.6724
0.00000E+00	0.0000				
173	0.0003	1.92992E-04	4.2724	1.27240E-04	3.7369
0.00000E+00	0.0000				
174	0.0003	2.61499E-04	3.7788	1.62129E-04	3.3767
0.00000E+00	0.0000				
175	0.0002	1.22854E-04	5.6904	7.36445E-05	5.1540
0.00000E+00	0.0000				
176	0.0002	1.27725E-04	6.4201	7.55031E-05	5.8248
0.00000E+00	0.0000				
177	0.0002	1.19636E-04	6.2773	7.07251E-05	5.6288
0.00000E+00	0.0000				
178	0.0001	1.11608E-04	6.0674	6.57493E-05	5.4071
0.00000E+00	0.0000				
179	0.0001	1.08076E-04	6.3954	6.35220E-05	5.6662
0.00000E+00	0.0000				
180	0.0001	1.02344E-04	6.4345	6.00428E-05	5.6878
0.00000E+00	0.0000				
181	0.0002	1.15940E-04	6.2399	6.65650E-05	5.5528
0.00000E+00	0.0000				
182	0.0001	1.03067E-04	5.9749	5.98438E-05	5.2311
0.00000E+00	0.0000				
183	0.0001	1.03157E-04	6.9406	5.98679E-05	6.0358
0.00000E+00	0.0000				
184	0.0001	9.61084E-05	5.8535	5.59932E-05	5.0724
0.00000E+00	0.0000				
185	0.0001	9.16845E-05	6.8687	5.37969E-05	5.8174
0.00000E+00	0.0000				
186	0.0001	1.02096E-04	6.1471	5.88656E-05	5.2719
0.00000E+00	0.0000				
187	0.0001	8.26590E-05	6.0672	4.92499E-05	4.9897
0.00000E+00	0.0000				
188	0.0001	9.45433E-05	6.7153	5.51583E-05	5.7141
0.00000E+00	0.0000				
189	0.0001	8.33297E-05	6.2051	4.98429E-05	5.1315
0.00000E+00	0.0000				
190	0.0003	2.09711E-04	3.8473	1.24726E-04	3.2095
0.00000E+00	0.0000				
191	0.0003	2.16609E-04	4.6051	1.28855E-04	3.7790
0.00000E+00	0.0000				
192	0.0003	2.00644E-04	4.1959	1.21353E-04	3.3914
0.00000E+00	0.0000				
193	0.0003	1.96203E-04	4.1362	1.20337E-04	3.3042
0.00000E+00	0.0000				
194	0.0005	4.17700E-04	2.5225	2.54910E-04	2.0218
0.00000E+00	0.0000				
195	0.0006	4.25134E-04	2.9481	2.64146E-04	2.3045
0.00000E+00	0.0000				
196	0.0006	4.61958E-04	2.7173	2.87357E-04	2.1272
0.00000E+00	0.0000				
197	0.0007	5.15665E-04	2.9011	3.20654E-04	2.2604
0.00000E+00	0.0000				

198	0.0007	5.60169E-04	2.2148	3.49453E-04	1.7136
0.00000E+00	0.0000				
199	0.0004	3.07176E-04	3.2311	1.92050E-04	2.4879
0.00000E+00	0.0000				
200	0.0005	3.69390E-04	3.1388	2.25878E-04	2.4881
0.00000E+00	0.0000				
201	0.0010	7.93376E-04	2.2847	4.86038E-04	1.8180
0.00000E+00	0.0000				
202	0.0013	9.90455E-04	2.0374	5.99882E-04	1.6602
0.00000E+00	0.0000				
203	0.0015	1.16701E-03	1.7401	7.04226E-04	1.4229
0.00000E+00	0.0000				
204	0.0021	1.57531E-03	1.6303	9.36811E-04	1.3566
0.00000E+00	0.0000				
205	0.0015	1.12595E-03	1.9337	6.59279E-04	1.6516
0.00000E+00	0.0000				
206	0.0018	1.40115E-03	1.6519	8.15808E-04	1.4148
0.00000E+00	0.0000				
207	0.0022	1.67018E-03	1.7572	9.69267E-04	1.5447
0.00000E+00	0.0000				
208	0.0028	2.12872E-03	1.7054	1.24469E-03	1.5035
0.00000E+00	0.0000				
209	0.0031	2.38347E-03	1.3591	1.40069E-03	1.2036
0.00000E+00	0.0000				
210	0.0037	2.82021E-03	1.3442	1.68449E-03	1.1717
0.00000E+00	0.0000				
211	0.0040	3.09976E-03	1.2140	1.86944E-03	1.0630
0.00000E+00	0.0000				
212	0.0048	3.68340E-03	1.0821	2.22522E-03	0.9180
0.00000E+00	0.0000				
213	0.0064	4.93201E-03	1.0164	2.99162E-03	0.8568
0.00000E+00	0.0000				
214	0.0095	7.30174E-03	0.9016	4.40530E-03	0.7569
0.00000E+00	0.0000				
215	0.0157	1.19940E-02	0.5453	7.16667E-03	0.4595
0.00000E+00	0.0000				
216	0.0302	2.31138E-02	0.4839	1.36274E-02	0.4085
0.00000E+00	0.0000				
217	0.0200	1.53399E-02	0.6003	9.02324E-03	0.5059
0.00000E+00	0.0000				
218	0.0273	2.08855E-02	0.5109	1.22554E-02	0.4249
0.00000E+00	0.0000				
219	0.0361	2.76145E-02	0.4685	1.60859E-02	0.3962
0.00000E+00	0.0000				
220	0.0476	3.64269E-02	0.3642	2.11681E-02	0.3123
0.00000E+00	0.0000				
221	0.0625	4.78512E-02	0.3171	2.77589E-02	0.2707
0.00000E+00	0.0000				
222	0.0801	6.13823E-02	0.2611	3.55634E-02	0.2241
0.00000E+00	0.0000				
223	0.1047	8.02325E-02	0.2502	4.65275E-02	0.2156
0.00000E+00	0.0000				

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  224    0.0586                 4.48524E-02     0.2994
2.61137E-02     0.2528       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    0.2303                 1.76412E-01     0.1752
1.04509E-01     0.1481       0.00000E+00     0.0000
  226    0.0456                 3.49294E-02     0.3258
2.12330E-02     0.2720       0.00000E+00     0.0000
  227    0.0489                 3.74194E-02     0.4193
2.32339E-02     0.3410       0.00000E+00     0.0000
  228    0.0211                 1.61589E-02     0.6178
1.02159E-02     0.4983       0.00000E+00     0.0000
  229    0.0219                 1.68003E-02     0.5968
1.08289E-02     0.4654       0.00000E+00     0.0000
  230    0.0117                 8.94168E-03     0.7039
5.85729E-03     0.5469       0.00000E+00     0.0000
  231    0.0123                 9.42983E-03     0.7980
6.26725E-03     0.6005       0.00000E+00     0.0000
  232    0.0130                 9.99124E-03     0.7516
6.78551E-03     0.5589       0.00000E+00     0.0000
  233    0.0082                 6.31695E-03     1.1046
4.43969E-03     0.7982       0.00000E+00     0.0000
  234    0.0060                 4.60087E-03     1.1136
3.30271E-03     0.8003       0.00000E+00     0.0000
  235    0.0024                 1.85451E-03     1.6247
1.23057E-03     1.2246       0.00000E+00     0.0000
  236    0.0019                 1.47559E-03     1.9827
9.86466E-04     1.5502       0.00000E+00     0.0000
  237    0.0017                 1.31993E-03     1.9139
9.34158E-04     1.3713       0.00000E+00     0.0000
  238    0.0001                 6.22310E-05    10.0917
5.79926E-05     5.6002       0.00000E+00     0.0000

 system total =                  7.65953E-01     0.0568
4.68965E-01     0.0500       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3108E-01  +
or -  0.0002



 elapsed time   3.11017 minutes
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random number= 615E701FCB754673

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.089E-03	0.06	7.660E-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	1.893E-08	31.67	1.065E-08	27.59	1.057E-08	28.97
3	9.023E-07	4.33	7.364E-07	3.85	7.955E-07	3.97
4	1.445E-06	3.17	1.203E-06	2.84	1.292E-06	2.86
5	2.257E-06	2.60	1.854E-06	2.36	1.992E-06	2.43
6	9.373E-06	1.25	7.490E-06	1.11	7.974E-06	1.09
7	1.234E-05	1.24	9.301E-06	1.00	9.854E-06	1.00
8	3.154E-05	0.69	2.292E-05	0.59	2.399E-05	0.58
9	8.225E-05	0.53	5.901E-05	0.42	6.137E-05	0.41
10	4.612E-05	0.66	3.275E-05	0.53	3.413E-05	0.54
11	2.208E-04	0.30	1.559E-04	0.25	1.616E-04	0.23
12	1.900E-04	0.32	1.378E-04	0.27	1.445E-04	0.27
13	5.663E-05	0.49	4.167E-05	0.42	4.358E-05	0.41
14	2.536E-04	0.26	1.834E-04	0.22	1.917E-04	0.22
15	2.208E-04	0.30	1.601E-04	0.25	1.671E-04	0.25
16	7.055E-05	0.47	5.145E-05	0.42	5.380E-05	0.41
17	3.205E-05	0.65	2.354E-05	0.59	2.455E-05	0.57
18	2.790E-05	0.77	2.032E-05	0.63	2.096E-05	0.65
19	5.033E-05	0.48	3.666E-05	0.44	3.827E-05	0.43
20	3.964E-05	0.51	2.903E-05	0.46	3.041E-05	0.42
21	7.969E-05	0.47	5.836E-05	0.39	6.108E-05	0.39

22	7.290E-05	0.45	5.327E-05	0.40	5.513E-05	0.38
23	7.687E-05	0.41	5.641E-05	0.35	5.849E-05	0.35
24	1.856E-05	0.87	1.363E-05	0.73	1.425E-05	0.69
25	2.331E-05	0.71	1.736E-05	0.57	1.818E-05	0.59
26	1.347E-05	0.86	9.956E-06	0.76	1.043E-05	0.69
27	4.194E-05	0.58	3.097E-05	0.49	3.285E-05	0.46
28	7.713E-05	0.41	5.735E-05	0.34	6.075E-05	0.33
29	7.927E-05	0.36	5.919E-05	0.31	6.190E-05	0.28
30	9.984E-06	1.17	7.519E-06	0.93	7.862E-06	0.89
31	7.856E-05	0.42	5.906E-05	0.36	6.213E-05	0.34
32	3.118E-05	0.64	2.343E-05	0.53	2.468E-05	0.51
33	2.681E-05	0.57	2.028E-05	0.53	2.139E-05	0.53
34	6.059E-05	0.42	4.566E-05	0.36	4.824E-05	0.33
35	3.633E-05	0.55	2.738E-05	0.45	2.867E-05	0.41
36	3.435E-05	0.49	2.581E-05	0.40	2.698E-05	0.42
37	2.215E-05	0.64	1.676E-05	0.56	1.745E-05	0.47
38	2.571E-05	0.57	1.966E-05	0.51	2.072E-05	0.47
39	9.777E-05	0.36	7.496E-05	0.30	7.918E-05	0.26
40	8.973E-05	0.32	6.933E-05	0.30	7.401E-05	0.28
41	1.127E-04	0.30	8.838E-05	0.27	9.432E-05	0.25
42	9.392E-05	0.29	7.406E-05	0.25	7.944E-05	0.25
43	5.106E-05	0.40	4.060E-05	0.37	4.275E-05	0.33
44	6.999E-05	0.34	5.596E-05	0.28	6.019E-05	0.26
45	3.517E-05	0.49	2.804E-05	0.43	3.106E-05	0.38
46	8.363E-06	0.97	6.588E-06	0.80	7.115E-06	0.74
47	2.378E-05	0.59	1.888E-05	0.47	1.960E-05	0.42
48	6.784E-06	1.20	5.386E-06	0.98	5.633E-06	0.85
49	4.359E-05	0.41	3.509E-05	0.36	3.775E-05	0.29
50	2.927E-05	0.48	2.363E-05	0.43	2.565E-05	0.37
51	7.821E-06	0.87	6.266E-06	0.83	6.866E-06	0.70
52	2.071E-05	0.51	1.669E-05	0.44	1.822E-05	0.39
53	7.634E-05	0.31	6.171E-05	0.28	6.700E-05	0.23
54	3.335E-05	0.43	2.711E-05	0.36	2.928E-05	0.28
55	6.631E-05	0.35	5.392E-05	0.29	5.881E-05	0.24
56	4.354E-05	0.40	3.545E-05	0.35	3.853E-05	0.32
57	4.892E-05	0.39	3.983E-05	0.35	4.360E-05	0.29
58	2.585E-05	0.47	2.112E-05	0.38	2.301E-05	0.31
59	4.415E-05	0.35	3.613E-05	0.34	3.934E-05	0.27
60	6.467E-05	0.31	5.280E-05	0.26	5.733E-05	0.23
61	6.151E-06	1.03	5.057E-06	0.87	5.559E-06	0.71
62	3.236E-05	0.43	2.651E-05	0.39	2.873E-05	0.33
63	2.165E-05	0.50	1.779E-05	0.45	1.939E-05	0.35
64	1.717E-05	0.55	1.417E-05	0.54	1.535E-05	0.47
65	5.863E-06	0.87	4.777E-06	0.84	5.163E-06	0.68
66	2.873E-05	0.48	2.361E-05	0.44	2.564E-05	0.32
67	2.129E-05	0.49	1.751E-05	0.46	1.902E-05	0.39
68	4.593E-06	1.14	3.803E-06	1.03	4.101E-06	0.85
69	3.742E-05	0.39	3.079E-05	0.36	3.349E-05	0.29
70	2.664E-05	0.55	2.192E-05	0.51	2.376E-05	0.40
71	4.552E-05	0.33	3.750E-05	0.29	4.094E-05	0.23
72	2.679E-06	1.43	2.201E-06	1.19	2.392E-06	1.04
73	2.721E-05	0.50	2.241E-05	0.43	2.441E-05	0.32

74	7.917E-05	0.29	6.570E-05	0.24	7.112E-05	0.18
75	9.150E-06	0.73	7.596E-06	0.60	8.174E-06	0.59
76	2.288E-05	0.45	1.904E-05	0.41	2.059E-05	0.33
77	1.767E-05	0.58	1.470E-05	0.50	1.589E-05	0.41
78	1.487E-06	1.99	1.275E-06	1.82	1.396E-06	1.45
79	9.823E-06	0.72	8.177E-06	0.68	8.845E-06	0.46
80	4.652E-06	0.95	3.859E-06	0.85	4.161E-06	0.74
81	5.540E-05	0.30	4.606E-05	0.26	4.991E-05	0.23
82	3.239E-06	1.22	2.694E-06	1.17	2.941E-06	0.91
83	4.461E-06	1.06	3.710E-06	0.85	4.005E-06	0.76
84	8.096E-06	0.87	6.693E-06	0.73	7.289E-06	0.62
85	1.007E-05	0.70	8.383E-06	0.60	9.035E-06	0.51
86	1.358E-05	0.65	1.130E-05	0.59	1.224E-05	0.48
87	1.180E-05	0.71	9.907E-06	0.60	1.079E-05	0.54
88	3.162E-06	1.20	2.625E-06	1.04	2.865E-06	0.92
89	6.620E-06	0.77	5.533E-06	0.71	5.981E-06	0.57
90	6.899E-06	0.85	5.833E-06	0.78	6.239E-06	0.63
91	8.290E-06	0.80	6.953E-06	0.69	7.530E-06	0.56
92	4.801E-06	0.96	4.011E-06	0.80	4.349E-06	0.70
93	8.133E-06	0.81	6.823E-06	0.69	7.303E-06	0.63
94	4.294E-06	1.21	3.582E-06	0.96	3.891E-06	0.76
95	1.259E-05	0.55	1.056E-05	0.51	1.147E-05	0.42
96	3.387E-06	1.20	2.798E-06	0.98	3.039E-06	0.88
97	3.456E-06	1.20	2.895E-06	1.17	3.121E-06	0.85
98	3.567E-06	1.05	2.969E-06	0.89	3.230E-06	0.77
99	2.265E-06	1.45	1.920E-06	1.35	2.106E-06	1.16
100	3.440E-06	1.17	2.874E-06	1.02	3.112E-06	0.82
101	4.940E-06	1.03	4.128E-06	0.99	4.484E-06	0.66
102	3.314E-06	1.16	2.825E-06	1.06	3.065E-06	0.88
103	4.636E-06	1.01	3.883E-06	0.95	4.202E-06	0.72
104	4.159E-06	0.92	3.492E-06	0.89	3.793E-06	0.71
105	4.385E-06	1.07	3.645E-06	0.98	3.987E-06	0.86
106	1.544E-06	1.60	1.302E-06	1.46	1.399E-06	1.37
107	3.506E-06	1.24	2.958E-06	1.15	3.190E-06	0.92
108	3.215E-06	1.29	2.741E-06	1.15	2.979E-06	0.92
109	5.237E-06	0.92	4.361E-06	0.81	4.679E-06	0.67
110	3.003E-06	1.28	2.549E-06	1.22	2.822E-06	1.06
111	2.991E-06	1.08	2.534E-06	1.06	2.748E-06	0.94
112	1.799E-06	1.93	1.512E-06	1.60	1.640E-06	1.19
113	5.813E-06	0.92	4.905E-06	0.82	5.268E-06	0.66
114	2.000E-06	1.41	1.692E-06	1.31	1.813E-06	1.04
115	5.122E-06	0.98	4.296E-06	0.82	4.632E-06	0.69
116	1.078E-05	0.75	9.055E-06	0.68	9.775E-06	0.52
117	1.174E-05	0.68	9.889E-06	0.59	1.071E-05	0.51
118	1.302E-05	0.65	1.095E-05	0.53	1.184E-05	0.44
119	8.144E-06	0.72	6.919E-06	0.76	7.540E-06	0.59
120	5.795E-06	0.88	4.922E-06	0.69	5.345E-06	0.60
121	6.044E-06	0.85	5.113E-06	0.81	5.607E-06	0.63
122	3.239E-06	1.35	2.733E-06	1.11	2.940E-06	0.89
123	1.033E-05	0.69	8.658E-06	0.65	9.372E-06	0.53
124	7.395E-06	0.87	6.204E-06	0.70	6.686E-06	0.57
125	7.102E-06	0.89	5.920E-06	0.75	6.420E-06	0.63

126	5.754E-06	0.99	4.809E-06	0.88	5.202E-06	0.70
127	5.566E-06	0.93	4.661E-06	0.88	5.034E-06	0.73
128	7.742E-06	0.77	6.468E-06	0.66	6.963E-06	0.58
129	9.676E-06	0.60	8.174E-06	0.60	8.785E-06	0.50
130	3.984E-06	1.05	3.372E-06	0.89	3.689E-06	0.78
131	1.685E-05	0.61	1.416E-05	0.52	1.529E-05	0.46
132	1.112E-05	0.74	9.402E-06	0.56	1.020E-05	0.52
133	1.363E-05	0.55	1.150E-05	0.50	1.248E-05	0.43
134	1.475E-05	0.66	1.242E-05	0.57	1.340E-05	0.44
135	2.383E-06	1.36	2.028E-06	1.34	2.198E-06	1.04
136	3.842E-06	1.08	3.351E-06	0.87	3.677E-06	0.75
137	2.546E-06	1.05	2.645E-06	0.82	3.018E-06	0.79
138	4.035E-06	0.93	3.532E-06	0.88	3.895E-06	0.73
139	4.602E-06	0.89	3.900E-06	0.78	4.257E-06	0.60
140	1.201E-05	0.61	1.021E-05	0.56	1.103E-05	0.41
141	8.856E-06	0.77	7.457E-06	0.69	8.087E-06	0.58
142	5.865E-06	0.96	4.953E-06	0.88	5.370E-06	0.63
143	1.991E-05	0.53	1.674E-05	0.48	1.798E-05	0.37
144	7.942E-06	0.80	6.715E-06	0.67	7.326E-06	0.60
145	7.112E-06	0.75	6.043E-06	0.69	6.524E-06	0.63
146	1.207E-05	0.66	1.018E-05	0.55	1.100E-05	0.52
147	3.646E-06	1.03	3.037E-06	0.88	3.329E-06	0.70
148	1.891E-06	1.69	1.605E-06	1.51	1.713E-06	1.22
149	1.232E-06	2.08	1.018E-06	1.71	1.090E-06	1.52
150	3.921E-06	1.10	3.315E-06	1.03	3.597E-06	0.77
151	4.158E-06	1.19	3.511E-06	1.04	3.788E-06	0.79
152	4.241E-06	1.07	3.579E-06	0.89	3.859E-06	0.71
153	4.538E-06	1.06	3.785E-06	0.95	4.098E-06	0.69
154	4.638E-06	1.07	3.884E-06	0.85	4.203E-06	0.70
155	4.289E-06	1.06	3.626E-06	0.93	3.875E-06	0.68
156	3.915E-06	1.07	3.288E-06	0.96	3.594E-06	0.69
157	4.597E-06	0.95	3.874E-06	0.85	4.216E-06	0.77
158	4.953E-06	0.99	4.142E-06	0.93	4.468E-06	0.64
159	6.905E-06	0.88	5.835E-06	0.74	6.276E-06	0.66
160	3.582E-06	1.14	3.001E-06	0.95	3.239E-06	0.73
161	5.000E-06	0.98	4.227E-06	0.81	4.518E-06	0.70
162	5.777E-06	0.86	4.901E-06	0.75	5.308E-06	0.60
163	6.164E-06	0.74	5.192E-06	0.70	5.565E-06	0.53
164	6.620E-06	0.88	5.536E-06	0.84	5.952E-06	0.69
165	6.791E-06	0.89	5.753E-06	0.80	6.254E-06	0.66
166	3.995E-06	1.10	3.371E-06	1.02	3.647E-06	0.84
167	4.175E-06	1.03	3.494E-06	0.95	3.773E-06	0.68
168	4.322E-06	1.06	3.613E-06	0.89	3.917E-06	0.73
169	4.447E-06	1.12	3.762E-06	1.07	4.054E-06	0.82
170	4.635E-06	1.01	3.921E-06	0.89	4.258E-06	0.64
171	2.389E-06	1.35	2.037E-06	1.30	2.187E-06	1.06
172	2.368E-06	1.40	2.011E-06	1.26	2.182E-06	1.00
173	2.441E-06	1.46	2.108E-06	1.32	2.291E-06	0.97
174	2.538E-06	1.46	2.160E-06	1.27	2.311E-06	0.98
175	1.034E-06	2.00	8.899E-07	1.69	9.610E-07	1.23
176	1.013E-06	2.02	8.768E-07	1.77	9.447E-07	1.37
177	1.059E-06	2.02	9.055E-07	1.93	9.626E-07	1.44

178	1.044E-06	2.10	8.904E-07	1.84	9.581E-07	1.53
179	1.027E-06	1.99	8.734E-07	1.67	9.599E-07	1.40
180	1.031E-06	1.76	8.934E-07	1.76	9.574E-07	1.44
181	1.049E-06	2.02	8.778E-07	1.80	9.798E-07	1.47
182	1.074E-06	2.13	8.938E-07	1.88	9.712E-07	1.39
183	1.083E-06	1.93	9.187E-07	1.72	9.954E-07	1.43
184	1.149E-06	2.43	9.777E-07	2.32	1.040E-06	1.71
185	1.104E-06	2.29	9.275E-07	1.95	9.958E-07	1.40
186	1.153E-06	1.84	9.643E-07	1.59	1.052E-06	1.31
187	1.132E-06	1.94	9.651E-07	1.71	1.056E-06	1.37
188	1.163E-06	2.05	9.906E-07	1.92	1.063E-06	1.47
189	1.203E-06	2.26	1.025E-06	1.59	1.121E-06	1.52
190	3.004E-06	1.15	2.532E-06	1.01	2.744E-06	0.79
191	3.091E-06	1.20	2.607E-06	1.13	2.819E-06	0.89
192	3.146E-06	1.26	2.673E-06	1.06	2.890E-06	0.90
193	3.295E-06	1.07	2.774E-06	0.97	3.027E-06	0.82
194	6.811E-06	0.93	5.791E-06	0.79	6.275E-06	0.60
195	7.377E-06	0.74	6.220E-06	0.65	6.730E-06	0.56
196	7.874E-06	0.85	6.646E-06	0.73	7.143E-06	0.58
197	8.490E-06	0.77	7.195E-06	0.70	7.756E-06	0.54
198	8.925E-06	0.75	7.530E-06	0.69	8.173E-06	0.54
199	4.865E-06	0.94	4.087E-06	0.86	4.419E-06	0.70
200	5.130E-06	0.93	4.350E-06	0.80	4.719E-06	0.68
201	1.069E-05	0.61	9.044E-06	0.54	9.779E-06	0.46
202	1.202E-05	0.64	1.020E-05	0.56	1.096E-05	0.44
203	1.283E-05	0.58	1.092E-05	0.52	1.184E-05	0.45
204	1.486E-05	0.53	1.257E-05	0.48	1.364E-05	0.40
205	8.582E-06	0.73	7.688E-06	0.66	8.170E-06	0.51
206	9.260E-06	0.64	8.376E-06	0.61	8.857E-06	0.55
207	9.623E-06	0.61	8.716E-06	0.53	9.216E-06	0.43
208	1.127E-05	0.59	1.017E-05	0.54	1.086E-05	0.45
209	1.166E-05	0.60	1.057E-05	0.51	1.120E-05	0.44
210	1.408E-05	0.46	1.269E-05	0.38	1.358E-05	0.33
211	1.637E-05	0.48	1.479E-05	0.49	1.569E-05	0.36
212	1.938E-05	0.37	1.750E-05	0.33	1.858E-05	0.30
213	2.616E-05	0.35	2.360E-05	0.31	2.527E-05	0.25
214	3.691E-05	0.35	3.311E-05	0.30	3.561E-05	0.23
215	5.522E-05	0.26	4.986E-05	0.22	5.380E-05	0.21
216	9.209E-05	0.21	8.390E-05	0.17	9.086E-05	0.14
217	5.532E-05	0.26	5.304E-05	0.21	5.618E-05	0.18
218	7.075E-05	0.20	6.776E-05	0.17	7.202E-05	0.14
219	8.407E-05	0.18	8.137E-05	0.15	8.644E-05	0.14
220	1.015E-04	0.17	9.904E-05	0.15	1.054E-04	0.12
221	1.209E-04	0.16	1.190E-04	0.14	1.268E-04	0.11
222	1.370E-04	0.15	1.369E-04	0.13	1.460E-04	0.11
223	1.537E-04	0.15	1.576E-04	0.14	1.676E-04	0.10
224	7.524E-05	0.20	7.995E-05	0.17	8.449E-05	0.11
225	2.334E-04	0.11	2.720E-04	0.10	2.822E-04	0.08
226	3.171E-05	0.24	4.479E-05	0.19	4.445E-05	0.13
227	2.878E-05	0.25	4.612E-05	0.19	4.431E-05	0.14
228	1.047E-05	0.39	1.898E-05	0.32	1.756E-05	0.16
229	9.571E-06	0.37	1.957E-05	0.31	1.741E-05	0.19

230	4.490E-06	0.54	1.020E-05	0.42	8.726E-06	0.22
231	4.282E-06	0.52	1.056E-05	0.39	8.762E-06	0.23
232	3.980E-06	0.57	1.137E-05	0.38	8.867E-06	0.24
233	2.212E-06	0.73	7.370E-06	0.50	5.472E-06	0.28
234	1.418E-06	0.88	5.327E-06	0.57	3.809E-06	0.27
235	5.197E-07	1.63	1.061E-06	1.14	1.122E-06	0.47
236	3.468E-07	1.57	7.386E-07	1.34	7.927E-07	0.56
237	2.248E-07	1.96	5.510E-07	1.44	6.132E-07	0.58
238	4.748E-09	10.67	2.182E-08	5.39	2.635E-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
  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
0.76594 + or - 0.00042                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.64537E-02 + or -  1.17199E-04            ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  9.04193E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52910E-01 + or -  1.70449E-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 3.11433 minutes

```
*****************************************************************
*********************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


      0000000       666666666666                    33333333333
22222222222                    5555555555555    666666666666
     000000000     6666666666666                   3333333333333
2222222222222                   5555555555555   6666666666666
    00       00    66                    :::       33         33   22
22         :::       55              66
   00         00   66                    :::                 33
22         :::       55              66
   00         00   66                    :::                 33
22         :::       55              66
   00         00   666666666666                          333
22                      555555555555    666666666666
   00         00   6666666666666                         333
22                        5555555555555   6666666666666
   00         00   66         66         :::                 33
```

```
22                :::                   55   66         66
   00         00   66         66         :::                   33
22                  :::                   55   66         66
    00       00    66         66         :::       33         33    22
:::       55         55   66         66
     000000000     6666666666666                   3333333333333
2222222222222                   5555555555555   6666666666666
      0000000       66666666666                     33333333333
2222222222222                   55555555555     66666666666
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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
EEEEEEEE
    SSSSSSSSSSSS   CC              AAAAAAAAAAAAA   LL
EEEEEEEE
              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
EEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:32:56.71
*****
        *****
*****
        *****
*****

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

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

*********************************************************************
*********************************************
        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
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    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99745E-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
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    1026057  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90903E-08  1.32111E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.16668E-08  3.17470E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.38587E-09  3.85416E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.98883E-10  8.49115E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.39627E-17  3.88308E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.66434E-10  4.72825E-09   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  1.21357E-08  3.44762E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.02002E-09  2.32642E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
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    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  5.24645E-12  1.55331E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.25713E-09  3.72192E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.49065E-11  2.61544E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.86804E-11  1.86029E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  5.29960E-10  1.63246E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  2.40053E-13  7.53822E-12   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  2.03943E-10  6.40425E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53945E-12  2.13182E-10   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  8.98777E-11  2.90303E-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  1.29592E-09  4.30219E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43912E-09  8.17026E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.56544E-12  8.82387E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51419E-11  2.24055E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.28380E-11  1.24743E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.12580E-10  4.34405E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.84532E-16  7.45207E-15   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.74020E-10  2.24929E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  1.98836E-11  7.91044E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.05203E-14  4.24840E-13   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.34090E-09  5.33458E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.12545E-15  8.51953E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41912E-09  5.73075E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23463E-09  5.05972E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  4.95578E-11  2.07551E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.38013E-10  5.82129E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  1.07182E-12  4.58514E-11   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
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    1058144  7.14373E-10  3.07744E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.08954E-09  4.59556E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  5.57992E-11  2.38701E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.14888E-09  4.91472E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  3.95478E-10  1.70363E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32868E-10  3.61280E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.49989E-11  6.59616E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.85654E-10  1.69600E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.95308E-17  8.64769E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  6.27506E-13  2.79723E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.45313E-11  2.39814E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.22506E-10  9.91853E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06746E-09  1.38576E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50024E-11  2.50125E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  6.61930E-14  3.03001E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45292E-09  6.56370E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59127E-09  7.28405E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30672E-14  6.02070E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.11938E-12  2.83782E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.60774E-13  7.50401E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84211E-12  2.65672E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27372E-10  1.98190E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
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    1064156  5.94485E-10  2.77467E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51352E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.13367E-11  8.04427E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.61106E-17  1.86057E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.27474E-10  6.63676E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88247E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71857E-20  2.68323E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08511E-20  7.82986E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  1.12103E-29  8.12270E-28   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.50092E-21  2.53668E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
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    1096243  9.74965E-21  7.09360E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.60091E-21  7.01416E-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:
  9291 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

                                             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       ........

                                 ........     0.01483 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

   0.00117 minutes were required for starting.   total elapsed time is
0.01600 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 15719 independent fission points were generated for generation 1
          1       7.67808E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15453 independent fission points were generated for generation 2
          2       7.56973E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15790 independent fission points were generated for generation 3
          3       7.70701E-01      7.70701E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.66612E-01      7.68656E-01      2.04453E-03
0.00000E+00      0.00000E+00
          5       7.69267E-01      7.68860E-01      1.19783E-03
0.00000E+00      0.00000E+00
          6       7.63545E-01      7.67531E-01      1.57580E-03
```

0.00000E+00	0.00000E+00				
7	7.75059E-01	7.69037E-01	1.93824E-03	0.00000E+00	0.00000E+00
8	7.63953E-01	7.68190E-01	1.79507E-03	0.00000E+00	0.00000E+00
9	7.58090E-01	7.66747E-01	2.09363E-03	0.00000E+00	0.00000E+00
10	7.67747E-01	7.66872E-01	1.81744E-03	0.00000E+00	0.00000E+00
11	7.71076E-01	7.67339E-01	1.66950E-03	0.00000E+00	0.00000E+00
12	7.66233E-01	7.67228E-01	1.49734E-03	0.00000E+00	0.00000E+00
13	7.62282E-01	7.66779E-01	1.42707E-03	0.00000E+00	0.00000E+00
14	7.70612E-01	7.67098E-01	1.34133E-03	0.00000E+00	0.00000E+00
15	7.65848E-01	7.67002E-01	1.23758E-03	0.00000E+00	0.00000E+00
16	7.59871E-01	7.66493E-01	1.25391E-03	0.00000E+00	0.00000E+00
17	7.65816E-01	7.66447E-01	1.16820E-03	0.00000E+00	0.00000E+00
18	7.69478E-01	7.66637E-01	1.10905E-03	0.00000E+00	0.00000E+00
19	7.64642E-01	7.66520E-01	1.04836E-03	0.00000E+00	0.00000E+00
20	7.73592E-01	7.66913E-01	1.06364E-03	0.00000E+00	0.00000E+00
21	7.63640E-01	7.66740E-01	1.02074E-03	0.00000E+00	0.00000E+00
22	7.68125E-01	7.66809E-01	9.70827E-04	0.00000E+00	0.00000E+00
23	7.64422E-01	7.66696E-01	9.30412E-04	0.00000E+00	0.00000E+00
24	7.67163E-01	7.66717E-01	8.87367E-04	0.00000E+00	0.00000E+00
25	7.60195E-01	7.66433E-01	8.94072E-04	0.00000E+00	0.00000E+00
26	7.67694E-01	7.66486E-01	8.57618E-04	0.00000E+00	0.00000E+00
27	7.68584E-01	7.65909E-01	2.72532E-03	0.00000E+00	0.00000E+00
28	7.60994E-01	7.64926E-01	2.30747E-03	0.00000E+00	0.00000E+00
29	7.72656E-01	7.66214E-01	2.38423E-03	0.00000E+00	0.00000E+00
30	7.63843E-01	7.65876E-01	4.43309E-03	0.00000E+00	0.00000E+00
31	7.70747E-01	7.66484E-01	3.59726E-03	0.00000E+00	0.00000E+00
32	7.64478E-01	7.66261E-01	2.84533E-03		

0.00000E+00	0.00000E+00				
33	7.61844E-01	7.65820E-01	2.40939E-03	0.00000E+00	0.00000E+00
34	7.67412E-01	7.65964E-01	2.12260E-03	0.00000E+00	0.00000E+00
35	7.65137E-01	7.65895E-01	1.91234E-03	0.00000E+00	0.00000E+00
36	7.71521E-01	7.66328E-01	1.52829E-03	0.00000E+00	0.00000E+00
37	7.68349E-01	7.66473E-01	1.38936E-03	0.00000E+00	0.00000E+00
38	7.62675E-01	7.66219E-01	1.33678E-03	0.00000E+00	0.00000E+00
39	7.62628E-01	7.65995E-01	1.11815E-03	0.00000E+00	0.00000E+00
40	7.59177E-01	7.65594E-01	1.24585E-03	0.00000E+00	0.00000E+00
41	7.56052E-01	7.65064E-01	1.95430E-03	0.00000E+00	0.00000E+00
42	7.67304E-01	7.65182E-01	1.29428E-03	0.00000E+00	0.00000E+00
43	7.64858E-01	7.65165E-01	1.30444E-03	0.00000E+00	0.00000E+00
44	7.64507E-01	7.65134E-01	1.24296E-03	0.00000E+00	0.00000E+00
45	7.66473E-01	7.65195E-01	1.18327E-03	0.00000E+00	0.00000E+00
46	7.67498E-01	7.65295E-01	1.12178E-03	0.00000E+00	0.00000E+00
47	7.70797E-01	7.65524E-01	1.10365E-03	0.00000E+00	0.00000E+00
48	7.62790E-01	7.65415E-01	1.04031E-03	0.00000E+00	0.00000E+00
49	7.67014E-01	7.65476E-01	1.02012E-03	0.00000E+00	0.00000E+00
50	7.67478E-01	7.65551E-01	9.89493E-04	0.00000E+00	0.00000E+00
51	7.65093E-01	7.65534E-01	9.50161E-04	0.00000E+00	0.00000E+00
52	7.58684E-01	7.65298E-01	9.11063E-04	0.00000E+00	0.00000E+00
53	7.65753E-01	7.65313E-01	8.77802E-04	0.00000E+00	0.00000E+00
54	7.67225E-01	7.65375E-01	8.26086E-04	0.00000E+00	0.00000E+00
55	7.69067E-01	7.65490E-01	7.72201E-04	0.00000E+00	0.00000E+00
56	7.66444E-01	7.65519E-01	7.49922E-04	0.00000E+00	0.00000E+00
57	7.62973E-01	7.65444E-01	7.17722E-04	0.00000E+00	0.00000E+00
58	7.59375E-01	7.65271E-01	7.41135E-04		

0.00000E+00	0.00000E+00				
59	7.65386E-01	7.65274E-01	7.16991E-04	0.00000E+00	0.00000E+00
60	7.60415E-01	7.65143E-01	7.45708E-04	0.00000E+00	0.00000E+00
61	7.65249E-01	7.65146E-01	7.23465E-04	0.00000E+00	0.00000E+00
62	7.62988E-01	7.65090E-01	7.17091E-04	0.00000E+00	0.00000E+00
63	7.65969E-01	7.65112E-01	6.95845E-04	0.00000E+00	0.00000E+00
64	7.66170E-01	7.65138E-01	6.76373E-04	0.00000E+00	0.00000E+00
65	7.63200E-01	7.65092E-01	6.41313E-04	0.00000E+00	0.00000E+00
66	7.65568E-01	7.65103E-01	6.26015E-04	0.00000E+00	0.00000E+00
67	7.64548E-01	7.65090E-01	6.12099E-04	0.00000E+00	0.00000E+00
68	7.68256E-01	7.65161E-01	6.03381E-04	0.00000E+00	0.00000E+00
69	7.65899E-01	7.65177E-01	5.89309E-04	0.00000E+00	0.00000E+00
70	7.69425E-01	7.65267E-01	6.10231E-04	0.00000E+00	0.00000E+00
71	7.62112E-01	7.65201E-01	5.84186E-04	0.00000E+00	0.00000E+00
72	7.60435E-01	7.65104E-01	5.79374E-04	0.00000E+00	0.00000E+00
73	7.69389E-01	7.65190E-01	5.48650E-04	0.00000E+00	0.00000E+00
74	7.62744E-01	7.65142E-01	5.48865E-04	0.00000E+00	0.00000E+00
75	7.69277E-01	7.65221E-01	5.57046E-04	0.00000E+00	0.00000E+00
76	7.65162E-01	7.65220E-01	5.46107E-04	0.00000E+00	0.00000E+00
77	7.63752E-01	7.65193E-01	5.32004E-04	0.00000E+00	0.00000E+00
78	7.71774E-01	7.65313E-01	5.35906E-04	0.00000E+00	0.00000E+00
79	7.60482E-01	7.65226E-01	5.38252E-04	0.00000E+00	0.00000E+00
80	7.67830E-01	7.65272E-01	5.41161E-04	0.00000E+00	0.00000E+00
81	7.64929E-01	7.65266E-01	5.32452E-04	0.00000E+00	0.00000E+00
82	7.65269E-01	7.65266E-01	5.23017E-04	0.00000E+00	0.00000E+00
83	7.66040E-01	7.65279E-01	5.13899E-04	0.00000E+00	0.00000E+00
84	7.63533E-01	7.65251E-01	5.06018E-04		

```
0.00000E+00      0.00000E+00
         85       7.72016E-01      7.65360E-01      5.12817E-04
0.00000E+00      0.00000E+00
         86       7.66941E-01      7.65385E-01      5.03448E-04
0.00000E+00      0.00000E+00
         87       7.62119E-01      7.65334E-01      4.86266E-04
0.00000E+00      0.00000E+00
         88       7.67003E-01      7.65359E-01      4.80574E-04
0.00000E+00      0.00000E+00
         89       7.61288E-01      7.65298E-01      4.84225E-04
0.00000E+00      0.00000E+00
         90       7.66229E-01      7.65312E-01      4.77684E-04
0.00000E+00      0.00000E+00
         91       7.58288E-01      7.65208E-01      4.96055E-04
0.00000E+00      0.00000E+00
         92       7.67755E-01      7.65245E-01      4.91103E-04
0.00000E+00      0.00000E+00
         93       7.64621E-01      7.65236E-01      4.85902E-04
0.00000E+00      0.00000E+00
         94       7.66087E-01      7.65248E-01      4.79903E-04
0.00000E+00      0.00000E+00
         95       7.62403E-01      7.65209E-01      4.75560E-04
0.00000E+00      0.00000E+00
         96       7.69657E-01      7.65270E-01      4.74499E-04
0.00000E+00      0.00000E+00
         97       7.63700E-01      7.65248E-01      4.70253E-04
0.00000E+00      0.00000E+00
         98       7.62564E-01      7.65213E-01      4.60349E-04
0.00000E+00      0.00000E+00
         99       7.55921E-01      7.65090E-01      4.76952E-04
0.00000E+00      0.00000E+00
        100       7.62462E-01      7.65056E-01      4.74565E-04
0.00000E+00      0.00000E+00
        101       7.71102E-01      7.65134E-01      4.53672E-04
0.00000E+00      0.00000E+00
        102       7.73066E-01      7.65234E-01      4.51490E-04
0.00000E+00      0.00000E+00
        103       7.63104E-01      7.65208E-01      4.41702E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=875846453BFEB8B2
        104       7.71671E-01      7.65287E-01      4.61966E-04
0.00000E+00      0.00000E+00
        105       7.69275E-01      7.65336E-01      4.55869E-04
0.00000E+00      0.00000E+00
        106       7.64915E-01      7.65331E-01      4.49303E-04
0.00000E+00      0.00000E+00
        107       7.67282E-01      7.65354E-01      4.47025E-04
0.00000E+00      0.00000E+00
        108       7.61939E-01      7.65314E-01      4.44035E-04
0.00000E+00      0.00000E+00
        109       7.68133E-01      7.65347E-01      4.41749E-04
```

```
0.00000E+00      0.00000E+00
        110       7.61562E-01      7.65303E-01      4.42934E-04
0.00000E+00      0.00000E+00
        111       7.59616E-01      7.65239E-01      4.37798E-04
0.00000E+00      0.00000E+00
        112       7.65286E-01      7.65239E-01      4.32678E-04
0.00000E+00      0.00000E+00
        113       7.64106E-01      7.65227E-01      4.29897E-04
0.00000E+00      0.00000E+00
        114       7.68963E-01      7.65268E-01      4.27117E-04
0.00000E+00      0.00000E+00
        115       7.66667E-01      7.65283E-01      4.22144E-04
0.00000E+00      0.00000E+00
        116       7.65284E-01      7.65283E-01      4.17477E-04
0.00000E+00      0.00000E+00
        117       7.61344E-01      7.65241E-01      4.13574E-04
0.00000E+00      0.00000E+00
        118       7.69415E-01      7.65285E-01      4.11516E-04
0.00000E+00      0.00000E+00
        119       7.72162E-01      7.65357E-01      4.06005E-04
0.00000E+00      0.00000E+00
        120       7.65673E-01      7.65360E-01      4.02085E-04
0.00000E+00      0.00000E+00
        121       7.61882E-01      7.65324E-01      3.92933E-04
0.00000E+00      0.00000E+00
        122       7.62811E-01      7.65299E-01      3.89526E-04
0.00000E+00      0.00000E+00
        123       7.69705E-01      7.65343E-01      3.83927E-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=510DEF4DF9DFAAB6
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55209E-05 + or -  1.11937E-08             generation time
=  2.99609E-05 + or -  1.93849E-08
 nu bar   =  2.43896E+00 + or -  1.04053E-05       average fission group
=  2.17558E+02 + or -  1.04638E-02
                      energy(ev) of the average lethargy causing fission
=  5.65281E-02 + or -  1.30272E-04
                                                system mean free path (cm)
=  6.52810E-01 + or -  1.63956E-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	0.76534	+ or - 0.00038	0.76496 to 0.76573	0.76458 to 0.76611	0.76419 to 0.76649	2000000	12.2895
24	0.76532	+ or - 0.00039	0.76494 to 0.76571	0.76455 to 0.76610	0.76417 to 0.76648	1980000	12.3644
25	0.76538	+ or - 0.00039	0.76499 to 0.76577	0.76459 to 0.76616	0.76420 to 0.76655	1960000	12.2829
26	0.76535	+ or - 0.00040	0.76496 to 0.76575	0.76456 to 0.76615	0.76416 to 0.76655	1940000	12.1269
27	0.76532	+ or - 0.00039	0.76493 to 0.76571	0.76453 to 0.76611	0.76414 to 0.76650	1920000	12.6368
28	0.76536	+ or - 0.00039	0.76497 to 0.76576	0.76458 to 0.76615	0.76419 to 0.76654	1900000	12.9446
29	0.76529	+ or - 0.00038	0.76491 to 0.76567	0.76453 to 0.76605	0.76415 to 0.76643	1880000	13.7732
30	0.76530	+ or - 0.00038	0.76492 to 0.76569	0.76454 to 0.76607	0.76415 to 0.76645	1860000	13.7758
31	0.76524	+ or - 0.00039	0.76486 to 0.76563	0.76447 to 0.76602	0.76408 to 0.76641	1840000	13.6244
32	0.76525	+ or - 0.00039	0.76486 to 0.76564	0.76447 to 0.76604	0.76408 to 0.76643	1820000	13.6538
37	0.76516	+ or - 0.00041	0.76475 to 0.76556	0.76435 to 0.76597	0.76394 to 0.76638	1720000	13.9673
42	0.76538	+ or - 0.00040	0.76498 to 0.76578	0.76459 to 0.76617	0.76419 to 0.76657	1620000	14.7179
47	0.76529	+ or - 0.00042	0.76487 to 0.76570	0.76446 to 0.76612	0.76404 to 0.76653	1520000	14.9805
52	0.76536	+ or - 0.00044	0.76492 to 0.76580	0.76448 to 0.76624	0.76405 to 0.76668	1420000	14.9039
57	0.76529	+ or - 0.00047	0.76482 to 0.76576	0.76434 to 0.76624	0.76387 to 0.76671	1320000	14.7052
62	0.76550	+ or - 0.00048	0.76503 to 0.76598	0.76455 to 0.76646	0.76407 to 0.76694	1220000	16.4684
67	0.76554	+ or - 0.00052	0.76502 to 0.76606	0.76450 to 0.76658	0.76398 to 0.76710	1120000	16.2401

```
      72          0.76557   + or - 0.00055     0.76502 to 0.76612
0.76447 to 0.76667    0.76392 to 0.76722    1020000      17.3545

      77          0.76552   + or - 0.00059     0.76492 to 0.76611
0.76433 to 0.76671    0.76374 to 0.76730     920000      18.0941

      82          0.76545   + or - 0.00066     0.76479 to 0.76612
0.76413 to 0.76678    0.76346 to 0.76745     820000      17.6553

      87          0.76536   + or - 0.00074     0.76462 to 0.76610
0.76387 to 0.76685    0.76313 to 0.76759     720000      17.5557

      92          0.76556   + or - 0.00087     0.76469 to 0.76643
0.76382 to 0.76730    0.76295 to 0.76817     620000      16.3660

      97          0.76561   + or - 0.00106     0.76455 to 0.76667
0.76349 to 0.76773    0.76243 to 0.76879     520000      15.4657

     102          0.76575   + or - 0.00091     0.76484 to 0.76666
0.76393 to 0.76758    0.76301 to 0.76849     420000      17.1187

     107          0.76528   + or - 0.00112     0.76417 to 0.76640
0.76305 to 0.76752    0.76194 to 0.76863     320000      18.3047

     112          0.76618   + or - 0.00138     0.76481 to 0.76756
0.76343 to 0.76893    0.76206 to 0.77031     220000      19.5149
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)

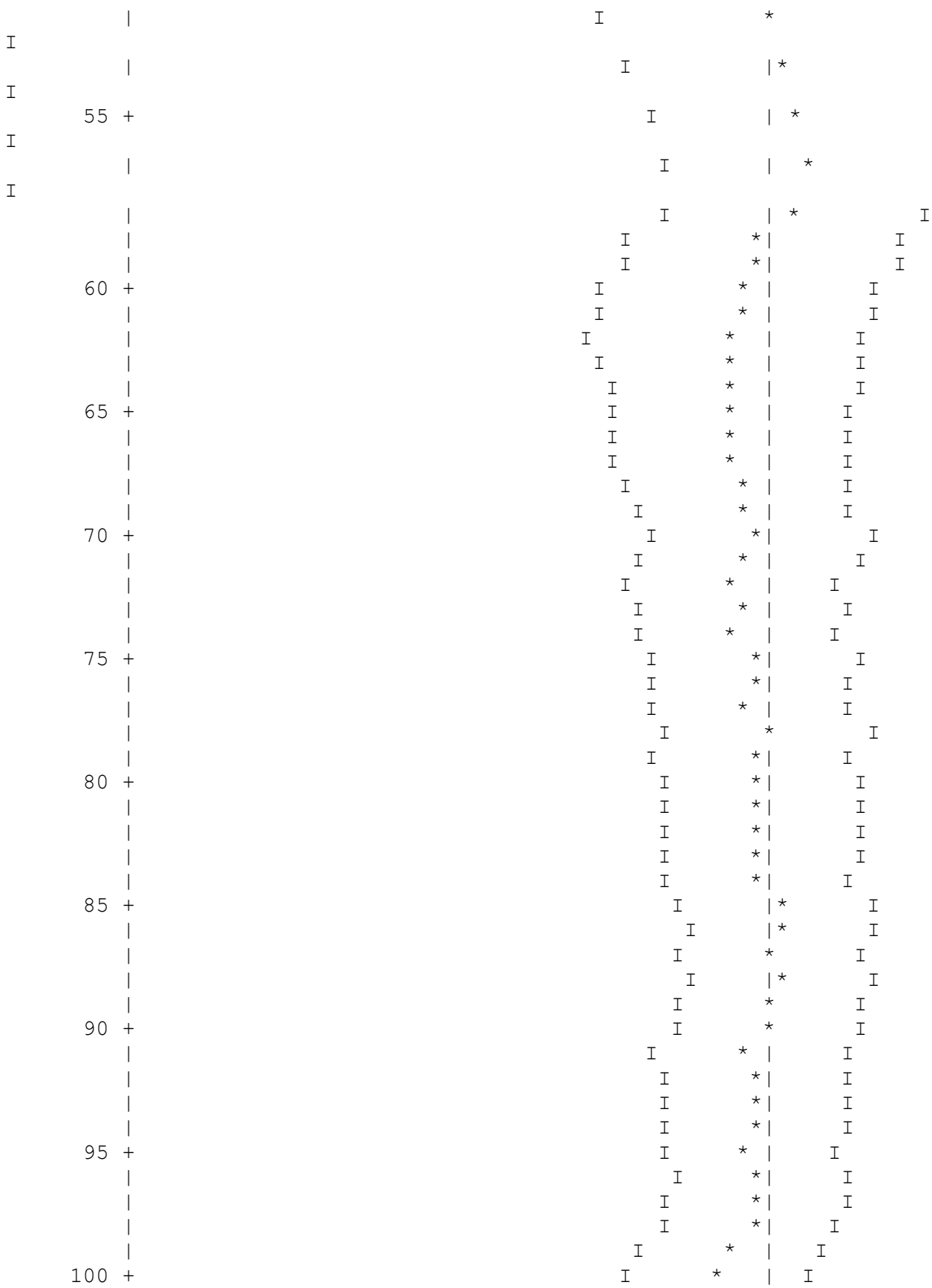
     117          0.76694   + or - 0.00342     0.76352 to 0.77037
0.76009 to 0.77379    0.75667 to 0.77721     120000       9.3361
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76534 + or - 0.00038 which occurs for
123 generations run.

                                0.7637                   0.7654
0.7672

|-------------------------|------------------------|------------------
------|------------------------
         |
      25 +                          *                       |
I
```

```
         |                                                 *   |
         |                  I                                  |         *
I
         |          I                                  *      |
I
         |                            I                        |
*                                 I
      30 +                                                     |        *
         |              I                                     |
*
         |                      I                             |
*
         |                      I                             |       *
I
         |                            I                       |         *
I
      35 +                              I                    |        *
I
         |                                            I       |
*                     I
         |                                                I  |
*                   I
         |                                            I      |
*                  I
         |                                            I      |          *
I
      40 +                                  I               |   *
I
         |                 I                            *   |
I
         |                            I                   * |
I
         |                            I                   * |
I
         |                             I                 *  |
I
      45 +                              I                 * |
I
         |                                 I                *
I
         |                                     I             |  *
I
         |                                    I              |*
I
         |                                      I            | *
I
      50 +                                       I           |  *
I
         |                                       I           |  *
I
         |                                     I             *
I
```

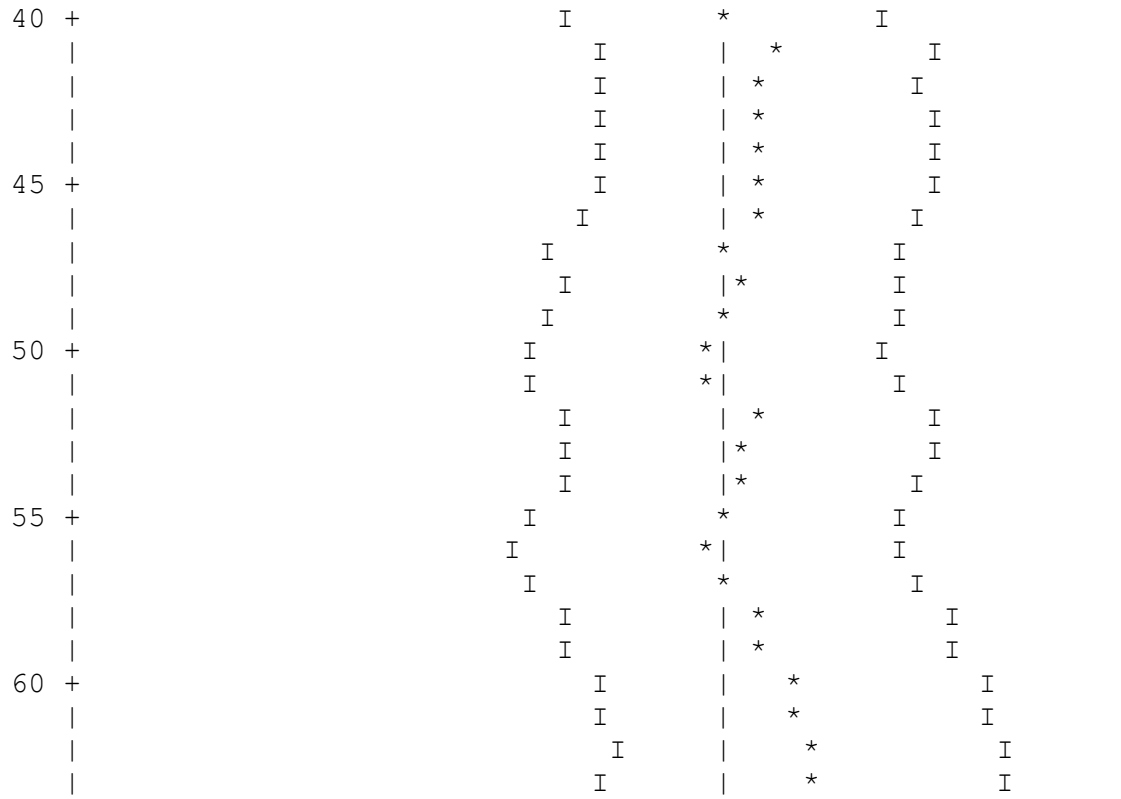


```
         |                                          I     *  |   I
         |                                           I      *|    I
         |                                           I     * |    I
         |                                            I      *     I
     105 +                                             I     *      I
         |                                             I     *      I
         |                                             I     |*     I
         |                                             I     *     I
         |                                             I     *      I
     110 +                                            I      *     I
         |                                            I     *|    I
         |                                            I     *|    I
         |                                            I     *|    I
         |                                            I     *|    I
     115 +                                            I      *     I
         |                                             I     *     I
         |                                            I     *|    I
         |                                             I     *    I
         |                                              I    |*    I
     120 +                                              I    |*    I
         |                                             I     *     I
         |                                             I     *    I
         |                                              I    *     I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7652 + or - 0.0003 which occurs for 29 generations skipped.

```
                                0.7648                   0.7659
0.7669

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


40
45
50
55
60
65
70
75
80
85
90

```
I
         |                      I              |     *
I
         |                      I              |      *
I
         |                     I               |      *
I
      95 +                      I              |        *
I
         |                  I                  |     *
I
         |                   I                 |      *
I
         |                      I              |         *
I
         |                          I          |                  *
I
     100 +                          I          |                       *
I
         |                                  I |                  *
I
         |                         I           |          *
I
         |                          I          |             *
I
         |                     I               |      *
I
     105 +                I                    | *                     I
         |                I                    |  *
I
         |          I                          *
I
         |            I                        |    *
I
         |    I                                |*
I
     110 +              I                      |      *
I
         |                          I          |                  *
I
         |                         I           |                    *
I
         |                        I            |
*                                   I
         |              I                      |                  *
I
     115 +    I                                |                 *
         |                                     |                   *
         |                                     |
*
         |                                     |
*
```

```
         |                              *     |
I
     120 +                         *          |

   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                 6.97035E-07    74.2338
4.65178E-07    43.1276       0.00000E+00     0.0000
    3    0.0000                 1.49001E-05    12.6274
2.09763E-05     5.1284       0.00000E+00     0.0000
    4    0.0000                 1.82223E-05     8.9046
3.21469E-05     4.2113       0.00000E+00     0.0000
    5    0.0000                 2.76866E-05     7.6189
5.37311E-05     3.0468       0.00000E+00     0.0000
    6    0.0001                 9.68744E-05     4.0502
2.30622E-04     1.3997       0.00000E+00     0.0000
    7    0.0002                 1.17580E-04     3.7818
2.10196E-04     1.6016       0.00000E+00     0.0000
    8    0.0003                 2.51258E-04     2.0820
3.27592E-04     0.9727       0.00000E+00     0.0000
    9    0.0005                 3.84697E-04     1.2612
4.43709E-04     0.6213       0.00000E+00     0.0000
   10    0.0003                 2.02407E-04     1.4647
2.06346E-04     0.6545       0.00000E+00     0.0000
   11    0.0012                 9.12653E-04     0.7404
5.25832E-04     0.4906       0.00000E+00     0.0000
   12    0.0010                 7.69570E-04     0.7100
3.01650E-04     0.6999       0.00000E+00     0.0000
   13    0.0003                 2.28207E-04     1.6422
9.06623E-05     1.6258       0.00000E+00     0.0000
   14    0.0013                 1.00738E-03     0.6123
4.11753E-04     0.6056       0.00000E+00     0.0000
   15    0.0010                 7.61519E-04     0.7308
3.28298E-04     0.7224       0.00000E+00     0.0000
   16    0.0002                 1.90586E-04     1.3374
8.75849E-05     1.3148       0.00000E+00     0.0000
   17    0.0001                 6.79777E-05     1.6916
3.30514E-05     1.6630       0.00000E+00     0.0000
   18    0.0001                 5.16756E-05     1.9218
2.60905E-05     1.8846       0.00000E+00     0.0000
   19    0.0001                 7.88675E-05     1.3623
4.17118E-05     1.3342       0.00000E+00     0.0000
```

20	0.0001	6.02262E-05	1.5949	3.29908E-05	1.5615	0.00000E+00	0.0000
21	0.0002	1.19371E-04	1.0215	6.74192E-05	0.9979	0.00000E+00	0.0000
22	0.0001	1.05322E-04	1.2181	6.23583E-05	1.1917	0.00000E+00	0.0000
23	0.0001	1.06555E-04	1.1528	6.50214E-05	1.1273	0.00000E+00	0.0000
24	0.0000	2.44421E-05	2.2375	1.51965E-05	2.1827	0.00000E+00	0.0000
25	0.0000	3.07759E-05	1.8127	1.92249E-05	1.7611	0.00000E+00	0.0000
26	0.0000	1.69201E-05	2.4736	1.06340E-05	2.4043	0.00000E+00	0.0000
27	0.0001	5.33207E-05	1.2271	3.32702E-05	1.2002	0.00000E+00	0.0000
28	0.0001	9.90073E-05	0.9340	6.17495E-05	0.9189	0.00000E+00	0.0000
29	0.0001	9.80120E-05	1.1321	6.17553E-05	1.1176	0.00000E+00	0.0000
30	0.0000	1.16448E-05	3.1431	7.30776E-06	3.1182	0.00000E+00	0.0000
31	0.0001	9.67370E-05	1.1111	6.11155E-05	1.0971	0.00000E+00	0.0000
32	0.0000	3.73605E-05	1.6826	2.38960E-05	1.6458	0.00000E+00	0.0000
33	0.0000	3.24985E-05	1.7751	2.03483E-05	1.7538	0.00000E+00	0.0000
34	0.0001	7.41424E-05	1.1265	4.65865E-05	1.1100	0.00000E+00	0.0000
35	0.0001	4.47644E-05	1.1777	2.81018E-05	1.1581	0.00000E+00	0.0000
36	0.0001	4.28755E-05	1.3514	2.65421E-05	1.3390	0.00000E+00	0.0000
37	0.0000	2.79818E-05	1.6569	1.75708E-05	1.6190	0.00000E+00	0.0000
38	0.0000	3.42099E-05	1.6109	2.15479E-05	1.5747	0.00000E+00	0.0000
39	0.0002	1.30453E-04	0.9397	8.30012E-05	0.9207	0.00000E+00	0.0000
40	0.0002	1.21033E-04	0.9568	7.82328E-05	0.9397	0.00000E+00	0.0000
41	0.0002	1.59900E-04	0.7920	1.06841E-04	0.7702	0.00000E+00	0.0000
42	0.0002	1.40109E-04	0.7428	9.52580E-05	0.7260	0.00000E+00	0.0000
43	0.0001	8.04887E-05	1.2277	5.77654E-05	1.1746	0.00000E+00	0.0000
44	0.0001	1.13715E-04	0.9898	8.34978E-05	0.9466	0.00000E+00	0.0000
45	0.0001	6.02228E-05	0.9396	4.85372E-05	0.8697	0.00000E+00	0.0000

```
   46    0.0000                 1.42381E-05     1.8524
1.14685E-05     1.7259       0.00000E+00     0.0000
   47    0.0001                 4.16873E-05     1.8513
3.23552E-05     1.7845       0.00000E+00     0.0000
   48    0.0000                 1.29273E-05     3.4943
1.00194E-05     3.4054       0.00000E+00     0.0000
   49    0.0001                 8.11727E-05     1.6451
6.39815E-05     1.6089       0.00000E+00     0.0000
   50    0.0001                 5.64448E-05     1.7362
4.64877E-05     1.7027       0.00000E+00     0.0000
   51    0.0000                 1.44733E-05     3.3053
1.20383E-05     3.2351       0.00000E+00     0.0000
   52    0.0001                 3.98098E-05     1.8767
3.44434E-05     1.8313       0.00000E+00     0.0000
   53    0.0002                 1.59848E-04     0.7733
1.57002E-04     0.7172       0.00000E+00     0.0000
   54    0.0001                 7.73536E-05     1.7215
7.19109E-05     1.6446       0.00000E+00     0.0000
   55    0.0002                 1.65151E-04     1.3677
1.51408E-04     1.3301       0.00000E+00     0.0000
   56    0.0002                 1.17699E-04     1.6610
1.09175E-04     1.6204       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                 1.47735E-04     1.4731
1.34091E-04     1.4344       0.00000E+00     0.0000
   58    0.0001                 8.64151E-05     1.8324
7.56531E-05     1.7846       0.00000E+00     0.0000
   59    0.0002                 1.59063E-04     1.6752
1.42808E-04     1.6104       0.00000E+00     0.0000
   60    0.0004                 2.78923E-04     1.2901
2.52765E-04     1.2135       0.00000E+00     0.0000
   61    0.0000                 2.72069E-05     3.9182
2.09595E-05     3.7828       0.00000E+00     0.0000
   62    0.0002                 1.61341E-04     1.5651
1.35408E-04     1.5228       0.00000E+00     0.0000
   63    0.0002                 1.17369E-04     2.0471
9.67365E-05     1.9708       0.00000E+00     0.0000
   64    0.0001                 1.02899E-04     2.1772
8.28897E-05     2.1066       0.00000E+00     0.0000
   65    0.0000                 3.52970E-05     3.7535
3.48688E-05     3.6333       0.00000E+00     0.0000
   66    0.0002                 1.76228E-04     1.8573
1.56240E-04     1.7999       0.00000E+00     0.0000
   67    0.0002                 1.45861E-04     2.1103
```

1.19386E-04	2.0426	0.00000E+00	0.0000	68	0.0000	2.68310E-05	3.9241
2.32135E-05	3.7817	0.00000E+00	0.0000	69	0.0004	3.02896E-04	1.5162
2.37612E-04	1.4680	0.00000E+00	0.0000	70	0.0003	2.10258E-04	1.7943
1.91247E-04	1.7280	0.00000E+00	0.0000	71	0.0006	4.36698E-04	1.4411
3.61254E-04	1.3977	0.00000E+00	0.0000	72	0.0001	4.58203E-05	5.8168
2.71181E-05	5.6644	0.00000E+00	0.0000	73	0.0004	3.15817E-04	1.8065
2.41199E-04	1.7076	0.00000E+00	0.0000	74	0.0014	1.05189E-03	1.0873
7.65086E-04	1.0389	0.00000E+00	0.0000	75	0.0001	1.09303E-04	2.7706
8.41145E-05	2.6329	0.00000E+00	0.0000	76	0.0006	4.47720E-04	1.9474
2.84591E-04	1.8788	0.00000E+00	0.0000	77	0.0005	3.58452E-04	1.9005
2.57392E-04	1.8293	0.00000E+00	0.0000	78	0.0000	7.40707E-06	4.0006
7.24455E-05	3.9592	0.00000E+00	0.0000	79	0.0003	1.93544E-04	2.4654
1.29943E-04	2.3769	0.00000E+00	0.0000	80	0.0001	6.33694E-05	3.7055
8.44181E-05	3.6043	0.00000E+00	0.0000	81	0.0014	1.04464E-03	1.2929
7.68683E-04	1.2396	0.00000E+00	0.0000	82	0.0001	6.23399E-05	4.6213
3.75845E-05	4.3530	0.00000E+00	0.0000	83	0.0002	1.34873E-04	3.3996
1.49062E-04	3.3329	0.00000E+00	0.0000	84	0.0001	8.12960E-05	3.1001
8.24227E-05	2.8783	0.00000E+00	0.0000	85	0.0003	1.97308E-04	2.4849
2.43004E-04	2.4161	0.00000E+00	0.0000	86	0.0003	2.60858E-04	2.2981
2.10088E-04	2.1769	0.00000E+00	0.0000	87	0.0005	3.47724E-04	2.3384
2.15977E-04	2.2429	0.00000E+00	0.0000	88	0.0001	5.31734E-05	4.1050
9.66368E-05	4.0029	0.00000E+00	0.0000	89	0.0001	8.94035E-05	3.6487
6.22783E-05	3.3429	0.00000E+00	0.0000	90	0.0003	2.20741E-04	2.9268
1.30382E-04	2.8057	0.00000E+00	0.0000	91	0.0002	1.81637E-04	2.8851
1.15181E-04	2.7130	0.00000E+00	0.0000	92	0.0000	3.04287E-05	2.5349
1.99137E-04	2.4864	0.00000E+00	0.0000	93	0.0002	1.32255E-04	3.1720

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1.07421E-04     2.9610       0.00000E+00     0.0000
   94    0.0002                 1.25962E-04     3.9889
7.03050E-05     3.7691       0.00000E+00     0.0000
   95    0.0008                 5.94307E-04     2.1786
3.66945E-04     2.1076       0.00000E+00     0.0000
   96    0.0002                 1.51994E-04     4.2819
7.71626E-05     4.1036       0.00000E+00     0.0000
   97    0.0004                 2.72684E-04     4.0496
1.56275E-04     3.9653       0.00000E+00     0.0000
   98    0.0001                 9.94946E-05     3.6551
9.55686E-05     3.5233       0.00000E+00     0.0000
   99    0.0001                 1.10701E-04     4.1043
7.39982E-05     3.9752       0.00000E+00     0.0000
  100    0.0002                 1.25843E-04     4.0858
8.42169E-05     3.9098       0.00000E+00     0.0000
  101    0.0001                 1.08727E-04     3.6659
6.92196E-05     3.3915       0.00000E+00     0.0000
  102    0.0002                 1.65885E-04     4.2977
9.22864E-05     4.1320       0.00000E+00     0.0000
  103    0.0001                 9.04874E-05     3.4312
8.86676E-05     3.2276       0.00000E+00     0.0000
  104    0.0002                 1.71471E-04     3.6722
1.35853E-04     3.5476       0.00000E+00     0.0000
  105    0.0002                 1.18817E-04     3.6442
7.87421E-05     3.4197       0.00000E+00     0.0000
  106    0.0002                 1.78218E-04     3.9284
1.32419E-04     3.8788       0.00000E+00     0.0000
  107    0.0001                 6.44358E-05     3.2519
6.49952E-05     3.0404       0.00000E+00     0.0000
  108    0.0000                 3.52297E-05     2.5872
1.52118E-04     2.5278       0.00000E+00     0.0000
  109    0.0002                 1.33281E-04     2.1079
4.42214E-04     2.0804       0.00000E+00     0.0000
  110    0.0008                 6.40611E-04     2.6242
3.95149E-04     2.5969       0.00000E+00     0.0000
  111    0.0002                 1.48217E-04     4.3474
1.36395E-04     4.2248       0.00000E+00     0.0000
  112    0.0001                 1.13857E-04     5.0720
1.20169E-04     4.9729       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                 1.28744E-04     3.5473
1.12379E-04     3.3168       0.00000E+00     0.0000
  114    0.0000                 1.06335E-05     7.5230
1.46461E-05     6.2220       0.00000E+00     0.0000
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115	0.0001	7.23720E-05	4.1857	8.41565E-05	3.8613
116	0.0003	1.98330E-04	2.7359	1.48700E-04	2.4835
117	0.0006	4.78658E-04	2.3346	2.55800E-04	2.1837
118	0.0008	5.83973E-04	1.9297	4.56281E-04	1.8486
119	0.0002	1.36766E-04	2.3975	3.53455E-04	2.3072
120	0.0002	1.62587E-04	1.9883	6.19028E-04	1.9594
121	0.0007	5.44771E-04	2.6682	4.18664E-04	2.6050
122	0.0001	9.70514E-05	5.1599	7.61975E-05	4.7926
123	0.0003	2.24315E-04	2.8305	1.58275E-04	2.5114
124	0.0003	2.37720E-04	3.3139	1.95854E-04	3.0916
125	0.0002	1.49039E-04	3.5773	1.36220E-04	3.2497
126	0.0001	1.01544E-04	3.6375	9.09015E-05	3.2060
127	0.0005	4.03085E-04	3.3699	1.97605E-04	3.1904
128	0.0003	2.32064E-04	3.0860	1.42456E-04	2.7532
129	0.0006	4.56378E-04	2.4143	4.20104E-04	2.2991
130	0.0002	1.17357E-04	3.1242	2.86189E-04	3.0307
131	0.0004	2.89797E-04	2.1605	2.33208E-04	1.8258
132	0.0007	5.21992E-04	2.3865	3.20715E-04	2.1995
133	0.0013	1.01601E-03	1.8990	6.42708E-04	1.8028
134	0.0001	9.15746E-05	1.8860	2.37827E-04	1.6026
135	0.0002	1.78452E-04	3.4158	2.64474E-04	3.3337
136	0.0001	4.61559E-05	2.0506	7.16084E-04	2.0190
137	0.0000	1.95476E-05	1.0443	3.51728E-03	1.0413
138	0.0004	3.06864E-04	1.9874	7.99547E-04	1.9574
139	0.0003	1.91431E-04	3.3787	2.34348E-04	3.1799
140	0.0003	2.25563E-04	2.2394	2.97328E-04	1.9608

141	0.0001	8.42424E-05	2.4360	2.64256E-04	2.1863
142	0.0001	6.82959E-05	3.3980	2.35432E-04	3.1281
143	0.0001	8.29318E-05	2.0724	1.76869E-04	1.3050
144	0.0000	3.31016E-05	3.0372	7.33108E-05	1.7911
145	0.0005	3.80199E-04	2.6138	2.98208E-04	2.3805
146	0.0004	3.40780E-04	2.7191	2.49625E-04	2.2269
147	0.0002	1.75221E-04	4.0535	1.12052E-04	3.5302
148	0.0001	5.51712E-05	6.7463	3.74006E-05	5.3472
149	0.0000	2.77389E-05	8.6616	1.95891E-05	6.5001
150	0.0001	8.73103E-05	4.1530	6.37850E-05	3.0468
151	0.0001	6.46768E-05	4.3560	5.50713E-05	2.9196
152	0.0001	4.11587E-05	4.8133	4.68509E-05	2.9054
153	0.0001	4.16881E-05	4.4204	4.64594E-05	2.6592
154	0.0001	4.96310E-05	4.1958	5.10373E-05	2.5127
155	0.0001	5.07684E-05	4.1603	4.96319E-05	2.4794
156	0.0001	4.84931E-05	4.6673	4.70842E-05	2.8247
157	0.0001	5.85726E-05	4.4339	5.71369E-05	2.6657
158	0.0001	6.25595E-05	4.4962	6.50553E-05	2.9107
159	0.0002	1.49246E-04	3.0227	2.07725E-04	2.5427
160	0.0001	6.15336E-05	3.8743	7.31250E-05	2.8925
161	0.0001	7.67332E-05	4.4355	7.44267E-05	2.9163
162	0.0001	8.80865E-05	3.7085	8.25613E-05	2.3172
163	0.0001	9.17845E-05	3.6232	8.57105E-05	2.1994
164	0.0001	1.05902E-04	3.6018	9.62057E-05	2.2807
165	0.0001	1.14282E-04	3.5538	1.04826E-04	2.2150
166	0.0001	6.97880E-05	4.5353	6.40687E-05	2.9272

```
  167    0.0001                 8.00072E-05     4.3264
7.17337E-05     2.8490       0.00000E+00     0.0000
  168    0.0001                 9.06396E-05     3.7517
7.97447E-05     2.5087       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                 1.14341E-04     3.8491
9.79267E-05     2.7491       0.00000E+00     0.0000
  170    0.0002                 1.37482E-04     4.2816
1.16726E-04     3.2737       0.00000E+00     0.0000
  171    0.0001                 9.80286E-05     4.9828
7.54472E-05     3.9868       0.00000E+00     0.0000
  172    0.0002                 1.37048E-04     4.9097
9.72794E-05     4.0822       0.00000E+00     0.0000
  173    0.0003                 1.92440E-04     4.0165
1.27184E-04     3.4887       0.00000E+00     0.0000
  174    0.0003                 2.61943E-04     3.6930
1.62185E-04     3.3305       0.00000E+00     0.0000
  175    0.0001                 1.10386E-04     6.0738
6.67131E-05     5.4278       0.00000E+00     0.0000
  176    0.0001                 1.01563E-04     6.6056
6.14267E-05     5.8598       0.00000E+00     0.0000
  177    0.0001                 1.12874E-04     5.2825
6.69104E-05     4.7568       0.00000E+00     0.0000
  178    0.0002                 1.19628E-04     5.7636
6.98688E-05     5.1779       0.00000E+00     0.0000
  179    0.0001                 1.12185E-04     5.6132
6.58141E-05     4.9775       0.00000E+00     0.0000
  180    0.0002                 1.15204E-04     6.2822
6.68724E-05     5.5741       0.00000E+00     0.0000
  181    0.0001                 1.12652E-04     6.8417
6.47423E-05     6.0769       0.00000E+00     0.0000
  182    0.0001                 1.09704E-04     5.4679
6.35257E-05     4.7705       0.00000E+00     0.0000
  183    0.0001                 1.05792E-04     5.6404
6.12612E-05     4.8974       0.00000E+00     0.0000
  184    0.0001                 1.03226E-04     5.8954
5.97931E-05     5.1001       0.00000E+00     0.0000
  185    0.0001                 9.36767E-05     5.8627
5.47135E-05     4.9758       0.00000E+00     0.0000
  186    0.0001                 9.81576E-05     6.7635
5.71921E-05     5.7673       0.00000E+00     0.0000
  187    0.0001                 8.43299E-05     6.2121
4.99820E-05     5.2096       0.00000E+00     0.0000
  188    0.0001                 8.80425E-05     6.5847
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5.19046E-05 5.5279 0.00000E+00 0.0000
189 0.0001 7.92421E-05 6.5290
4.75656E-05 5.3645 0.00000E+00 0.0000
190 0.0003 2.12980E-04 4.4804
1.26199E-04 3.7134 0.00000E+00 0.0000
191 0.0003 1.96115E-04 4.0133
1.18500E-04 3.2465 0.00000E+00 0.0000
192 0.0003 1.97458E-04 4.3935
1.19901E-04 3.5292 0.00000E+00 0.0000
193 0.0003 2.01773E-04 4.2917
1.22713E-04 3.4205 0.00000E+00 0.0000
194 0.0005 3.96650E-04 2.6640
2.44963E-04 2.1096 0.00000E+00 0.0000
195 0.0006 4.28394E-04 3.1999
2.64917E-04 2.5124 0.00000E+00 0.0000
196 0.0006 4.43863E-04 2.8181
2.78257E-04 2.1790 0.00000E+00 0.0000
197 0.0007 5.07092E-04 2.9856
3.16308E-04 2.3058 0.00000E+00 0.0000
198 0.0008 5.94888E-04 2.3209
3.66454E-04 1.8330 0.00000E+00 0.0000
199 0.0004 3.11977E-04 3.2636
1.93881E-04 2.5550 0.00000E+00 0.0000
200 0.0005 3.49902E-04 3.6394
2.16710E-04 2.8593 0.00000E+00 0.0000
201 0.0010 7.74821E-04 2.0491
4.77375E-04 1.5950 0.00000E+00 0.0000
202 0.0013 9.85844E-04 1.7729
5.97427E-04 1.4287 0.00000E+00 0.0000
203 0.0016 1.19660E-03 1.8551
7.18350E-04 1.4946 0.00000E+00 0.0000
204 0.0022 1.64814E-03 1.7018
9.71043E-04 1.4068 0.00000E+00 0.0000
205 0.0015 1.11842E-03 2.2880
6.55925E-04 1.9268 0.00000E+00 0.0000
206 0.0019 1.41935E-03 1.7589
8.23607E-04 1.5123 0.00000E+00 0.0000
207 0.0021 1.64277E-03 1.5769
9.55226E-04 1.3742 0.00000E+00 0.0000
208 0.0028 2.15196E-03 1.6296
1.25458E-03 1.4367 0.00000E+00 0.0000
209 0.0031 2.34405E-03 1.4512
1.38037E-03 1.2796 0.00000E+00 0.0000
210 0.0038 2.87670E-03 1.2598
1.71171E-03 1.1081 0.00000E+00 0.0000
211 0.0041 3.12038E-03 1.1758
1.88060E-03 1.0161 0.00000E+00 0.0000
212 0.0047 3.58880E-03 1.0437
2.17597E-03 0.9032 0.00000E+00 0.0000
213 0.0063 4.84410E-03 0.9615
2.94609E-03 0.8154 0.00000E+00 0.0000
214 0.0098 7.46220E-03 0.7465

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4.48296E-03     0.6353       0.00000E+00     0.0000
  215    0.0157                 1.19999E-02     0.6382
7.16384E-03     0.5301       0.00000E+00     0.0000
  216    0.0299                 2.28977E-02     0.3746
1.35208E-02     0.3185       0.00000E+00     0.0000
  217    0.0201                 1.53679E-02     0.4959
9.03949E-03     0.4247       0.00000E+00     0.0000
  218    0.0277                 2.12026E-02     0.4996
1.24092E-02     0.4244       0.00000E+00     0.0000
  219    0.0358                 2.74038E-02     0.4006
1.59746E-02     0.3414       0.00000E+00     0.0000
  220    0.0475                 3.63886E-02     0.3612
2.11444E-02     0.3064       0.00000E+00     0.0000
  221    0.0624                 4.77860E-02     0.2825
2.77154E-02     0.2401       0.00000E+00     0.0000
  222    0.0805                 6.15954E-02     0.2831
3.56492E-02     0.2397       0.00000E+00     0.0000
  223    0.1044                 7.99121E-02     0.2411
4.63581E-02     0.2080       0.00000E+00     0.0000
  224    0.0582                 4.45154E-02     0.3198
2.59379E-02     0.2730       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    0.2305                 1.76429E-01     0.1584
1.04507E-01     0.1340       0.00000E+00     0.0000
  226    0.0454                 3.47803E-02     0.3967
2.11695E-02     0.3297       0.00000E+00     0.0000
  227    0.0491                 3.75564E-02     0.4333
2.33219E-02     0.3548       0.00000E+00     0.0000
  228    0.0212                 1.61985E-02     0.5876
1.02433E-02     0.4681       0.00000E+00     0.0000
  229    0.0222                 1.69584E-02     0.6375
1.09156E-02     0.4974       0.00000E+00     0.0000
  230    0.0117                 8.94218E-03     0.6957
5.86321E-03     0.5362       0.00000E+00     0.0000
  231    0.0123                 9.39643E-03     0.7136
6.24377E-03     0.5334       0.00000E+00     0.0000
  232    0.0129                 9.84258E-03     0.7152
6.71930E-03     0.5356       0.00000E+00     0.0000
  233    0.0085                 6.46950E-03     0.8539
4.53122E-03     0.6437       0.00000E+00     0.0000
  234    0.0058                 4.42844E-03     1.0022
3.21140E-03     0.7114       0.00000E+00     0.0000
  235    0.0024                 1.86861E-03     1.7198
1.23336E-03     1.3468       0.00000E+00     0.0000
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  236    0.0019                 1.47426E-03     1.9025
9.90585E-04     1.4412       0.00000E+00     0.0000
  237    0.0017                 1.27014E-03     1.8812
9.12493E-04     1.3472       0.00000E+00     0.0000
  238    0.0001                 7.18488E-05     9.0298
6.19158E-05     5.3452       0.00000E+00     0.0000

 system total =                 7.65343E-01     0.0482
4.68712E-01     0.0426       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3134E-01  +
or -  0.0002



 elapsed time   3.10683 minutes

 random number=   3A3BA20AC046FB20
1                                                fuel bundle

                                                     **** fission
densities ****


                                                          fission
percent         total
                                             unit  region   density
deviation      fissions

                                                1      1    3.087E-03
0.05         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     flux     percent     flux     percent
                 deviation            deviation            deviation
    1   0.000E+00    0.00   0.000E+00    0.00   0.000E+00    0.00
    2   2.382E-08   23.95   1.885E-08   25.14   1.997E-08   24.43
```

3	9.707E-07	4.13	7.765E-07	3.75	8.422E-07	3.74
4	1.428E-06	3.43	1.172E-06	3.10	1.260E-06	3.07
5	2.314E-06	2.29	1.925E-06	2.07	2.049E-06	2.10
6	9.506E-06	1.29	7.591E-06	1.18	8.093E-06	1.14
7	1.236E-05	1.01	9.433E-06	0.81	9.964E-06	0.84
8	3.088E-05	0.80	2.262E-05	0.66	2.377E-05	0.67
9	8.200E-05	0.49	5.859E-05	0.47	6.115E-05	0.45
10	4.608E-05	0.54	3.275E-05	0.51	3.402E-05	0.49
11	2.206E-04	0.26	1.560E-04	0.24	1.619E-04	0.23
12	1.896E-04	0.27	1.377E-04	0.26	1.446E-04	0.24
13	5.650E-05	0.55	4.127E-05	0.48	4.328E-05	0.50
14	2.523E-04	0.26	1.828E-04	0.22	1.910E-04	0.22
15	2.193E-04	0.27	1.595E-04	0.24	1.668E-04	0.23
16	7.120E-05	0.49	5.168E-05	0.44	5.406E-05	0.41
17	3.217E-05	0.70	2.342E-05	0.53	2.440E-05	0.53
18	2.775E-05	0.62	2.038E-05	0.62	2.111E-05	0.60
19	5.048E-05	0.52	3.686E-05	0.46	3.834E-05	0.43
20	3.962E-05	0.60	2.912E-05	0.48	3.045E-05	0.47
21	8.029E-05	0.38	5.850E-05	0.34	6.111E-05	0.33
22	7.355E-05	0.37	5.396E-05	0.34	5.563E-05	0.32
23	7.677E-05	0.43	5.618E-05	0.36	5.825E-05	0.33
24	1.871E-05	0.87	1.379E-05	0.74	1.438E-05	0.67
25	2.319E-05	0.59	1.708E-05	0.57	1.789E-05	0.56
26	1.320E-05	0.89	9.840E-06	0.78	1.040E-05	0.81
27	4.197E-05	0.48	3.112E-05	0.44	3.295E-05	0.43
28	7.748E-05	0.40	5.765E-05	0.35	6.104E-05	0.33
29	7.957E-05	0.38	5.966E-05	0.32	6.242E-05	0.28
30	9.985E-06	1.08	7.466E-06	0.94	7.875E-06	0.93
31	7.856E-05	0.38	5.878E-05	0.31	6.189E-05	0.32
32	3.084E-05	0.57	2.329E-05	0.51	2.465E-05	0.52
33	2.662E-05	0.63	2.013E-05	0.58	2.123E-05	0.51
34	6.058E-05	0.44	4.583E-05	0.37	4.814E-05	0.36
35	3.636E-05	0.53	2.765E-05	0.46	2.900E-05	0.42
36	3.411E-05	0.57	2.569E-05	0.44	2.692E-05	0.39
37	2.192E-05	0.65	1.660E-05	0.61	1.732E-05	0.54
38	2.591E-05	0.61	1.978E-05	0.53	2.074E-05	0.52
39	9.788E-05	0.32	7.511E-05	0.28	7.936E-05	0.24
40	8.971E-05	0.35	6.947E-05	0.29	7.418E-05	0.27
41	1.129E-04	0.28	8.847E-05	0.25	9.458E-05	0.23
42	9.362E-05	0.33	7.377E-05	0.27	7.941E-05	0.26
43	5.130E-05	0.39	4.084E-05	0.39	4.300E-05	0.31
44	6.983E-05	0.35	5.607E-05	0.31	6.020E-05	0.26
45	3.537E-05	0.43	2.818E-05	0.35	3.118E-05	0.34
46	8.366E-06	0.85	6.642E-06	0.68	7.211E-06	0.67
47	2.355E-05	0.51	1.872E-05	0.43	1.955E-05	0.38
48	6.757E-06	0.99	5.394E-06	0.86	5.602E-06	0.74
49	4.382E-05	0.43	3.508E-05	0.37	3.778E-05	0.29
50	2.957E-05	0.52	2.375E-05	0.43	2.588E-05	0.37
51	7.847E-06	0.92	6.322E-06	0.80	6.862E-06	0.71
52	2.054E-05	0.53	1.661E-05	0.50	1.806E-05	0.41
53	7.697E-05	0.34	6.195E-05	0.29	6.711E-05	0.22
54	3.347E-05	0.40	2.726E-05	0.38	2.931E-05	0.32

55	6.669E-05	0.33	5.434E-05	0.28	5.914E-05	0.23
56	4.323E-05	0.36	3.520E-05	0.31	3.840E-05	0.27
57	4.910E-05	0.27	4.007E-05	0.26	4.373E-05	0.23
58	2.615E-05	0.57	2.129E-05	0.45	2.321E-05	0.36
59	4.427E-05	0.43	3.621E-05	0.36	3.930E-05	0.30
60	6.445E-05	0.28	5.277E-05	0.25	5.730E-05	0.21
61	6.205E-06	0.95	5.080E-06	0.89	5.519E-06	0.62
62	3.248E-05	0.43	2.670E-05	0.42	2.895E-05	0.32
63	2.195E-05	0.49	1.796E-05	0.43	1.955E-05	0.35
64	1.715E-05	0.55	1.417E-05	0.51	1.532E-05	0.38
65	5.732E-06	1.00	4.694E-06	0.85	5.104E-06	0.72
66	2.875E-05	0.44	2.364E-05	0.37	2.564E-05	0.33
67	2.128E-05	0.54	1.745E-05	0.48	1.900E-05	0.38
68	4.600E-06	1.03	3.838E-06	0.89	4.134E-06	0.75
69	3.719E-05	0.39	3.069E-05	0.34	3.332E-05	0.30
70	2.676E-05	0.49	2.197E-05	0.43	2.380E-05	0.35
71	4.561E-05	0.33	3.769E-05	0.33	4.082E-05	0.26
72	2.572E-06	1.49	2.117E-06	1.35	2.338E-06	1.03
73	2.726E-05	0.45	2.238E-05	0.41	2.434E-05	0.33
74	7.930E-05	0.29	6.585E-05	0.25	7.151E-05	0.20
75	9.130E-06	0.74	7.542E-06	0.70	8.181E-06	0.52
76	2.271E-05	0.50	1.896E-05	0.44	2.062E-05	0.38
77	1.775E-05	0.50	1.477E-05	0.46	1.603E-05	0.39
78	1.525E-06	1.82	1.257E-06	1.67	1.377E-06	1.34
79	9.842E-06	0.72	8.186E-06	0.66	8.864E-06	0.55
80	4.539E-06	1.12	3.749E-06	1.01	4.053E-06	0.75
81	5.522E-05	0.32	4.589E-05	0.27	4.973E-05	0.24
82	3.129E-06	1.25	2.640E-06	0.99	2.907E-06	0.86
83	4.458E-06	0.96	3.724E-06	0.92	4.031E-06	0.69
84	8.271E-06	0.82	6.860E-06	0.69	7.391E-06	0.58
85	1.005E-05	0.73	8.341E-06	0.63	9.033E-06	0.57
86	1.364E-05	0.72	1.143E-05	0.58	1.234E-05	0.44
87	1.189E-05	0.68	9.936E-06	0.65	1.079E-05	0.45
88	3.167E-06	1.09	2.641E-06	1.00	2.879E-06	0.76
89	6.509E-06	0.83	5.482E-06	0.77	5.926E-06	0.61
90	6.941E-06	0.83	5.798E-06	0.78	6.238E-06	0.65
91	8.290E-06	0.80	6.881E-06	0.69	7.421E-06	0.56
92	4.740E-06	1.04	4.000E-06	0.90	4.317E-06	0.74
93	8.177E-06	0.77	6.799E-06	0.68	7.379E-06	0.60
94	4.303E-06	1.08	3.587E-06	0.96	3.861E-06	0.81
95	1.266E-05	0.61	1.058E-05	0.59	1.150E-05	0.48
96	3.326E-06	1.18	2.762E-06	1.11	3.005E-06	0.88
97	3.375E-06	1.30	2.840E-06	1.22	3.087E-06	0.97
98	3.542E-06	1.18	2.952E-06	1.07	3.202E-06	0.94
99	2.289E-06	1.29	1.921E-06	1.25	2.091E-06	1.02
100	3.409E-06	1.22	2.836E-06	1.03	3.077E-06	0.83
101	4.850E-06	0.92	4.090E-06	0.90	4.427E-06	0.63
102	3.406E-06	1.24	2.815E-06	0.93	3.064E-06	0.93
103	4.678E-06	1.02	3.898E-06	0.85	4.274E-06	0.75
104	4.214E-06	1.15	3.514E-06	1.00	3.793E-06	0.82
105	4.356E-06	0.98	3.663E-06	0.86	3.942E-06	0.72
106	1.529E-06	1.71	1.277E-06	1.58	1.398E-06	1.38

107	3.566E-06	1.04	2.991E-06	0.99	3.240E-06	0.86
108	3.210E-06	1.22	2.705E-06	1.12	2.962E-06	0.84
109	5.145E-06	0.92	4.312E-06	0.94	4.665E-06	0.68
110	3.053E-06	1.02	2.594E-06	0.90	2.851E-06	0.76
111	3.059E-06	1.15	2.547E-06	1.03	2.788E-06	0.98
112	1.781E-06	1.58	1.520E-06	1.59	1.661E-06	1.26
113	5.753E-06	0.90	4.845E-06	0.76	5.192E-06	0.63
114	1.996E-06	1.61	1.669E-06	1.40	1.811E-06	1.22
115	5.142E-06	1.06	4.278E-06	0.93	4.652E-06	0.65
116	1.067E-05	0.68	8.992E-06	0.60	9.779E-06	0.50
117	1.184E-05	0.63	9.903E-06	0.57	1.067E-05	0.50
118	1.288E-05	0.60	1.083E-05	0.53	1.175E-05	0.45
119	8.210E-06	0.79	6.916E-06	0.68	7.588E-06	0.57
120	5.825E-06	0.90	4.965E-06	0.85	5.370E-06	0.66
121	6.034E-06	0.87	5.101E-06	0.75	5.567E-06	0.59
122	3.257E-06	1.14	2.753E-06	1.01	2.963E-06	0.82
123	1.039E-05	0.71	8.734E-06	0.62	9.415E-06	0.48
124	7.326E-06	0.85	6.164E-06	0.70	6.686E-06	0.57
125	7.129E-06	0.76	5.971E-06	0.71	6.452E-06	0.66
126	5.869E-06	0.97	4.909E-06	0.78	5.263E-06	0.68
127	5.536E-06	0.84	4.650E-06	0.72	5.051E-06	0.60
128	7.817E-06	0.79	6.543E-06	0.67	7.056E-06	0.59
129	9.687E-06	0.77	8.173E-06	0.69	8.845E-06	0.53
130	3.988E-06	1.25	3.393E-06	1.09	3.654E-06	0.84
131	1.687E-05	0.52	1.413E-05	0.45	1.529E-05	0.38
132	1.125E-05	0.74	9.480E-06	0.65	1.021E-05	0.49
133	1.361E-05	0.61	1.160E-05	0.55	1.250E-05	0.44
134	1.469E-05	0.61	1.237E-05	0.52	1.334E-05	0.44
135	2.371E-06	1.39	2.029E-06	1.20	2.215E-06	1.03
136	3.900E-06	1.02	3.374E-06	0.97	3.689E-06	0.81
137	2.524E-06	1.00	2.668E-06	0.89	2.989E-06	0.76
138	4.173E-06	1.03	3.628E-06	0.91	3.953E-06	0.84
139	4.619E-06	1.04	3.922E-06	0.99	4.279E-06	0.79
140	1.207E-05	0.64	1.019E-05	0.56	1.104E-05	0.50
141	8.948E-06	0.64	7.525E-06	0.67	8.089E-06	0.54
142	5.813E-06	0.98	4.946E-06	0.90	5.344E-06	0.71
143	2.002E-05	0.53	1.694E-05	0.47	1.820E-05	0.39
144	8.083E-06	0.72	6.833E-06	0.62	7.358E-06	0.55
145	7.152E-06	0.76	6.064E-06	0.62	6.518E-06	0.54
146	1.194E-05	0.71	1.010E-05	0.64	1.086E-05	0.50
147	3.631E-06	1.12	3.071E-06	1.01	3.332E-06	0.84
148	1.905E-06	1.37	1.606E-06	1.34	1.720E-06	1.14
149	1.148E-06	1.92	9.855E-07	2.04	1.062E-06	1.64
150	4.016E-06	1.04	3.360E-06	0.92	3.644E-06	0.73
151	4.112E-06	1.10	3.513E-06	0.93	3.734E-06	0.73
152	4.306E-06	1.07	3.632E-06	0.90	3.905E-06	0.79
153	4.448E-06	1.00	3.723E-06	0.80	4.012E-06	0.71
154	4.620E-06	1.02	3.907E-06	0.83	4.191E-06	0.77
155	4.283E-06	1.06	3.630E-06	0.96	3.884E-06	0.77
156	3.998E-06	1.09	3.393E-06	0.92	3.629E-06	0.74
157	4.640E-06	0.95	3.912E-06	0.86	4.247E-06	0.75
158	4.818E-06	1.19	4.074E-06	0.95	4.431E-06	0.81

159	6.823E-06	0.91	5.756E-06	0.78	6.235E-06	0.66
160	3.542E-06	1.17	2.970E-06	1.00	3.239E-06	0.79
161	5.043E-06	0.93	4.225E-06	0.85	4.604E-06	0.75
162	5.844E-06	0.88	4.956E-06	0.75	5.320E-06	0.66
163	6.012E-06	0.86	5.073E-06	0.76	5.498E-06	0.63
164	6.418E-06	0.85	5.434E-06	0.77	5.878E-06	0.66
165	6.944E-06	0.92	5.847E-06	0.80	6.298E-06	0.61
166	4.027E-06	0.99	3.402E-06	0.95	3.664E-06	0.78
167	4.226E-06	1.05	3.542E-06	0.99	3.809E-06	0.75
168	4.348E-06	1.16	3.677E-06	0.99	3.957E-06	0.80
169	4.456E-06	1.01	3.735E-06	0.80	4.054E-06	0.78
170	4.682E-06	0.99	3.932E-06	0.87	4.219E-06	0.75
171	2.339E-06	1.43	1.968E-06	1.23	2.131E-06	1.00
172	2.378E-06	1.53	2.031E-06	1.27	2.185E-06	1.04
173	2.478E-06	1.38	2.099E-06	1.29	2.273E-06	1.00
174	2.475E-06	1.31	2.117E-06	1.21	2.307E-06	0.94
175	1.010E-06	2.21	8.603E-07	1.96	9.325E-07	1.65
176	1.002E-06	1.87	8.612E-07	1.80	9.388E-07	1.47
177	1.034E-06	2.22	8.678E-07	1.96	9.481E-07	1.57
178	1.061E-06	2.05	8.802E-07	1.76	9.577E-07	1.55
179	1.044E-06	2.15	9.000E-07	1.89	9.550E-07	1.58
180	1.046E-06	2.11	8.926E-07	1.84	9.800E-07	1.41
181	1.055E-06	1.86	8.918E-07	1.65	9.826E-07	1.36
182	1.071E-06	2.07	9.198E-07	1.92	9.903E-07	1.52
183	1.104E-06	2.03	9.550E-07	1.81	1.015E-06	1.34
184	1.104E-06	1.86	9.348E-07	1.66	1.022E-06	1.50
185	1.134E-06	1.89	9.637E-07	1.68	1.036E-06	1.41
186	1.124E-06	1.65	9.501E-07	1.62	1.044E-06	1.27
187	1.132E-06	1.81	9.687E-07	1.56	1.053E-06	1.37
188	1.159E-06	1.95	9.848E-07	1.74	1.087E-06	1.38
189	1.161E-06	1.79	9.925E-07	1.78	1.065E-06	1.20
190	2.975E-06	1.09	2.531E-06	0.98	2.714E-06	0.84
191	3.046E-06	1.10	2.575E-06	0.90	2.809E-06	0.83
192	3.190E-06	1.25	2.697E-06	1.08	2.888E-06	0.87
193	3.256E-06	1.13	2.763E-06	1.06	2.983E-06	0.86
194	6.866E-06	0.88	5.804E-06	0.72	6.236E-06	0.62
195	7.316E-06	0.84	6.191E-06	0.72	6.709E-06	0.62
196	7.826E-06	0.72	6.620E-06	0.67	7.105E-06	0.49
197	8.422E-06	0.77	7.135E-06	0.67	7.727E-06	0.57
198	8.965E-06	0.63	7.617E-06	0.63	8.232E-06	0.53
199	4.825E-06	0.98	4.064E-06	0.91	4.403E-06	0.77
200	5.038E-06	1.05	4.267E-06	0.96	4.650E-06	0.77
201	1.080E-05	0.55	9.184E-06	0.54	9.853E-06	0.41
202	1.195E-05	0.64	1.009E-05	0.59	1.095E-05	0.47
203	1.281E-05	0.57	1.089E-05	0.49	1.185E-05	0.40
204	1.462E-05	0.49	1.241E-05	0.45	1.349E-05	0.39
205	8.487E-06	0.67	7.655E-06	0.56	8.088E-06	0.50
206	9.298E-06	0.69	8.345E-06	0.58	8.843E-06	0.47
207	9.525E-06	0.59	8.670E-06	0.53	9.125E-06	0.44
208	1.124E-05	0.60	1.019E-05	0.53	1.082E-05	0.44
209	1.154E-05	0.60	1.054E-05	0.56	1.117E-05	0.42
210	1.415E-05	0.54	1.276E-05	0.48	1.355E-05	0.37

211	1.625E-05	0.45	1.464E-05	0.42	1.560E-05	0.33
212	1.926E-05	0.41	1.742E-05	0.37	1.850E-05	0.28
213	2.626E-05	0.38	2.360E-05	0.32	2.523E-05	0.28
214	3.701E-05	0.33	3.317E-05	0.27	3.564E-05	0.23
215	5.528E-05	0.26	4.987E-05	0.22	5.384E-05	0.17
216	9.241E-05	0.18	8.420E-05	0.18	9.086E-05	0.15
217	5.541E-05	0.22	5.291E-05	0.21	5.612E-05	0.17
218	7.068E-05	0.20	6.781E-05	0.17	7.219E-05	0.14
219	8.401E-05	0.20	8.119E-05	0.18	8.643E-05	0.14
220	1.015E-04	0.18	9.915E-05	0.15	1.055E-04	0.12
221	1.201E-04	0.18	1.182E-04	0.15	1.261E-04	0.11
222	1.367E-04	0.17	1.366E-04	0.13	1.455E-04	0.11
223	1.534E-04	0.15	1.573E-04	0.13	1.675E-04	0.11
224	7.518E-05	0.19	7.977E-05	0.14	8.451E-05	0.12
225	2.338E-04	0.12	2.724E-04	0.11	2.825E-04	0.08
226	3.175E-05	0.26	4.482E-05	0.22	4.447E-05	0.13
227	2.900E-05	0.29	4.643E-05	0.19	4.453E-05	0.13
228	1.045E-05	0.34	1.907E-05	0.28	1.759E-05	0.16
229	9.677E-06	0.39	1.974E-05	0.32	1.749E-05	0.17
230	4.520E-06	0.58	1.022E-05	0.47	8.713E-06	0.23
231	4.280E-06	0.55	1.065E-05	0.45	8.785E-06	0.22
232	3.912E-06	0.57	1.136E-05	0.37	8.869E-06	0.19
233	2.260E-06	0.78	7.447E-06	0.56	5.523E-06	0.28
234	1.420E-06	0.95	5.363E-06	0.75	3.823E-06	0.30
235	5.138E-07	1.64	1.037E-06	1.06	1.123E-06	0.54
236	3.497E-07	1.74	7.317E-07	1.15	8.040E-07	0.52
237	2.212E-07	2.00	5.427E-07	1.48	6.164E-07	0.58
238	5.640E-09	12.06	2.344E-08	5.77	2.510E-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
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
 0.7554 to 0.7582     **
 0.7582 to 0.7610     **********
 0.7610 to 0.7639     ************************
 0.7639 to 0.7667     ****************************
 0.7667 to 0.7695     ************************
 0.7695 to 0.7724     **********
 0.7724 to 0.7752     **

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7554 to 0.7582     *
 0.7582 to 0.7610     *******
 0.7610 to 0.7639     *******************
 0.7639 to 0.7667     **********************
 0.7667 to 0.7695     *****************
 0.7695 to 0.7724     *******
 0.7724 to 0.7752     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7554 to 0.7582     *
 0.7582 to 0.7610     ***
 0.7610 to 0.7639     ***************
 0.7639 to 0.7667     *************
 0.7667 to 0.7695     **********
 0.7695 to 0.7724     *******
 0.7724 to 0.7752     *

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7554 to 0.7582     *
 0.7582 to 0.7610     *
 0.7610 to 0.7639     *******
 0.7639 to 0.7667     ******
 0.7667 to 0.7695     *****
```

```
 0.7695 to 0.7724     ****
 0.7724 to 0.7752     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76528 + or - 0.00037                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65281E-02 + or -  1.30272E-04            ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  1.04053E-05            ***
        ***
***
        ***        system mean free path (cm)
6.52810E-01 + or -  1.63956E-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     3.10400 minutes


*********************************************************************
*************************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


      0000000       666666666666                    33333333333
666666666666                        11         22222222222
     000000000     6666666666666                   3333333333333
6666666666666                       111        2222222222222
```

```
    00       00    66                    :::       33         33   66
:::           1111        22         22
   00         00   66                    :::                  33   66
:::             11                    22
   00         00   66                    :::                  33   66
:::             11                    22
   00         00   666666666666                            333
666666666666                           11                 22
   00         00   6666666666666                           333
6666666666666                          11               22
   00         00   66         66         :::                  33   66
66         :::             11             22
   00         00   66         66         :::                  33   66
66         :::             11           22
    00       00    66         66         :::       33         33   66
66         :::             11         22
     000000000     6666666666666                   3333333333333
6666666666666                      11111111     2222222222222
      0000000       66666666666                    33333333333
66666666666                       11111111     2222222222222
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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
EEEEEEEE
    SSSSSSSSSSSS   CC              AAAAAAAAAAAAA   LL
EEEEEEEE
              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
EEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
```

```
*****
        *****    time of execution:  06:36:12.55
*****
        *****
*****
        *****
*****

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

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

*************************************************************************
*********************************************
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.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02827E-07  7.99745E-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
```

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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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90903E-08  1.32111E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.16698E-08  3.17552E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  1.38587E-09  3.85418E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  2.95665E-10  8.39973E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  1.40435E-17  3.90556E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.66354E-10  4.72600E-09   41095    94.9068     nb95 4131
```

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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  1.21390E-08  3.44856E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.02009E-09  2.32644E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  4.07662E-12  1.20696E-10   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                 12/17/09
    1043099  1.25841E-09  3.72569E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                 12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                 12/17/09
    1044103  8.34206E-11  2.56967E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                 12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                 12/17/09
    1044106  5.85716E-11  1.85684E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                 12/17/09
    1045103  5.31447E-10  1.63704E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                 12/17/09
    1045105  1.49963E-13  4.70917E-12   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                 12/17/09
    1046105  2.04033E-10  6.40708E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                 12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                 12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53959E-12  2.13186E-10   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  8.98777E-11  2.90303E-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  1.29593E-09  4.30221E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                 12/17/09
    1048112  2.43912E-09  8.17026E-08   48112   111.9028     cd112 4843
```

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endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.56775E-12  8.83180E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51420E-11  2.24056E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.28857E-11  1.24924E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                12/17/09
    1053129  1.12580E-10  4.34405E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                12/17/09
    1053135  1.46918E-17  5.93308E-16   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                12/17/09
    1054131  5.75117E-10  2.25359E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  1.75755E-11  6.99222E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.75875E-15  7.10232E-14   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.34337E-09  5.34442E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.12350E-15  8.51170E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41913E-09  5.73078E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23456E-09  5.05940E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
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endf/b7 rel0 rev7 mod1                12/17/09
    1056140  4.69359E-11  1.96570E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.35102E-10  5.69848E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  6.47803E-13  2.77124E-11   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.12637E-10  3.06996E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.09245E-09  4.60784E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  5.34330E-11  2.28579E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.15167E-09  4.92665E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  3.97214E-10  1.71111E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32868E-10  3.61280E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.40813E-11  6.19263E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.86292E-10  1.69881E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.72709E-17  7.64708E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  4.58679E-13  2.04465E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.48105E-11  2.41041E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.22674E-10  9.92606E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06742E-09  1.38574E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50024E-11  2.50125E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  4.62078E-14  2.11518E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45298E-09  6.56400E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59129E-09  7.28415E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30643E-14  6.01937E-13   63154   153.9230     eu154 6334
```

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endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.11694E-12  2.83669E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.53610E-13  7.16962E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84211E-12  2.65672E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27374E-10  1.98192E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94493E-10  2.77470E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51352E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.13567E-11  8.05844E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.61476E-17  1.86320E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.28223E-10  6.64213E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88247E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71808E-20  2.68287E-18   94241   241.0569     pu241 9443
```

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endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08560E-20  7.83339E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  4.11692E-30  2.98302E-28   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.48604E-21  2.52590E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.74901E-21  7.09314E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.59990E-21  7.01342E-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
```

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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
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

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                                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
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                                        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:
  9305 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

                                                 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       ........

                                 ........     0.01583 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
0.01633 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 15709 independent fission points were generated for generation 1
          1       7.68758E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15853 independent fission points were generated for generation 2
```

```
          2       7.72622E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15677 independent fission points were generated for generation 3
          3       7.64144E-01      7.64144E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.72813E-01      7.68478E-01      4.33475E-03
0.00000E+00      0.00000E+00
          5       7.67159E-01      7.68038E-01      2.54104E-03
0.00000E+00      0.00000E+00
          6       7.60917E-01      7.66258E-01      2.52954E-03
0.00000E+00      0.00000E+00
          7       7.64278E-01      7.65862E-01      1.99899E-03
0.00000E+00      0.00000E+00
          8       7.64784E-01      7.65682E-01      1.64203E-03
0.00000E+00      0.00000E+00
          9       7.68399E-01      7.66070E-01      1.44100E-03
0.00000E+00      0.00000E+00
         10       7.72835E-01      7.66916E-01      1.50747E-03
0.00000E+00      0.00000E+00
         11       7.68638E-01      7.67107E-01      1.34316E-03
0.00000E+00      0.00000E+00
         12       7.69150E-01      7.67312E-01      1.21861E-03
0.00000E+00      0.00000E+00
         13       7.68580E-01      7.67427E-01      1.10829E-03
0.00000E+00      0.00000E+00
         14       7.68633E-01      7.67528E-01      1.01670E-03
0.00000E+00      0.00000E+00
         15       7.62257E-01      7.67122E-01      1.01933E-03
0.00000E+00      0.00000E+00
         16       7.70976E-01      7.67397E-01      9.83049E-04
0.00000E+00      0.00000E+00
         17       7.68121E-01      7.67446E-01      9.16441E-04
0.00000E+00      0.00000E+00
         18       7.65518E-01      7.67325E-01      8.65674E-04
0.00000E+00      0.00000E+00
         19       7.68710E-01      7.67407E-01      8.17227E-04
0.00000E+00      0.00000E+00
         20       7.71713E-01      7.67646E-01      8.06786E-04
0.00000E+00      0.00000E+00
         21       7.70079E-01      7.67774E-01      7.73817E-04
0.00000E+00      0.00000E+00
         22       7.61171E-01      7.67444E-01      8.04937E-04
0.00000E+00      0.00000E+00
         23       7.59878E-01      7.67084E-01      8.46183E-04
0.00000E+00      0.00000E+00
         24       7.66235E-01      7.67045E-01      8.07724E-04
0.00000E+00      0.00000E+00
         25       7.61038E-01      7.66784E-01      8.14797E-04
0.00000E+00      0.00000E+00
         26       7.65708E-01      7.66739E-01      7.81395E-04
0.00000E+00      0.00000E+00
```

27	7.61859E-01	7.63710E-01	5.51658E-03	0.00000E+00
28	7.70159E-01	7.65000E-01	4.18520E-03	0.00000E+00
29	7.66643E-01	7.65274E-01	2.72818E-03	0.00000E+00
30	7.61259E-01	7.64700E-01	1.53045E-03	0.00000E+00
31	7.61469E-01	7.64296E-01	1.37501E-03	0.00000E+00
32	7.62671E-01	7.64116E-01	1.20827E-03	0.00000E+00
33	7.69109E-01	7.64615E-01	1.20297E-03	0.00000E+00
34	7.63680E-01	7.64530E-01	1.08007E-03	0.00000E+00
35	7.67604E-01	7.64786E-01	1.01647E-03	0.00000E+00
36	7.63795E-01	7.64710E-01	9.31588E-04	0.00000E+00
37	7.68873E-01	7.65007E-01	1.04637E-03	0.00000E+00
38	7.68488E-01	7.65239E-01	9.70500E-04	0.00000E+00
39	7.67461E-01	7.65378E-01	9.63179E-04	0.00000E+00
40	7.62640E-01	7.65217E-01	8.67153E-04	0.00000E+00
41	7.56561E-01	7.64736E-01	1.00377E-03	0.00000E+00
42	7.62734E-01	7.64631E-01	1.01433E-03	0.00000E+00
43	7.65076E-01	7.64653E-01	9.53454E-04	0.00000E+00
44	7.64769E-01	7.64659E-01	9.01873E-04	0.00000E+00
45	7.63119E-01	7.64589E-01	8.57957E-04	0.00000E+00
46	7.63610E-01	7.64546E-01	8.21417E-04	0.00000E+00
47	7.65493E-01	7.64586E-01	7.81849E-04	0.00000E+00
48	7.65886E-01	7.64638E-01	7.52571E-04	0.00000E+00
49	7.65220E-01	7.64660E-01	7.22821E-04	0.00000E+00
50	7.62261E-01	7.64571E-01	6.96130E-04	0.00000E+00
51	7.63055E-01	7.64517E-01	6.79342E-04	0.00000E+00
52	7.64219E-01	7.64507E-01	6.54648E-04	0.00000E+00

53	7.67980E-01	7.64622E-01	6.41132E-04	0.00000E+00	0.00000E+00
54	7.66966E-01	7.64698E-01	6.39924E-04	0.00000E+00	0.00000E+00
55	7.67374E-01	7.64782E-01	6.36229E-04	0.00000E+00	0.00000E+00
56	7.66598E-01	7.64837E-01	6.26611E-04	0.00000E+00	0.00000E+00
57	7.67015E-01	7.64901E-01	6.17092E-04	0.00000E+00	0.00000E+00
58	7.58385E-01	7.64715E-01	6.07666E-04	0.00000E+00	0.00000E+00
59	7.67715E-01	7.64798E-01	5.66264E-04	0.00000E+00	0.00000E+00
60	7.69031E-01	7.64912E-01	5.81856E-04	0.00000E+00	0.00000E+00
61	7.61020E-01	7.64810E-01	5.52295E-04	0.00000E+00	0.00000E+00
62	7.66173E-01	7.64845E-01	5.31028E-04	0.00000E+00	0.00000E+00
63	7.63041E-01	7.64800E-01	5.15562E-04	0.00000E+00	0.00000E+00
64	7.70027E-01	7.64927E-01	4.98570E-04	0.00000E+00	0.00000E+00
65	7.59200E-01	7.64791E-01	5.05938E-04	0.00000E+00	0.00000E+00
66	7.59172E-01	7.64660E-01	5.11555E-04	0.00000E+00	0.00000E+00
67	7.70965E-01	7.64804E-01	5.20599E-04	0.00000E+00	0.00000E+00
68	7.69794E-01	7.64914E-01	5.21127E-04	0.00000E+00	0.00000E+00
69	7.68536E-01	7.64993E-01	5.40938E-04	0.00000E+00	0.00000E+00
70	7.68791E-01	7.65074E-01	5.48383E-04	0.00000E+00	0.00000E+00
71	7.64809E-01	7.65068E-01	5.35437E-04	0.00000E+00	0.00000E+00
72	7.65773E-01	7.65083E-01	5.23975E-04	0.00000E+00	0.00000E+00
73	7.61456E-01	7.65010E-01	5.16204E-04	0.00000E+00	0.00000E+00
74	7.65964E-01	7.65029E-01	5.03031E-04	0.00000E+00	0.00000E+00
75	7.64999E-01	7.65028E-01	4.92838E-04	0.00000E+00	0.00000E+00
76	7.66458E-01	7.65055E-01	4.83877E-04	0.00000E+00	0.00000E+00
77	7.62549E-01	7.65009E-01	4.74029E-04	0.00000E+00	0.00000E+00
78	7.59310E-01	7.64905E-01	4.87911E-04	0.00000E+00	0.00000E+00

```
         79       7.63599E-01      7.64882E-01      4.84765E-04
0.00000E+00      0.00000E+00
         80       7.64563E-01      7.64876E-01      4.76185E-04
0.00000E+00      0.00000E+00
         81       7.63627E-01      7.64855E-01      4.68384E-04
0.00000E+00      0.00000E+00
         82       7.67813E-01      7.64905E-01      4.60543E-04
0.00000E+00      0.00000E+00
         83       7.71237E-01      7.65011E-01      4.77613E-04
0.00000E+00      0.00000E+00
         84       7.66485E-01      7.65035E-01      4.75889E-04
0.00000E+00      0.00000E+00
         85       7.62076E-01      7.64987E-01      4.67810E-04
0.00000E+00      0.00000E+00
         86       7.66018E-01      7.65003E-01      4.58576E-04
0.00000E+00      0.00000E+00
         87       7.64924E-01      7.65002E-01      4.51064E-04
0.00000E+00      0.00000E+00
         88       7.67988E-01      7.65048E-01      4.46258E-04
0.00000E+00      0.00000E+00
         89       7.63751E-01      7.65028E-01      4.37487E-04
0.00000E+00      0.00000E+00
         90       7.65466E-01      7.65035E-01      4.30437E-04
0.00000E+00      0.00000E+00
         91       7.65462E-01      7.65041E-01      4.24015E-04
0.00000E+00      0.00000E+00
         92       7.67006E-01      7.65070E-01      4.19133E-04
0.00000E+00      0.00000E+00
         93       7.70573E-01      7.65148E-01      4.26426E-04
0.00000E+00      0.00000E+00
         94       7.64546E-01      7.65140E-01      4.18596E-04
0.00000E+00      0.00000E+00
         95       7.66756E-01      7.65162E-01      4.12737E-04
0.00000E+00      0.00000E+00
         96       7.62340E-01      7.65124E-01      4.06541E-04
0.00000E+00      0.00000E+00
         97       7.69653E-01      7.65185E-01      3.99579E-04
0.00000E+00      0.00000E+00
         98       7.71431E-01      7.65268E-01      4.16418E-04
0.00000E+00      0.00000E+00
         99       7.66188E-01      7.65280E-01      4.13520E-04
0.00000E+00      0.00000E+00
        100       7.67141E-01      7.65304E-01      4.09481E-04
0.00000E+00      0.00000E+00
        101       7.65765E-01      7.65310E-01      4.04471E-04
0.00000E+00      0.00000E+00
        102       7.75376E-01      7.65438E-01      4.21971E-04
0.00000E+00      0.00000E+00
        103       7.71141E-01      7.65509E-01      4.44938E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=C8CF63CA3D2DBA50
```

```
        104       7.59675E-01      7.65437E-01      4.33115E-04
0.00000E+00      0.00000E+00
        105       7.72212E-01      7.65520E-01      4.21401E-04
0.00000E+00      0.00000E+00
        106       7.63724E-01      7.65498E-01      4.12218E-04
0.00000E+00      0.00000E+00
        107       7.64087E-01      7.65481E-01      4.08450E-04
0.00000E+00      0.00000E+00
        108       7.68381E-01      7.65515E-01      4.03527E-04
0.00000E+00      0.00000E+00
        109       7.62524E-01      7.65481E-01      3.97149E-04
0.00000E+00      0.00000E+00
        110       7.73944E-01      7.65578E-01      3.96054E-04
0.00000E+00      0.00000E+00
        111       7.66705E-01      7.65591E-01      3.94961E-04
0.00000E+00      0.00000E+00
        112       7.68101E-01      7.65619E-01      3.92428E-04
0.00000E+00      0.00000E+00
        113       7.56311E-01      7.65515E-01      3.94420E-04
0.00000E+00      0.00000E+00
        114       7.55725E-01      7.65408E-01      4.32922E-04
0.00000E+00      0.00000E+00
        115       7.66273E-01      7.65417E-01      4.25715E-04
0.00000E+00      0.00000E+00
        116       7.68535E-01      7.65451E-01      4.23186E-04
0.00000E+00      0.00000E+00
        117       7.64809E-01      7.65444E-01      4.18042E-04
0.00000E+00      0.00000E+00
        118       7.66466E-01      7.65455E-01      4.13483E-04
0.00000E+00      0.00000E+00
        119       7.59163E-01      7.65389E-01      4.12705E-04
0.00000E+00      0.00000E+00
        120       7.65652E-01      7.65392E-01      4.07891E-04
0.00000E+00      0.00000E+00
        121       7.67486E-01      7.65413E-01      4.04361E-04
0.00000E+00      0.00000E+00
        122       7.58434E-01      7.65343E-01      4.02689E-04
0.00000E+00      0.00000E+00
        123       7.60330E-01      7.65293E-01      4.10871E-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=4D8E1711FA93D18E
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.55139E-05 + or -  1.17210E-08             generation time
=  2.99478E-05 + or -  2.27019E-08
 nu bar   =  2.43896E+00 + or -  9.65262E-06       average fission group
```

```
=  2.17554E+02 + or -  9.91806E-03
                      energy(ev) of the average lethargy causing fission
=  5.68083E-02 + or -  1.28800E-04
                                          system mean free path (cm)
=  6.52613E-01 + or -  1.81496E-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          0.76529   + or - 0.00041     0.76488 to 0.76570
0.76447 to 0.76611    0.76406 to 0.76653    2000000      12.4698

      24          0.76528   + or - 0.00042     0.76487 to 0.76570
0.76445 to 0.76612    0.76403 to 0.76653    1980000      12.3791

      25          0.76533   + or - 0.00042     0.76491 to 0.76574
0.76449 to 0.76616    0.76407 to 0.76658    1960000      12.5146

      26          0.76532   + or - 0.00042     0.76490 to 0.76575
0.76448 to 0.76617    0.76405 to 0.76659    1940000      12.4595

      27          0.76536   + or - 0.00043     0.76493 to 0.76579
0.76450 to 0.76622    0.76407 to 0.76665    1920000      12.3107

      28          0.76531   + or - 0.00043     0.76488 to 0.76574
0.76445 to 0.76617    0.76402 to 0.76660    1900000      12.5435

      29          0.76529   + or - 0.00044     0.76486 to 0.76573
0.76442 to 0.76617    0.76398 to 0.76660    1880000      12.4354

      30          0.76534   + or - 0.00043     0.76490 to 0.76577
0.76447 to 0.76621    0.76403 to 0.76664    1860000      12.8480

      31          0.76538   + or - 0.00043     0.76495 to 0.76581
0.76451 to 0.76625    0.76408 to 0.76668    1840000      13.1859

      32          0.76541   + or - 0.00044     0.76497 to 0.76585
0.76453 to 0.76629    0.76409 to 0.76673    1820000      13.0848

      37          0.76534   + or - 0.00046     0.76487 to 0.76580
0.76441 to 0.76627    0.76395 to 0.76673    1720000      13.1238

      42          0.76545   + or - 0.00046     0.76499 to 0.76591
0.76453 to 0.76636    0.76407 to 0.76682    1620000      14.4598

      47          0.76552   + or - 0.00049     0.76503 to 0.76600
0.76455 to 0.76649    0.76406 to 0.76697    1520000      14.5720
```

```
      52          0.76561   + or - 0.00051     0.76510 to 0.76613
0.76459 to 0.76664    0.76408 to 0.76715    1420000      14.9255

      57          0.76549   + or - 0.00055     0.76494 to 0.76605
0.76439 to 0.76660    0.76384 to 0.76715    1320000      14.7137

      62          0.76558   + or - 0.00059     0.76499 to 0.76617
0.76440 to 0.76676    0.76381 to 0.76735    1220000      14.7760

      67          0.76568   + or - 0.00061     0.76506 to 0.76629
0.76445 to 0.76690    0.76384 to 0.76751    1120000      16.0200

      72          0.76549   + or - 0.00065     0.76484 to 0.76615
0.76419 to 0.76680    0.76354 to 0.76745    1020000      16.8451

      77          0.76563   + or - 0.00071     0.76492 to 0.76633
0.76421 to 0.76704    0.76351 to 0.76774     920000      17.5778

      82          0.76585   + or - 0.00075     0.76510 to 0.76660
0.76435 to 0.76735    0.76360 to 0.76810     820000      19.5348

      87          0.76581   + or - 0.00084     0.76497 to 0.76665
0.76413 to 0.76749    0.76329 to 0.76833     720000      19.8873

      92          0.76579   + or - 0.00098     0.76481 to 0.76677
0.76383 to 0.76774    0.76285 to 0.76872     620000      19.2894

      97          0.76560   + or - 0.00121     0.76439 to 0.76681
0.76318 to 0.76802    0.76197 to 0.76923     520000      17.5740

     102          0.76475   + or - 0.00116     0.76359 to 0.76591
0.76242 to 0.76707    0.76126 to 0.76823     420000      23.5643

     107          0.76430   + or - 0.00158     0.76272 to 0.76588
0.76115 to 0.76746    0.75957 to 0.76904     320000      20.2360

     112          0.76265   + or - 0.00209     0.76056 to 0.76474
0.75847 to 0.76683    0.75638 to 0.76892     220000      11.1984
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          0.76292   + or - 0.00202     0.76090 to 0.76494
0.75888 to 0.76697    0.75685 to 0.76899     120000      15.0302
1                           fuel bundle
```

plot of average k-effective by generation run.

the line represents k-eff = 0.76561 + or - 0.00039 which occurs for 112 generations run.

```
                                0.7636                   0.7649
0.7662

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

```
I|
         |                                          I          *
I |
         |                                           I         *
I |
      75 +                                           I         *
I |
         |                                           I          *
I |
         |                                           I         *
I  |
         |                                         I         *         I
|
         |                                        I         *          I
|
      80 +                                        I         *          I
|
         |                                        I         *         I
|
         |                                         I         *         I
|
         |                                           I         *
I  |
         |                                           I         *
I |
      85 +                                          I         *         I
|
         |                                           I         *
I  |
         |                                           I         *        I
|
         |                                            I         *
I  |
         |                                            I        *
I  |
      90 +                                            I        *         I
|
         |                                            I         *
I  |
         |                                             I        *
I  |
         |                                               I        *
I|
         |                                               I        *
I |
      95 +                                                I        *
I|
         |                                               I        *
I |
         |                                                 I      *
I|
         |                                                  I       *
```

```
|I
         |                                                      I       *
|I
     100 +                                                     I       *
|I
         |                                                     I       *
|I
         |                                                       I       *
|   I
         |                                                       I
* |     I
         |                                                       I       *
|   I
     105 +                                                         I
* |     I
         |                                                       I
*  |    I
         |                                                       I
*  |    I
         |                                                         I
* |    I
         |                                                       I
*  |    I
     110 +                                                           I
*|     I
         |                                                           I
*|      I
         |                                                             I
*      I
         |                                                         I
* |    I
         |                                                     I         *
|   I
     115 +                                                       I       *
|   I
         |                                                       I       *
|    I
         |                                                       I       *
|   I
         |                                                       I      *
|   I
         |                                                     I       *
|  I
     120 +                                                     I       *
|  I
         |                                                       I       *
|  I
         |                                                     I      *
| I
         |                                                     I       *
|I
1                           fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7652 + or - 0.0004 which occurs for 23 generations skipped.

```
                                0.7594                    0.7626
0.7659

|-------------------------|------------------------|------------------
------|------------------------
         |
         |
I  *  I
         |
I  *  I
      25 +
I  *  I
         |
I  *  I
         |
I  *   I
         |
I  *  I
         |
I  *  I
      30 +
I  *   I
         |
I  |*  I
         |
I  |*  I
         |
I  *   I
         |
I  |*  I
      35 +
I  *   I
         |
I  |*  I
         |
I  *   I
         |
I   *   I
         |
I   *  I
      40 +
I   *   I
         |
I  |*  I
         |
I |*   I
         |
```

```
I |*   I
          |
I |*   I
      45 +
I |*   I
          |
I | *  I
          |
I | *  I
          |
I | *  I
          |
I | *  I
      50 +
I | *   I
          |
I | *   I
          |
I | *   I
          |
I | *   I
          |
I | *   I
      55 +
I | *   I
          |
I  | *   I
          |
I  |*    I
          |
I | *    I
          |
I | *   I
      60 +
I  | *   I
          |
I | *    I
          |
I | *    I
          |
I | *    I
          |
I  | *    I
      65 +
I |  *   I
          |
I|   *   I
          |
I |  *    I
          |
I | *    I
          |
```

```
I  | *    I
      70 +
I  |*    I
         |
I  |*    I
         |
I   |*    I
         |
I  | *    I
         |
I  | *    I
      75 +
I  | *    I
         |
I   | *    I
         |
I  | *     I
         |
I |  *     I
         |
I |   *    I
      80 +
I|   *     I
         |
I|    *    I
         |
I |   *     I
         |
I  |  *     I
         |
I  |  *     I
      85 +
I |   *     I
         |
I  |   *     I
         |
I  |   *     I
         |
I  |  *      I
         |
I  |   *      I
         |
I  |   *      I
      90 +
I  |   *      I
         |
I  |   *      I
         |
I   |   *      I
         |
I     | *        I
         |
I     |  *       I
      95 +
```

```
I     | *        I
         |
I     |  *         I
         |
I      | *         I
         |
I        *         I
         |
I        *        I
     100 +                                                          I
*        I
         |                                                         I
*|         I
         |                                                        I
*   |    I
         |                                                     I
*      | I
         |                                                      I
*    |     I
     105 +                                                 I
*       | I
         |                                                 I
*       |  I
         |                                               I
*       |   I
         |                                            I
*         |  I
         |                                          I
*        |     I
     110 +                                        I            *
I |
         |                                      I            *
I   |
         |                                  I               *
I   |
         |                                        I           *
I  |
         |                              I
*        |                    I
     115 +                                          I            *
|I
         |                                        I            *
I  |
         |                                    I               *
I  |
         |                              I                  *
I     |
         |        I                                         *
|                        I
     120 +         I                                  *
|           I
```

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

skipping 23 generations

group	fission fraction	unit absorptions	percent deviation	region fissions	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	4.39985E-07	57.8858	9.05951E-07	78.4070	0.00000E+00	0.0000
3	0.0000	2.10502E-05	5.0553	1.41529E-05	10.8555	0.00000E+00	0.0000
4	0.0000	3.34291E-05	3.7633	1.87337E-05	9.4929	0.00000E+00	0.0000
5	0.0000	5.48413E-05	3.2072	2.67234E-05	6.6362	0.00000E+00	0.0000
6	0.0001	2.27661E-04	1.5794	9.69671E-05	3.4103	0.00000E+00	0.0000
7	0.0002	2.13716E-04	1.3443	1.22350E-04	3.2056	0.00000E+00	0.0000
8	0.0003	3.25930E-04	0.9379	2.55323E-04	2.2158	0.00000E+00	0.0000
9	0.0005	4.43355E-04	0.5969	3.85340E-04	1.3245	0.00000E+00	0.0000
10	0.0003	2.08022E-04	0.6783	2.02142E-04	1.3766	0.00000E+00	0.0000
11	0.0012	5.23806E-04	0.5058	9.08503E-04	0.7547	0.00000E+00	0.0000
12	0.0010	2.98048E-04	0.7635	7.60294E-04	0.7758	0.00000E+00	0.0000
13	0.0003	9.23931E-05	1.3401	2.32624E-04	1.3533	0.00000E+00	0.0000
14	0.0013	4.16921E-04	0.5878	1.02009E-03	0.5938	0.00000E+00	0.0000
15	0.0010	3.28584E-04	0.7047	7.62121E-04	0.7129	0.00000E+00	0.0000
16	0.0002	8.48733E-05	1.0446	1.84655E-04	1.0621	0.00000E+00	0.0000
17	0.0001	3.19032E-05	1.6908	6.55765E-05	1.7223	0.00000E+00	0.0000
18	0.0001	2.61534E-05	1.7675	5.17672E-05	1.8005	0.00000E+00	0.0000
19	0.0001	4.12560E-05	1.3436	7.79808E-05	1.3753	0.00000E+00	0.0000
20	0.0001	3.25816E-05	1.5211	5.94671E-05	1.5568	0.00000E+00	0.0000
21	0.0002	6.68720E-05	1.1492	1.18398E-04	1.1752	0.00000E+00	0.0000

22	0.0001	1.04592E-04	1.2206	6.19309E-05	1.1903
0.00000E+00	0.0000				
23	0.0001	1.07623E-04	1.2472	6.57103E-05	1.2175
0.00000E+00	0.0000				
24	0.0000	2.50785E-05	2.1429	1.55606E-05	2.0928
0.00000E+00	0.0000				
25	0.0000	3.15448E-05	1.8685	1.96862E-05	1.8199
0.00000E+00	0.0000				
26	0.0000	1.75743E-05	2.3745	1.10357E-05	2.3128
0.00000E+00	0.0000				
27	0.0001	5.43063E-05	1.2496	3.38798E-05	1.2255
0.00000E+00	0.0000				
28	0.0001	9.67471E-05	0.9777	6.03451E-05	0.9623
0.00000E+00	0.0000				
29	0.0001	9.75865E-05	1.0901	6.14872E-05	1.0762
0.00000E+00	0.0000				
30	0.0000	1.28783E-05	2.8948	8.07765E-06	2.8740
0.00000E+00	0.0000				
31	0.0001	9.77342E-05	0.9099	6.17448E-05	0.8992
0.00000E+00	0.0000				
32	0.0001	3.85439E-05	1.7189	2.46390E-05	1.6812
0.00000E+00	0.0000				
33	0.0000	3.25998E-05	1.6871	2.04120E-05	1.6671
0.00000E+00	0.0000				
34	0.0001	7.36790E-05	1.2005	4.62933E-05	1.1810
0.00000E+00	0.0000				
35	0.0001	4.46178E-05	1.5868	2.80085E-05	1.5653
0.00000E+00	0.0000				
36	0.0001	4.33030E-05	1.3880	2.68046E-05	1.3753
0.00000E+00	0.0000				
37	0.0000	2.79973E-05	1.8640	1.75772E-05	1.8238
0.00000E+00	0.0000				
38	0.0000	3.47794E-05	1.6305	2.18943E-05	1.5940
0.00000E+00	0.0000				
39	0.0002	1.29268E-04	1.0250	8.22276E-05	1.0017
0.00000E+00	0.0000				
40	0.0002	1.21288E-04	0.8483	7.83882E-05	0.8311
0.00000E+00	0.0000				
41	0.0002	1.61019E-04	0.7771	1.07552E-04	0.7499
0.00000E+00	0.0000				
42	0.0002	1.38559E-04	0.7169	9.42468E-05	0.7008
0.00000E+00	0.0000				
43	0.0001	8.03847E-05	1.0071	5.77012E-05	0.9609
0.00000E+00	0.0000				
44	0.0002	1.15413E-04	1.1007	8.47182E-05	1.0521
0.00000E+00	0.0000				
45	0.0001	5.84355E-05	0.9214	4.71961E-05	0.8465
0.00000E+00	0.0000				
46	0.0000	1.40568E-05	2.0301	1.13121E-05	1.9019
0.00000E+00	0.0000				
47	0.0001	4.11518E-05	1.5478	3.19439E-05	1.4965
0.00000E+00	0.0000				

```
   48    0.0000                 1.11595E-05     3.9523
8.67730E-06     3.8310       0.00000E+00     0.0000
   49    0.0001                 8.17044E-05     1.4734
6.43991E-05     1.4424       0.00000E+00     0.0000
   50    0.0001                 5.71271E-05     1.9092
4.70279E-05     1.8766       0.00000E+00     0.0000
   51    0.0000                 1.46807E-05     3.5095
1.22079E-05     3.4370       0.00000E+00     0.0000
   52    0.0001                 4.02337E-05     1.9599
3.47959E-05     1.9078       0.00000E+00     0.0000
   53    0.0002                 1.58725E-04     0.7611
1.55854E-04     0.7134       0.00000E+00     0.0000
   54    0.0001                 7.59993E-05     1.8329
7.05401E-05     1.7712       0.00000E+00     0.0000
   55    0.0002                 1.65250E-04     1.2685
1.51459E-04     1.2362       0.00000E+00     0.0000
   56    0.0002                 1.19730E-04     1.5944
1.11003E-04     1.5555       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                 1.49668E-04     1.5498
1.35809E-04     1.5136       0.00000E+00     0.0000
   58    0.0001                 8.71766E-05     1.8197
7.63152E-05     1.7682       0.00000E+00     0.0000
   59    0.0002                 1.65060E-04     1.4862
1.47946E-04     1.4320       0.00000E+00     0.0000
   60    0.0004                 2.73276E-04     1.2110
2.47823E-04     1.1509       0.00000E+00     0.0000
   61    0.0000                 2.72073E-05     4.0616
2.09463E-05     3.9267       0.00000E+00     0.0000
   62    0.0002                 1.64543E-04     1.7530
1.37981E-04     1.7079       0.00000E+00     0.0000
   63    0.0002                 1.22489E-04     1.8910
1.00804E-04     1.8297       0.00000E+00     0.0000
   64    0.0001                 9.93955E-05     2.4258
8.01312E-05     2.3464       0.00000E+00     0.0000
   65    0.0000                 3.28929E-05     3.4979
3.25581E-05     3.3741       0.00000E+00     0.0000
   66    0.0002                 1.72669E-04     1.9798
1.53212E-04     1.9183       0.00000E+00     0.0000
   67    0.0002                 1.42883E-04     2.2734
1.16998E-04     2.1982       0.00000E+00     0.0000
   68    0.0000                 2.78502E-05     4.0877
2.40646E-05     3.9480       0.00000E+00     0.0000
   69    0.0004                 3.03238E-04     1.5351
```

2.37911E-04	1.4869	0.00000E+00	0.0000	70	0.0003	2.12438E-04	1.8755
1.93135E-04	1.8042	0.00000E+00	0.0000	71	0.0006	4.37394E-04	1.4239
3.61718E-04	1.3816	0.00000E+00	0.0000	72	0.0001	4.82798E-05	5.4037
2.85264E-05	5.2688	0.00000E+00	0.0000	73	0.0004	3.13989E-04	1.7483
2.39955E-04	1.6464	0.00000E+00	0.0000	74	0.0014	1.04346E-03	1.1586
7.59137E-04	1.1089	0.00000E+00	0.0000	75	0.0001	1.08205E-04	2.9304
8.32730E-05	2.7902	0.00000E+00	0.0000	76	0.0006	4.56754E-04	1.7066
2.90177E-04	1.6471	0.00000E+00	0.0000	77	0.0005	3.83001E-04	1.7933
2.74336E-04	1.7272	0.00000E+00	0.0000	78	0.0000	7.39494E-06	3.7910
7.23360E-05	3.7496	0.00000E+00	0.0000	79	0.0002	1.86296E-04	2.4073
1.25278E-04	2.3166	0.00000E+00	0.0000	80	0.0001	6.21232E-05	3.6655
8.28072E-05	3.5636	0.00000E+00	0.0000	81	0.0014	1.06821E-03	1.1375
7.85464E-04	1.0896	0.00000E+00	0.0000	82	0.0001	6.64866E-05	4.8988
3.99019E-05	4.6399	0.00000E+00	0.0000	83	0.0002	1.25044E-04	3.1770
1.38387E-04	3.1157	0.00000E+00	0.0000	84	0.0001	7.50672E-05	2.9942
7.65092E-05	2.7633	0.00000E+00	0.0000	85	0.0002	1.89556E-04	2.3580
2.33721E-04	2.2894	0.00000E+00	0.0000	86	0.0003	2.64201E-04	2.4542
2.12730E-04	2.3308	0.00000E+00	0.0000	87	0.0004	3.36217E-04	2.5045
2.09180E-04	2.3949	0.00000E+00	0.0000	88	0.0001	5.27256E-05	4.0663
9.58097E-05	3.9635	0.00000E+00	0.0000	89	0.0001	9.23438E-05	3.9977
6.41287E-05	3.6771	0.00000E+00	0.0000	90	0.0003	2.27650E-04	3.1531
1.34332E-04	3.0228	0.00000E+00	0.0000	91	0.0002	1.82791E-04	2.8773
1.15880E-04	2.7016	0.00000E+00	0.0000	92	0.0000	2.96454E-05	2.7385
1.94190E-04	2.6788	0.00000E+00	0.0000	93	0.0002	1.25996E-04	3.0315
1.02571E-04	2.8292	0.00000E+00	0.0000	94	0.0002	1.20258E-04	3.7286
6.71494E-05	3.5219	0.00000E+00	0.0000	95	0.0008	6.00624E-04	2.4697

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3.70618E-04     2.3909       0.00000E+00     0.0000
   96    0.0002                 1.45316E-04     3.9283
7.38194E-05     3.7584       0.00000E+00     0.0000
   97    0.0004                 2.88918E-04     3.6829
1.65321E-04     3.6080       0.00000E+00     0.0000
   98    0.0001                 1.00657E-04     3.8663
9.66592E-05     3.7249       0.00000E+00     0.0000
   99    0.0001                 1.00671E-04     5.0936
6.75526E-05     4.9111       0.00000E+00     0.0000
  100    0.0002                 1.24395E-04     3.8815
8.33377E-05     3.7005       0.00000E+00     0.0000
  101    0.0002                 1.15067E-04     3.6872
7.29677E-05     3.4318       0.00000E+00     0.0000
  102    0.0002                 1.53245E-04     4.1985
8.55790E-05     4.0232       0.00000E+00     0.0000
  103    0.0001                 9.12214E-05     4.1208
8.92658E-05     3.8925       0.00000E+00     0.0000
  104    0.0002                 1.73388E-04     2.9559
1.37312E-04     2.8578       0.00000E+00     0.0000
  105    0.0002                 1.26080E-04     3.5660
8.32792E-05     3.3542       0.00000E+00     0.0000
  106    0.0002                 1.73013E-04     4.2077
1.28621E-04     4.1494       0.00000E+00     0.0000
  107    0.0001                 6.21673E-05     3.7805
6.29146E-05     3.5412       0.00000E+00     0.0000
  108    0.0000                 3.54638E-05     2.6057
1.53111E-04     2.5414       0.00000E+00     0.0000
  109    0.0002                 1.26411E-04     2.3267
4.19629E-04     2.2927       0.00000E+00     0.0000
  110    0.0008                 6.24970E-04     3.2468
3.85628E-04     3.2168       0.00000E+00     0.0000
  111    0.0002                 1.61948E-04     4.4325
1.48648E-04     4.3241       0.00000E+00     0.0000
  112    0.0002                 1.21446E-04     4.4888
1.27917E-04     4.4125       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                 1.30611E-04     3.3868
1.14005E-04     3.1751       0.00000E+00     0.0000
  114    0.0000                 1.16542E-05     7.6346
1.57754E-05     6.4222       0.00000E+00     0.0000
  115    0.0001                 7.20750E-05     3.9955
8.38440E-05     3.6744       0.00000E+00     0.0000
  116    0.0003                 1.91839E-04     2.8357
1.44495E-04     2.5527       0.00000E+00     0.0000
```

117	0.0006	4.72657E-04	2.3354	2.52830E-04	2.1815
0.00000E+00	0.0000				
118	0.0008	5.74296E-04	2.1291	4.48765E-04	2.0443
0.00000E+00	0.0000				
119	0.0002	1.37129E-04	2.1506	3.54179E-04	2.0774
0.00000E+00	0.0000				
120	0.0002	1.66713E-04	2.1394	6.34510E-04	2.1114
0.00000E+00	0.0000				
121	0.0007	5.31663E-04	2.6577	4.08806E-04	2.5949
0.00000E+00	0.0000				
122	0.0001	1.03333E-04	4.7862	8.06825E-05	4.4668
0.00000E+00	0.0000				
123	0.0003	2.25677E-04	3.1158	1.59132E-04	2.7699
0.00000E+00	0.0000				
124	0.0003	2.27202E-04	2.6946	1.87870E-04	2.5142
0.00000E+00	0.0000				
125	0.0002	1.36780E-04	3.5521	1.26090E-04	3.1991
0.00000E+00	0.0000				
126	0.0001	1.03617E-04	3.2794	9.25844E-05	2.8846
0.00000E+00	0.0000				
127	0.0005	4.13979E-04	3.1353	2.02881E-04	2.9740
0.00000E+00	0.0000				
128	0.0003	2.10600E-04	3.1298	1.30608E-04	2.7738
0.00000E+00	0.0000				
129	0.0006	4.58624E-04	2.2001	4.21899E-04	2.1029
0.00000E+00	0.0000				
130	0.0002	1.18004E-04	2.9389	2.87734E-04	2.8526
0.00000E+00	0.0000				
131	0.0004	2.92826E-04	2.3365	2.35392E-04	1.9858
0.00000E+00	0.0000				
132	0.0007	5.34969E-04	2.0787	3.28086E-04	1.9158
0.00000E+00	0.0000				
133	0.0014	1.05180E-03	1.8921	6.64642E-04	1.7971
0.00000E+00	0.0000				
134	0.0001	9.34462E-05	2.0932	2.42420E-04	1.7744
0.00000E+00	0.0000				
135	0.0002	1.72561E-04	3.2418	2.55924E-04	3.1566
0.00000E+00	0.0000				
136	0.0001	4.54778E-05	1.8906	7.05843E-04	1.8611
0.00000E+00	0.0000				
137	0.0000	1.96836E-05	0.9116	3.54157E-03	0.9092
0.00000E+00	0.0000				
138	0.0004	3.14249E-04	2.0723	8.18491E-04	2.0419
0.00000E+00	0.0000				
139	0.0002	1.86583E-04	3.6465	2.28766E-04	3.4256
0.00000E+00	0.0000				
140	0.0003	2.11655E-04	2.2504	2.81454E-04	1.9568
0.00000E+00	0.0000				
141	0.0001	8.23764E-05	2.5238	2.59103E-04	2.2505
0.00000E+00	0.0000				
142	0.0001	6.98321E-05	3.1129	2.40390E-04	2.8743
0.00000E+00	0.0000				

143	0.0001	8.30060E-05	2.1056	1.77095E-04	1.3275
0.00000E+00	0.0000				
144	0.0000	3.32636E-05	3.3173	7.30120E-05	2.0140
0.00000E+00	0.0000				
145	0.0005	3.75883E-04	2.5324	2.95599E-04	2.2885
0.00000E+00	0.0000				
146	0.0004	3.33429E-04	2.4386	2.45240E-04	1.9803
0.00000E+00	0.0000				
147	0.0002	1.64131E-04	4.0912	1.06272E-04	3.4835
0.00000E+00	0.0000				
148	0.0001	6.38905E-05	6.2026	4.21033E-05	5.0481
0.00000E+00	0.0000				
149	0.0000	2.87820E-05	8.7004	2.03108E-05	6.6208
0.00000E+00	0.0000				
150	0.0001	9.31283E-05	4.5775	6.68116E-05	3.4598
0.00000E+00	0.0000				
151	0.0001	6.61511E-05	4.4722	5.59925E-05	3.1204
0.00000E+00	0.0000				
152	0.0001	4.26872E-05	4.5172	4.79197E-05	2.7585
0.00000E+00	0.0000				
153	0.0001	3.98688E-05	4.1087	4.55892E-05	2.3749
0.00000E+00	0.0000				
154	0.0001	4.59928E-05	4.4365	4.88275E-05	2.6104
0.00000E+00	0.0000				
155	0.0001	4.68425E-05	4.7692	4.74573E-05	2.8045
0.00000E+00	0.0000				
156	0.0001	4.70857E-05	4.3893	4.60829E-05	2.7039
0.00000E+00	0.0000				
157	0.0001	6.04014E-05	3.7458	5.86505E-05	2.3052
0.00000E+00	0.0000				
158	0.0001	6.60693E-05	3.7197	6.74098E-05	2.3711
0.00000E+00	0.0000				
159	0.0002	1.46939E-04	2.7309	2.04835E-04	2.2746
0.00000E+00	0.0000				
160	0.0001	6.25776E-05	4.2854	7.38810E-05	3.2599
0.00000E+00	0.0000				
161	0.0001	8.01908E-05	3.8768	7.64461E-05	2.6697
0.00000E+00	0.0000				
162	0.0001	8.87280E-05	3.8120	8.27694E-05	2.3738
0.00000E+00	0.0000				
163	0.0001	9.48040E-05	3.4581	8.77949E-05	2.1568
0.00000E+00	0.0000				
164	0.0001	9.46881E-05	3.3291	9.07154E-05	1.9624
0.00000E+00	0.0000				
165	0.0002	1.15900E-04	2.9885	1.05880E-04	1.8777
0.00000E+00	0.0000				
166	0.0001	7.26864E-05	4.7019	6.53923E-05	3.0467
0.00000E+00	0.0000				
167	0.0001	7.67539E-05	4.3969	6.96791E-05	2.8348
0.00000E+00	0.0000				
168	0.0001	9.27941E-05	4.0072	8.09132E-05	2.7565
0.00000E+00	0.0000				

1 fuel bundle

skipping 23 generations

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

  169    0.0001                 1.10617E-04     4.5679
9.52233E-05     3.2800       0.00000E+00     0.0000
  170    0.0002                 1.34322E-04     3.7135
1.14645E-04     2.7729       0.00000E+00     0.0000
  171    0.0001                 9.78931E-05     4.5323
7.57376E-05     3.5882       0.00000E+00     0.0000
  172    0.0002                 1.44728E-04     4.5767
1.01925E-04     3.8660       0.00000E+00     0.0000
  173    0.0002                 1.73526E-04     4.1006
1.15914E-04     3.5247       0.00000E+00     0.0000
  174    0.0003                 2.51885E-04     3.8491
1.56249E-04     3.4243       0.00000E+00     0.0000
  175    0.0001                 1.12376E-04     6.2881
6.77964E-05     5.6609       0.00000E+00     0.0000
  176    0.0002                 1.15787E-04     5.5954
6.90116E-05     5.0530       0.00000E+00     0.0000
  177    0.0002                 1.24191E-04     5.9532
7.31758E-05     5.3701       0.00000E+00     0.0000
  178    0.0001                 1.14755E-04     5.9769
6.72340E-05     5.3808       0.00000E+00     0.0000
  179    0.0002                 1.22117E-04     5.9625
7.08034E-05     5.3613       0.00000E+00     0.0000
  180    0.0001                 1.12419E-04     6.2592
6.53691E-05     5.5272       0.00000E+00     0.0000
  181    0.0001                 1.02906E-04     6.2604
6.00266E-05     5.4936       0.00000E+00     0.0000
  182    0.0001                 1.01779E-04     6.1294
5.94504E-05     5.3754       0.00000E+00     0.0000
  183    0.0001                 9.81747E-05     6.2984
5.74298E-05     5.4762       0.00000E+00     0.0000
  184    0.0001                 9.64977E-05     6.5197
5.60529E-05     5.6056       0.00000E+00     0.0000
  185    0.0001                 9.65203E-05     5.5955
5.61356E-05     4.8092       0.00000E+00     0.0000
  186    0.0001                 9.04292E-05     6.2553
5.28280E-05     5.3631       0.00000E+00     0.0000
  187    0.0001                 8.86777E-05     6.3707
5.18924E-05     5.3943       0.00000E+00     0.0000
  188    0.0001                 8.60544E-05     6.8937
5.08743E-05     5.7824       0.00000E+00     0.0000
  189    0.0001                 9.12925E-05     5.9496
5.33989E-05     5.0313       0.00000E+00     0.0000
  190    0.0003                 2.02822E-04     4.7691
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1.21518E-04	3.9070	0.00000E+00	0.0000	191	0.0003	1.94621E-04	4.1461
1.17999E-04	3.3439	0.00000E+00	0.0000	192	0.0003	1.93268E-04	3.9358
1.17593E-04	3.1254	0.00000E+00	0.0000	193	0.0003	1.95707E-04	3.9604
1.19459E-04	3.1455	0.00000E+00	0.0000	194	0.0005	3.92885E-04	2.6526
2.43110E-04	2.1004	0.00000E+00	0.0000	195	0.0005	4.05367E-04	2.7912
2.54551E-04	2.1599	0.00000E+00	0.0000	196	0.0006	4.59862E-04	2.7486
2.85884E-04	2.1473	0.00000E+00	0.0000	197	0.0007	5.16709E-04	2.4636
3.21591E-04	1.9313	0.00000E+00	0.0000	198	0.0007	5.60456E-04	2.3007
3.49433E-04	1.7897	0.00000E+00	0.0000	199	0.0004	3.37325E-04	2.7225
2.06213E-04	2.1872	0.00000E+00	0.0000	200	0.0005	3.58974E-04	3.4731
2.20863E-04	2.7492	0.00000E+00	0.0000	201	0.0010	7.80722E-04	2.1011
4.78333E-04	1.6772	0.00000E+00	0.0000	202	0.0013	9.78783E-04	1.8643
5.94216E-04	1.4928	0.00000E+00	0.0000	203	0.0015	1.18291E-03	1.8095
7.11477E-04	1.4873	0.00000E+00	0.0000	204	0.0022	1.67609E-03	1.3636
9.84941E-04	1.1389	0.00000E+00	0.0000	205	0.0015	1.12246E-03	2.0710
6.60019E-04	1.7525	0.00000E+00	0.0000	206	0.0018	1.38558E-03	1.8312
8.06854E-04	1.5825	0.00000E+00	0.0000	207	0.0022	1.65211E-03	1.7137
9.59522E-04	1.4980	0.00000E+00	0.0000	208	0.0029	2.21584E-03	1.4299
1.28865E-03	1.2686	0.00000E+00	0.0000	209	0.0031	2.37220E-03	1.3243
1.39447E-03	1.1797	0.00000E+00	0.0000	210	0.0038	2.87306E-03	1.3663
1.70840E-03	1.1870	0.00000E+00	0.0000	211	0.0041	3.13044E-03	1.4440
1.88859E-03	1.2428	0.00000E+00	0.0000	212	0.0047	3.56813E-03	1.1829
2.16453E-03	1.0093	0.00000E+00	0.0000	213	0.0065	4.94496E-03	0.9500
2.99726E-03	0.8072	0.00000E+00	0.0000	214	0.0096	7.33478E-03	0.8265
4.42012E-03	0.6991	0.00000E+00	0.0000	215	0.0158	1.20868E-02	0.6095
7.21274E-03	0.5106	0.00000E+00	0.0000	216	0.0301	2.30183E-02	0.4559

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1.35839E-02     0.3859       0.00000E+00     0.0000
  217    0.0201                 1.53899E-02     0.5638
9.05030E-03     0.4713       0.00000E+00     0.0000
  218    0.0276                 2.11320E-02     0.4321
1.23769E-02     0.3650       0.00000E+00     0.0000
  219    0.0355                 2.71784E-02     0.3410
1.58719E-02     0.2931       0.00000E+00     0.0000
  220    0.0475                 3.63135E-02     0.3643
2.11113E-02     0.3109       0.00000E+00     0.0000
  221    0.0626                 4.79374E-02     0.3441
2.77891E-02     0.2952       0.00000E+00     0.0000
  222    0.0803                 6.14604E-02     0.3039
3.56021E-02     0.2621       0.00000E+00     0.0000
  223    0.1042                 7.97460E-02     0.2324
4.62751E-02     0.1979       0.00000E+00     0.0000
  224    0.0584                 4.46808E-02     0.3143
2.60212E-02     0.2643       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                 1.76340E-01     0.1464
1.04484E-01     0.1247       0.00000E+00     0.0000
  226    0.0451                 3.45066E-02     0.4050
2.10383E-02     0.3288       0.00000E+00     0.0000
  227    0.0493                 3.77020E-02     0.3381
2.33906E-02     0.2678       0.00000E+00     0.0000
  228    0.0211                 1.61514E-02     0.5886
1.02169E-02     0.4812       0.00000E+00     0.0000
  229    0.0224                 1.71087E-02     0.5531
1.09940E-02     0.4259       0.00000E+00     0.0000
  230    0.0118                 9.03055E-03     0.7572
5.89170E-03     0.5974       0.00000E+00     0.0000
  231    0.0122                 9.34657E-03     0.8125
6.21714E-03     0.6346       0.00000E+00     0.0000
  232    0.0130                 9.92928E-03     0.7577
6.76749E-03     0.5608       0.00000E+00     0.0000
  233    0.0082                 6.27917E-03     0.8946
4.42148E-03     0.6636       0.00000E+00     0.0000
  234    0.0060                 4.58783E-03     1.2504
3.30171E-03     0.8756       0.00000E+00     0.0000
  235    0.0025                 1.87946E-03     1.6562
1.24414E-03     1.2606       0.00000E+00     0.0000
  236    0.0020                 1.50309E-03     1.9981
1.00207E-03     1.5176       0.00000E+00     0.0000
  237    0.0017                 1.33832E-03     2.0842
9.45280E-04     1.4790       0.00000E+00     0.0000
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  238    0.0001                 6.56942E-05     8.3145
5.85984E-05     4.7233       0.00000E+00     0.0000

 system total =                 7.65293E-01     0.0491
4.68740E-01     0.0410       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3122E-01  +
or -  0.0002



 elapsed time   3.10883 minutes

 random number=   BBB04A884F65EC4F
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.087E-03
0.05         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     flux     percent     flux     percent
                 deviation            deviation            deviation
    1   0.000E+00    0.00   0.000E+00    0.00   0.000E+00    0.00
    2   2.059E-08   25.11   1.319E-08   23.36   1.535E-08   23.56
    3   9.311E-07    4.29   7.692E-07    3.91   8.242E-07    3.90
    4   1.442E-06    3.19   1.177E-06    2.79   1.267E-06    2.85
    5   2.316E-06    2.24   1.903E-06    2.08   2.042E-06    2.17
    6   9.667E-06    1.17   7.642E-06    0.96   8.211E-06    0.96
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7	1.270E-05	1.09	9.646E-06	0.90	1.023E-05	0.94
8	3.112E-05	0.68	2.273E-05	0.62	2.397E-05	0.62
9	8.240E-05	0.54	5.883E-05	0.42	6.153E-05	0.43
10	4.688E-05	0.65	3.310E-05	0.53	3.435E-05	0.54
11	2.206E-04	0.27	1.558E-04	0.23	1.615E-04	0.21
12	1.897E-04	0.31	1.378E-04	0.27	1.444E-04	0.26
13	5.685E-05	0.55	4.153E-05	0.46	4.352E-05	0.44
14	2.533E-04	0.27	1.835E-04	0.25	1.917E-04	0.25
15	2.201E-04	0.26	1.597E-04	0.20	1.666E-04	0.19
16	7.120E-05	0.46	5.153E-05	0.38	5.388E-05	0.38
17	3.240E-05	0.73	2.360E-05	0.64	2.445E-05	0.63
18	2.775E-05	0.81	2.017E-05	0.60	2.091E-05	0.62
19	4.984E-05	0.53	3.660E-05	0.48	3.811E-05	0.47
20	3.997E-05	0.65	2.942E-05	0.58	3.068E-05	0.54
21	8.063E-05	0.38	5.894E-05	0.33	6.151E-05	0.32
22	7.312E-05	0.43	5.345E-05	0.34	5.521E-05	0.33
23	7.724E-05	0.39	5.627E-05	0.29	5.849E-05	0.25
24	1.867E-05	0.75	1.381E-05	0.72	1.439E-05	0.63
25	2.357E-05	0.80	1.725E-05	0.60	1.814E-05	0.56
26	1.367E-05	0.94	1.001E-05	0.77	1.056E-05	0.73
27	4.187E-05	0.51	3.110E-05	0.45	3.294E-05	0.43
28	7.723E-05	0.35	5.744E-05	0.33	6.064E-05	0.32
29	7.941E-05	0.37	5.956E-05	0.35	6.230E-05	0.33
30	1.022E-05	1.08	7.588E-06	0.82	7.941E-06	0.74
31	7.872E-05	0.40	5.894E-05	0.35	6.184E-05	0.35
32	3.111E-05	0.61	2.342E-05	0.52	2.468E-05	0.50
33	2.657E-05	0.66	2.016E-05	0.57	2.127E-05	0.53
34	6.055E-05	0.44	4.567E-05	0.38	4.805E-05	0.36
35	3.641E-05	0.62	2.748E-05	0.48	2.881E-05	0.48
36	3.404E-05	0.57	2.568E-05	0.46	2.683E-05	0.44
37	2.212E-05	0.74	1.670E-05	0.53	1.734E-05	0.51
38	2.599E-05	0.62	1.979E-05	0.50	2.079E-05	0.48
39	9.732E-05	0.34	7.455E-05	0.32	7.871E-05	0.28
40	9.019E-05	0.31	6.942E-05	0.27	7.395E-05	0.24
41	1.133E-04	0.28	8.843E-05	0.27	9.458E-05	0.26
42	9.322E-05	0.33	7.355E-05	0.28	7.889E-05	0.26
43	5.098E-05	0.40	4.059E-05	0.32	4.283E-05	0.28
44	6.995E-05	0.41	5.598E-05	0.34	6.011E-05	0.30
45	3.498E-05	0.40	2.787E-05	0.41	3.106E-05	0.34
46	8.287E-06	1.01	6.629E-06	0.79	7.197E-06	0.66
47	2.361E-05	0.64	1.866E-05	0.51	1.947E-05	0.48
48	6.655E-06	0.99	5.331E-06	0.97	5.633E-06	0.82
49	4.352E-05	0.42	3.499E-05	0.39	3.758E-05	0.35
50	2.943E-05	0.50	2.362E-05	0.47	2.572E-05	0.40
51	7.817E-06	0.95	6.273E-06	0.77	6.830E-06	0.72
52	2.069E-05	0.58	1.663E-05	0.49	1.810E-05	0.39
53	7.594E-05	0.31	6.129E-05	0.27	6.653E-05	0.21
54	3.333E-05	0.47	2.694E-05	0.39	2.918E-05	0.33
55	6.661E-05	0.31	5.391E-05	0.29	5.881E-05	0.24
56	4.360E-05	0.34	3.542E-05	0.33	3.863E-05	0.26
57	4.956E-05	0.35	4.025E-05	0.33	4.387E-05	0.25
58	2.604E-05	0.51	2.123E-05	0.45	2.306E-05	0.41

59	4.425E-05	0.34	3.609E-05	0.31	3.937E-05	0.25
60	6.452E-05	0.30	5.277E-05	0.27	5.740E-05	0.24
61	6.209E-06	0.93	5.060E-06	0.85	5.496E-06	0.76
62	3.234E-05	0.44	2.648E-05	0.39	2.891E-05	0.30
63	2.178E-05	0.57	1.787E-05	0.51	1.941E-05	0.38
64	1.725E-05	0.53	1.407E-05	0.46	1.527E-05	0.43
65	5.620E-06	0.93	4.656E-06	0.85	5.028E-06	0.69
66	2.862E-05	0.48	2.355E-05	0.42	2.557E-05	0.36
67	2.135E-05	0.55	1.754E-05	0.47	1.900E-05	0.36
68	4.764E-06	1.08	3.903E-06	0.97	4.219E-06	0.79
69	3.721E-05	0.35	3.068E-05	0.32	3.338E-05	0.26
70	2.678E-05	0.47	2.201E-05	0.40	2.392E-05	0.32
71	4.581E-05	0.34	3.785E-05	0.31	4.108E-05	0.28
72	2.673E-06	1.37	2.198E-06	1.20	2.374E-06	0.90
73	2.716E-05	0.42	2.227E-05	0.37	2.426E-05	0.33
74	7.951E-05	0.27	6.583E-05	0.24	7.147E-05	0.20
75	9.004E-06	0.78	7.485E-06	0.73	8.116E-06	0.54
76	2.273E-05	0.46	1.895E-05	0.40	2.056E-05	0.34
77	1.770E-05	0.56	1.469E-05	0.52	1.587E-05	0.40
78	1.523E-06	1.66	1.266E-06	1.36	1.389E-06	1.20
79	9.853E-06	0.67	8.186E-06	0.64	8.879E-06	0.46
80	4.605E-06	1.15	3.800E-06	1.00	4.090E-06	0.81
81	5.521E-05	0.30	4.596E-05	0.27	4.981E-05	0.22
82	3.229E-06	1.34	2.681E-06	1.17	2.923E-06	0.93
83	4.419E-06	1.04	3.639E-06	0.98	3.999E-06	0.78
84	8.143E-06	0.81	6.716E-06	0.70	7.322E-06	0.53
85	9.964E-06	0.63	8.322E-06	0.61	9.012E-06	0.47
86	1.364E-05	0.61	1.143E-05	0.52	1.238E-05	0.43
87	1.190E-05	0.72	9.963E-06	0.62	1.076E-05	0.51
88	3.096E-06	1.28	2.569E-06	1.09	2.820E-06	1.01
89	6.629E-06	0.93	5.492E-06	0.82	5.946E-06	0.66
90	6.871E-06	1.03	5.704E-06	0.88	6.199E-06	0.73
91	8.205E-06	0.72	6.865E-06	0.58	7.446E-06	0.57
92	4.763E-06	0.83	3.987E-06	0.84	4.342E-06	0.70
93	8.140E-06	0.76	6.742E-06	0.68	7.278E-06	0.53
94	4.209E-06	1.16	3.527E-06	1.03	3.813E-06	0.80
95	1.253E-05	0.69	1.047E-05	0.63	1.140E-05	0.47
96	3.331E-06	1.25	2.775E-06	1.10	3.028E-06	0.90
97	3.406E-06	1.41	2.862E-06	1.24	3.068E-06	1.05
98	3.560E-06	1.26	2.942E-06	1.00	3.218E-06	0.86
99	2.303E-06	1.48	1.938E-06	1.29	2.092E-06	1.00
100	3.400E-06	1.03	2.829E-06	1.06	3.094E-06	0.81
101	5.001E-06	1.14	4.123E-06	0.92	4.447E-06	0.77
102	3.380E-06	1.17	2.826E-06	1.03	3.070E-06	0.90
103	4.656E-06	1.04	3.875E-06	0.93	4.192E-06	0.73
104	4.234E-06	0.97	3.545E-06	0.87	3.837E-06	0.69
105	4.403E-06	1.00	3.693E-06	0.93	3.994E-06	0.74
106	1.501E-06	1.59	1.294E-06	1.59	1.412E-06	1.29
107	3.575E-06	1.18	2.983E-06	1.00	3.258E-06	0.85
108	3.166E-06	1.14	2.671E-06	0.89	2.968E-06	0.82
109	5.120E-06	0.96	4.305E-06	0.85	4.676E-06	0.75
110	3.018E-06	1.31	2.575E-06	1.22	2.805E-06	0.98

111	2.976E-06	1.27	2.523E-06	1.11	2.722E-06	0.95
112	1.807E-06	1.65	1.498E-06	1.46	1.641E-06	1.17
113	5.753E-06	0.88	4.810E-06	0.79	5.204E-06	0.64
114	2.020E-06	1.51	1.708E-06	1.57	1.838E-06	1.22
115	5.090E-06	0.90	4.287E-06	0.84	4.629E-06	0.60
116	1.086E-05	0.63	9.187E-06	0.59	9.865E-06	0.53
117	1.173E-05	0.62	9.884E-06	0.52	1.063E-05	0.46
118	1.279E-05	0.59	1.083E-05	0.56	1.164E-05	0.41
119	8.238E-06	0.64	6.957E-06	0.67	7.578E-06	0.52
120	5.812E-06	0.98	4.963E-06	0.81	5.329E-06	0.71
121	6.120E-06	0.81	5.155E-06	0.76	5.635E-06	0.58
122	3.175E-06	1.11	2.680E-06	1.00	2.935E-06	0.89
123	1.033E-05	0.66	8.665E-06	0.64	9.367E-06	0.47
124	7.304E-06	0.76	6.126E-06	0.62	6.646E-06	0.51
125	7.004E-06	0.86	5.909E-06	0.78	6.376E-06	0.53
126	5.819E-06	0.90	4.833E-06	0.74	5.188E-06	0.56
127	5.597E-06	0.92	4.679E-06	0.84	5.074E-06	0.68
128	7.731E-06	0.88	6.495E-06	0.70	7.021E-06	0.57
129	9.536E-06	0.64	8.066E-06	0.58	8.729E-06	0.49
130	4.045E-06	1.14	3.435E-06	0.97	3.669E-06	0.75
131	1.675E-05	0.53	1.408E-05	0.44	1.520E-05	0.40
132	1.124E-05	0.64	9.432E-06	0.59	1.023E-05	0.49
133	1.374E-05	0.60	1.156E-05	0.53	1.255E-05	0.41
134	1.491E-05	0.55	1.254E-05	0.52	1.352E-05	0.44
135	2.379E-06	1.14	2.052E-06	1.01	2.211E-06	0.90
136	3.844E-06	1.06	3.344E-06	0.95	3.683E-06	0.75
137	2.532E-06	0.95	2.651E-06	0.97	2.977E-06	0.73
138	4.078E-06	1.00	3.549E-06	0.94	3.904E-06	0.80
139	4.639E-06	0.99	3.914E-06	0.93	4.215E-06	0.79
140	1.211E-05	0.58	1.015E-05	0.60	1.098E-05	0.45
141	8.855E-06	0.71	7.506E-06	0.66	8.130E-06	0.54
142	5.836E-06	0.84	4.958E-06	0.89	5.323E-06	0.68
143	2.007E-05	0.49	1.683E-05	0.45	1.815E-05	0.36
144	7.971E-06	0.71	6.738E-06	0.66	7.275E-06	0.50
145	7.159E-06	0.81	6.084E-06	0.72	6.597E-06	0.61
146	1.206E-05	0.67	1.019E-05	0.57	1.099E-05	0.45
147	3.649E-06	1.34	3.077E-06	1.12	3.300E-06	0.97
148	1.936E-06	1.44	1.621E-06	1.26	1.744E-06	1.10
149	1.202E-06	2.01	9.994E-07	1.62	1.095E-06	1.46
150	4.033E-06	1.16	3.401E-06	0.98	3.627E-06	0.82
151	4.063E-06	1.00	3.422E-06	0.99	3.723E-06	0.77
152	4.377E-06	0.95	3.651E-06	0.81	3.916E-06	0.72
153	4.362E-06	1.12	3.681E-06	0.90	4.005E-06	0.85
154	4.645E-06	0.98	3.916E-06	0.89	4.210E-06	0.76
155	4.299E-06	1.00	3.640E-06	0.92	3.924E-06	0.72
156	3.989E-06	1.09	3.360E-06	0.97	3.609E-06	0.85
157	4.603E-06	1.00	3.898E-06	0.88	4.241E-06	0.74
158	4.896E-06	0.86	4.091E-06	0.86	4.422E-06	0.54
159	6.815E-06	0.83	5.737E-06	0.75	6.178E-06	0.54
160	3.505E-06	1.12	2.994E-06	0.97	3.214E-06	0.77
161	4.926E-06	0.98	4.156E-06	0.91	4.512E-06	0.71
162	5.726E-06	0.88	4.833E-06	0.78	5.236E-06	0.66

163	6.219E-06	0.91	5.227E-06	0.86	5.592E-06	0.64
164	6.515E-06	0.83	5.494E-06	0.74	5.914E-06	0.54
165	6.904E-06	0.81	5.812E-06	0.77	6.289E-06	0.62
166	3.992E-06	1.08	3.386E-06	1.00	3.656E-06	0.81
167	4.256E-06	1.09	3.592E-06	0.96	3.845E-06	0.77
168	4.236E-06	1.18	3.572E-06	0.94	3.892E-06	0.76
169	4.459E-06	1.06	3.766E-06	0.94	4.057E-06	0.83
170	4.593E-06	1.09	3.913E-06	0.91	4.213E-06	0.79
171	2.352E-06	1.48	1.997E-06	1.35	2.162E-06	1.08
172	2.467E-06	1.47	2.059E-06	1.19	2.230E-06	1.09
173	2.465E-06	1.17	2.093E-06	1.04	2.269E-06	0.83
174	2.465E-06	1.27	2.084E-06	1.23	2.275E-06	1.04
175	1.020E-06	2.10	8.816E-07	1.85	9.411E-07	1.51
176	1.005E-06	2.00	8.622E-07	1.93	9.232E-07	1.54
177	1.047E-06	1.88	8.762E-07	1.87	9.621E-07	1.40
178	1.009E-06	2.08	8.631E-07	1.95	9.270E-07	1.49
179	1.093E-06	2.22	9.179E-07	1.93	9.833E-07	1.60
180	1.061E-06	1.89	8.854E-07	1.75	9.778E-07	1.47
181	1.062E-06	2.00	9.052E-07	1.67	9.820E-07	1.43
182	1.066E-06	1.83	9.112E-07	1.60	9.855E-07	1.58
183	1.143E-06	2.21	9.690E-07	1.93	1.036E-06	1.36
184	1.068E-06	2.04	9.244E-07	1.96	9.910E-07	1.43
185	1.146E-06	1.97	9.662E-07	1.75	1.026E-06	1.35
186	1.147E-06	1.88	9.768E-07	1.86	1.041E-06	1.43
187	1.154E-06	1.94	9.851E-07	1.63	1.057E-06	1.34
188	1.160E-06	1.89	9.663E-07	1.86	1.078E-06	1.39
189	1.170E-06	2.06	9.867E-07	1.68	1.062E-06	1.39
190	2.995E-06	1.31	2.533E-06	1.12	2.755E-06	0.89
191	3.122E-06	1.33	2.646E-06	1.18	2.834E-06	0.84
192	3.111E-06	1.33	2.684E-06	1.08	2.898E-06	0.82
193	3.193E-06	1.11	2.715E-06	0.99	2.929E-06	0.81
194	6.814E-06	0.74	5.768E-06	0.66	6.234E-06	0.52
195	7.315E-06	0.88	6.202E-06	0.74	6.692E-06	0.65
196	7.719E-06	0.75	6.520E-06	0.63	7.060E-06	0.52
197	8.457E-06	0.73	7.098E-06	0.66	7.743E-06	0.59
198	8.975E-06	0.70	7.598E-06	0.59	8.194E-06	0.50
199	4.761E-06	0.92	4.039E-06	0.79	4.392E-06	0.61
200	5.093E-06	1.00	4.299E-06	0.84	4.682E-06	0.78
201	1.066E-05	0.66	9.035E-06	0.63	9.748E-06	0.50
202	1.210E-05	0.56	1.020E-05	0.51	1.106E-05	0.43
203	1.289E-05	0.59	1.092E-05	0.49	1.189E-05	0.42
204	1.469E-05	0.61	1.245E-05	0.52	1.353E-05	0.44
205	8.548E-06	0.77	7.734E-06	0.70	8.180E-06	0.53
206	9.202E-06	0.73	8.240E-06	0.58	8.814E-06	0.52
207	9.625E-06	0.70	8.705E-06	0.57	9.177E-06	0.45
208	1.125E-05	0.57	1.018E-05	0.55	1.084E-05	0.45
209	1.151E-05	0.53	1.049E-05	0.44	1.110E-05	0.39
210	1.407E-05	0.46	1.273E-05	0.46	1.351E-05	0.34
211	1.614E-05	0.47	1.463E-05	0.46	1.559E-05	0.37
212	1.919E-05	0.42	1.724E-05	0.36	1.847E-05	0.30
213	2.609E-05	0.34	2.345E-05	0.27	2.515E-05	0.24
214	3.687E-05	0.29	3.315E-05	0.28	3.571E-05	0.22

215	5.549E-05	0.25	5.008E-05	0.22	5.395E-05	0.18
216	9.195E-05	0.19	8.381E-05	0.19	9.081E-05	0.14
217	5.531E-05	0.22	5.297E-05	0.19	5.612E-05	0.15
218	7.082E-05	0.19	6.791E-05	0.17	7.220E-05	0.14
219	8.413E-05	0.20	8.133E-05	0.17	8.641E-05	0.14
220	1.014E-04	0.16	9.889E-05	0.14	1.055E-04	0.11
221	1.206E-04	0.16	1.186E-04	0.14	1.265E-04	0.11
222	1.366E-04	0.15	1.366E-04	0.13	1.458E-04	0.10
223	1.533E-04	0.15	1.573E-04	0.11	1.674E-04	0.10
224	7.520E-05	0.20	7.987E-05	0.17	8.451E-05	0.12
225	2.340E-04	0.13	2.724E-04	0.11	2.828E-04	0.10
226	3.165E-05	0.24	4.479E-05	0.19	4.449E-05	0.13
227	2.893E-05	0.25	4.646E-05	0.20	4.448E-05	0.14
228	1.044E-05	0.37	1.900E-05	0.29	1.759E-05	0.16
229	9.683E-06	0.41	1.962E-05	0.32	1.747E-05	0.18
230	4.490E-06	0.59	1.020E-05	0.45	8.697E-06	0.23
231	4.247E-06	0.59	1.062E-05	0.39	8.753E-06	0.20
232	3.939E-06	0.57	1.134E-05	0.41	8.894E-06	0.21
233	2.200E-06	0.66	7.429E-06	0.56	5.493E-06	0.26
234	1.446E-06	0.95	5.378E-06	0.67	3.828E-06	0.28
235	5.264E-07	1.34	1.057E-06	1.03	1.121E-06	0.49
236	3.491E-07	1.95	7.493E-07	1.37	7.962E-07	0.65
237	2.259E-07	2.26	5.542E-07	1.36	6.157E-07	0.53
238	4.905E-09	10.50	1.831E-08	5.95	2.457E-08	1.98

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
 0.7554 to 0.7582     ***
 0.7582 to 0.7610     **********
 0.7610 to 0.7639     **********************
 0.7639 to 0.7667     ******************************
 0.7667 to 0.7695     **********************
 0.7695 to 0.7724     **********
 0.7724 to 0.7752     *
 0.7752 to 0.7780     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7554 to 0.7582     **
 0.7582 to 0.7610     *********
 0.7610 to 0.7639     ************
 0.7639 to 0.7667     ************************
 0.7667 to 0.7695     *****************
 0.7695 to 0.7724     *********
 0.7724 to 0.7752     *
 0.7752 to 0.7780     *

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7554 to 0.7582     **
 0.7582 to 0.7610     *****
 0.7610 to 0.7639     ********
 0.7639 to 0.7667     ******************
 0.7667 to 0.7695     *********
 0.7695 to 0.7724     ******
 0.7724 to 0.7752     *
 0.7752 to 0.7780     *

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7554 to 0.7582     **
 0.7582 to 0.7610     ****
 0.7610 to 0.7639     **
 0.7639 to 0.7667     ********
 0.7667 to 0.7695     *****
 0.7695 to 0.7724     **
```

```
 0.7724 to 0.7752     *
 0.7752 to 0.7780     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76529 + or - 0.00041                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.68083E-02 + or -  1.28800E-04           ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.65262E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52613E-01 + or -  1.81496E-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     3.11433 minutes


*********************************************************************
*********************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666


      0000000       666666666666                    33333333333
99999999999                     22222222222     88888888888
     000000000     6666666666666                   3333333333333
9999999999999                   2222222222222   8888888888888
```

```
    00       00    66                    :::       33         33   99
99         :::       22         22   88         88
   00         00   66                    :::                  33   99
99         :::                  22   88         88
   00         00   66                    :::                  33   99
99         :::                  22   88         88
   00         00   666666666666                            333
9999999999999                            22      88888888888
   00         00   6666666666666                           333
999999999999                             22        88888888888
   00         00   66         66         :::                  33
99         :::            22         88         88
   00         00   66         66         :::                  33
99         :::          22           88         88
    00       00    66         66         :::       33         33
99         :::        22             88         88
     000000000     6666666666666                   3333333333333
9999999999999                    2222222222222   8888888888888
      0000000       66666666666                     33333333333
999999999999                     2222222222222    88888888888
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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
EEEEEEEE
    SSSSSSSSSSSS   CC              AAAAAAAAAAAAA   LL
EEEEEEEE
              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
EEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
```

```
*****
        *****    time of execution:  06:39:28.54
*****
        *****
*****
        *****
*****

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

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

*************************************************************************
*********************************************
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.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90904E-08  1.32112E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.16727E-08  3.17633E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  1.38587E-09  3.85418E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  2.92482E-10  8.30930E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  1.41245E-17  3.92809E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.66243E-10  4.72282E-09   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  1.21423E-08  3.44950E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.02011E-09  2.32645E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  3.16763E-12  9.37834E-11   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.25940E-09  3.72862E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.19607E-11  2.52470E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.84630E-11  1.85340E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  5.32908E-10  1.64155E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  9.36824E-14  2.94184E-12   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  2.04090E-10  6.40884E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53963E-12  2.13187E-10   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  8.98777E-11  2.90303E-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  1.29594E-09  4.30223E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43912E-09  8.17026E-08   48112   111.9028     cd112 4843
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.56953E-12  8.83792E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51421E-11  2.24056E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.29262E-11  1.25078E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                12/17/09
    1053129  1.12580E-10  4.34405E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                12/17/09
    1053135  1.18997E-18  4.80553E-17   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                12/17/09
    1054131  5.76126E-10  2.25754E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  1.54730E-11  6.15573E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  2.89286E-16  1.16822E-14   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.34555E-09  5.35311E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.12155E-15  8.50388E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41913E-09  5.73079E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23448E-09  5.05908E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
```

```
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  4.44528E-11  1.86171E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.32251E-10  5.57826E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  3.91530E-13  1.67493E-11   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.10906E-10  3.06250E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.09530E-09  4.61986E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  5.10215E-11  2.18263E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.15434E-09  4.93806E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  3.98945E-10  1.71857E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32868E-10  3.61280E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.32199E-11  5.81378E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.86874E-10  1.70137E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.52830E-17  6.76689E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  3.35274E-13  1.49455E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.50902E-11  2.42271E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.22798E-10  9.93156E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06736E-09  1.38571E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50024E-11  2.50125E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  3.22566E-14  1.47656E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45305E-09  6.56429E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59130E-09  7.28421E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30614E-14  6.01804E-13   63154   153.9230     eu154 6334
```

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endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.11450E-12  2.83556E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.46759E-13  6.84987E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84212E-12  2.65673E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27377E-10  1.98193E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94500E-10  2.77473E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51352E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.13747E-11  8.07122E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.61741E-17  1.86509E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.28782E-10  6.64612E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88247E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71758E-20  2.68251E-18   94241   241.0569     pu241 9443
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endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08609E-20  7.83692E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  1.60578E-30  1.16351E-28   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.47123E-21  2.51517E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.74837E-21  7.09267E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.59889E-21  7.01269E-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
```

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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
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:
  9317 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

                                                 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       ........

                                 ........     0.01567 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
0.01650 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 15762 independent fission points were generated for generation 1
          1       7.72066E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15571 independent fission points were generated for generation 2
```

```
          2       7.63912E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15573 independent fission points were generated for generation 3
          3       7.60941E-01      7.60941E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.64768E-01      7.62855E-01      1.91325E-03
0.00000E+00      0.00000E+00
          5       7.66608E-01      7.64106E-01      1.66895E-03
0.00000E+00      0.00000E+00
          6       7.63068E-01      7.63846E-01      1.20831E-03
0.00000E+00      0.00000E+00
          7       7.70591E-01      7.65195E-01      1.64185E-03
0.00000E+00      0.00000E+00
          8       7.63250E-01      7.64871E-01      1.37920E-03
0.00000E+00      0.00000E+00
          9       7.65585E-01      7.64973E-01      1.17009E-03
0.00000E+00      0.00000E+00
         10       7.66688E-01      7.65187E-01      1.03576E-03
0.00000E+00      0.00000E+00
         11       7.62024E-01      7.64836E-01      9.78743E-04
0.00000E+00      0.00000E+00
         12       7.70139E-01      7.65366E-01      1.02349E-03
0.00000E+00      0.00000E+00
         13       7.62241E-01      7.65082E-01      9.68391E-04
0.00000E+00      0.00000E+00
         14       7.71200E-01      7.65592E-01      1.02051E-03
0.00000E+00      0.00000E+00
         15       7.70835E-01      7.65995E-01      1.02170E-03
0.00000E+00      0.00000E+00
         16       7.69680E-01      7.66259E-01      9.81852E-04
0.00000E+00      0.00000E+00
         17       7.60043E-01      7.65844E-01      1.00360E-03
0.00000E+00      0.00000E+00
         18       7.59048E-01      7.65419E-01      1.03040E-03
0.00000E+00      0.00000E+00
         19       7.63256E-01      7.65292E-01      9.76226E-04
0.00000E+00      0.00000E+00
         20       7.70519E-01      7.65583E-01      9.65113E-04
0.00000E+00      0.00000E+00
         21       7.62302E-01      7.65410E-01      9.29092E-04
0.00000E+00      0.00000E+00
         22       7.73717E-01      7.65825E-01      9.74384E-04
0.00000E+00      0.00000E+00
         23       7.62982E-01      7.65690E-01      9.36663E-04
0.00000E+00      0.00000E+00
         24       7.67167E-01      7.65757E-01      8.95593E-04
0.00000E+00      0.00000E+00
         25       7.63239E-01      7.65647E-01      8.62744E-04
0.00000E+00      0.00000E+00
         26       7.71787E-01      7.65903E-01      8.64720E-04
0.00000E+00      0.00000E+00
```

27	7.63725E-01	7.66479E-01	6.96383E-03	0.00000E+00
28	7.66161E-01	7.66416E-01	3.66181E-03	0.00000E+00
29	7.62378E-01	7.65743E-01	3.18419E-03	0.00000E+00
30	7.64010E-01	7.65495E-01	2.46017E-03	0.00000E+00
31	7.61683E-01	7.65019E-01	2.31827E-03	0.00000E+00
32	7.64767E-01	7.64991E-01	1.94991E-03	0.00000E+00
33	7.66855E-01	7.65177E-01	1.61986E-03	0.00000E+00
34	7.71666E-01	7.65767E-01	1.57630E-03	0.00000E+00
35	7.56037E-01	7.64956E-01	1.59821E-03	0.00000E+00
36	7.68044E-01	7.65194E-01	1.59363E-03	0.00000E+00
37	7.73974E-01	7.65821E-01	1.35004E-03	0.00000E+00
38	7.67655E-01	7.65943E-01	1.25678E-03	0.00000E+00
39	7.69109E-01	7.66141E-01	1.18897E-03	0.00000E+00
40	7.72134E-01	7.66494E-01	1.17379E-03	0.00000E+00
41	7.65404E-01	7.66433E-01	1.10445E-03	0.00000E+00
42	7.62042E-01	7.66202E-01	1.06956E-03	0.00000E+00
43	7.65947E-01	7.66189E-01	1.01179E-03	0.00000E+00
44	7.66003E-01	7.66180E-01	9.59911E-04	0.00000E+00
45	7.67412E-01	7.66236E-01	9.14946E-04	0.00000E+00
46	7.67924E-01	7.66310E-01	8.75739E-04	0.00000E+00
47	7.65788E-01	7.66288E-01	8.37106E-04	0.00000E+00
48	7.61197E-01	7.66084E-01	8.29113E-04	0.00000E+00
49	7.65358E-01	7.66056E-01	7.95789E-04	0.00000E+00
50	7.73918E-01	7.66348E-01	8.22277E-04	0.00000E+00
51	7.62665E-01	7.66216E-01	8.02921E-04	0.00000E+00
52	7.66236E-01	7.66217E-01	7.73714E-04	0.00000E+00

53	7.66760E-01	7.66235E-01	7.46793E-04	0.00000E+00
54	7.65453E-01	7.66210E-01	7.21941E-04	0.00000E+00
55	7.61297E-01	7.66056E-01	7.16041E-04	0.00000E+00
56	7.68050E-01	7.66116E-01	6.96100E-04	0.00000E+00
57	7.61755E-01	7.65988E-01	6.87510E-04	0.00000E+00
58	7.65496E-01	7.65974E-01	6.67140E-04	0.00000E+00
59	7.69778E-01	7.66080E-01	6.56861E-04	0.00000E+00
60	7.68355E-01	7.66141E-01	6.41476E-04	0.00000E+00
61	7.68837E-01	7.66212E-01	6.28141E-04	0.00000E+00
62	7.70323E-01	7.66318E-01	6.20891E-04	0.00000E+00
63	7.69008E-01	7.66385E-01	6.08686E-04	0.00000E+00
64	7.65780E-01	7.66370E-01	5.93466E-04	0.00000E+00
65	7.69441E-01	7.66443E-01	5.83638E-04	0.00000E+00
66	7.67436E-01	7.66466E-01	5.70062E-04	0.00000E+00
67	7.66560E-01	7.66468E-01	5.56651E-04	0.00000E+00
68	7.67657E-01	7.66495E-01	5.44524E-04	0.00000E+00
69	7.78042E-01	7.66746E-01	5.90934E-04	0.00000E+00
70	7.68635E-01	7.66786E-01	5.79403E-04	0.00000E+00
71	7.67853E-01	7.66808E-01	5.67396E-04	0.00000E+00
72	7.70706E-01	7.66888E-01	7.65997E-04	0.00000E+00
73	7.72334E-01	7.66997E-01	8.16216E-04	0.00000E+00
74	7.66653E-01	7.66990E-01	7.96941E-04	0.00000E+00
75	7.57352E-01	7.66805E-01	7.80684E-04	0.00000E+00
76	7.61250E-01	7.66700E-01	7.73643E-04	0.00000E+00
77	7.58691E-01	7.66552E-01	7.76351E-04	0.00000E+00
78	7.67171E-01	7.66563E-01	7.55178E-04	0.00000E+00

```
         79       7.68081E-01      7.66590E-01      7.29750E-04
0.00000E+00      0.00000E+00
         80       7.71266E-01      7.66672E-01      6.92412E-04
0.00000E+00      0.00000E+00
         81       7.70408E-01      7.66736E-01      6.72643E-04
0.00000E+00      0.00000E+00
         82       7.63403E-01      7.66680E-01      6.54477E-04
0.00000E+00      0.00000E+00
         83       7.63888E-01      7.66633E-01      6.42844E-04
0.00000E+00      0.00000E+00
         84       7.62454E-01      7.66565E-01      6.33747E-04
0.00000E+00      0.00000E+00
         85       7.71491E-01      7.66644E-01      6.02542E-04
0.00000E+00      0.00000E+00
         86       7.66754E-01      7.66646E-01      5.92817E-04
0.00000E+00      0.00000E+00
         87       7.65254E-01      7.66624E-01      5.94040E-04
0.00000E+00      0.00000E+00
         88       7.65261E-01      7.66603E-01      5.75415E-04
0.00000E+00      0.00000E+00
         89       7.63416E-01      7.66555E-01      5.70405E-04
0.00000E+00      0.00000E+00
         90       7.65144E-01      7.66534E-01      5.63881E-04
0.00000E+00      0.00000E+00
         91       7.61052E-01      7.66453E-01      5.74956E-04
0.00000E+00      0.00000E+00
         92       7.56510E-01      7.66309E-01      6.18981E-04
0.00000E+00      0.00000E+00
         93       7.57676E-01      7.66186E-01      6.90124E-04
0.00000E+00      0.00000E+00
         94       7.63296E-01      7.66145E-01      7.05014E-04
0.00000E+00      0.00000E+00
         95       7.59743E-01      7.66056E-01      7.52808E-04
0.00000E+00      0.00000E+00
         96       7.66978E-01      7.66069E-01      7.34507E-04
0.00000E+00      0.00000E+00
         97       7.74744E-01      7.66186E-01      6.99274E-04
0.00000E+00      0.00000E+00
         98       7.63013E-01      7.66144E-01      6.87788E-04
0.00000E+00      0.00000E+00
         99       7.59327E-01      7.66054E-01      6.79950E-04
0.00000E+00      0.00000E+00
        100       7.63958E-01      7.66027E-01      6.71344E-04
0.00000E+00      0.00000E+00
        101       7.67714E-01      7.66049E-01      6.61008E-04
0.00000E+00      0.00000E+00
        102       7.64242E-01      7.66026E-01      6.57689E-04
0.00000E+00      0.00000E+00
        103       7.65570E-01      7.66020E-01      6.50087E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=C99D6BC171DEF6B1
```

```
        104       7.58977E-01      7.65933E-01      6.52853E-04
0.00000E+00      0.00000E+00
        105       7.66509E-01      7.65940E-01      6.43329E-04
0.00000E+00      0.00000E+00
        106       7.67678E-01      7.65961E-01      6.31645E-04
0.00000E+00      0.00000E+00
        107       7.66450E-01      7.65967E-01      6.23076E-04
0.00000E+00      0.00000E+00
        108       7.62793E-01      7.65929E-01      6.19866E-04
0.00000E+00      0.00000E+00
        109       7.67408E-01      7.65947E-01      6.12401E-04
0.00000E+00      0.00000E+00
        110       7.64232E-01      7.65927E-01      6.05060E-04
0.00000E+00      0.00000E+00
        111       7.64454E-01      7.65910E-01      5.99057E-04
0.00000E+00      0.00000E+00
        112       7.69029E-01      7.65945E-01      5.89536E-04
0.00000E+00      0.00000E+00
        113       7.63217E-01      7.65915E-01      5.82540E-04
0.00000E+00      0.00000E+00
        114       7.64365E-01      7.65898E-01      5.77043E-04
0.00000E+00      0.00000E+00
        115       7.61417E-01      7.65849E-01      5.75303E-04
0.00000E+00      0.00000E+00
        116       7.71669E-01      7.65912E-01      5.65274E-04
0.00000E+00      0.00000E+00
        117       7.66713E-01      7.65920E-01      5.58503E-04
0.00000E+00      0.00000E+00
        118       7.70945E-01      7.65973E-01      5.55791E-04
0.00000E+00      0.00000E+00
        119       7.64152E-01      7.65954E-01      5.47198E-04
0.00000E+00      0.00000E+00
        120       7.60869E-01      7.65902E-01      5.33113E-04
0.00000E+00      0.00000E+00
        121       7.64268E-01      7.65885E-01      5.28045E-04
0.00000E+00      0.00000E+00
        122       7.68992E-01      7.65917E-01      5.23350E-04
0.00000E+00      0.00000E+00
        123       7.59122E-01      7.65849E-01      5.28164E-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=A48D6B67FEA6D1C3
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.55083E-05 + or -  1.17727E-08             generation time
=  2.99266E-05 + or -  1.93861E-08
 nu bar   =  2.43895E+00 + or -  9.78861E-06       average fission group
```

```
=  2.17561E+02 + or -  1.00211E-02
                      energy(ev) of the average lethargy causing fission
=  5.65587E-02 + or -  1.29397E-04
                                                system mean free path (cm)
=  6.52830E-01 + or -  1.72868E-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          0.76585   + or - 0.00053     0.76532 to 0.76638
0.76479 to 0.76690    0.76426 to 0.76743    2000000       9.1373

      24          0.76584   + or - 0.00053     0.76530 to 0.76637
0.76477 to 0.76690    0.76423 to 0.76744    1980000       9.0852

      25          0.76586   + or - 0.00054     0.76532 to 0.76640
0.76478 to 0.76694    0.76424 to 0.76749    1960000       9.0433

      26          0.76580   + or - 0.00055     0.76525 to 0.76635
0.76469 to 0.76691    0.76414 to 0.76746    1940000       8.8232

      27          0.76582   + or - 0.00056     0.76527 to 0.76638
0.76471 to 0.76693    0.76415 to 0.76749    1920000       8.9030

      28          0.76582   + or - 0.00056     0.76526 to 0.76638
0.76469 to 0.76694    0.76413 to 0.76751    1900000       8.8541

      29          0.76586   + or - 0.00057     0.76529 to 0.76642
0.76472 to 0.76699    0.76416 to 0.76755    1880000       8.9394

      30          0.76588   + or - 0.00057     0.76530 to 0.76645
0.76473 to 0.76702    0.76416 to 0.76759    1860000       8.8996

      31          0.76592   + or - 0.00057     0.76535 to 0.76649
0.76478 to 0.76706    0.76420 to 0.76764    1840000       9.1216

      32          0.76593   + or - 0.00058     0.76536 to 0.76651
0.76478 to 0.76709    0.76420 to 0.76766    1820000       9.1602

      37          0.76585   + or - 0.00058     0.76527 to 0.76644
0.76469 to 0.76702    0.76410 to 0.76760    1720000       9.2131

      42          0.76577   + or - 0.00062     0.76515 to 0.76638
0.76453 to 0.76700    0.76392 to 0.76761    1620000       9.2773

      47          0.76571   + or - 0.00066     0.76505 to 0.76637
0.76440 to 0.76702    0.76374 to 0.76768    1520000       9.1738
```

```
      52          0.76570   + or - 0.00070     0.76500 to 0.76640
0.76429 to 0.76710    0.76359 to 0.76781    1420000       8.8985

      57          0.76578   + or - 0.00077     0.76501 to 0.76655
0.76424 to 0.76732    0.76347 to 0.76809    1320000       8.5222

      62          0.76555   + or - 0.00078     0.76477 to 0.76633
0.76399 to 0.76711    0.76320 to 0.76789    1220000       9.7195

      67          0.76536   + or - 0.00079     0.76457 to 0.76615
0.76378 to 0.76694    0.76299 to 0.76773    1120000      11.3000

      72          0.76485   + or - 0.00071     0.76414 to 0.76556
0.76343 to 0.76627    0.76272 to 0.76698    1020000      12.3414

      77          0.76502   + or - 0.00071     0.76432 to 0.76573
0.76361 to 0.76644    0.76290 to 0.76715     920000      14.0079

      82          0.76465   + or - 0.00071     0.76394 to 0.76536
0.76324 to 0.76607    0.76253 to 0.76678     820000      17.4575

      87          0.76447   + or - 0.00078     0.76369 to 0.76525
0.76291 to 0.76603    0.76213 to 0.76681     720000      18.2535

      92          0.76482   + or - 0.00074     0.76409 to 0.76556
0.76335 to 0.76630    0.76262 to 0.76703     620000      24.5328

      97          0.76489   + or - 0.00069     0.76419 to 0.76558
0.76350 to 0.76628    0.76281 to 0.76697     520000      23.4040

     102          0.76518   + or - 0.00080     0.76438 to 0.76598
0.76358 to 0.76678    0.76278 to 0.76758     420000      25.3444

     107          0.76523   + or - 0.00096     0.76426 to 0.76619
0.76330 to 0.76715    0.76234 to 0.76812     320000      26.6034

     112          0.76507   + or - 0.00137     0.76370 to 0.76643
0.76233 to 0.76780    0.76097 to 0.76916     220000      28.5318
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          0.76472   + or - 0.00228     0.76245 to 0.76700
0.76017 to 0.76928    0.75789 to 0.77156     120000      31.0378
1                           fuel bundle
```

plot of average k-effective by generation run.

the line represents k-eff = 0.76591 + or - 0.00052 which occurs for 122 generations run.

```
                                0.7650                    0.7662
0.7674

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

```
I
         |                                 I             |  *
I
      50 +                                      I        |         *
I
         |                                   I          |     *
I
         |                                   I          |     *
I
         |                                    I         |      *
I
         |                                    I         |     *
I
      55 +                                 I            |  *
I
         |                                   I          |   *
I
         |                                 I            | *              I
         |                                 I            |*              I
         |                                   I          |   *
I
      60 +                                      I        |    *
I
         |                                        I      |     *
I
         |                                           I   |        *
I
         |                                            I  |          *
I
         |                                            I  |         *
I
      65 +                                              I|           *
I
         |                                               I           *
I
         |                                               I           *
I
         |                                               |I           *
I
         |                                               |    I
*           I
      70 +                                               |     I
*           I
         |                                               |      I
*           I
         |                                               |   I
*               I
         |                                               |     I
*                I
         |                                               |     I
*               I
      75 +                                               | I
```

```
*               I
         |                                          I
*               I
         |                                       I  |            *
I
         |                                        I |            *
I
         |                                         I|             *
I
      80 +                                         |I              *
I
         |                                         |  I
*             I
         |                                         | I             *
I
         |                                         | I            *
I
         |                                         I            *
I
      85 +                                         |  I           *
I
         |                                         |  I           *
I
         |                                         | I            *
I
         |                                         | I           *
I
         |                                         | I          *
I
      90 +                                         |I           *
I
         |                                         I|          *
I
         |                                      I   |       *
I
         |                                    I        |     *
I
         |                                  I          |    *
I
      95 +                               I            |  *
I
         |                               I            |  *
I
         |                                 I         |     *
I
         |                                 I         |    *
I
         |                              I           |  *
I
     100 +                              I           | *              I
         |                              I           |  *
I
```

```
         |                                  I           | *              I
         |                                  I           | *              I
         |                               I              |*             I
     105 +                               I              |*             I
         |                                I             |*             I
         |                                I             |*             I
         |                                I            *             I
         |                                I            |*            I
     110 +                                I            *             I
         |                                I            *            I
         |                                 I           |*            I
         |                                I            *            I
         |                                I            *            I
     115 +                               I            *|           I
         |                                I            *            I
         |                                 I           *            I
         |                                  I          |*            I
         |                                  I          |*           I
     120 +                                 I           *           I
         |                                 I           *          I
         |                                 I           *           I
         |                                I           *|          I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7658 + or - 0.0005 which occurs for 23 generations skipped.

```
                                 0.7633                    0.7646
0.7660

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

```
          |
I         | *           I
          |
I         | *           I
          |
I           *           I
      35 +
I         |  *           I
          |
I         | *           I
          |
I           *           I
          |
I           *           I
          |
I           *|          I
      40 +                                                          I
* |         I
          |                                                         I
* |         I
          |                                                          I
*|          I
          |                                                          I
*|          I
          |                                                          I
*|          I
      45 +                                                          I
* |          I
          |                                                        I
* |          I
          |                                                        I
* |          I
          |                                                         I
*|           I
          |                                                         I
*|            I
      50 +                                                       I
*  |          I
          |                                                       I
* |           I
          |                                                       I
*  |           I
          |                                                       I
*  |           I
          |                                                     I
*  |           I
      55 +                                                       I
* |            I
          |                                                       I
* |            I
          |                                                       I
*|             I
```

```
          |                                                                I
*|              I
          |                                                              I
* |            I
      60 +                                                            I
*  |            I
          |                                                          I
*   |           I
          |                                                        I
*    |         I
          |                                                      I
*      |        I
          |                                                    I
*      |        I
      65 +                                                    I
*       |       I
          |                                                 I
*         |     I
          |                                               I
*         |     I
          |                                               I
*          |    I
          |                                         I              *
I|
      70 +                                       I              *
I |
          |                                     I              *
I  |
          |                                 I             *
I    |
          |                            I              *
I       |
          |                         I              *
I        |
      75 +                                 I             *
I     |
          |                                  I             *
I    |
          |                                    I              *
I |
          |                                     I              *
I  |
          |                                  I             *
I   |
      80 +                                I             *
I      |
          |                         I             *
I         |
          |                         I              *
I        |
          |                         I              *
I        |
```

```
          |                                         I              *
I      |
      85 +                                   I              *
I         |
          |                                I              *
I          |
          |                                I              *
I          |
          |                               I              *
I          |
          |                               I              *
I         |
      90 +                             I               *
I         |
          |                                I               *
I       |
          |                                        I              *
I    |
          |                                             I             *
I|
          |                                              I              *
I
      95 +                                                I
*         |   I
          |                                               I
*          |  I
          |                                           I             *
I    |
          |                                            I              *
I  |
          |                                                 I
*           |I
     100 +                                                 I
*          |  I
          |                                              I              *
|I
          |                                              I
*           |  I
          |                                            I               *
|  I
          |                                                     I
*      |        I
     105 +                                                  I
*       |        I
          |                                              I
*         |      I
          |                                           I
*          |      I
          |                                             I
*       |          I
          |                                         I
*          |        I
```

```
     110 +                                          I
*         |            I
         |                                        I
*       |               I
         |                                 I                         *
|          I
         |                                  I
*          |                I
         |                                I
*        |                      I
     115 +                   I
*
         |                     I                                    *
|                   I
         |        I                                            *
|                    I
         |                            *
I  |
         |                        *
|         I
     120 +                                          *
|

   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                 4.64690E-07    70.3526
3.84100E-07    37.7495       0.00000E+00     0.0000
    3    0.0000                 1.05843E-05    12.8783
2.04020E-05     5.0286       0.00000E+00     0.0000
    4    0.0000                 2.13441E-05     9.0754
3.47145E-05     4.0870       0.00000E+00     0.0000
    5    0.0000                 2.97488E-05     6.5849
5.68370E-05     3.1585       0.00000E+00     0.0000
    6    0.0001                 9.76048E-05     3.8689
2.25437E-04     1.9801       0.00000E+00     0.0000
    7    0.0001                 1.13126E-04     3.3524
2.07981E-04     1.6333       0.00000E+00     0.0000
    8    0.0003                 2.45447E-04     2.1621
3.24217E-04     0.9836       0.00000E+00     0.0000
    9    0.0005                 3.90505E-04     1.2557
4.46009E-04     0.5732       0.00000E+00     0.0000
   10    0.0003                 2.06544E-04     1.4483
```

2.08580E-04	0.7476	0.00000E+00	0.0000	11	0.0012	9.01786E-04	0.8238
5.20505E-04	0.5706	0.00000E+00	0.0000	12	0.0010	7.57729E-04	0.7672
2.97076E-04	0.7545	0.00000E+00	0.0000	13	0.0003	2.25570E-04	1.5224
8.96478E-05	1.5064	0.00000E+00	0.0000	14	0.0013	1.00311E-03	0.6641
4.10093E-04	0.6572	0.00000E+00	0.0000	15	0.0010	7.67166E-04	0.7054
3.30756E-04	0.6980	0.00000E+00	0.0000	16	0.0002	1.87011E-04	1.1605
8.59529E-05	1.1414	0.00000E+00	0.0000	17	0.0001	7.09886E-05	1.9067
3.45013E-05	1.8746	0.00000E+00	0.0000	18	0.0001	5.13542E-05	1.8501
2.59492E-05	1.8142	0.00000E+00	0.0000	19	0.0001	8.12547E-05	1.2736
4.29598E-05	1.2444	0.00000E+00	0.0000	20	0.0001	5.93505E-05	1.5265
3.25255E-05	1.4881	0.00000E+00	0.0000	21	0.0002	1.20787E-04	1.0999
6.81929E-05	1.0739	0.00000E+00	0.0000	22	0.0001	1.03436E-04	1.3118
6.12783E-05	1.2812	0.00000E+00	0.0000	23	0.0001	1.06096E-04	1.0653
6.47671E-05	1.0400	0.00000E+00	0.0000	24	0.0000	2.40439E-05	2.3898
1.49348E-05	2.3285	0.00000E+00	0.0000	25	0.0000	2.95353E-05	1.9405
1.84707E-05	1.8897	0.00000E+00	0.0000	26	0.0000	1.69627E-05	2.4866
1.06629E-05	2.4194	0.00000E+00	0.0000	27	0.0001	5.26456E-05	1.2674
3.28577E-05	1.2368	0.00000E+00	0.0000	28	0.0001	9.67231E-05	1.0037
6.03392E-05	0.9868	0.00000E+00	0.0000	29	0.0001	9.89148E-05	1.0322
6.23069E-05	1.0178	0.00000E+00	0.0000	30	0.0000	1.28042E-05	3.0052
8.03117E-06	2.9829	0.00000E+00	0.0000	31	0.0001	9.52951E-05	1.0919
6.02215E-05	1.0770	0.00000E+00	0.0000	32	0.0001	3.87720E-05	1.7277
2.47652E-05	1.6936	0.00000E+00	0.0000	33	0.0000	3.24872E-05	1.6293
2.03459E-05	1.6096	0.00000E+00	0.0000	34	0.0001	7.60863E-05	1.0862
4.77889E-05	1.0702	0.00000E+00	0.0000	35	0.0001	4.55532E-05	1.5088
2.85782E-05	1.4844	0.00000E+00	0.0000	36	0.0001	4.32658E-05	1.3783

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2.67807E-05     1.3652       0.00000E+00     0.0000
   37    0.0000                 2.82832E-05     1.8262
1.77557E-05     1.7867       0.00000E+00     0.0000
   38    0.0000                 3.36735E-05     1.7680
2.11929E-05     1.7270       0.00000E+00     0.0000
   39    0.0002                 1.26972E-04     1.0896
8.08256E-05     1.0654       0.00000E+00     0.0000
   40    0.0002                 1.21592E-04     0.8874
7.85926E-05     0.8714       0.00000E+00     0.0000
   41    0.0002                 1.61456E-04     0.7873
1.07877E-04     0.7643       0.00000E+00     0.0000
   42    0.0002                 1.38296E-04     0.8092
9.40767E-05     0.7904       0.00000E+00     0.0000
   43    0.0001                 7.96210E-05     1.2022
5.71485E-05     1.1460       0.00000E+00     0.0000
   44    0.0001                 1.13953E-04     1.1366
8.36856E-05     1.0877       0.00000E+00     0.0000
   45    0.0001                 6.02241E-05     1.0265
4.85416E-05     0.9463       0.00000E+00     0.0000
   46    0.0000                 1.43570E-05     2.0266
1.15520E-05     1.8849       0.00000E+00     0.0000
   47    0.0001                 4.05034E-05     1.6876
3.14621E-05     1.6194       0.00000E+00     0.0000
   48    0.0000                 1.19031E-05     3.9383
9.24464E-06     3.8279       0.00000E+00     0.0000
   49    0.0001                 7.91330E-05     1.8286
6.24251E-05     1.7848       0.00000E+00     0.0000
   50    0.0001                 5.65842E-05     1.7039
4.66061E-05     1.6684       0.00000E+00     0.0000
   51    0.0000                 1.56621E-05     3.0377
1.30035E-05     2.9773       0.00000E+00     0.0000
   52    0.0001                 4.11235E-05     1.9898
3.55513E-05     1.9417       0.00000E+00     0.0000
   53    0.0002                 1.61797E-04     0.8258
1.58634E-04     0.7678       0.00000E+00     0.0000
   54    0.0001                 7.34768E-05     1.6475
6.83329E-05     1.5924       0.00000E+00     0.0000
   55    0.0002                 1.63903E-04     1.3960
1.50325E-04     1.3577       0.00000E+00     0.0000
   56    0.0002                 1.19600E-04     1.3687
1.10897E-04     1.3342       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                 1.49741E-04     1.4413
1.35877E-04     1.4066       0.00000E+00     0.0000
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58	0.0001	8.59642E-05	1.9415	7.52700E-05	1.8887	0.00000E+00	0.0000
59	0.0002	1.63151E-04	1.4189	1.46357E-04	1.3639	0.00000E+00	0.0000
60	0.0004	2.74483E-04	1.1419	2.48984E-04	1.0762	0.00000E+00	0.0000
61	0.0000	2.86686E-05	3.9611	2.20396E-05	3.8377	0.00000E+00	0.0000
62	0.0002	1.59827E-04	1.4085	1.34172E-04	1.3708	0.00000E+00	0.0000
63	0.0002	1.19755E-04	1.8049	9.86546E-05	1.7372	0.00000E+00	0.0000
64	0.0001	9.73189E-05	2.5620	7.85585E-05	2.4742	0.00000E+00	0.0000
65	0.0000	3.44190E-05	3.7218	3.40057E-05	3.6012	0.00000E+00	0.0000
66	0.0002	1.66442E-04	1.7635	1.47862E-04	1.7010	0.00000E+00	0.0000
67	0.0002	1.47234E-04	2.1736	1.20414E-04	2.1038	0.00000E+00	0.0000
68	0.0000	2.65597E-05	4.0381	2.29714E-05	3.8886	0.00000E+00	0.0000
69	0.0004	3.03056E-04	1.6550	2.37814E-04	1.6017	0.00000E+00	0.0000
70	0.0003	2.12282E-04	1.7376	1.93045E-04	1.6758	0.00000E+00	0.0000
71	0.0006	4.30728E-04	1.3330	3.56419E-04	1.2909	0.00000E+00	0.0000
72	0.0001	4.88097E-05	5.8002	2.88508E-05	5.6620	0.00000E+00	0.0000
73	0.0004	3.21996E-04	2.1820	2.45678E-04	2.0543	0.00000E+00	0.0000
74	0.0014	1.07326E-03	0.9657	7.80178E-04	0.9242	0.00000E+00	0.0000
75	0.0001	1.13434E-04	2.8025	8.71544E-05	2.6743	0.00000E+00	0.0000
76	0.0006	4.53725E-04	1.6056	2.88389E-04	1.5469	0.00000E+00	0.0000
77	0.0005	3.67324E-04	1.8645	2.63680E-04	1.7893	0.00000E+00	0.0000
78	0.0000	7.21748E-06	4.0123	7.06286E-05	3.9718	0.00000E+00	0.0000
79	0.0002	1.88556E-04	2.4091	1.26764E-04	2.3163	0.00000E+00	0.0000
80	0.0001	6.51059E-05	2.9509	8.67171E-05	2.8699	0.00000E+00	0.0000
81	0.0014	1.06655E-03	1.0597	7.84164E-04	1.0177	0.00000E+00	0.0000
82	0.0001	6.73163E-05	4.7383	4.04099E-05	4.4869	0.00000E+00	0.0000
83	0.0002	1.28239E-04	3.3592	1.41838E-04	3.2905	0.00000E+00	0.0000

84	0.0001	8.04742E-05	3.3635	8.16476E-05	3.1228
0.00000E+00	0.0000				
85	0.0003	1.98152E-04	2.1895	2.43999E-04	2.1286
0.00000E+00	0.0000				
86	0.0003	2.64551E-04	2.3449	2.12858E-04	2.2278
0.00000E+00	0.0000				
87	0.0005	3.58286E-04	2.3116	2.22263E-04	2.2126
0.00000E+00	0.0000				
88	0.0001	5.28322E-05	4.5737	9.60695E-05	4.4559
0.00000E+00	0.0000				
89	0.0001	1.00242E-04	3.5543	6.92708E-05	3.2903
0.00000E+00	0.0000				
90	0.0003	2.27214E-04	3.0590	1.34166E-04	2.9306
0.00000E+00	0.0000				
91	0.0002	1.88508E-04	3.0031	1.19270E-04	2.8237
0.00000E+00	0.0000				
92	0.0000	3.10380E-05	2.8660	2.03107E-04	2.8103
0.00000E+00	0.0000				
93	0.0002	1.24133E-04	3.7768	1.01232E-04	3.5046
0.00000E+00	0.0000				
94	0.0002	1.17067E-04	4.0681	6.55857E-05	3.8249
0.00000E+00	0.0000				
95	0.0008	6.27880E-04	1.8479	3.86764E-04	1.7938
0.00000E+00	0.0000				
96	0.0002	1.36125E-04	4.1086	6.94729E-05	3.9082
0.00000E+00	0.0000				
97	0.0004	2.80721E-04	3.7197	1.60736E-04	3.6463
0.00000E+00	0.0000				
98	0.0001	1.02353E-04	3.9152	9.81892E-05	3.7693
0.00000E+00	0.0000				
99	0.0001	9.62693E-05	4.7694	6.46697E-05	4.5993
0.00000E+00	0.0000				
100	0.0002	1.22286E-04	4.6613	8.19660E-05	4.4584
0.00000E+00	0.0000				
101	0.0002	1.20645E-04	3.1996	7.64085E-05	2.9737
0.00000E+00	0.0000				
102	0.0002	1.52562E-04	3.8106	8.52391E-05	3.6538
0.00000E+00	0.0000				
103	0.0001	9.83903E-05	3.7755	9.59549E-05	3.5705
0.00000E+00	0.0000				
104	0.0002	1.74656E-04	3.4092	1.38290E-04	3.2931
0.00000E+00	0.0000				
105	0.0002	1.20314E-04	3.5860	7.97002E-05	3.3594
0.00000E+00	0.0000				
106	0.0002	1.84431E-04	3.9082	1.37018E-04	3.8561
0.00000E+00	0.0000				
107	0.0001	6.57101E-05	3.3463	6.63034E-05	3.1510
0.00000E+00	0.0000				
108	0.0000	3.56762E-05	2.9217	1.54053E-04	2.8531
0.00000E+00	0.0000				
109	0.0002	1.33007E-04	2.0971	4.41251E-04	2.0682
0.00000E+00	0.0000				

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  110    0.0008                 6.24717E-04     2.9115
3.85421E-04     2.8844       0.00000E+00     0.0000
  111    0.0002                 1.50341E-04     4.3422
1.38288E-04     4.2262       0.00000E+00     0.0000
  112    0.0001                 1.09171E-04     4.9134
1.15318E-04     4.8182       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                 1.37075E-04     3.6708
1.19185E-04     3.4680       0.00000E+00     0.0000
  114    0.0000                 9.97776E-06     7.0935
1.38411E-05     5.8301       0.00000E+00     0.0000
  115    0.0001                 7.07071E-05     4.2417
8.24811E-05     3.8944       0.00000E+00     0.0000
  116    0.0002                 1.89606E-04     2.8907
1.42792E-04     2.6021       0.00000E+00     0.0000
  117    0.0006                 4.73875E-04     2.5834
2.53294E-04     2.4249       0.00000E+00     0.0000
  118    0.0008                 5.77447E-04     2.0828
4.51225E-04     1.9932       0.00000E+00     0.0000
  119    0.0002                 1.38838E-04     2.1168
3.58535E-04     2.0428       0.00000E+00     0.0000
  120    0.0002                 1.70215E-04     2.3962
6.47758E-04     2.3607       0.00000E+00     0.0000
  121    0.0007                 5.34039E-04     2.5987
4.10656E-04     2.5378       0.00000E+00     0.0000
  122    0.0001                 1.00141E-04     4.2168
7.84341E-05     3.9188       0.00000E+00     0.0000
  123    0.0003                 2.13325E-04     2.6534
1.51233E-04     2.3423       0.00000E+00     0.0000
  124    0.0003                 2.37200E-04     2.8499
1.95418E-04     2.6671       0.00000E+00     0.0000
  125    0.0002                 1.41794E-04     3.2591
1.30232E-04     2.9510       0.00000E+00     0.0000
  126    0.0001                 9.39712E-05     3.5151
8.49672E-05     3.0827       0.00000E+00     0.0000
  127    0.0005                 4.18821E-04     3.4214
2.05066E-04     3.2430       0.00000E+00     0.0000
  128    0.0003                 2.30368E-04     3.1504
1.41565E-04     2.8042       0.00000E+00     0.0000
  129    0.0006                 4.63953E-04     2.4675
4.26696E-04     2.3539       0.00000E+00     0.0000
  130    0.0002                 1.18873E-04     2.8961
2.89682E-04     2.8103       0.00000E+00     0.0000
  131    0.0004                 2.89398E-04     2.3488
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2.33692E-04	1.9829	0.00000E+00	0.0000	132	0.0007	5.23092E-04	2.3807
3.21576E-04	2.1882	0.00000E+00	0.0000	133	0.0014	1.03727E-03	1.7345
6.55848E-04	1.6457	0.00000E+00	0.0000	134	0.0001	8.73280E-05	2.2356
2.28567E-04	1.8859	0.00000E+00	0.0000	135	0.0002	1.74150E-04	3.1087
2.58360E-04	3.0292	0.00000E+00	0.0000	136	0.0001	4.58151E-05	1.8938
7.11035E-04	1.8640	0.00000E+00	0.0000	137	0.0000	1.92961E-05	1.1797
3.47214E-03	1.1767	0.00000E+00	0.0000	138	0.0004	3.20187E-04	2.3591
8.33806E-04	2.3256	0.00000E+00	0.0000	139	0.0002	1.76101E-04	3.3001
2.16626E-04	3.1015	0.00000E+00	0.0000	140	0.0003	2.15948E-04	2.3712
2.86529E-04	2.0659	0.00000E+00	0.0000	141	0.0001	8.18081E-05	2.5258
2.57387E-04	2.2583	0.00000E+00	0.0000	142	0.0001	6.65522E-05	2.6794
2.29810E-04	2.4634	0.00000E+00	0.0000	143	0.0001	8.28299E-05	2.1473
1.76779E-04	1.3335	0.00000E+00	0.0000	144	0.0000	3.34000E-05	3.6949
7.35649E-05	2.2326	0.00000E+00	0.0000	145	0.0005	3.72697E-04	2.7696
2.93465E-04	2.5144	0.00000E+00	0.0000	146	0.0004	3.42582E-04	2.2536
2.50662E-04	1.8237	0.00000E+00	0.0000	147	0.0002	1.86154E-04	4.3187
1.18582E-04	3.7674	0.00000E+00	0.0000	148	0.0001	5.61612E-05	5.7535
3.80409E-05	4.5884	0.00000E+00	0.0000	149	0.0000	3.14248E-05	7.6640
2.16343E-05	5.8777	0.00000E+00	0.0000	150	0.0001	8.63861E-05	4.0663
6.29594E-05	3.0098	0.00000E+00	0.0000	151	0.0001	6.43117E-05	4.3972
5.51136E-05	3.0371	0.00000E+00	0.0000	152	0.0001	4.13753E-05	4.2660
4.70541E-05	2.6150	0.00000E+00	0.0000	153	0.0001	4.20889E-05	3.9083
4.71766E-05	2.2754	0.00000E+00	0.0000	154	0.0001	4.50808E-05	4.3374
4.82746E-05	2.4729	0.00000E+00	0.0000	155	0.0001	4.96664E-05	4.4470
4.93113E-05	2.6424	0.00000E+00	0.0000	156	0.0001	4.92012E-05	5.6229
4.75786E-05	3.4385	0.00000E+00	0.0000	157	0.0001	5.86894E-05	3.9550

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5.70792E-05     2.4026       0.00000E+00     0.0000
  158    0.0001                 6.24337E-05     4.2217
6.46211E-05     2.7267       0.00000E+00     0.0000
  159    0.0002                 1.52235E-04     2.7011
2.11260E-04     2.2487       0.00000E+00     0.0000
  160    0.0001                 5.97335E-05     3.7641
7.15762E-05     2.8223       0.00000E+00     0.0000
  161    0.0001                 7.26405E-05     4.0631
7.21267E-05     2.6337       0.00000E+00     0.0000
  162    0.0001                 7.93216E-05     3.6028
7.74720E-05     2.2690       0.00000E+00     0.0000
  163    0.0001                 9.75646E-05     3.8528
8.92853E-05     2.4689       0.00000E+00     0.0000
  164    0.0001                 1.04741E-04     3.4534
9.57673E-05     2.2234       0.00000E+00     0.0000
  165    0.0001                 1.11511E-04     3.2513
1.03387E-04     2.0226       0.00000E+00     0.0000
  166    0.0001                 7.20334E-05     4.2932
6.48957E-05     2.7211       0.00000E+00     0.0000
  167    0.0001                 8.17207E-05     4.1050
7.27788E-05     2.7537       0.00000E+00     0.0000
  168    0.0001                 8.95464E-05     3.9152
7.90975E-05     2.5963       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                 1.02766E-04     4.1323
9.11746E-05     2.8864       0.00000E+00     0.0000
  170    0.0002                 1.34298E-04     3.4228
1.14999E-04     2.5586       0.00000E+00     0.0000
  171    0.0001                 9.45627E-05     4.7831
7.39083E-05     3.7853       0.00000E+00     0.0000
  172    0.0002                 1.42585E-04     4.3295
1.00618E-04     3.6649       0.00000E+00     0.0000
  173    0.0003                 2.04607E-04     4.1467
1.33636E-04     3.6290       0.00000E+00     0.0000
  174    0.0003                 2.46202E-04     4.0340
1.53543E-04     3.5908       0.00000E+00     0.0000
  175    0.0001                 1.03805E-04     5.9760
6.33074E-05     5.3495       0.00000E+00     0.0000
  176    0.0001                 1.01056E-04     6.5700
6.10795E-05     5.8297       0.00000E+00     0.0000
  177    0.0002                 1.15520E-04     6.8829
6.84168E-05     6.1760       0.00000E+00     0.0000
  178    0.0002                 1.21907E-04     5.5827
7.10300E-05     5.0231       0.00000E+00     0.0000
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179	0.0002	1.15114E-04	6.5513	6.71005E-05	5.8516
0.00000E+00	0.0000				
180	0.0001	1.11923E-04	5.7898	6.50038E-05	5.1473
0.00000E+00	0.0000				
181	0.0001	1.10888E-04	6.4244	6.41182E-05	5.6666
0.00000E+00	0.0000				
182	0.0001	1.10655E-04	6.0661	6.37595E-05	5.3352
0.00000E+00	0.0000				
183	0.0001	8.96760E-05	6.2420	5.29053E-05	5.3883
0.00000E+00	0.0000				
184	0.0001	9.76562E-05	7.1568	5.69291E-05	6.2000
0.00000E+00	0.0000				
185	0.0001	9.76961E-05	6.0907	5.66140E-05	5.2571
0.00000E+00	0.0000				
186	0.0001	9.97851E-05	6.4883	5.76914E-05	5.6052
0.00000E+00	0.0000				
187	0.0001	7.66206E-05	6.8276	4.58599E-05	5.6184
0.00000E+00	0.0000				
188	0.0001	1.03999E-04	6.2888	5.95431E-05	5.4280
0.00000E+00	0.0000				
189	0.0001	8.24159E-05	6.8270	4.89888E-05	5.6896
0.00000E+00	0.0000				
190	0.0003	2.04268E-04	4.2066	1.22043E-04	3.4633
0.00000E+00	0.0000				
191	0.0003	2.04196E-04	4.6546	1.22701E-04	3.7894
0.00000E+00	0.0000				
192	0.0003	2.04151E-04	3.7273	1.23094E-04	2.9954
0.00000E+00	0.0000				
193	0.0003	2.17660E-04	3.9561	1.29968E-04	3.2026
0.00000E+00	0.0000				
194	0.0005	3.96885E-04	2.7564	2.44647E-04	2.1814
0.00000E+00	0.0000				
195	0.0006	4.30538E-04	2.9219	2.65545E-04	2.3078
0.00000E+00	0.0000				
196	0.0006	4.63720E-04	2.7502	2.88817E-04	2.1479
0.00000E+00	0.0000				
197	0.0007	5.44629E-04	2.2447	3.34053E-04	1.7587
0.00000E+00	0.0000				
198	0.0007	5.47691E-04	2.5827	3.43610E-04	2.0034
0.00000E+00	0.0000				
199	0.0004	3.18005E-04	3.0446	1.97653E-04	2.3760
0.00000E+00	0.0000				
200	0.0005	3.52621E-04	2.7539	2.17251E-04	2.1393
0.00000E+00	0.0000				
201	0.0010	8.02441E-04	2.2136	4.90008E-04	1.7381
0.00000E+00	0.0000				
202	0.0012	9.57286E-04	2.0390	5.83797E-04	1.6288
0.00000E+00	0.0000				
203	0.0016	1.21873E-03	1.9530	7.28059E-04	1.5901
0.00000E+00	0.0000				
204	0.0022	1.65265E-03	1.6999	9.73906E-04	1.4139
0.00000E+00	0.0000				

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  205    0.0015                 1.15241E-03     2.0439
6.73588E-04     1.7362       0.00000E+00     0.0000
  206    0.0018                 1.37359E-03     2.1348
8.02860E-04     1.8341       0.00000E+00     0.0000
  207    0.0021                 1.62524E-03     1.7789
9.47456E-04     1.5450       0.00000E+00     0.0000
  208    0.0029                 2.18753E-03     1.4275
1.27315E-03     1.2584       0.00000E+00     0.0000
  209    0.0031                 2.36375E-03     1.5466
1.39094E-03     1.3638       0.00000E+00     0.0000
  210    0.0038                 2.89332E-03     1.2065
1.72048E-03     1.0623       0.00000E+00     0.0000
  211    0.0041                 3.11997E-03     1.1859
1.88092E-03     1.0283       0.00000E+00     0.0000
  212    0.0046                 3.53610E-03     1.2666
2.14901E-03     1.0794       0.00000E+00     0.0000
  213    0.0064                 4.89002E-03     1.0603
2.96693E-03     0.9035       0.00000E+00     0.0000
  214    0.0096                 7.31774E-03     0.7566
4.40804E-03     0.6407       0.00000E+00     0.0000
  215    0.0156                 1.19306E-02     0.6342
7.12944E-03     0.5291       0.00000E+00     0.0000
  216    0.0300                 2.29958E-02     0.4719
1.35653E-02     0.3975       0.00000E+00     0.0000
  217    0.0200                 1.53337E-02     0.5627
9.02016E-03     0.4735       0.00000E+00     0.0000
  218    0.0276                 2.11358E-02     0.4878
1.23812E-02     0.4140       0.00000E+00     0.0000
  219    0.0359                 2.75128E-02     0.3969
1.60415E-02     0.3357       0.00000E+00     0.0000
  220    0.0475                 3.63791E-02     0.3370
2.11417E-02     0.2848       0.00000E+00     0.0000
  221    0.0625                 4.78833E-02     0.3072
2.77663E-02     0.2595       0.00000E+00     0.0000
  222    0.0801                 6.13279E-02     0.2726
3.55277E-02     0.2356       0.00000E+00     0.0000
  223    0.1047                 8.01781E-02     0.2755
4.64870E-02     0.2377       0.00000E+00     0.0000
  224    0.0581                 4.45194E-02     0.3098
2.59431E-02     0.2622       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                 1.76432E-01     0.1640
1.04516E-01     0.1411       0.00000E+00     0.0000
  226    0.0454                 3.47595E-02     0.3729
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2.11623E-02     0.3045       0.00000E+00     0.0000
  227    0.0492                 3.76921E-02     0.3332
2.33958E-02     0.2659       0.00000E+00     0.0000
  228    0.0212                 1.62340E-02     0.6109
1.02623E-02     0.4758       0.00000E+00     0.0000
  229    0.0223                 1.70735E-02     0.4883
1.09692E-02     0.3891       0.00000E+00     0.0000
  230    0.0116                 8.84602E-03     0.7228
5.80814E-03     0.5712       0.00000E+00     0.0000
  231    0.0122                 9.33698E-03     0.6755
6.22285E-03     0.5021       0.00000E+00     0.0000
  232    0.0129                 9.91421E-03     0.6963
6.75668E-03     0.5266       0.00000E+00     0.0000
  233    0.0084                 6.42359E-03     0.7927
4.50411E-03     0.5823       0.00000E+00     0.0000
  234    0.0059                 4.54345E-03     1.1284
3.26898E-03     0.8087       0.00000E+00     0.0000
  235    0.0025                 1.92117E-03     1.8499
1.26278E-03     1.4136       0.00000E+00     0.0000
  236    0.0019                 1.48145E-03     1.8134
9.93681E-04     1.3594       0.00000E+00     0.0000
  237    0.0018                 1.36716E-03     2.0156
9.58222E-04     1.4365       0.00000E+00     0.0000
  238    0.0001                 6.98614E-05     9.5839
6.04297E-05     5.4735       0.00000E+00     0.0000

 system total =                 7.65849E-01     0.0538
4.68986E-01     0.0472       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3114E-01  +
or -  0.0002



 elapsed time   3.11283 minutes

 random number=   2CA7906A38B090A7
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.089E-03
```

0.05 7.658E-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	1.445E-08	24.43	1.015E-08	23.67	1.098E-08	24.18
3	8.988E-07	4.29	7.423E-07	3.84	8.051E-07	3.95
4	1.451E-06	3.07	1.216E-06	2.83	1.294E-06	2.79
5	2.333E-06	2.35	1.887E-06	2.09	2.029E-06	2.05
6	9.372E-06	1.43	7.562E-06	1.26	8.043E-06	1.26
7	1.241E-05	1.13	9.504E-06	1.05	1.009E-05	0.98
8	3.081E-05	0.77	2.260E-05	0.72	2.371E-05	0.68
9	8.222E-05	0.56	5.877E-05	0.47	6.131E-05	0.44
10	4.632E-05	0.63	3.290E-05	0.52	3.421E-05	0.52
11	2.184E-04	0.31	1.545E-04	0.25	1.603E-04	0.24
12	1.905E-04	0.31	1.380E-04	0.25	1.448E-04	0.26
13	5.663E-05	0.52	4.149E-05	0.43	4.336E-05	0.43
14	2.534E-04	0.27	1.837E-04	0.22	1.918E-04	0.21
15	2.203E-04	0.26	1.600E-04	0.23	1.665E-04	0.23
16	7.148E-05	0.42	5.170E-05	0.36	5.407E-05	0.36
17	3.231E-05	0.74	2.365E-05	0.60	2.466E-05	0.56
18	2.783E-05	0.65	2.028E-05	0.58	2.101E-05	0.54
19	5.039E-05	0.54	3.681E-05	0.47	3.815E-05	0.45
20	3.951E-05	0.62	2.898E-05	0.50	3.037E-05	0.47
21	8.030E-05	0.43	5.874E-05	0.36	6.136E-05	0.32
22	7.349E-05	0.42	5.362E-05	0.36	5.551E-05	0.37
23	7.631E-05	0.45	5.610E-05	0.37	5.839E-05	0.38
24	1.859E-05	0.78	1.366E-05	0.68	1.423E-05	0.65
25	2.347E-05	0.78	1.736E-05	0.70	1.821E-05	0.67
26	1.342E-05	1.02	9.831E-06	0.89	1.041E-05	0.87
27	4.143E-05	0.53	3.080E-05	0.48	3.268E-05	0.48
28	7.709E-05	0.40	5.712E-05	0.34	6.058E-05	0.35
29	7.960E-05	0.38	5.915E-05	0.31	6.222E-05	0.32
30	1.018E-05	0.98	7.708E-06	0.91	8.019E-06	0.87
31	7.825E-05	0.40	5.880E-05	0.33	6.202E-05	0.32
32	3.100E-05	0.60	2.317E-05	0.48	2.444E-05	0.47
33	2.661E-05	0.68	2.017E-05	0.59	2.127E-05	0.57
34	6.105E-05	0.49	4.611E-05	0.37	4.867E-05	0.35
35	3.616E-05	0.49	2.731E-05	0.42	2.882E-05	0.39

36	3.395E-05	0.54	2.560E-05	0.50	2.684E-05	0.45
37	2.207E-05	0.66	1.655E-05	0.49	1.742E-05	0.47
38	2.561E-05	0.61	1.964E-05	0.48	2.065E-05	0.45
39	9.698E-05	0.32	7.468E-05	0.29	7.893E-05	0.25
40	9.077E-05	0.35	6.991E-05	0.29	7.455E-05	0.28
41	1.140E-04	0.30	8.886E-05	0.26	9.476E-05	0.25
42	9.397E-05	0.34	7.408E-05	0.31	7.938E-05	0.26
43	5.110E-05	0.38	4.059E-05	0.32	4.277E-05	0.29
44	7.003E-05	0.32	5.613E-05	0.29	6.031E-05	0.28
45	3.552E-05	0.42	2.829E-05	0.39	3.125E-05	0.36
46	8.268E-06	0.86	6.575E-06	0.77	7.137E-06	0.67
47	2.337E-05	0.54	1.860E-05	0.42	1.940E-05	0.41
48	6.597E-06	1.05	5.299E-06	0.94	5.560E-06	0.71
49	4.359E-05	0.43	3.492E-05	0.37	3.767E-05	0.32
50	2.948E-05	0.51	2.361E-05	0.42	2.580E-05	0.36
51	7.960E-06	1.00	6.395E-06	0.89	6.926E-06	0.72
52	2.082E-05	0.52	1.675E-05	0.46	1.828E-05	0.43
53	7.625E-05	0.29	6.150E-05	0.23	6.677E-05	0.21
54	3.319E-05	0.44	2.697E-05	0.41	2.914E-05	0.34
55	6.652E-05	0.29	5.399E-05	0.26	5.889E-05	0.25
56	4.347E-05	0.38	3.539E-05	0.36	3.856E-05	0.27
57	4.933E-05	0.34	4.022E-05	0.31	4.370E-05	0.27
58	2.591E-05	0.51	2.126E-05	0.42	2.316E-05	0.35
59	4.462E-05	0.42	3.636E-05	0.37	3.951E-05	0.29
60	6.459E-05	0.32	5.281E-05	0.27	5.735E-05	0.23
61	6.069E-06	0.90	5.004E-06	0.71	5.431E-06	0.67
62	3.241E-05	0.42	2.649E-05	0.35	2.888E-05	0.31
63	2.189E-05	0.62	1.788E-05	0.49	1.954E-05	0.37
64	1.732E-05	0.59	1.424E-05	0.49	1.543E-05	0.44
65	5.722E-06	1.00	4.709E-06	0.95	5.124E-06	0.77
66	2.843E-05	0.42	2.341E-05	0.41	2.543E-05	0.35
67	2.103E-05	0.51	1.741E-05	0.46	1.881E-05	0.37
68	4.755E-06	0.99	3.868E-06	0.92	4.192E-06	0.71
69	3.741E-05	0.46	3.083E-05	0.37	3.349E-05	0.31
70	2.647E-05	0.42	2.186E-05	0.36	2.372E-05	0.32
71	4.581E-05	0.39	3.780E-05	0.34	4.102E-05	0.26
72	2.650E-06	1.19	2.197E-06	1.09	2.392E-06	1.04
73	2.708E-05	0.48	2.234E-05	0.41	2.430E-05	0.34
74	7.971E-05	0.27	6.605E-05	0.24	7.154E-05	0.19
75	9.132E-06	0.71	7.547E-06	0.58	8.166E-06	0.51
76	2.283E-05	0.51	1.900E-05	0.46	2.061E-05	0.36
77	1.767E-05	0.48	1.471E-05	0.47	1.598E-05	0.38
78	1.567E-06	1.97	1.309E-06	1.69	1.415E-06	1.37
79	9.989E-06	0.71	8.289E-06	0.63	8.984E-06	0.52
80	4.670E-06	1.12	3.801E-06	0.88	4.144E-06	0.80
81	5.520E-05	0.31	4.587E-05	0.27	4.992E-05	0.24
82	3.231E-06	1.49	2.691E-06	1.23	2.905E-06	0.91
83	4.392E-06	1.03	3.636E-06	0.92	3.951E-06	0.78
84	8.244E-06	0.80	6.817E-06	0.71	7.381E-06	0.55
85	9.972E-06	0.63	8.343E-06	0.57	9.066E-06	0.47
86	1.349E-05	0.57	1.121E-05	0.47	1.220E-05	0.40
87	1.210E-05	0.60	1.005E-05	0.54	1.086E-05	0.41

88	3.164E-06	1.35	2.632E-06	1.15	2.856E-06	0.95
89	6.613E-06	0.91	5.512E-06	0.86	5.964E-06	0.71
90	6.905E-06	0.84	5.797E-06	0.71	6.256E-06	0.65
91	8.396E-06	0.81	6.984E-06	0.71	7.489E-06	0.59
92	4.731E-06	1.02	3.995E-06	0.96	4.314E-06	0.70
93	8.016E-06	0.77	6.705E-06	0.70	7.241E-06	0.55
94	4.267E-06	1.15	3.582E-06	1.05	3.893E-06	0.77
95	1.248E-05	0.64	1.042E-05	0.57	1.139E-05	0.44
96	3.302E-06	1.26	2.755E-06	1.05	3.018E-06	0.89
97	3.357E-06	1.30	2.829E-06	1.21	3.096E-06	0.91
98	3.526E-06	1.15	2.932E-06	1.10	3.190E-06	0.88
99	2.305E-06	1.61	1.927E-06	1.30	2.059E-06	1.03
100	3.439E-06	1.20	2.896E-06	1.18	3.116E-06	0.83
101	4.950E-06	0.99	4.141E-06	0.95	4.499E-06	0.68
102	3.344E-06	1.10	2.805E-06	0.98	3.061E-06	0.84
103	4.670E-06	1.18	3.928E-06	0.87	4.244E-06	0.68
104	4.207E-06	1.11	3.516E-06	1.08	3.800E-06	0.74
105	4.279E-06	0.98	3.655E-06	1.01	3.952E-06	0.82
106	1.545E-06	1.64	1.299E-06	1.48	1.427E-06	1.17
107	3.557E-06	1.18	3.006E-06	1.06	3.223E-06	0.86
108	3.232E-06	1.23	2.729E-06	1.22	2.963E-06	1.04
109	5.108E-06	0.97	4.293E-06	0.89	4.660E-06	0.73
110	2.984E-06	1.22	2.546E-06	1.10	2.799E-06	0.87
111	3.035E-06	1.29	2.572E-06	1.06	2.817E-06	0.90
112	1.797E-06	1.51	1.513E-06	1.28	1.681E-06	1.02
113	5.773E-06	1.01	4.866E-06	0.95	5.276E-06	0.76
114	1.988E-06	1.66	1.679E-06	1.67	1.788E-06	1.25
115	5.127E-06	0.98	4.278E-06	0.87	4.635E-06	0.70
116	1.070E-05	0.73	8.978E-06	0.63	9.733E-06	0.52
117	1.166E-05	0.56	9.829E-06	0.52	1.061E-05	0.42
118	1.271E-05	0.58	1.071E-05	0.52	1.162E-05	0.41
119	8.254E-06	0.75	6.984E-06	0.66	7.563E-06	0.54
120	5.801E-06	0.85	4.930E-06	0.71	5.370E-06	0.58
121	6.128E-06	0.92	5.148E-06	0.73	5.627E-06	0.64
122	3.228E-06	1.23	2.708E-06	1.04	2.918E-06	0.95
123	1.030E-05	0.72	8.591E-06	0.62	9.305E-06	0.50
124	7.410E-06	0.82	6.204E-06	0.79	6.679E-06	0.65
125	7.059E-06	0.82	5.893E-06	0.69	6.388E-06	0.59
126	5.761E-06	0.98	4.820E-06	0.77	5.240E-06	0.64
127	5.649E-06	0.99	4.719E-06	0.79	5.080E-06	0.73
128	7.815E-06	0.77	6.579E-06	0.73	7.057E-06	0.57
129	9.635E-06	0.74	8.129E-06	0.70	8.706E-06	0.52
130	4.059E-06	1.00	3.421E-06	0.93	3.717E-06	0.76
131	1.685E-05	0.49	1.420E-05	0.50	1.533E-05	0.37
132	1.120E-05	0.67	9.414E-06	0.50	1.020E-05	0.45
133	1.371E-05	0.55	1.155E-05	0.48	1.245E-05	0.37
134	1.462E-05	0.57	1.225E-05	0.52	1.331E-05	0.42
135	2.400E-06	1.12	2.066E-06	1.05	2.245E-06	0.93
136	3.893E-06	0.91	3.352E-06	0.85	3.688E-06	0.68
137	2.521E-06	1.11	2.638E-06	1.01	2.992E-06	0.86
138	4.110E-06	0.97	3.563E-06	0.99	3.898E-06	0.88
139	4.579E-06	1.05	3.910E-06	0.86	4.202E-06	0.72

140	1.211E-05	0.66	1.022E-05	0.54	1.097E-05	0.44
141	8.876E-06	0.73	7.507E-06	0.62	8.081E-06	0.50
142	5.798E-06	0.92	4.935E-06	0.84	5.322E-06	0.63
143	2.001E-05	0.54	1.677E-05	0.43	1.805E-05	0.38
144	8.088E-06	0.84	6.831E-06	0.68	7.340E-06	0.55
145	7.176E-06	0.83	6.174E-06	0.76	6.595E-06	0.60
146	1.206E-05	0.64	1.016E-05	0.58	1.099E-05	0.50
147	3.666E-06	1.20	3.104E-06	1.04	3.359E-06	0.84
148	1.874E-06	1.67	1.563E-06	1.48	1.716E-06	1.22
149	1.141E-06	1.98	9.694E-07	1.74	1.049E-06	1.40
150	3.982E-06	0.97	3.341E-06	0.85	3.604E-06	0.73
151	4.049E-06	1.15	3.440E-06	1.04	3.725E-06	0.80
152	4.320E-06	1.05	3.647E-06	0.98	3.910E-06	0.78
153	4.522E-06	1.14	3.804E-06	0.95	4.118E-06	0.80
154	4.652E-06	1.12	3.934E-06	0.95	4.224E-06	0.73
155	4.358E-06	1.08	3.659E-06	0.95	3.914E-06	0.80
156	3.983E-06	1.00	3.349E-06	0.96	3.614E-06	0.78
157	4.633E-06	0.94	3.929E-06	0.88	4.229E-06	0.71
158	4.867E-06	0.98	4.089E-06	0.85	4.415E-06	0.71
159	6.835E-06	0.80	5.762E-06	0.73	6.197E-06	0.61
160	3.524E-06	1.34	2.996E-06	1.15	3.228E-06	0.94
161	5.001E-06	1.04	4.212E-06	0.87	4.556E-06	0.71
162	5.829E-06	0.90	4.908E-06	0.82	5.324E-06	0.64
163	6.141E-06	0.95	5.170E-06	0.81	5.611E-06	0.65
164	6.417E-06	1.02	5.449E-06	0.91	5.937E-06	0.81
165	6.819E-06	0.80	5.761E-06	0.78	6.218E-06	0.59
166	3.987E-06	0.97	3.379E-06	0.91	3.630E-06	0.74
167	4.184E-06	1.10	3.561E-06	0.90	3.811E-06	0.62
168	4.348E-06	1.10	3.651E-06	0.89	3.916E-06	0.77
169	4.472E-06	1.15	3.753E-06	0.93	4.067E-06	0.81
170	4.574E-06	0.96	3.902E-06	0.88	4.225E-06	0.76
171	2.423E-06	1.42	2.046E-06	1.19	2.201E-06	1.05
172	2.431E-06	1.38	2.085E-06	1.20	2.220E-06	0.98
173	2.436E-06	1.32	2.069E-06	1.12	2.252E-06	0.90
174	2.532E-06	1.25	2.118E-06	1.22	2.306E-06	0.80
175	1.059E-06	2.17	8.924E-07	1.93	9.650E-07	1.59
176	9.984E-07	2.01	8.708E-07	1.75	9.382E-07	1.41
177	1.027E-06	1.75	8.763E-07	1.80	9.396E-07	1.27
178	9.967E-07	2.07	8.614E-07	1.88	9.409E-07	1.54
179	1.089E-06	2.24	9.056E-07	2.00	9.863E-07	1.52
180	1.053E-06	2.19	9.012E-07	1.99	9.667E-07	1.69
181	1.051E-06	1.98	9.016E-07	1.79	9.741E-07	1.55
182	1.079E-06	1.90	9.179E-07	1.63	9.814E-07	1.33
183	1.109E-06	1.88	9.278E-07	1.53	9.968E-07	1.28
184	1.119E-06	1.90	9.452E-07	1.73	1.020E-06	1.35
185	1.105E-06	1.84	9.352E-07	1.81	1.005E-06	1.32
186	1.120E-06	2.14	9.565E-07	2.06	1.034E-06	1.52
187	1.125E-06	2.00	9.699E-07	1.70	1.047E-06	1.38
188	1.185E-06	1.77	9.852E-07	1.55	1.049E-06	1.13
189	1.186E-06	1.86	1.010E-06	1.62	1.088E-06	1.45
190	3.024E-06	1.23	2.562E-06	1.14	2.779E-06	0.96
191	3.078E-06	1.10	2.630E-06	1.09	2.827E-06	0.84

192	3.210E-06	1.27	2.719E-06	1.06	2.925E-06	0.86
193	3.259E-06	1.16	2.763E-06	1.02	3.009E-06	0.80
194	6.841E-06	0.86	5.776E-06	0.70	6.218E-06	0.61
195	7.305E-06	0.82	6.175E-06	0.67	6.657E-06	0.49
196	7.904E-06	0.76	6.677E-06	0.68	7.162E-06	0.49
197	8.437E-06	0.69	7.106E-06	0.60	7.696E-06	0.54
198	8.898E-06	0.74	7.570E-06	0.64	8.173E-06	0.52
199	4.831E-06	0.95	4.059E-06	0.84	4.416E-06	0.67
200	5.076E-06	1.05	4.303E-06	0.88	4.672E-06	0.70
201	1.068E-05	0.64	9.066E-06	0.55	9.789E-06	0.48
202	1.203E-05	0.59	1.010E-05	0.52	1.101E-05	0.47
203	1.281E-05	0.53	1.085E-05	0.49	1.185E-05	0.43
204	1.475E-05	0.60	1.254E-05	0.48	1.359E-05	0.43
205	8.574E-06	0.72	7.671E-06	0.61	8.132E-06	0.48
206	9.244E-06	0.69	8.323E-06	0.59	8.864E-06	0.46
207	9.686E-06	0.68	8.731E-06	0.59	9.236E-06	0.51
208	1.124E-05	0.63	1.015E-05	0.55	1.077E-05	0.44
209	1.161E-05	0.56	1.057E-05	0.54	1.115E-05	0.42
210	1.400E-05	0.51	1.275E-05	0.44	1.348E-05	0.37
211	1.606E-05	0.43	1.457E-05	0.39	1.552E-05	0.33
212	1.910E-05	0.46	1.726E-05	0.40	1.840E-05	0.29
213	2.611E-05	0.36	2.350E-05	0.33	2.518E-05	0.28
214	3.681E-05	0.30	3.312E-05	0.24	3.561E-05	0.24
215	5.486E-05	0.29	4.980E-05	0.22	5.369E-05	0.21
216	9.199E-05	0.22	8.394E-05	0.18	9.081E-05	0.14
217	5.533E-05	0.25	5.299E-05	0.19	5.619E-05	0.15
218	7.072E-05	0.23	6.800E-05	0.17	7.217E-05	0.14
219	8.416E-05	0.21	8.145E-05	0.18	8.671E-05	0.15
220	1.012E-04	0.20	9.882E-05	0.16	1.053E-04	0.13
221	1.203E-04	0.17	1.185E-04	0.15	1.265E-04	0.12
222	1.364E-04	0.15	1.365E-04	0.13	1.456E-04	0.11
223	1.534E-04	0.15	1.576E-04	0.12	1.676E-04	0.10
224	7.520E-05	0.18	7.992E-05	0.14	8.461E-05	0.13
225	2.335E-04	0.12	2.724E-04	0.10	2.828E-04	0.08
226	3.176E-05	0.24	4.495E-05	0.23	4.446E-05	0.14
227	2.885E-05	0.25	4.628E-05	0.20	4.446E-05	0.13
228	1.046E-05	0.37	1.898E-05	0.32	1.757E-05	0.16
229	9.725E-06	0.39	1.971E-05	0.34	1.752E-05	0.19
230	4.483E-06	0.51	1.018E-05	0.44	8.718E-06	0.21
231	4.219E-06	0.52	1.052E-05	0.41	8.761E-06	0.21
232	3.967E-06	0.64	1.135E-05	0.40	8.896E-06	0.22
233	2.214E-06	0.67	7.423E-06	0.56	5.530E-06	0.25
234	1.420E-06	0.85	5.404E-06	0.67	3.824E-06	0.30
235	5.294E-07	1.44	1.048E-06	1.13	1.122E-06	0.54
236	3.469E-07	1.85	7.499E-07	1.21	8.008E-07	0.52
237	2.372E-07	2.00	5.454E-07	1.48	6.127E-07	0.53
238	5.939E-09	11.14	2.354E-08	6.28	2.588E-08	2.04

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
 0.7559 to 0.7588     *****
 0.7588 to 0.7616     **********
 0.7616 to 0.7644     **********************
 0.7644 to 0.7673     ***************************
 0.7673 to 0.7701     *********************
 0.7701 to 0.7729     ***********
 0.7729 to 0.7757     ***
 0.7757 to 0.7786     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7559 to 0.7588     ****
 0.7588 to 0.7616     *********
 0.7616 to 0.7644     ****************
 0.7644 to 0.7673     *******************
 0.7673 to 0.7701     ****************
```

```
 0.7701 to 0.7729     ********
 0.7729 to 0.7757     **
 0.7757 to 0.7786     *

                               frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7559 to 0.7588     ****
 0.7588 to 0.7616     ********
 0.7616 to 0.7644     **************
 0.7644 to 0.7673     ************
 0.7673 to 0.7701     ******
 0.7701 to 0.7729     *****
 0.7729 to 0.7757     *
 0.7757 to 0.7786

                               frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7559 to 0.7588
 0.7588 to 0.7616     *****
 0.7616 to 0.7644     ********
 0.7644 to 0.7673     *****
 0.7673 to 0.7701     *****
 0.7701 to 0.7729     **
 0.7729 to 0.7757
 0.7757 to 0.7786

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

**********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76584 + or - 0.00052                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65587E-02 + or -  1.29397E-04           ***
        ***
***
```

```
        ***        system nu bar
2.43895E+00 + or -  9.78861E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52830E-01 + or -  1.72868E-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     3.11467 minutes


*********************************************************************
*********************************************************
1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
```

```
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00              99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666



      0000000       666666666666                            44
22222222222                            44              44
     000000000     6666666666666                           444
2222222222222                          444             444
    00       00    66                   :::              4444     22
22         :::             4444            4444
   00         00   66                   :::             44 44
22         :::            44 44           44 44
   00         00   66                   :::            44  44
22         :::           44  44          44  44
   00         00   666666666666                        44   44
22                        44   44         44   44
   00         00   6666666666666                     44    44
22                         44    44        44    44
   00         00   66         66         :::        444444444444
22               :::        444444444444    444444444444
   00         00   66         66         :::       4444444444444
22                  :::       4444444444444   4444444444444
    00       00    66         66         :::                44      22
:::                44              44
     000000000     6666666666666                           44
2222222222222                          44              44
      0000000       66666666666                            44
2222222222222                          44              44
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE




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

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

```
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:42:44.82
*****
        *****
*****
        *****
*****

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1

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

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```

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

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        ***
***
        ***          unit
volume                                          ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
```

```
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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

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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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90905E-08  1.32112E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.16757E-08  3.17713E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.38587E-09  3.85418E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.89333E-10  8.21983E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.42057E-17  3.95068E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.66099E-10  4.71875E-09   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  1.21456E-08  3.45043E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.02012E-09  2.32645E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  2.46132E-12  7.28719E-11   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.26016E-09  3.73089E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  8.05264E-11  2.48052E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.83546E-11  1.84996E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
```

```
    1045103  5.34344E-10  1.64597E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  5.85238E-14  1.83778E-12   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  2.04125E-10  6.40995E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53964E-12  2.13188E-10   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  8.98777E-11  2.90303E-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  1.29594E-09  4.30225E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43912E-09  8.17026E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.57092E-12  8.84269E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51422E-11  2.24056E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
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    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.29606E-11  1.25209E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.12580E-10  4.34405E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  1.16610E-19  4.70915E-18   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.77053E-10  2.26117E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  1.35934E-11  5.40796E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  4.72405E-17  1.90771E-15   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.34747E-09  5.36074E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.11960E-15  8.49607E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41913E-09  5.73079E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23440E-09  5.05876E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  4.21010E-11  1.76321E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.29461E-10  5.46057E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  2.36639E-13  1.01232E-11   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.09178E-10  3.05506E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.09809E-09  4.63163E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  4.86315E-11  2.08039E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.15688E-09  4.94895E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  4.00673E-10  1.72601E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32868E-10  3.61280E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.24111E-11  5.45811E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
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    1061147  3.87403E-10  1.70369E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.35342E-17  5.99256E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  2.45070E-13  1.09245E-11   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.53703E-11  2.43503E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.22888E-10  9.93558E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06731E-09  1.38569E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50024E-11  2.50125E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  2.25176E-14  1.03075E-12   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45311E-09  6.56458E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59131E-09  7.28426E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30585E-14  6.01671E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.11206E-12  2.83442E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.40213E-13  6.54433E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84213E-12  2.65673E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27379E-10  1.98194E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94506E-10  2.77476E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51352E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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
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    1082206  1.31999E-09  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.13910E-11  8.08276E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.61930E-17  1.86644E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.29198E-10  6.64910E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88246E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71709E-20  2.68216E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08657E-20  7.84045E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  7.16783E-31  5.19364E-29   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.45649E-21  2.50448E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.74774E-21  7.09221E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.59789E-21  7.01195E-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
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    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
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    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
                                  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:
  9316 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       ........

                                 ........     0.01567 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
0.01633 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 15335 independent fission points were generated for generation 1
          1       7.57617E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15742 independent fission points were generated for generation 2
          2       7.67971E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15702 independent fission points were generated for generation 3
          3       7.67678E-01      7.67678E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.73667E-01      7.70673E-01      2.99433E-03
0.00000E+00      0.00000E+00
          5       7.71620E-01      7.70988E-01      1.75737E-03
0.00000E+00      0.00000E+00
          6       7.60904E-01      7.68467E-01      2.81061E-03
0.00000E+00      0.00000E+00
          7       7.68351E-01      7.68444E-01      2.17721E-03
0.00000E+00      0.00000E+00
          8       7.65794E-01      7.68002E-01      1.83172E-03
0.00000E+00      0.00000E+00
          9       7.73147E-01      7.68737E-01      1.71366E-03
0.00000E+00      0.00000E+00
         10       7.66932E-01      7.68512E-01      1.50114E-03
0.00000E+00      0.00000E+00
         11       7.57130E-01      7.67247E-01      1.83084E-03
0.00000E+00      0.00000E+00
         12       7.71898E-01      7.67712E-01      1.70232E-03
0.00000E+00      0.00000E+00
         13       7.66710E-01      7.67621E-01      1.54250E-03
0.00000E+00      0.00000E+00
         14       7.62745E-01      7.67215E-01      1.46555E-03
0.00000E+00      0.00000E+00
         15       7.60768E-01      7.66719E-01      1.43643E-03
```

0.00000E+00	0.00000E+00				
16	7.68958E-01	7.66879E-01	1.33945E-03	0.00000E+00	0.00000E+00
17	7.67647E-01	7.66930E-01	1.24801E-03	0.00000E+00	0.00000E+00
18	7.65893E-01	7.66865E-01	1.16921E-03	0.00000E+00	0.00000E+00
19	7.61650E-01	7.66558E-01	1.14032E-03	0.00000E+00	0.00000E+00
20	7.59481E-01	7.66165E-01	1.14474E-03	0.00000E+00	0.00000E+00
21	7.76059E-01	7.66686E-01	1.20151E-03	0.00000E+00	0.00000E+00
22	7.70551E-01	7.66879E-01	1.15612E-03	0.00000E+00	0.00000E+00
23	7.59247E-01	7.66516E-01	1.15819E-03	0.00000E+00	0.00000E+00
24	7.58566E-01	7.66154E-01	1.16191E-03	0.00000E+00	0.00000E+00
25	7.62679E-01	7.66003E-01	1.12047E-03	0.00000E+00	0.00000E+00
26	7.67754E-01	7.66076E-01	1.07525E-03	0.00000E+00	0.00000E+00
27	7.63324E-01	7.63081E-01	4.77650E-03	0.00000E+00	0.00000E+00
28	7.70892E-01	7.64643E-01	4.09501E-03	0.00000E+00	0.00000E+00
29	7.59900E-01	7.63853E-01	3.35971E-03	0.00000E+00	0.00000E+00
30	7.65731E-01	7.64121E-01	2.85139E-03	0.00000E+00	0.00000E+00
31	7.60672E-01	7.63690E-01	2.64990E-03	0.00000E+00	0.00000E+00
32	7.70220E-01	7.64415E-01	2.48467E-03	0.00000E+00	0.00000E+00
33	7.75262E-01	7.65500E-01	1.92646E-03	0.00000E+00	0.00000E+00
34	7.68075E-01	7.65734E-01	2.38132E-03	0.00000E+00	0.00000E+00
35	7.65365E-01	7.65703E-01	2.06992E-03	0.00000E+00	0.00000E+00
36	7.56259E-01	7.64977E-01	1.89441E-03	0.00000E+00	0.00000E+00
37	7.68374E-01	7.65220E-01	1.53257E-03	0.00000E+00	0.00000E+00
38	7.66408E-01	7.65299E-01	1.42144E-03	0.00000E+00	0.00000E+00
39	7.68789E-01	7.65517E-01	1.34368E-03	0.00000E+00	0.00000E+00
40	7.70461E-01	7.65808E-01	1.40687E-03	0.00000E+00	0.00000E+00
41	7.58489E-01	7.65401E-01	1.29017E-03		

0.00000E+00	0.00000E+00				
42	7.66812E-01	7.65475E-01	1.21892E-03	0.00000E+00	0.00000E+00
43	7.65197E-01	7.65461E-01	1.15307E-03	0.00000E+00	0.00000E+00
44	7.61787E-01	7.65287E-01	1.10926E-03	0.00000E+00	0.00000E+00
45	7.64686E-01	7.65259E-01	1.05550E-03	0.00000E+00	0.00000E+00
46	7.57853E-01	7.64937E-01	1.11532E-03	0.00000E+00	0.00000E+00
47	7.60056E-01	7.64734E-01	1.17259E-03	0.00000E+00	0.00000E+00
48	7.66384E-01	7.64800E-01	1.04440E-03	0.00000E+00	0.00000E+00
49	7.65794E-01	7.64838E-01	1.00331E-03	0.00000E+00	0.00000E+00
50	7.65393E-01	7.64859E-01	9.63308E-04	0.00000E+00	0.00000E+00
51	7.65425E-01	7.64879E-01	9.26065E-04	0.00000E+00	0.00000E+00
52	7.60751E-01	7.64737E-01	9.01899E-04	0.00000E+00	0.00000E+00
53	7.72598E-01	7.64999E-01	8.76336E-04	0.00000E+00	0.00000E+00
54	7.60504E-01	7.64854E-01	9.03421E-04	0.00000E+00	0.00000E+00
55	7.63902E-01	7.64824E-01	8.63781E-04	0.00000E+00	0.00000E+00
56	7.65800E-01	7.64853E-01	8.06311E-04	0.00000E+00	0.00000E+00
57	7.64131E-01	7.64832E-01	7.81803E-04	0.00000E+00	0.00000E+00
58	7.59867E-01	7.64690E-01	7.72401E-04	0.00000E+00	0.00000E+00
59	7.66594E-01	7.64743E-01	7.51978E-04	0.00000E+00	0.00000E+00
60	7.62442E-01	7.64681E-01	7.60703E-04	0.00000E+00	0.00000E+00
61	7.63859E-01	7.64659E-01	7.38129E-04	0.00000E+00	0.00000E+00
62	7.56676E-01	7.64455E-01	7.69409E-04	0.00000E+00	0.00000E+00
63	7.67783E-01	7.64538E-01	7.50797E-04	0.00000E+00	0.00000E+00
64	7.72294E-01	7.64727E-01	7.20720E-04	0.00000E+00	0.00000E+00
65	7.64679E-01	7.64726E-01	7.02923E-04	0.00000E+00	0.00000E+00
66	7.64961E-01	7.64731E-01	6.86004E-04	0.00000E+00	0.00000E+00
67	7.61725E-01	7.64663E-01	6.73502E-04		

0.00000E+00	0.00000E+00				
68	7.70603E-01	7.64795E-01	6.71727E-04	0.00000E+00	0.00000E+00
69	7.67834E-01	7.64861E-01	6.60095E-04	0.00000E+00	0.00000E+00
70	7.65931E-01	7.64884E-01	6.46004E-04	0.00000E+00	0.00000E+00
71	7.67542E-01	7.64939E-01	6.34636E-04	0.00000E+00	0.00000E+00
72	7.65110E-01	7.64943E-01	6.21284E-04	0.00000E+00	0.00000E+00
73	7.66319E-01	7.64970E-01	6.09122E-04	0.00000E+00	0.00000E+00
74	7.67027E-01	7.65011E-01	5.98231E-04	0.00000E+00	0.00000E+00
75	7.65863E-01	7.65027E-01	5.86622E-04	0.00000E+00	0.00000E+00
76	7.60937E-01	7.64950E-01	5.80585E-04	0.00000E+00	0.00000E+00
77	7.63855E-01	7.64930E-01	5.69899E-04	0.00000E+00	0.00000E+00
78	7.66613E-01	7.64960E-01	5.60114E-04	0.00000E+00	0.00000E+00
79	7.72489E-01	7.65095E-01	5.66627E-04	0.00000E+00	0.00000E+00
80	7.69004E-01	7.65163E-01	5.60781E-04	0.00000E+00	0.00000E+00
81	7.63771E-01	7.65139E-01	5.51396E-04	0.00000E+00	0.00000E+00
82	7.75287E-01	7.65311E-01	5.69363E-04	0.00000E+00	0.00000E+00
83	7.70224E-01	7.65393E-01	5.83180E-04	0.00000E+00	0.00000E+00
84	7.60923E-01	7.65320E-01	5.61250E-04	0.00000E+00	0.00000E+00
85	7.60241E-01	7.65238E-01	5.75636E-04	0.00000E+00	0.00000E+00
86	7.65869E-01	7.65248E-01	5.64632E-04	0.00000E+00	0.00000E+00
87	7.66377E-01	7.65265E-01	5.56030E-04	0.00000E+00	0.00000E+00
88	7.64538E-01	7.65254E-01	5.46904E-04	0.00000E+00	0.00000E+00
89	7.69634E-01	7.65321E-01	5.40957E-04	0.00000E+00	0.00000E+00
90	7.61178E-01	7.65259E-01	5.24116E-04	0.00000E+00	0.00000E+00
91	7.57112E-01	7.65139E-01	5.49602E-04	0.00000E+00	0.00000E+00
92	7.64385E-01	7.65128E-01	5.44042E-04	0.00000E+00	0.00000E+00
93	7.67231E-01	7.65158E-01	5.36140E-04		

```
0.00000E+00      0.00000E+00
         94       7.62950E-01      7.65127E-01      5.27489E-04
0.00000E+00      0.00000E+00
         95       7.62697E-01      7.65093E-01      5.23270E-04
0.00000E+00      0.00000E+00
         96       7.58911E-01      7.65009E-01      5.29102E-04
0.00000E+00      0.00000E+00
         97       7.63474E-01      7.64988E-01      5.25726E-04
0.00000E+00      0.00000E+00
         98       7.68516E-01      7.65035E-01      5.18624E-04
0.00000E+00      0.00000E+00
         99       7.67201E-01      7.65063E-01      5.15089E-04
0.00000E+00      0.00000E+00
        100       7.67098E-01      7.65090E-01      5.10392E-04
0.00000E+00      0.00000E+00
        101       7.63691E-01      7.65072E-01      5.03013E-04
0.00000E+00      0.00000E+00
        102       7.57472E-01      7.64976E-01      5.09938E-04
0.00000E+00      0.00000E+00
        103       7.66366E-01      7.64993E-01      5.00128E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=45200ABB31969199
        104       7.61657E-01      7.64952E-01      4.94124E-04
0.00000E+00      0.00000E+00
        105       7.62802E-01      7.64926E-01      4.91016E-04
0.00000E+00      0.00000E+00
        106       7.61261E-01      7.64882E-01      4.89599E-04
0.00000E+00      0.00000E+00
        107       7.63922E-01      7.64870E-01      4.84845E-04
0.00000E+00      0.00000E+00
        108       7.68631E-01      7.64914E-01      4.79912E-04
0.00000E+00      0.00000E+00
        109       7.67634E-01      7.64946E-01      4.78283E-04
0.00000E+00      0.00000E+00
        110       7.66012E-01      7.64958E-01      4.73620E-04
0.00000E+00      0.00000E+00
        111       7.66673E-01      7.64978E-01      4.68998E-04
0.00000E+00      0.00000E+00
        112       7.65315E-01      7.64982E-01      4.63748E-04
0.00000E+00      0.00000E+00
        113       7.67722E-01      7.65012E-01      4.59708E-04
0.00000E+00      0.00000E+00
        114       7.68315E-01      7.65048E-01      4.58485E-04
0.00000E+00      0.00000E+00
        115       7.66535E-01      7.65064E-01      4.54980E-04
0.00000E+00      0.00000E+00
        116       7.65444E-01      7.65069E-01      4.50114E-04
0.00000E+00      0.00000E+00
        117       7.62632E-01      7.65043E-01      4.45777E-04
0.00000E+00      0.00000E+00
        118       7.68958E-01      7.65084E-01      4.40363E-04
```

```
0.00000E+00      0.00000E+00
        119       7.67128E-01      7.65105E-01      4.38251E-04
0.00000E+00      0.00000E+00
        120       7.64918E-01      7.65103E-01      4.33519E-04
0.00000E+00      0.00000E+00
        121       7.67643E-01      7.65129E-01      4.29628E-04
0.00000E+00      0.00000E+00
        122       7.56615E-01      7.65043E-01      4.28898E-04
0.00000E+00      0.00000E+00
        123       7.63320E-01      7.65026E-01      4.28505E-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=DA7D016444949E03
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.55003E-05 + or -  1.13558E-08             generation time
=  2.99266E-05 + or -  2.20277E-08
 nu bar   =  2.43895E+00 + or -  9.42259E-06       average fission group
=  2.17539E+02 + or -  9.78050E-03
                      energy(ev) of the average lethargy causing fission
=  5.64940E-02 + or -  1.23098E-04
                                                 system mean free path (cm)
=  6.52748E-01 + or -  1.60774E-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          0.76503   + or - 0.00043     0.76460 to 0.76545
0.76417 to 0.76588    0.76374 to 0.76631    2000000      12.4085

      24          0.76509   + or - 0.00042     0.76467 to 0.76551
0.76424 to 0.76594    0.76382 to 0.76636    1980000      12.8713

      25          0.76512   + or - 0.00043     0.76469 to 0.76554
0.76426 to 0.76597    0.76383 to 0.76640    1960000      12.8061

      26          0.76509   + or - 0.00043     0.76465 to 0.76552
0.76422 to 0.76596    0.76379 to 0.76639    1940000      12.7688

      27          0.76511   + or - 0.00044     0.76467 to 0.76555
0.76423 to 0.76599    0.76378 to 0.76643    1920000      12.6153

      28          0.76505   + or - 0.00045     0.76460 to 0.76550
```

0.76415 to 0.76594 0.76370 to 0.76639 1900000 12.3603

29 0.76510 + or - 0.00045 0.76465 to 0.76555
0.76420 to 0.76600 0.76375 to 0.76645 1880000 12.4962

30 0.76509 + or - 0.00046 0.76464 to 0.76555
0.76418 to 0.76601 0.76372 to 0.76647 1860000 12.4227

31 0.76514 + or - 0.00047 0.76468 to 0.76561
0.76421 to 0.76607 0.76375 to 0.76654 1840000 12.2407

32 0.76509 + or - 0.00045 0.76463 to 0.76554
0.76418 to 0.76599 0.76373 to 0.76644 1820000 13.2106

37 0.76499 + or - 0.00045 0.76455 to 0.76544
0.76410 to 0.76589 0.76365 to 0.76634 1720000 13.0669

42 0.76492 + or - 0.00047 0.76445 to 0.76539
0.76399 to 0.76585 0.76352 to 0.76632 1620000 13.2619

47 0.76512 + or - 0.00047 0.76465 to 0.76559
0.76418 to 0.76606 0.76371 to 0.76653 1520000 14.5165

52 0.76514 + or - 0.00051 0.76463 to 0.76566
0.76412 to 0.76617 0.76360 to 0.76669 1420000 13.7941

57 0.76513 + or - 0.00055 0.76458 to 0.76567
0.76403 to 0.76622 0.76348 to 0.76677 1320000 13.5505

62 0.76539 + or - 0.00057 0.76482 to 0.76597
0.76424 to 0.76654 0.76367 to 0.76711 1220000 13.5406

67 0.76531 + or - 0.00061 0.76470 to 0.76592
0.76409 to 0.76653 0.76348 to 0.76715 1120000 13.7067

72 0.76511 + or - 0.00065 0.76446 to 0.76576
0.76381 to 0.76641 0.76316 to 0.76706 1020000 14.3848

77 0.76514 + or - 0.00074 0.76440 to 0.76588
0.76365 to 0.76662 0.76291 to 0.76737 920000 13.4243

82 0.76462 + or - 0.00064 0.76398 to 0.76525
0.76334 to 0.76589 0.76271 to 0.76652 820000 15.1580

87 0.76460 + or - 0.00070 0.76390 to 0.76530
0.76320 to 0.76600 0.76250 to 0.76670 720000 15.8253

92 0.76480 + or - 0.00077 0.76403 to 0.76557
0.76325 to 0.76634 0.76248 to 0.76712 620000 15.7143

97 0.76513 + or - 0.00088 0.76426 to 0.76601
0.76338 to 0.76689 0.76250 to 0.76777 520000 18.1225

```
     102          0.76521   + or - 0.00092     0.76430 to 0.76613
0.76338 to 0.76705    0.76246 to 0.76797     420000      21.3644

     107          0.76584   + or - 0.00094     0.76491 to 0.76678
0.76397 to 0.76771    0.76304 to 0.76865     320000      42.2066

     112          0.76538   + or - 0.00135     0.76403 to 0.76674
0.76268 to 0.76809    0.76133 to 0.76944     220000      40.3797
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          0.76476   + or - 0.00296     0.76180 to 0.76773
0.75884 to 0.77069    0.75587 to 0.77366     120000      29.1950
1                          fuel bundle

                      plot of average k-effective by generation run.
      the line represents k-eff = 0.76502 + or - 0.00042 which occurs for
123 generations run.

                                0.7586                   0.7622
0.7658

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

```
      35 +                                                                I
|    *              I
         |                                                          I
*             I
         |
I        |*           I
         |
I       | *          I
         |
I     |  *          I
      40 +
I   |     *         I
         |
I     |  *         I
         |
I    |  *         I
         |
I    |  *        I
         |
I     | *        I
      45 +
I     | *      I
         |
I      *|      I
         |                                                                I
* |     I
         |
I       *|     I
         |
I      *|     I
      50 +
I      *|     I
         |
I     *|    I
         |
I     * |   I
         |
I     *     I
         |
I     *|    I
      55 +
I     *|    I
         |
I     *|   I
         |
I     *|   I
         |
I     * |  I
         |
I    * |  I
      60 +
I     * |  I
```

```
          |
I     * |  I
          |
I    *   |I
          |
I    *  | I
          |
I    * |  I
      65 +
I    * |  I
          |
I    * |  I
          |
I    * | I
          |
I    *|  I
          |
I    *|   I
      70 +
I   *|   I
          |
I    *   I
          |
I    *   I
          |
I   *   I
          |
I   *   I
      75 +
I   *   I
          |
I   *   I
          |
I  *|  I
          |
I   *   I
          |
I  |*  I
      80 +
I  |*   I
          |
I  |*   I
          |
I | *   I
          |
I|  *   I
          |
I | *   I
      85 +
I | *   I
          |
I | *   I
```

```
          |
I | *   I
          |
I | *  I
          |
I | *   I
      90 +
I | *  I
          |
I  |*   I
          |
I  |*   I
          |
I  |*   I
          |
I  |*  I
      95 +
I  |*  I
          |
I   *   I
          |
I   *  I
          |
I  *   I
          |
I  *   I
     100 +
I  |*  I
          |
I  *   I
          |
I   *  I
          |
I   *  I
          |
I   *  I
     105 +
I  *|  I
          |
I  *| I
          |
I  *| I
          |
I  *|  I
          |
I   *  I
     110 +
I   *  I
          |
I  *  I
          |
I  *  I
```

```
          |
I  *  I
          |
I  *  I
     115 +
I  *   I
          |
I  *   I
          |
I  *  I
          |
I  |*  I
          |
I |*  I
     120 +
I |*  I
          |
I |*  I
          |
I  *  I
          |
I  *  I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7650 + or - 0.0004 which occurs for 24 generations skipped.

```
                                0.7600                   0.7629
0.7658

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

```
          |
I   *   I
          |
I   *|  I
          |
I   *|  I
      35 +
I   *|  I
          |
I    *   I
          |
I   *|  I
          |
I   *|   I
          |
I   *|  I
      40 +
I   * | I
          |
I   *|  I
          |
I   *|  I
          |
I   *|  I
          |
I   *|  I
      45 +
I   *|  I
          |
I   *   I
          |
I   *   I
          |
I   *   I
          |
I   *   I
      50 +
I   *   I
          |
I   *   I
          |
I   |*   I
          |
I    *   I
          |
I   *    I
      55 +
I   *    I
          |
I   *    I
          |
I   *    I
```

```
          |
I   |*    I
          |
I   |*    I
      60 +
I   |*    I
          |
I  |*    I
          |
I |  *    I
          |
I  | *    I
          |
I   |*    I
      65 +
I   |*    I
          |
I   |*    I
          |
I  | *    I
          |
I   |*    I
          |
I   |*    I
      70 +
I    |*    I
          |
I    *     I
          |
I    *     I
          |
I     *     I
          |
I     *    I
      75 +
I     *    I
          |
I     *     I
          |
I     |*     I
          |
I     *      I
          |
I     *|    I
      80 +                                                              I
* |   I
          |
I     * |   I
          |                                                            I
*   |I
          |                                                          I
*    I
```

```
         |                                                                I
*   |I
      85 +                                                                 I
*  | I
         |                                                                 I
*   | I
         |                                                                I
*   | I
         |                                                                I
*   | I
         |                                                              I
*    |I
      90 +                                                              I
*   | I
         |                                                                 I
*  |   I
         |                                                                 I
* |   I
         |                                                                I
*  |   I
         |                                                                I
*  |   I
      95 +                                                                 I
* |    I
         |
I      *      I
         |
I      *       I
         |
I      *|      I
         |                                                              I
*|        I
     100 +                                                            I
* |        I
         |                                                            I
* |        I
         |
I      |*       I
         |
I       |*       I
         |
I    | *       I
     105 +
I   |  *       I
         |
I |     *      I
         |
I|      *      I
         |
I  |    *       I
         |
I    |   *       I
```

```
     110 +
I     |  *         I
         |
I       |  *         I
         |                                                                I
|  *          I
         |                                                              I
|*          I
         |                                                          I
* |        I
     115 +                                                  I
*   |           I
         |                                                I
*    |          I
         |                                          I
*  |                      I
         |                           I                              *
|                     I
         |                       I                          *
|           I
     120 +                                            *
|                         I
```

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 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			2.32345E-07	100.0000	2.54032E-07	42.3564	0.00000E+00	0.0000
3	0.0000			1.38789E-05	11.1202	1.98709E-05	4.6102	0.00000E+00	0.0000
4	0.0000			1.72015E-05	11.7840	3.28397E-05	3.8237	0.00000E+00	0.0000
5	0.0000			2.76137E-05	7.0091	5.39342E-05	3.0714	0.00000E+00	0.0000
6	0.0001			1.00050E-04	3.7762	2.31304E-04	1.4507	0.00000E+00	0.0000
7	0.0001			1.13073E-04	3.5228	2.05544E-04	1.5347	0.00000E+00	0.0000
8	0.0003			2.38298E-04	1.9476	3.22169E-04	0.9093	0.00000E+00	0.0000
9	0.0005			3.88629E-04	1.2910	4.45364E-04	0.6046	0.00000E+00	0.0000
10	0.0003			2.03761E-04	1.3288				

2.07375E-04	0.6476	0.00000E+00	0.0000	11	0.0012	9.21180E-04	0.7250
5.28198E-04	0.4990	0.00000E+00	0.0000	12	0.0010	7.68012E-04	0.8115
3.01035E-04	0.7982	0.00000E+00	0.0000	13	0.0003	2.35470E-04	1.4084
9.35086E-05	1.3945	0.00000E+00	0.0000	14	0.0013	1.00743E-03	0.6340
4.11835E-04	0.6286	0.00000E+00	0.0000	15	0.0010	7.67863E-04	0.6694
3.31033E-04	0.6618	0.00000E+00	0.0000	16	0.0003	1.92071E-04	1.3401
8.82552E-05	1.3215	0.00000E+00	0.0000	17	0.0001	6.57502E-05	1.7528
3.19936E-05	1.7225	0.00000E+00	0.0000	18	0.0001	5.33211E-05	1.7367
2.69163E-05	1.7028	0.00000E+00	0.0000	19	0.0001	8.18807E-05	1.4802
4.32876E-05	1.4492	0.00000E+00	0.0000	20	0.0001	6.04393E-05	1.5249
3.30882E-05	1.4903	0.00000E+00	0.0000	21	0.0002	1.21635E-04	1.0592
6.86416E-05	1.0376	0.00000E+00	0.0000	22	0.0001	1.04364E-04	1.1742
6.18176E-05	1.1434	0.00000E+00	0.0000	23	0.0001	1.06230E-04	1.2510
6.48391E-05	1.2218	0.00000E+00	0.0000	24	0.0000	2.38613E-05	2.2710
1.48280E-05	2.2068	0.00000E+00	0.0000	25	0.0000	3.14863E-05	1.8161
1.96512E-05	1.7695	0.00000E+00	0.0000	26	0.0000	1.76480E-05	2.3803
1.10785E-05	2.3092	0.00000E+00	0.0000	27	0.0001	5.31997E-05	1.2913
3.32026E-05	1.2652	0.00000E+00	0.0000	28	0.0001	9.62932E-05	1.0157
6.00735E-05	0.9985	0.00000E+00	0.0000	29	0.0001	9.88233E-05	1.1337
6.22464E-05	1.1180	0.00000E+00	0.0000	30	0.0000	1.21196E-05	3.4330
7.60369E-06	3.4086	0.00000E+00	0.0000	31	0.0001	9.64271E-05	1.0655
6.09242E-05	1.0527	0.00000E+00	0.0000	32	0.0000	3.75783E-05	1.6398
2.40269E-05	1.6049	0.00000E+00	0.0000	33	0.0000	3.29805E-05	1.5772
2.06486E-05	1.5597	0.00000E+00	0.0000	34	0.0001	7.40102E-05	1.1019
4.65023E-05	1.0851	0.00000E+00	0.0000	35	0.0001	4.57265E-05	1.5546
2.86854E-05	1.5293	0.00000E+00	0.0000	36	0.0001	4.26609E-05	1.4870

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2.64059E-05     1.4747       0.00000E+00     0.0000
   37    0.0000                 2.81985E-05     1.4051
1.76980E-05     1.3734       0.00000E+00     0.0000
   38    0.0000                 3.40919E-05     1.5412
2.14605E-05     1.5030       0.00000E+00     0.0000
   39    0.0002                 1.28096E-04     0.9898
8.15438E-05     0.9688       0.00000E+00     0.0000
   40    0.0002                 1.21453E-04     0.9358
7.84872E-05     0.9155       0.00000E+00     0.0000
   41    0.0002                 1.58541E-04     0.8142
1.05931E-04     0.7875       0.00000E+00     0.0000
   42    0.0002                 1.38749E-04     0.7328
9.43810E-05     0.7159       0.00000E+00     0.0000
   43    0.0001                 7.86889E-05     1.1295
5.64777E-05     1.0820       0.00000E+00     0.0000
   44    0.0001                 1.14719E-04     1.0176
8.41562E-05     0.9787       0.00000E+00     0.0000
   45    0.0001                 5.91594E-05     0.8585
4.77501E-05     0.7894       0.00000E+00     0.0000
   46    0.0000                 1.45664E-05     1.9379
1.17147E-05     1.8210       0.00000E+00     0.0000
   47    0.0001                 4.05948E-05     1.7537
3.15136E-05     1.6824       0.00000E+00     0.0000
   48    0.0000                 1.18756E-05     3.8568
9.21741E-06     3.7431       0.00000E+00     0.0000
   49    0.0001                 8.10700E-05     1.5064
6.39297E-05     1.4745       0.00000E+00     0.0000
   50    0.0001                 5.51308E-05     1.6760
4.54218E-05     1.6431       0.00000E+00     0.0000
   51    0.0000                 1.49725E-05     3.6328
1.24486E-05     3.5535       0.00000E+00     0.0000
   52    0.0001                 3.98955E-05     2.0094
3.45204E-05     1.9619       0.00000E+00     0.0000
   53    0.0002                 1.56865E-04     0.7901
1.54247E-04     0.7356       0.00000E+00     0.0000
   54    0.0001                 7.40931E-05     2.0039
6.88415E-05     1.9300       0.00000E+00     0.0000
   55    0.0002                 1.62750E-04     1.3463
1.49194E-04     1.3140       0.00000E+00     0.0000
   56    0.0002                 1.15803E-04     1.7901
1.07433E-04     1.7468       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                 1.50215E-04     1.5033
1.36282E-04     1.4660       0.00000E+00     0.0000
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58	0.0001	8.52174E-05	1.9282	7.46332E-05	1.8757	0.00000E+00	0.0000
59	0.0002	1.59390E-04	1.5019	1.43119E-04	1.4450	0.00000E+00	0.0000
60	0.0004	2.72897E-04	1.1920	2.47420E-04	1.1240	0.00000E+00	0.0000
61	0.0000	2.67293E-05	3.7886	2.06027E-05	3.6576	0.00000E+00	0.0000
62	0.0002	1.61646E-04	1.8084	1.35644E-04	1.7587	0.00000E+00	0.0000
63	0.0002	1.15780E-04	1.9826	9.54902E-05	1.9119	0.00000E+00	0.0000
64	0.0001	1.00254E-04	2.2592	8.08526E-05	2.1812	0.00000E+00	0.0000
65	0.0000	3.46375E-05	3.9606	3.42730E-05	3.8264	0.00000E+00	0.0000
66	0.0002	1.75139E-04	1.6243	1.55331E-04	1.5726	0.00000E+00	0.0000
67	0.0002	1.42276E-04	1.9806	1.16517E-04	1.9146	0.00000E+00	0.0000
68	0.0000	2.82460E-05	4.3886	2.43865E-05	4.2366	0.00000E+00	0.0000
69	0.0004	3.02705E-04	1.4436	2.37530E-04	1.3990	0.00000E+00	0.0000
70	0.0003	2.07673E-04	1.9901	1.89082E-04	1.9119	0.00000E+00	0.0000
71	0.0006	4.27140E-04	1.6111	3.53534E-04	1.5602	0.00000E+00	0.0000
72	0.0001	4.99225E-05	5.2957	2.94793E-05	5.1732	0.00000E+00	0.0000
73	0.0004	3.17747E-04	1.7353	2.42157E-04	1.6459	0.00000E+00	0.0000
74	0.0014	1.06688E-03	0.9863	7.75505E-04	0.9450	0.00000E+00	0.0000
75	0.0001	1.10675E-04	2.9039	8.50563E-05	2.7716	0.00000E+00	0.0000
76	0.0006	4.69181E-04	1.8134	2.97722E-04	1.7508	0.00000E+00	0.0000
77	0.0005	3.63476E-04	2.1753	2.60762E-04	2.0926	0.00000E+00	0.0000
78	0.0000	7.50644E-06	4.4927	7.34155E-05	4.4448	0.00000E+00	0.0000
79	0.0002	1.87424E-04	2.8107	1.26087E-04	2.7000	0.00000E+00	0.0000
80	0.0001	6.08172E-05	3.4037	8.11414E-05	3.3054	0.00000E+00	0.0000
81	0.0014	1.06694E-03	1.1569	7.84342E-04	1.1103	0.00000E+00	0.0000
82	0.0001	6.54087E-05	4.1878	3.93002E-05	3.9626	0.00000E+00	0.0000
83	0.0002	1.22381E-04	3.2201	1.35475E-04	3.1537	0.00000E+00	0.0000

84	0.0001	7.56571E-05	3.2265	7.70694E-05	2.9873	0.00000E+00	0.0000
85	0.0002	1.85104E-04	2.1422	2.28353E-04	2.0791	0.00000E+00	0.0000
86	0.0004	2.69125E-04	2.7214	2.16290E-04	2.5897	0.00000E+00	0.0000
87	0.0005	3.53186E-04	2.4962	2.19215E-04	2.3921	0.00000E+00	0.0000
88	0.0001	5.86564E-05	3.5029	1.06337E-04	3.4161	0.00000E+00	0.0000
89	0.0001	9.34632E-05	3.3074	6.49074E-05	3.0317	0.00000E+00	0.0000
90	0.0003	2.27978E-04	3.0915	1.34486E-04	2.9604	0.00000E+00	0.0000
91	0.0003	1.99213E-04	2.6765	1.25661E-04	2.5236	0.00000E+00	0.0000
92	0.0000	2.98989E-05	3.0925	1.95764E-04	3.0292	0.00000E+00	0.0000
93	0.0002	1.22730E-04	3.4384	1.00168E-04	3.1865	0.00000E+00	0.0000
94	0.0001	1.13607E-04	4.0059	6.37951E-05	3.7600	0.00000E+00	0.0000
95	0.0008	5.98640E-04	2.1044	3.69509E-04	2.0383	0.00000E+00	0.0000
96	0.0002	1.50735E-04	4.5917	7.65880E-05	4.3900	0.00000E+00	0.0000
97	0.0004	2.82708E-04	3.2296	1.61869E-04	3.1627	0.00000E+00	0.0000
98	0.0001	9.69438E-05	4.4477	9.32550E-05	4.2792	0.00000E+00	0.0000
99	0.0001	1.05787E-04	4.4488	7.07946E-05	4.3063	0.00000E+00	0.0000
100	0.0002	1.23256E-04	3.9660	8.25814E-05	3.7938	0.00000E+00	0.0000
101	0.0001	1.10417E-04	3.4027	7.03383E-05	3.1543	0.00000E+00	0.0000
102	0.0002	1.57339E-04	4.0107	8.78058E-05	3.8458	0.00000E+00	0.0000
103	0.0001	8.96484E-05	3.6494	8.78412E-05	3.4382	0.00000E+00	0.0000
104	0.0002	1.68376E-04	3.5051	1.33507E-04	3.3888	0.00000E+00	0.0000
105	0.0002	1.25184E-04	3.8310	8.27159E-05	3.6090	0.00000E+00	0.0000
106	0.0002	1.70516E-04	4.0264	1.26816E-04	3.9707	0.00000E+00	0.0000
107	0.0001	6.11610E-05	3.4942	6.19538E-05	3.2836	0.00000E+00	0.0000
108	0.0000	3.51835E-05	2.2819	1.51904E-04	2.2237	0.00000E+00	0.0000
109	0.0002	1.35715E-04	1.8540	4.50118E-04	1.8308	0.00000E+00	0.0000

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  110    0.0009                 6.81262E-04     2.9530
4.19897E-04     2.9253       0.00000E+00     0.0000
  111    0.0002                 1.42477E-04     4.3633
1.31198E-04     4.2474       0.00000E+00     0.0000
  112    0.0002                 1.23011E-04     5.0974
1.29576E-04     5.0030       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                 1.34768E-04     3.3219
1.17366E-04     3.1105       0.00000E+00     0.0000
  114    0.0000                 1.06353E-05     7.1031
1.45710E-05     5.8602       0.00000E+00     0.0000
  115    0.0001                 7.41938E-05     3.7777
8.60372E-05     3.4975       0.00000E+00     0.0000
  116    0.0003                 1.95666E-04     2.9839
1.46840E-04     2.6992       0.00000E+00     0.0000
  117    0.0006                 4.89413E-04     2.5680
2.61195E-04     2.4098       0.00000E+00     0.0000
  118    0.0008                 5.89686E-04     1.8808
4.60448E-04     1.8077       0.00000E+00     0.0000
  119    0.0002                 1.41610E-04     1.9109
3.65442E-04     1.8477       0.00000E+00     0.0000
  120    0.0002                 1.65919E-04     2.0282
6.31410E-04     2.0012       0.00000E+00     0.0000
  121    0.0007                 5.09490E-04     2.8058
3.92111E-04     2.7351       0.00000E+00     0.0000
  122    0.0001                 1.04619E-04     4.5970
8.16883E-05     4.3113       0.00000E+00     0.0000
  123    0.0003                 2.09807E-04     3.0340
1.49085E-04     2.6742       0.00000E+00     0.0000
  124    0.0003                 2.33952E-04     3.3151
1.92956E-04     3.0893       0.00000E+00     0.0000
  125    0.0002                 1.42883E-04     3.6954
1.31051E-04     3.3430       0.00000E+00     0.0000
  126    0.0001                 9.63043E-05     3.7050
8.66107E-05     3.2566       0.00000E+00     0.0000
  127    0.0005                 3.98422E-04     2.7169
1.95665E-04     2.5680       0.00000E+00     0.0000
  128    0.0003                 2.23857E-04     2.9723
1.37933E-04     2.6479       0.00000E+00     0.0000
  129    0.0006                 4.50304E-04     2.4008
4.14819E-04     2.2807       0.00000E+00     0.0000
  130    0.0002                 1.18818E-04     3.0630
2.89541E-04     2.9770       0.00000E+00     0.0000
  131    0.0004                 2.86781E-04     2.2943
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2.31283E-04	1.9319	0.00000E+00	0.0000	132	0.0007	5.24135E-04	2.3789
3.21999E-04	2.1904	0.00000E+00	0.0000	133	0.0013	1.00731E-03	2.1824
6.37758E-04	2.0664	0.00000E+00	0.0000	134	0.0001	8.85298E-05	2.0913
2.30969E-04	1.7486	0.00000E+00	0.0000	135	0.0002	1.77673E-04	3.5555
2.63519E-04	3.4641	0.00000E+00	0.0000	136	0.0001	4.39888E-05	1.8254
6.82978E-04	1.7945	0.00000E+00	0.0000	137	0.0000	1.91447E-05	1.0995
3.44475E-03	1.0969	0.00000E+00	0.0000	138	0.0004	3.09351E-04	1.9040
8.05964E-04	1.8748	0.00000E+00	0.0000	139	0.0003	1.96004E-04	3.1110
2.39619E-04	2.9373	0.00000E+00	0.0000	140	0.0003	2.15203E-04	2.5334
2.85282E-04	2.2240	0.00000E+00	0.0000	141	0.0001	7.69873E-05	2.6096
2.43533E-04	2.3095	0.00000E+00	0.0000	142	0.0001	6.29107E-05	3.0434
2.18266E-04	2.7763	0.00000E+00	0.0000	143	0.0001	7.94443E-05	2.3039
1.71759E-04	1.4375	0.00000E+00	0.0000	144	0.0000	3.50444E-05	3.5202
7.49849E-05	2.1763	0.00000E+00	0.0000	145	0.0005	3.90129E-04	2.6053
3.05629E-04	2.3755	0.00000E+00	0.0000	146	0.0005	3.45542E-04	2.0678
2.52811E-04	1.7007	0.00000E+00	0.0000	147	0.0002	1.69874E-04	3.9542
1.09313E-04	3.4204	0.00000E+00	0.0000	148	0.0001	5.96441E-05	6.3664
3.94420E-05	5.1216	0.00000E+00	0.0000	149	0.0000	3.23088E-05	6.9549
2.22547E-05	5.4667	0.00000E+00	0.0000	150	0.0001	8.73490E-05	4.3060
6.36293E-05	3.2160	0.00000E+00	0.0000	151	0.0001	7.19167E-05	3.8201
5.95228E-05	2.6835	0.00000E+00	0.0000	152	0.0001	3.92990E-05	4.9591
4.58082E-05	2.9272	0.00000E+00	0.0000	153	0.0001	4.27293E-05	4.6451
4.71994E-05	2.7328	0.00000E+00	0.0000	154	0.0001	5.18378E-05	4.3689
5.26516E-05	2.6152	0.00000E+00	0.0000	155	0.0001	4.66125E-05	4.7871
4.74396E-05	2.8112	0.00000E+00	0.0000	156	0.0001	4.92597E-05	4.3937
4.76482E-05	2.6647	0.00000E+00	0.0000	157	0.0001	5.66530E-05	4.2465

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5.63369E-05     2.6038       0.00000E+00     0.0000
  158    0.0001                 7.25194E-05     3.5971
7.15532E-05     2.4653       0.00000E+00     0.0000
  159    0.0002                 1.50713E-04     2.7416
2.09379E-04     2.3103       0.00000E+00     0.0000
  160    0.0001                 5.94559E-05     4.4200
7.12229E-05     3.3110       0.00000E+00     0.0000
  161    0.0001                 7.57477E-05     3.8138
7.38234E-05     2.5442       0.00000E+00     0.0000
  162    0.0001                 8.84468E-05     3.3553
8.28627E-05     2.1289       0.00000E+00     0.0000
  163    0.0001                 9.40989E-05     3.4730
8.70563E-05     2.1394       0.00000E+00     0.0000
  164    0.0001                 1.04490E-04     3.2256
9.53510E-05     2.0608       0.00000E+00     0.0000
  165    0.0001                 1.10380E-04     3.7060
1.03279E-04     2.2883       0.00000E+00     0.0000
  166    0.0001                 7.40229E-05     4.7328
6.61753E-05     3.1344       0.00000E+00     0.0000
  167    0.0001                 7.95498E-05     3.8353
7.10505E-05     2.5107       0.00000E+00     0.0000
  168    0.0001                 8.67450E-05     4.2688
7.73499E-05     2.8404       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                 1.03820E-04     4.1157
9.13611E-05     2.8813       0.00000E+00     0.0000
  170    0.0002                 1.38502E-04     3.8466
1.17350E-04     2.9499       0.00000E+00     0.0000
  171    0.0001                 9.02294E-05     5.8136
7.08608E-05     4.5118       0.00000E+00     0.0000
  172    0.0002                 1.32711E-04     4.6783
9.45862E-05     3.8923       0.00000E+00     0.0000
  173    0.0003                 1.91800E-04     3.7537
1.26812E-04     3.2640       0.00000E+00     0.0000
  174    0.0003                 2.65318E-04     4.0508
1.64051E-04     3.6317       0.00000E+00     0.0000
  175    0.0002                 1.18874E-04     5.4271
7.12909E-05     4.9196       0.00000E+00     0.0000
  176    0.0001                 1.12036E-04     6.2472
6.68343E-05     5.6159       0.00000E+00     0.0000
  177    0.0002                 1.24941E-04     5.4819
7.33073E-05     4.9664       0.00000E+00     0.0000
  178    0.0001                 1.14531E-04     6.8543
6.71534E-05     6.1415       0.00000E+00     0.0000
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179	0.0002	1.25787E-04	5.5926	7.26448E-05	5.0417
0.00000E+00	0.0000				
180	0.0002	1.18767E-04	5.4092	6.85055E-05	4.8324
0.00000E+00	0.0000				
181	0.0001	1.11965E-04	6.0463	6.48232E-05	5.3570
0.00000E+00	0.0000				
182	0.0002	1.19393E-04	5.9400	6.83146E-05	5.2720
0.00000E+00	0.0000				
183	0.0001	9.63973E-05	5.7149	5.62700E-05	4.9910
0.00000E+00	0.0000				
184	0.0001	1.06562E-04	6.5077	6.11840E-05	5.7161
0.00000E+00	0.0000				
185	0.0001	9.33120E-05	6.2570	5.45341E-05	5.3385
0.00000E+00	0.0000				
186	0.0001	9.15408E-05	6.1831	5.36336E-05	5.2958
0.00000E+00	0.0000				
187	0.0001	9.45429E-05	6.1854	5.50580E-05	5.2906
0.00000E+00	0.0000				
188	0.0001	8.73544E-05	6.1406	5.10413E-05	5.2077
0.00000E+00	0.0000				
189	0.0001	8.73259E-05	6.5108	5.15195E-05	5.4122
0.00000E+00	0.0000				
190	0.0003	1.98791E-04	4.2974	1.19335E-04	3.5142
0.00000E+00	0.0000				
191	0.0003	2.06401E-04	4.4862	1.23607E-04	3.6509
0.00000E+00	0.0000				
192	0.0003	2.07580E-04	4.2523	1.24349E-04	3.4218
0.00000E+00	0.0000				
193	0.0003	2.03462E-04	4.1011	1.23439E-04	3.2899
0.00000E+00	0.0000				
194	0.0005	4.05094E-04	2.8009	2.48889E-04	2.2193
0.00000E+00	0.0000				
195	0.0005	4.16097E-04	2.9290	2.59515E-04	2.2611
0.00000E+00	0.0000				
196	0.0006	4.52704E-04	2.6907	2.80918E-04	2.0900
0.00000E+00	0.0000				
197	0.0007	5.08580E-04	2.1731	3.18197E-04	1.6948
0.00000E+00	0.0000				
198	0.0008	5.82565E-04	2.3226	3.59852E-04	1.8162
0.00000E+00	0.0000				
199	0.0004	3.17097E-04	2.9418	1.96585E-04	2.3140
0.00000E+00	0.0000				
200	0.0005	3.47343E-04	3.0813	2.15044E-04	2.4007
0.00000E+00	0.0000				
201	0.0011	8.14691E-04	2.1460	4.95973E-04	1.7042
0.00000E+00	0.0000				
202	0.0013	1.02052E-03	1.8949	6.14375E-04	1.5271
0.00000E+00	0.0000				
203	0.0016	1.20347E-03	1.9487	7.20368E-04	1.5887
0.00000E+00	0.0000				
204	0.0022	1.65566E-03	1.4090	9.75544E-04	1.1644
0.00000E+00	0.0000				

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  205    0.0015                 1.12426E-03     1.9915
6.60187E-04     1.6823       0.00000E+00     0.0000
  206    0.0019                 1.43833E-03     1.7429
8.33177E-04     1.5032       0.00000E+00     0.0000
  207    0.0022                 1.67609E-03     1.8134
9.72743E-04     1.5782       0.00000E+00     0.0000
  208    0.0029                 2.18662E-03     1.4318
1.27291E-03     1.2623       0.00000E+00     0.0000
  209    0.0030                 2.33124E-03     1.2590
1.37429E-03     1.1066       0.00000E+00     0.0000
  210    0.0038                 2.88552E-03     1.3618
1.71685E-03     1.1976       0.00000E+00     0.0000
  211    0.0042                 3.17718E-03     1.1898
1.90919E-03     1.0346       0.00000E+00     0.0000
  212    0.0047                 3.60741E-03     0.9476
2.18742E-03     0.8179       0.00000E+00     0.0000
  213    0.0064                 4.88001E-03     1.0359
2.96543E-03     0.8735       0.00000E+00     0.0000
  214    0.0096                 7.38037E-03     0.7069
4.44133E-03     0.5930       0.00000E+00     0.0000
  215    0.0156                 1.18974E-02     0.5595
7.10654E-03     0.4730       0.00000E+00     0.0000
  216    0.0300                 2.29729E-02     0.4523
1.35502E-02     0.3812       0.00000E+00     0.0000
  217    0.0200                 1.53215E-02     0.5275
9.01792E-03     0.4404       0.00000E+00     0.0000
  218    0.0275                 2.10123E-02     0.4660
1.23209E-02     0.3924       0.00000E+00     0.0000
  219    0.0358                 2.73629E-02     0.4555
1.59683E-02     0.3890       0.00000E+00     0.0000
  220    0.0473                 3.62037E-02     0.3400
2.10454E-02     0.2859       0.00000E+00     0.0000
  221    0.0627                 4.79363E-02     0.3507
2.77839E-02     0.2968       0.00000E+00     0.0000
  222    0.0804                 6.14975E-02     0.3000
3.56087E-02     0.2550       0.00000E+00     0.0000
  223    0.1041                 7.96355E-02     0.2358
4.62157E-02     0.1984       0.00000E+00     0.0000
  224    0.0583                 4.46070E-02     0.3122
2.59897E-02     0.2633       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    0.2303                 1.76219E-01     0.1669
1.04423E-01     0.1428       0.00000E+00     0.0000
  226    0.0459                 3.50969E-02     0.3840
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2.13264E-02     0.3150       0.00000E+00     0.0000
  227    0.0492                 3.76290E-02     0.3717
2.33487E-02     0.3036       0.00000E+00     0.0000
  228    0.0209                 1.60216E-02     0.5536
1.01357E-02     0.4388       0.00000E+00     0.0000
  229    0.0223                 1.70593E-02     0.5420
1.09629E-02     0.4136       0.00000E+00     0.0000
  230    0.0119                 9.10007E-03     0.7327
5.93700E-03     0.5638       0.00000E+00     0.0000
  231    0.0122                 9.32337E-03     0.6771
6.22337E-03     0.5043       0.00000E+00     0.0000
  232    0.0129                 9.87046E-03     0.6584
6.74275E-03     0.4993       0.00000E+00     0.0000
  233    0.0081                 6.20248E-03     0.9870
4.38114E-03     0.7095       0.00000E+00     0.0000
  234    0.0058                 4.44712E-03     1.0819
3.22586E-03     0.7301       0.00000E+00     0.0000
  235    0.0024                 1.87037E-03     1.8931
1.23831E-03     1.4368       0.00000E+00     0.0000
  236    0.0019                 1.48958E-03     1.6920
9.99245E-04     1.2912       0.00000E+00     0.0000
  237    0.0017                 1.31876E-03     2.0548
9.35214E-04     1.4652       0.00000E+00     0.0000
  238    0.0001                 8.01829E-05     8.4271
6.67459E-05     5.2241       0.00000E+00     0.0000

 system total =                 7.65026E-01     0.0519
4.68421E-01     0.0423       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3165E-01  +
or -  0.0002



 elapsed time   3.10750 minutes

 random number=   17807D97263E065F
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.086E-03
```

0.05 7.650E-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	3.570E-08	26.41	2.816E-08	27.40	3.024E-08	27.02
3	9.547E-07	4.34	7.550E-07	3.32	8.146E-07	3.31
4	1.470E-06	2.97	1.209E-06	2.65	1.298E-06	2.73
5	2.272E-06	2.44	1.878E-06	2.29	2.012E-06	2.24
6	9.501E-06	1.22	7.575E-06	1.07	8.108E-06	1.12
7	1.245E-05	0.98	9.546E-06	0.95	1.009E-05	0.91
8	3.098E-05	0.65	2.288E-05	0.60	2.397E-05	0.59
9	8.192E-05	0.44	5.879E-05	0.38	6.125E-05	0.40
10	4.595E-05	0.65	3.275E-05	0.59	3.407E-05	0.57
11	2.198E-04	0.25	1.555E-04	0.21	1.609E-04	0.22
12	1.894E-04	0.30	1.375E-04	0.24	1.441E-04	0.24
13	5.721E-05	0.53	4.144E-05	0.44	4.352E-05	0.44
14	2.548E-04	0.24	1.842E-04	0.20	1.920E-04	0.20
15	2.203E-04	0.25	1.599E-04	0.22	1.667E-04	0.23
16	7.055E-05	0.48	5.148E-05	0.39	5.398E-05	0.36
17	3.195E-05	0.64	2.332E-05	0.48	2.430E-05	0.47
18	2.825E-05	0.76	2.055E-05	0.69	2.123E-05	0.66
19	5.053E-05	0.53	3.692E-05	0.42	3.844E-05	0.43
20	3.968E-05	0.57	2.895E-05	0.51	3.034E-05	0.50
21	7.977E-05	0.41	5.852E-05	0.35	6.105E-05	0.34
22	7.300E-05	0.42	5.352E-05	0.39	5.523E-05	0.33
23	7.723E-05	0.42	5.643E-05	0.34	5.854E-05	0.33
24	1.847E-05	0.89	1.367E-05	0.69	1.427E-05	0.63
25	2.349E-05	0.64	1.735E-05	0.54	1.821E-05	0.51
26	1.329E-05	0.88	9.781E-06	0.72	1.029E-05	0.71
27	4.251E-05	0.56	3.143E-05	0.43	3.338E-05	0.43
28	7.723E-05	0.39	5.739E-05	0.33	6.075E-05	0.32
29	7.988E-05	0.36	5.951E-05	0.28	6.242E-05	0.26
30	9.839E-06	1.04	7.415E-06	0.98	7.822E-06	0.90
31	7.897E-05	0.38	5.918E-05	0.32	6.223E-05	0.31
32	3.072E-05	0.55	2.310E-05	0.53	2.436E-05	0.49
33	2.673E-05	0.60	2.012E-05	0.59	2.128E-05	0.56
34	6.089E-05	0.42	4.591E-05	0.38	4.848E-05	0.35
35	3.617E-05	0.52	2.728E-05	0.42	2.890E-05	0.44

36	3.381E-05	0.49	2.561E-05	0.41	2.683E-05	0.38
37	2.226E-05	0.74	1.671E-05	0.58	1.751E-05	0.45
38	2.588E-05	0.63	1.967E-05	0.52	2.069E-05	0.50
39	9.784E-05	0.35	7.505E-05	0.29	7.924E-05	0.27
40	8.978E-05	0.31	6.930E-05	0.25	7.388E-05	0.24
41	1.130E-04	0.31	8.836E-05	0.24	9.412E-05	0.24
42	9.398E-05	0.33	7.412E-05	0.30	7.955E-05	0.28
43	5.073E-05	0.41	4.042E-05	0.38	4.244E-05	0.32
44	6.967E-05	0.36	5.600E-05	0.29	6.019E-05	0.28
45	3.525E-05	0.42	2.810E-05	0.35	3.117E-05	0.35
46	8.328E-06	0.83	6.568E-06	0.78	7.118E-06	0.70
47	2.340E-05	0.62	1.852E-05	0.49	1.942E-05	0.41
48	6.744E-06	1.07	5.392E-06	0.99	5.706E-06	0.89
49	4.376E-05	0.41	3.512E-05	0.38	3.779E-05	0.32
50	2.940E-05	0.42	2.374E-05	0.41	2.580E-05	0.36
51	8.017E-06	0.97	6.369E-06	0.84	6.916E-06	0.68
52	2.048E-05	0.57	1.657E-05	0.48	1.814E-05	0.42
53	7.623E-05	0.31	6.165E-05	0.25	6.691E-05	0.23
54	3.324E-05	0.48	2.689E-05	0.42	2.902E-05	0.33
55	6.630E-05	0.33	5.403E-05	0.28	5.879E-05	0.25
56	4.315E-05	0.37	3.527E-05	0.32	3.838E-05	0.30
57	4.924E-05	0.33	4.027E-05	0.29	4.369E-05	0.25
58	2.573E-05	0.53	2.109E-05	0.45	2.298E-05	0.36
59	4.422E-05	0.35	3.625E-05	0.32	3.944E-05	0.25
60	6.438E-05	0.28	5.279E-05	0.26	5.737E-05	0.24
61	6.076E-06	0.98	5.009E-06	0.83	5.443E-06	0.67
62	3.242E-05	0.43	2.657E-05	0.40	2.892E-05	0.31
63	2.161E-05	0.51	1.783E-05	0.45	1.946E-05	0.37
64	1.731E-05	0.59	1.420E-05	0.52	1.536E-05	0.42
65	5.707E-06	0.96	4.689E-06	0.91	5.084E-06	0.71
66	2.889E-05	0.43	2.369E-05	0.39	2.575E-05	0.32
67	2.107E-05	0.57	1.738E-05	0.46	1.895E-05	0.38
68	4.680E-06	1.16	3.842E-06	0.98	4.177E-06	0.83
69	3.734E-05	0.39	3.077E-05	0.37	3.339E-05	0.28
70	2.680E-05	0.44	2.211E-05	0.39	2.396E-05	0.33
71	4.574E-05	0.39	3.763E-05	0.34	4.084E-05	0.27
72	2.606E-06	1.44	2.164E-06	1.30	2.371E-06	1.12
73	2.726E-05	0.42	2.241E-05	0.38	2.437E-05	0.32
74	7.910E-05	0.26	6.578E-05	0.25	7.122E-05	0.22
75	8.986E-06	0.81	7.479E-06	0.65	8.106E-06	0.51
76	2.267E-05	0.49	1.879E-05	0.44	2.047E-05	0.36
77	1.755E-05	0.57	1.459E-05	0.48	1.586E-05	0.38
78	1.492E-06	1.80	1.267E-06	1.56	1.381E-06	1.19
79	1.003E-05	0.75	8.317E-06	0.61	8.929E-06	0.51
80	4.559E-06	1.02	3.765E-06	0.92	4.079E-06	0.78
81	5.524E-05	0.32	4.588E-05	0.28	4.971E-05	0.23
82	3.235E-06	1.30	2.723E-06	1.06	2.953E-06	0.89
83	4.392E-06	1.07	3.653E-06	0.85	3.954E-06	0.70
84	8.220E-06	0.74	6.821E-06	0.62	7.422E-06	0.53
85	1.001E-05	0.79	8.305E-06	0.64	8.962E-06	0.56
86	1.347E-05	0.60	1.125E-05	0.58	1.220E-05	0.45
87	1.194E-05	0.64	9.932E-06	0.60	1.077E-05	0.49

88	3.192E-06	1.16	2.650E-06	1.21	2.857E-06	0.91
89	6.457E-06	0.92	5.398E-06	0.75	5.878E-06	0.69
90	6.934E-06	0.90	5.761E-06	0.76	6.276E-06	0.63
91	8.315E-06	0.78	6.931E-06	0.68	7.499E-06	0.60
92	4.725E-06	1.02	3.931E-06	0.89	4.288E-06	0.77
93	8.089E-06	0.73	6.733E-06	0.67	7.301E-06	0.55
94	4.354E-06	1.09	3.597E-06	0.90	3.899E-06	0.78
95	1.258E-05	0.57	1.054E-05	0.53	1.140E-05	0.42
96	3.337E-06	1.19	2.821E-06	1.11	3.065E-06	0.81
97	3.358E-06	1.21	2.822E-06	1.07	3.082E-06	0.80
98	3.526E-06	1.17	2.978E-06	1.09	3.236E-06	0.86
99	2.299E-06	1.32	1.942E-06	1.12	2.097E-06	1.04
100	3.418E-06	1.14	2.886E-06	1.00	3.110E-06	0.86
101	4.943E-06	0.90	4.111E-06	0.81	4.451E-06	0.72
102	3.375E-06	1.17	2.816E-06	0.95	3.061E-06	0.81
103	4.713E-06	1.13	3.928E-06	0.98	4.220E-06	0.76
104	4.203E-06	1.15	3.542E-06	1.05	3.813E-06	0.88
105	4.369E-06	0.96	3.662E-06	0.90	3.944E-06	0.74
106	1.520E-06	1.74	1.293E-06	1.60	1.397E-06	1.34
107	3.517E-06	1.25	2.938E-06	1.18	3.225E-06	1.00
108	3.178E-06	1.16	2.677E-06	0.98	2.933E-06	0.95
109	5.141E-06	0.98	4.328E-06	0.90	4.680E-06	0.72
110	3.013E-06	1.02	2.556E-06	0.90	2.783E-06	0.81
111	3.002E-06	1.01	2.552E-06	0.95	2.781E-06	0.77
112	1.763E-06	1.44	1.505E-06	1.39	1.649E-06	1.06
113	5.763E-06	0.95	4.846E-06	0.87	5.199E-06	0.71
114	1.946E-06	1.62	1.616E-06	1.53	1.778E-06	1.09
115	5.012E-06	0.80	4.235E-06	0.82	4.593E-06	0.70
116	1.082E-05	0.66	9.095E-06	0.55	9.823E-06	0.49
117	1.180E-05	0.62	9.863E-06	0.58	1.064E-05	0.44
118	1.291E-05	0.60	1.079E-05	0.55	1.174E-05	0.43
119	8.198E-06	0.72	6.940E-06	0.67	7.550E-06	0.57
120	5.698E-06	0.82	4.829E-06	0.82	5.270E-06	0.65
121	6.062E-06	0.85	5.122E-06	0.75	5.566E-06	0.58
122	3.242E-06	1.30	2.702E-06	1.05	2.952E-06	0.83
123	1.041E-05	0.66	8.682E-06	0.61	9.375E-06	0.49
124	7.299E-06	0.82	6.183E-06	0.82	6.632E-06	0.61
125	7.096E-06	0.85	5.968E-06	0.79	6.434E-06	0.62
126	5.700E-06	0.84	4.795E-06	0.73	5.180E-06	0.68
127	5.542E-06	0.76	4.677E-06	0.73	5.047E-06	0.62
128	7.719E-06	0.71	6.515E-06	0.73	7.036E-06	0.52
129	9.612E-06	0.71	8.102E-06	0.64	8.772E-06	0.53
130	3.992E-06	1.07	3.384E-06	0.87	3.666E-06	0.80
131	1.678E-05	0.52	1.409E-05	0.40	1.515E-05	0.36
132	1.117E-05	0.64	9.421E-06	0.53	1.019E-05	0.47
133	1.343E-05	0.57	1.144E-05	0.49	1.238E-05	0.40
134	1.456E-05	0.51	1.226E-05	0.44	1.326E-05	0.38
135	2.395E-06	1.30	2.080E-06	1.17	2.239E-06	1.04
136	3.869E-06	1.00	3.361E-06	0.83	3.690E-06	0.70
137	2.479E-06	1.03	2.599E-06	1.01	2.957E-06	0.84
138	4.013E-06	1.00	3.515E-06	0.84	3.842E-06	0.70
139	4.586E-06	0.96	3.901E-06	0.79	4.189E-06	0.78

140	1.204E-05	0.64	1.018E-05	0.54	1.097E-05	0.43
141	8.691E-06	0.69	7.349E-06	0.59	7.934E-06	0.52
142	5.881E-06	0.92	4.988E-06	0.84	5.351E-06	0.64
143	1.966E-05	0.50	1.658E-05	0.46	1.792E-05	0.35
144	7.994E-06	0.82	6.732E-06	0.67	7.269E-06	0.62
145	7.049E-06	0.73	6.022E-06	0.67	6.543E-06	0.54
146	1.206E-05	0.66	1.018E-05	0.56	1.098E-05	0.48
147	3.641E-06	1.31	3.085E-06	1.13	3.300E-06	0.97
148	1.861E-06	1.77	1.550E-06	1.45	1.687E-06	1.27
149	1.224E-06	2.08	1.028E-06	1.86	1.097E-06	1.47
150	3.989E-06	1.11	3.366E-06	0.95	3.640E-06	0.85
151	4.094E-06	1.13	3.462E-06	1.11	3.736E-06	0.91
152	4.355E-06	1.11	3.695E-06	0.92	3.961E-06	0.77
153	4.511E-06	1.14	3.803E-06	0.96	4.072E-06	0.80
154	4.683E-06	1.06	3.921E-06	0.97	4.230E-06	0.80
155	4.326E-06	1.17	3.645E-06	0.97	3.933E-06	0.77
156	3.979E-06	1.16	3.345E-06	1.04	3.618E-06	0.93
157	4.621E-06	0.95	3.906E-06	0.92	4.221E-06	0.84
158	4.957E-06	1.01	4.138E-06	0.91	4.408E-06	0.77
159	6.812E-06	0.82	5.700E-06	0.72	6.204E-06	0.61
160	3.611E-06	1.19	3.038E-06	1.14	3.215E-06	0.89
161	4.877E-06	1.12	4.127E-06	0.95	4.462E-06	0.80
162	5.834E-06	0.92	4.954E-06	0.96	5.335E-06	0.67
163	6.130E-06	0.94	5.173E-06	0.88	5.576E-06	0.68
164	6.426E-06	0.91	5.430E-06	0.80	5.885E-06	0.63
165	6.814E-06	0.75	5.800E-06	0.72	6.252E-06	0.62
166	4.067E-06	1.33	3.405E-06	1.19	3.679E-06	0.97
167	4.185E-06	1.09	3.530E-06	0.98	3.814E-06	0.81
168	4.274E-06	0.99	3.633E-06	0.90	3.923E-06	0.78
169	4.432E-06	0.92	3.744E-06	0.79	4.054E-06	0.67
170	4.590E-06	1.05	3.880E-06	0.87	4.184E-06	0.75
171	2.293E-06	1.26	1.937E-06	1.21	2.131E-06	0.99
172	2.380E-06	1.44	2.001E-06	1.31	2.200E-06	1.00
173	2.463E-06	1.45	2.070E-06	1.35	2.269E-06	1.03
174	2.446E-06	1.37	2.073E-06	1.25	2.242E-06	0.96
175	1.033E-06	1.87	8.856E-07	1.76	9.395E-07	1.50
176	1.002E-06	1.98	8.543E-07	1.92	9.186E-07	1.52
177	1.011E-06	1.86	8.648E-07	1.77	9.421E-07	1.48
178	1.046E-06	2.01	8.978E-07	1.64	9.695E-07	1.44
179	1.016E-06	2.11	8.811E-07	1.91	9.561E-07	1.46
180	1.039E-06	1.87	8.834E-07	1.54	9.757E-07	1.31
181	1.083E-06	1.90	9.015E-07	1.67	9.909E-07	1.37
182	1.089E-06	1.94	9.399E-07	1.76	1.001E-06	1.49
183	1.052E-06	1.91	9.036E-07	1.77	9.871E-07	1.33
184	1.107E-06	1.75	9.404E-07	1.82	1.030E-06	1.43
185	1.093E-06	1.85	9.268E-07	1.70	1.008E-06	1.40
186	1.120E-06	2.03	9.554E-07	1.78	1.026E-06	1.41
187	1.121E-06	1.86	9.616E-07	1.76	1.029E-06	1.31
188	1.131E-06	2.03	9.622E-07	1.79	1.059E-06	1.50
189	1.182E-06	2.23	1.004E-06	1.96	1.073E-06	1.42
190	2.980E-06	1.12	2.520E-06	1.02	2.720E-06	0.89
191	3.137E-06	1.26	2.653E-06	1.20	2.837E-06	0.85

192	3.129E-06	1.23	2.679E-06	1.08	2.878E-06	0.91
193	3.212E-06	1.22	2.719E-06	1.10	2.958E-06	0.80
194	6.799E-06	0.86	5.757E-06	0.72	6.251E-06	0.60
195	7.282E-06	0.80	6.134E-06	0.68	6.695E-06	0.54
196	7.727E-06	0.84	6.499E-06	0.75	7.043E-06	0.53
197	8.490E-06	0.68	7.155E-06	0.58	7.764E-06	0.49
198	8.956E-06	0.70	7.525E-06	0.66	8.198E-06	0.53
199	4.826E-06	0.94	4.067E-06	0.84	4.426E-06	0.65
200	5.091E-06	0.94	4.277E-06	0.84	4.641E-06	0.64
201	1.082E-05	0.62	9.112E-06	0.51	9.866E-06	0.46
202	1.199E-05	0.61	1.013E-05	0.52	1.102E-05	0.43
203	1.283E-05	0.57	1.093E-05	0.50	1.190E-05	0.45
204	1.476E-05	0.59	1.245E-05	0.54	1.358E-05	0.46
205	8.601E-06	0.77	7.738E-06	0.66	8.179E-06	0.52
206	9.273E-06	0.66	8.356E-06	0.59	8.890E-06	0.50
207	9.611E-06	0.65	8.712E-06	0.55	9.170E-06	0.46
208	1.126E-05	0.57	1.015E-05	0.52	1.083E-05	0.41
209	1.156E-05	0.59	1.056E-05	0.53	1.115E-05	0.42
210	1.413E-05	0.55	1.273E-05	0.48	1.361E-05	0.39
211	1.612E-05	0.49	1.459E-05	0.46	1.555E-05	0.37
212	1.924E-05	0.41	1.743E-05	0.37	1.851E-05	0.29
213	2.627E-05	0.37	2.356E-05	0.36	2.522E-05	0.27
214	3.665E-05	0.31	3.307E-05	0.27	3.552E-05	0.24
215	5.502E-05	0.28	4.977E-05	0.24	5.359E-05	0.20
216	9.194E-05	0.21	8.392E-05	0.17	9.056E-05	0.14
217	5.541E-05	0.26	5.314E-05	0.22	5.632E-05	0.18
218	7.052E-05	0.23	6.780E-05	0.18	7.201E-05	0.15
219	8.387E-05	0.20	8.120E-05	0.18	8.641E-05	0.14
220	1.014E-04	0.19	9.904E-05	0.16	1.054E-04	0.12
221	1.201E-04	0.16	1.184E-04	0.15	1.263E-04	0.13
222	1.364E-04	0.13	1.366E-04	0.12	1.455E-04	0.10
223	1.533E-04	0.12	1.573E-04	0.11	1.674E-04	0.09
224	7.518E-05	0.18	7.983E-05	0.15	8.453E-05	0.12
225	2.333E-04	0.12	2.724E-04	0.11	2.822E-04	0.09
226	3.172E-05	0.22	4.482E-05	0.21	4.452E-05	0.12
227	2.897E-05	0.24	4.639E-05	0.20	4.446E-05	0.12
228	1.041E-05	0.42	1.910E-05	0.30	1.750E-05	0.17
229	9.681E-06	0.40	1.970E-05	0.32	1.748E-05	0.18
230	4.478E-06	0.52	1.021E-05	0.43	8.740E-06	0.21
231	4.283E-06	0.59	1.063E-05	0.44	8.747E-06	0.20
232	3.928E-06	0.51	1.137E-05	0.42	8.869E-06	0.20
233	2.222E-06	0.79	7.404E-06	0.49	5.496E-06	0.25
234	1.416E-06	0.81	5.340E-06	0.61	3.811E-06	0.30
235	5.168E-07	1.59	1.043E-06	1.06	1.121E-06	0.54
236	3.523E-07	1.85	7.419E-07	1.32	8.031E-07	0.54
237	2.216E-07	1.82	5.504E-07	1.31	6.158E-07	0.55
238	6.393E-09	10.96	2.194E-08	5.80	2.611E-08	1.94

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

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  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
 0.7552 to 0.7580     ******
 0.7580 to 0.7608     **********
 0.7608 to 0.7637     ****************
 0.7637 to 0.7665     ********************************
 0.7665 to 0.7693     ************************
 0.7693 to 0.7722     ******
 0.7722 to 0.7750     ***
 0.7750 to 0.7778     **

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7552 to 0.7580     ****
 0.7580 to 0.7608     *****
 0.7608 to 0.7637     *************
 0.7637 to 0.7665     **************************
 0.7665 to 0.7693     ********************
```

```
 0.7693 to 0.7722     ***
 0.7722 to 0.7750     ***
 0.7750 to 0.7778     *

                               frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7552 to 0.7580     ***
 0.7580 to 0.7608     **
 0.7608 to 0.7637     ***********
 0.7637 to 0.7665     **************
 0.7665 to 0.7693     ****************
 0.7693 to 0.7722     **
 0.7722 to 0.7750     *
 0.7750 to 0.7778     *

                               frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7552 to 0.7580     **
 0.7580 to 0.7608
 0.7608 to 0.7637     *****
 0.7637 to 0.7665     *******
 0.7665 to 0.7693     ***********
 0.7693 to 0.7722
 0.7722 to 0.7750
 0.7750 to 0.7778

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

**********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76509 + or - 0.00042                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.64940E-02 + or -  1.23098E-04           ***
        ***
***
```

```
        ***        system nu bar
2.43895E+00 + or -  9.42259E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52748E-01 + or -  1.60774E-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     3.11433 minutes


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1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
```

```
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00              99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //               11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666



      0000000       666666666666                            44
666666666666                       0000000            11
     000000000     6666666666666                          444
6666666666666                      000000000          111
    00       00    66                   :::              4444     66
:::        00       00        1111
   00         00   66                   :::             44 44     66
:::       00         00         11
   00         00   66                   :::            44  44     66
:::       00         00         11
   00         00   666666666666                       44   44
666666666666                     00         00         11
   00         00   6666666666666                      44    44
6666666666666                    00         00         11
   00         00   66         66         :::        444444444444   66
66         :::       00         00         11
   00         00   66         66         :::       4444444444444   66
66         :::       00         00         11
    00       00    66         66         :::                44     66
66         :::        00       00          11
     000000000     6666666666666                          44
6666666666666                      000000000        11111111
      0000000       66666666666                           44
66666666666                        0000000         11111111
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE




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

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

```
*****
        *****               library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****               jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:46:01.10
*****
        *****
*****
        *****
*****

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1

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

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```

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

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        ***
***
        ***          unit
volume                                          ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
```

```
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

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

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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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                 12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                 12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90906E-08  1.32112E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.16786E-08  3.17792E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.38587E-09  3.85418E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.86218E-10  8.13133E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.42871E-17  3.97331E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.65925E-10  4.71381E-09   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  1.21489E-08  3.45137E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.02012E-09  2.32645E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.91250E-12  5.66232E-11   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.26076E-09  3.73266E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  7.91171E-11  2.43711E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.82465E-11  1.84653E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
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    1045103  5.35755E-10  1.65031E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  3.65601E-14  1.14807E-12   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  2.04147E-10  6.41064E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53965E-12  2.13188E-10   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  8.98777E-11  2.90303E-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  1.29595E-09  4.30227E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43912E-09  8.17026E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.57202E-12  8.84647E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51422E-11  2.24056E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
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    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.29900E-11  1.25320E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.12580E-10  4.34405E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  3.12815E-20  1.26326E-18   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.77904E-10  2.26451E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  1.19289E-11  4.74575E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  7.70999E-18  3.11352E-16   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.34916E-09  5.36744E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.11765E-15  8.48827E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41913E-09  5.73079E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23432E-09  5.05844E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  3.98736E-11  1.66993E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.26730E-10  5.34537E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  1.43024E-13  6.11844E-12   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.07455E-10  3.04763E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.10082E-09  4.64315E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  4.63008E-11  1.98069E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.15931E-09  4.95932E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  4.02396E-10  1.73343E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32868E-10  3.61280E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.16518E-11  5.12419E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
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    1061147  3.87882E-10  1.70580E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.19955E-17  5.31128E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.79136E-13  7.98531E-12   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.56507E-11  2.44736E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.22954E-10  9.93852E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06724E-09  1.38566E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50024E-11  2.50125E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  1.57190E-14  7.19545E-13   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45318E-09  6.56487E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59132E-09  7.28429E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30556E-14  6.01538E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.10962E-12  2.83329E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.33959E-13  6.25241E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84213E-12  2.65673E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27382E-10  1.98195E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94512E-10  2.77479E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51352E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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
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    1082206  1.31999E-09  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.14057E-11  8.09317E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.62065E-17  1.86740E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.29509E-10  6.65132E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88246E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71660E-20  2.68180E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08706E-20  7.84397E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  4.02087E-31  2.91343E-29   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.44180E-21  2.49384E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.74710E-21  7.09175E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.59688E-21  7.01122E-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
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    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
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    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
                                  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:
  9312 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       ........

                                 ........     0.01633 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
0.01683 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 15550 independent fission points were generated for generation 1
          1       7.71285E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15766 independent fission points were generated for generation 2
          2       7.65470E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15612 independent fission points were generated for generation 3
          3       7.68302E-01      7.68302E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.68421E-01      7.68362E-01      5.95152E-05
0.00000E+00      0.00000E+00
          5       7.61210E-01      7.65978E-01      2.38397E-03
0.00000E+00      0.00000E+00
          6       7.73366E-01      7.67825E-01      2.50067E-03
0.00000E+00      0.00000E+00
          7       7.66543E-01      7.67568E-01      1.95392E-03
0.00000E+00      0.00000E+00
          8       7.61419E-01      7.66544E-01      1.89619E-03
0.00000E+00      0.00000E+00
          9       7.69333E-01      7.66942E-01      1.65136E-03
0.00000E+00      0.00000E+00
         10       7.67341E-01      7.66992E-01      1.43099E-03
0.00000E+00      0.00000E+00
         11       7.73311E-01      7.67694E-01      1.44418E-03
0.00000E+00      0.00000E+00
         12       7.60222E-01      7.66947E-01      1.49227E-03
0.00000E+00      0.00000E+00
         13       7.63734E-01      7.66655E-01      1.38105E-03
0.00000E+00      0.00000E+00
         14       7.63191E-01      7.66366E-01      1.29333E-03
0.00000E+00      0.00000E+00
         15       7.68147E-01      7.66503E-01      1.19755E-03
```

0.00000E+00	0.00000E+00				
16	7.64636E-01	7.66370E-01	1.11671E-03	0.00000E+00	0.00000E+00
17	7.63728E-01	7.66194E-01	1.05441E-03	0.00000E+00	0.00000E+00
18	7.58232E-01	7.65696E-01	1.10472E-03	0.00000E+00	0.00000E+00
19	7.66729E-01	7.65757E-01	1.03948E-03	0.00000E+00	0.00000E+00
20	7.66632E-01	7.65805E-01	9.81238E-04	0.00000E+00	0.00000E+00
21	7.72886E-01	7.66178E-01	1.00019E-03	0.00000E+00	0.00000E+00
22	7.65529E-01	7.66146E-01	9.49416E-04	0.00000E+00	0.00000E+00
23	7.62888E-01	7.65991E-01	9.16297E-04	0.00000E+00	0.00000E+00
24	7.69133E-01	7.66133E-01	8.85252E-04	0.00000E+00	0.00000E+00
25	7.60618E-01	7.65894E-01	8.79225E-04	0.00000E+00	0.00000E+00
26	7.74061E-01	7.66234E-01	9.07978E-04	0.00000E+00	0.00000E+00
27	7.62308E-01	7.66530E-01	1.21323E-02	0.00000E+00	0.00000E+00
28	7.69133E-01	7.67050E-01	7.07995E-03	0.00000E+00	0.00000E+00
29	7.56652E-01	7.65317E-01	6.43511E-03	0.00000E+00	0.00000E+00
30	7.65911E-01	7.65402E-01	4.91441E-03	0.00000E+00	0.00000E+00
31	7.74904E-01	7.66590E-01	3.38301E-03	0.00000E+00	0.00000E+00
32	7.59625E-01	7.65816E-01	3.02536E-03	0.00000E+00	0.00000E+00
33	7.65015E-01	7.65736E-01	2.56622E-03	0.00000E+00	0.00000E+00
34	7.65336E-01	7.65700E-01	2.27946E-03	0.00000E+00	0.00000E+00
35	7.65056E-01	7.65646E-01	2.04180E-03	0.00000E+00	0.00000E+00
36	7.73663E-01	7.66263E-01	1.96354E-03	0.00000E+00	0.00000E+00
37	7.69666E-01	7.66506E-01	1.80035E-03	0.00000E+00	0.00000E+00
38	7.66871E-01	7.66530E-01	1.66695E-03	0.00000E+00	0.00000E+00
39	7.71952E-01	7.66869E-01	1.85304E-03	0.00000E+00	0.00000E+00
40	7.58749E-01	7.66391E-01	1.62487E-03	0.00000E+00	0.00000E+00
41	7.63933E-01	7.66255E-01	1.49128E-03		

0.00000E+00	0.00000E+00				
42	7.64437E-01	7.66159E-01	1.44347E-03	0.00000E+00	0.00000E+00
43	7.66629E-01	7.66183E-01	1.35799E-03	0.00000E+00	0.00000E+00
44	7.70937E-01	7.66409E-01	1.28745E-03	0.00000E+00	0.00000E+00
45	7.63882E-01	7.66294E-01	1.22611E-03	0.00000E+00	0.00000E+00
46	7.65001E-01	7.66238E-01	1.15550E-03	0.00000E+00	0.00000E+00
47	7.64284E-01	7.66156E-01	1.11527E-03	0.00000E+00	0.00000E+00
48	7.68393E-01	7.66246E-01	1.06425E-03	0.00000E+00	0.00000E+00
49	7.65768E-01	7.66228E-01	1.02084E-03	0.00000E+00	0.00000E+00
50	7.65373E-01	7.66196E-01	9.76598E-04	0.00000E+00	0.00000E+00
51	7.62482E-01	7.66063E-01	9.52471E-04	0.00000E+00	0.00000E+00
52	7.68490E-01	7.66147E-01	9.17365E-04	0.00000E+00	0.00000E+00
53	7.63585E-01	7.66062E-01	9.03077E-04	0.00000E+00	0.00000E+00
54	7.63408E-01	7.65976E-01	8.67297E-04	0.00000E+00	0.00000E+00
55	7.62810E-01	7.65877E-01	8.55716E-04	0.00000E+00	0.00000E+00
56	7.65393E-01	7.65862E-01	8.29463E-04	0.00000E+00	0.00000E+00
57	7.65925E-01	7.65864E-01	8.02836E-04	0.00000E+00	0.00000E+00
58	7.62039E-01	7.65755E-01	7.89159E-04	0.00000E+00	0.00000E+00
59	7.58573E-01	7.65555E-01	7.93978E-04	0.00000E+00	0.00000E+00
60	7.64820E-01	7.65535E-01	7.74299E-04	0.00000E+00	0.00000E+00
61	7.63590E-01	7.65484E-01	7.69018E-04	0.00000E+00	0.00000E+00
62	7.65540E-01	7.65486E-01	7.47864E-04	0.00000E+00	0.00000E+00
63	7.58526E-01	7.65312E-01	7.63468E-04	0.00000E+00	0.00000E+00
64	7.64336E-01	7.65288E-01	7.43980E-04	0.00000E+00	0.00000E+00
65	7.68752E-01	7.65370E-01	7.08718E-04	0.00000E+00	0.00000E+00
66	7.61683E-01	7.65285E-01	7.18906E-04	0.00000E+00	0.00000E+00
67	7.67204E-01	7.65328E-01	6.90464E-04		

0.00000E+00	0.00000E+00				
68	7.71930E-01	7.65475E-01	7.07297E-04	0.00000E+00	0.00000E+00
69	7.68911E-01	7.65550E-01	6.90696E-04	0.00000E+00	0.00000E+00
70	7.71687E-01	7.65680E-01	7.28514E-04	0.00000E+00	0.00000E+00
71	7.71796E-01	7.65808E-01	7.66866E-04	0.00000E+00	0.00000E+00
72	7.65619E-01	7.65804E-01	7.48797E-04	0.00000E+00	0.00000E+00
73	7.64165E-01	7.65771E-01	7.20611E-04	0.00000E+00	0.00000E+00
74	7.71051E-01	7.65875E-01	7.33386E-04	0.00000E+00	0.00000E+00
75	7.59747E-01	7.65757E-01	7.35239E-04	0.00000E+00	0.00000E+00
76	7.61636E-01	7.65679E-01	7.16307E-04	0.00000E+00	0.00000E+00
77	7.56541E-01	7.65510E-01	7.28164E-04	0.00000E+00	0.00000E+00
78	7.59154E-01	7.65394E-01	8.47795E-04	0.00000E+00	0.00000E+00
79	7.57408E-01	7.65252E-01	8.95607E-04	0.00000E+00	0.00000E+00
80	7.69732E-01	7.65330E-01	8.24572E-04	0.00000E+00	0.00000E+00
81	7.67480E-01	7.65367E-01	7.96607E-04	0.00000E+00	0.00000E+00
82	7.67914E-01	7.65410E-01	7.71448E-04	0.00000E+00	0.00000E+00
83	7.55406E-01	7.65244E-01	7.06881E-04	0.00000E+00	0.00000E+00
84	7.71114E-01	7.65340E-01	7.55393E-04	0.00000E+00	0.00000E+00
85	7.67049E-01	7.65367E-01	7.42238E-04	0.00000E+00	0.00000E+00
86	7.74607E-01	7.65514E-01	7.02500E-04	0.00000E+00	0.00000E+00
87	7.66105E-01	7.65523E-01	6.91501E-04	0.00000E+00	0.00000E+00
88	7.68359E-01	7.65567E-01	6.91648E-04	0.00000E+00	0.00000E+00
89	7.61834E-01	7.65510E-01	6.82456E-04	0.00000E+00	0.00000E+00
90	7.63829E-01	7.65485E-01	6.70655E-04	0.00000E+00	0.00000E+00
91	7.60848E-01	7.65417E-01	6.70198E-04	0.00000E+00	0.00000E+00
92	7.64232E-01	7.65400E-01	6.61023E-04	0.00000E+00	0.00000E+00
93	7.58473E-01	7.65301E-01	6.69771E-04		

```
0.00000E+00      0.00000E+00
         94       7.59453E-01      7.65219E-01      7.19795E-04
0.00000E+00      0.00000E+00
         95       7.66945E-01      7.65243E-01      7.00270E-04
0.00000E+00      0.00000E+00
         96       7.67103E-01      7.65268E-01      6.87566E-04
0.00000E+00      0.00000E+00
         97       7.66077E-01      7.65279E-01      6.76952E-04
0.00000E+00      0.00000E+00
         98       7.66985E-01      7.65302E-01      6.66178E-04
0.00000E+00      0.00000E+00
         99       7.63617E-01      7.65280E-01      6.55076E-04
0.00000E+00      0.00000E+00
        100       7.64791E-01      7.65273E-01      6.45767E-04
0.00000E+00      0.00000E+00
        101       7.63589E-01      7.65252E-01      6.37985E-04
0.00000E+00      0.00000E+00
        102       7.66718E-01      7.65270E-01      6.29557E-04
0.00000E+00      0.00000E+00
        103       7.65182E-01      7.65269E-01      6.21248E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=0598E40536027742
        104       7.61592E-01      7.65224E-01      6.13952E-04
0.00000E+00      0.00000E+00
        105       7.70026E-01      7.65282E-01      6.02075E-04
0.00000E+00      0.00000E+00
        106       7.68908E-01      7.65326E-01      5.98804E-04
0.00000E+00      0.00000E+00
        107       7.68232E-01      7.65361E-01      5.98878E-04
0.00000E+00      0.00000E+00
        108       7.64442E-01      7.65350E-01      5.90830E-04
0.00000E+00      0.00000E+00
        109       7.65375E-01      7.65350E-01      5.83612E-04
0.00000E+00      0.00000E+00
        110       7.69719E-01      7.65400E-01      5.82038E-04
0.00000E+00      0.00000E+00
        111       7.74404E-01      7.65503E-01      6.09746E-04
0.00000E+00      0.00000E+00
        112       7.60258E-01      7.65444E-01      5.81479E-04
0.00000E+00      0.00000E+00
        113       7.66523E-01      7.65456E-01      5.75794E-04
0.00000E+00      0.00000E+00
        114       7.63856E-01      7.65438E-01      5.69319E-04
0.00000E+00      0.00000E+00
        115       7.62928E-01      7.65411E-01      5.58518E-04
0.00000E+00      0.00000E+00
        116       7.67457E-01      7.65433E-01      5.48274E-04
0.00000E+00      0.00000E+00
        117       7.67189E-01      7.65452E-01      5.42769E-04
0.00000E+00      0.00000E+00
        118       7.70898E-01      7.65509E-01      5.42879E-04
```

```
0.00000E+00      0.00000E+00
        119       7.65907E-01      7.65513E-01      5.37376E-04
0.00000E+00      0.00000E+00
        120       7.64241E-01      7.65500E-01      5.29505E-04
0.00000E+00      0.00000E+00
        121       7.67869E-01      7.65524E-01      5.30917E-04
0.00000E+00      0.00000E+00
        122       7.63156E-01      7.65500E-01      5.16582E-04
0.00000E+00      0.00000E+00
        123       7.66739E-01      7.65513E-01      5.17717E-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=BD9AB78AB3C7AA31
                                    A start type 6 file will be written to
keno_start6_file
1                                                   fuel bundle

 lifetime =  1.54957E-05 + or -  1.20708E-08             generation time
=  2.99154E-05 + or -  2.13593E-08
 nu bar   =  2.43896E+00 + or -  9.57273E-06       average fission group
=  2.17553E+02 + or -  1.10011E-02
                      energy(ev) of the average lethargy causing fission
=  5.66609E-02 + or -  1.22119E-04
                                                 system mean free path (cm)
=  6.52932E-01 + or -  1.62633E-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          0.76551   + or - 0.00052     0.76499 to 0.76603
0.76448 to 0.76655    0.76396 to 0.76707    2000000       9.1439

      24          0.76548   + or - 0.00052     0.76495 to 0.76600
0.76443 to 0.76652    0.76391 to 0.76704    1980000       9.1423

      25          0.76553   + or - 0.00051     0.76502 to 0.76604
0.76450 to 0.76655    0.76399 to 0.76706    1960000       9.7978

      26          0.76544   + or - 0.00051     0.76492 to 0.76595
0.76441 to 0.76646    0.76390 to 0.76698    1940000       9.6133

      27          0.76547   + or - 0.00051     0.76496 to 0.76598
0.76444 to 0.76650    0.76393 to 0.76701    1920000       9.7801

      28          0.76543   + or - 0.00053     0.76490 to 0.76596
```

0.76438 to 0.76649 0.76385 to 0.76701 1900000 9.4680

29 0.76552 + or - 0.00054 0.76498 to 0.76607
0.76444 to 0.76661 0.76389 to 0.76716 1880000 8.7916

30 0.76552 + or - 0.00055 0.76497 to 0.76607
0.76442 to 0.76662 0.76387 to 0.76717 1860000 8.7708

31 0.76542 + or - 0.00056 0.76486 to 0.76598
0.76430 to 0.76654 0.76374 to 0.76710 1840000 8.1399

32 0.76548 + or - 0.00057 0.76491 to 0.76606
0.76434 to 0.76663 0.76376 to 0.76720 1820000 7.9315

37 0.76535 + or - 0.00060 0.76476 to 0.76595
0.76416 to 0.76654 0.76356 to 0.76714 1720000 7.9009

42 0.76536 + or - 0.00064 0.76472 to 0.76600
0.76408 to 0.76664 0.76344 to 0.76729 1620000 7.4809

47 0.76531 + or - 0.00068 0.76463 to 0.76599
0.76395 to 0.76666 0.76328 to 0.76734 1520000 7.5030

52 0.76525 + or - 0.00072 0.76453 to 0.76598
0.76380 to 0.76670 0.76308 to 0.76743 1420000 7.4647

57 0.76533 + or - 0.00077 0.76456 to 0.76610
0.76379 to 0.76688 0.76301 to 0.76765 1320000 7.5214

62 0.76553 + or - 0.00079 0.76474 to 0.76632
0.76395 to 0.76711 0.76316 to 0.76790 1220000 8.3279

67 0.76566 + or - 0.00088 0.76478 to 0.76653
0.76391 to 0.76741 0.76303 to 0.76828 1120000 7.9460

72 0.76523 + or - 0.00086 0.76437 to 0.76610
0.76351 to 0.76696 0.76264 to 0.76782 1020000 9.3998

77 0.76552 + or - 0.00079 0.76473 to 0.76630
0.76394 to 0.76709 0.76315 to 0.76788 920000 13.0506

82 0.76566 + or - 0.00075 0.76491 to 0.76641
0.76415 to 0.76717 0.76340 to 0.76792 820000 16.8895

87 0.76549 + or - 0.00081 0.76468 to 0.76630
0.76387 to 0.76711 0.76306 to 0.76792 720000 12.3213

92 0.76576 + or - 0.00069 0.76507 to 0.76645
0.76438 to 0.76714 0.76369 to 0.76783 620000 22.5985

97 0.76618 + or - 0.00063 0.76554 to 0.76681
0.76491 to 0.76744 0.76428 to 0.76808 520000 29.7217

```
     102          0.76642   + or - 0.00077     0.76566 to 0.76719
0.76489 to 0.76796    0.76412 to 0.76872     420000      30.1612

     107          0.76631   + or - 0.00091     0.76540 to 0.76722
0.76448 to 0.76814    0.76357 to 0.76905     320000      37.3037

     112          0.76607   + or - 0.00080     0.76527 to 0.76687
0.76448 to 0.76766    0.76368 to 0.76846     220000      36.2121
1                                                fuel bundle

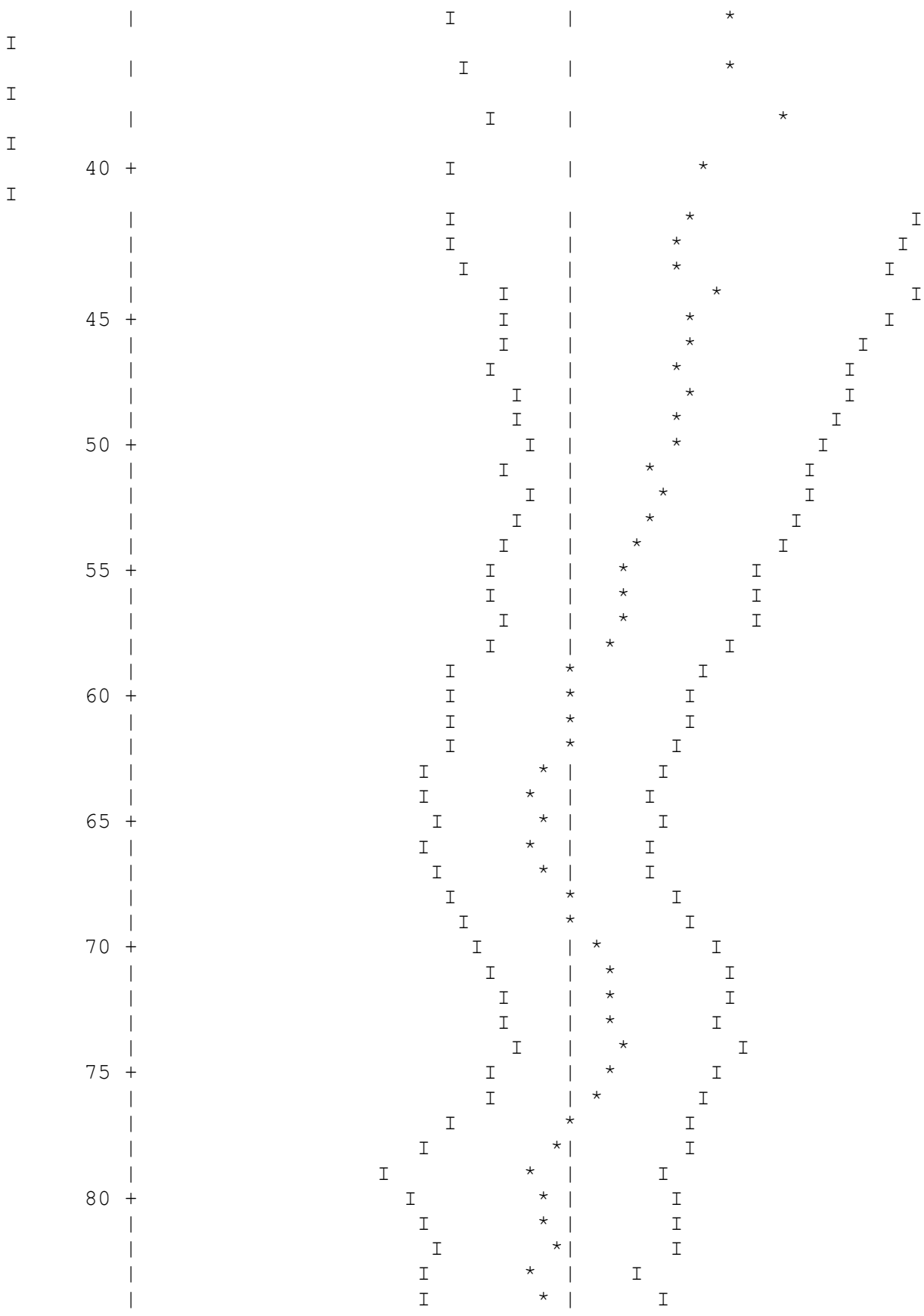
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76647   + or - 0.00138     0.76509 to 0.76785
0.76371 to 0.76922    0.76234 to 0.77060     120000      41.3326
1                          fuel bundle

                      plot of average k-effective by generation run.
      the line represents k-eff = 0.76550 + or - 0.00051 which occurs for
122 generations run.

                                0.7649                   0.7670
0.7691

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



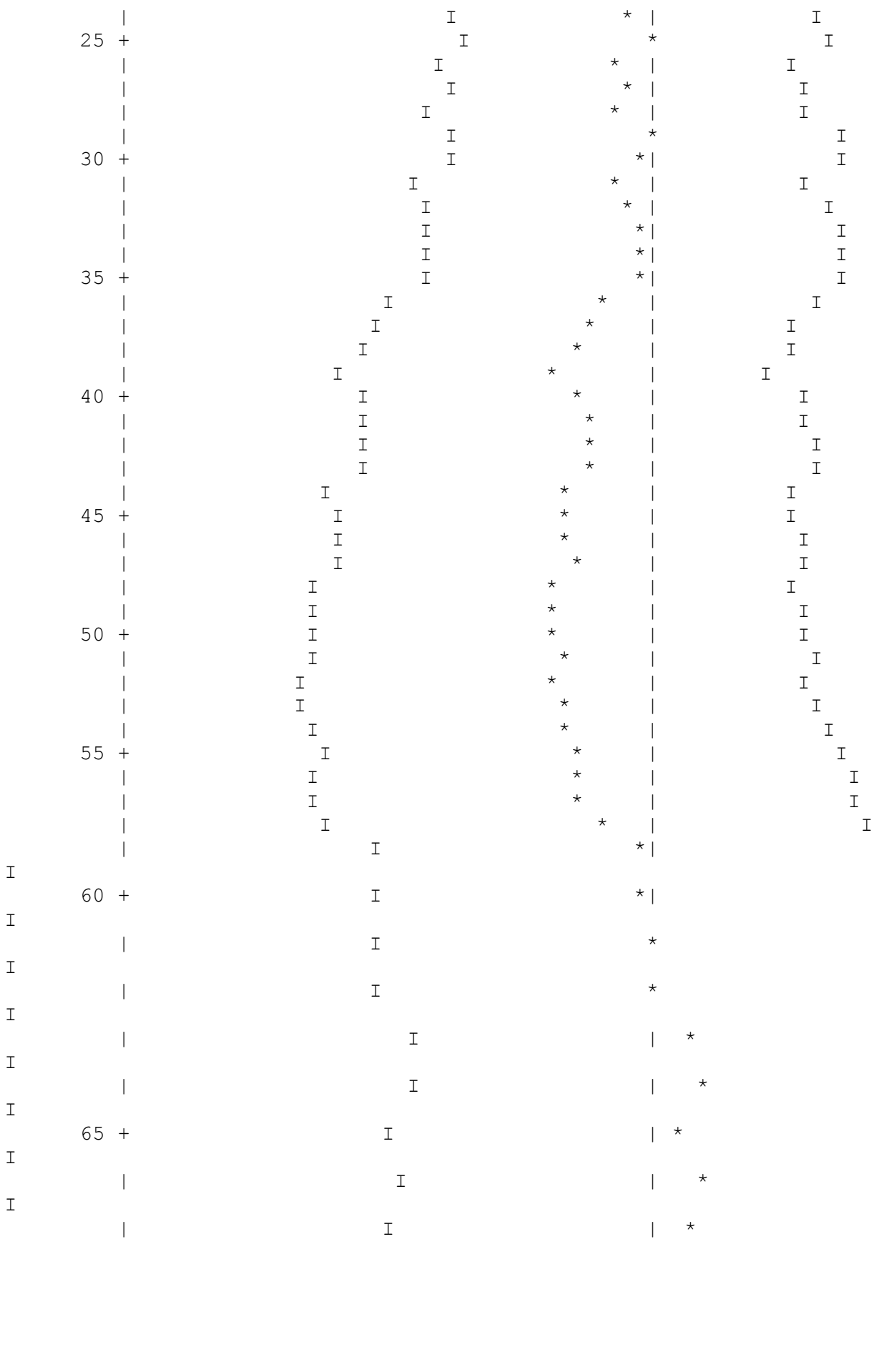
```
     85 +                        I       * |      I
        |                          I       *       I
        |                          I       *       I
        |                           I      |*       I
        |                          I       *       I
     90 +                          I       *       I
        |                         I       *|      I
        |                         I       *|     I
        |                        I       * |    I
        |                      I        *  |    I
     95 +                       I       *  |    I
        |                       I       *  |    I
        |                       I       *  |    I
        |                        I       * |    I
        |                        I      *  |    I
    100 +                        I      *  |    I
        |                       I       *  |   I
        |                        I      *  |    I
        |                        I      *  |   I
        |                       I       *  |   I
    105 +                        I      *  |   I
        |                         I      * |    I
        |                         I      * |    I
        |                         I      * |    I
        |                         I      * |    I
    110 +                          I      *|     I
        |                           I      *      I
        |                          I      *|     I
        |                           I     *|     I
        |                          I      *|     I
    115 +                          I      *|    I
        |                           I     *|    I
        |                           I     *|     I
        |                            I     *     I
        |                            I     *     I
    120 +                            I     *     I
        |                            I     *     I
        |                            I     *     I
        |                            I     *     I
1                           fuel bundle
```

plot of average k-effective by generation skipped.

the line represents k-eff = 0.7655 + or - 0.0005 which occurs for 25 generations skipped.

```
                                0.7649                    0.7658
0.7667

|-------------------------|-----------------------|------------------
------|-----------------------
        |
        |                           I             *|             I
```



```
I
         |                  I                        *
I
         |                 I                       * |
I
      70 +              I                      *    |                  I
         |          I                        *        |               I
         |         I                        *         |               I
         |          I                        *        |                I
         |    I                          *           |               I
      75 +         I                        *        |                I
         |            I                        *     |                  I
         |                  I                      *|
I
         |                          I                |  *
I
         |                              I            |        *
I
      80 +                             I             |      *
I
         |                          I                |    *
I
         |                       I                   |  *
I
         |                              I            |          *
I
         |                            I              |       *
I
      85 +                          I                |      *
I
         |                  I                      *|
I
         |                 I                       *|
I
         |            I                         *   |
I
         |                 I                       *|
I
      90 +                  I                      |*
I
         |                            I              |    *
I
         |                             I             |      *
I
         |                                     I    |             *
I
         |                                          |   I
*                I
      95 +                                          | I                 *
I
         |                                          |I                 *
I
```

```
         |                                          I                 *
I
         |                                        I |                *
I
         |                                          |I
*                  I
     100 +                                          | I
*                  I
         |                                          |    I
*                   I
         |                                          |  I
*                    I
         |                                          |   I
*                      I
         |                                          |          I
*                     I
     105 +                                          |    I
*                      I
         |                                          |I
*                       I
         |                                     I   |
*                          I
         |                                        I |
*                           I
         |                                        I |
*                             I
     110 +                        I                 |
*                                 I
         |      I                                   |*
I
         |                                  I       |              *
I
         |                              I           |            *
I
         |                                  I       |
*                           I
     115 +                            I              |
*
         |                                       I  |
*
         |                              I           |
*
         |                                          |*
         |                                        *|
     120 +                                          |          *
```

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 fraction	percent deviation	leakage deviation	percent deviation
1	0.0000	0.00000E+00	0.00000E+00	0.0000
2	0.0000	9.29380E-07	6.19835E-07	38.5976
3	0.0000	1.23606E-05	2.08024E-05	4.6447
4	0.0000	1.84953E-05	3.43818E-05	3.6943
5	0.0000	2.62370E-05	5.43656E-05	2.8342
6	0.0001	9.30421E-05	2.26983E-04	1.2650
7	0.0002	1.16313E-04	2.10780E-04	1.4751
8	0.0003	2.46700E-04	3.23288E-04	0.9394
9	0.0005	3.89165E-04	4.45396E-04	0.5523
10	0.0003	2.08079E-04	2.09082E-04	0.7688
11	0.0012	9.23307E-04	5.28776E-04	0.4989
12	0.0010	7.54222E-04	2.95698E-04	0.7688
13	0.0003	2.30457E-04	9.15526E-05	1.3009
14	0.0013	1.01621E-03	4.15330E-04	0.5959
15	0.0010	7.66223E-04	3.30335E-04	0.7042
16	0.0003	1.91809E-04	8.81335E-05	1.1658
17	0.0001	6.71021E-05	3.26315E-05	1.7637
18	0.0001	5.22064E-05	2.63655E-05	1.7977
19	0.0001	8.03676E-05	4.25061E-05	1.4016
20	0.0001	5.91672E-05	3.24484E-05	1.5265
21	0.0002	1.19192E-04	6.73127E-05	1.0125
22	0.0001	1.04626E-04	6.19624E-05	1.2526
23	0.0001	1.07903E-04	6.58430E-05	1.1075
24	0.0000	2.40252E-05	1.49284E-05	2.1391
		0.00000E+00	0.00000E+00	0.0000

25	0.0000	3.16767E-05	1.8684	1.97600E-05	1.8261	0.00000E+00	0.0000
26	0.0000	1.77007E-05	2.2241	1.11181E-05	2.1649	0.00000E+00	0.0000
27	0.0001	5.25725E-05	1.2967	3.28176E-05	1.2706	0.00000E+00	0.0000
28	0.0001	9.89396E-05	0.8887	6.17057E-05	0.8741	0.00000E+00	0.0000
29	0.0001	9.94181E-05	1.0558	6.26154E-05	1.0416	0.00000E+00	0.0000
30	0.0000	1.27662E-05	3.1197	8.00643E-06	3.0979	0.00000E+00	0.0000
31	0.0001	9.77561E-05	0.9683	6.17518E-05	0.9565	0.00000E+00	0.0000
32	0.0000	3.81308E-05	1.6652	2.43763E-05	1.6286	0.00000E+00	0.0000
33	0.0000	3.25979E-05	1.5569	2.04104E-05	1.5379	0.00000E+00	0.0000
34	0.0001	7.55355E-05	1.1578	4.74404E-05	1.1416	0.00000E+00	0.0000
35	0.0001	4.48578E-05	1.5442	2.81527E-05	1.5213	0.00000E+00	0.0000
36	0.0001	4.30712E-05	1.5401	2.66627E-05	1.5257	0.00000E+00	0.0000
37	0.0000	2.78034E-05	1.6364	1.74551E-05	1.6033	0.00000E+00	0.0000
38	0.0000	3.35403E-05	1.8482	2.11202E-05	1.8049	0.00000E+00	0.0000
39	0.0002	1.27885E-04	0.8917	8.13956E-05	0.8705	0.00000E+00	0.0000
40	0.0002	1.21258E-04	0.9496	7.83735E-05	0.9311	0.00000E+00	0.0000
41	0.0002	1.59064E-04	0.7121	1.06377E-04	0.6872	0.00000E+00	0.0000
42	0.0002	1.39419E-04	0.8019	9.48118E-05	0.7844	0.00000E+00	0.0000
43	0.0001	7.95616E-05	1.1358	5.71247E-05	1.0853	0.00000E+00	0.0000
44	0.0001	1.12892E-04	1.0969	8.29495E-05	1.0512	0.00000E+00	0.0000
45	0.0001	5.87614E-05	0.9323	4.74712E-05	0.8591	0.00000E+00	0.0000
46	0.0000	1.43003E-05	1.9481	1.14984E-05	1.8148	0.00000E+00	0.0000
47	0.0001	4.06282E-05	1.6815	3.15472E-05	1.6156	0.00000E+00	0.0000
48	0.0000	1.29671E-05	3.9464	1.00446E-05	3.8434	0.00000E+00	0.0000
49	0.0001	8.29379E-05	1.4414	6.53573E-05	1.4106	0.00000E+00	0.0000
50	0.0001	5.68024E-05	1.7798	4.67659E-05	1.7461	0.00000E+00	0.0000

```
   51    0.0000                 1.54396E-05     3.4804
1.28220E-05     3.4038       0.00000E+00     0.0000
   52    0.0001                 4.11671E-05     2.1527
3.55617E-05     2.0984       0.00000E+00     0.0000
   53    0.0002                 1.58696E-04     0.7748
1.55919E-04     0.7243       0.00000E+00     0.0000
   54    0.0001                 7.83255E-05     2.0340
7.26394E-05     1.9648       0.00000E+00     0.0000
   55    0.0002                 1.62318E-04     1.2959
1.48853E-04     1.2610       0.00000E+00     0.0000
   56    0.0002                 1.19840E-04     1.5638
1.11061E-04     1.5268       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                 1.48637E-04     1.5123
1.34877E-04     1.4746       0.00000E+00     0.0000
   58    0.0001                 8.66756E-05     1.9176
7.58772E-05     1.8674       0.00000E+00     0.0000
   59    0.0002                 1.60150E-04     1.5505
1.43795E-04     1.4905       0.00000E+00     0.0000
   60    0.0004                 2.75641E-04     1.0856
2.49741E-04     1.0253       0.00000E+00     0.0000
   61    0.0000                 2.72093E-05     3.6483
2.09662E-05     3.5269       0.00000E+00     0.0000
   62    0.0002                 1.64991E-04     1.7785
1.38356E-04     1.7302       0.00000E+00     0.0000
   63    0.0002                 1.17102E-04     2.0748
9.65472E-05     2.0045       0.00000E+00     0.0000
   64    0.0001                 9.63109E-05     2.2295
7.77265E-05     2.1539       0.00000E+00     0.0000
   65    0.0000                 3.21265E-05     3.8636
3.18636E-05     3.7139       0.00000E+00     0.0000
   66    0.0002                 1.63794E-04     1.8943
1.45620E-04     1.8285       0.00000E+00     0.0000
   67    0.0002                 1.43430E-04     2.1311
1.17441E-04     2.0620       0.00000E+00     0.0000
   68    0.0000                 2.87566E-05     4.4979
2.48157E-05     4.3487       0.00000E+00     0.0000
   69    0.0004                 2.97107E-04     1.4830
2.33277E-04     1.4372       0.00000E+00     0.0000
   70    0.0003                 2.05992E-04     1.7583
1.87539E-04     1.6934       0.00000E+00     0.0000
   71    0.0006                 4.31407E-04     1.2459
3.57037E-04     1.2069       0.00000E+00     0.0000
   72    0.0001                 4.96734E-05     5.2398
```

2.93442E-05	5.1191	0.00000E+00	0.0000	73	0.0004	3.20599E-04	1.7884
2.44554E-04	1.6944	0.00000E+00	0.0000	74	0.0014	1.07346E-03	0.9999
7.80175E-04	0.9600	0.00000E+00	0.0000	75	0.0001	1.11699E-04	3.2569
8.58828E-05	3.0999	0.00000E+00	0.0000	76	0.0006	4.65974E-04	1.9305
2.95828E-04	1.8639	0.00000E+00	0.0000	77	0.0005	3.74399E-04	2.0504
2.68293E-04	1.9748	0.00000E+00	0.0000	78	0.0000	7.65946E-06	3.7887
7.49036E-05	3.7507	0.00000E+00	0.0000	79	0.0002	1.85469E-04	2.4014
1.24704E-04	2.3040	0.00000E+00	0.0000	80	0.0001	6.14196E-05	3.2339
8.19048E-05	3.1443	0.00000E+00	0.0000	81	0.0014	1.05811E-03	1.2879
7.78363E-04	1.2333	0.00000E+00	0.0000	82	0.0001	6.65259E-05	4.1558
3.99363E-05	3.9235	0.00000E+00	0.0000	83	0.0002	1.25452E-04	3.3010
1.38847E-04	3.2320	0.00000E+00	0.0000	84	0.0001	8.10999E-05	3.3046
8.22104E-05	3.0757	0.00000E+00	0.0000	85	0.0003	1.94535E-04	2.1559
2.39657E-04	2.0941	0.00000E+00	0.0000	86	0.0004	2.71679E-04	2.3634
2.18475E-04	2.2497	0.00000E+00	0.0000	87	0.0004	3.33734E-04	2.0815
2.07680E-04	1.9897	0.00000E+00	0.0000	88	0.0001	5.38708E-05	4.7256
9.78999E-05	4.6039	0.00000E+00	0.0000	89	0.0001	1.01484E-04	3.5429
7.00482E-05	3.2688	0.00000E+00	0.0000	90	0.0003	2.20588E-04	3.3760
1.30299E-04	3.2278	0.00000E+00	0.0000	91	0.0002	1.91057E-04	2.6641
1.20779E-04	2.5098	0.00000E+00	0.0000	92	0.0000	3.02882E-05	2.7430
1.98298E-04	2.6843	0.00000E+00	0.0000	93	0.0002	1.25921E-04	3.4536
1.02615E-04	3.1997	0.00000E+00	0.0000	94	0.0001	1.11002E-04	4.7025
6.23616E-05	4.4166	0.00000E+00	0.0000	95	0.0008	6.11424E-04	2.0743
3.77004E-04	2.0087	0.00000E+00	0.0000	96	0.0002	1.48414E-04	3.9990
7.54039E-05	3.8254	0.00000E+00	0.0000	97	0.0004	2.70031E-04	3.8650
1.54770E-04	3.7777	0.00000E+00	0.0000	98	0.0001	1.03088E-04	4.5109

```
9.88508E-05     4.3504       0.00000E+00     0.0000
   99    0.0001                 1.00664E-04     4.9717
6.75423E-05     4.8021       0.00000E+00     0.0000
  100    0.0002                 1.23491E-04     4.3948
8.27145E-05     4.2064       0.00000E+00     0.0000
  101    0.0001                 1.11108E-04     3.8072
7.06951E-05     3.5352       0.00000E+00     0.0000
  102    0.0002                 1.56469E-04     4.0566
8.73773E-05     3.8924       0.00000E+00     0.0000
  103    0.0001                 9.97741E-05     3.4817
9.71663E-05     3.3039       0.00000E+00     0.0000
  104    0.0002                 1.72995E-04     3.4385
1.37000E-04     3.3185       0.00000E+00     0.0000
  105    0.0002                 1.19333E-04     3.5884
7.90973E-05     3.3629       0.00000E+00     0.0000
  106    0.0002                 1.75014E-04     4.0867
1.30092E-04     4.0336       0.00000E+00     0.0000
  107    0.0001                 6.68876E-05     3.6649
6.73900E-05     3.4480       0.00000E+00     0.0000
  108    0.0000                 3.40932E-05     2.5574
1.47351E-04     2.4933       0.00000E+00     0.0000
  109    0.0002                 1.33116E-04     2.5389
4.41570E-04     2.5064       0.00000E+00     0.0000
  110    0.0008                 6.34250E-04     3.0075
3.91287E-04     2.9769       0.00000E+00     0.0000
  111    0.0002                 1.50837E-04     4.3708
1.38767E-04     4.2531       0.00000E+00     0.0000
  112    0.0002                 1.21864E-04     4.4132
1.28407E-04     4.3324       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                 1.25953E-04     3.9637
1.10184E-04     3.7065       0.00000E+00     0.0000
  114    0.0000                 1.01835E-05     7.7414
1.40024E-05     6.3546       0.00000E+00     0.0000
  115    0.0001                 7.42696E-05     3.8541
8.61425E-05     3.5649       0.00000E+00     0.0000
  116    0.0002                 1.83090E-04     2.9403
1.38359E-04     2.6410       0.00000E+00     0.0000
  117    0.0006                 4.68492E-04     2.1835
2.50698E-04     2.0426       0.00000E+00     0.0000
  118    0.0008                 5.90980E-04     2.1304
4.61232E-04     2.0411       0.00000E+00     0.0000
  119    0.0002                 1.38363E-04     2.2044
3.57212E-04     2.1310       0.00000E+00     0.0000
```

120	0.0002	1.69911E-04	2.3702	6.46567E-04	2.3356
0.00000E+00	0.0000				
121	0.0007	5.22297E-04	2.5243	4.01756E-04	2.4604
0.00000E+00	0.0000				
122	0.0001	1.02999E-04	4.5978	8.04795E-05	4.2812
0.00000E+00	0.0000				
123	0.0003	2.18449E-04	2.9730	1.54488E-04	2.6485
0.00000E+00	0.0000				
124	0.0003	2.22199E-04	2.9695	1.84014E-04	2.7573
0.00000E+00	0.0000				
125	0.0002	1.43013E-04	3.2812	1.31144E-04	2.9611
0.00000E+00	0.0000				
126	0.0001	9.86652E-05	3.4621	8.85735E-05	3.0607
0.00000E+00	0.0000				
127	0.0005	4.02405E-04	3.0319	1.97426E-04	2.8703
0.00000E+00	0.0000				
128	0.0003	2.27258E-04	3.1589	1.39870E-04	2.8054
0.00000E+00	0.0000				
129	0.0006	4.50367E-04	2.2797	4.14893E-04	2.1755
0.00000E+00	0.0000				
130	0.0002	1.24447E-04	2.9485	3.02868E-04	2.8640
0.00000E+00	0.0000				
131	0.0004	2.91368E-04	2.1060	2.34880E-04	1.7698
0.00000E+00	0.0000				
132	0.0007	5.36557E-04	2.3601	3.29116E-04	2.1702
0.00000E+00	0.0000				
133	0.0014	1.06141E-03	1.9423	6.70033E-04	1.8456
0.00000E+00	0.0000				
134	0.0001	9.17744E-05	2.2485	2.38613E-04	1.8916
0.00000E+00	0.0000				
135	0.0002	1.71613E-04	3.1280	2.54563E-04	3.0544
0.00000E+00	0.0000				
136	0.0001	4.53070E-05	2.0006	7.03157E-04	1.9719
0.00000E+00	0.0000				
137	0.0000	1.95226E-05	0.9505	3.51276E-03	0.9476
0.00000E+00	0.0000				
138	0.0004	3.16463E-04	2.1713	8.24343E-04	2.1404
0.00000E+00	0.0000				
139	0.0002	1.77116E-04	3.4236	2.17907E-04	3.2047
0.00000E+00	0.0000				
140	0.0003	2.09073E-04	2.8150	2.78347E-04	2.4456
0.00000E+00	0.0000				
141	0.0001	7.70630E-05	2.5728	2.44056E-04	2.2905
0.00000E+00	0.0000				
142	0.0001	6.77422E-05	2.7975	2.33688E-04	2.5691
0.00000E+00	0.0000				
143	0.0001	7.88900E-05	2.2619	1.71661E-04	1.3661
0.00000E+00	0.0000				
144	0.0000	3.35553E-05	3.7031	7.33602E-05	2.2498
0.00000E+00	0.0000				
145	0.0005	3.84609E-04	2.5716	3.01183E-04	2.3490
0.00000E+00	0.0000				

```
  146    0.0004                 3.38947E-04     2.3099
2.48985E-04     1.8679       0.00000E+00     0.0000
  147    0.0002                 1.72676E-04     3.8760
1.11013E-04     3.3619       0.00000E+00     0.0000
  148    0.0001                 6.05566E-05     6.5099
4.01315E-05     5.2192       0.00000E+00     0.0000
  149    0.0000                 3.16958E-05     7.8104
2.17854E-05     6.0642       0.00000E+00     0.0000
  150    0.0001                 8.94757E-05     4.6088
6.49078E-05     3.4390       0.00000E+00     0.0000
  151    0.0001                 6.94926E-05     4.1354
5.83353E-05     2.9081       0.00000E+00     0.0000
  152    0.0001                 4.13116E-05     4.7671
4.70019E-05     2.8500       0.00000E+00     0.0000
  153    0.0001                 4.03555E-05     4.2107
4.59931E-05     2.4551       0.00000E+00     0.0000
  154    0.0001                 5.07354E-05     4.0402
5.16048E-05     2.4203       0.00000E+00     0.0000
  155    0.0001                 4.93002E-05     4.4460
4.88210E-05     2.7170       0.00000E+00     0.0000
  156    0.0001                 4.88711E-05     4.7179
4.69974E-05     2.9731       0.00000E+00     0.0000
  157    0.0001                 5.87395E-05     4.7782
5.71001E-05     2.9439       0.00000E+00     0.0000
  158    0.0001                 6.79016E-05     4.2959
6.84995E-05     2.8656       0.00000E+00     0.0000
  159    0.0002                 1.45078E-04     2.8760
2.02764E-04     2.4142       0.00000E+00     0.0000
  160    0.0001                 6.00666E-05     4.6652
7.16755E-05     3.5403       0.00000E+00     0.0000
  161    0.0001                 6.82995E-05     4.0027
6.91714E-05     2.5463       0.00000E+00     0.0000
  162    0.0001                 8.56214E-05     3.5142
8.10071E-05     2.1176       0.00000E+00     0.0000
  163    0.0001                 8.65397E-05     3.8269
8.30069E-05     2.2796       0.00000E+00     0.0000
  164    0.0001                 1.00934E-04     3.5533
9.37806E-05     2.2508       0.00000E+00     0.0000
  165    0.0001                 1.14129E-04     3.5246
1.04611E-04     2.2321       0.00000E+00     0.0000
  166    0.0001                 6.72219E-05     4.8869
6.26671E-05     3.0402       0.00000E+00     0.0000
  167    0.0001                 7.86541E-05     3.9716
7.07458E-05     2.5763       0.00000E+00     0.0000
  168    0.0001                 9.65107E-05     3.4398
8.31129E-05     2.3369       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	9.08266E-05	2.8872	1.02965E-04	0.00000E+00	4.1149 0.0000
170	0.0002	1.10175E-04	3.1806	1.26619E-04	0.00000E+00	4.2442 0.0000
171	0.0001	7.31875E-05	3.7152	9.41312E-05	0.00000E+00	4.6889 0.0000
172	0.0002	9.34155E-05	4.0335	1.30595E-04	0.00000E+00	4.8603 0.0000
173	0.0002	1.23925E-04	3.6353	1.87106E-04	0.00000E+00	4.1623 0.0000
174	0.0003	1.50162E-04	3.4632	2.40474E-04	0.00000E+00	3.9077 0.0000
175	0.0001	6.71962E-05	4.9535	1.10824E-04	0.00000E+00	5.4913 0.0000
176	0.0002	7.20048E-05	5.1202	1.21085E-04	0.00000E+00	5.6457 0.0000
177	0.0001	6.00042E-05	5.6002	1.00043E-04	0.00000E+00	6.3219 0.0000
178	0.0002	6.78935E-05	5.2502	1.15215E-04	0.00000E+00	5.9065 0.0000
179	0.0001	6.27688E-05	6.2718	1.07026E-04	0.00000E+00	7.0405 0.0000
180	0.0002	6.84411E-05	5.6942	1.18255E-04	0.00000E+00	6.3941 0.0000
181	0.0001	6.18902E-05	6.0260	1.06096E-04	0.00000E+00	6.8776 0.0000
182	0.0001	6.52966E-05	5.6750	1.13474E-04	0.00000E+00	6.4297 0.0000
183	0.0001	6.15056E-05	4.7839	1.06569E-04	0.00000E+00	5.4426 0.0000
184	0.0001	5.43899E-05	5.6093	9.25830E-05	0.00000E+00	6.5581 0.0000
185	0.0001	5.65716E-05	5.3426	9.75051E-05	0.00000E+00	6.2445 0.0000
186	0.0001	5.31845E-05	5.9440	9.01930E-05	0.00000E+00	7.0532 0.0000
187	0.0001	4.79118E-05	5.5980	8.04941E-05	0.00000E+00	6.7214 0.0000
188	0.0001	5.49091E-05	5.6088	9.45083E-05	0.00000E+00	6.6141 0.0000
189	0.0001	5.19012E-05	4.7650	8.79114E-05	0.00000E+00	5.6825 0.0000
190	0.0003	1.19675E-04	3.2105	1.98902E-04	0.00000E+00	3.9247 0.0000
191	0.0002	1.13022E-04	3.1141	1.86431E-04	0.00000E+00	3.8724 0.0000
192	0.0003	1.25833E-04	3.0267	2.10112E-04	0.00000E+00	3.6928 0.0000
193	0.0003			2.01239E-04		3.9611

1.22184E-04	3.1424	0.00000E+00	0.0000	194	0.0005	4.11219E-04	2.7754
2.51726E-04	2.2072	0.00000E+00	0.0000	195	0.0006	4.40520E-04	2.8499
2.70757E-04	2.2582	0.00000E+00	0.0000	196	0.0006	4.57695E-04	2.6484
2.85119E-04	2.0832	0.00000E+00	0.0000	197	0.0006	4.84079E-04	2.9592
3.05688E-04	2.3129	0.00000E+00	0.0000	198	0.0008	5.77814E-04	2.3473
3.57213E-04	1.8441	0.00000E+00	0.0000	199	0.0004	3.17313E-04	3.3397
1.96766E-04	2.5877	0.00000E+00	0.0000	200	0.0005	3.60069E-04	3.0996
2.21322E-04	2.4180	0.00000E+00	0.0000	201	0.0010	7.74204E-04	2.2051
4.75807E-04	1.7566	0.00000E+00	0.0000	202	0.0013	9.59178E-04	2.0158
5.84192E-04	1.6194	0.00000E+00	0.0000	203	0.0016	1.25261E-03	1.9320
7.43378E-04	1.6041	0.00000E+00	0.0000	204	0.0021	1.62711E-03	1.4596
9.61025E-04	1.2140	0.00000E+00	0.0000	205	0.0015	1.12842E-03	2.0972
6.61559E-04	1.7825	0.00000E+00	0.0000	206	0.0019	1.44202E-03	1.6667
8.36477E-04	1.4320	0.00000E+00	0.0000	207	0.0021	1.63812E-03	1.4981
9.53241E-04	1.2880	0.00000E+00	0.0000	208	0.0028	2.12511E-03	1.5633
1.24324E-03	1.3715	0.00000E+00	0.0000	209	0.0031	2.37008E-03	1.2799
1.39413E-03	1.1250	0.00000E+00	0.0000	210	0.0037	2.84639E-03	1.0327
1.69751E-03	0.9042	0.00000E+00	0.0000	211	0.0041	3.16734E-03	1.0943
1.90589E-03	0.9499	0.00000E+00	0.0000	212	0.0047	3.61869E-03	1.1583
2.19160E-03	1.0026	0.00000E+00	0.0000	213	0.0065	4.93803E-03	1.0147
2.99534E-03	0.8507	0.00000E+00	0.0000	214	0.0095	7.29233E-03	0.7911
4.39719E-03	0.6629	0.00000E+00	0.0000	215	0.0158	1.21152E-02	0.6924
7.21622E-03	0.5851	0.00000E+00	0.0000	216	0.0302	2.31437E-02	0.4176
1.36397E-02	0.3571	0.00000E+00	0.0000	217	0.0201	1.53798E-02	0.5562
9.04428E-03	0.4619	0.00000E+00	0.0000	218	0.0275	2.10501E-02	0.4759
1.23294E-02	0.3987	0.00000E+00	0.0000	219	0.0359	2.74719E-02	0.4541

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1.60104E-02     0.3885       0.00000E+00     0.0000
  220    0.0474                 3.63230E-02     0.3470
2.11180E-02     0.2942       0.00000E+00     0.0000
  221    0.0621                 4.75038E-02     0.3488
2.75633E-02     0.2961       0.00000E+00     0.0000
  222    0.0803                 6.14400E-02     0.2848
3.55811E-02     0.2439       0.00000E+00     0.0000
  223    0.1044                 7.98995E-02     0.2270
4.63346E-02     0.1943       0.00000E+00     0.0000
  224    0.0584                 4.47199E-02     0.3521
2.60355E-02     0.2987       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    0.2308                 1.76708E-01     0.1629
1.04633E-01     0.1391       0.00000E+00     0.0000
  226    0.0455                 3.48476E-02     0.3772
2.11937E-02     0.3107       0.00000E+00     0.0000
  227    0.0489                 3.74505E-02     0.4039
2.32383E-02     0.3287       0.00000E+00     0.0000
  228    0.0212                 1.62391E-02     0.5526
1.02482E-02     0.4388       0.00000E+00     0.0000
  229    0.0222                 1.69619E-02     0.6319
1.08997E-02     0.5063       0.00000E+00     0.0000
  230    0.0116                 8.84374E-03     0.7992
5.79869E-03     0.6043       0.00000E+00     0.0000
  231    0.0122                 9.30740E-03     0.7963
6.19692E-03     0.6197       0.00000E+00     0.0000
  232    0.0131                 9.99910E-03     0.7541
6.79651E-03     0.5734       0.00000E+00     0.0000
  233    0.0083                 6.34054E-03     0.9556
4.45901E-03     0.6803       0.00000E+00     0.0000
  234    0.0060                 4.59055E-03     1.2765
3.29867E-03     0.9310       0.00000E+00     0.0000
  235    0.0024                 1.84564E-03     1.9637
1.22030E-03     1.5115       0.00000E+00     0.0000
  236    0.0019                 1.44327E-03     1.9525
9.73983E-04     1.4819       0.00000E+00     0.0000
  237    0.0017                 1.28853E-03     2.0133
9.17655E-04     1.4452       0.00000E+00     0.0000
  238    0.0001                 6.81329E-05     9.1954
6.01214E-05     5.2704       0.00000E+00     0.0000

 system total =                  7.65513E-01     0.0552
4.68640E-01     0.0480       0.00000E+00     0.0000
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the weight lost in the albedo portion of the problem = 5.3138E-01 + or - 0.0002

elapsed time 3.11167 minutes

random number= 82CD75227B8F95B0

1 fuel bundle

**** fission densities ****

unit	region	fission density	percent deviation	total fissions
1	1	3.088E-03	0.06	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	2.086E-08	36.23	1.392E-08	30.00	1.300E-08	27.11
3	9.022E-07	3.82	7.394E-07	3.42	7.879E-07	3.54
4	1.388E-06	2.99	1.158E-06	2.81	1.235E-06	2.77
5	2.280E-06	2.52	1.897E-06	2.33	2.043E-06	2.38
6	9.577E-06	1.19	7.615E-06	1.12	8.170E-06	1.10
7	1.245E-05	1.29	9.540E-06	1.07	1.005E-05	1.07
8	3.124E-05	0.70	2.295E-05	0.64	2.401E-05	0.67
9	8.206E-05	0.50	5.884E-05	0.43	6.126E-05	0.45
10	4.643E-05	0.62	3.290E-05	0.53	3.427E-05	0.50
11	2.201E-04	0.28	1.556E-04	0.24	1.615E-04	0.24
12	1.888E-04	0.31	1.372E-04	0.27	1.438E-04	0.26

13	5.715E-05	0.51	4.164E-05	0.46	4.360E-05	0.44
14	2.545E-04	0.26	1.839E-04	0.21	1.916E-04	0.20
15	2.202E-04	0.26	1.596E-04	0.23	1.667E-04	0.22
16	7.133E-05	0.46	5.173E-05	0.40	5.396E-05	0.39
17	3.213E-05	0.70	2.352E-05	0.59	2.447E-05	0.58
18	2.777E-05	0.69	2.023E-05	0.56	2.091E-05	0.57
19	5.046E-05	0.57	3.676E-05	0.49	3.820E-05	0.46
20	3.959E-05	0.62	2.914E-05	0.55	3.047E-05	0.52
21	8.080E-05	0.38	5.908E-05	0.35	6.156E-05	0.34
22	7.267E-05	0.46	5.351E-05	0.38	5.527E-05	0.38
23	7.733E-05	0.39	5.651E-05	0.33	5.855E-05	0.31
24	1.887E-05	0.80	1.384E-05	0.66	1.438E-05	0.66
25	2.349E-05	0.75	1.715E-05	0.62	1.803E-05	0.60
26	1.331E-05	0.82	9.900E-06	0.73	1.044E-05	0.72
27	4.206E-05	0.49	3.115E-05	0.44	3.304E-05	0.44
28	7.737E-05	0.38	5.757E-05	0.34	6.082E-05	0.33
29	7.972E-05	0.37	5.962E-05	0.32	6.240E-05	0.30
30	9.986E-06	0.94	7.544E-06	0.93	7.899E-06	0.87
31	7.875E-05	0.43	5.888E-05	0.33	6.196E-05	0.33
32	3.139E-05	0.61	2.353E-05	0.50	2.480E-05	0.49
33	2.652E-05	0.58	2.002E-05	0.54	2.106E-05	0.50
34	6.047E-05	0.46	4.584E-05	0.41	4.839E-05	0.38
35	3.619E-05	0.52	2.728E-05	0.48	2.864E-05	0.44
36	3.431E-05	0.59	2.572E-05	0.48	2.703E-05	0.43
37	2.195E-05	0.63	1.651E-05	0.52	1.723E-05	0.48
38	2.599E-05	0.56	1.973E-05	0.51	2.081E-05	0.45
39	9.727E-05	0.31	7.456E-05	0.28	7.872E-05	0.26
40	8.999E-05	0.38	6.930E-05	0.31	7.408E-05	0.24
41	1.132E-04	0.25	8.842E-05	0.24	9.414E-05	0.21
42	9.387E-05	0.31	7.397E-05	0.26	7.938E-05	0.23
43	5.119E-05	0.43	4.067E-05	0.36	4.280E-05	0.32
44	6.913E-05	0.36	5.557E-05	0.30	5.978E-05	0.26
45	3.523E-05	0.42	2.808E-05	0.35	3.109E-05	0.30
46	8.223E-06	0.86	6.553E-06	0.73	7.121E-06	0.66
47	2.352E-05	0.56	1.863E-05	0.46	1.944E-05	0.41
48	6.658E-06	1.00	5.334E-06	0.85	5.643E-06	0.70
49	4.373E-05	0.45	3.498E-05	0.37	3.774E-05	0.33
50	2.958E-05	0.50	2.374E-05	0.46	2.583E-05	0.38
51	7.858E-06	0.90	6.363E-06	0.79	6.847E-06	0.70
52	2.067E-05	0.60	1.661E-05	0.55	1.815E-05	0.47
53	7.622E-05	0.32	6.159E-05	0.26	6.674E-05	0.23
54	3.368E-05	0.48	2.732E-05	0.42	2.942E-05	0.35
55	6.642E-05	0.31	5.394E-05	0.30	5.887E-05	0.27
56	4.352E-05	0.41	3.548E-05	0.37	3.859E-05	0.30
57	4.929E-05	0.34	4.019E-05	0.34	4.380E-05	0.26
58	2.619E-05	0.54	2.140E-05	0.44	2.324E-05	0.37
59	4.425E-05	0.39	3.615E-05	0.35	3.936E-05	0.27
60	6.477E-05	0.27	5.288E-05	0.26	5.754E-05	0.21
61	6.077E-06	1.00	4.952E-06	0.81	5.461E-06	0.72
62	3.235E-05	0.45	2.648E-05	0.42	2.876E-05	0.33
63	2.167E-05	0.56	1.788E-05	0.45	1.940E-05	0.38
64	1.713E-05	0.60	1.409E-05	0.50	1.533E-05	0.41

65	5.760E-06	0.92	4.736E-06	0.91	5.122E-06	0.77
66	2.862E-05	0.43	2.356E-05	0.42	2.556E-05	0.34
67	2.127E-05	0.53	1.756E-05	0.47	1.910E-05	0.39
68	4.634E-06	1.03	3.818E-06	0.88	4.157E-06	0.77
69	3.714E-05	0.40	3.065E-05	0.37	3.336E-05	0.28
70	2.679E-05	0.44	2.204E-05	0.41	2.395E-05	0.34
71	4.562E-05	0.38	3.757E-05	0.30	4.078E-05	0.26
72	2.587E-06	1.31	2.117E-06	1.20	2.318E-06	1.10
73	2.725E-05	0.44	2.243E-05	0.36	2.441E-05	0.32
74	7.971E-05	0.27	6.589E-05	0.23	7.140E-05	0.21
75	9.109E-06	0.75	7.508E-06	0.67	8.142E-06	0.55
76	2.279E-05	0.47	1.898E-05	0.41	2.057E-05	0.35
77	1.769E-05	0.56	1.467E-05	0.56	1.592E-05	0.42
78	1.523E-06	1.79	1.267E-06	1.50	1.395E-06	1.25
79	9.938E-06	0.64	8.212E-06	0.57	8.872E-06	0.45
80	4.540E-06	1.06	3.747E-06	0.95	4.085E-06	0.84
81	5.520E-05	0.34	4.590E-05	0.32	4.992E-05	0.26
82	3.207E-06	1.09	2.695E-06	1.03	2.922E-06	0.82
83	4.513E-06	1.13	3.754E-06	1.01	4.018E-06	0.79
84	8.186E-06	0.87	6.823E-06	0.76	7.387E-06	0.63
85	9.930E-06	0.70	8.289E-06	0.59	8.948E-06	0.47
86	1.366E-05	0.61	1.135E-05	0.51	1.232E-05	0.41
87	1.188E-05	0.69	9.925E-06	0.57	1.074E-05	0.50
88	3.171E-06	1.26	2.651E-06	1.20	2.857E-06	1.01
89	6.743E-06	0.92	5.576E-06	0.79	6.013E-06	0.65
90	6.885E-06	0.88	5.745E-06	0.83	6.238E-06	0.65
91	8.176E-06	0.90	6.827E-06	0.71	7.421E-06	0.61
92	4.785E-06	0.90	3.988E-06	0.85	4.348E-06	0.69
93	8.226E-06	0.86	6.861E-06	0.74	7.393E-06	0.61
94	4.214E-06	0.97	3.519E-06	0.83	3.839E-06	0.68
95	1.248E-05	0.62	1.045E-05	0.63	1.137E-05	0.46
96	3.386E-06	1.26	2.817E-06	0.94	3.042E-06	0.82
97	3.382E-06	1.08	2.826E-06	0.91	3.072E-06	0.78
98	3.523E-06	1.23	2.946E-06	1.06	3.195E-06	0.83
99	2.351E-06	1.49	1.963E-06	1.35	2.130E-06	1.08
100	3.431E-06	1.18	2.879E-06	1.02	3.106E-06	0.91
101	4.915E-06	0.96	4.080E-06	0.94	4.433E-06	0.74
102	3.425E-06	1.29	2.840E-06	1.19	3.078E-06	0.91
103	4.744E-06	0.96	3.945E-06	0.89	4.265E-06	0.74
104	4.137E-06	1.07	3.447E-06	0.95	3.783E-06	0.78
105	4.324E-06	1.10	3.683E-06	0.90	3.964E-06	0.73
106	1.546E-06	1.61	1.307E-06	1.66	1.408E-06	1.16
107	3.534E-06	1.11	2.973E-06	1.14	3.217E-06	0.82
108	3.217E-06	1.01	2.708E-06	0.92	2.950E-06	0.76
109	5.195E-06	0.83	4.299E-06	0.70	4.679E-06	0.66
110	3.024E-06	1.14	2.602E-06	1.03	2.822E-06	0.89
111	3.091E-06	1.26	2.593E-06	1.18	2.811E-06	0.99
112	1.804E-06	1.72	1.518E-06	1.37	1.648E-06	1.18
113	5.758E-06	0.94	4.789E-06	0.86	5.208E-06	0.73
114	1.968E-06	1.39	1.652E-06	1.28	1.804E-06	1.15
115	5.032E-06	0.99	4.224E-06	0.86	4.563E-06	0.73
116	1.074E-05	0.71	9.074E-06	0.60	9.796E-06	0.50

117	1.171E-05	0.78	9.847E-06	0.68	1.065E-05	0.58
118	1.292E-05	0.64	1.088E-05	0.55	1.173E-05	0.41
119	8.215E-06	0.65	6.900E-06	0.68	7.530E-06	0.57
120	5.788E-06	0.81	4.904E-06	0.85	5.361E-06	0.63
121	6.109E-06	0.92	5.133E-06	0.85	5.611E-06	0.71
122	3.201E-06	1.44	2.688E-06	1.15	2.919E-06	0.90
123	1.033E-05	0.74	8.648E-06	0.65	9.374E-06	0.50
124	7.327E-06	0.81	6.139E-06	0.71	6.630E-06	0.58
125	7.010E-06	0.88	5.848E-06	0.82	6.320E-06	0.65
126	5.841E-06	0.81	4.854E-06	0.78	5.226E-06	0.61
127	5.656E-06	0.96	4.729E-06	0.82	5.083E-06	0.62
128	7.772E-06	0.77	6.551E-06	0.64	7.031E-06	0.50
129	9.663E-06	0.78	8.155E-06	0.72	8.804E-06	0.51
130	3.991E-06	1.09	3.385E-06	0.94	3.667E-06	0.78
131	1.707E-05	0.49	1.425E-05	0.43	1.539E-05	0.36
132	1.127E-05	0.63	9.480E-06	0.63	1.022E-05	0.48
133	1.364E-05	0.51	1.153E-05	0.46	1.251E-05	0.39
134	1.474E-05	0.58	1.239E-05	0.53	1.346E-05	0.46
135	2.332E-06	1.38	1.992E-06	1.33	2.192E-06	1.02
136	3.877E-06	1.02	3.343E-06	0.92	3.649E-06	0.77
137	2.503E-06	0.83	2.625E-06	0.81	2.963E-06	0.65
138	4.051E-06	0.91	3.552E-06	0.90	3.861E-06	0.73
139	4.638E-06	1.07	3.942E-06	0.91	4.260E-06	0.72
140	1.188E-05	0.65	1.012E-05	0.57	1.097E-05	0.45
141	8.826E-06	0.87	7.483E-06	0.71	8.024E-06	0.58
142	5.941E-06	0.91	4.980E-06	0.84	5.404E-06	0.62
143	2.000E-05	0.57	1.682E-05	0.44	1.811E-05	0.36
144	8.108E-06	0.73	6.800E-06	0.69	7.338E-06	0.56
145	7.138E-06	0.77	6.048E-06	0.77	6.523E-06	0.57
146	1.198E-05	0.66	1.017E-05	0.65	1.094E-05	0.48
147	3.759E-06	1.22	3.148E-06	1.05	3.414E-06	0.82
148	1.871E-06	1.56	1.597E-06	1.35	1.722E-06	1.08
149	1.169E-06	1.98	9.738E-07	1.76	1.045E-06	1.44
150	3.969E-06	1.19	3.353E-06	0.97	3.624E-06	0.74
151	4.196E-06	1.04	3.512E-06	0.79	3.799E-06	0.68
152	4.339E-06	1.09	3.688E-06	0.93	3.954E-06	0.78
153	4.470E-06	1.03	3.760E-06	0.88	4.059E-06	0.72
154	4.575E-06	1.06	3.869E-06	0.95	4.176E-06	0.71
155	4.279E-06	1.14	3.600E-06	1.02	3.894E-06	0.83
156	3.946E-06	1.02	3.371E-06	0.89	3.636E-06	0.76
157	4.553E-06	0.96	3.880E-06	0.81	4.205E-06	0.70
158	4.865E-06	1.01	4.082E-06	0.82	4.405E-06	0.70
159	6.694E-06	0.76	5.706E-06	0.68	6.150E-06	0.62
160	3.521E-06	1.07	2.967E-06	0.91	3.226E-06	0.79
161	4.888E-06	0.97	4.128E-06	0.90	4.499E-06	0.71
162	5.765E-06	0.96	4.881E-06	0.75	5.268E-06	0.67
163	6.173E-06	0.78	5.207E-06	0.68	5.613E-06	0.57
164	6.509E-06	0.83	5.479E-06	0.69	5.896E-06	0.58
165	6.847E-06	0.75	5.784E-06	0.74	6.216E-06	0.58
166	3.980E-06	1.08	3.377E-06	0.92	3.635E-06	0.69
167	4.196E-06	1.05	3.541E-06	1.00	3.773E-06	0.75
168	4.300E-06	1.02	3.635E-06	0.91	3.927E-06	0.78

169	4.432E-06	0.82	3.769E-06	0.80	4.055E-06	0.64
170	4.588E-06	1.16	3.895E-06	1.06	4.207E-06	0.86
171	2.419E-06	1.48	2.036E-06	1.24	2.180E-06	0.94
172	2.432E-06	1.48	2.045E-06	1.27	2.205E-06	1.03
173	2.457E-06	1.38	2.066E-06	1.16	2.244E-06	0.92
174	2.480E-06	1.41	2.128E-06	1.23	2.298E-06	1.05
175	1.018E-06	1.94	8.582E-07	1.77	9.320E-07	1.38
176	1.015E-06	1.88	8.558E-07	1.89	9.375E-07	1.48
177	1.041E-06	2.11	8.751E-07	1.93	9.471E-07	1.42
178	1.035E-06	1.96	8.751E-07	1.83	9.376E-07	1.43
179	1.029E-06	2.38	8.773E-07	2.21	9.546E-07	1.63
180	1.021E-06	1.96	8.637E-07	1.74	9.442E-07	1.41
181	1.035E-06	1.93	8.925E-07	1.84	9.834E-07	1.36
182	1.103E-06	1.94	9.314E-07	1.78	1.000E-06	1.45
183	1.131E-06	1.86	9.572E-07	1.51	1.029E-06	1.26
184	1.112E-06	2.01	9.488E-07	1.73	1.026E-06	1.42
185	1.174E-06	2.25	9.789E-07	1.87	1.054E-06	1.39
186	1.133E-06	2.02	9.811E-07	1.64	1.049E-06	1.34
187	1.096E-06	1.84	9.414E-07	1.66	1.031E-06	1.45
188	1.164E-06	2.24	9.817E-07	1.80	1.066E-06	1.61
189	1.195E-06	1.85	1.025E-06	1.67	1.090E-06	1.38
190	2.975E-06	1.24	2.541E-06	1.23	2.748E-06	0.99
191	3.104E-06	1.22	2.631E-06	1.03	2.821E-06	0.93
192	3.182E-06	1.01	2.698E-06	0.96	2.902E-06	0.94
193	3.257E-06	1.06	2.750E-06	0.94	2.957E-06	0.75
194	6.880E-06	0.83	5.750E-06	0.72	6.207E-06	0.59
195	7.312E-06	0.81	6.187E-06	0.75	6.670E-06	0.62
196	7.777E-06	0.77	6.564E-06	0.71	7.082E-06	0.59
197	8.453E-06	0.81	7.126E-06	0.65	7.738E-06	0.54
198	9.023E-06	0.70	7.613E-06	0.63	8.224E-06	0.54
199	4.825E-06	1.04	4.065E-06	0.94	4.378E-06	0.72
200	5.120E-06	0.90	4.301E-06	0.87	4.674E-06	0.74
201	1.065E-05	0.66	9.001E-06	0.61	9.768E-06	0.48
202	1.184E-05	0.63	1.001E-05	0.57	1.087E-05	0.48
203	1.282E-05	0.61	1.090E-05	0.60	1.179E-05	0.45
204	1.463E-05	0.58	1.243E-05	0.53	1.353E-05	0.38
205	8.548E-06	0.68	7.670E-06	0.60	8.144E-06	0.52
206	9.387E-06	0.61	8.446E-06	0.53	8.921E-06	0.47
207	9.545E-06	0.64	8.663E-06	0.57	9.203E-06	0.47
208	1.121E-05	0.59	1.011E-05	0.54	1.078E-05	0.43
209	1.162E-05	0.67	1.057E-05	0.59	1.116E-05	0.45
210	1.413E-05	0.53	1.281E-05	0.45	1.365E-05	0.37
211	1.621E-05	0.49	1.470E-05	0.43	1.562E-05	0.35
212	1.918E-05	0.51	1.738E-05	0.41	1.848E-05	0.34
213	2.628E-05	0.39	2.358E-05	0.31	2.529E-05	0.27
214	3.691E-05	0.31	3.311E-05	0.26	3.561E-05	0.22
215	5.529E-05	0.24	4.990E-05	0.24	5.386E-05	0.20
216	9.198E-05	0.21	8.401E-05	0.18	9.073E-05	0.16
217	5.547E-05	0.22	5.311E-05	0.20	5.625E-05	0.16
218	7.051E-05	0.19	6.752E-05	0.18	7.204E-05	0.13
219	8.397E-05	0.20	8.111E-05	0.18	8.642E-05	0.14
220	1.015E-04	0.18	9.889E-05	0.14	1.054E-04	0.12

221	1.202E-04	0.16	1.184E-04	0.15	1.261E-04	0.13
222	1.367E-04	0.14	1.364E-04	0.13	1.455E-04	0.11
223	1.534E-04	0.15	1.574E-04	0.13	1.673E-04	0.11
224	7.510E-05	0.19	7.992E-05	0.15	8.446E-05	0.12
225	2.332E-04	0.12	2.716E-04	0.10	2.819E-04	0.09
226	3.179E-05	0.25	4.487E-05	0.19	4.438E-05	0.15
227	2.871E-05	0.24	4.608E-05	0.21	4.429E-05	0.14
228	1.047E-05	0.39	1.907E-05	0.31	1.753E-05	0.16
229	9.635E-06	0.39	1.964E-05	0.32	1.741E-05	0.17
230	4.435E-06	0.60	1.011E-05	0.48	8.680E-06	0.24
231	4.226E-06	0.58	1.057E-05	0.42	8.737E-06	0.19
232	3.936E-06	0.64	1.123E-05	0.45	8.883E-06	0.24
233	2.206E-06	0.70	7.373E-06	0.59	5.505E-06	0.24
234	1.411E-06	0.94	5.391E-06	0.59	3.822E-06	0.35
235	5.227E-07	1.58	1.044E-06	1.13	1.112E-06	0.49
236	3.439E-07	1.62	7.284E-07	1.19	7.983E-07	0.60
237	2.267E-07	2.14	5.504E-07	1.41	6.161E-07	0.52
238	4.912E-09	11.12	1.976E-08	6.27	2.453E-08	1.83

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
 0.7528 to 0.7556     *
 0.7556 to 0.7585     ***
 0.7585 to 0.7613     ***********
 0.7613 to 0.7641     *******************
 0.7641 to 0.7669     ******************************
 0.7669 to 0.7698     **********************
 0.7698 to 0.7726     *********
 0.7726 to 0.7754     *****

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7528 to 0.7556     *
 0.7556 to 0.7585     **
 0.7585 to 0.7613     ********
 0.7613 to 0.7641     ****************
 0.7641 to 0.7669     *********************
 0.7669 to 0.7698     ******************
 0.7698 to 0.7726     *******
 0.7726 to 0.7754     **

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7528 to 0.7556     *
 0.7556 to 0.7585     **
 0.7585 to 0.7613     ******
 0.7613 to 0.7641     *********
 0.7641 to 0.7669     ************
 0.7669 to 0.7698     **************
 0.7698 to 0.7726     ****
 0.7726 to 0.7754     **

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7528 to 0.7556
 0.7556 to 0.7585
 0.7585 to 0.7613     *
 0.7613 to 0.7641     ******
 0.7641 to 0.7669     *********
 0.7669 to 0.7698     ******
 0.7698 to 0.7726     **
 0.7726 to 0.7754     *

1
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```

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

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        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76552 + or - 0.00051                     ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.66609E-02 + or -  1.22119E-04            ***
        ***
***
        ***        system nu bar
2.43896E+00 + or -  9.57273E-06            ***
        ***
***
        ***        system mean free path (cm)
6.52932E-01 + or -  1.62633E-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     3.11433 minutes


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1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII



   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       99999999999                //   22222222222
22222222222                //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222              //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //                22
22             //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666


      0000000       666666666666                            44
99999999999                          11        7777777777777
     000000000     6666666666666                         444
9999999999999                        111        777777777777
    00       00    66                   :::              4444     99
99         :::           1111        77        77
   00         00   66                   :::             44 44     99
99         :::             11                 77
   00         00   66                   :::            44  44     99
99         :::             11                77
```

```
   00         00   666666666666                        44   44
9999999999999                         11               77
   00         00   6666666666666                      44    44
999999999999                          11               77
   00         00   66         66         :::        444444444444
99         :::             11              77
   00         00   66         66         :::       4444444444444
99         :::             11              77
    00       00    66         66         :::                44
99         :::             11             77
     000000000     6666666666666                           44
9999999999999                        11111111          77
      0000000       66666666666                            44
999999999999                         11111111          77
1

    SSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

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

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

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**********************************************************************
************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:49:17.95
*****
        *****
*****
        *****
```

```
*****

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1

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

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

```
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\xfile008             input data
direct access           ***
        ***
***
        ***           10      unknown
xsec mixing direct access          ***
        ***
***

**********************************************************************
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                                 ........ finished preparing input data
........
1
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****************************
                  ***
```

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

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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  ***
                 ***
***

*********************************************************************
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                                 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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                    12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                  12/17/09
    1040090  4.90907E-08  1.32112E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                  12/17/09
    1040091  1.16814E-08  3.17870E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                  12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                  12/17/09
    1040093  1.38587E-09  3.85418E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                  12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                  12/17/09
    1040095  2.83136E-10  8.04379E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                  12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                  12/17/09
    1041093  1.43687E-17  3.99600E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                  12/17/09
    1041095  1.65722E-10  4.70802E-09   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  1.21522E-08  3.45230E-07   42095    94.9058     mo95 4234
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endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.02012E-09  2.32645E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.48606E-12  4.39975E-11   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.26123E-09  3.73403E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  7.77325E-11  2.39446E-09   44103   102.9063     ru103 4446
endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.81385E-11  1.84311E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  5.37141E-10  1.65458E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  2.28393E-14  7.17205E-13   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  2.04161E-10  6.41107E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53965E-12  2.13188E-10   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  8.98777E-11  2.90303E-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  1.29595E-09  4.30228E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43912E-09  8.17026E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
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endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.57290E-12  8.84953E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51422E-11  2.24056E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.30151E-11  1.25416E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.12580E-10  4.34405E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  2.44979E-20  9.89318E-19   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.78686E-10  2.26757E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  1.04619E-11  4.16212E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  1.28039E-18  5.17058E-17   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.35064E-09  5.37332E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.11571E-15  8.48047E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41913E-09  5.73079E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23425E-09  5.05812E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  3.77641E-11  1.58158E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.24056E-10  5.23260E-09   58141   140.9083     ce141 5840
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endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  8.64432E-14  3.69796E-12   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.05736E-10  3.04023E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.10349E-09  4.65443E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  4.40502E-11  1.88441E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.16161E-09  4.96919E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  4.04115E-10  1.74084E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32868E-10  3.61280E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.09390E-11  4.81071E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.88314E-10  1.70770E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  1.06415E-17  4.71177E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  1.30940E-13  5.83691E-12   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.59314E-11  2.45971E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.23002E-10  9.94067E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06718E-09  1.38563E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50024E-11  2.50126E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  1.09731E-14  5.02298E-13   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45324E-09  6.56516E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59132E-09  7.28431E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30528E-14  6.01406E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.10718E-12  2.83216E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.27983E-13  5.97351E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84214E-12  2.65673E-10   64152   151.9198     gd152 6425
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endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27384E-10  1.98196E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94518E-10  2.77482E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51352E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.14189E-11  8.10256E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.62161E-17  1.86809E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.29740E-10  6.65298E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88246E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71610E-20  2.68144E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08755E-20  7.84750E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  2.90677E-31  2.10618E-29   95242   242.0596     am242 9546
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endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.42718E-21  2.48324E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.74646E-21  7.09128E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.59587E-21  7.01048E-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
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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
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:
  9323 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

                                            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       ........

                                 ........     0.01483 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
0.01567 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 15771 independent fission points were generated for generation 1
          1       7.69274E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15578 independent fission points were generated for generation 2
          2       7.62383E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15631 independent fission points were generated for generation 3
          3       7.69066E-01      7.69066E-01      0.00000E+00
0.00000E+00      0.00000E+00
```

4	7.63162E-01	7.66114E-01	2.95189E-03	0.00000E+00	0.00000E+00
5	7.64657E-01	7.65628E-01	1.77210E-03	0.00000E+00	0.00000E+00
6	7.69195E-01	7.66520E-01	1.53794E-03	0.00000E+00	0.00000E+00
7	7.68086E-01	7.66833E-01	1.23177E-03	0.00000E+00	0.00000E+00
8	7.64028E-01	7.66365E-01	1.10911E-03	0.00000E+00	0.00000E+00
9	7.59682E-01	7.65411E-01	1.33801E-03	0.00000E+00	0.00000E+00
10	7.58075E-01	7.64494E-01	1.47763E-03	0.00000E+00	0.00000E+00
11	7.64249E-01	7.64467E-01	1.30343E-03	0.00000E+00	0.00000E+00
12	7.67451E-01	7.64765E-01	1.20343E-03	0.00000E+00	0.00000E+00
13	7.62636E-01	7.64571E-01	1.10562E-03	0.00000E+00	0.00000E+00
14	7.69812E-01	7.65008E-01	1.09971E-03	0.00000E+00	0.00000E+00
15	7.54585E-01	7.64206E-01	1.29078E-03	0.00000E+00	0.00000E+00
16	7.67845E-01	7.64466E-01	1.22296E-03	0.00000E+00	0.00000E+00
17	7.70295E-01	7.64855E-01	1.20299E-03	0.00000E+00	0.00000E+00
18	7.64781E-01	7.64850E-01	1.12531E-03	0.00000E+00	0.00000E+00
19	7.69952E-01	7.65150E-01	1.09881E-03	0.00000E+00	0.00000E+00
20	7.65906E-01	7.65192E-01	1.03682E-03	0.00000E+00	0.00000E+00
21	7.66053E-01	7.65238E-01	9.81780E-04	0.00000E+00	0.00000E+00
22	7.69182E-01	7.65435E-01	9.52054E-04	0.00000E+00	0.00000E+00
23	7.65024E-01	7.65415E-01	9.05796E-04	0.00000E+00	0.00000E+00
24	7.70550E-01	7.65649E-01	8.94619E-04	0.00000E+00	0.00000E+00
25	7.67180E-01	7.65715E-01	8.57427E-04	0.00000E+00	0.00000E+00
26	7.64213E-01	7.65653E-01	8.23306E-04	0.00000E+00	0.00000E+00
27	7.71595E-01	7.68385E-01	2.37502E-03	0.00000E+00	0.00000E+00
28	7.71003E-01	7.68908E-01	1.81035E-03	0.00000E+00	0.00000E+00
29	7.70148E-01	7.69115E-01	1.90540E-03	0.00000E+00	0.00000E+00

30	7.67998E-01	7.68955E-01	1.17871E-03	0.00000E+00
31	7.72664E-01	7.69419E-01	1.13092E-03	0.00000E+00
32	7.63979E-01	7.68815E-01	1.19538E-03	0.00000E+00
33	7.68396E-01	7.68773E-01	1.05527E-03	0.00000E+00
34	7.61560E-01	7.68117E-01	1.55615E-03	0.00000E+00
35	7.72915E-01	7.68517E-01	1.46306E-03	0.00000E+00
36	7.65795E-01	7.68307E-01	1.47146E-03	0.00000E+00
37	7.66830E-01	7.68202E-01	1.30539E-03	0.00000E+00
38	7.72273E-01	7.68473E-01	1.18311E-03	0.00000E+00
39	7.62678E-01	7.68111E-01	1.20883E-03	0.00000E+00
40	7.59506E-01	7.67605E-01	1.06868E-03	0.00000E+00
41	7.64360E-01	7.67425E-01	1.13256E-03	0.00000E+00
42	7.56643E-01	7.66857E-01	1.87091E-03	0.00000E+00
43	7.73430E-01	7.67186E-01	1.39906E-03	0.00000E+00
44	7.69428E-01	7.67293E-01	1.27441E-03	0.00000E+00
45	7.73101E-01	7.67557E-01	1.32290E-03	0.00000E+00
46	7.71407E-01	7.67724E-01	1.28787E-03	0.00000E+00
47	7.69354E-01	7.67792E-01	1.31688E-03	0.00000E+00
48	7.66259E-01	7.67731E-01	1.24202E-03	0.00000E+00
49	7.70876E-01	7.67852E-01	1.14799E-03	0.00000E+00
50	7.66991E-01	7.67820E-01	1.10326E-03	0.00000E+00
51	7.66263E-01	7.67764E-01	1.05409E-03	0.00000E+00
52	7.78677E-01	7.68140E-01	1.08033E-03	0.00000E+00
53	7.59842E-01	7.67864E-01	1.13980E-03	0.00000E+00
54	7.68915E-01	7.67898E-01	1.07286E-03	0.00000E+00
55	7.67734E-01	7.67893E-01	1.03783E-03	0.00000E+00

56	7.64384E-01	7.67786E-01	1.06875E-03	0.00000E+00
57	7.62922E-01	7.67643E-01	1.04067E-03	0.00000E+00
58	7.68774E-01	7.67676E-01	1.00402E-03	0.00000E+00
59	7.66313E-01	7.67638E-01	9.84823E-04	0.00000E+00
60	7.60265E-01	7.67438E-01	1.00392E-03	0.00000E+00
61	7.63389E-01	7.67332E-01	9.81958E-04	0.00000E+00
62	7.65832E-01	7.67293E-01	9.65769E-04	0.00000E+00
63	7.67431E-01	7.67297E-01	9.37952E-04	0.00000E+00
64	7.70363E-01	7.67372E-01	9.03273E-04	0.00000E+00
65	7.61028E-01	7.67221E-01	9.00783E-04	0.00000E+00
66	7.64729E-01	7.67163E-01	8.74078E-04	0.00000E+00
67	7.59709E-01	7.66993E-01	8.87897E-04	0.00000E+00
68	7.69898E-01	7.67058E-01	8.52110E-04	0.00000E+00
69	7.58579E-01	7.66873E-01	9.07409E-04	0.00000E+00
70	7.68440E-01	7.66907E-01	8.83048E-04	0.00000E+00
71	7.71420E-01	7.67001E-01	8.54486E-04	0.00000E+00
72	7.65351E-01	7.66967E-01	8.42890E-04	0.00000E+00
73	7.66939E-01	7.66967E-01	8.24604E-04	0.00000E+00
74	7.62400E-01	7.66877E-01	8.05347E-04	0.00000E+00
75	7.72278E-01	7.66981E-01	7.91809E-04	0.00000E+00
76	7.56112E-01	7.66776E-01	8.30028E-04	0.00000E+00
77	7.67670E-01	7.66792E-01	8.14143E-04	0.00000E+00
78	7.72334E-01	7.66893E-01	7.91342E-04	0.00000E+00
79	7.64719E-01	7.66854E-01	7.87286E-04	0.00000E+00
80	7.66216E-01	7.66843E-01	7.70732E-04	0.00000E+00
81	7.64398E-01	7.66801E-01	7.54076E-04	0.00000E+00

```
         82       7.64895E-01      7.66769E-01      7.43494E-04
0.00000E+00      0.00000E+00
         83       7.72973E-01      7.66872E-01      7.30467E-04
0.00000E+00      0.00000E+00
         84       7.71628E-01      7.66950E-01      7.13843E-04
0.00000E+00      0.00000E+00
         85       7.63076E-01      7.66888E-01      6.97623E-04
0.00000E+00      0.00000E+00
         86       7.70029E-01      7.66937E-01      7.01976E-04
0.00000E+00      0.00000E+00
         87       7.66886E-01      7.66937E-01      6.90330E-04
0.00000E+00      0.00000E+00
         88       7.66650E-01      7.66932E-01      6.79171E-04
0.00000E+00      0.00000E+00
         89       7.71817E-01      7.67006E-01      6.78622E-04
0.00000E+00      0.00000E+00
         90       7.70394E-01      7.67057E-01      6.69661E-04
0.00000E+00      0.00000E+00
         91       7.64429E-01      7.67018E-01      6.56026E-04
0.00000E+00      0.00000E+00
         92       7.62982E-01      7.66960E-01      6.36667E-04
0.00000E+00      0.00000E+00
         93       7.72216E-01      7.67035E-01      6.33530E-04
0.00000E+00      0.00000E+00
         94       7.60220E-01      7.66939E-01      6.47548E-04
0.00000E+00      0.00000E+00
         95       7.72165E-01      7.67011E-01      6.44791E-04
0.00000E+00      0.00000E+00
         96       7.64948E-01      7.66983E-01      6.37181E-04
0.00000E+00      0.00000E+00
         97       7.60461E-01      7.66895E-01      6.37945E-04
0.00000E+00      0.00000E+00
         98       7.60210E-01      7.66806E-01      6.29113E-04
0.00000E+00      0.00000E+00
         99       7.66896E-01      7.66807E-01      6.20189E-04
0.00000E+00      0.00000E+00
        100       7.65796E-01      7.66794E-01      6.15894E-04
0.00000E+00      0.00000E+00
        101       7.60379E-01      7.66712E-01      6.25756E-04
0.00000E+00      0.00000E+00
        102       7.63774E-01      7.66674E-01      6.19358E-04
0.00000E+00      0.00000E+00
        103       7.67345E-01      7.66683E-01      6.09933E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=7DE9898928047DAA
        104       7.65416E-01      7.66667E-01      6.05507E-04
0.00000E+00      0.00000E+00
        105       7.63275E-01      7.66626E-01      6.01326E-04
0.00000E+00      0.00000E+00
        106       7.62795E-01      7.66580E-01      5.96197E-04
0.00000E+00      0.00000E+00
```

```
        107       7.68872E-01      7.66607E-01      5.86707E-04
0.00000E+00      0.00000E+00
        108       7.61501E-01      7.66547E-01      5.92175E-04
0.00000E+00      0.00000E+00
        109       7.65544E-01      7.66535E-01      5.85475E-04
0.00000E+00      0.00000E+00
        110       7.74085E-01      7.66622E-01      5.80314E-04
0.00000E+00      0.00000E+00
        111       7.60046E-01      7.66547E-01      5.88158E-04
0.00000E+00      0.00000E+00
        112       7.64055E-01      7.66519E-01      5.78093E-04
0.00000E+00      0.00000E+00
        113       7.73127E-01      7.66593E-01      5.78038E-04
0.00000E+00      0.00000E+00
        114       7.60734E-01      7.66528E-01      5.87130E-04
0.00000E+00      0.00000E+00
        115       7.66671E-01      7.66530E-01      5.80618E-04
0.00000E+00      0.00000E+00
        116       7.64909E-01      7.66512E-01      5.74110E-04
0.00000E+00      0.00000E+00
        117       7.72566E-01      7.66577E-01      5.64299E-04
0.00000E+00      0.00000E+00
        118       7.66063E-01      7.66571E-01      5.58305E-04
0.00000E+00      0.00000E+00
        119       7.64756E-01      7.66553E-01      5.50873E-04
0.00000E+00      0.00000E+00
        120       7.58579E-01      7.66470E-01      5.42169E-04
0.00000E+00      0.00000E+00
        121       7.64424E-01      7.66449E-01      5.37815E-04
0.00000E+00      0.00000E+00
        122       7.65308E-01      7.66438E-01      5.34586E-04
0.00000E+00      0.00000E+00
        123       7.69605E-01      7.66470E-01      5.23627E-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=9094DBA2BCF525AD
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.55070E-05 + or -  1.19381E-08             generation time
=  2.99165E-05 + or -  2.07561E-08
 nu bar   =  2.43895E+00 + or -  9.29726E-06       average fission group
=  2.17547E+02 + or -  1.03020E-02
                      energy(ev) of the average lethargy causing fission
=  5.65950E-02 + or -  1.27661E-04
                                              system mean free path (cm)
=  6.52725E-01 + or -  1.77603E-04
```

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories	variance deviation of (per cent)
23	0.76647	+ or - 0.00052	0.76595 to 0.76699	0.76542 to 0.76752	0.76490 to 0.76804	2000000	9.1358
24	0.76643	+ or - 0.00052	0.76590 to 0.76695	0.76538 to 0.76748	0.76485 to 0.76800	1980000	9.2822
25	0.76642	+ or - 0.00053	0.76589 to 0.76695	0.76536 to 0.76748	0.76483 to 0.76801	1960000	9.3069
26	0.76644	+ or - 0.00054	0.76591 to 0.76698	0.76537 to 0.76752	0.76483 to 0.76806	1940000	9.1619
27	0.76639	+ or - 0.00053	0.76586 to 0.76692	0.76532 to 0.76746	0.76479 to 0.76799	1920000	9.4740
28	0.76634	+ or - 0.00053	0.76581 to 0.76687	0.76528 to 0.76740	0.76475 to 0.76793	1900000	9.8687
29	0.76630	+ or - 0.00053	0.76577 to 0.76683	0.76524 to 0.76736	0.76471 to 0.76789	1880000	10.0697
30	0.76628	+ or - 0.00054	0.76575 to 0.76682	0.76521 to 0.76735	0.76468 to 0.76789	1860000	10.0549
31	0.76621	+ or - 0.00054	0.76567 to 0.76675	0.76513 to 0.76729	0.76459 to 0.76783	1840000	10.0682
32	0.76624	+ or - 0.00055	0.76569 to 0.76678	0.76514 to 0.76733	0.76460 to 0.76788	1820000	10.0182
37	0.76619	+ or - 0.00056	0.76563 to 0.76675	0.76507 to 0.76730	0.76451 to 0.76786	1720000	10.6652
42	0.76638	+ or - 0.00079	0.76559 to 0.76717	0.76481 to 0.76795	0.76402 to 0.76874	1620000	5.6657
47	0.76605	+ or - 0.00051	0.76555 to 0.76656	0.76504 to 0.76706	0.76453 to 0.76757	1520000	15.4973
52	0.76579	+ or - 0.00050	0.76528 to 0.76629	0.76478 to 0.76680	0.76427 to 0.76730	1420000	13.5003
57	0.76586	+ or - 0.00053	0.76533 to 0.76640	0.76480 to 0.76693	0.76427 to 0.76746	1320000	13.9286

```
      62          0.76594   + or - 0.00056     0.76538 to 0.76651
0.76482 to 0.76707    0.76425 to 0.76763    1220000      14.1950

      67          0.76606   + or - 0.00059     0.76547 to 0.76665
0.76488 to 0.76724    0.76428 to 0.76783    1120000      15.0579

      72          0.76599   + or - 0.00062     0.76537 to 0.76661
0.76476 to 0.76723    0.76414 to 0.76784    1020000      16.0895

      77          0.76609   + or - 0.00063     0.76546 to 0.76672
0.76484 to 0.76734    0.76421 to 0.76797     920000      15.6536

      82          0.76604   + or - 0.00069     0.76535 to 0.76672
0.76467 to 0.76741    0.76398 to 0.76810     820000      15.8582

      87          0.76564   + or - 0.00072     0.76492 to 0.76636
0.76419 to 0.76709    0.76347 to 0.76781     720000      18.4282

      92          0.76538   + or - 0.00079     0.76458 to 0.76617
0.76379 to 0.76697    0.76299 to 0.76776     620000      20.7200

      97          0.76526   + or - 0.00082     0.76444 to 0.76608
0.76361 to 0.76690    0.76279 to 0.76773     520000      26.0430

     102          0.76570   + or - 0.00096     0.76474 to 0.76665
0.76379 to 0.76761    0.76283 to 0.76857     420000      27.3259

     107          0.76575   + or - 0.00123     0.76451 to 0.76698
0.76328 to 0.76822    0.76205 to 0.76945     320000      27.8249

     112          0.76607   + or - 0.00172     0.76435 to 0.76779
0.76262 to 0.76951    0.76090 to 0.77123     220000      25.0093
1                                                 fuel bundle

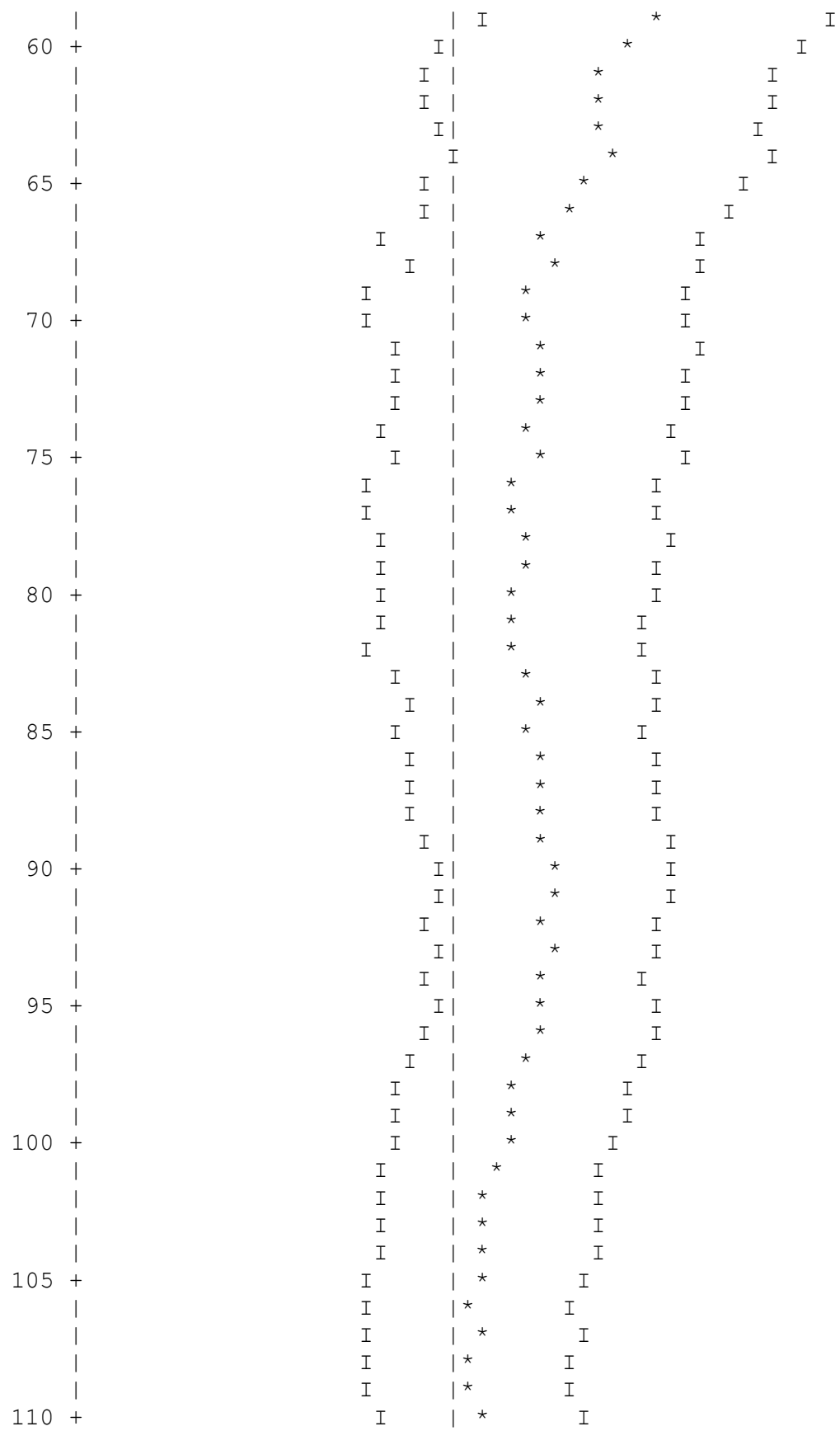
 no. of initial
deviation of
  generations      average                          67 per cent
95 per cent           99 per cent      number of   variance
    skipped      k-effective      deviation    confidence interval
confidence interval   confidence interval  histories  (per cent)

     117          0.76479   + or - 0.00251     0.76228 to 0.76730
0.75977 to 0.76981    0.75726 to 0.77232     120000      26.6108
1                           fuel bundle

                       plot of average k-effective by generation run.
      the line represents k-eff = 0.76646 + or - 0.00052 which occurs for
123 generations run.

                                 0.7664                   0.7685
0.7705
```

```
|-------------------------|-------------------------|------------------
------|------------------------
         |
      25 +                         |        I                   *
I
         |                         |         *
I
         |                   I     |                      *
I
         |                         |       I                     *
I
         |                         |        I                      *
I
      30 +                         |               I             *
I
         |                         |                     I
*             I
         |                         |             I             *
I
         |                         |              I            *
I
         |                         |I                  *
I
      35 +                         |      I                 *
I
         |                         |   I                *
I
         |                         |    I               *
I
         |                         |         I             *
I
         |                         |    I              *
I
      40 +                         |I            *            I
         |                       I |          *             I
         |       I                 |    *                     I
         |                 I       |        *                I
         |                   I     |         *              I
      45 +                      I  |            *               I
         |                        I|              *               I
         |                         I               *               I
         |                         I              *              I
         |                         |  I             *             I
      50 +                         |  I            *             I
         |                         |  I            *           I
         |                         |      I            *            I
         |                         |  I             *             I
         |                         |   I            *            I
      55 +                         |    I           *            I
         |                         |  I            *            I
         |                         | I           *            I
         |                         | I            *           I
```


60
65
70
75
80
85
90
95
100
105
110

```
         |                   I     |*      I
         |                  I      *       I
         |                   I     |*      I
         |                  I      |*      I
     115 +                   I     |*      I
         |                  I      *      I
         |                   I     |*      I
         |                   I     |*      I
         |                   I     |*      I
     120 +                  I      *     I
         |                  I      *     I
         |                  I      *     I
         |                   I     *     I
1                         fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7662 + or - 0.0004 which occurs for 43 generations skipped.

```
                                 0.7645                    0.7660
0.7675

|-------------------------|------------------------|------------------
------|------------------------
         |
         |                                                   I     |  *
I
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          |                                               I        *      |  I
          |                                            I        *         I
          |                                             I         *       |I
          |                                             I        *        |I
       55 +                                            I         *        I
          |                                            I         *        |I
          |                                             I         *       | I
          |                                            I         *        |I
          |                                            I         *        |I
       60 +                                             I         *       |  I
          |                                              I         *      |  I
          |                                              I         *      |   I
          |                                             I          *      |  I
          |                                            I         *        | I
       65 +                                             I          *      |   I
          |                                             I          *      |   I
          |                                               I          *   |
I
          |                                              I          *    |
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          |                                                I          *  |
I
       70 +                                               I          *   |
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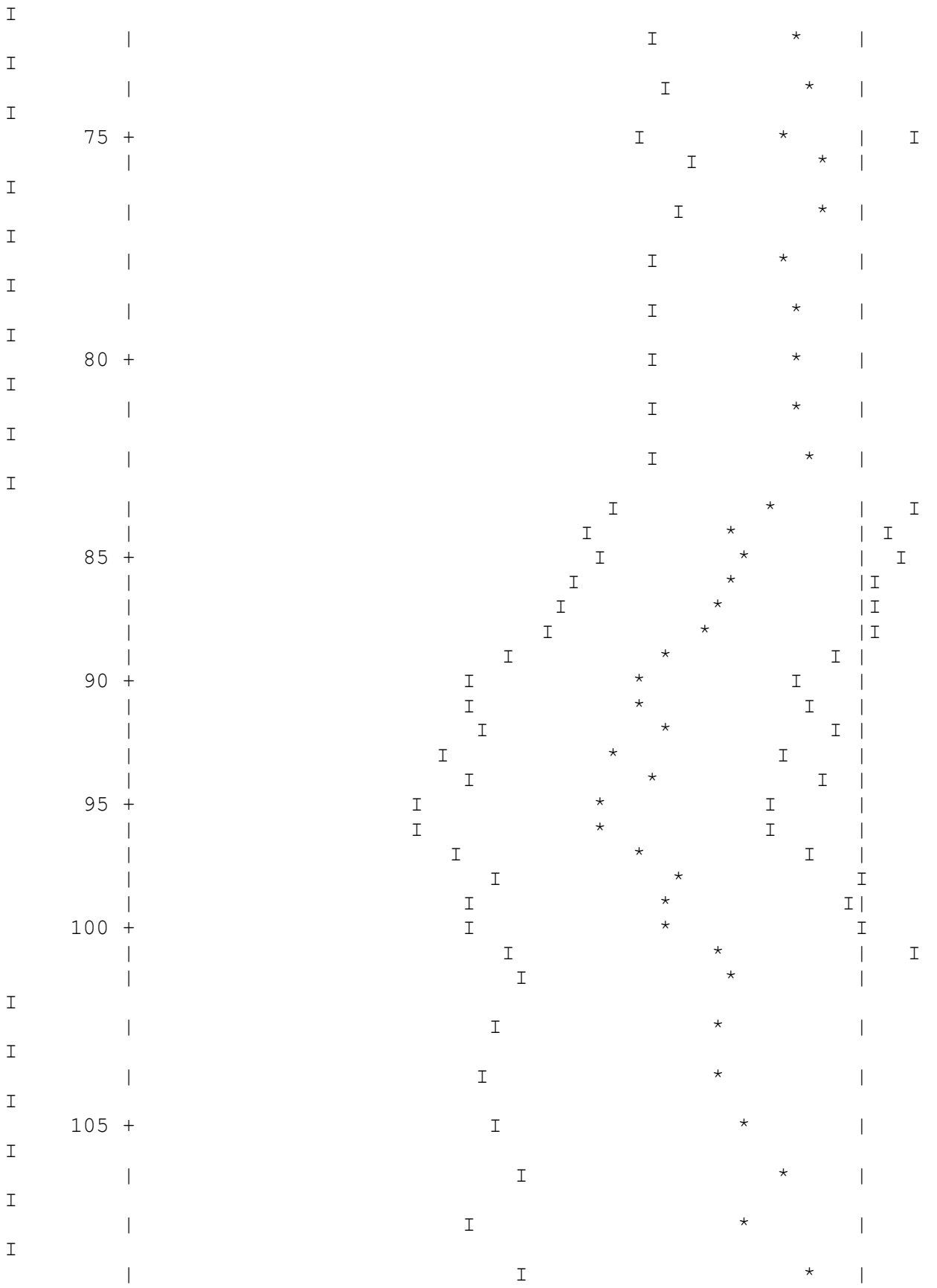
I
          |                                              I          *    |
```



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     120 +           I                                         |  *
```

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 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			2.20963E-07	100.0000	3.20611E-07	47.2079	0.00000E+00	0.0000
3	0.0000			1.17245E-05	13.8298	1.89044E-05	5.3346	0.00000E+00	0.0000
4	0.0000			1.83970E-05	9.0277	3.36753E-05	3.9345	0.00000E+00	0.0000
5	0.0000			2.57567E-05	7.7732	5.21017E-05	3.1443	0.00000E+00	0.0000
6	0.0001			9.39801E-05	3.7643	2.25881E-04	1.6223	0.00000E+00	0.0000
7	0.0002			1.16153E-04	3.4286	2.07250E-04	1.3886	0.00000E+00	0.0000
8	0.0003			2.53015E-04	1.8761	3.25274E-04	1.0640	0.00000E+00	0.0000
9	0.0005			3.87564E-04	1.3104	4.44625E-04	0.6722	0.00000E+00	0.0000

10	0.0003	2.05051E-04	1.7116	2.08850E-04	0.7425	0.00000E+00	0.0000
11	0.0012	9.19988E-04	0.7162	5.28402E-04	0.4898	0.00000E+00	0.0000
12	0.0010	7.63027E-04	0.6897	2.99086E-04	0.6807	0.00000E+00	0.0000
13	0.0003	2.31525E-04	1.3417	9.19765E-05	1.3274	0.00000E+00	0.0000
14	0.0013	1.01797E-03	0.5967	4.16052E-04	0.5907	0.00000E+00	0.0000
15	0.0010	7.67140E-04	0.6963	3.30721E-04	0.6881	0.00000E+00	0.0000
16	0.0002	1.90001E-04	1.1782	8.73148E-05	1.1603	0.00000E+00	0.0000
17	0.0001	6.86711E-05	1.6130	3.33738E-05	1.5858	0.00000E+00	0.0000
18	0.0001	5.11671E-05	1.6821	2.58384E-05	1.6488	0.00000E+00	0.0000
19	0.0001	8.05126E-05	1.2793	4.25731E-05	1.2475	0.00000E+00	0.0000
20	0.0001	6.08152E-05	1.5976	3.33009E-05	1.5597	0.00000E+00	0.0000
21	0.0002	1.16225E-04	1.0286	6.56585E-05	1.0037	0.00000E+00	0.0000
22	0.0001	1.03012E-04	1.0399	6.10125E-05	1.0145	0.00000E+00	0.0000
23	0.0001	1.09592E-04	1.1902	6.68564E-05	1.1625	0.00000E+00	0.0000
24	0.0000	2.45269E-05	2.1723	1.52349E-05	2.1120	0.00000E+00	0.0000
25	0.0000	3.06261E-05	1.7692	1.91266E-05	1.7164	0.00000E+00	0.0000
26	0.0000	1.73426E-05	2.4041	1.08949E-05	2.3504	0.00000E+00	0.0000
27	0.0001	5.33112E-05	1.3802	3.32621E-05	1.3540	0.00000E+00	0.0000
28	0.0001	9.64804E-05	1.1079	6.01868E-05	1.0885	0.00000E+00	0.0000
29	0.0001	9.75248E-05	1.1534	6.14357E-05	1.1391	0.00000E+00	0.0000
30	0.0000	1.24827E-05	3.3565	7.83046E-06	3.3319	0.00000E+00	0.0000
31	0.0001	9.60052E-05	1.0402	6.06579E-05	1.0262	0.00000E+00	0.0000
32	0.0001	3.92302E-05	1.5436	2.50582E-05	1.5089	0.00000E+00	0.0000
33	0.0000	3.23702E-05	1.6339	2.02682E-05	1.6162	0.00000E+00	0.0000
34	0.0001	7.64401E-05	1.1456	4.80121E-05	1.1291	0.00000E+00	0.0000
35	0.0001	4.50099E-05	1.5106	2.82511E-05	1.4851	0.00000E+00	0.0000

```
   36    0.0001                 4.31019E-05     1.4935
2.66787E-05     1.4802       0.00000E+00     0.0000
   37    0.0000                 2.91268E-05     1.6302
1.82675E-05     1.5974       0.00000E+00     0.0000
   38    0.0000                 3.37017E-05     1.6506
2.12296E-05     1.6142       0.00000E+00     0.0000
   39    0.0002                 1.27928E-04     0.9569
8.14104E-05     0.9330       0.00000E+00     0.0000
   40    0.0002                 1.19839E-04     0.9137
7.74621E-05     0.8946       0.00000E+00     0.0000
   41    0.0002                 1.58725E-04     0.8154
1.06065E-04     0.7886       0.00000E+00     0.0000
   42    0.0002                 1.40540E-04     0.7324
9.55825E-05     0.7133       0.00000E+00     0.0000
   43    0.0001                 8.24900E-05     1.0179
5.91812E-05     0.9820       0.00000E+00     0.0000
   44    0.0001                 1.14020E-04     1.1205
8.37383E-05     1.0784       0.00000E+00     0.0000
   45    0.0001                 5.97453E-05     0.9113
4.81818E-05     0.8498       0.00000E+00     0.0000
   46    0.0000                 1.43743E-05     2.2340
1.15517E-05     2.0815       0.00000E+00     0.0000
   47    0.0001                 4.14176E-05     1.5695
3.21436E-05     1.5077       0.00000E+00     0.0000
   48    0.0000                 1.15170E-05     3.7356
8.95727E-06     3.6307       0.00000E+00     0.0000
   49    0.0001                 8.01776E-05     1.6996
6.32239E-05     1.6628       0.00000E+00     0.0000
   50    0.0001                 5.69799E-05     1.8809
4.69081E-05     1.8405       0.00000E+00     0.0000
   51    0.0000                 1.54778E-05     3.2398
1.28548E-05     3.1711       0.00000E+00     0.0000
   52    0.0001                 4.04841E-05     1.9741
3.50027E-05     1.9198       0.00000E+00     0.0000
   53    0.0002                 1.57161E-04     0.8322
1.54604E-04     0.7725       0.00000E+00     0.0000
   54    0.0001                 7.39283E-05     1.8851
6.86936E-05     1.8147       0.00000E+00     0.0000
   55    0.0002                 1.62524E-04     1.3239
1.49017E-04     1.2891       0.00000E+00     0.0000
   56    0.0002                 1.16172E-04     1.5193
1.07780E-04     1.4819       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                 1.50440E-04     1.3136
```

1.36510E-04	1.2806	0.00000E+00	0.0000	58	0.0001	8.70363E-05	1.7604
7.61455E-05	1.7132	0.00000E+00	0.0000	59	0.0002	1.61705E-04	1.5093
1.45168E-04	1.4526	0.00000E+00	0.0000	60	0.0004	2.68836E-04	1.3241
2.43837E-04	1.2519	0.00000E+00	0.0000	61	0.0000	2.91686E-05	3.6916
2.24142E-05	3.5753	0.00000E+00	0.0000	62	0.0002	1.63890E-04	1.6085
1.37428E-04	1.5648	0.00000E+00	0.0000	63	0.0002	1.18979E-04	1.9728
9.80430E-05	1.9017	0.00000E+00	0.0000	64	0.0001	9.78156E-05	2.5609
7.89389E-05	2.4749	0.00000E+00	0.0000	65	0.0000	3.43339E-05	3.6660
3.39670E-05	3.5399	0.00000E+00	0.0000	66	0.0002	1.78511E-04	1.8381
1.58216E-04	1.7830	0.00000E+00	0.0000	67	0.0002	1.43679E-04	2.0414
1.17652E-04	1.9742	0.00000E+00	0.0000	68	0.0000	2.50893E-05	4.4800
2.17456E-05	4.3087	0.00000E+00	0.0000	69	0.0004	2.99131E-04	1.5143
2.34767E-04	1.4670	0.00000E+00	0.0000	70	0.0003	2.05598E-04	1.8718
1.87206E-04	1.7991	0.00000E+00	0.0000	71	0.0006	4.25287E-04	1.3093
3.52036E-04	1.2679	0.00000E+00	0.0000	72	0.0001	5.19814E-05	5.2675
3.06625E-05	5.1485	0.00000E+00	0.0000	73	0.0004	3.21702E-04	1.9897
2.45594E-04	1.8883	0.00000E+00	0.0000	74	0.0014	1.05476E-03	0.8422
7.67151E-04	0.8021	0.00000E+00	0.0000	75	0.0001	1.08092E-04	3.0734
8.32810E-05	2.9227	0.00000E+00	0.0000	76	0.0006	4.64673E-04	1.8318
2.95002E-04	1.7707	0.00000E+00	0.0000	77	0.0005	3.65967E-04	1.8154
2.62557E-04	1.7489	0.00000E+00	0.0000	78	0.0000	7.14690E-06	3.7019
6.99354E-05	3.6619	0.00000E+00	0.0000	79	0.0003	1.95691E-04	2.4800
1.31396E-04	2.3851	0.00000E+00	0.0000	80	0.0001	6.48702E-05	3.2823
8.63817E-05	3.1897	0.00000E+00	0.0000	81	0.0014	1.06218E-03	1.0281
7.81282E-04	0.9844	0.00000E+00	0.0000	82	0.0001	7.19557E-05	3.6309
4.29930E-05	3.4672	0.00000E+00	0.0000	83	0.0002	1.29299E-04	3.1652

1.43013E-04	3.0975	0.00000E+00	0.0000	84	0.0001	8.08508E-05	2.8712
8.21230E-05	2.6679	0.00000E+00	0.0000	85	0.0002	1.89209E-04	2.2827
2.33310E-04	2.2146	0.00000E+00	0.0000	86	0.0003	2.67524E-04	2.4020
2.15259E-04	2.2874	0.00000E+00	0.0000	87	0.0005	3.48945E-04	2.3217
2.16742E-04	2.2245	0.00000E+00	0.0000	88	0.0001	5.50382E-05	4.0547
9.99298E-05	3.9490	0.00000E+00	0.0000	89	0.0001	9.35368E-05	3.4454
6.49536E-05	3.1708	0.00000E+00	0.0000	90	0.0003	2.18569E-04	2.7927
1.29204E-04	2.6731	0.00000E+00	0.0000	91	0.0002	1.77486E-04	3.0336
1.12667E-04	2.8462	0.00000E+00	0.0000	92	0.0000	3.19869E-05	2.5360
2.09149E-04	2.4894	0.00000E+00	0.0000	93	0.0002	1.27986E-04	3.1346
1.04156E-04	2.9282	0.00000E+00	0.0000	94	0.0001	1.12340E-04	3.9214
6.30705E-05	3.6801	0.00000E+00	0.0000	95	0.0008	6.20512E-04	2.2043
3.82409E-04	2.1363	0.00000E+00	0.0000	96	0.0002	1.52248E-04	4.3666
7.72630E-05	4.1840	0.00000E+00	0.0000	97	0.0004	2.84787E-04	3.2911
1.63024E-04	3.2239	0.00000E+00	0.0000	98	0.0001	1.09472E-04	4.3669
1.04808E-04	4.2165	0.00000E+00	0.0000	99	0.0001	9.97569E-05	4.4904
6.68948E-05	4.3312	0.00000E+00	0.0000	100	0.0002	1.30434E-04	4.5435
8.72065E-05	4.3630	0.00000E+00	0.0000	101	0.0001	1.14051E-04	3.6637
7.24106E-05	3.4064	0.00000E+00	0.0000	102	0.0002	1.62217E-04	3.9818
9.04431E-05	3.8212	0.00000E+00	0.0000	103	0.0001	9.35720E-05	3.8695
9.14091E-05	3.6614	0.00000E+00	0.0000	104	0.0002	1.57731E-04	3.7639
1.25299E-04	3.6255	0.00000E+00	0.0000	105	0.0002	1.27396E-04	3.4094
8.40350E-05	3.2146	0.00000E+00	0.0000	106	0.0002	1.84670E-04	3.9325
1.37145E-04	3.8820	0.00000E+00	0.0000	107	0.0001	6.44881E-05	3.5089
6.51023E-05	3.2865	0.00000E+00	0.0000	108	0.0000	3.56160E-05	2.6162
1.53774E-04	2.5550	0.00000E+00	0.0000	109	0.0002	1.33469E-04	2.3058

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4.42786E-04     2.2743       0.00000E+00     0.0000
  110    0.0009                 6.67392E-04     2.5317
4.11493E-04     2.5089       0.00000E+00     0.0000
  111    0.0002                 1.54845E-04     4.2019
1.42229E-04     4.0940       0.00000E+00     0.0000
  112    0.0002                 1.33900E-04     4.9300
1.40802E-04     4.8482       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                 1.27510E-04     3.5682
1.11322E-04     3.3423       0.00000E+00     0.0000
  114    0.0000                 1.02226E-05     7.5584
1.41557E-05     6.1542       0.00000E+00     0.0000
  115    0.0001                 7.25105E-05     4.7474
8.43871E-05     4.3760       0.00000E+00     0.0000
  116    0.0002                 1.89315E-04     2.5362
1.42658E-04     2.2813       0.00000E+00     0.0000
  117    0.0006                 4.72595E-04     2.3569
2.52756E-04     2.2060       0.00000E+00     0.0000
  118    0.0008                 5.91564E-04     2.1987
4.61647E-04     2.1066       0.00000E+00     0.0000
  119    0.0002                 1.43446E-04     2.0345
3.69972E-04     1.9638       0.00000E+00     0.0000
  120    0.0002                 1.61595E-04     2.3144
6.15447E-04     2.2801       0.00000E+00     0.0000
  121    0.0007                 5.21348E-04     2.9325
4.01179E-04     2.8657       0.00000E+00     0.0000
  122    0.0001                 1.00792E-04     4.5554
7.88419E-05     4.2500       0.00000E+00     0.0000
  123    0.0003                 2.17980E-04     2.7876
1.54492E-04     2.4643       0.00000E+00     0.0000
  124    0.0003                 2.31729E-04     3.2336
1.91281E-04     3.0222       0.00000E+00     0.0000
  125    0.0002                 1.35115E-04     2.9549
1.24856E-04     2.6575       0.00000E+00     0.0000
  126    0.0001                 9.73888E-05     3.7963
8.76677E-05     3.3365       0.00000E+00     0.0000
  127    0.0005                 3.78446E-04     3.4626
1.86114E-04     3.2700       0.00000E+00     0.0000
  128    0.0003                 2.17350E-04     3.1082
1.34475E-04     2.7644       0.00000E+00     0.0000
  129    0.0006                 4.52874E-04     2.2658
4.17191E-04     2.1568       0.00000E+00     0.0000
  130    0.0002                 1.20538E-04     2.5710
2.93714E-04     2.5021       0.00000E+00     0.0000
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131	0.0004	2.98084E-04	2.1014	2.38906E-04	1.7736
132	0.0007	5.32126E-04	1.8285	3.26550E-04	1.6806
133	0.0014	1.09061E-03	1.6731	6.87585E-04	1.5956
134	0.0001	9.17573E-05	2.2753	2.38573E-04	1.9144
135	0.0002	1.70271E-04	3.3014	2.52717E-04	3.2094
136	0.0001	4.69983E-05	1.9425	7.29006E-04	1.9157
137	0.0000	1.94656E-05	0.9695	3.50253E-03	0.9668
138	0.0004	3.15345E-04	1.8971	8.21321E-04	1.8690
139	0.0002	1.85970E-04	2.9605	2.28231E-04	2.7721
140	0.0003	2.03071E-04	2.5468	2.71615E-04	2.2212
141	0.0001	8.04111E-05	2.5660	2.53440E-04	2.2894
142	0.0001	6.49966E-05	3.3323	2.24646E-04	3.0652
143	0.0001	8.09732E-05	2.0678	1.73933E-04	1.3048
144	0.0000	3.28909E-05	3.6911	7.24636E-05	2.2878
145	0.0005	3.93559E-04	2.6407	3.08055E-04	2.3981
146	0.0004	3.40708E-04	2.2962	2.49831E-04	1.8402
147	0.0002	1.63986E-04	3.7653	1.05936E-04	3.2383
148	0.0001	5.61675E-05	5.7075	3.78522E-05	4.5759
149	0.0000	3.57052E-05	7.5821	2.38302E-05	6.0638
150	0.0001	8.42156E-05	4.2758	6.17784E-05	3.1545
151	0.0001	6.74217E-05	4.5813	5.72707E-05	3.1626
152	0.0001	4.45916E-05	4.5228	4.92948E-05	2.8757
153	0.0001	3.99158E-05	4.5353	4.59798E-05	2.5645
154	0.0001	5.17048E-05	4.2360	5.23380E-05	2.5722
155	0.0001	4.99491E-05	4.3529	4.93132E-05	2.6553
156	0.0001	4.96637E-05	4.3341	4.75314E-05	2.7765

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  157    0.0001                 6.04408E-05     3.9707
5.81596E-05     2.4720       0.00000E+00     0.0000
  158    0.0001                 6.08270E-05     4.5752
6.31591E-05     2.9461       0.00000E+00     0.0000
  159    0.0002                 1.48645E-04     3.2824
2.06690E-04     2.7443       0.00000E+00     0.0000
  160    0.0001                 6.32580E-05     4.7786
7.44110E-05     3.6680       0.00000E+00     0.0000
  161    0.0001                 7.25565E-05     4.0351
7.18027E-05     2.6209       0.00000E+00     0.0000
  162    0.0001                 8.96895E-05     4.1718
8.31616E-05     2.6511       0.00000E+00     0.0000
  163    0.0001                 9.05707E-05     3.1023
8.50687E-05     1.9240       0.00000E+00     0.0000
  164    0.0001                 9.94854E-05     3.7829
9.31484E-05     2.3102       0.00000E+00     0.0000
  165    0.0002                 1.15308E-04     3.3853
1.05779E-04     2.1442       0.00000E+00     0.0000
  166    0.0001                 7.26540E-05     4.2836
6.53528E-05     2.7783       0.00000E+00     0.0000
  167    0.0001                 7.78266E-05     4.4626
7.00586E-05     2.8969       0.00000E+00     0.0000
  168    0.0001                 8.64685E-05     4.2996
7.76826E-05     2.7536       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                 1.06265E-04     3.4708
9.26092E-05     2.4441       0.00000E+00     0.0000
  170    0.0002                 1.34606E-04     3.5281
1.15272E-04     2.6092       0.00000E+00     0.0000
  171    0.0001                 9.85129E-05     5.1850
7.56929E-05     4.1881       0.00000E+00     0.0000
  172    0.0002                 1.28820E-04     4.6083
9.24145E-05     3.8041       0.00000E+00     0.0000
  173    0.0003                 1.96523E-04     3.9297
1.29319E-04     3.4505       0.00000E+00     0.0000
  174    0.0003                 2.59960E-04     4.1447
1.61174E-04     3.7193       0.00000E+00     0.0000
  175    0.0002                 1.15315E-04     5.6830
6.94969E-05     5.1333       0.00000E+00     0.0000
  176    0.0002                 1.40811E-04     5.5328
8.23424E-05     5.0834       0.00000E+00     0.0000
  177    0.0002                 1.21201E-04     6.5522
7.13610E-05     5.9009       0.00000E+00     0.0000
  178    0.0002                 1.21860E-04     5.7876
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7.11578E-05	5.2147	0.00000E+00	0.0000	179	0.0002	1.21736E-04	5.7987
7.03229E-05	5.2515	0.00000E+00	0.0000	180	0.0002	1.23799E-04	5.6165
7.11543E-05	5.0768	0.00000E+00	0.0000	181	0.0001	1.09352E-04	6.2609
6.34532E-05	5.5363	0.00000E+00	0.0000	182	0.0001	1.07713E-04	6.0184
6.22445E-05	5.2773	0.00000E+00	0.0000	183	0.0001	1.10601E-04	6.0880
6.34932E-05	5.3551	0.00000E+00	0.0000	184	0.0001	1.03800E-04	6.7777
6.00992E-05	5.9066	0.00000E+00	0.0000	185	0.0001	8.78893E-05	6.4175
5.16966E-05	5.4407	0.00000E+00	0.0000	186	0.0001	9.44566E-05	6.5011
5.49777E-05	5.5541	0.00000E+00	0.0000	187	0.0001	9.26276E-05	7.5388
5.39736E-05	6.4582	0.00000E+00	0.0000	188	0.0001	1.05248E-04	5.2872
6.02653E-05	4.5569	0.00000E+00	0.0000	189	0.0001	9.59155E-05	5.3540
5.55950E-05	4.5346	0.00000E+00	0.0000	190	0.0003	2.09851E-04	4.2957
1.24971E-04	3.5331	0.00000E+00	0.0000	191	0.0003	1.94303E-04	4.0043
1.17901E-04	3.2623	0.00000E+00	0.0000	192	0.0003	2.09654E-04	3.4314
1.25459E-04	2.8178	0.00000E+00	0.0000	193	0.0003	2.07683E-04	3.8986
1.25491E-04	3.1346	0.00000E+00	0.0000	194	0.0005	4.04631E-04	2.8774
2.49317E-04	2.2808	0.00000E+00	0.0000	195	0.0006	4.30905E-04	2.6829
2.65663E-04	2.1410	0.00000E+00	0.0000	196	0.0006	4.72363E-04	2.8810
2.91651E-04	2.2665	0.00000E+00	0.0000	197	0.0007	5.23397E-04	2.3647
3.24981E-04	1.8309	0.00000E+00	0.0000	198	0.0007	5.68664E-04	2.3644
3.52808E-04	1.8354	0.00000E+00	0.0000	199	0.0004	3.34018E-04	3.0753
2.05531E-04	2.4487	0.00000E+00	0.0000	200	0.0004	3.44771E-04	2.8813
2.13388E-04	2.2574	0.00000E+00	0.0000	201	0.0010	7.77104E-04	1.9997
4.76166E-04	1.5541	0.00000E+00	0.0000	202	0.0013	1.00050E-03	2.1813
6.02708E-04	1.7804	0.00000E+00	0.0000	203	0.0016	1.20407E-03	1.9208
7.22317E-04	1.5639	0.00000E+00	0.0000	204	0.0021	1.63076E-03	1.4571

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9.64021E-04     1.2151       0.00000E+00     0.0000
  205    0.0015                 1.13835E-03     1.9218
6.66475E-04     1.6295       0.00000E+00     0.0000
  206    0.0018                 1.41521E-03     1.7119
8.23521E-04     1.4739       0.00000E+00     0.0000
  207    0.0022                 1.65909E-03     1.7281
9.64533E-04     1.5045       0.00000E+00     0.0000
  208    0.0029                 2.21583E-03     1.6657
1.28739E-03     1.4719       0.00000E+00     0.0000
  209    0.0031                 2.37054E-03     1.3949
1.39441E-03     1.2335       0.00000E+00     0.0000
  210    0.0037                 2.80134E-03     1.1563
1.67379E-03     1.0109       0.00000E+00     0.0000
  211    0.0042                 3.20369E-03     1.3308
1.92406E-03     1.1543       0.00000E+00     0.0000
  212    0.0047                 3.59503E-03     1.1055
2.18049E-03     0.9439       0.00000E+00     0.0000
  213    0.0064                 4.90787E-03     0.9026
2.98121E-03     0.7526       0.00000E+00     0.0000
  214    0.0095                 7.31120E-03     0.7224
4.40745E-03     0.6059       0.00000E+00     0.0000
  215    0.0157                 1.20693E-02     0.6119
7.19570E-03     0.5182       0.00000E+00     0.0000
  216    0.0300                 2.29606E-02     0.4259
1.35443E-02     0.3639       0.00000E+00     0.0000
  217    0.0202                 1.54462E-02     0.5002
9.07580E-03     0.4222       0.00000E+00     0.0000
  218    0.0277                 2.11952E-02     0.4812
1.24126E-02     0.4055       0.00000E+00     0.0000
  219    0.0358                 2.74396E-02     0.3845
1.60043E-02     0.3226       0.00000E+00     0.0000
  220    0.0473                 3.62855E-02     0.3623
2.10978E-02     0.3086       0.00000E+00     0.0000
  221    0.0624                 4.78190E-02     0.3218
2.77335E-02     0.2719       0.00000E+00     0.0000
  222    0.0801                 6.13706E-02     0.2496
3.55456E-02     0.2126       0.00000E+00     0.0000
  223    0.1039                 7.96311E-02     0.2458
4.62169E-02     0.2120       0.00000E+00     0.0000
  224    0.0581                 4.44977E-02     0.3008
2.59219E-02     0.2520       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    0.2310                 1.77076E-01     0.1582
1.04821E-01     0.1344       0.00000E+00     0.0000
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  226    0.0457                 3.50011E-02     0.3986
2.12866E-02     0.3299       0.00000E+00     0.0000
  227    0.0493                 3.77495E-02     0.3669
2.34043E-02     0.2941       0.00000E+00     0.0000
  228    0.0211                 1.61979E-02     0.5750
1.02350E-02     0.4610       0.00000E+00     0.0000
  229    0.0222                 1.70075E-02     0.5353
1.09200E-02     0.4202       0.00000E+00     0.0000
  230    0.0117                 8.94371E-03     0.7572
5.85599E-03     0.5895       0.00000E+00     0.0000
  231    0.0121                 9.28190E-03     0.8167
6.17505E-03     0.6153       0.00000E+00     0.0000
  232    0.0130                 9.95220E-03     0.7399
6.77523E-03     0.5284       0.00000E+00     0.0000
  233    0.0083                 6.39292E-03     0.7991
4.49263E-03     0.5869       0.00000E+00     0.0000
  234    0.0058                 4.46627E-03     1.2088
3.24042E-03     0.8187       0.00000E+00     0.0000
  235    0.0025                 1.88618E-03     1.8977
1.23987E-03     1.4314       0.00000E+00     0.0000
  236    0.0020                 1.50288E-03     1.8698
9.99955E-04     1.3695       0.00000E+00     0.0000
  237    0.0017                 1.33728E-03     2.0157
9.45747E-04     1.4611       0.00000E+00     0.0000
  238    0.0001                 7.06736E-05     8.0731
6.01694E-05     4.8891       0.00000E+00     0.0000

 system total =                 7.66470E-01     0.0581
4.69232E-01     0.0498       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3091E-01  +
or -  0.0002



 elapsed time   3.11383 minutes

 random number=   6C4C09DAF528F1F3
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                          unit  region   density
deviation      fissions
```

```
                                                  1      1    3.092E-03
0.06         7.665E-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	1.625E-08	26.42	1.219E-08	24.44	1.365E-08	24.40
3	8.852E-07	4.38	7.245E-07	3.91	7.754E-07	4.06
4	1.467E-06	3.03	1.220E-06	2.78	1.306E-06	2.88
5	2.211E-06	2.80	1.824E-06	2.42	1.947E-06	2.51
6	9.520E-06	1.31	7.601E-06	1.18	8.103E-06	1.21
7	1.229E-05	1.32	9.509E-06	1.12	1.002E-05	1.12
8	3.114E-05	0.75	2.278E-05	0.65	2.389E-05	0.67
9	8.195E-05	0.47	5.874E-05	0.39	6.130E-05	0.40
10	4.661E-05	0.63	3.303E-05	0.55	3.437E-05	0.51
11	2.206E-04	0.30	1.559E-04	0.24	1.617E-04	0.24
12	1.898E-04	0.29	1.376E-04	0.25	1.443E-04	0.25
13	5.635E-05	0.54	4.118E-05	0.43	4.309E-05	0.42
14	2.551E-04	0.26	1.848E-04	0.23	1.929E-04	0.23
15	2.209E-04	0.25	1.604E-04	0.22	1.671E-04	0.21
16	7.126E-05	0.44	5.157E-05	0.39	5.387E-05	0.37
17	3.188E-05	0.63	2.336E-05	0.56	2.426E-05	0.49
18	2.791E-05	0.81	2.038E-05	0.64	2.104E-05	0.64
19	5.040E-05	0.52	3.685E-05	0.45	3.836E-05	0.41
20	3.972E-05	0.57	2.918E-05	0.49	3.050E-05	0.48
21	7.964E-05	0.41	5.835E-05	0.35	6.106E-05	0.33
22	7.336E-05	0.45	5.339E-05	0.33	5.522E-05	0.31
23	7.702E-05	0.38	5.624E-05	0.33	5.847E-05	0.31
24	1.865E-05	0.95	1.376E-05	0.73	1.428E-05	0.68
25	2.330E-05	0.70	1.728E-05	0.58	1.809E-05	0.57
26	1.341E-05	1.11	9.932E-06	0.83	1.048E-05	0.73
27	4.206E-05	0.55	3.130E-05	0.51	3.299E-05	0.49
28	7.702E-05	0.42	5.723E-05	0.36	6.055E-05	0.31
29	7.913E-05	0.45	5.893E-05	0.32	6.188E-05	0.31
30	9.887E-06	1.10	7.429E-06	0.90	7.798E-06	0.88
31	7.818E-05	0.34	5.897E-05	0.34	6.194E-05	0.32
32	3.120E-05	0.61	2.350E-05	0.51	2.479E-05	0.50
33	2.663E-05	0.68	2.014E-05	0.58	2.120E-05	0.55
34	6.084E-05	0.44	4.605E-05	0.37	4.850E-05	0.34

35	3.651E-05	0.57	2.755E-05	0.49	2.893E-05	0.45
36	3.392E-05	0.62	2.564E-05	0.50	2.693E-05	0.44
37	2.199E-05	0.61	1.655E-05	0.56	1.733E-05	0.52
38	2.569E-05	0.64	1.954E-05	0.48	2.052E-05	0.46
39	9.726E-05	0.35	7.456E-05	0.28	7.904E-05	0.27
40	8.951E-05	0.33	6.903E-05	0.26	7.355E-05	0.26
41	1.127E-04	0.25	8.811E-05	0.22	9.426E-05	0.21
42	9.348E-05	0.32	7.379E-05	0.26	7.918E-05	0.24
43	5.138E-05	0.40	4.075E-05	0.36	4.275E-05	0.31
44	6.946E-05	0.38	5.581E-05	0.32	5.997E-05	0.27
45	3.526E-05	0.43	2.809E-05	0.34	3.114E-05	0.29
46	8.282E-06	0.87	6.551E-06	0.76	7.055E-06	0.67
47	2.343E-05	0.62	1.857E-05	0.54	1.946E-05	0.43
48	6.812E-06	1.10	5.410E-06	0.93	5.625E-06	0.68
49	4.359E-05	0.40	3.493E-05	0.34	3.775E-05	0.32
50	2.943E-05	0.49	2.379E-05	0.45	2.582E-05	0.36
51	7.765E-06	0.80	6.281E-06	0.78	6.821E-06	0.70
52	2.060E-05	0.61	1.663E-05	0.48	1.810E-05	0.41
53	7.634E-05	0.32	6.156E-05	0.28	6.681E-05	0.26
54	3.344E-05	0.47	2.709E-05	0.42	2.927E-05	0.38
55	6.671E-05	0.32	5.424E-05	0.29	5.910E-05	0.24
56	4.347E-05	0.36	3.541E-05	0.32	3.865E-05	0.25
57	4.902E-05	0.38	4.007E-05	0.34	4.376E-05	0.29
58	2.562E-05	0.47	2.094E-05	0.41	2.277E-05	0.34
59	4.435E-05	0.40	3.618E-05	0.36	3.940E-05	0.29
60	6.431E-05	0.31	5.264E-05	0.28	5.709E-05	0.24
61	6.121E-06	0.98	4.988E-06	0.85	5.487E-06	0.71
62	3.228E-05	0.41	2.650E-05	0.39	2.880E-05	0.28
63	2.172E-05	0.49	1.783E-05	0.48	1.940E-05	0.36
64	1.740E-05	0.59	1.422E-05	0.51	1.539E-05	0.45
65	5.720E-06	0.92	4.726E-06	0.81	5.141E-06	0.72
66	2.881E-05	0.42	2.357E-05	0.40	2.558E-05	0.34
67	2.134E-05	0.54	1.753E-05	0.45	1.906E-05	0.42
68	4.591E-06	0.99	3.803E-06	0.79	4.108E-06	0.81
69	3.721E-05	0.39	3.055E-05	0.34	3.319E-05	0.30
70	2.673E-05	0.44	2.199E-05	0.38	2.397E-05	0.33
71	4.580E-05	0.35	3.768E-05	0.28	4.097E-05	0.26
72	2.614E-06	1.20	2.147E-06	1.11	2.361E-06	0.85
73	2.716E-05	0.40	2.245E-05	0.36	2.432E-05	0.31
74	7.957E-05	0.27	6.600E-05	0.24	7.147E-05	0.21
75	9.114E-06	0.74	7.554E-06	0.61	8.199E-06	0.59
76	2.277E-05	0.48	1.889E-05	0.44	2.055E-05	0.35
77	1.758E-05	0.58	1.457E-05	0.50	1.588E-05	0.40
78	1.542E-06	1.82	1.266E-06	1.52	1.412E-06	1.26
79	9.893E-06	0.68	8.165E-06	0.66	8.865E-06	0.56
80	4.559E-06	1.12	3.786E-06	1.04	4.139E-06	0.83
81	5.549E-05	0.34	4.616E-05	0.29	4.994E-05	0.24
82	3.331E-06	1.31	2.744E-06	1.19	2.961E-06	0.89
83	4.466E-06	0.96	3.711E-06	0.78	4.026E-06	0.68
84	8.256E-06	0.90	6.860E-06	0.79	7.432E-06	0.66
85	9.813E-06	0.67	8.184E-06	0.60	8.894E-06	0.49
86	1.366E-05	0.65	1.138E-05	0.62	1.231E-05	0.47

87	1.204E-05	0.70	1.005E-05	0.62	1.085E-05	0.53
88	3.111E-06	1.08	2.577E-06	0.96	2.822E-06	0.84
89	6.594E-06	0.92	5.492E-06	0.77	5.925E-06	0.69
90	6.899E-06	0.79	5.732E-06	0.71	6.242E-06	0.60
91	8.171E-06	0.81	6.833E-06	0.74	7.440E-06	0.57
92	4.790E-06	0.93	4.027E-06	0.87	4.340E-06	0.71
93	8.086E-06	0.81	6.782E-06	0.65	7.361E-06	0.60
94	4.324E-06	1.05	3.593E-06	0.95	3.893E-06	0.76
95	1.264E-05	0.69	1.050E-05	0.58	1.142E-05	0.48
96	3.390E-06	1.32	2.829E-06	1.08	3.043E-06	0.89
97	3.379E-06	1.21	2.873E-06	1.03	3.098E-06	0.87
98	3.527E-06	1.11	2.953E-06	0.97	3.256E-06	0.88
99	2.343E-06	1.36	1.934E-06	1.26	2.099E-06	1.05
100	3.429E-06	1.06	2.847E-06	0.90	3.134E-06	0.79
101	4.949E-06	1.02	4.089E-06	0.83	4.457E-06	0.72
102	3.383E-06	1.26	2.834E-06	1.11	3.057E-06	0.92
103	4.674E-06	1.02	3.934E-06	0.94	4.224E-06	0.77
104	4.179E-06	1.05	3.493E-06	0.99	3.811E-06	0.86
105	4.349E-06	1.03	3.635E-06	0.98	3.914E-06	0.77
106	1.510E-06	1.50	1.286E-06	1.37	1.407E-06	1.11
107	3.548E-06	1.09	2.979E-06	1.08	3.215E-06	0.84
108	3.200E-06	1.02	2.702E-06	1.01	2.951E-06	0.85
109	5.162E-06	0.94	4.350E-06	0.90	4.684E-06	0.69
110	3.034E-06	1.26	2.565E-06	1.07	2.824E-06	0.86
111	3.068E-06	1.26	2.574E-06	1.15	2.795E-06	0.91
112	1.771E-06	1.45	1.508E-06	1.41	1.644E-06	1.15
113	5.618E-06	0.89	4.716E-06	0.80	5.118E-06	0.67
114	2.056E-06	1.55	1.705E-06	1.40	1.836E-06	1.15
115	5.147E-06	0.99	4.280E-06	0.79	4.644E-06	0.66
116	1.083E-05	0.77	9.034E-06	0.68	9.806E-06	0.53
117	1.170E-05	0.62	9.909E-06	0.63	1.066E-05	0.49
118	1.288E-05	0.55	1.079E-05	0.49	1.171E-05	0.44
119	8.308E-06	0.74	7.002E-06	0.67	7.608E-06	0.59
120	5.764E-06	0.93	4.904E-06	0.86	5.321E-06	0.70
121	6.094E-06	0.95	5.157E-06	0.84	5.587E-06	0.70
122	3.162E-06	1.18	2.698E-06	1.09	2.899E-06	0.87
123	1.050E-05	0.71	8.775E-06	0.61	9.512E-06	0.53
124	7.310E-06	0.77	6.160E-06	0.62	6.617E-06	0.52
125	7.042E-06	0.89	5.894E-06	0.75	6.371E-06	0.60
126	5.769E-06	0.96	4.824E-06	0.89	5.225E-06	0.69
127	5.552E-06	1.14	4.608E-06	0.92	5.006E-06	0.70
128	7.805E-06	0.69	6.593E-06	0.65	7.125E-06	0.52
129	9.648E-06	0.67	8.166E-06	0.66	8.885E-06	0.48
130	3.998E-06	1.19	3.360E-06	1.01	3.699E-06	0.78
131	1.693E-05	0.55	1.422E-05	0.48	1.537E-05	0.39
132	1.109E-05	0.73	9.362E-06	0.66	1.015E-05	0.54
133	1.367E-05	0.62	1.152E-05	0.49	1.246E-05	0.45
134	1.488E-05	0.61	1.254E-05	0.53	1.346E-05	0.45
135	2.389E-06	1.35	2.053E-06	1.24	2.218E-06	1.08
136	3.849E-06	1.01	3.327E-06	0.91	3.689E-06	0.75
137	2.479E-06	0.96	2.606E-06	0.89	2.923E-06	0.66
138	4.042E-06	0.97	3.522E-06	0.89	3.869E-06	0.73

139	4.731E-06	1.02	4.010E-06	0.91	4.325E-06	0.82
140	1.198E-05	0.57	1.022E-05	0.52	1.102E-05	0.46
141	8.825E-06	0.72	7.414E-06	0.63	8.075E-06	0.53
142	5.736E-06	0.89	4.868E-06	0.76	5.289E-06	0.65
143	1.985E-05	0.47	1.679E-05	0.40	1.809E-05	0.35
144	8.025E-06	0.84	6.735E-06	0.73	7.212E-06	0.59
145	7.174E-06	0.79	6.088E-06	0.70	6.642E-06	0.57
146	1.208E-05	0.57	1.023E-05	0.47	1.101E-05	0.37
147	3.630E-06	1.06	3.027E-06	1.05	3.314E-06	0.84
148	1.906E-06	1.47	1.589E-06	1.39	1.718E-06	1.12
149	1.207E-06	2.15	1.007E-06	1.92	1.083E-06	1.62
150	4.015E-06	1.17	3.408E-06	1.05	3.626E-06	0.84
151	4.101E-06	1.16	3.478E-06	1.08	3.750E-06	0.75
152	4.351E-06	0.93	3.653E-06	0.82	3.944E-06	0.70
153	4.559E-06	1.16	3.808E-06	0.88	4.098E-06	0.77
154	4.733E-06	0.99	3.994E-06	0.79	4.249E-06	0.62
155	4.275E-06	1.01	3.658E-06	0.92	3.952E-06	0.78
156	4.019E-06	1.21	3.381E-06	1.04	3.649E-06	0.90
157	4.686E-06	0.94	3.959E-06	0.85	4.291E-06	0.72
158	4.766E-06	1.02	4.043E-06	0.94	4.364E-06	0.71
159	6.767E-06	0.77	5.732E-06	0.72	6.158E-06	0.58
160	3.479E-06	1.07	2.951E-06	0.96	3.178E-06	0.85
161	4.929E-06	0.98	4.163E-06	0.84	4.457E-06	0.70
162	5.813E-06	0.98	4.894E-06	0.80	5.232E-06	0.62
163	6.173E-06	0.92	5.181E-06	0.77	5.585E-06	0.63
164	6.618E-06	0.87	5.555E-06	0.74	5.945E-06	0.61
165	6.925E-06	0.83	5.833E-06	0.73	6.262E-06	0.61
166	4.047E-06	1.12	3.403E-06	1.00	3.653E-06	0.81
167	4.179E-06	1.03	3.521E-06	1.05	3.794E-06	0.80
168	4.383E-06	0.97	3.657E-06	0.83	3.942E-06	0.72
169	4.408E-06	1.09	3.714E-06	0.94	4.027E-06	0.75
170	4.559E-06	1.09	3.893E-06	0.98	4.197E-06	0.78
171	2.343E-06	1.37	2.005E-06	1.22	2.154E-06	1.01
172	2.347E-06	1.24	1.989E-06	1.15	2.194E-06	0.92
173	2.506E-06	1.35	2.102E-06	1.21	2.276E-06	0.98
174	2.498E-06	1.36	2.125E-06	1.21	2.308E-06	0.99
175	1.043E-06	1.87	8.763E-07	1.79	9.561E-07	1.42
176	1.005E-06	2.21	8.601E-07	1.95	9.399E-07	1.64
177	1.031E-06	2.03	8.604E-07	1.92	9.524E-07	1.43
178	1.015E-06	2.10	8.726E-07	2.03	9.366E-07	1.45
179	1.013E-06	1.94	8.638E-07	2.01	9.471E-07	1.56
180	1.091E-06	1.66	9.307E-07	1.71	9.975E-07	1.29
181	1.075E-06	1.97	9.009E-07	1.86	9.831E-07	1.51
182	1.063E-06	2.11	8.990E-07	1.62	9.900E-07	1.44
183	1.081E-06	1.83	9.239E-07	1.58	1.013E-06	1.41
184	1.131E-06	2.13	9.464E-07	1.83	1.032E-06	1.49
185	1.072E-06	1.98	9.253E-07	1.77	1.006E-06	1.61
186	1.095E-06	1.94	9.329E-07	1.87	1.005E-06	1.45
187	1.151E-06	1.91	9.738E-07	1.58	1.050E-06	1.33
188	1.224E-06	2.00	1.018E-06	1.74	1.087E-06	1.41
189	1.161E-06	1.82	9.956E-07	1.65	1.061E-06	1.41
190	3.033E-06	1.20	2.576E-06	1.09	2.783E-06	0.90

191	3.097E-06	1.13	2.630E-06	0.94	2.813E-06	0.89
192	3.201E-06	1.09	2.714E-06	1.09	2.920E-06	0.82
193	3.264E-06	1.11	2.778E-06	1.03	3.017E-06	0.78
194	6.968E-06	0.91	5.856E-06	0.76	6.305E-06	0.56
195	7.248E-06	0.85	6.143E-06	0.77	6.665E-06	0.59
196	7.830E-06	0.76	6.627E-06	0.67	7.111E-06	0.56
197	8.442E-06	0.79	7.112E-06	0.70	7.728E-06	0.55
198	8.934E-06	0.64	7.525E-06	0.58	8.203E-06	0.51
199	4.798E-06	0.99	4.079E-06	0.83	4.423E-06	0.68
200	5.073E-06	0.85	4.262E-06	0.80	4.643E-06	0.69
201	1.060E-05	0.70	9.006E-06	0.57	9.712E-06	0.51
202	1.188E-05	0.65	1.005E-05	0.60	1.088E-05	0.52
203	1.297E-05	0.64	1.095E-05	0.59	1.193E-05	0.48
204	1.481E-05	0.54	1.252E-05	0.50	1.361E-05	0.42
205	8.591E-06	0.66	7.729E-06	0.56	8.188E-06	0.45
206	9.379E-06	0.68	8.435E-06	0.60	8.891E-06	0.46
207	9.598E-06	0.59	8.716E-06	0.55	9.209E-06	0.44
208	1.117E-05	0.56	1.012E-05	0.51	1.081E-05	0.40
209	1.161E-05	0.55	1.052E-05	0.46	1.120E-05	0.39
210	1.411E-05	0.52	1.275E-05	0.45	1.362E-05	0.40
211	1.611E-05	0.45	1.455E-05	0.38	1.553E-05	0.34
212	1.917E-05	0.44	1.737E-05	0.38	1.851E-05	0.29
213	2.614E-05	0.40	2.351E-05	0.33	2.518E-05	0.28
214	3.700E-05	0.29	3.330E-05	0.29	3.566E-05	0.23
215	5.491E-05	0.27	4.955E-05	0.23	5.348E-05	0.17
216	9.182E-05	0.20	8.366E-05	0.18	9.037E-05	0.16
217	5.536E-05	0.24	5.292E-05	0.19	5.614E-05	0.16
218	7.087E-05	0.21	6.779E-05	0.17	7.225E-05	0.14
219	8.417E-05	0.20	8.146E-05	0.19	8.663E-05	0.14
220	1.015E-04	0.19	9.882E-05	0.15	1.054E-04	0.12
221	1.201E-04	0.14	1.183E-04	0.12	1.262E-04	0.10
222	1.367E-04	0.16	1.365E-04	0.14	1.456E-04	0.10
223	1.530E-04	0.15	1.570E-04	0.12	1.671E-04	0.10
224	7.514E-05	0.19	7.978E-05	0.16	8.446E-05	0.12
225	2.336E-04	0.12	2.719E-04	0.09	2.823E-04	0.08
226	3.188E-05	0.27	4.490E-05	0.22	4.452E-05	0.14
227	2.886E-05	0.25	4.619E-05	0.19	4.438E-05	0.12
228	1.035E-05	0.39	1.913E-05	0.31	1.753E-05	0.17
229	9.682E-06	0.42	1.960E-05	0.32	1.747E-05	0.17
230	4.455E-06	0.54	1.008E-05	0.47	8.699E-06	0.24
231	4.216E-06	0.61	1.051E-05	0.43	8.710E-06	0.22
232	3.971E-06	0.51	1.130E-05	0.40	8.888E-06	0.20
233	2.219E-06	0.80	7.377E-06	0.53	5.504E-06	0.28
234	1.447E-06	0.84	5.341E-06	0.63	3.843E-06	0.30
235	5.126E-07	1.49	1.040E-06	1.04	1.112E-06	0.50
236	3.465E-07	1.70	7.318E-07	1.23	7.934E-07	0.61
237	2.334E-07	1.91	5.542E-07	1.39	6.124E-07	0.59
238	5.548E-09	11.18	1.867E-08	6.99	2.559E-08	1.98

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

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  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
 0.7536 to 0.7564     *
 0.7564 to 0.7592     ***
 0.7592 to 0.7620     *************
 0.7620 to 0.7649     ********************
 0.7649 to 0.7677     **************************
 0.7677 to 0.7705     ***************
 0.7705 to 0.7734     *******************
 0.7734 to 0.7762     **
 0.7762 to 0.7790     *

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7536 to 0.7564     *
 0.7564 to 0.7592     **
 0.7592 to 0.7620     ***********
```

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 0.7620 to 0.7649     ****************
 0.7649 to 0.7677     **********************
 0.7677 to 0.7705     **********
 0.7705 to 0.7734     ***********
 0.7734 to 0.7762     *
 0.7762 to 0.7790     *

                                 frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7536 to 0.7564     *
 0.7564 to 0.7592     *
 0.7592 to 0.7620     *******
 0.7620 to 0.7649     ************
 0.7649 to 0.7677     ***************
 0.7677 to 0.7705     ****
 0.7705 to 0.7734     *********
 0.7734 to 0.7762     *
 0.7762 to 0.7790

                                 frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7536 to 0.7564
 0.7564 to 0.7592     *
 0.7592 to 0.7620     ****
 0.7620 to 0.7649     ******
 0.7649 to 0.7677     *********
 0.7677 to 0.7705     **
 0.7705 to 0.7734     **
 0.7734 to 0.7762     *
 0.7762 to 0.7790

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

**********************************************************************
*********************************************
        ***
***
        ***                                     ******      final results
table      ******                                   ***
        ***
***
        ***        best estimate system k-eff
0.76629 + or - 0.00049                     ***
        ***
```

```
***
        ***        Energy of average lethargy of Fission (eV)
5.65950E-02 + or -  1.27661E-04           ***
        ***
***
        ***        system nu bar
2.43895E+00 + or -  9.29726E-06           ***
        ***
***
        ***        system mean free path (cm)
6.52725E-01 + or -  1.77603E-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     3.11433 minutes


*********************************************************************
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1
   KK          KK  EEEEEEEEEEEEE   NN          NN   OOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   KK         KK   EEEEEEEEEEEEE   NNN         NN  OOOOOOOOOOOOO
VV          VV  IIIIIIIIIIII
   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   OOOOOOOOOOO
V        IIIIIIIIIIII


   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
```

2222222222222 // 111 6666666666666
00 00 99 99 // 22 22 22
22 // 1111 66
00 00 99 99 // 22
22 // 11 66
00 00 99 99 // 22
22 // 11 66
00 00 9999999999999 // 22
22 // 11 666666666666
00 00 999999999999 // 22
22 // 11 6666666666666
00 00 99 // 22
22 // 11 66 66
00 00 99 // 22
22 // 11 66 66
00 00 99 // 22 22
// 11 66 66
000000000 9999999999999 // 2222222222222
2222222222222 // 11111111 6666666666666
0000000 999999999999 // 2222222222222
2222222222222 // 11111111 66666666666

0000000 666666666666 5555555555555
22222222222 33333333333 44
000000000 6666666666666 5555555555555
2222222222222 3333333333333 444
00 00 66 ::: 55 22
22 ::: 33 33 4444
00 00 66 ::: 55
22 ::: 33 44 44
00 00 66 ::: 55
22 ::: 33 44 44
00 00 666666666666 555555555555
22 333 44 44
00 00 6666666666666 5555555555555
22 333 44 44
00 00 66 66 ::: 55
22 ::: 33 444444444444
00 00 66 66 ::: 55
22 ::: 33 4444444444444
00 00 66 66 ::: 55 55 22
::: 33 33 44
000000000 6666666666666 5555555555555
2222222222222 3333333333333 44
0000000 66666666666 55555555555
2222222222222 33333333333 44
1

SSSSSSSSSS CCCCCCCCCCC AAAAAAAAA LL
EEEEEEEEEEEEE

```
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEEE
```

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

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*********************************************************************
************************************************
        *****
*****
        *****
*****
        *****              program:  kenovi
*****
```

```
        *****
*****
        *****        creation date:  21_jun_2011
*****
        *****
*****
        *****              library:
C:\Users\David\AppData\Local\Temp\scale.David.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:52:34.97
*****
        *****
*****
        *****
*****

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1

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

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*********************************************
        ***
***
        ***          unit
volume                                            ***
        ***         number                data set name
name        unit function                       ***
        ***         ------                -------------
----        -------------                       ***
        ***
***
        ***      xsc  14
->Data\Local\Temp\scale.David.40724\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.40724\restart.keno_input             read restart
data                  ***
        ***
***
        ***      wrs  95
->\Temp\scale.David.40724\restart.keno_input             write restart
data                 ***
        ***
***
        ***      lib   4
->Data\Local\Temp\scale.David.40724\ft04f001             input ampx
working library         ***
        ***
***
        ***            8
->Data\Local\Temp\scale.David.40724\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  9.12385E-12  2.75250E-12    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  6.04483E-08  1.81179E-07    5010    10.0129     b10 525
endf/b7 rel1 rev7 mod0                   12/17/09
    1005011  2.54328E-14  8.38138E-14    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  7.37714E-07  5.29652E-06   12024    23.9850     mg24 1225
endf/b7 rel3 rev7 mod3                  12/17/09
    1012025  9.33938E-08  6.98512E-07   12025    24.9858     mg25 1228
endf/b7 rel3 rev7 mod2                  12/17/09
    1012026  1.02827E-07  7.99745E-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  5.24104E-07  8.93227E-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  1.55121E-08  2.96840E-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  1.12598E-10  2.79461E-09   36083    82.9141     kr83 3640
endf/b7 rel0 rev7 mod1                 12/17/09
    1040090  4.90907E-08  1.32112E-06   40090    89.9047     zr90 4025
endf/b7 rel0 rev7 mod1                 12/17/09
    1040091  1.16843E-08  3.17947E-07   40091    90.9056     zr91 4028
endf/b7 rel0 rev7 mod1                 12/17/09
    1040092  1.76232E-08  4.84827E-07   40092    91.9050     zr92 4031
endf/b7 rel3 rev7 mod4                 12/17/09
    1040093  1.38587E-09  3.85418E-08   40093    92.9065     zr93 4034
endf/b7 rel3 rev7 mod1                 12/17/09
    1040094  1.78901E-08  5.02885E-07   40094    93.9063     zr94 4037
endf/b7 rel3 rev7 mod1                 12/17/09
    1040095  2.80088E-10  7.95718E-09   40095    94.9080     zr95 4040
endf/b7 rel0 rev7 mod1                 12/17/09
    1040096  3.95042E-09  1.13412E-07   40096    95.9083     zr96 4043
endf/b7 rel0 rev7 mod1                 12/17/09
    1041093  1.44505E-17  4.01875E-16   41093    92.9064     nb93 4125
endf/b7 rel6 rev7 mod3                 12/17/09
    1041095  1.65489E-10  4.70141E-09   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  1.21554E-08  3.45323E-07   42095    94.9058     mo95 4234
endf/b7 rel0 rev7 mod1                 12/17/09
    1042096  1.18398E-08  3.39895E-07   42096    95.9047     mo96 4237
endf/b7 rel0 rev7 mod1                 12/17/09
    1042097  8.02012E-09  2.32645E-07   42097    96.9060     mo97 4240
endf/b7 rel0 rev7 mod1                 12/17/09
    1042098  1.83337E-08  5.37302E-07   42098    97.9054     mo98 4243
endf/b7 rel0 rev7 mod1                 12/17/09
    1042099  1.15470E-12  3.41871E-11   42099    98.9077     mo99 4246
endf/b7 rel0 rev7 mod1                 12/17/09
    1042100  8.13507E-09  2.43288E-07   42100    99.9075     mo100 4249
endf/b7 rel0 rev7 mod1                12/17/09
    1043099  1.26159E-09  3.73510E-08   43099    98.9062     tc99 4325
endf/b7 rel0 rev7 mod1                 12/17/09
    1044101  1.05011E-09  3.17183E-08   44101   100.9056     ru101 4440
endf/b7 rel0 rev7 mod1                12/17/09
    1044102  8.67395E-10  2.64589E-08   44102   101.9044     ru102 4443
endf/b7 rel0 rev7 mod1                12/17/09
    1044103  7.63722E-11  2.35255E-09   44103   102.9063     ru103 4446
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endf/b7 rel0 rev7 mod1                12/17/09
    1044104  3.83340E-10  1.19230E-08   44104   103.9054     ru104 4449
endf/b7 rel0 rev7 mod1                12/17/09
    1044106  5.80307E-11  1.83970E-09   44106   105.9073     ru106 4455
endf/b7 rel0 rev7 mod0                12/17/09
    1045103  5.38502E-10  1.65878E-08   45103   102.9055     rh103 4525
endf/b7 rel0 rev7 mod1                12/17/09
    1045105  1.42678E-14  4.48042E-13   45105   104.9057     rh105 4531
endf/b7 rel0 rev7 mod1                12/17/09
    1046105  2.04169E-10  6.41134E-09   46105   104.9051     pd105 4634
endf/b7 rel0 rev7 mod1                12/17/09
    1046107  3.07545E-11  9.84168E-10   46107   106.9051     pd107 4640
endf/b7 rel0 rev7 mod1                12/17/09
    1046108  1.14732E-11  3.70583E-10   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  6.53965E-12  2.13188E-10   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  8.98777E-11  2.90303E-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  1.29596E-09  4.30229E-08   48111   110.9042     cd111 4840
endf/b7 rel0 rev7 mod1                12/17/09
    1048112  2.43912E-09  8.17026E-08   48112   111.9028     cd112 4843
endf/b7 rel0 rev7 mod1                12/17/09
    1048113  1.23609E-09  4.17755E-08   48113   112.9044     cd113 4846
endf/b7 rel0 rev7 mod1                12/17/09
    1048114  2.90394E-09  9.90116E-08   48114   113.9034     cd114 4849
endf/b7 rel4 rev7 mod1                12/17/09
    1048116  7.58989E-10  2.63329E-08   48116   115.9048     cd116 4855
endf/b7 rel0 rev7 mod1                12/17/09
    1049115  2.57364E-12  8.85205E-11   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  4.30292E-09   50114   113.9028     sn114 5031
endf/b7 rel0 rev7 mod1                12/17/09
    1050115  6.51422E-11  2.24056E-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  1.47123E-09  5.14835E-08   50117   116.9029     sn117 5040
endf/b7 rel0 rev7 mod1                12/17/09
    1050118  4.63365E-09  1.63533E-07   50118   117.9016     sn118 5043
endf/b7 rel0 rev7 mod1                12/17/09
    1050119  1.64524E-09  5.85578E-08   50119   118.9033     sn119 5046
endf/b7 rel0 rev7 mod1                12/17/09
    1050120  6.23244E-09  2.23690E-07   50120   119.9022     sn120 5049
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endf/b7 rel0 rev7 mod1                12/17/09
    1050122  8.88560E-10  3.24238E-08   50122   121.9034     sn122 5055
endf/b7 rel0 rev7 mod1                12/17/09
    1050124  1.11267E-09  4.12684E-08   50124   123.9053     sn124 5061
endf/b7 rel0 rev7 mod1                12/17/09
    1050126  1.14274E-11  4.30686E-10   50126   125.9077     sn126 5067
endf/b7 rel0 rev7 mod1                12/17/09
    1053127  3.30367E-11  1.25498E-09   53127   126.9045     i127 5325
endf/b7 rel2 rev7 mod1                 12/17/09
    1053129  1.12580E-10  4.34405E-09   53129   128.9050     i129 5331
endf/b7 rel0 rev7 mod1                 12/17/09
    1053135  2.39588E-20  9.67544E-19   53135   134.9100     i135 5349
endf/b7 rel0 rev7 mod1                 12/17/09
    1054131  5.79405E-10  2.27039E-08   54131   130.9051     xe131 5446
endf/b7 rel0 rev7 mod1                12/17/09
    1054133  9.17217E-12  3.64904E-10   54133   132.9059     xe133 5452
endf/b7 rel0 rev7 mod1                12/17/09
    1054135  2.36708E-19  9.55895E-18   54135   134.9072     xe135 5458
endf/b7 rel0 rev7 mod1                12/17/09
    1055133  1.35193E-09  5.37848E-08   55133   132.9055     cs133 5525
endf/b7 rel0 rev7 mod1                12/17/09
    1055134  2.11376E-15  8.47268E-14   55134   133.9067     cs134 5528
endf/b7 rel0 rev7 mod1                12/17/09
    1055135  1.41913E-09  5.73079E-08   55135   134.9060     cs135 5531
endf/b7 rel0 rev7 mod1                12/17/09
    1055137  1.23417E-09  5.05780E-08   55137   136.9071     cs137 5537
endf/b7 rel0 rev7 mod1                12/17/09
    1056138  3.42967E-08  1.41578E-06   56138   137.9052     ba138 5649
endf/b7 rel0 rev7 mod1                12/17/09
    1056140  3.57661E-11  1.49791E-09   56140   139.9106     ba140 5655
endf/b7 rel0 rev7 mod1                12/17/09
    1057139  1.31617E-09  5.47264E-08   57139   138.9064     la139 5728
endf/b7 rel0 rev7 mod1                12/17/09
    1058141  1.21439E-10  5.12221E-09   58141   140.9083     ce141 5840
endf/b7 rel0 rev7 mod1                12/17/09
    1058142  1.20236E-09  5.10748E-08   58142   141.9092     ce142 5843
endf/b7 rel0 rev7 mod1                12/17/09
    1058143  5.22460E-14  2.23504E-12   58143   142.9124     ce143 5846
endf/b7 rel0 rev7 mod1                12/17/09
    1058144  7.04021E-10  3.03284E-08   58144   143.9137     ce144 5849
endf/b7 rel0 rev7 mod1                12/17/09
    1059141  1.10611E-09  4.66547E-08   59141   140.9077     pr141 5925
endf/b7 rel0 rev7 mod1                12/17/09
    1059143  4.18899E-11  1.79199E-09   59143   142.9108     pr143 5931
endf/b7 rel0 rev7 mod1                12/17/09
    1060143  1.16381E-09  4.97858E-08   60143   142.9098     nd143 6028
endf/b7 rel0 rev7 mod1                12/17/09
    1060144  4.05830E-10  1.74823E-08   60144   143.9101     nd144 6031
endf/b7 rel0 rev7 mod1                12/17/09
    1060145  8.32868E-10  3.61280E-08   60145   144.9126     nd145 6034
endf/b7 rel0 rev7 mod1                12/17/09
    1060146  6.09025E-10  2.66006E-08   60146   145.9131     nd146 6037
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endf/b7 rel0 rev7 mod1                12/17/09
    1060147  1.02698E-11  4.51640E-10   60147   146.9161     nd147 6040
endf/b7 rel0 rev7 mod1                12/17/09
    1060148  3.38510E-10  1.49883E-08   60148   147.9169     nd148 6043
endf/b7 rel0 rev7 mod1                12/17/09
    1061147  3.88702E-10  1.70941E-08   61147   146.9151     pm147 6149
endf/b7 rel3 rev7 mod1                12/17/09
    1061148  9.44991E-18  4.18417E-16   61148   147.9175     pm148 6152
endf/b7 rel3 rev7 mod1                12/17/09
    1061149  9.57114E-14  4.26652E-12   61149   148.9183     pm149 6155
endf/b7 rel3 rev7 mod1                12/17/09
    1062147  5.62125E-11  2.47207E-09   62147   146.9149     sm147 6234
endf/b7 rel0 rev7 mod1                12/17/09
    1062149  2.23037E-10  9.94224E-09   62149   148.9172     sm149 6240
endf/b7 rel0 rev7 mod1                12/17/09
    1062150  1.52326E-13  6.83578E-12   62150   149.9173     sm150 6243
endf/b7 rel0 rev7 mod1                12/17/09
    1062151  3.06712E-09  1.38560E-07   62151   150.9199     sm151 6246
endf/b7 rel0 rev7 mod1                12/17/09
    1062152  5.50025E-11  2.50126E-09   62152   151.9197     sm152 6249
endf/b7 rel0 rev7 mod1                12/17/09
    1062153  7.66006E-15  3.50643E-13   62153   152.9221     sm153 6252
endf/b7 rel0 rev7 mod1                12/17/09
    1063151  1.45330E-09  6.56546E-08   63151   150.9198     eu151 6325
endf/b7 rel0 rev7 mod1                12/17/09
    1063153  1.59133E-09  7.28432E-08   63153   152.9212     eu153 6331
endf/b7 rel1 rev7 mod1                12/17/09
    1063154  1.30499E-14  6.01273E-13   63154   153.9230     eu154 6334
endf/b7 rel0 rev7 mod1                12/17/09
    1063155  6.10474E-12  2.83103E-10   63155   154.9229     eu155 6337
endf/b7 rel0 rev7 mod1                12/17/09
    1063156  1.22274E-13  5.70705E-12   63156   155.9247     eu156 6340
endf/b7 rel0 rev7 mod1                12/17/09
    1064152  5.84214E-12  2.65674E-10   64152   151.9198     gd152 6425
endf/b7 rel0 rev7 mod1                12/17/09
    1064154  6.29368E-11  2.89977E-09   64154   153.9209     gd154 6431
endf/b7 rel0 rev7 mod1                12/17/09
    1064155  4.27387E-10  1.98197E-08   64155   154.9226     gd155 6434
endf/b7 rel0 rev7 mod1                12/17/09
    1064156  5.94524E-10  2.77485E-08   64156   155.9221     gd156 6437
endf/b7 rel0 rev7 mod1                12/17/09
    1064157  4.51352E-10  2.12015E-08   64157   156.9240     gd157 6440
endf/b7 rel0 rev7 mod1                12/17/09
    1064158  7.19563E-10  3.40157E-08   64158   157.9241     gd158 6443
endf/b7 rel0 rev7 mod1                12/17/09
    1064160  6.31164E-10  3.02152E-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
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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  8.13855E-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  1.45934E-05  1.02238E-03   92234   234.0410     u234 9225
endf/b7 rel5 rev7 mod2                 12/17/09
    1092235  1.76385E-03  1.24100E-01   92235   235.0439     u235 9228
endf/b7 rel0 rev7 mod7                 12/17/09
    1092236  9.22917E-06  6.52110E-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  1.14308E-11  8.11104E-10   93237   237.0482     np237 9346
endf/b7 rel0 rev7 mod1                12/17/09
    1094238  2.62228E-17  1.86857E-15   94238   238.0496     pu238 9434
endf/b7 rel0 rev7 mod0                12/17/09
    1094239  9.29912E-10  6.65421E-08   94239   239.0522     pu239 9437
endf/b7 rel5 rev7 mod5                12/17/09
    1094240  3.88246E-15  2.78983E-13   94240   240.0538     pu240 9440
endf/b7 rel2 rev7 mod0                12/17/09
    1094241  3.71561E-20  2.68109E-18   94241   241.0569     pu241 9443
endf/b7 rel3 rev7 mod1                12/17/09
    1094242  1.17301E-20  8.49933E-19   94242   242.0587     pu242 9446
endf/b7 rel0 rev7 mod0                12/17/09
    1095241  1.08804E-20  7.85103E-19   95241   241.0568     am241 9543
endf/b7 rel0 rev7 mod4                12/17/09
    1095242  2.51234E-31  1.82038E-29   95242   242.0596     am242 9546
endf/b7 rel0 rev7 mod0                12/17/09
    1095243  9.99973E-21  7.27555E-19   95243   243.0614     am243 9549
endf/b7 rel5 rev7 mod0                12/17/09
    1096242  3.41262E-21  2.47269E-19   96242   242.0588     cm242 9631
endf/b7 rel0 rev7 mod0                12/17/09
    1096243  9.74582E-21  7.09082E-19   96243   243.0614     cm243 9634
endf/b7 rel7 rev7 mod0                12/17/09
    1096244  9.59486E-21  7.00974E-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
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 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
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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							
		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:
  9317 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       ........
```

```
                                ........     0.01417 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
0.01483 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 15762 independent fission points were generated for generation 1
          1       7.76617E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15552 independent fission points were generated for generation 2
          2       7.64665E-01      1.00000E+00      0.00000E+00
0.00000E+00      0.00000E+00
  keno message number k6-132 follows:
 only 15737 independent fission points were generated for generation 3
          3       7.69324E-01      7.69324E-01      0.00000E+00
0.00000E+00      0.00000E+00
          4       7.66465E-01      7.67895E-01      1.42980E-03
0.00000E+00      0.00000E+00
          5       7.64112E-01      7.66634E-01      1.50702E-03
0.00000E+00      0.00000E+00
          6       7.62233E-01      7.65534E-01      1.53164E-03
0.00000E+00      0.00000E+00
          7       7.69701E-01      7.66367E-01      1.44987E-03
0.00000E+00      0.00000E+00
          8       7.61790E-01      7.65604E-01      1.40834E-03
0.00000E+00      0.00000E+00
          9       7.63949E-01      7.65368E-01      1.21351E-03
0.00000E+00      0.00000E+00
         10       7.69003E-01      7.65822E-01      1.14498E-03
0.00000E+00      0.00000E+00
         11       7.75696E-01      7.66919E-01      1.49101E-03
0.00000E+00      0.00000E+00
         12       7.62932E-01      7.66521E-01      1.39195E-03
0.00000E+00      0.00000E+00
```

13	7.73536E-01	7.67158E-01	1.41139E-03	0.00000E+00
14	7.65134E-01	7.66990E-01	1.29941E-03	0.00000E+00
15	7.70941E-01	7.67294E-01	1.23333E-03	0.00000E+00
16	7.62782E-01	7.66971E-01	1.18645E-03	0.00000E+00
17	7.68015E-01	7.67041E-01	1.10672E-03	0.00000E+00
18	7.68782E-01	7.67150E-01	1.04094E-03	0.00000E+00
19	7.68064E-01	7.67203E-01	9.79269E-04	0.00000E+00
20	7.67940E-01	7.67244E-01	9.24168E-04	0.00000E+00
21	7.71125E-01	7.67449E-01	8.97716E-04	0.00000E+00
22	7.60166E-01	7.67084E-01	9.26227E-04	0.00000E+00
23	7.64826E-01	7.66977E-01	8.87555E-04	0.00000E+00
24	7.60759E-01	7.66694E-01	8.92208E-04	0.00000E+00
25	7.66632E-01	7.66692E-01	8.52538E-04	0.00000E+00
26	7.68091E-01	7.66750E-01	8.18323E-04	0.00000E+00
27	7.63977E-01	7.64864E-01	2.27952E-03	0.00000E+00
28	7.65437E-01	7.64979E-01	1.61865E-03	0.00000E+00
29	7.64854E-01	7.64958E-01	1.25408E-03	0.00000E+00
30	7.60716E-01	7.64352E-01	1.25010E-03	0.00000E+00
31	7.65351E-01	7.64477E-01	1.06632E-03	0.00000E+00
32	7.65601E-01	7.64602E-01	9.34243E-04	0.00000E+00
33	7.58995E-01	7.64041E-01	1.03529E-03	0.00000E+00
34	7.62681E-01	7.63917E-01	9.36034E-04	0.00000E+00
35	7.75435E-01	7.64877E-01	1.34993E-03	0.00000E+00
36	7.72494E-01	7.65463E-01	1.85253E-03	0.00000E+00
37	7.57077E-01	7.64864E-01	2.25174E-03	0.00000E+00
38	7.63765E-01	7.64791E-01	2.02991E-03	0.00000E+00

39	7.67318E-01	7.64949E-01	2.03908E-03	0.00000E+00
40	7.61966E-01	7.64773E-01	1.18111E-03	0.00000E+00
41	7.61009E-01	7.64564E-01	1.89235E-03	0.00000E+00
42	7.69606E-01	7.64830E-01	1.10299E-03	0.00000E+00
43	7.66309E-01	7.64904E-01	1.04623E-03	0.00000E+00
44	7.67242E-01	7.65015E-01	1.53678E-03	0.00000E+00
45	7.62463E-01	7.64899E-01	9.58389E-04	0.00000E+00
46	7.64061E-01	7.64862E-01	9.14584E-04	0.00000E+00
47	7.60933E-01	7.64699E-01	1.27259E-03	0.00000E+00
48	7.75379E-01	7.65126E-01	9.61910E-04	0.00000E+00
49	7.62436E-01	7.65022E-01	9.28896E-04	0.00000E+00
50	7.60876E-01	7.64869E-01	9.06609E-04	0.00000E+00
51	7.65929E-01	7.64907E-01	8.73270E-04	0.00000E+00
52	7.62067E-01	7.64809E-01	8.47604E-04	0.00000E+00
53	7.66807E-01	7.64875E-01	8.20754E-04	0.00000E+00
54	7.63099E-01	7.64818E-01	7.95134E-04	0.00000E+00
55	7.67502E-01	7.64902E-01	7.73920E-04	0.00000E+00
56	7.59963E-01	7.64752E-01	7.65088E-04	0.00000E+00
57	7.60394E-01	7.64624E-01	7.53223E-04	0.00000E+00
58	7.63687E-01	7.64597E-01	7.31254E-04	0.00000E+00
59	7.61036E-01	7.64498E-01	7.17312E-04	0.00000E+00
60	7.54380E-01	7.64225E-01	7.51672E-04	0.00000E+00
61	7.63340E-01	7.64202E-01	7.31465E-04	0.00000E+00
62	7.63730E-01	7.64190E-01	7.12064E-04	0.00000E+00
63	7.64318E-01	7.64193E-01	6.93574E-04	0.00000E+00
64	7.68461E-01	7.64297E-01	6.84387E-04	0.00000E+00

65	7.67014E-01	7.64362E-01	6.70769E-04	0.00000E+00
66	7.75158E-01	7.64613E-01	9.02909E-04	0.00000E+00
67	7.56534E-01	7.64429E-01	7.11994E-04	0.00000E+00
68	7.75960E-01	7.64685E-01	7.43376E-04	0.00000E+00
69	7.68025E-01	7.64758E-01	7.30450E-04	0.00000E+00
70	7.68537E-01	7.64838E-01	7.19105E-04	0.00000E+00
71	7.61879E-01	7.64777E-01	7.06451E-04	0.00000E+00
72	7.70349E-01	7.64890E-01	7.01255E-04	0.00000E+00
73	7.66609E-01	7.64925E-01	6.87690E-04	0.00000E+00
74	7.73078E-01	7.65085E-01	9.29580E-04	0.00000E+00
75	7.63280E-01	7.65050E-01	6.80446E-04	0.00000E+00
76	7.57618E-01	7.64910E-01	6.82372E-04	0.00000E+00
77	7.57826E-01	7.64779E-01	6.82592E-04	0.00000E+00
78	7.69366E-01	7.64862E-01	6.75200E-04	0.00000E+00
79	7.62172E-01	7.64814E-01	6.64613E-04	0.00000E+00
80	7.67777E-01	7.64866E-01	6.54779E-04	0.00000E+00
81	7.67497E-01	7.64911E-01	6.44844E-04	0.00000E+00
82	7.68073E-01	7.64965E-01	6.35970E-04	0.00000E+00
83	7.69759E-01	7.65045E-01	6.30359E-04	0.00000E+00
84	7.67413E-01	7.65084E-01	6.21019E-04	0.00000E+00
85	7.73213E-01	7.65215E-01	6.39956E-04	0.00000E+00
86	7.64136E-01	7.65198E-01	6.28540E-04	0.00000E+00
87	7.63806E-01	7.65176E-01	6.05768E-04	0.00000E+00
88	7.77459E-01	7.65365E-01	6.26363E-04	0.00000E+00
89	7.66853E-01	7.65387E-01	6.17077E-04	0.00000E+00
90	7.56602E-01	7.65256E-01	6.22067E-04	0.00000E+00

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         91       7.64322E-01      7.65242E-01      6.12871E-04
0.00000E+00      0.00000E+00
         92       7.70145E-01      7.65314E-01      6.08081E-04
0.00000E+00      0.00000E+00
         93       7.62981E-01      7.65280E-01      6.00157E-04
0.00000E+00      0.00000E+00
         94       7.62250E-01      7.65238E-01      5.93102E-04
0.00000E+00      0.00000E+00
         95       7.63470E-01      7.65213E-01      5.85219E-04
0.00000E+00      0.00000E+00
         96       7.66832E-01      7.65235E-01      5.77472E-04
0.00000E+00      0.00000E+00
         97       7.71844E-01      7.65324E-01      5.76658E-04
0.00000E+00      0.00000E+00
         98       7.70047E-01      7.65387E-01      5.72381E-04
0.00000E+00      0.00000E+00
         99       7.66666E-01      7.65404E-01      5.64955E-04
0.00000E+00      0.00000E+00
        100       7.65187E-01      7.65401E-01      5.57479E-04
0.00000E+00      0.00000E+00
        101       7.66117E-01      7.65411E-01      5.50270E-04
0.00000E+00      0.00000E+00
        102       7.66671E-01      7.65427E-01      5.43410E-04
0.00000E+00      0.00000E+00
        103       7.59257E-01      7.65349E-01      5.42142E-04
0.00000E+00      0.00000E+00
                                   restart data was written for
generation  103       random number=D993B74C97A34980
        104       7.63459E-01      7.65326E-01      5.35843E-04
0.00000E+00      0.00000E+00
        105       7.64975E-01      7.65322E-01      5.29204E-04
0.00000E+00      0.00000E+00
        106       7.68665E-01      7.65362E-01      5.24299E-04
0.00000E+00      0.00000E+00
        107       7.67753E-01      7.65391E-01      5.18744E-04
0.00000E+00      0.00000E+00
        108       7.66001E-01      7.65398E-01      5.12583E-04
0.00000E+00      0.00000E+00
        109       7.72372E-01      7.65479E-01      5.13120E-04
0.00000E+00      0.00000E+00
        110       7.59882E-01      7.65415E-01      5.11278E-04
0.00000E+00      0.00000E+00
        111       7.62021E-01      7.65376E-01      5.06871E-04
0.00000E+00      0.00000E+00
        112       7.63698E-01      7.65357E-01      5.01440E-04
0.00000E+00      0.00000E+00
        113       7.69971E-01      7.65408E-01      4.98477E-04
0.00000E+00      0.00000E+00
        114       7.77365E-01      7.65540E-01      5.23575E-04
0.00000E+00      0.00000E+00
        115       7.68303E-01      7.65570E-01      5.26492E-04
0.00000E+00      0.00000E+00
```

```
        116       7.72657E-01      7.65646E-01      6.10877E-04
0.00000E+00      0.00000E+00
        117       7.59709E-01      7.65583E-01      5.19534E-04
0.00000E+00      0.00000E+00
        118       7.65172E-01      7.65579E-01      5.14494E-04
0.00000E+00      0.00000E+00
        119       7.66260E-01      7.65586E-01      5.08971E-04
0.00000E+00      0.00000E+00
        120       7.62995E-01      7.65559E-01      5.03959E-04
0.00000E+00      0.00000E+00
        121       7.66222E-01      7.65566E-01      4.98344E-04
0.00000E+00      0.00000E+00
        122       7.66029E-01      7.65570E-01      4.93264E-04
0.00000E+00      0.00000E+00
        123       7.62343E-01      7.65538E-01      4.89025E-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=61F8FB997233D535
                                    A start type 6 file will be written to
keno_start6_file
1                                                 fuel bundle

 lifetime =  1.55098E-05 + or -  1.22675E-08             generation time
=  2.99276E-05 + or -  2.15250E-08
 nu bar   =  2.43894E+00 + or -  1.09020E-05       average fission group
=  2.17546E+02 + or -  1.00052E-02
                      energy(ev) of the average lethargy causing fission
=  5.65450E-02 + or -  1.36339E-04
                                                system mean free path (cm)
=  6.52559E-01 + or -  1.65871E-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          0.76554   + or - 0.00049     0.76505 to 0.76603
0.76456 to 0.76652    0.76407 to 0.76701    2000000      13.6911

      24          0.76559   + or - 0.00049     0.76509 to 0.76608
0.76460 to 0.76657    0.76411 to 0.76706    1980000      13.7224

      25          0.76558   + or - 0.00050     0.76508 to 0.76607
0.76458 to 0.76657    0.76408 to 0.76707    1960000      13.7375

      26          0.76555   + or - 0.00050     0.76505 to 0.76605
0.76454 to 0.76655    0.76404 to 0.76706    1940000      13.7298
```

27	0.76557	+ or - 0.00051	0.76506 to 0.76607	0.76455 to 0.76658	0.76404 to 0.76709	1920000	13.7016
28	0.76557	+ or - 0.00051	0.76505 to 0.76608	0.76454 to 0.76659	0.76403 to 0.76711	1900000	13.6626
29	0.76558	+ or - 0.00052	0.76506 to 0.76609	0.76454 to 0.76661	0.76402 to 0.76713	1880000	13.6636
30	0.76563	+ or - 0.00052	0.76511 to 0.76615	0.76459 to 0.76667	0.76407 to 0.76719	1860000	13.7777
31	0.76563	+ or - 0.00053	0.76510 to 0.76616	0.76458 to 0.76668	0.76405 to 0.76721	1840000	13.7343
32	0.76563	+ or - 0.00053	0.76510 to 0.76616	0.76457 to 0.76669	0.76403 to 0.76723	1820000	13.6938
37	0.76565	+ or - 0.00059	0.76506 to 0.76624	0.76447 to 0.76682	0.76388 to 0.76741	1720000	11.9488
42	0.76570	+ or - 0.00062	0.76508 to 0.76633	0.76445 to 0.76695	0.76383 to 0.76758	1620000	11.8528
47	0.76580	+ or - 0.00066	0.76514 to 0.76646	0.76448 to 0.76713	0.76382 to 0.76779	1520000	11.8744
52	0.76584	+ or - 0.00070	0.76513 to 0.76654	0.76443 to 0.76724	0.76373 to 0.76794	1420000	11.6824
57	0.76601	+ or - 0.00069	0.76532 to 0.76669	0.76464 to 0.76738	0.76395 to 0.76807	1320000	14.0329
62	0.76640	+ or - 0.00062	0.76578 to 0.76702	0.76516 to 0.76764	0.76453 to 0.76827	1220000	17.8474
67	0.76641	+ or - 0.00070	0.76571 to 0.76711	0.76500 to 0.76782	0.76430 to 0.76852	1120000	15.1742
72	0.76616	+ or - 0.00074	0.76542 to 0.76690	0.76468 to 0.76764	0.76394 to 0.76838	1020000	15.7956
77	0.76643	+ or - 0.00072	0.76571 to 0.76715	0.76499 to 0.76787	0.76427 to 0.76859	920000	18.7939
82	0.76636	+ or - 0.00081	0.76556 to 0.76717	0.76475 to 0.76798	0.76394 to 0.76878	820000	18.7607
87	0.76618	+ or - 0.00092	0.76526 to 0.76710	0.76435 to 0.76802	0.76343 to 0.76893	720000	18.8801

```
      92          0.76604   + or - 0.00098     0.76505 to 0.76702
0.76407 to 0.76801    0.76309 to 0.76899     620000      16.3819

      97          0.76615   + or - 0.00107     0.76508 to 0.76721
0.76401 to 0.76828    0.76294 to 0.76935     520000      19.5254

     102          0.76596   + or - 0.00138     0.76458 to 0.76734
0.76320 to 0.76872    0.76182 to 0.77010     420000      18.1372

     107          0.76631   + or - 0.00169     0.76463 to 0.76800
0.76294 to 0.76969    0.76125 to 0.77137     320000      19.5663

     112          0.76700   + or - 0.00290     0.76410 to 0.76990
0.76121 to 0.77280    0.75831 to 0.77569     220000      13.0488
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          0.76484   + or - 0.00087     0.76397 to 0.76571
0.76310 to 0.76657    0.76223 to 0.76744     120000      28.4108
1                           fuel bundle

                      plot of average k-effective by generation run.
      the line represents k-eff = 0.76553 + or - 0.00048 which occurs for
123 generations run.

                                0.7608                   0.7632
0.7656

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

```
*        I
         |                                                    I          *
I   |
         |                                                    I         *
I      |
      35 +                                                          I
*     |      I
         |                                                           I
*                   I
         |                                                 I
*     |                I
         |                                                   I
*      |             I
         |                                                    I
*     |              I
      40 +                                                          I
*      |    I
         |                                                 I
*         |         I
         |                                                          I
*      |   I
         |                                                           I
*     |    I
         |                                                       I
*    |          I
      45 +                                                           I
*     |   I
         |                                                           I
*      |  I
         |                                                       I
*       |    I
         |                                                             I
*   |     I
         |                                                             I
*    |    I
      50 +                                                           I
*     |  I
         |                                                            I
*     |  I
         |                                                           I
*      | I
         |                                                            I
*     | I
         |                                                            I
*      |I
      55 +                                                             I
*     | I
         |                                                            I
*       I
         |                                                           I
*       I|
         |                                                           I
```

```
*      I |
         |                                                                I
*      I  |
      60 +                                                            I        *
I    |
         |                                                            I
*      I     |
         |                                                            I
*      I     |
         |                                                             I
*      I     |
         |                                                              I
*      I    |
      65 +                                                              I
*      I    |
         |                                                               I
*        I
         |                                                               I
*      I   |
         |                                                                 I
*      I|
         |                                                                  I
*       I
      70 +                                                                  I
*      |I
         |                                                                  I
*      I
         |
I      *     |I
         |
I      *     |I
         |                                                                  I
*   |    I
      75 +
I      *    | I
         |
I      *     |I
         |                                                                  I
*      I
         |
I     *      I
         |                                                                  I
*      I
      80 +                                                                   I
*     I
         |
I      *     |I
         |
I      *    |I
         |
I     *    | I
         |
```

```
I      *   | I
      85 +
I     *  |   I
         |
I      *  |  I
         |
I      *  |  I
         |
I      *|    I
         |
I     *|    I
      90 +
I      * |   I
         |
I     *  |   I
         |
I     * |   I
         |
I     * |   I
         |
I     *  |  I
      95 +
I     *  |  I
         |
I     *  |  I
         |
I     * |   I
         |
I     *|    I
         |
I     *|    I
     100 +
I     *|    I
         |
I     *|    I
         |
I    *|    I
         |
I    * |   I
         |
I    * |   I
     105 +
I    * |   I
         |
I     *|   I
         |
I    *|   I
         |
I    *|   I
         |
I    *    I
     110 +
```

```
I    *|   I
         |
I    *|   I
         |
I     *|   I
         |
I    *|   I
         |
I    *     I
     115 +
I    |*    I
         |
I    | *     I
         |
I   |*    I
         |
I   |*    I
         |
I   |*    I
     120 +
I    |*    I
         |
I   |*    I
         |
I   |*    I
         |
I    *    I
1                          fuel bundle
```

plot of average k-effective by generation skipped.
the line represents k-eff = 0.7655 + or - 0.0004 which occurs for 23 generations skipped.

```
                                 0.7641                   0.7656
0.7670

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

```
I
      35 +                                                I       | *         I
         |                                              I          *
I
         |                                                I        | *
I
         |                                                I        |  *
I
         |                                                I        | *
I
      40 +                                                I        |  *
I
         |                                                 I       |   *
I
         |                                                I        |  *
I
         |                                                I        |  *
I
         |                                                I        |  *
I
      45 +                                                I        |  *
I
         |                                                 I       |   *
I
         |                                                 I       |    *
I
         |                                               I         |  *
I
         |                                              I          |  *
I
      50 +                                                 I       |    *
I
         |                                                I        |   *
I
         |                                                 I       |    *
I
         |                                                 I       |    *
I
         |                                                 I       |     *
I
      55 +                                                 I       |    *
I
         |                                                   I     |       *
I
         |                                                      I  |        *
I
         |                                                       I |         *
I
         |                                                         I          *
I
      60 +                                                         |  I
*          I
```

```
          |                                                        |   I
*           I
          |                                                        |   I
*           I
          |                                                        |    I
*           I
          |                                                        |   I
*           I
       65 +                                                        |   I
*           I
          |                                                        |I
*            I
          |                                                        |  I
*            I
          |                                                        I
*            I
          |                                                        I
*            I
       70 +                                                       I|           *
I
          |                                                        I
*             I
          |                                                     I |           *
I
          |                                                     I |           *
I
          |                                                 I    |        *
I
       75 +                                                  I   |         *
I
          |                                                        I
*             I
          |                                                        |  I
*            I
          |                                                        | I
*             I
          |                                                        |  I
*             I
       80 +                                                        | I
*             I
          |                                                        | I
*              I
          |                                                        |I
*              I
          |                                                       I|
*              I
          |                                                     I |
*              I
       85 +                                                 I    |         *
I
          |                                                 I    |          *
I
```

```
         |                                                I   |
*               I
         |                                          I         |     *
I
         |                                         I          |    *
I
      90 +                                              I    |          *
I
         |                                                I   |
*               I
         |                                            I       |        *
I
         |                                              I     |
*                I
         |                                                I   |
*                I
      95 +                                                I   |
*                 I
         |                                                I   |
*                  I
         |                                            I       |
*                 I
         |                                         I          |       *
I
         |                                       I            |       *
I
     100 +                                     I              |       *
I
         |                                    I               |       *
I
         |                                 I                  |      *
I
         |                                          I         |
*                      I
         |                                            I       |
*                       I
     105 +                                          I         |
*                         I
         |                                       I            |
*                           I
         |                                 I                  |
*                            I
         |                              I                     |
*                               I
         |                  I                                 |      *
I
     110 +                            I                       |
*                                I
         |                                I                  |
*
         |                           I                       |
*
```

```
         |                  I                              |
*
         |                        I                        *
I
     115 +                I                          *     |
I
         |     I                  *                  I    |
         |                     I              *           |  I
         |                 I                 *            |     I
         |     I                       *                  |    I
     120 +                                    *          |
I
```

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			2.32345E-07	100.0000	1.79287E-07	52.1770	0.00000E+00	0.0000
3	0.0000			1.30621E-05	11.9646	2.05038E-05	5.0270	0.00000E+00	0.0000
4	0.0000			2.11186E-05	9.6571	3.55390E-05	3.8023	0.00000E+00	0.0000
5	0.0000			2.68700E-05	7.5835	5.52545E-05	3.2037	0.00000E+00	0.0000
6	0.0001			9.62595E-05	3.5954	2.28556E-04	1.4782	0.00000E+00	0.0000
7	0.0001			1.08816E-04	3.4918	2.02042E-04	1.6485	0.00000E+00	0.0000
8	0.0003			2.39982E-04	2.0552	3.19720E-04	1.0122	0.00000E+00	0.0000
9	0.0005			3.77569E-04	1.3246	4.38385E-04	0.6458	0.00000E+00	0.0000
10	0.0003			2.00572E-04	1.7687	2.05966E-04	0.8438	0.00000E+00	0.0000
11	0.0012			9.08113E-04	0.7667	5.23273E-04	0.5085	0.00000E+00	0.0000
12	0.0010			7.57711E-04	0.6768	2.97075E-04	0.6670	0.00000E+00	0.0000
13	0.0003			2.27158E-04	1.3380	9.02467E-05	1.3250	0.00000E+00	0.0000
14	0.0013			1.01131E-03	0.6637	4.13372E-04	0.6569	0.00000E+00	0.0000
15	0.0010			7.68300E-04	0.6723				

3.31201E-04	0.6652	0.00000E+00	0.0000	16	0.0003	1.92818E-04	1.1206
8.86033E-05	1.1060	0.00000E+00	0.0000	17	0.0001	6.66565E-05	1.5781
3.24205E-05	1.5504	0.00000E+00	0.0000	18	0.0001	5.16907E-05	1.9835
2.61130E-05	1.9448	0.00000E+00	0.0000	19	0.0001	8.02275E-05	1.4865
4.24069E-05	1.4563	0.00000E+00	0.0000	20	0.0001	5.95912E-05	1.5245
3.26573E-05	1.4848	0.00000E+00	0.0000	21	0.0002	1.20200E-04	1.0840
6.78351E-05	1.0594	0.00000E+00	0.0000	22	0.0001	1.06938E-04	1.1137
6.33025E-05	1.0856	0.00000E+00	0.0000	23	0.0001	1.06245E-04	1.3141
6.48723E-05	1.2844	0.00000E+00	0.0000	24	0.0000	2.49792E-05	2.4541
1.55100E-05	2.3920	0.00000E+00	0.0000	25	0.0000	3.11309E-05	2.1111
1.94516E-05	2.0504	0.00000E+00	0.0000	26	0.0000	1.77301E-05	2.4095
1.11375E-05	2.3377	0.00000E+00	0.0000	27	0.0001	5.26901E-05	1.3696
3.28861E-05	1.3395	0.00000E+00	0.0000	28	0.0001	9.65007E-05	1.0523
6.02084E-05	1.0364	0.00000E+00	0.0000	29	0.0001	9.99799E-05	1.0137
6.29633E-05	1.0011	0.00000E+00	0.0000	30	0.0000	1.29963E-05	3.1039
8.14928E-06	3.0843	0.00000E+00	0.0000	31	0.0001	9.64294E-05	0.9836
6.09171E-05	0.9725	0.00000E+00	0.0000	32	0.0000	3.73836E-05	1.6471
2.39075E-05	1.6089	0.00000E+00	0.0000	33	0.0000	3.29470E-05	1.5241
2.06265E-05	1.5059	0.00000E+00	0.0000	34	0.0001	7.50971E-05	1.1229
4.71742E-05	1.1070	0.00000E+00	0.0000	35	0.0001	4.34543E-05	1.5511
2.72907E-05	1.5273	0.00000E+00	0.0000	36	0.0001	4.29455E-05	1.5880
2.65833E-05	1.5740	0.00000E+00	0.0000	37	0.0000	2.78681E-05	1.8603
1.74944E-05	1.8184	0.00000E+00	0.0000	38	0.0000	3.36003E-05	1.5388
2.11564E-05	1.5086	0.00000E+00	0.0000	39	0.0002	1.26102E-04	0.9981
8.02881E-05	0.9754	0.00000E+00	0.0000	40	0.0002	1.21970E-04	0.8803
7.88213E-05	0.8639	0.00000E+00	0.0000	41	0.0002	1.60877E-04	0.6966

```
1.07469E-04     0.6777       0.00000E+00     0.0000
   42    0.0002                 1.41052E-04     0.7510
9.59090E-05     0.7354       0.00000E+00     0.0000
   43    0.0001                 7.96427E-05     1.0021
5.72017E-05     0.9509       0.00000E+00     0.0000
   44    0.0002                 1.15230E-04     1.0801
8.45580E-05     1.0325       0.00000E+00     0.0000
   45    0.0001                 5.90887E-05     1.0078
4.76911E-05     0.9264       0.00000E+00     0.0000
   46    0.0000                 1.37820E-05     2.0002
1.11231E-05     1.8541       0.00000E+00     0.0000
   47    0.0001                 4.09669E-05     1.7547
3.18132E-05     1.6849       0.00000E+00     0.0000
   48    0.0000                 1.22802E-05     3.3708
9.51487E-06     3.2838       0.00000E+00     0.0000
   49    0.0001                 8.06691E-05     1.4917
6.36126E-05     1.4619       0.00000E+00     0.0000
   50    0.0001                 5.50095E-05     1.8195
4.53216E-05     1.7824       0.00000E+00     0.0000
   51    0.0000                 1.42665E-05     3.5815
1.18670E-05     3.5054       0.00000E+00     0.0000
   52    0.0001                 4.12198E-05     2.0851
3.56361E-05     2.0367       0.00000E+00     0.0000
   53    0.0002                 1.59434E-04     0.8278
1.56637E-04     0.7623       0.00000E+00     0.0000
   54    0.0001                 7.37600E-05     1.8065
6.86037E-05     1.7463       0.00000E+00     0.0000
   55    0.0002                 1.65538E-04     1.3745
1.51707E-04     1.3403       0.00000E+00     0.0000
   56    0.0002                 1.18211E-04     1.4502
1.09619E-04     1.4148       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                 1.49056E-04     1.5836
1.35270E-04     1.5472       0.00000E+00     0.0000
   58    0.0001                 8.60096E-05     2.1567
7.52695E-05     2.0989       0.00000E+00     0.0000
   59    0.0002                 1.60531E-04     1.6486
1.43995E-04     1.5820       0.00000E+00     0.0000
   60    0.0004                 2.76589E-04     1.0957
2.50996E-04     1.0381       0.00000E+00     0.0000
   61    0.0000                 2.86721E-05     3.9316
2.20546E-05     3.8098       0.00000E+00     0.0000
   62    0.0002                 1.62710E-04     1.9054
1.36519E-04     1.8522       0.00000E+00     0.0000
```

63	0.0002	1.15694E-04	1.8558	9.54201E-05	1.7879	0.00000E+00	0.0000
64	0.0001	1.00467E-04	2.6103	8.09564E-05	2.5239	0.00000E+00	0.0000
65	0.0000	3.69226E-05	3.5876	3.64257E-05	3.4710	0.00000E+00	0.0000
66	0.0002	1.69717E-04	1.5630	1.50703E-04	1.5133	0.00000E+00	0.0000
67	0.0002	1.49459E-04	2.2642	1.22154E-04	2.1933	0.00000E+00	0.0000
68	0.0000	2.87376E-05	4.7126	2.47928E-05	4.5627	0.00000E+00	0.0000
69	0.0004	3.01692E-04	1.4892	2.36718E-04	1.4407	0.00000E+00	0.0000
70	0.0003	2.07798E-04	1.7010	1.89128E-04	1.6332	0.00000E+00	0.0000
71	0.0006	4.33942E-04	1.4660	3.59008E-04	1.4213	0.00000E+00	0.0000
72	0.0001	5.14827E-05	4.8418	3.03774E-05	4.7366	0.00000E+00	0.0000
73	0.0004	3.09419E-04	1.6502	2.36451E-04	1.5562	0.00000E+00	0.0000
74	0.0014	1.06544E-03	1.1034	7.74541E-04	1.0566	0.00000E+00	0.0000
75	0.0001	1.13881E-04	2.6189	8.74605E-05	2.4937	0.00000E+00	0.0000
76	0.0006	4.74215E-04	1.9202	3.00974E-04	1.8544	0.00000E+00	0.0000
77	0.0005	3.74994E-04	1.9007	2.68744E-04	1.8312	0.00000E+00	0.0000
78	0.0000	7.89049E-06	3.7976	7.71484E-05	3.7608	0.00000E+00	0.0000
79	0.0002	1.87621E-04	2.4695	1.26121E-04	2.3710	0.00000E+00	0.0000
80	0.0001	5.96757E-05	3.3290	7.96204E-05	3.2348	0.00000E+00	0.0000
81	0.0014	1.06934E-03	1.2636	7.86251E-04	1.2119	0.00000E+00	0.0000
82	0.0001	6.50185E-05	4.9143	3.90772E-05	4.6324	0.00000E+00	0.0000
83	0.0002	1.26441E-04	2.8080	1.39891E-04	2.7493	0.00000E+00	0.0000
84	0.0001	7.90422E-05	3.1514	8.01776E-05	2.9297	0.00000E+00	0.0000
85	0.0002	1.86376E-04	2.3801	2.29883E-04	2.3077	0.00000E+00	0.0000
86	0.0003	2.63572E-04	2.5816	2.12132E-04	2.4528	0.00000E+00	0.0000
87	0.0005	3.45458E-04	2.6192	2.14601E-04	2.5103	0.00000E+00	0.0000
88	0.0001	5.87423E-05	3.8304	1.06491E-04	3.7414	0.00000E+00	0.0000

```
   89    0.0001                 9.95562E-05     3.0844
6.87864E-05     2.8512       0.00000E+00     0.0000
   90    0.0003                 2.29462E-04     2.8791
1.35316E-04     2.7603       0.00000E+00     0.0000
   91    0.0002                 1.88639E-04     2.6761
1.19344E-04     2.5189       0.00000E+00     0.0000
   92    0.0000                 3.01388E-05     2.8911
1.97317E-04     2.8325       0.00000E+00     0.0000
   93    0.0002                 1.25608E-04     3.7201
1.02344E-04     3.4653       0.00000E+00     0.0000
   94    0.0001                 1.13752E-04     4.3072
6.38158E-05     4.0470       0.00000E+00     0.0000
   95    0.0008                 6.14061E-04     2.2162
3.78681E-04     2.1463       0.00000E+00     0.0000
   96    0.0002                 1.50522E-04     4.8312
7.64117E-05     4.6153       0.00000E+00     0.0000
   97    0.0004                 2.84620E-04     3.3407
1.63004E-04     3.2730       0.00000E+00     0.0000
   98    0.0001                 9.51098E-05     3.8017
9.15271E-05     3.6528       0.00000E+00     0.0000
   99    0.0001                 1.09708E-04     4.8836
7.33939E-05     4.7337       0.00000E+00     0.0000
  100    0.0002                 1.21135E-04     4.2965
8.11965E-05     4.1089       0.00000E+00     0.0000
  101    0.0002                 1.15048E-04     3.9753
7.29930E-05     3.6913       0.00000E+00     0.0000
  102    0.0002                 1.61095E-04     3.9726
8.97792E-05     3.8249       0.00000E+00     0.0000
  103    0.0001                 9.16639E-05     3.9006
8.96687E-05     3.6823       0.00000E+00     0.0000
  104    0.0002                 1.57156E-04     3.4932
1.24836E-04     3.3709       0.00000E+00     0.0000
  105    0.0002                 1.17548E-04     3.5664
7.79705E-05     3.3542       0.00000E+00     0.0000
  106    0.0002                 1.79090E-04     4.2326
1.33108E-04     4.1779       0.00000E+00     0.0000
  107    0.0001                 6.45395E-05     3.6347
6.52160E-05     3.4098       0.00000E+00     0.0000
  108    0.0000                 3.47652E-05     2.2580
1.50189E-04     2.2007       0.00000E+00     0.0000
  109    0.0002                 1.25402E-04     2.2250
4.16402E-04     2.1928       0.00000E+00     0.0000
  110    0.0008                 6.27583E-04     3.1463
3.87200E-04     3.1156       0.00000E+00     0.0000
  111    0.0002                 1.50984E-04     4.4448
1.38880E-04     4.3225       0.00000E+00     0.0000
  112    0.0002                 1.26147E-04     4.7420
1.32848E-04     4.6596       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                 1.30067E-04     3.6335
1.13591E-04     3.3990       0.00000E+00     0.0000
  114    0.0000                 1.05476E-05     6.9575
1.45086E-05     5.7765       0.00000E+00     0.0000
  115    0.0001                 7.62860E-05     3.6314
8.82668E-05     3.3657       0.00000E+00     0.0000
  116    0.0002                 1.90354E-04     2.7100
1.43347E-04     2.4400       0.00000E+00     0.0000
  117    0.0006                 4.77482E-04     2.4260
2.55170E-04     2.2701       0.00000E+00     0.0000
  118    0.0008                 5.85030E-04     1.9932
4.57000E-04     1.9144       0.00000E+00     0.0000
  119    0.0002                 1.41244E-04     2.1204
3.64572E-04     2.0490       0.00000E+00     0.0000
  120    0.0002                 1.74149E-04     2.1778
6.62315E-04     2.1477       0.00000E+00     0.0000
  121    0.0007                 5.26646E-04     2.7430
4.05037E-04     2.6761       0.00000E+00     0.0000
  122    0.0001                 1.02181E-04     5.0741
7.98840E-05     4.7297       0.00000E+00     0.0000
  123    0.0003                 2.26381E-04     2.8328
1.59651E-04     2.5257       0.00000E+00     0.0000
  124    0.0003                 2.28919E-04     2.8725
1.89234E-04     2.6776       0.00000E+00     0.0000
  125    0.0002                 1.25055E-04     3.8370
1.16297E-04     3.4197       0.00000E+00     0.0000
  126    0.0001                 9.22559E-05     3.8732
8.37051E-05     3.3717       0.00000E+00     0.0000
  127    0.0005                 4.00048E-04     3.1870
1.96334E-04     3.0115       0.00000E+00     0.0000
  128    0.0003                 2.22692E-04     2.8684
1.37314E-04     2.5688       0.00000E+00     0.0000
  129    0.0006                 4.52554E-04     2.1633
4.16765E-04     2.0673       0.00000E+00     0.0000
  130    0.0002                 1.16244E-04     2.3962
2.83437E-04     2.3265       0.00000E+00     0.0000
  131    0.0004                 2.97371E-04     2.5560
2.38524E-04     2.1523       0.00000E+00     0.0000
  132    0.0007                 5.27348E-04     2.4699
3.23895E-04     2.2643       0.00000E+00     0.0000
  133    0.0014                 1.05894E-03     1.9246
6.68669E-04     1.8279       0.00000E+00     0.0000
  134    0.0001                 8.83495E-05     2.0198
2.31325E-04     1.6939       0.00000E+00     0.0000
  135    0.0002                 1.74376E-04     3.2229
2.58632E-04     3.1417       0.00000E+00     0.0000
  136    0.0001                 4.49624E-05     2.0669
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6.97822E-04	2.0348	0.00000E+00	0.0000	137	0.0000	1.92253E-05	0.9447
3.45956E-03	0.9419	0.00000E+00	0.0000	138	0.0004	3.20655E-04	2.0915
8.35101E-04	2.0603	0.00000E+00	0.0000	139	0.0002	1.91346E-04	3.3447
2.34336E-04	3.1497	0.00000E+00	0.0000	140	0.0003	2.17528E-04	2.1141
2.88049E-04	1.8461	0.00000E+00	0.0000	141	0.0001	7.98807E-05	2.9965
2.51967E-04	2.6833	0.00000E+00	0.0000	142	0.0001	6.37368E-05	3.1725
2.20857E-04	2.9082	0.00000E+00	0.0000	143	0.0001	8.00348E-05	2.0027
1.72838E-04	1.2442	0.00000E+00	0.0000	144	0.0000	3.35530E-05	3.2024
7.34970E-05	1.9924	0.00000E+00	0.0000	145	0.0005	3.91635E-04	2.5509
3.06580E-04	2.3341	0.00000E+00	0.0000	146	0.0004	3.35194E-04	2.7959
2.45925E-04	2.2644	0.00000E+00	0.0000	147	0.0002	1.81816E-04	4.0939
1.15847E-04	3.5769	0.00000E+00	0.0000	148	0.0001	6.03295E-05	5.0934
4.01962E-05	4.1113	0.00000E+00	0.0000	149	0.0000	3.21255E-05	7.7217
2.19924E-05	6.0382	0.00000E+00	0.0000	150	0.0001	8.58929E-05	4.2136
6.27508E-05	3.1109	0.00000E+00	0.0000	151	0.0001	6.79199E-05	4.2617
5.75819E-05	2.9447	0.00000E+00	0.0000	152	0.0001	4.01146E-05	4.5771
4.61472E-05	2.7810	0.00000E+00	0.0000	153	0.0001	4.11241E-05	4.3893
4.66509E-05	2.5464	0.00000E+00	0.0000	154	0.0001	5.04335E-05	4.0652
5.15594E-05	2.4274	0.00000E+00	0.0000	155	0.0001	4.62366E-05	4.6521
4.69570E-05	2.7383	0.00000E+00	0.0000	156	0.0001	5.10008E-05	4.3063
4.84891E-05	2.6644	0.00000E+00	0.0000	157	0.0001	6.04861E-05	4.0593
5.79809E-05	2.5329	0.00000E+00	0.0000	158	0.0001	6.89559E-05	3.6293
6.91744E-05	2.4164	0.00000E+00	0.0000	159	0.0002	1.47370E-04	2.9176
2.05544E-04	2.4414	0.00000E+00	0.0000	160	0.0001	5.98586E-05	4.5450
7.18259E-05	3.3915	0.00000E+00	0.0000	161	0.0001	7.47405E-05	4.2552
7.33859E-05	2.7927	0.00000E+00	0.0000	162	0.0001	7.98782E-05	3.9913

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7.76614E-05     2.4229       0.00000E+00     0.0000
  163    0.0001                 9.59983E-05     3.3474
8.79525E-05     2.1184       0.00000E+00     0.0000
  164    0.0001                 1.06199E-04     3.2160
9.64583E-05     2.0826       0.00000E+00     0.0000
  165    0.0001                 1.12328E-04     3.2420
1.03972E-04     1.9967       0.00000E+00     0.0000
  166    0.0001                 7.32784E-05     4.1915
6.57092E-05     2.7351       0.00000E+00     0.0000
  167    0.0001                 7.82774E-05     3.8007
7.09883E-05     2.5087       0.00000E+00     0.0000
  168    0.0001                 9.56346E-05     3.9379
8.26596E-05     2.7277       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                 1.04391E-04     4.0422
9.16524E-05     2.8397       0.00000E+00     0.0000
  170    0.0002                 1.34848E-04     4.0047
1.15220E-04     3.0161       0.00000E+00     0.0000
  171    0.0001                 1.06852E-04     3.9569
8.10562E-05     3.1941       0.00000E+00     0.0000
  172    0.0002                 1.34506E-04     4.8803
9.57538E-05     4.0614       0.00000E+00     0.0000
  173    0.0002                 1.88139E-04     4.3447
1.24040E-04     3.7758       0.00000E+00     0.0000
  174    0.0003                 2.31418E-04     4.3050
1.45059E-04     3.8238       0.00000E+00     0.0000
  175    0.0002                 1.17906E-04     6.4088
7.07247E-05     5.7945       0.00000E+00     0.0000
  176    0.0001                 1.07549E-04     5.5029
6.46644E-05     4.9231       0.00000E+00     0.0000
  177    0.0002                 1.23099E-04     5.3077
7.22938E-05     4.7992       0.00000E+00     0.0000
  178    0.0002                 1.20455E-04     6.0197
7.05081E-05     5.4087       0.00000E+00     0.0000
  179    0.0002                 1.18132E-04     6.5746
6.85494E-05     5.9070       0.00000E+00     0.0000
  180    0.0001                 1.05866E-04     5.3833
6.19654E-05     4.7764       0.00000E+00     0.0000
  181    0.0001                 1.05819E-04     6.3775
6.16783E-05     5.6170       0.00000E+00     0.0000
  182    0.0001                 1.03163E-04     7.1281
6.00931E-05     6.2016       0.00000E+00     0.0000
  183    0.0001                 1.04921E-04     6.6770
6.08268E-05     5.8476       0.00000E+00     0.0000
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184	0.0001	9.47664E-05	7.1586	5.51945E-05	6.1713
0.00000E+00	0.0000				
185	0.0001	9.27030E-05	6.2170	5.43520E-05	5.3485
0.00000E+00	0.0000				
186	0.0001	8.57449E-05	6.8588	5.08448E-05	5.7737
0.00000E+00	0.0000				
187	0.0001	8.87053E-05	6.3637	5.22672E-05	5.3461
0.00000E+00	0.0000				
188	0.0001	8.40216E-05	5.8932	4.98773E-05	4.8740
0.00000E+00	0.0000				
189	0.0001	8.55364E-05	6.3607	5.06978E-05	5.2844
0.00000E+00	0.0000				
190	0.0003	2.11436E-04	3.7690	1.25796E-04	3.1290
0.00000E+00	0.0000				
191	0.0003	1.92188E-04	3.7014	1.16611E-04	3.0161
0.00000E+00	0.0000				
192	0.0003	1.96729E-04	4.2579	1.19144E-04	3.4064
0.00000E+00	0.0000				
193	0.0002	1.87451E-04	3.7130	1.15751E-04	2.9180
0.00000E+00	0.0000				
194	0.0005	4.03732E-04	2.6985	2.48655E-04	2.1279
0.00000E+00	0.0000				
195	0.0006	4.36474E-04	2.8571	2.68025E-04	2.2451
0.00000E+00	0.0000				
196	0.0006	4.61128E-04	2.9209	2.86836E-04	2.2639
0.00000E+00	0.0000				
197	0.0007	5.19071E-04	2.5743	3.22455E-04	1.9916
0.00000E+00	0.0000				
198	0.0008	5.76983E-04	2.5214	3.57430E-04	1.9787
0.00000E+00	0.0000				
199	0.0004	3.27122E-04	3.5508	2.00881E-04	2.8015
0.00000E+00	0.0000				
200	0.0005	3.73558E-04	2.9319	2.28315E-04	2.3129
0.00000E+00	0.0000				
201	0.0010	7.94127E-04	1.9559	4.85570E-04	1.5672
0.00000E+00	0.0000				
202	0.0013	9.89092E-04	1.7635	5.99148E-04	1.4394
0.00000E+00	0.0000				
203	0.0016	1.24148E-03	1.7796	7.39746E-04	1.4723
0.00000E+00	0.0000				
204	0.0022	1.65830E-03	1.6348	9.77067E-04	1.3717
0.00000E+00	0.0000				
205	0.0015	1.15351E-03	2.0584	6.74257E-04	1.7355
0.00000E+00	0.0000				
206	0.0019	1.42863E-03	1.6881	8.29618E-04	1.4548
0.00000E+00	0.0000				
207	0.0022	1.64692E-03	1.8601	9.57538E-04	1.6253
0.00000E+00	0.0000				
208	0.0029	2.20239E-03	1.4184	1.28190E-03	1.2620
0.00000E+00	0.0000				
209	0.0032	2.43447E-03	1.3113	1.42731E-03	1.1406
0.00000E+00	0.0000				

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  210    0.0038                 2.92098E-03     1.4884
1.73534E-03     1.3067       0.00000E+00     0.0000
  211    0.0041                 3.16552E-03     1.2836
1.90588E-03     1.1029       0.00000E+00     0.0000
  212    0.0047                 3.62265E-03     1.1184
2.19512E-03     0.9584       0.00000E+00     0.0000
  213    0.0066                 5.03526E-03     0.8243
3.04192E-03     0.7094       0.00000E+00     0.0000
  214    0.0096                 7.33989E-03     0.7682
4.42004E-03     0.6419       0.00000E+00     0.0000
  215    0.0158                 1.20873E-02     0.6568
7.20751E-03     0.5485       0.00000E+00     0.0000
  216    0.0301                 2.30388E-02     0.4485
1.35802E-02     0.3826       0.00000E+00     0.0000
  217    0.0199                 1.52661E-02     0.6308
8.98893E-03     0.5264       0.00000E+00     0.0000
  218    0.0277                 2.12182E-02     0.4750
1.24202E-02     0.3969       0.00000E+00     0.0000
  219    0.0358                 2.74010E-02     0.4216
1.59828E-02     0.3599       0.00000E+00     0.0000
  220    0.0472                 3.61181E-02     0.3322
2.10072E-02     0.2847       0.00000E+00     0.0000
  221    0.0621                 4.75777E-02     0.3038
2.76150E-02     0.2611       0.00000E+00     0.0000
  222    0.0803                 6.15047E-02     0.2737
3.56188E-02     0.2311       0.00000E+00     0.0000
  223    0.1043                 7.98325E-02     0.2453
4.62988E-02     0.2106       0.00000E+00     0.0000
  224    0.0586                 4.48254E-02     0.3409
2.60954E-02     0.2914       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    0.2303                 1.76266E-01     0.1666
1.04441E-01     0.1429       0.00000E+00     0.0000
  226    0.0451                 3.45112E-02     0.4234
2.10443E-02     0.3494       0.00000E+00     0.0000
  227    0.0491                 3.76138E-02     0.3929
2.33283E-02     0.3248       0.00000E+00     0.0000
  228    0.0212                 1.62469E-02     0.5722
1.02597E-02     0.4595       0.00000E+00     0.0000
  229    0.0223                 1.70759E-02     0.5433
1.09772E-02     0.4204       0.00000E+00     0.0000
  230    0.0117                 8.98366E-03     0.8053
5.87304E-03     0.6209       0.00000E+00     0.0000
  231    0.0124                 9.52417E-03     0.6241
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6.30918E-03     0.4706       0.00000E+00     0.0000
  232    0.0129                 9.86346E-03     0.7042
6.73334E-03     0.5330       0.00000E+00     0.0000
  233    0.0083                 6.36566E-03     0.9738
4.46906E-03     0.7092       0.00000E+00     0.0000
  234    0.0058                 4.46758E-03     1.0738
3.23444E-03     0.7757       0.00000E+00     0.0000
  235    0.0024                 1.84386E-03     1.7802
1.22217E-03     1.3403       0.00000E+00     0.0000
  236    0.0019                 1.45840E-03     1.6531
9.83073E-04     1.2628       0.00000E+00     0.0000
  237    0.0017                 1.30215E-03     1.9413
9.25693E-04     1.3638       0.00000E+00     0.0000
  238    0.0001                 6.95983E-05     9.1716
6.04459E-05     5.4838       0.00000E+00     0.0000

 system total =                 7.65538E-01     0.0615
4.68731E-01     0.0543       0.00000E+00     0.0000



 the weight lost in the albedo portion of the problem =   5.3143E-01  +
or -  0.0002



 elapsed time   3.11900 minutes

 random number=   E54D1EA19B4F85EC
1                                                   fuel bundle

                                                        **** fission
densities ****


                                                          fission
percent         total
                                              unit  region   density
deviation      fissions

                                                 1      1    3.088E-03
0.06         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	1.939E-08	29.82	1.382E-08	26.83	1.493E-08	27.50
3	8.518E-07	3.95	7.001E-07	3.39	7.518E-07	3.44
4	1.499E-06	3.10	1.208E-06	2.74	1.290E-06	2.70
5	2.338E-06	2.35	1.922E-06	2.20	2.055E-06	2.22
6	9.435E-06	1.31	7.520E-06	1.11	8.042E-06	1.12
7	1.236E-05	1.35	9.411E-06	1.14	9.940E-06	1.15
8	3.145E-05	0.73	2.303E-05	0.68	2.411E-05	0.66
9	8.226E-05	0.53	5.877E-05	0.46	6.129E-05	0.45
10	4.562E-05	0.70	3.254E-05	0.59	3.387E-05	0.60
11	2.193E-04	0.29	1.554E-04	0.28	1.608E-04	0.28
12	1.906E-04	0.30	1.380E-04	0.27	1.447E-04	0.27
13	5.657E-05	0.51	4.141E-05	0.48	4.336E-05	0.48
14	2.544E-04	0.26	1.839E-04	0.21	1.919E-04	0.20
15	2.195E-04	0.27	1.594E-04	0.22	1.663E-04	0.21
16	7.132E-05	0.44	5.164E-05	0.36	5.417E-05	0.33
17	3.208E-05	0.70	2.348E-05	0.59	2.427E-05	0.57
18	2.785E-05	0.75	2.037E-05	0.66	2.110E-05	0.61
19	4.960E-05	0.52	3.636E-05	0.45	3.788E-05	0.41
20	3.981E-05	0.66	2.919E-05	0.58	3.042E-05	0.56
21	8.034E-05	0.40	5.860E-05	0.34	6.124E-05	0.34
22	7.248E-05	0.42	5.318E-05	0.36	5.503E-05	0.32
23	7.639E-05	0.38	5.612E-05	0.33	5.831E-05	0.32
24	1.844E-05	0.88	1.371E-05	0.73	1.433E-05	0.74
25	2.342E-05	0.81	1.733E-05	0.58	1.811E-05	0.52
26	1.316E-05	0.83	9.724E-06	0.75	1.029E-05	0.72
27	4.164E-05	0.56	3.097E-05	0.54	3.280E-05	0.51
28	7.706E-05	0.45	5.742E-05	0.38	6.079E-05	0.33
29	7.937E-05	0.43	5.935E-05	0.37	6.221E-05	0.38
30	1.012E-05	1.28	7.549E-06	0.93	7.922E-06	0.84
31	7.849E-05	0.43	5.894E-05	0.34	6.199E-05	0.31
32	3.059E-05	0.68	2.319E-05	0.52	2.444E-05	0.54
33	2.640E-05	0.68	1.994E-05	0.53	2.109E-05	0.49
34	6.065E-05	0.40	4.581E-05	0.33	4.822E-05	0.31
35	3.602E-05	0.50	2.728E-05	0.45	2.874E-05	0.42
36	3.382E-05	0.45	2.565E-05	0.40	2.684E-05	0.40
37	2.194E-05	0.64	1.652E-05	0.53	1.729E-05	0.52
38	2.575E-05	0.63	1.958E-05	0.53	2.060E-05	0.46
39	9.749E-05	0.38	7.461E-05	0.31	7.873E-05	0.30
40	9.052E-05	0.34	6.976E-05	0.30	7.435E-05	0.28
41	1.137E-04	0.26	8.868E-05	0.23	9.477E-05	0.23
42	9.366E-05	0.34	7.389E-05	0.28	7.929E-05	0.26
43	5.098E-05	0.41	4.078E-05	0.35	4.294E-05	0.29
44	6.963E-05	0.35	5.585E-05	0.28	5.984E-05	0.25
45	3.519E-05	0.45	2.800E-05	0.40	3.118E-05	0.36

46	8.420E-06	0.91	6.634E-06	0.77	7.221E-06	0.64
47	2.339E-05	0.57	1.854E-05	0.49	1.938E-05	0.39
48	6.664E-06	1.27	5.288E-06	1.00	5.601E-06	0.84
49	4.370E-05	0.44	3.497E-05	0.39	3.772E-05	0.31
50	2.939E-05	0.50	2.360E-05	0.42	2.568E-05	0.36
51	7.881E-06	0.92	6.322E-06	0.80	6.884E-06	0.67
52	2.086E-05	0.61	1.680E-05	0.52	1.821E-05	0.45
53	7.649E-05	0.27	6.171E-05	0.23	6.693E-05	0.21
54	3.328E-05	0.43	2.700E-05	0.38	2.923E-05	0.32
55	6.655E-05	0.35	5.414E-05	0.29	5.893E-05	0.24
56	4.344E-05	0.36	3.537E-05	0.31	3.849E-05	0.30
57	4.921E-05	0.38	4.017E-05	0.32	4.369E-05	0.28
58	2.572E-05	0.45	2.103E-05	0.38	2.302E-05	0.32
59	4.426E-05	0.34	3.624E-05	0.33	3.950E-05	0.26
60	6.472E-05	0.31	5.297E-05	0.30	5.746E-05	0.24
61	6.208E-06	0.90	5.063E-06	0.83	5.538E-06	0.69
62	3.255E-05	0.38	2.664E-05	0.34	2.910E-05	0.30
63	2.179E-05	0.49	1.795E-05	0.45	1.945E-05	0.38
64	1.719E-05	0.49	1.405E-05	0.44	1.525E-05	0.35
65	5.714E-06	1.02	4.682E-06	0.90	5.121E-06	0.72
66	2.868E-05	0.46	2.368E-05	0.39	2.564E-05	0.32
67	2.127E-05	0.50	1.753E-05	0.43	1.896E-05	0.33
68	4.589E-06	1.19	3.790E-06	1.08	4.101E-06	0.82
69	3.733E-05	0.38	3.070E-05	0.34	3.338E-05	0.27
70	2.646E-05	0.43	2.183E-05	0.37	2.377E-05	0.30
71	4.567E-05	0.36	3.760E-05	0.33	4.088E-05	0.28
72	2.643E-06	1.54	2.176E-06	1.16	2.339E-06	1.05
73	2.709E-05	0.48	2.231E-05	0.45	2.426E-05	0.35
74	7.948E-05	0.28	6.607E-05	0.24	7.150E-05	0.19
75	9.105E-06	0.73	7.525E-06	0.60	8.135E-06	0.49
76	2.292E-05	0.48	1.903E-05	0.43	2.059E-05	0.38
77	1.757E-05	0.58	1.465E-05	0.50	1.588E-05	0.41
78	1.553E-06	1.68	1.311E-06	1.62	1.422E-06	1.26
79	1.006E-05	0.85	8.294E-06	0.68	8.975E-06	0.60
80	4.529E-06	1.12	3.762E-06	0.98	4.051E-06	0.80
81	5.539E-05	0.32	4.594E-05	0.26	4.970E-05	0.22
82	3.191E-06	1.27	2.656E-06	1.16	2.874E-06	0.84
83	4.418E-06	1.04	3.653E-06	0.91	4.005E-06	0.71
84	8.160E-06	1.06	6.792E-06	0.89	7.360E-06	0.67
85	9.908E-06	0.68	8.292E-06	0.60	8.990E-06	0.42
86	1.356E-05	0.59	1.134E-05	0.55	1.230E-05	0.40
87	1.197E-05	0.72	9.983E-06	0.61	1.080E-05	0.50
88	3.102E-06	1.22	2.590E-06	1.00	2.831E-06	0.81
89	6.610E-06	0.81	5.504E-06	0.76	5.940E-06	0.71
90	6.901E-06	0.87	5.762E-06	0.86	6.188E-06	0.67
91	8.306E-06	0.74	6.879E-06	0.65	7.462E-06	0.56
92	4.747E-06	0.95	3.972E-06	0.84	4.368E-06	0.79
93	8.039E-06	0.87	6.736E-06	0.75	7.262E-06	0.55
94	4.205E-06	1.04	3.514E-06	0.96	3.812E-06	0.76
95	1.254E-05	0.67	1.056E-05	0.60	1.137E-05	0.48
96	3.346E-06	1.03	2.785E-06	1.09	3.035E-06	0.79
97	3.391E-06	1.25	2.841E-06	1.13	3.082E-06	0.85

98	3.554E-06	1.02	2.942E-06	0.87	3.217E-06	0.78
99	2.292E-06	1.51	1.938E-06	1.32	2.125E-06	1.03
100	3.449E-06	1.18	2.854E-06	0.99	3.105E-06	0.81
101	4.998E-06	1.02	4.182E-06	0.96	4.531E-06	0.81
102	3.328E-06	1.08	2.799E-06	0.90	3.047E-06	0.86
103	4.682E-06	1.18	3.875E-06	1.06	4.222E-06	0.76
104	4.138E-06	1.11	3.434E-06	0.97	3.778E-06	0.80
105	4.370E-06	1.19	3.652E-06	1.01	3.944E-06	0.83
106	1.551E-06	1.54	1.317E-06	1.46	1.429E-06	1.10
107	3.610E-06	1.06	3.011E-06	0.92	3.270E-06	0.69
108	3.204E-06	1.30	2.703E-06	1.11	2.944E-06	0.89
109	5.184E-06	0.94	4.314E-06	0.87	4.669E-06	0.71
110	3.021E-06	1.18	2.580E-06	1.00	2.818E-06	0.85
111	3.084E-06	1.25	2.590E-06	1.16	2.827E-06	0.91
112	1.793E-06	1.53	1.504E-06	1.28	1.666E-06	1.14
113	5.775E-06	0.89	4.808E-06	0.74	5.240E-06	0.67
114	2.014E-06	1.50	1.687E-06	1.26	1.811E-06	1.05
115	5.224E-06	0.97	4.334E-06	0.88	4.670E-06	0.73
116	1.084E-05	0.65	9.058E-06	0.62	9.803E-06	0.49
117	1.177E-05	0.67	9.817E-06	0.57	1.061E-05	0.48
118	1.287E-05	0.60	1.085E-05	0.57	1.180E-05	0.44
119	8.287E-06	0.75	7.005E-06	0.68	7.624E-06	0.55
120	5.715E-06	0.81	4.895E-06	0.72	5.329E-06	0.61
121	6.145E-06	0.85	5.216E-06	0.75	5.631E-06	0.69
122	3.280E-06	1.30	2.776E-06	1.02	2.973E-06	0.86
123	1.027E-05	0.66	8.663E-06	0.68	9.350E-06	0.52
124	7.304E-06	0.86	6.129E-06	0.72	6.656E-06	0.59
125	6.992E-06	0.80	5.876E-06	0.68	6.374E-06	0.63
126	5.811E-06	0.92	4.865E-06	0.86	5.277E-06	0.70
127	5.497E-06	0.87	4.624E-06	0.72	5.027E-06	0.65
128	7.709E-06	0.79	6.508E-06	0.74	6.998E-06	0.58
129	9.676E-06	0.80	8.180E-06	0.67	8.816E-06	0.57
130	3.986E-06	1.05	3.393E-06	0.97	3.670E-06	0.80
131	1.690E-05	0.62	1.419E-05	0.50	1.526E-05	0.42
132	1.105E-05	0.70	9.359E-06	0.62	1.018E-05	0.51
133	1.359E-05	0.61	1.147E-05	0.55	1.244E-05	0.44
134	1.483E-05	0.58	1.249E-05	0.48	1.343E-05	0.39
135	2.325E-06	1.18	2.010E-06	1.11	2.201E-06	0.96
136	3.793E-06	0.99	3.332E-06	0.91	3.647E-06	0.73
137	2.452E-06	0.94	2.601E-06	1.13	2.940E-06	0.73
138	4.048E-06	1.01	3.549E-06	0.96	3.880E-06	0.69
139	4.617E-06	0.96	3.945E-06	0.98	4.264E-06	0.71
140	1.210E-05	0.67	1.023E-05	0.57	1.098E-05	0.45
141	8.824E-06	0.78	7.433E-06	0.66	8.049E-06	0.54
142	5.729E-06	0.94	4.863E-06	0.78	5.297E-06	0.63
143	1.998E-05	0.48	1.686E-05	0.43	1.812E-05	0.35
144	8.096E-06	0.90	6.801E-06	0.76	7.336E-06	0.60
145	7.257E-06	0.83	6.138E-06	0.71	6.586E-06	0.62
146	1.192E-05	0.59	1.014E-05	0.58	1.089E-05	0.44
147	3.630E-06	1.25	3.067E-06	1.14	3.313E-06	0.85
148	1.850E-06	1.49	1.574E-06	1.35	1.695E-06	1.20
149	1.176E-06	1.85	1.006E-06	1.71	1.095E-06	1.48

150	3.990E-06	1.05	3.337E-06	0.91	3.616E-06	0.78
151	4.152E-06	1.10	3.498E-06	0.87	3.799E-06	0.74
152	4.334E-06	1.14	3.627E-06	0.90	3.919E-06	0.72
153	4.444E-06	1.05	3.746E-06	0.91	4.029E-06	0.71
154	4.751E-06	1.02	4.016E-06	0.85	4.289E-06	0.75
155	4.348E-06	1.14	3.643E-06	0.99	3.933E-06	0.80
156	4.005E-06	1.02	3.385E-06	0.98	3.653E-06	0.79
157	4.651E-06	1.02	3.930E-06	0.92	4.215E-06	0.73
158	4.820E-06	1.12	4.055E-06	0.90	4.357E-06	0.75
159	6.855E-06	0.88	5.809E-06	0.79	6.241E-06	0.66
160	3.578E-06	1.07	3.018E-06	1.05	3.264E-06	0.79
161	4.941E-06	0.96	4.209E-06	0.98	4.497E-06	0.66
162	5.854E-06	0.99	4.928E-06	0.89	5.328E-06	0.68
163	6.129E-06	1.07	5.156E-06	0.91	5.539E-06	0.71
164	6.447E-06	0.94	5.449E-06	0.78	5.863E-06	0.62
165	6.850E-06	0.91	5.750E-06	0.79	6.249E-06	0.63
166	3.975E-06	1.16	3.361E-06	0.98	3.572E-06	0.85
167	4.227E-06	1.12	3.531E-06	0.91	3.800E-06	0.73
168	4.375E-06	1.11	3.690E-06	1.03	3.973E-06	0.82
169	4.409E-06	1.06	3.765E-06	0.95	4.046E-06	0.70
170	4.667E-06	1.08	3.908E-06	0.90	4.230E-06	0.82
171	2.354E-06	1.32	1.988E-06	1.09	2.170E-06	0.92
172	2.439E-06	1.55	2.044E-06	1.27	2.206E-06	0.97
173	2.418E-06	1.30	2.052E-06	1.10	2.232E-06	1.03
174	2.435E-06	1.36	2.088E-06	1.25	2.270E-06	1.03
175	1.005E-06	2.23	8.593E-07	1.90	9.228E-07	1.53
176	9.843E-07	1.87	8.502E-07	1.74	9.149E-07	1.51
177	1.005E-06	1.86	8.584E-07	1.92	9.316E-07	1.42
178	1.061E-06	1.87	8.951E-07	1.57	9.733E-07	1.46
179	1.030E-06	2.05	8.679E-07	1.88	9.486E-07	1.42
180	1.054E-06	2.35	8.885E-07	1.91	9.592E-07	1.48
181	1.092E-06	1.93	9.082E-07	1.71	9.988E-07	1.38
182	1.129E-06	1.98	9.389E-07	1.87	1.006E-06	1.49
183	1.111E-06	1.88	9.301E-07	1.56	1.002E-06	1.43
184	1.092E-06	1.85	9.274E-07	1.78	1.006E-06	1.35
185	1.099E-06	2.01	9.498E-07	1.84	1.024E-06	1.49
186	1.117E-06	2.05	9.658E-07	1.62	1.043E-06	1.35
187	1.154E-06	1.95	9.808E-07	1.85	1.062E-06	1.41
188	1.178E-06	2.07	9.958E-07	1.83	1.074E-06	1.32
189	1.125E-06	1.78	9.654E-07	1.72	1.050E-06	1.27
190	3.058E-06	1.17	2.584E-06	1.01	2.787E-06	0.87
191	3.108E-06	1.21	2.645E-06	1.19	2.870E-06	0.91
192	3.148E-06	1.09	2.647E-06	1.03	2.895E-06	0.91
193	3.259E-06	1.13	2.747E-06	1.01	2.967E-06	0.80
194	6.871E-06	0.77	5.781E-06	0.71	6.256E-06	0.60
195	7.342E-06	0.87	6.183E-06	0.75	6.667E-06	0.67
196	7.807E-06	0.77	6.566E-06	0.69	7.152E-06	0.61
197	8.388E-06	0.73	7.130E-06	0.61	7.714E-06	0.53
198	8.967E-06	0.71	7.586E-06	0.64	8.182E-06	0.49
199	4.821E-06	0.90	4.072E-06	0.82	4.414E-06	0.65
200	5.089E-06	0.92	4.292E-06	0.74	4.637E-06	0.63
201	1.068E-05	0.63	9.037E-06	0.58	9.768E-06	0.44

202	1.207E-05	0.61	1.017E-05	0.51	1.101E-05	0.40
203	1.291E-05	0.60	1.097E-05	0.55	1.185E-05	0.46
204	1.472E-05	0.56	1.253E-05	0.52	1.353E-05	0.43
205	8.640E-06	0.68	7.733E-06	0.62	8.221E-06	0.50
206	9.304E-06	0.61	8.388E-06	0.52	8.894E-06	0.43
207	9.595E-06	0.69	8.691E-06	0.58	9.169E-06	0.49
208	1.128E-05	0.58	1.016E-05	0.52	1.081E-05	0.43
209	1.167E-05	0.55	1.061E-05	0.52	1.116E-05	0.43
210	1.406E-05	0.55	1.271E-05	0.45	1.348E-05	0.41
211	1.628E-05	0.46	1.469E-05	0.41	1.562E-05	0.31
212	1.913E-05	0.43	1.734E-05	0.36	1.848E-05	0.29
213	2.620E-05	0.39	2.353E-05	0.36	2.519E-05	0.27
214	3.691E-05	0.29	3.322E-05	0.27	3.564E-05	0.19
215	5.511E-05	0.25	4.984E-05	0.20	5.368E-05	0.17
216	9.192E-05	0.20	8.377E-05	0.17	9.057E-05	0.15
217	5.534E-05	0.24	5.299E-05	0.20	5.617E-05	0.16
218	7.064E-05	0.22	6.775E-05	0.20	7.207E-05	0.16
219	8.408E-05	0.21	8.135E-05	0.16	8.659E-05	0.13
220	1.012E-04	0.20	9.885E-05	0.17	1.053E-04	0.13
221	1.206E-04	0.15	1.186E-04	0.14	1.264E-04	0.11
222	1.365E-04	0.16	1.368E-04	0.14	1.457E-04	0.12
223	1.532E-04	0.14	1.572E-04	0.12	1.674E-04	0.10
224	7.530E-05	0.21	7.998E-05	0.18	8.457E-05	0.13
225	2.333E-04	0.14	2.726E-04	0.11	2.825E-04	0.09
226	3.168E-05	0.22	4.468E-05	0.20	4.451E-05	0.13
227	2.894E-05	0.28	4.636E-05	0.24	4.450E-05	0.14
228	1.042E-05	0.38	1.912E-05	0.34	1.757E-05	0.19
229	9.636E-06	0.40	1.968E-05	0.32	1.749E-05	0.18
230	4.468E-06	0.49	1.021E-05	0.40	8.715E-06	0.23
231	4.272E-06	0.50	1.069E-05	0.44	8.760E-06	0.21
232	3.905E-06	0.51	1.126E-05	0.40	8.858E-06	0.21
233	2.221E-06	0.72	7.364E-06	0.50	5.518E-06	0.27
234	1.420E-06	0.91	5.300E-06	0.59	3.801E-06	0.30
235	5.281E-07	1.41	1.057E-06	1.04	1.126E-06	0.59
236	3.429E-07	1.65	7.275E-07	1.30	7.998E-07	0.57
237	2.259E-07	2.08	5.423E-07	1.25	6.157E-07	0.67
238	5.694E-09	10.08	2.238E-08	6.36	2.500E-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
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
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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
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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
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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
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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
 0.7528 to 0.7556     *
 0.7556 to 0.7585     *****
 0.7585 to 0.7613     ************
 0.7613 to 0.7641     ************************
 0.7641 to 0.7670     ************************
 0.7670 to 0.7698     ******************
 0.7698 to 0.7726     *******
 0.7726 to 0.7754     ******
 0.7754 to 0.7783     ***

                                frequency for generations      49 to
123 each asterisk represents   1.0000 generations
 0.7528 to 0.7556     *
 0.7556 to 0.7585     ****
 0.7585 to 0.7613     *******
 0.7613 to 0.7641     ******************
 0.7641 to 0.7670     ******************
 0.7670 to 0.7698     **************
 0.7698 to 0.7726     ******
 0.7726 to 0.7754     ****
 0.7754 to 0.7783     ***

                                frequency for generations      74 to
123 each asterisk represents   1.0000 generations
 0.7528 to 0.7556
 0.7556 to 0.7585     ***
```

```
 0.7585 to 0.7613     ***
 0.7613 to 0.7641     ***********
 0.7641 to 0.7670     **************
 0.7670 to 0.7698     *********
 0.7698 to 0.7726     *****
 0.7726 to 0.7754     ***
 0.7754 to 0.7783     **

                                frequency for generations      99 to
123 each asterisk represents   1.0000 generations
 0.7528 to 0.7556
 0.7556 to 0.7585
 0.7585 to 0.7613     ***
 0.7613 to 0.7641     *****
 0.7641 to 0.7670     **********
 0.7670 to 0.7698     ***
 0.7698 to 0.7726     **
 0.7726 to 0.7754     *
 0.7754 to 0.7783     *

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

*********************************************************************
*********************************************
        ***
***
        ***                                   ******      final results
table      ******                                  ***
        ***
***
        ***        best estimate system k-eff
0.76553 + or - 0.00048                    ***
        ***
***
        ***        Energy of average lethargy of Fission (eV)
5.65450E-02 + or -  1.36339E-04           ***
        ***
***
        ***        system nu bar
2.43894E+00 + or -  1.09020E-05           ***
        ***
***
        ***        system mean free path (cm)
6.52559E-01 + or -  1.65871E-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     3.12533 minutes


*********************************************************************
************************************************************
1
    OOOOOOOOOOO    PPPPPPPPPPPP    UU         UU    SSSSSSSSSSS
   OOOOOOOOOOOOO   PPPPPPPPPPPPP   UU         UU   SSSSSSSSSSSSS
   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   SSSSSSSSSSSS
   OO         OO   PPPPPPPPPPPP    UU         UU    SSSSSSSSSSSS
   OO         OO   PP              UU         UU              SS
   OO         OO   PP              UU         UU              SS
   OO         OO   PP              UU         UU   SS         SS
   OOOOOOOOOOOOO   PP              UUUUUUUUUUUUU   SSSSSSSSSSSSS
    OOOOOOOOOOO    PP               UUUUUUUUUUU     SSSSSSSSSSS


   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22            //           11        66
   00         00   99         99           //                 22
22           //            11        66
   00         00   9999999999999          //                22
22            //             11        666666666666
   00         00    999999999999         //               22
22             //              11        6666666666666
   00         00               99        //              22
22              //               11        66         66
   00         00               99       //             22
22               //                11        66         66
    00       00               99      //            22              22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //             2222222222222
2222222222222    //                11111111      66666666666
```

```
      0000000       666666666666                    5555555555555
5555555555555                            44              44
     000000000     6666666666666                    5555555555555
5555555555555                           444             444
    00       00    66                   :::       55              55
:::              4444            4444
   00         00   66                   :::       55              55
:::             44 44           44 44
   00         00   66                   :::       55              55
:::            44  44          44  44
   00         00   666666666666                    555555555555
555555555555                          44   44         44   44
   00         00   6666666666666                   5555555555555
5555555555555                        44    44        44    44
   00         00   66         66         :::                 55
55         :::        444444444444    444444444444
   00         00   66         66         :::                 55
55         :::       4444444444444   4444444444444
    00       00    66         66         :::       55         55   55
55         :::                44              44
     000000000     6666666666666                    5555555555555
5555555555555                            44              44
      0000000       66666666666                     55555555555
55555555555                             44              44
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    LL
EEEEEEEEEEEEE
   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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLLL
EEEEEEEEEEEEE
```

****

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

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

*********************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
```

```
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:55:44.94
*****
        *****
*****
        *****
*****

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

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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 1.000E+00 2.000E+00 3.000E+00 5.000E+00 1.000E+01
1.500E+01 2.000E+01 3.000E+01 4.000E+01 5.000E+01 7.500E+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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     ag110   2.136E-26 8.060E-09 2.216E-08 3.841E-08 7.216E-08 1.571E-07
2.427E-07 3.268E-07 4.948E-07 6.663E-07 8.361E-07 1.255E-06
     am241   3.934E-12 3.935E-12 3.935E-12 3.936E-12 3.937E-12 3.939E-12
3.942E-12 3.944E-12 3.949E-12 3.954E-12 3.959E-12 3.972E-12
     am242m  0.000E+00 5.428E-20 1.085E-19 1.628E-19 2.714E-19 5.430E-19
8.146E-19 1.086E-18 1.630E-18 2.175E-18 2.720E-18 4.085E-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 2.309E-13 2.309E-13 2.309E-13 2.309E-13
     cm242   3.818E-09 5.837E-09 6.532E-09 6.759E-09 6.824E-09 6.697E-09
6.556E-09 6.418E-09 6.151E-09 5.894E-09 5.649E-09 5.078E-09
     cm243   5.848E-11 5.848E-11 5.848E-11 5.847E-11 5.846E-11 5.845E-11
5.843E-11 5.841E-11 5.837E-11 5.833E-11 5.829E-11 5.820E-11
     cm244   9.403E-11 9.402E-11 9.401E-11 9.400E-11 9.398E-11 9.393E-11
9.388E-11 9.383E-11 9.373E-11 9.363E-11 9.354E-11 9.329E-11
     cm245   0.000E+00 8.106E-22 1.622E-21 2.434E-21 4.046E-21 8.110E-21
1.215E-20 1.618E-20 2.425E-20 3.228E-20 4.036E-20 6.037E-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 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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
i129 1.084E-16 2.131E-09 5.276E-09 8.446E-09 1.526E-08 3.177E-08 4.826E-08 6.476E-08 9.688E-08 1.290E-07 1.611E-07 2.401E-07
i130 9.763E-23 7.350E-03 9.272E-03 9.772E-03 9.893E-03 9.876E-03 9.877E-03 9.877E-03 9.871E-03 9.872E-03 9.872E-03 9.874E-03
i131 1.583E-22 1.112E+01 2.209E+01 3.233E+01 4.956E+01 8.065E+01 1.009E+02 1.140E+02 1.274E+02 1.330E+02 1.354E+02 1.363E+02
i132 3.121E-20 3.537E+01 6.831E+01 9.484E+01 1.331E+02 1.843E+02 2.000E+02 2.054E+02 2.065E+02 2.068E+02 2.068E+02 2.047E+02
i133 3.125E-20 1.743E+02 2.565E+02 2.934E+02 3.221E+02 3.188E+02 3.188E+02 3.188E+02 3.157E+02 3.157E+02 3.157E+02 3.148E+02
i135 2.271E-06 2.723E+02 2.939E+02 2.956E+02 2.957E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02
kr85 2.104E-24 2.451E-03 5.527E-03 8.617E-03 1.477E-02 3.007E-02 4.537E-02 6.065E-02 9.367E-02 1.266E-01 1.595E-01 2.377E-01
kr85m 1.022E-20 6.202E+01 6.355E+01 6.359E+01 6.328E+01 6.317E+01 6.317E+01 6.317E+01 6.319E+01 6.319E+01 6.319E+01 6.318E+01
kr88 4.754E-18 1.650E+02 1.654E+02 1.654E+02 1.654E+02 1.655E+02 1.655E+02 1.655E+02 1.654E+02 1.654E+02 1.654E+02 1.654E+02
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 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 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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
pm147 6.487E-10 2.453E-03 9.681E-03 2.139E-02 5.690E-02 2.038E-01 4.148E-01 6.721E-01 1.276E+00 1.950E+00 2.657E+00 4.471E+00
pu238 1.941E-11 1.951E-11 1.966E-11 1.986E-11 2.053E-11 2.572E-11 3.974E-11 6.614E-11 1.642E-10 3.295E-10 5.654E-10 1.470E-09
pu239 7.059E-14 2.425E-06 8.972E-06 1.861E-05 4.377E-05 1.217E-04 2.061E-04 2.918E-04 4.632E-04 6.336E-04 8.046E-04 1.232E-03
pu240 2.594E-13 5.042E-13 1.438E-12 3.271E-12 1.016E-11 4.911E-11 1.216E-10 2.284E-10 5.459E-10 1.001E-09 1.594E-09 3.676E-09
pu241 1.191E-10 1.191E-10 1.191E-10 1.190E-10 1.190E-10 1.189E-10 1.189E-10 1.188E-10 1.188E-10 1.188E-10 1.190E-10 1.202E-10
pu242 4.538E-15 5.046E-15 5.225E-15 5.289E-15 5.319E-15 5.323E-15 5.323E-15 5.323E-15 5.323E-15 5.323E-15 5.323E-15 5.323E-15
pu243 0.000E+00 6.839E-15 7.423E-15 7.594E-15 7.657E-15 7.589E-15 7.593E-15 7.507E-15 7.518E-15 7.544E-15 7.539E-15 7.521E-15
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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
sb132 2.197E-16 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01
sm147 1.606E-20 1.466E-17 1.164E-16 3.881E-16 1.744E-15 1.286E-14 4.014E-14 8.850E-14 2.615E-13 5.496E-13 9.617E-13 2.556E-12
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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     sm151   5.688E+00 5.688E+00 5.688E+00 5.689E+00 5.689E+00 5.691E+00
5.692E+00 5.694E+00 5.697E+00 5.699E+00 5.702E+00 5.710E+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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     tc99    8.062E-15 1.758E-07 8.334E-07 1.917E-06 5.012E-06 1.566E-05
2.793E-05 4.065E-05 6.639E-05 9.219E-05 1.180E-04 1.843E-04
     te132   1.553E-19 3.958E+01 7.154E+01 9.729E+01 1.344E+02 1.794E+02
1.947E+02 1.999E+02 2.021E+02 2.023E+02 2.024E+02 2.023E+02
     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 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 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 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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     xe133   1.186E-07 1.205E+01 3.792E+01 6.753E+01 1.248E+02 2.203E+02
2.695E+02 2.949E+02 3.123E+02 3.168E+02 3.180E+02 3.162E+02
     xe133m  2.827E-22 3.088E-01 8.809E-01 1.454E+00 2.355E+00 3.218E+00
3.391E+00 3.427E+00 3.399E+00 3.397E+00 3.397E+00 3.372E+00
     xe135   1.632E-06 1.958E+02 2.852E+02 3.043E+02 3.079E+02 3.077E+02
3.077E+02 3.078E+02 3.077E+02 3.077E+02 3.077E+02 3.077E+02
     xe135m  5.455E-18 3.572E+01 3.794E+01 3.811E+01 3.783E+01 3.754E+01
3.754E+01 3.754E+01 3.749E+01 3.749E+01 3.749E+01 3.749E+01
  subtotal   1.657E+01 1.110E+03 1.410E+03 1.560E+03 1.743E+03 1.963E+03
2.064E+03 2.113E+03 2.144E+03 2.156E+03 2.160E+03 2.158E+03
     total   1.657E+01 2.220E+04 2.309E+04 2.355E+04 2.408E+04 2.477E+04
2.515E+04 2.541E+04 2.575E+04 2.600E+04 2.619E+04 2.650E+04
1
0                  units of measure: curies
0                                       time (d)
   nuclide   1.000E+02 1.250E+02 1.500E+02 1.750E+02 2.000E+02 2.250E+02
2.500E+02 2.750E+02 3.000E+02 3.250E+02 3.500E+02 3.850E+02
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     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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     ag110   1.669E-06 2.118E-06 2.535E-06 2.964E-06 3.396E-06 3.818E-06
4.248E-06 4.634E-06 5.095E-06 5.494E-06 5.953E-06 6.538E-06
     am241   3.985E-12 3.998E-12 4.012E-12 4.027E-12 4.044E-12 4.062E-12
4.083E-12 4.106E-12 4.133E-12 4.165E-12 4.201E-12 4.262E-12
     am242m  5.454E-18 6.827E-18 8.205E-18 9.588E-18 1.098E-17 1.237E-17
1.377E-17 1.517E-17 1.659E-17 1.801E-17 1.945E-17 2.148E-17
     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 2.309E-13 2.309E-13 2.309E-13 2.309E-13
     cm242   4.566E-09 4.105E-09 3.690E-09 3.318E-09 2.983E-09 2.681E-09
2.411E-09 2.167E-09 1.948E-09 1.752E-09 1.575E-09 1.357E-09
     cm243   5.810E-11 5.801E-11 5.791E-11 5.782E-11 5.773E-11 5.763E-11
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5.754E-11 5.744E-11 5.735E-11 5.726E-11 5.716E-11 5.703E-11
cm244 9.305E-11 9.280E-11 9.256E-11 9.232E-11 9.208E-11 9.183E-11
9.159E-11 9.135E-11 9.112E-11 9.088E-11 9.064E-11 9.031E-11
cm245 8.034E-20 1.005E-19 1.205E-19 1.404E-19 1.602E-19 1.800E-19
1.998E-19 2.195E-19 2.391E-19 2.588E-19 2.784E-19 3.056E-19
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 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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
i129 3.191E-07 3.981E-07 4.771E-07 5.561E-07 6.351E-07 7.141E-07
7.931E-07 8.721E-07 9.511E-07 1.030E-06 1.109E-06 1.219E-06
i130 9.875E-03 9.876E-03 9.877E-03 9.878E-03 9.879E-03 9.880E-03
9.881E-03 9.882E-03 9.883E-03 9.884E-03 9.885E-03 9.885E-03
i131 1.364E+02 1.364E+02 1.364E+02 1.364E+02 1.364E+02 1.364E+02
1.364E+02 1.364E+02 1.364E+02 1.364E+02 1.364E+02 1.362E+02
i132 2.047E+02 2.047E+02 2.047E+02 2.047E+02 2.047E+02 2.047E+02
2.047E+02 2.047E+02 2.047E+02 2.047E+02 2.047E+02 2.040E+02
i133 3.148E+02 3.148E+02 3.148E+02 3.148E+02 3.148E+02 3.148E+02
3.148E+02 3.148E+02 3.148E+02 3.148E+02 3.148E+02 3.148E+02
i135 2.956E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02
2.956E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02 2.956E+02
kr85 3.155E-01 3.930E-01 4.701E-01 5.469E-01 6.234E-01 6.995E-01
7.753E-01 8.508E-01 9.259E-01 1.001E+00 1.075E+00 1.178E+00
kr85m 6.318E+01 6.318E+01 6.319E+01 6.318E+01 6.318E+01 6.318E+01
6.318E+01 6.318E+01 6.318E+01 6.318E+01 6.318E+01 6.318E+01
kr88 1.654E+02 1.654E+02 1.654E+02 1.654E+02 1.654E+02 1.654E+02
1.654E+02 1.654E+02 1.654E+02 1.654E+02 1.654E+02 1.654E+02
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 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 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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
pm147 6.282E+00 8.066E+00 9.819E+00 1.154E+01 1.323E+01 1.489E+01
1.653E+01 1.813E+01 1.970E+01 2.125E+01 2.276E+01 2.484E+01
pu238 2.827E-09 4.634E-09 6.894E-09 9.602E-09 1.276E-08 1.637E-08
2.042E-08 2.493E-08 2.989E-08 3.529E-08 4.116E-08 5.011E-08
pu239 1.657E-03 2.082E-03 2.505E-03 2.931E-03 3.357E-03 3.784E-03
4.210E-03 4.636E-03 5.061E-03 5.488E-03 5.914E-03 6.509E-03
pu240 6.619E-09 1.042E-08 1.507E-08 2.058E-08 2.694E-08 3.417E-08
4.225E-08 5.118E-08 6.097E-08 7.163E-08 8.315E-08 1.007E-07
pu241 1.231E-10 1.282E-10 1.360E-10 1.470E-10 1.619E-10 1.811E-10
2.054E-10 2.348E-10 2.702E-10 3.120E-10 3.611E-10 4.431E-10
pu242 5.323E-15 5.323E-15 5.323E-15 5.323E-15 5.324E-15 5.324E-15
5.324E-15 5.324E-15 5.324E-15 5.324E-15 5.324E-15 5.324E-15
pu243 7.539E-15 7.585E-15 7.557E-15 7.638E-15 7.530E-15 7.549E-15
7.522E-15 7.572E-15 7.539E-15 7.553E-15 7.532E-15 7.542E-15
rh103 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

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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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     sb132   8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01
8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01 8.969E+01
     sm147   4.964E-12 8.176E-12 1.218E-11 1.696E-11 2.251E-11 2.880E-11
3.583E-11 4.359E-11 5.206E-11 6.122E-11 7.107E-11 8.599E-11
     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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     sm151   5.717E+00 5.724E+00 5.732E+00 5.739E+00 5.746E+00 5.754E+00
5.761E+00 5.768E+00 5.776E+00 5.783E+00 5.790E+00 5.800E+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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     tc99    2.507E-04 3.171E-04 3.835E-04 4.498E-04 5.162E-04 5.826E-04
6.489E-04 7.153E-04 7.817E-04 8.480E-04 9.144E-04 1.007E-03
     te132   2.023E+02 2.023E+02 2.023E+02 2.023E+02 2.023E+02 2.023E+02
2.023E+02 2.023E+02 2.023E+02 2.023E+02 2.023E+02 2.023E+02
     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 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 4.264E-01 4.264E-01 4.264E-01 4.264E-01
     u236    6.705E-02 6.705E-02 6.705E-02 6.705E-02 6.705E-02 6.706E-02
6.706E-02 6.706E-02 6.706E-02 6.706E-02 6.706E-02 6.707E-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 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 0.000E+00 0.000E+00 0.000E+00 0.000E+00
     xe133   3.162E+02 3.162E+02 3.162E+02 3.162E+02 3.162E+02 3.162E+02
3.162E+02 3.162E+02 3.162E+02 3.162E+02 3.162E+02 3.157E+02
     xe133m  3.372E+00 3.372E+00 3.372E+00 3.372E+00 3.372E+00 3.372E+00
3.372E+00 3.372E+00 3.372E+00 3.371E+00 3.372E+00 3.367E+00
     xe135   3.077E+02 3.077E+02 3.077E+02 3.077E+02 3.077E+02 3.077E+02
3.077E+02 3.077E+02 3.077E+02 3.077E+02 3.077E+02 3.077E+02
     xe135m  3.749E+01 3.749E+01 3.749E+01 3.749E+01 3.749E+01 3.749E+01
3.749E+01 3.749E+01 3.749E+01 3.749E+01 3.749E+01 3.749E+01
  subtotal   2.160E+03 2.162E+03 2.164E+03 2.165E+03 2.167E+03 2.169E+03
2.171E+03 2.172E+03 2.174E+03 2.176E+03 2.177E+03 2.178E+03
     total   2.672E+04 2.688E+04 2.700E+04 2.710E+04 2.718E+04 2.724E+04
2.730E+04 2.734E+04 2.738E+04 2.741E+04 2.744E+04 2.746E+04
1
0                  units of measure: curies
0                                         time (d)
   nuclide   3.860E+02 3.870E+02 3.880E+02 3.890E+02 3.900E+02 3.910E+02
3.920E+02 3.930E+02 3.940E+02 3.950E+02
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     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 0.000E+00 0.000E+00
     ag110   1.671E-09 1.666E-09 1.661E-09 1.657E-09 1.652E-09 1.648E-09
1.643E-09 1.638E-09 1.634E-09 1.629E-09
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     am241   4.264E-12 4.266E-12 4.268E-12 4.270E-12 4.272E-12 4.274E-12
4.276E-12 4.278E-12 4.279E-12 4.281E-12
     am242m  2.148E-17 2.148E-17 2.148E-17 2.148E-17 2.148E-17 2.148E-17
2.148E-17 2.148E-17 2.148E-17 2.148E-17
     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 2.309E-13 2.309E-13
     cm242   1.351E-09 1.345E-09 1.340E-09 1.334E-09 1.328E-09 1.323E-09
1.317E-09 1.311E-09 1.306E-09 1.300E-09
     cm243   5.703E-11 5.703E-11 5.702E-11 5.702E-11 5.701E-11 5.701E-11
5.701E-11 5.700E-11 5.700E-11 5.700E-11
     cm244   9.030E-11 9.029E-11 9.028E-11 9.027E-11 9.026E-11 9.025E-11
9.024E-11 9.023E-11 9.022E-11 9.021E-11
     cm245   3.056E-19 3.056E-19 3.056E-19 3.056E-19 3.056E-19 3.056E-19
3.056E-19 3.056E-19 3.056E-19 3.056E-19
     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 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 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 0.000E+00 0.000E+00
     i129    1.220E-06 1.220E-06 1.220E-06 1.220E-06 1.220E-06 1.220E-06
1.220E-06 1.220E-06 1.220E-06 1.220E-06
     i130    2.581E-03 6.719E-04 1.749E-04 4.553E-05 1.185E-05 3.085E-06
8.031E-07 2.092E-07 5.459E-08 1.434E-08
     i131    1.261E+02 1.161E+02 1.067E+02 9.800E+01 8.997E+01 8.256E+01
7.575E+01 6.949E+01 6.375E+01 5.848E+01
     i132    1.680E+02 1.353E+02 1.090E+02 8.779E+01 7.071E+01 5.695E+01
4.587E+01 3.695E+01 2.976E+01 2.397E+01
     i133    1.454E+02 6.534E+01 2.937E+01 1.320E+01 5.932E+00 2.666E+00
1.198E+00 5.385E-01 2.420E-01 1.088E-01
     i135    2.351E+01 1.869E+00 1.486E-01 1.182E-02 9.445E-04 8.008E-05
1.136E-05 5.899E-06 5.465E-06 5.430E-06
     kr85    1.178E+00 1.178E+00 1.178E+00 1.178E+00 1.177E+00 1.177E+00
1.177E+00 1.177E+00 1.177E+00 1.176E+00
     kr85m   1.561E+00 3.808E-02 9.303E-04 2.383E-05 1.720E-06 1.180E-06
1.167E-06 1.167E-06 1.167E-06 1.167E-06
     kr88    4.731E-01 1.355E-03 6.901E-06 3.047E-06 3.036E-06 3.036E-06
3.036E-06 3.036E-06 3.036E-06 3.036E-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 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 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 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 0.000E+00 0.000E+00
     pm147   2.490E+01 2.495E+01 2.500E+01 2.504E+01 2.508E+01 2.512E+01
2.515E+01 2.518E+01 2.520E+01 2.523E+01
     pu238   5.034E-08 5.051E-08 5.062E-08 5.071E-08 5.077E-08 5.081E-08
5.084E-08 5.087E-08 5.088E-08 5.089E-08
     pu239   6.524E-03 6.535E-03 6.544E-03 6.550E-03 6.554E-03 6.558E-03
6.560E-03 6.562E-03 6.564E-03 6.565E-03
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     pu240   1.007E-07 1.007E-07 1.007E-07 1.007E-07 1.007E-07 1.007E-07
1.007E-07 1.007E-07 1.007E-07 1.007E-07
     pu241   4.430E-10 4.430E-10 4.429E-10 4.428E-10 4.428E-10 4.427E-10
4.427E-10 4.426E-10 4.425E-10 4.425E-10
     pu242   5.324E-15 5.324E-15 5.324E-15 5.324E-15 5.324E-15 5.324E-15
5.324E-15 5.324E-15 5.324E-15 5.324E-15
     pu243   2.629E-16 9.161E-18 3.194E-19 1.127E-20 5.260E-22 1.530E-22
1.404E-22 1.393E-22 1.404E-22 1.390E-22
     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 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 0.000E+00 0.000E+00
     sb132   1.646E-06 1.646E-06 1.646E-06 1.646E-06 1.646E-06 1.646E-06
1.646E-06 1.646E-06 1.646E-06 1.646E-06
     sm147   8.644E-11 8.688E-11 8.733E-11 8.778E-11 8.823E-11 8.867E-11
8.912E-11 8.958E-11 9.003E-11 9.048E-11
     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 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 0.000E+00 0.000E+00
     sm151   5.801E+00 5.801E+00 5.801E+00 5.800E+00 5.800E+00 5.800E+00
5.800E+00 5.800E+00 5.800E+00 5.800E+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 0.000E+00 0.000E+00
     tc99    1.009E-03 1.011E-03 1.013E-03 1.014E-03 1.015E-03 1.016E-03
1.016E-03 1.017E-03 1.017E-03 1.017E-03
     te132   1.630E+02 1.313E+02 1.057E+02 8.517E+01 6.860E+01 5.526E+01
4.451E+01 3.585E+01 2.887E+01 2.326E+01
     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 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 4.264E-01 4.264E-01
     u236    6.707E-02 6.707E-02 6.707E-02 6.707E-02 6.707E-02 6.707E-02
6.707E-02 6.707E-02 6.707E-02 6.707E-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 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 0.000E+00 0.000E+00
     xe133   3.040E+02 2.789E+02 2.501E+02 2.218E+02 1.956E+02 1.720E+02
1.510E+02 1.325E+02 1.161E+02 1.018E+02
     xe133m  3.068E+00 2.512E+00 1.955E+00 1.480E+00 1.104E+00 8.157E-01
5.994E-01 4.391E-01 3.210E-01 2.344E-01
     xe135   1.124E+02 2.319E+01 4.152E+00 7.041E-01 1.166E-01 1.909E-02
3.113E-03 5.104E-04 8.754E-05 1.893E-05
     xe135m  2.411E+00 1.916E-01 1.524E-02 1.212E-03 9.698E-05 8.354E-06
1.308E-06 7.480E-07 7.035E-07 6.999E-07
  subtotal   1.093E+03 7.975E+02 6.500E+02 5.510E+02 4.750E+02 4.132E+02
3.619E+02 3.188E+02 2.822E+02 2.510E+02
     total   5.328E+03 4.456E+03 4.005E+03 3.700E+03 3.467E+03 3.279E+03
3.121E+03 2.986E+03 2.868E+03 2.764E+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	ag110	am241	am242m	am243	cm242	cm243	cm244	cm245	cs133	eu153	gd155
0.000E+00	0.000E+00	2.136E-26	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
1.000E+00	0.000E+00	8.060E-09	3.935E-12	5.428E-20	2.309E-13	5.837E-09	5.848E-11	9.402E-11	8.106E-22	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	2.216E-08	3.935E-12	1.085E-19	2.309E-13	6.532E-09	5.848E-11	9.401E-11	1.622E-21	0.000E+00	0.000E+00	0.000E+00
3.000E+00	0.000E+00	3.841E-08	3.936E-12	1.628E-19	2.309E-13	6.759E-09	5.847E-11	9.400E-11	2.434E-21	0.000E+00	0.000E+00	0.000E+00
5.000E+00	0.000E+00	7.216E-08	3.937E-12	2.714E-19	2.309E-13	6.824E-09	5.846E-11	9.398E-11	4.046E-21	0.000E+00	0.000E+00	0.000E+00
1.000E+01	0.000E+00	1.571E-07	3.939E-12	5.430E-19	2.309E-13	6.697E-09	5.845E-11	9.393E-11	8.110E-21	0.000E+00	0.000E+00	0.000E+00
1.500E+01	0.000E+00	2.427E-07	3.942E-12	8.146E-19	2.309E-13	6.556E-09	5.843E-11	9.388E-11	1.215E-20	0.000E+00	0.000E+00	0.000E+00
2.000E+01	0.000E+00	3.268E-07	3.944E-12	1.086E-18	2.309E-13	6.418E-09	5.841E-11	9.383E-11	1.618E-20	0.000E+00	0.000E+00	0.000E+00
3.000E+01	0.000E+00	4.948E-07	3.949E-12	1.630E-18	2.309E-13	6.151E-09	5.837E-11	9.373E-11	2.425E-20	0.000E+00	0.000E+00	0.000E+00
4.000E+01	0.000E+00	6.663E-07	3.954E-12	2.175E-18	2.309E-13	5.894E-09	5.833E-11	9.363E-11	3.228E-20	0.000E+00	0.000E+00	0.000E+00
5.000E+01	0.000E+00	8.361E-07	3.959E-12	2.720E-18	2.309E-13	5.649E-09	5.829E-11	9.354E-11	4.036E-20	0.000E+00	0.000E+00	0.000E+00
7.500E+01	0.000E+00	1.255E-06	3.972E-12	4.085E-18	2.309E-13	5.078E-09	5.820E-11	9.329E-11	6.037E-20	0.000E+00	0.000E+00	0.000E+00
1.000E+02	0.000E+00	1.669E-06	3.985E-12	5.454E-18	2.309E-13	4.566E-09	5.810E-11	9.305E-11	8.034E-20	0.000E+00	0.000E+00	0.000E+00
1.250E+02	0.000E+00	2.118E-06	3.998E-12	6.827E-18	2.309E-13	4.105E-09	5.801E-11	9.280E-11	1.005E-19	0.000E+00	0.000E+00	0.000E+00
1.500E+02	0.000E+00	2.535E-06	4.012E-12	8.205E-18	2.309E-13	3.690E-09	5.791E-11	9.256E-11	1.205E-19	0.000E+00	0.000E+00	0.000E+00
1.750E+02	0.000E+00	2.964E-06	4.027E-12	9.588E-18	2.309E-13	3.318E-09	5.782E-11	9.232E-11	1.404E-19	0.000E+00	0.000E+00	0.000E+00
2.000E+02	0.000E+00	3.396E-06	4.044E-12	1.098E-17	2.309E-13	2.983E-09	5.773E-11	9.208E-11	1.602E-19	0.000E+00	0.000E+00	0.000E+00
2.250E+02	0.000E+00	3.818E-06	4.062E-12	1.237E-17	2.309E-13	2.681E-09	5.763E-11	9.183E-11	1.800E-19	0.000E+00	0.000E+00	0.000E+00
2.500E+02	0.000E+00	4.248E-06	4.083E-12	1.377E-17	2.309E-13	2.411E-09	5.754E-11	9.159E-11	1.998E-19	0.000E+00	0.000E+00	0.000E+00
2.750E+02	0.000E+00	4.634E-06	4.106E-12	1.517E-17	2.309E-13	2.167E-09	5.744E-11	9.135E-11	2.195E-19	0.000E+00	0.000E+00	0.000E+00
3.000E+02	0.000E+00	5.095E-06	4.133E-12	1.659E-17	2.309E-13	1.948E-09	5.735E-11	9.112E-11	2.391E-19	0.000E+00	0.000E+00	0.000E+00
3.250E+02	0.000E+00	5.494E-06	4.165E-12	1.801E-17	2.309E-13	1.752E-09	5.726E-11	9.088E-11	2.588E-19	0.000E+00	0.000E+00	0.000E+00
3.500E+02	0.000E+00	5.953E-06	4.201E-12	1.945E-17	2.309E-13	1.575E-09						

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5.716E-11 9.064E-11 2.784E-19 0.000E+00 0.000E+00 0.000E+00
  3.850E+02   0.000E+00 6.538E-06 4.262E-12 2.148E-17 2.309E-13 1.357E-09
5.703E-11 9.031E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.860E+02   0.000E+00 1.671E-09 4.264E-12 2.148E-17 2.309E-13 1.351E-09
5.703E-11 9.030E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.870E+02   0.000E+00 1.666E-09 4.266E-12 2.148E-17 2.309E-13 1.345E-09
5.703E-11 9.029E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.880E+02   0.000E+00 1.661E-09 4.268E-12 2.148E-17 2.309E-13 1.340E-09
5.702E-11 9.028E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.890E+02   0.000E+00 1.657E-09 4.270E-12 2.148E-17 2.309E-13 1.334E-09
5.702E-11 9.027E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.900E+02   0.000E+00 1.652E-09 4.272E-12 2.148E-17 2.309E-13 1.328E-09
5.701E-11 9.026E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.910E+02   0.000E+00 1.648E-09 4.274E-12 2.148E-17 2.309E-13 1.323E-09
5.701E-11 9.025E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.920E+02   0.000E+00 1.643E-09 4.276E-12 2.148E-17 2.309E-13 1.317E-09
5.701E-11 9.024E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.930E+02   0.000E+00 1.638E-09 4.278E-12 2.148E-17 2.309E-13 1.311E-09
5.700E-11 9.023E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.940E+02   0.000E+00 1.634E-09 4.279E-12 2.148E-17 2.309E-13 1.306E-09
5.700E-11 9.022E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
  3.950E+02   0.000E+00 1.629E-09 4.281E-12 2.148E-17 2.309E-13 1.300E-09
5.700E-11 9.021E-11 3.056E-19 0.000E+00 0.000E+00 0.000E+00
1
0                  units of measure: curies
                   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   1.084E-16 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
  1.000E+00   2.131E-09 7.350E-03 1.112E+01 3.537E+01 1.743E+02 2.723E+02
2.451E-03 6.202E+01 1.650E+02 0.000E+00 0.000E+00 0.000E+00
  2.000E+00   5.276E-09 9.272E-03 2.209E+01 6.831E+01 2.565E+02 2.939E+02
5.527E-03 6.355E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  3.000E+00   8.446E-09 9.772E-03 3.233E+01 9.484E+01 2.934E+02 2.956E+02
8.617E-03 6.359E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  5.000E+00   1.526E-08 9.893E-03 4.956E+01 1.331E+02 3.221E+02 2.957E+02
1.477E-02 6.328E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  1.000E+01   3.177E-08 9.876E-03 8.065E+01 1.843E+02 3.188E+02 2.956E+02
3.007E-02 6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00
  1.500E+01   4.826E-08 9.877E-03 1.009E+02 2.000E+02 3.188E+02 2.956E+02
4.537E-02 6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00
  2.000E+01   6.476E-08 9.877E-03 1.140E+02 2.054E+02 3.188E+02 2.956E+02
6.065E-02 6.317E+01 1.655E+02 0.000E+00 0.000E+00 0.000E+00
  3.000E+01   9.688E-08 9.871E-03 1.274E+02 2.065E+02 3.157E+02 2.956E+02
9.367E-02 6.319E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  4.000E+01   1.290E-07 9.872E-03 1.330E+02 2.068E+02 3.157E+02 2.956E+02
1.266E-01 6.319E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  5.000E+01   1.611E-07 9.872E-03 1.354E+02 2.068E+02 3.157E+02 2.956E+02
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1.595E-01 6.319E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  7.500E+01   2.401E-07 9.874E-03 1.363E+02 2.047E+02 3.148E+02 2.956E+02
2.377E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  1.000E+02   3.191E-07 9.875E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
3.155E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  1.250E+02   3.981E-07 9.876E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
3.930E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  1.500E+02   4.771E-07 9.877E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
4.701E-01 6.319E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  1.750E+02   5.561E-07 9.878E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
5.469E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  2.000E+02   6.351E-07 9.879E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
6.234E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  2.250E+02   7.141E-07 9.880E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
6.995E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  2.500E+02   7.931E-07 9.881E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
7.753E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  2.750E+02   8.721E-07 9.882E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
8.508E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  3.000E+02   9.511E-07 9.883E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
9.259E-01 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  3.250E+02   1.030E-06 9.884E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
1.001E+00 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  3.500E+02   1.109E-06 9.885E-03 1.364E+02 2.047E+02 3.148E+02 2.956E+02
1.075E+00 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  3.850E+02   1.219E-06 9.885E-03 1.362E+02 2.040E+02 3.148E+02 2.956E+02
1.178E+00 6.318E+01 1.654E+02 0.000E+00 0.000E+00 0.000E+00
  3.860E+02   1.220E-06 2.581E-03 1.261E+02 1.680E+02 1.454E+02 2.351E+01
1.178E+00 1.561E+00 4.731E-01 0.000E+00 0.000E+00 0.000E+00
  3.870E+02   1.220E-06 6.719E-04 1.161E+02 1.353E+02 6.534E+01 1.869E+00
1.178E+00 3.808E-02 1.355E-03 0.000E+00 0.000E+00 0.000E+00
  3.880E+02   1.220E-06 1.749E-04 1.067E+02 1.090E+02 2.937E+01 1.486E-01
1.178E+00 9.303E-04 6.901E-06 0.000E+00 0.000E+00 0.000E+00
  3.890E+02   1.220E-06 4.553E-05 9.800E+01 8.779E+01 1.320E+01 1.182E-02
1.178E+00 2.383E-05 3.047E-06 0.000E+00 0.000E+00 0.000E+00
  3.900E+02   1.220E-06 1.185E-05 8.997E+01 7.071E+01 5.932E+00 9.445E-04
1.177E+00 1.720E-06 3.036E-06 0.000E+00 0.000E+00 0.000E+00
  3.910E+02   1.220E-06 3.085E-06 8.256E+01 5.695E+01 2.666E+00 8.008E-05
1.177E+00 1.180E-06 3.036E-06 0.000E+00 0.000E+00 0.000E+00
  3.920E+02   1.220E-06 8.031E-07 7.575E+01 4.587E+01 1.198E+00 1.136E-05
1.177E+00 1.167E-06 3.036E-06 0.000E+00 0.000E+00 0.000E+00
  3.930E+02   1.220E-06 2.092E-07 6.949E+01 3.695E+01 5.385E-01 5.899E-06
1.177E+00 1.167E-06 3.036E-06 0.000E+00 0.000E+00 0.000E+00
  3.940E+02   1.220E-06 5.459E-08 6.375E+01 2.976E+01 2.420E-01 5.465E-06
1.177E+00 1.167E-06 3.036E-06 0.000E+00 0.000E+00 0.000E+00
  3.950E+02   1.220E-06 1.434E-08 5.848E+01 2.397E+01 1.088E-01 5.430E-06
1.176E+00 1.167E-06 3.036E-06 0.000E+00 0.000E+00 0.000E+00
1
0                  units of measure: curies
                   units of time(1st column):   time (d)
               nuclides
    time        o16       pm147     pu238     pu239     pu240
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pu241	pu242	pu243	rh103	ru101	sb132	sm147						
0.000E+00	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	2.197E-16	1.606E-20
1.000E+00	0.000E+00	2.453E-03	1.951E-11	2.425E-06	5.042E-13	1.191E-10	5.046E-15	6.839E-15	0.000E+00	0.000E+00	8.969E+01	1.466E-17
2.000E+00	0.000E+00	9.681E-03	1.966E-11	8.972E-06	1.438E-12	1.191E-10	5.225E-15	7.423E-15	0.000E+00	0.000E+00	8.969E+01	1.164E-16
3.000E+00	0.000E+00	2.139E-02	1.986E-11	1.861E-05	3.271E-12	1.190E-10	5.289E-15	7.594E-15	0.000E+00	0.000E+00	8.969E+01	3.881E-16
5.000E+00	0.000E+00	5.690E-02	2.053E-11	4.377E-05	1.016E-11	1.190E-10	5.319E-15	7.657E-15	0.000E+00	0.000E+00	8.969E+01	1.744E-15
1.000E+01	0.000E+00	2.038E-01	2.572E-11	1.217E-04	4.911E-11	1.189E-10	5.323E-15	7.589E-15	0.000E+00	0.000E+00	8.969E+01	1.286E-14
1.500E+01	0.000E+00	4.148E-01	3.974E-11	2.061E-04	1.216E-10	1.189E-10	5.323E-15	7.593E-15	0.000E+00	0.000E+00	8.969E+01	4.014E-14
2.000E+01	0.000E+00	6.721E-01	6.614E-11	2.918E-04	2.284E-10	1.188E-10	5.323E-15	7.507E-15	0.000E+00	0.000E+00	8.969E+01	8.850E-14
3.000E+01	0.000E+00	1.276E+00	1.642E-10	4.632E-04	5.459E-10	1.188E-10	5.323E-15	7.518E-15	0.000E+00	0.000E+00	8.969E+01	2.615E-13
4.000E+01	0.000E+00	1.950E+00	3.295E-10	6.336E-04	1.001E-09	1.188E-10	5.323E-15	7.544E-15	0.000E+00	0.000E+00	8.969E+01	5.496E-13
5.000E+01	0.000E+00	2.657E+00	5.654E-10	8.046E-04	1.594E-09	1.190E-10	5.323E-15	7.539E-15	0.000E+00	0.000E+00	8.969E+01	9.617E-13
7.500E+01	0.000E+00	4.471E+00	1.470E-09	1.232E-03	3.676E-09	1.202E-10	5.323E-15	7.521E-15	0.000E+00	0.000E+00	8.969E+01	2.556E-12
1.000E+02	0.000E+00	6.282E+00	2.827E-09	1.657E-03	6.619E-09	1.231E-10	5.323E-15	7.539E-15	0.000E+00	0.000E+00	8.969E+01	4.964E-12
1.250E+02	0.000E+00	8.066E+00	4.634E-09	2.082E-03	1.042E-08	1.282E-10	5.323E-15	7.585E-15	0.000E+00	0.000E+00	8.969E+01	8.176E-12
1.500E+02	0.000E+00	9.819E+00	6.894E-09	2.505E-03	1.507E-08	1.360E-10	5.323E-15	7.557E-15	0.000E+00	0.000E+00	8.969E+01	1.218E-11
1.750E+02	0.000E+00	1.154E+01	9.602E-09	2.931E-03	2.058E-08	1.470E-10	5.323E-15	7.638E-15	0.000E+00	0.000E+00	8.969E+01	1.696E-11
2.000E+02	0.000E+00	1.323E+01	1.276E-08	3.357E-03	2.694E-08	1.619E-10	5.324E-15	7.530E-15	0.000E+00	0.000E+00	8.969E+01	2.251E-11
2.250E+02	0.000E+00	1.489E+01	1.637E-08	3.784E-03	3.417E-08	1.811E-10	5.324E-15	7.549E-15	0.000E+00	0.000E+00	8.969E+01	2.880E-11
2.500E+02	0.000E+00	1.653E+01	2.042E-08	4.210E-03	4.225E-08	2.054E-10	5.324E-15	7.522E-15	0.000E+00	0.000E+00	8.969E+01	3.583E-11
2.750E+02	0.000E+00	1.813E+01	2.493E-08	4.636E-03	5.118E-08	2.348E-10	5.324E-15	7.572E-15	0.000E+00	0.000E+00	8.969E+01	4.359E-11
3.000E+02	0.000E+00	1.970E+01	2.989E-08	5.061E-03	6.097E-08	2.702E-10	5.324E-15	7.539E-15	0.000E+00	0.000E+00	8.969E+01	5.206E-11
3.250E+02	0.000E+00	2.125E+01	3.529E-08	5.488E-03	7.163E-08	3.120E-10	5.324E-15	7.553E-15	0.000E+00	0.000E+00	8.969E+01	6.122E-11
3.500E+02	0.000E+00	2.276E+01	4.116E-08	5.914E-03	8.315E-08	3.611E-10	5.324E-15	7.532E-15	0.000E+00	0.000E+00	8.969E+01	7.107E-11
3.850E+02	0.000E+00	2.484E+01	5.011E-08	6.509E-03	1.007E-07	4.431E-10	5.324E-15	7.542E-15	0.000E+00	0.000E+00	8.969E+01	8.599E-11
3.860E+02	0.000E+00	2.490E+01	5.034E-08	6.524E-03	1.007E-07	4.430E-10						

```
5.324E-15 2.629E-16 0.000E+00 0.000E+00 1.646E-06 8.644E-11
  3.870E+02   0.000E+00 2.495E+01 5.051E-08 6.535E-03 1.007E-07 4.430E-10
5.324E-15 9.161E-18 0.000E+00 0.000E+00 1.646E-06 8.688E-11
  3.880E+02   0.000E+00 2.500E+01 5.062E-08 6.544E-03 1.007E-07 4.429E-10
5.324E-15 3.194E-19 0.000E+00 0.000E+00 1.646E-06 8.733E-11
  3.890E+02   0.000E+00 2.504E+01 5.071E-08 6.550E-03 1.007E-07 4.428E-10
5.324E-15 1.127E-20 0.000E+00 0.000E+00 1.646E-06 8.778E-11
  3.900E+02   0.000E+00 2.508E+01 5.077E-08 6.554E-03 1.007E-07 4.428E-10
5.324E-15 5.260E-22 0.000E+00 0.000E+00 1.646E-06 8.823E-11
  3.910E+02   0.000E+00 2.512E+01 5.081E-08 6.558E-03 1.007E-07 4.427E-10
5.324E-15 1.530E-22 0.000E+00 0.000E+00 1.646E-06 8.867E-11
  3.920E+02   0.000E+00 2.515E+01 5.084E-08 6.560E-03 1.007E-07 4.427E-10
5.324E-15 1.404E-22 0.000E+00 0.000E+00 1.646E-06 8.912E-11
  3.930E+02   0.000E+00 2.518E+01 5.087E-08 6.562E-03 1.007E-07 4.426E-10
5.324E-15 1.393E-22 0.000E+00 0.000E+00 1.646E-06 8.958E-11
  3.940E+02   0.000E+00 2.520E+01 5.088E-08 6.564E-03 1.007E-07 4.425E-10
5.324E-15 1.404E-22 0.000E+00 0.000E+00 1.646E-06 9.003E-11
  3.950E+02   0.000E+00 2.523E+01 5.089E-08 6.565E-03 1.007E-07 4.425E-10
5.324E-15 1.390E-22 0.000E+00 0.000E+00 1.646E-06 9.048E-11
1
0                  units of measure: curies
                   units of time(1st column):   time (d)
               nuclides
    time         sm149     sm150     sm151     sm152     tc99
te132     u234      u235      u236      u238      xe131     xe133
 ----------   --------- --------- --------- --------- --------- ---------
--------- --------- --------- --------- --------- ---------
  0.000E+00   0.000E+00 0.000E+00 5.688E+00 0.000E+00 8.062E-15 1.553E-19
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 1.186E-07
  1.000E+00   0.000E+00 0.000E+00 5.688E+00 0.000E+00 1.758E-07 3.958E+01
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 1.205E+01
  2.000E+00   0.000E+00 0.000E+00 5.688E+00 0.000E+00 8.334E-07 7.154E+01
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 3.792E+01
  3.000E+00   0.000E+00 0.000E+00 5.689E+00 0.000E+00 1.917E-06 9.729E+01
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 6.753E+01
  5.000E+00   0.000E+00 0.000E+00 5.689E+00 0.000E+00 5.012E-06 1.344E+02
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 1.248E+02
  1.000E+01   0.000E+00 0.000E+00 5.691E+00 0.000E+00 1.566E-05 1.794E+02
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 2.203E+02
  1.500E+01   0.000E+00 0.000E+00 5.692E+00 0.000E+00 2.793E-05 1.947E+02
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 2.695E+02
  2.000E+01   0.000E+00 0.000E+00 5.694E+00 0.000E+00 4.065E-05 1.999E+02
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 2.949E+02
  3.000E+01   0.000E+00 0.000E+00 5.697E+00 0.000E+00 6.639E-05 2.021E+02
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 3.123E+02
  4.000E+01   0.000E+00 0.000E+00 5.699E+00 0.000E+00 9.219E-05 2.023E+02
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 3.168E+02
  5.000E+01   0.000E+00 0.000E+00 5.702E+00 0.000E+00 1.180E-04 2.024E+02
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 3.180E+02
  7.500E+01   0.000E+00 0.000E+00 5.710E+00 0.000E+00 1.843E-04 2.023E+02
1.012E+01 4.264E-01 6.704E-02 2.690E-01 0.000E+00 3.162E+02
  1.000E+02   0.000E+00 0.000E+00 5.717E+00 0.000E+00 2.507E-04 2.023E+02
```

```
1.012E+01 4.264E-01 6.705E-02 2.690E-01 0.000E+00 3.162E+02
  1.250E+02   0.000E+00 0.000E+00 5.724E+00 0.000E+00 3.171E-04 2.023E+02
1.012E+01 4.264E-01 6.705E-02 2.690E-01 0.000E+00 3.162E+02
  1.500E+02   0.000E+00 0.000E+00 5.732E+00 0.000E+00 3.835E-04 2.023E+02
1.012E+01 4.264E-01 6.705E-02 2.690E-01 0.000E+00 3.162E+02
  1.750E+02   0.000E+00 0.000E+00 5.739E+00 0.000E+00 4.498E-04 2.023E+02
1.012E+01 4.264E-01 6.705E-02 2.690E-01 0.000E+00 3.162E+02
  2.000E+02   0.000E+00 0.000E+00 5.746E+00 0.000E+00 5.162E-04 2.023E+02
1.012E+01 4.264E-01 6.705E-02 2.690E-01 0.000E+00 3.162E+02
  2.250E+02   0.000E+00 0.000E+00 5.754E+00 0.000E+00 5.826E-04 2.023E+02
1.012E+01 4.264E-01 6.706E-02 2.690E-01 0.000E+00 3.162E+02
  2.500E+02   0.000E+00 0.000E+00 5.761E+00 0.000E+00 6.489E-04 2.023E+02
1.012E+01 4.264E-01 6.706E-02 2.690E-01 0.000E+00 3.162E+02
  2.750E+02   0.000E+00 0.000E+00 5.768E+00 0.000E+00 7.153E-04 2.023E+02
1.012E+01 4.264E-01 6.706E-02 2.690E-01 0.000E+00 3.162E+02
  3.000E+02   0.000E+00 0.000E+00 5.776E+00 0.000E+00 7.817E-04 2.023E+02
1.012E+01 4.264E-01 6.706E-02 2.690E-01 0.000E+00 3.162E+02
  3.250E+02   0.000E+00 0.000E+00 5.783E+00 0.000E+00 8.480E-04 2.023E+02
1.012E+01 4.264E-01 6.706E-02 2.690E-01 0.000E+00 3.162E+02
  3.500E+02   0.000E+00 0.000E+00 5.790E+00 0.000E+00 9.144E-04 2.023E+02
1.012E+01 4.264E-01 6.706E-02 2.690E-01 0.000E+00 3.162E+02
  3.850E+02   0.000E+00 0.000E+00 5.800E+00 0.000E+00 1.007E-03 2.023E+02
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 3.157E+02
  3.860E+02   0.000E+00 0.000E+00 5.801E+00 0.000E+00 1.009E-03 1.630E+02
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 3.040E+02
  3.870E+02   0.000E+00 0.000E+00 5.801E+00 0.000E+00 1.011E-03 1.313E+02
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 2.789E+02
  3.880E+02   0.000E+00 0.000E+00 5.801E+00 0.000E+00 1.013E-03 1.057E+02
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 2.501E+02
  3.890E+02   0.000E+00 0.000E+00 5.800E+00 0.000E+00 1.014E-03 8.517E+01
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 2.218E+02
  3.900E+02   0.000E+00 0.000E+00 5.800E+00 0.000E+00 1.015E-03 6.860E+01
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 1.956E+02
  3.910E+02   0.000E+00 0.000E+00 5.800E+00 0.000E+00 1.016E-03 5.526E+01
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 1.720E+02
  3.920E+02   0.000E+00 0.000E+00 5.800E+00 0.000E+00 1.016E-03 4.451E+01
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 1.510E+02
  3.930E+02   0.000E+00 0.000E+00 5.800E+00 0.000E+00 1.017E-03 3.585E+01
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 1.325E+02
  3.940E+02   0.000E+00 0.000E+00 5.800E+00 0.000E+00 1.017E-03 2.887E+01
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 1.161E+02
  3.950E+02   0.000E+00 0.000E+00 5.800E+00 0.000E+00 1.017E-03 2.326E+01
1.012E+01 4.264E-01 6.707E-02 2.690E-01 0.000E+00 1.018E+02
1
0                   units of measure: curies
                    units of time(1st column):   time (d)
                nuclides
    time         xe133m    xe135     xe135m
 ----------   --------- --------- ---------
  0.000E+00   2.827E-22 1.632E-06 5.455E-18
  1.000E+00   3.088E-01 1.958E+02 3.572E+01
  2.000E+00   8.809E-01 2.852E+02 3.794E+01
```

3.000E+00	1.454E+00	3.043E+02	3.811E+01
5.000E+00	2.355E+00	3.079E+02	3.783E+01
1.000E+01	3.218E+00	3.077E+02	3.754E+01
1.500E+01	3.391E+00	3.077E+02	3.754E+01
2.000E+01	3.427E+00	3.078E+02	3.754E+01
3.000E+01	3.399E+00	3.077E+02	3.749E+01
4.000E+01	3.397E+00	3.077E+02	3.749E+01
5.000E+01	3.397E+00	3.077E+02	3.749E+01
7.500E+01	3.372E+00	3.077E+02	3.749E+01
1.000E+02	3.372E+00	3.077E+02	3.749E+01
1.250E+02	3.372E+00	3.077E+02	3.749E+01
1.500E+02	3.372E+00	3.077E+02	3.749E+01
1.750E+02	3.372E+00	3.077E+02	3.749E+01
2.000E+02	3.372E+00	3.077E+02	3.749E+01
2.250E+02	3.372E+00	3.077E+02	3.749E+01
2.500E+02	3.372E+00	3.077E+02	3.749E+01
2.750E+02	3.372E+00	3.077E+02	3.749E+01
3.000E+02	3.372E+00	3.077E+02	3.749E+01
3.250E+02	3.371E+00	3.077E+02	3.749E+01
3.500E+02	3.372E+00	3.077E+02	3.749E+01
3.850E+02	3.367E+00	3.077E+02	3.749E+01
3.860E+02	3.068E+00	1.124E+02	2.411E+00
3.870E+02	2.512E+00	2.319E+01	1.916E-01
3.880E+02	1.955E+00	4.152E+00	1.524E-02
3.890E+02	1.480E+00	7.041E-01	1.212E-03
3.900E+02	1.104E+00	1.166E-01	9.698E-05
3.910E+02	8.157E-01	1.909E-02	8.354E-06
3.920E+02	5.994E-01	3.113E-03	1.308E-06
3.930E+02	4.391E-01	5.104E-04	7.480E-07
3.940E+02	3.210E-01	8.754E-05	7.035E-07
3.950E+02	2.344E-01	1.893E-05	6.999E-07

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
1.000E+00	1.110E+03	2.220E+04
2.000E+00	1.410E+03	2.309E+04
3.000E+00	1.560E+03	2.355E+04
5.000E+00	1.743E+03	2.408E+04
1.000E+01	1.963E+03	2.477E+04
1.500E+01	2.064E+03	2.515E+04
2.000E+01	2.113E+03	2.541E+04
3.000E+01	2.144E+03	2.575E+04
4.000E+01	2.156E+03	2.600E+04
5.000E+01	2.160E+03	2.619E+04
7.500E+01	2.158E+03	2.650E+04
1.000E+02	2.160E+03	2.672E+04
1.250E+02	2.162E+03	2.688E+04
1.500E+02	2.164E+03	2.700E+04

```
  1.750E+02   2.165E+03 2.710E+04
  2.000E+02   2.167E+03 2.718E+04
  2.250E+02   2.169E+03 2.724E+04
  2.500E+02   2.171E+03 2.730E+04
  2.750E+02   2.172E+03 2.734E+04
  3.000E+02   2.174E+03 2.738E+04
  3.250E+02   2.176E+03 2.741E+04
  3.500E+02   2.177E+03 2.744E+04
  3.850E+02   2.178E+03 2.746E+04
  3.860E+02   1.093E+03 5.328E+03
  3.870E+02   7.975E+02 4.456E+03
  3.880E+02   6.500E+02 4.005E+03
  3.890E+02   5.510E+02 3.700E+03
  3.900E+02   4.750E+02 3.467E+03
  3.910E+02   4.132E+02 3.279E+03
  3.920E+02   3.619E+02 3.121E+03
  3.930E+02   3.188E+02 2.986E+03
  3.940E+02   2.822E+02 2.868E+03
  3.950E+02   2.510E+02 2.764E+03
1
    OOOOOOOOOOO    PPPPPPPPPPPP    UU         UU    SSSSSSSSSSS
   OOOOOOOOOOOOO   PPPPPPPPPPPPP   UU         UU   SSSSSSSSSSSSS
   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   SSSSSSSSSSSS
   OO         OO   PPPPPPPPPPPP    UU         UU    SSSSSSSSSSSS
   OO         OO   PP              UU         UU              SS
   OO         OO   PP              UU         UU              SS
   OO         OO   PP              UU         UU   SS         SS
   OOOOOOOOOOOOO   PP              UUUUUUUUUUUUU   SSSSSSSSSSSSS
    OOOOOOOOOOO    PP               UUUUUUUUUUU     SSSSSSSSSSS



   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       99999999999                //   22222222222
22222222222               //        11         666666666666
     000000000     9999999999999              //   2222222222222
2222222222222             //        111        6666666666666
    00       00    99         99             //    22         22   22
22             //        1111        66
   00         00   99         99            //                22
22           //           11        66
   00         00   99         99           //                 22
22          //            11        66
   00         00   9999999999999          //                22
22           //             11        666666666666
   00         00    999999999999         //               22
22            //              11        6666666666666
   00         00              99        //              22
22              //               11        66         66
   00         00              99       //             22
22               //                11        66         66
    00       00               99      //            22             22
//                 11        66         66
     000000000     9999999999999     //            2222222222222
2222222222222     //                11111111     6666666666666
      0000000      999999999999     //            2222222222222
2222222222222    //                11111111      66666666666



      0000000       666666666666                   5555555555555
5555555555555                            44     5555555555555
     000000000     6666666666666                  5555555555555
5555555555555                            444     5555555555555
    00       00    66                    :::       55             55
:::              4444     55
   00         00   66                    :::       55             55
:::             44 44     55
   00         00   66                    :::       55             55
:::            44  44     55
   00         00   666666666666                   555555555555
555555555555                             44   44     555555555555
   00         00   6666666666666                  5555555555555
5555555555555                           44    44     5555555555555
   00         00   66         66         :::                 55
```

```
55         :::        444444444444              55
   00         00   66         66         :::                  55
55         :::       4444444444444              55
    00       00    66         66         :::       55         55   55
55         :::                44     55         55
     000000000     6666666666666                   5555555555555
5555555555555                            44     5555555555555
      0000000       66666666666                     55555555555
55555555555                              44      55555555555
1

    SSSSSSSSSSS     CCCCCCCCCCC      AAAAAAAAA     LL
EEEEEEEEEEEE
   SSSSSSSSSSSSS   CCCCCCCCCCCCC    AAAAAAAAAAA    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   CCCCCCCCCCCCC   AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
    SSSSSSSSSSS     CCCCCCCCCCC    AA         AA   LLLLLLLLLLLL
EEEEEEEEEEEE
```

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

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

**********************************************************************
************************************************
        *****
*****
        *****                                          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.40724
*****
        *****
*****
        *****
*****
        *****    this is not a SCALE    configuration controlled code
*****
        *****
*****
        *****              jobname:  David
*****
        *****
*****
        *****         machine name:
*****
        *****
*****
        *****    date of execution:  22_sep_2016
*****
        *****
*****
        *****    time of execution:  06:55:45.07
*****
        *****
*****
        *****
*****

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

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

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************************************************
1
                          depletion material no. 1:depletion material no.
1:"grams"
0                  units of measure: grams
0                                        time (d)
   nuclide   0.000E+00 1.000E+00 2.000E+00 3.000E+00 5.000E+00 1.000E+01
1.500E+01 2.000E+01 3.000E+01 4.000E+01 5.000E+01 7.500E+01
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     ag108m  2.724E-31 2.724E-11 5.449E-11 8.176E-11 1.363E-10 2.724E-10
4.085E-10 5.448E-10 8.174E-10 1.090E-09 1.362E-09 2.044E-09
     ag109   5.187E-13 3.720E-07 1.105E-06 1.946E-06 3.696E-06 8.105E-06
1.251E-05 1.692E-05 2.574E-05 3.455E-05 4.337E-05 6.539E-05
     am241   1.147E-12 1.147E-12 1.147E-12 1.147E-12 1.148E-12 1.148E-12
1.149E-12 1.150E-12 1.151E-12 1.153E-12 1.154E-12 1.158E-12
     am242m  0.000E+00 5.179E-21 1.035E-20 1.553E-20 2.589E-20 5.180E-20
7.771E-20 1.036E-19 1.555E-19 2.075E-19 2.595E-19 3.897E-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 1.156E-12 1.156E-12 1.156E-12 1.156E-12
     cm242   1.152E-12 1.760E-12 1.970E-12 2.039E-12 2.058E-12 2.020E-12
1.977E-12 1.936E-12 1.855E-12 1.778E-12 1.704E-12 1.532E-12
     cm243   1.156E-12 1.156E-12 1.156E-12 1.156E-12 1.156E-12 1.156E-12
1.155E-12 1.155E-12 1.154E-12 1.153E-12 1.153E-12 1.151E-12
     cm244   1.161E-12 1.161E-12 1.161E-12 1.161E-12 1.160E-12 1.160E-12
1.159E-12 1.159E-12 1.157E-12 1.156E-12 1.155E-12 1.152E-12
     cm245   0.000E+00 4.720E-21 9.442E-21 1.417E-20 2.356E-20 4.722E-20
7.075E-20 9.423E-20 1.412E-19 1.880E-19 2.350E-19 3.515E-19
     cs133   6.329E-13 2.972E-06 2.018E-05 5.733E-05 1.940E-04 8.220E-04
1.696E-03 2.697E-03 4.856E-03 7.081E-03 9.323E-03 1.492E-02
     eu153   1.135E-01 1.135E-01 1.135E-01 1.135E-01 1.135E-01 1.136E-01
1.136E-01 1.136E-01 1.137E-01 1.137E-01 1.138E-01 1.140E-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 3.151E-02 3.151E-02 3.151E-02 3.151E-02
     i129    6.138E-13 1.207E-05 2.988E-05 4.783E-05 8.641E-05 1.799E-04
2.733E-04 3.667E-04 5.486E-04 7.305E-04 9.124E-04 1.360E-03
     i130    5.004E-29 3.767E-09 4.752E-09 5.008E-09 5.070E-09 5.062E-09
5.062E-09 5.062E-09 5.059E-09 5.059E-09 5.060E-09 5.061E-09
     i131    1.274E-27 8.946E-05 1.777E-04 2.600E-04 3.986E-04 6.487E-04
8.116E-04 9.173E-04 1.025E-03 1.070E-03 1.089E-03 1.096E-03
     i132    3.016E-27 3.417E-06 6.600E-06 9.164E-06 1.286E-05 1.781E-05
1.933E-05 1.985E-05 1.995E-05 1.998E-05 1.998E-05 1.978E-05
     i133    2.757E-26 1.538E-04 2.263E-04 2.589E-04 2.842E-04 2.813E-04
2.813E-04 2.813E-04 2.786E-04 2.786E-04 2.786E-04 2.778E-04
     i135    6.424E-13 7.702E-05 8.315E-05 8.363E-05 8.365E-05 8.364E-05
8.364E-05 8.364E-05 8.364E-05 8.364E-05 8.364E-05 8.364E-05
     kr85    5.379E-27 6.266E-06 1.413E-05 2.203E-05 3.775E-05 7.687E-05
1.160E-04 1.550E-04 2.394E-04 3.237E-04 4.078E-04 6.076E-04
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kr85m 1.241E-27 7.533E-06 7.719E-06 7.724E-06 7.686E-06 7.673E-06 7.673E-06 7.673E-06 7.675E-06 7.675E-06 7.675E-06 7.675E-06
kr88 3.790E-25 1.315E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05
mo95 5.102E-01 5.102E-01 5.102E-01 5.102E-01 5.102E-01 5.102E-01 5.102E-01 5.102E-01 5.103E-01 5.105E-01 5.107E-01 5.116E-01
nd143 6.805E-13 8.249E-07 5.874E-06 1.767E-05 6.589E-05 3.328E-04 7.799E-04 1.368E-03 2.847E-03 4.588E-03 6.487E-03 1.156E-02
nd145 6.900E-13 9.517E-05 2.362E-04 3.800E-04 6.666E-04 1.380E-03 2.093E-03 2.806E-03 4.231E-03 5.656E-03 7.081E-03 1.084E-02
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 7.613E-14 7.613E-14 7.613E-14 7.613E-14
pu238 1.133E-12 1.139E-12 1.148E-12 1.159E-12 1.198E-12 1.501E-12 2.319E-12 3.860E-12 9.584E-12 1.923E-11 3.299E-11 8.579E-11
pu239 1.137E-12 3.907E-05 1.446E-04 2.998E-04 7.052E-04 1.960E-03 3.321E-03 4.702E-03 7.462E-03 1.021E-02 1.296E-02 1.984E-02
pu240 1.142E-12 2.220E-12 6.331E-12 1.440E-11 4.473E-11 2.162E-10 5.352E-10 1.006E-09 2.403E-09 4.406E-09 7.016E-09 1.618E-08
pu241 1.147E-12 1.147E-12 1.146E-12 1.146E-12 1.146E-12 1.145E-12 1.145E-12 1.144E-12 1.144E-12 1.144E-12 1.146E-12 1.158E-12
pu242 1.152E-12 1.280E-12 1.326E-12 1.342E-12 1.350E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12
pu243 0.000E+00 2.627E-21 2.852E-21 2.917E-21 2.941E-21 2.915E-21 2.917E-21 2.884E-21 2.888E-21 2.898E-21 2.896E-21 2.889E-21
ra222 0.000E+00 8.745E-28 1.230E-26 5.526E-26 3.406E-25 3.429E-24 1.214E-23 2.836E-23 8.742E-23 1.835E-22 3.152E-22 7.695E-22
rh103 4.901E-13 6.158E-07 2.590E-06 5.904E-06 1.653E-05 6.488E-05 1.422E-04 2.461E-04 5.248E-04 8.851E-04 1.314E-03 2.616E-03
ru101 4.806E-13 1.343E-04 2.724E-04 4.105E-04 6.792E-04 1.340E-03 2.001E-03 2.661E-03 3.975E-03 5.289E-03 6.603E-03 9.876E-03
sm147 6.995E-13 6.386E-10 5.072E-09 1.691E-08 7.599E-08 5.601E-07 1.749E-06 3.856E-06 1.139E-05 2.395E-05 4.190E-05 1.114E-04
sm149 7.090E-13 4.710E-06 1.899E-05 4.036E-05 9.718E-05 2.868E-04 4.990E-04 7.159E-04 1.140E-03 1.560E-03 1.980E-03 3.006E-03
sm150 7.138E-13 9.479E-10 2.111E-09 3.338E-09 6.063E-09 1.571E-08 2.888E-08 4.579E-08 9.006E-08 1.489E-07 2.223E-07 4.673E-07
sm151 2.161E-01 2.161E-01 2.161E-01 2.162E-01 2.162E-01 2.162E-01 2.163E-01 2.163E-01 2.165E-01 2.166E-01 2.167E-01 2.170E-01
sm152 7.233E-13 1.033E-05 2.082E-05 3.131E-05 5.212E-05 1.039E-04 1.557E-04 2.074E-04 3.108E-04 4.142E-04 5.176E-04 7.758E-04
tc99 4.711E-13 1.027E-05 4.870E-05 1.120E-04 2.929E-04 9.151E-04 1.632E-03 2.375E-03 3.879E-03 5.387E-03 6.895E-03 1.077E-02
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 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 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 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 7.999E+05 7.999E+05 7.999E+05 7.999E+05
xe133 6.329E-13 6.431E-05 2.024E-04 3.605E-04 6.661E-04 1.176E-03 1.439E-03 1.574E-03 1.667E-03 1.691E-03 1.698E-03 1.688E-03

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     xe133m  6.303E-28 6.886E-07 1.964E-06 3.242E-06 5.252E-06 7.176E-06
7.562E-06 7.641E-06 7.579E-06 7.574E-06 7.574E-06 7.517E-06
     xe135   6.424E-13 7.708E-05 1.122E-04 1.197E-04 1.212E-04 1.211E-04
1.211E-04 1.211E-04 1.211E-04 1.211E-04 1.211E-04 1.211E-04
     xe135m  5.986E-26 3.920E-07 4.163E-07 4.183E-07 4.151E-07 4.120E-07
4.120E-07 4.120E-07 4.114E-07 4.114E-07 4.114E-07 4.114E-07
  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 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 1.590E+06 1.590E+06 1.590E+06 1.590E+06
1
0                  units of measure: grams
0                                        time (d)
   nuclide   1.000E+02 1.250E+02 1.500E+02 1.750E+02 2.000E+02 2.250E+02
2.500E+02 2.750E+02 3.000E+02 3.250E+02 3.500E+02 3.850E+02
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     ag108m  2.726E-09 3.406E-09 4.088E-09 4.769E-09 5.449E-09 6.131E-09
6.811E-09 7.492E-09 8.172E-09 8.852E-09 9.531E-09 1.048E-08
     ag109   8.741E-05 1.094E-04 1.315E-04 1.535E-04 1.755E-04 1.975E-04
2.195E-04 2.416E-04 2.636E-04 2.856E-04 3.076E-04 3.385E-04
     am241   1.162E-12 1.165E-12 1.170E-12 1.174E-12 1.179E-12 1.184E-12
1.190E-12 1.197E-12 1.205E-12 1.214E-12 1.225E-12 1.242E-12
     am242m  5.204E-19 6.513E-19 7.828E-19 9.147E-19 1.047E-18 1.180E-18
1.314E-18 1.448E-18 1.582E-18 1.718E-18 1.855E-18 2.049E-18
     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 1.156E-12 1.156E-12 1.156E-12 1.156E-12
     cm242   1.377E-12 1.238E-12 1.113E-12 1.001E-12 8.995E-13 8.087E-13
7.270E-13 6.536E-13 5.876E-13 5.283E-13 4.750E-13 4.092E-13
     cm243   1.149E-12 1.147E-12 1.145E-12 1.143E-12 1.141E-12 1.139E-12
1.138E-12 1.136E-12 1.134E-12 1.132E-12 1.130E-12 1.128E-12
     cm244   1.149E-12 1.146E-12 1.143E-12 1.140E-12 1.137E-12 1.134E-12
1.131E-12 1.128E-12 1.125E-12 1.122E-12 1.119E-12 1.115E-12
     cm245   4.678E-19 5.849E-19 7.015E-19 8.173E-19 9.330E-19 1.048E-18
1.163E-18 1.278E-18 1.392E-18 1.507E-18 1.621E-18 1.779E-18
     cs133   2.050E-02 2.609E-02 3.167E-02 3.726E-02 4.284E-02 4.843E-02
5.401E-02 5.960E-02 6.518E-02 7.077E-02 7.635E-02 8.416E-02
     eu153   1.141E-01 1.143E-01 1.144E-01 1.146E-01 1.147E-01 1.149E-01
1.150E-01 1.152E-01 1.153E-01 1.155E-01 1.156E-01 1.158E-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 3.151E-02 3.151E-02 3.152E-02 3.152E-02
     i129    1.807E-03 2.254E-03 2.702E-03 3.149E-03 3.596E-03 4.044E-03
4.491E-03 4.938E-03 5.386E-03 5.833E-03 6.280E-03 6.905E-03
     i130    5.061E-09 5.062E-09 5.062E-09 5.063E-09 5.063E-09 5.064E-09
5.064E-09 5.065E-09 5.065E-09 5.066E-09 5.066E-09 5.066E-09
     i131    1.097E-03 1.097E-03 1.097E-03 1.097E-03 1.097E-03 1.097E-03
1.097E-03 1.097E-03 1.097E-03 1.097E-03 1.097E-03 1.096E-03
     i132    1.978E-05 1.978E-05 1.978E-05 1.978E-05 1.978E-05 1.978E-05
1.978E-05 1.978E-05 1.978E-05 1.978E-05 1.978E-05 1.971E-05
     i133    2.778E-04 2.778E-04 2.778E-04 2.778E-04 2.778E-04 2.778E-04
2.778E-04 2.778E-04 2.778E-04 2.778E-04 2.778E-04 2.778E-04
     i135    8.364E-05 8.364E-05 8.364E-05 8.364E-05 8.364E-05 8.364E-05
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8.364E-05 8.364E-05 8.364E-05 8.364E-05 8.364E-05 8.364E-05
kr85 8.066E-04 1.005E-03 1.202E-03 1.398E-03 1.594E-03 1.788E-03
1.982E-03 2.175E-03 2.367E-03 2.558E-03 2.748E-03 3.011E-03
kr85m 7.675E-06 7.675E-06 7.675E-06 7.675E-06 7.675E-06 7.675E-06
7.675E-06 7.675E-06 7.675E-06 7.675E-06 7.675E-06 7.675E-06
kr88 1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05
1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05 1.319E-05
mo95 5.129E-01 5.148E-01 5.170E-01 5.196E-01 5.225E-01 5.255E-01
5.288E-01 5.322E-01 5.357E-01 5.392E-01 5.429E-01 5.481E-01
nd143 1.682E-02 2.212E-02 2.744E-02 3.276E-02 3.808E-02 4.340E-02
4.872E-02 5.404E-02 5.937E-02 6.469E-02 7.001E-02 7.746E-02
nd145 1.461E-02 1.837E-02 2.213E-02 2.589E-02 2.965E-02 3.342E-02
3.718E-02 4.094E-02 4.470E-02 4.847E-02 5.223E-02 5.741E-02
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 7.613E-14 7.613E-14 7.613E-14 7.613E-14
pu238 1.650E-10 2.704E-10 4.023E-10 5.604E-10 7.446E-10 9.551E-10
1.192E-09 1.455E-09 1.744E-09 2.060E-09 2.402E-09 2.925E-09
pu239 2.669E-02 3.354E-02 4.037E-02 4.722E-02 5.408E-02 6.096E-02
6.782E-02 7.468E-02 8.154E-02 8.842E-02 9.527E-02 1.049E-01
pu240 2.914E-08 4.586E-08 6.635E-08 9.059E-08 1.186E-07 1.504E-07
1.860E-07 2.253E-07 2.684E-07 3.154E-07 3.661E-07 4.434E-07
pu241 1.186E-12 1.235E-12 1.309E-12 1.416E-12 1.559E-12 1.744E-12
1.978E-12 2.261E-12 2.602E-12 3.005E-12 3.477E-12 4.266E-12
pu242 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12
1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12
pu243 2.896E-21 2.914E-21 2.903E-21 2.934E-21 2.893E-21 2.900E-21
2.889E-21 2.909E-21 2.896E-21 2.901E-21 2.893E-21 2.897E-21
ra222 1.339E-21 1.967E-21 2.619E-21 3.300E-21 3.991E-21 4.695E-21
5.390E-21 6.097E-21 6.793E-21 7.482E-21 8.185E-21 9.158E-21
rh103 4.153E-03 5.839E-03 7.622E-03 9.467E-03 1.135E-02 1.326E-02
1.519E-02 1.713E-02 1.907E-02 2.102E-02 2.297E-02 2.571E-02
ru101 1.315E-02 1.642E-02 1.970E-02 2.297E-02 2.624E-02 2.952E-02
3.279E-02 3.606E-02 3.934E-02 4.261E-02 4.588E-02 5.046E-02
sm147 2.162E-04 3.562E-04 5.306E-04 7.389E-04 9.805E-04 1.255E-03
1.561E-03 1.899E-03 2.268E-03 2.667E-03 3.096E-03 3.746E-03
sm149 4.030E-03 5.054E-03 6.077E-03 7.100E-03 8.124E-03 9.147E-03
1.017E-02 1.119E-02 1.222E-02 1.324E-02 1.426E-02 1.569E-02
sm150 8.013E-07 1.224E-06 1.735E-06 2.334E-06 3.023E-06 3.800E-06
4.666E-06 5.621E-06 6.665E-06 7.796E-06 9.015E-06 1.087E-05
sm151 2.172E-01 2.175E-01 2.178E-01 2.181E-01 2.183E-01 2.186E-01
2.189E-01 2.192E-01 2.195E-01 2.197E-01 2.200E-01 2.204E-01
sm152 1.034E-03 1.292E-03 1.550E-03 1.809E-03 2.067E-03 2.325E-03
2.583E-03 2.842E-03 3.100E-03 3.358E-03 3.617E-03 3.978E-03
tc99 1.465E-02 1.853E-02 2.241E-02 2.628E-02 3.016E-02 3.404E-02
3.792E-02 4.180E-02 4.567E-02 4.955E-02 5.343E-02 5.884E-02
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 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 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 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

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7.999E+05 7.999E+05 7.999E+05 7.999E+05 7.999E+05 7.999E+05
     xe133   1.688E-03 1.688E-03 1.688E-03 1.688E-03 1.688E-03 1.688E-03
1.688E-03 1.688E-03 1.688E-03 1.688E-03 1.688E-03 1.685E-03
     xe133m  7.517E-06 7.517E-06 7.517E-06 7.517E-06 7.517E-06 7.517E-06
7.517E-06 7.517E-06 7.517E-06 7.517E-06 7.517E-06 7.508E-06
     xe135   1.211E-04 1.211E-04 1.211E-04 1.211E-04 1.211E-04 1.211E-04
1.211E-04 1.211E-04 1.211E-04 1.211E-04 1.211E-04 1.211E-04
     xe135m  4.114E-07 4.114E-07 4.114E-07 4.114E-07 4.114E-07 4.114E-07
4.114E-07 4.114E-07 4.114E-07 4.114E-07 4.114E-07 4.114E-07
  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 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 1.590E+06 1.590E+06 1.590E+06 1.590E+06
1
0                  units of measure: grams
0                                        time (d)
   nuclide   3.860E+02 3.870E+02 3.880E+02 3.890E+02 3.900E+02 3.910E+02
3.920E+02 3.930E+02 3.940E+02 3.950E+02
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     ag108m  1.048E-08 1.048E-08 1.048E-08 1.048E-08 1.048E-08 1.048E-08
1.048E-08 1.048E-08 1.048E-08 1.048E-08
     ag109   3.390E-04 3.391E-04 3.392E-04 3.392E-04 3.392E-04 3.392E-04
3.392E-04 3.392E-04 3.392E-04 3.392E-04
     am241   1.243E-12 1.244E-12 1.244E-12 1.245E-12 1.245E-12 1.246E-12
1.246E-12 1.247E-12 1.247E-12 1.248E-12
     am242m  2.049E-18 2.049E-18 2.049E-18 2.049E-18 2.049E-18 2.049E-18
2.049E-18 2.049E-18 2.049E-18 2.049E-18
     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 1.156E-12 1.156E-12
     cm242   4.075E-13 4.057E-13 4.040E-13 4.023E-13 4.006E-13 3.989E-13
3.972E-13 3.955E-13 3.938E-13 3.921E-13
     cm243   1.128E-12 1.127E-12 1.127E-12 1.127E-12 1.127E-12 1.127E-12
1.127E-12 1.127E-12 1.127E-12 1.127E-12
     cm244   1.115E-12 1.115E-12 1.115E-12 1.115E-12 1.115E-12 1.114E-12
1.114E-12 1.114E-12 1.114E-12 1.114E-12
     cm245   1.779E-18 1.779E-18 1.779E-18 1.779E-18 1.779E-18 1.779E-18
1.779E-18 1.779E-18 1.779E-18 1.779E-18
     cs133   8.438E-02 8.459E-02 8.478E-02 8.494E-02 8.509E-02 8.522E-02
8.533E-02 8.543E-02 8.552E-02 8.560E-02
     eu153   1.158E-01 1.158E-01 1.158E-01 1.159E-01 1.159E-01 1.159E-01
1.159E-01 1.159E-01 1.159E-01 1.159E-01
     gd155   3.152E-02 3.152E-02 3.152E-02 3.152E-02 3.152E-02 3.152E-02
3.152E-02 3.152E-02 3.152E-02 3.152E-02
     i129    6.910E-03 6.911E-03 6.911E-03 6.911E-03 6.911E-03 6.911E-03
6.911E-03 6.911E-03 6.911E-03 6.911E-03
     i130    1.323E-09 3.444E-10 8.964E-11 2.333E-11 6.074E-12 1.581E-12
4.116E-13 1.072E-13 2.798E-14 7.352E-15
     i131    1.015E-03 9.337E-04 8.583E-04 7.883E-04 7.236E-04 6.641E-04
6.093E-04 5.590E-04 5.127E-04 4.703E-04
     i132    1.623E-05 1.308E-05 1.053E-05 8.483E-06 6.833E-06 5.503E-06
4.433E-06 3.570E-06 2.876E-06 2.316E-06
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i133 1.283E-04 5.766E-05 2.591E-05 1.165E-05 5.234E-06 2.352E-06 1.057E-06 4.752E-07 2.135E-07 9.598E-08
i135 6.652E-06 5.288E-07 4.204E-08 3.343E-09 2.672E-10 2.266E-11 3.214E-12 1.669E-12 1.546E-12 1.536E-12
kr85 3.012E-03 3.011E-03 3.011E-03 3.010E-03 3.010E-03 3.009E-03 3.009E-03 3.008E-03 3.008E-03 3.007E-03
kr85m 1.896E-07 4.626E-09 1.130E-10 2.895E-12 2.089E-13 1.434E-13 1.418E-13 1.417E-13 1.417E-13 1.417E-13
kr88 3.772E-08 1.080E-10 5.501E-13 2.429E-13 2.420E-13 2.420E-13 2.420E-13 2.420E-13 2.420E-13 2.420E-13
mo95 5.482E-01 5.484E-01 5.485E-01 5.487E-01 5.488E-01 5.490E-01 5.491E-01 5.493E-01 5.494E-01 5.496E-01
nd143 7.767E-02 7.788E-02 7.808E-02 7.827E-02 7.846E-02 7.864E-02 7.880E-02 7.897E-02 7.912E-02 7.926E-02
nd145 5.746E-02 5.747E-02 5.747E-02 5.747E-02 5.747E-02 5.747E-02 5.747E-02 5.747E-02 5.747E-02 5.747E-02
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 7.613E-14 7.613E-14
pu238 2.938E-09 2.947E-09 2.954E-09 2.959E-09 2.963E-09 2.965E-09 2.967E-09 2.968E-09 2.969E-09 2.970E-09
pu239 1.051E-01 1.053E-01 1.054E-01 1.055E-01 1.056E-01 1.057E-01 1.057E-01 1.057E-01 1.057E-01 1.058E-01
pu240 4.434E-07 4.434E-07 4.434E-07 4.434E-07 4.434E-07 4.434E-07 4.434E-07 4.434E-07 4.434E-07 4.434E-07
pu241 4.266E-12 4.265E-12 4.265E-12 4.264E-12 4.264E-12 4.263E-12 4.262E-12 4.262E-12 4.261E-12 4.261E-12
pu242 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12 1.351E-12
pu243 1.010E-22 3.519E-24 1.227E-25 4.328E-27 2.021E-28 5.877E-29 5.392E-29 5.350E-29 5.393E-29 5.339E-29
ra222 9.182E-21 9.189E-21 9.184E-21 9.167E-21 9.140E-21 9.103E-21 9.057E-21 9.003E-21 8.941E-21 8.872E-21
rh103 2.579E-02 2.586E-02 2.594E-02 2.601E-02 2.608E-02 2.615E-02 2.622E-02 2.629E-02 2.636E-02 2.643E-02
ru101 5.047E-02 5.047E-02 5.047E-02 5.047E-02 5.047E-02 5.047E-02 5.047E-02 5.047E-02 5.047E-02 5.047E-02
sm147 3.766E-03 3.785E-03 3.805E-03 3.824E-03 3.844E-03 3.863E-03 3.883E-03 3.903E-03 3.922E-03 3.942E-03
sm149 1.572E-02 1.575E-02 1.577E-02 1.578E-02 1.579E-02 1.580E-02 1.581E-02 1.581E-02 1.581E-02 1.581E-02
sm150 1.087E-05 1.087E-05 1.087E-05 1.087E-05 1.087E-05 1.087E-05 1.087E-05 1.087E-05 1.087E-05 1.087E-05
sm151 2.204E-01 2.204E-01 2.204E-01 2.204E-01 2.204E-01 2.204E-01 2.204E-01 2.204E-01 2.204E-01 2.204E-01
sm152 3.978E-03 3.978E-03 3.978E-03 3.978E-03 3.978E-03 3.978E-03 3.978E-03 3.978E-03 3.978E-03 3.978E-03
tc99 5.899E-02 5.910E-02 5.919E-02 5.925E-02 5.931E-02 5.935E-02 5.938E-02 5.940E-02 5.942E-02 5.944E-02
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 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 1.972E+05 1.972E+05

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     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 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 7.999E+05 7.999E+05
     xe133   1.623E-03 1.489E-03 1.335E-03 1.184E-03 1.044E-03 9.180E-04
8.060E-04 7.070E-04 6.200E-04 5.435E-04
     xe133m  6.841E-06 5.602E-06 4.359E-06 3.301E-06 2.461E-06 1.819E-06
1.337E-06 9.790E-07 7.157E-07 5.225E-07
     xe135   4.425E-05 9.126E-06 1.634E-06 2.771E-07 4.588E-08 7.514E-09
1.225E-09 2.009E-10 3.445E-11 7.451E-12
     xe135m  2.645E-08 2.103E-09 1.672E-10 1.330E-11 1.064E-12 9.167E-14
1.435E-14 8.208E-15 7.720E-15 7.681E-15
  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 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 1.590E+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   2.724E-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
  1.000E+00   2.724E-11 3.720E-07 1.147E-12 5.179E-21 1.156E-12 1.760E-12
1.156E-12 1.161E-12 4.720E-21 2.972E-06 1.135E-01 3.151E-02
  2.000E+00   5.449E-11 1.105E-06 1.147E-12 1.035E-20 1.156E-12 1.970E-12
1.156E-12 1.161E-12 9.442E-21 2.018E-05 1.135E-01 3.151E-02
  3.000E+00   8.176E-11 1.946E-06 1.147E-12 1.553E-20 1.156E-12 2.039E-12
1.156E-12 1.161E-12 1.417E-20 5.733E-05 1.135E-01 3.151E-02
  5.000E+00   1.363E-10 3.696E-06 1.148E-12 2.589E-20 1.156E-12 2.058E-12
1.156E-12 1.160E-12 2.356E-20 1.940E-04 1.135E-01 3.151E-02
  1.000E+01   2.724E-10 8.105E-06 1.148E-12 5.180E-20 1.156E-12 2.020E-12
1.156E-12 1.160E-12 4.722E-20 8.220E-04 1.136E-01 3.151E-02
  1.500E+01   4.085E-10 1.251E-05 1.149E-12 7.771E-20 1.156E-12 1.977E-12
1.155E-12 1.159E-12 7.075E-20 1.696E-03 1.136E-01 3.151E-02
  2.000E+01   5.448E-10 1.692E-05 1.150E-12 1.036E-19 1.156E-12 1.936E-12
1.155E-12 1.159E-12 9.423E-20 2.697E-03 1.136E-01 3.151E-02
  3.000E+01   8.174E-10 2.574E-05 1.151E-12 1.555E-19 1.156E-12 1.855E-12
1.154E-12 1.157E-12 1.412E-19 4.856E-03 1.137E-01 3.151E-02
  4.000E+01   1.090E-09 3.455E-05 1.153E-12 2.075E-19 1.156E-12 1.778E-12
1.153E-12 1.156E-12 1.880E-19 7.081E-03 1.137E-01 3.151E-02
  5.000E+01   1.362E-09 4.337E-05 1.154E-12 2.595E-19 1.156E-12 1.704E-12
1.153E-12 1.155E-12 2.350E-19 9.323E-03 1.138E-01 3.151E-02
  7.500E+01   2.044E-09 6.539E-05 1.158E-12 3.897E-19 1.156E-12 1.532E-12
1.151E-12 1.152E-12 3.515E-19 1.492E-02 1.140E-01 3.151E-02
  1.000E+02   2.726E-09 8.741E-05 1.162E-12 5.204E-19 1.156E-12 1.377E-12
1.149E-12 1.149E-12 4.678E-19 2.050E-02 1.141E-01 3.151E-02
  1.250E+02   3.406E-09 1.094E-04 1.165E-12 6.513E-19 1.156E-12 1.238E-12
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1.147E-12 1.146E-12 5.849E-19 2.609E-02 1.143E-01 3.151E-02
  1.500E+02   4.088E-09 1.315E-04 1.170E-12 7.828E-19 1.156E-12 1.113E-12
1.145E-12 1.143E-12 7.015E-19 3.167E-02 1.144E-01 3.151E-02
  1.750E+02   4.769E-09 1.535E-04 1.174E-12 9.147E-19 1.156E-12 1.001E-12
1.143E-12 1.140E-12 8.173E-19 3.726E-02 1.146E-01 3.151E-02
  2.000E+02   5.449E-09 1.755E-04 1.179E-12 1.047E-18 1.156E-12 8.995E-13
1.141E-12 1.137E-12 9.330E-19 4.284E-02 1.147E-01 3.151E-02
  2.250E+02   6.131E-09 1.975E-04 1.184E-12 1.180E-18 1.156E-12 8.087E-13
1.139E-12 1.134E-12 1.048E-18 4.843E-02 1.149E-01 3.151E-02
  2.500E+02   6.811E-09 2.195E-04 1.190E-12 1.314E-18 1.156E-12 7.270E-13
1.138E-12 1.131E-12 1.163E-18 5.401E-02 1.150E-01 3.151E-02
  2.750E+02   7.492E-09 2.416E-04 1.197E-12 1.448E-18 1.156E-12 6.536E-13
1.136E-12 1.128E-12 1.278E-18 5.960E-02 1.152E-01 3.151E-02
  3.000E+02   8.172E-09 2.636E-04 1.205E-12 1.582E-18 1.156E-12 5.876E-13
1.134E-12 1.125E-12 1.392E-18 6.518E-02 1.153E-01 3.151E-02
  3.250E+02   8.852E-09 2.856E-04 1.214E-12 1.718E-18 1.156E-12 5.283E-13
1.132E-12 1.122E-12 1.507E-18 7.077E-02 1.155E-01 3.151E-02
  3.500E+02   9.531E-09 3.076E-04 1.225E-12 1.855E-18 1.156E-12 4.750E-13
1.130E-12 1.119E-12 1.621E-18 7.635E-02 1.156E-01 3.152E-02
  3.850E+02   1.048E-08 3.385E-04 1.242E-12 2.049E-18 1.156E-12 4.092E-13
1.128E-12 1.115E-12 1.779E-18 8.416E-02 1.158E-01 3.152E-02
  3.860E+02   1.048E-08 3.390E-04 1.243E-12 2.049E-18 1.156E-12 4.075E-13
1.128E-12 1.115E-12 1.779E-18 8.438E-02 1.158E-01 3.152E-02
  3.870E+02   1.048E-08 3.391E-04 1.244E-12 2.049E-18 1.156E-12 4.057E-13
1.127E-12 1.115E-12 1.779E-18 8.459E-02 1.158E-01 3.152E-02
  3.880E+02   1.048E-08 3.392E-04 1.244E-12 2.049E-18 1.156E-12 4.040E-13
1.127E-12 1.115E-12 1.779E-18 8.478E-02 1.158E-01 3.152E-02
  3.890E+02   1.048E-08 3.392E-04 1.245E-12 2.049E-18 1.156E-12 4.023E-13
1.127E-12 1.115E-12 1.779E-18 8.494E-02 1.159E-01 3.152E-02
  3.900E+02   1.048E-08 3.392E-04 1.245E-12 2.049E-18 1.156E-12 4.006E-13
1.127E-12 1.115E-12 1.779E-18 8.509E-02 1.159E-01 3.152E-02
  3.910E+02   1.048E-08 3.392E-04 1.246E-12 2.049E-18 1.156E-12 3.989E-13
1.127E-12 1.114E-12 1.779E-18 8.522E-02 1.159E-01 3.152E-02
  3.920E+02   1.048E-08 3.392E-04 1.246E-12 2.049E-18 1.156E-12 3.972E-13
1.127E-12 1.114E-12 1.779E-18 8.533E-02 1.159E-01 3.152E-02
  3.930E+02   1.048E-08 3.392E-04 1.247E-12 2.049E-18 1.156E-12 3.955E-13
1.127E-12 1.114E-12 1.779E-18 8.543E-02 1.159E-01 3.152E-02
  3.940E+02   1.048E-08 3.392E-04 1.247E-12 2.049E-18 1.156E-12 3.938E-13
1.127E-12 1.114E-12 1.779E-18 8.552E-02 1.159E-01 3.152E-02
  3.950E+02   1.048E-08 3.392E-04 1.248E-12 2.049E-18 1.156E-12 3.921E-13
1.127E-12 1.114E-12 1.779E-18 8.560E-02 1.159E-01 3.152E-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
  1.000E+00   1.207E-05 3.767E-09 8.946E-05 3.417E-06 1.538E-04 7.702E-05
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6.266E-06 7.533E-06 1.315E-05 5.102E-01 8.249E-07 9.517E-05
2.000E+00 2.988E-05 4.752E-09 1.777E-04 6.600E-06 2.263E-04 8.315E-05
1.413E-05 7.719E-06 1.319E-05 5.102E-01 5.874E-06 2.362E-04
3.000E+00 4.783E-05 5.008E-09 2.600E-04 9.164E-06 2.589E-04 8.363E-05
2.203E-05 7.724E-06 1.319E-05 5.102E-01 1.767E-05 3.800E-04
5.000E+00 8.641E-05 5.070E-09 3.986E-04 1.286E-05 2.842E-04 8.365E-05
3.775E-05 7.686E-06 1.319E-05 5.102E-01 6.589E-05 6.666E-04
1.000E+01 1.799E-04 5.062E-09 6.487E-04 1.781E-05 2.813E-04 8.364E-05
7.687E-05 7.673E-06 1.319E-05 5.102E-01 3.328E-04 1.380E-03
1.500E+01 2.733E-04 5.062E-09 8.116E-04 1.933E-05 2.813E-04 8.364E-05
1.160E-04 7.673E-06 1.319E-05 5.102E-01 7.799E-04 2.093E-03
2.000E+01 3.667E-04 5.062E-09 9.173E-04 1.985E-05 2.813E-04 8.364E-05
1.550E-04 7.673E-06 1.319E-05 5.102E-01 1.368E-03 2.806E-03
3.000E+01 5.486E-04 5.059E-09 1.025E-03 1.995E-05 2.786E-04 8.364E-05
2.394E-04 7.675E-06 1.319E-05 5.103E-01 2.847E-03 4.231E-03
4.000E+01 7.305E-04 5.059E-09 1.070E-03 1.998E-05 2.786E-04 8.364E-05
3.237E-04 7.675E-06 1.319E-05 5.105E-01 4.588E-03 5.656E-03
5.000E+01 9.124E-04 5.060E-09 1.089E-03 1.998E-05 2.786E-04 8.364E-05
4.078E-04 7.675E-06 1.319E-05 5.107E-01 6.487E-03 7.081E-03
7.500E+01 1.360E-03 5.061E-09 1.096E-03 1.978E-05 2.778E-04 8.364E-05
6.076E-04 7.675E-06 1.319E-05 5.116E-01 1.156E-02 1.084E-02
1.000E+02 1.807E-03 5.061E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
8.066E-04 7.675E-06 1.319E-05 5.129E-01 1.682E-02 1.461E-02
1.250E+02 2.254E-03 5.062E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
1.005E-03 7.675E-06 1.319E-05 5.148E-01 2.212E-02 1.837E-02
1.500E+02 2.702E-03 5.062E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
1.202E-03 7.675E-06 1.319E-05 5.170E-01 2.744E-02 2.213E-02
1.750E+02 3.149E-03 5.063E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
1.398E-03 7.675E-06 1.319E-05 5.196E-01 3.276E-02 2.589E-02
2.000E+02 3.596E-03 5.063E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
1.594E-03 7.675E-06 1.319E-05 5.225E-01 3.808E-02 2.965E-02
2.250E+02 4.044E-03 5.064E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
1.788E-03 7.675E-06 1.319E-05 5.255E-01 4.340E-02 3.342E-02
2.500E+02 4.491E-03 5.064E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
1.982E-03 7.675E-06 1.319E-05 5.288E-01 4.872E-02 3.718E-02
2.750E+02 4.938E-03 5.065E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
2.175E-03 7.675E-06 1.319E-05 5.322E-01 5.404E-02 4.094E-02
3.000E+02 5.386E-03 5.065E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
2.367E-03 7.675E-06 1.319E-05 5.357E-01 5.937E-02 4.470E-02
3.250E+02 5.833E-03 5.066E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
2.558E-03 7.675E-06 1.319E-05 5.392E-01 6.469E-02 4.847E-02
3.500E+02 6.280E-03 5.066E-09 1.097E-03 1.978E-05 2.778E-04 8.364E-05
2.748E-03 7.675E-06 1.319E-05 5.429E-01 7.001E-02 5.223E-02
3.850E+02 6.905E-03 5.066E-09 1.096E-03 1.971E-05 2.778E-04 8.364E-05
3.011E-03 7.675E-06 1.319E-05 5.481E-01 7.746E-02 5.741E-02
3.860E+02 6.910E-03 1.323E-09 1.015E-03 1.623E-05 1.283E-04 6.652E-06
3.012E-03 1.896E-07 3.772E-08 5.482E-01 7.767E-02 5.746E-02
3.870E+02 6.911E-03 3.444E-10 9.337E-04 1.308E-05 5.766E-05 5.288E-07
3.011E-03 4.626E-09 1.080E-10 5.484E-01 7.788E-02 5.747E-02
3.880E+02 6.911E-03 8.964E-11 8.583E-04 1.053E-05 2.591E-05 4.204E-08
3.011E-03 1.130E-10 5.501E-13 5.485E-01 7.808E-02 5.747E-02
3.890E+02 6.911E-03 2.333E-11 7.883E-04 8.483E-06 1.165E-05 3.343E-09

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3.010E-03 2.895E-12 2.429E-13 5.487E-01 7.827E-02 5.747E-02
  3.900E+02   6.911E-03 6.074E-12 7.236E-04 6.833E-06 5.234E-06 2.672E-10
3.010E-03 2.089E-13 2.420E-13 5.488E-01 7.846E-02 5.747E-02
  3.910E+02   6.911E-03 1.581E-12 6.641E-04 5.503E-06 2.352E-06 2.266E-11
3.009E-03 1.434E-13 2.420E-13 5.490E-01 7.864E-02 5.747E-02
  3.920E+02   6.911E-03 4.116E-13 6.093E-04 4.433E-06 1.057E-06 3.214E-12
3.009E-03 1.418E-13 2.420E-13 5.491E-01 7.880E-02 5.747E-02
  3.930E+02   6.911E-03 1.072E-13 5.590E-04 3.570E-06 4.752E-07 1.669E-12
3.008E-03 1.417E-13 2.420E-13 5.493E-01 7.897E-02 5.747E-02
  3.940E+02   6.911E-03 2.798E-14 5.127E-04 2.876E-06 2.135E-07 1.546E-12
3.008E-03 1.417E-13 2.420E-13 5.494E-01 7.912E-02 5.747E-02
  3.950E+02   6.911E-03 7.352E-15 4.703E-04 2.316E-06 9.598E-08 1.536E-12
3.007E-03 1.417E-13 2.420E-13 5.496E-01 7.926E-02 5.747E-02
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
  1.000E+00   7.613E-14 1.139E-12 3.907E-05 2.220E-12 1.147E-12 1.280E-12
2.627E-21 8.745E-28 6.158E-07 1.343E-04 6.386E-10 4.710E-06
  2.000E+00   7.613E-14 1.148E-12 1.446E-04 6.331E-12 1.146E-12 1.326E-12
2.852E-21 1.230E-26 2.590E-06 2.724E-04 5.072E-09 1.899E-05
  3.000E+00   7.613E-14 1.159E-12 2.998E-04 1.440E-11 1.146E-12 1.342E-12
2.917E-21 5.526E-26 5.904E-06 4.105E-04 1.691E-08 4.036E-05
  5.000E+00   7.613E-14 1.198E-12 7.052E-04 4.473E-11 1.146E-12 1.350E-12
2.941E-21 3.406E-25 1.653E-05 6.792E-04 7.599E-08 9.718E-05
  1.000E+01   7.613E-14 1.501E-12 1.960E-03 2.162E-10 1.145E-12 1.351E-12
2.915E-21 3.429E-24 6.488E-05 1.340E-03 5.601E-07 2.868E-04
  1.500E+01   7.613E-14 2.319E-12 3.321E-03 5.352E-10 1.145E-12 1.351E-12
2.917E-21 1.214E-23 1.422E-04 2.001E-03 1.749E-06 4.990E-04
  2.000E+01   7.613E-14 3.860E-12 4.702E-03 1.006E-09 1.144E-12 1.351E-12
2.884E-21 2.836E-23 2.461E-04 2.661E-03 3.856E-06 7.159E-04
  3.000E+01   7.613E-14 9.584E-12 7.462E-03 2.403E-09 1.144E-12 1.351E-12
2.888E-21 8.742E-23 5.248E-04 3.975E-03 1.139E-05 1.140E-03
  4.000E+01   7.613E-14 1.923E-11 1.021E-02 4.406E-09 1.144E-12 1.351E-12
2.898E-21 1.835E-22 8.851E-04 5.289E-03 2.395E-05 1.560E-03
  5.000E+01   7.613E-14 3.299E-11 1.296E-02 7.016E-09 1.146E-12 1.351E-12
2.896E-21 3.152E-22 1.314E-03 6.603E-03 4.190E-05 1.980E-03
  7.500E+01   7.613E-14 8.579E-11 1.984E-02 1.618E-08 1.158E-12 1.351E-12
2.889E-21 7.695E-22 2.616E-03 9.876E-03 1.114E-04 3.006E-03
  1.000E+02   7.613E-14 1.650E-10 2.669E-02 2.914E-08 1.186E-12 1.351E-12
2.896E-21 1.339E-21 4.153E-03 1.315E-02 2.162E-04 4.030E-03
  1.250E+02   7.613E-14 2.704E-10 3.354E-02 4.586E-08 1.235E-12 1.351E-12
2.914E-21 1.967E-21 5.839E-03 1.642E-02 3.562E-04 5.054E-03
  1.500E+02   7.613E-14 4.023E-10 4.037E-02 6.635E-08 1.309E-12 1.351E-12
2.903E-21 2.619E-21 7.622E-03 1.970E-02 5.306E-04 6.077E-03
  1.750E+02   7.613E-14 5.604E-10 4.722E-02 9.059E-08 1.416E-12 1.351E-12
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2.934E-21 3.300E-21 9.467E-03 2.297E-02 7.389E-04 7.100E-03
  2.000E+02   7.613E-14 7.446E-10 5.408E-02 1.186E-07 1.559E-12 1.351E-12
2.893E-21 3.991E-21 1.135E-02 2.624E-02 9.805E-04 8.124E-03
  2.250E+02   7.613E-14 9.551E-10 6.096E-02 1.504E-07 1.744E-12 1.351E-12
2.900E-21 4.695E-21 1.326E-02 2.952E-02 1.255E-03 9.147E-03
  2.500E+02   7.613E-14 1.192E-09 6.782E-02 1.860E-07 1.978E-12 1.351E-12
2.889E-21 5.390E-21 1.519E-02 3.279E-02 1.561E-03 1.017E-02
  2.750E+02   7.613E-14 1.455E-09 7.468E-02 2.253E-07 2.261E-12 1.351E-12
2.909E-21 6.097E-21 1.713E-02 3.606E-02 1.899E-03 1.119E-02
  3.000E+02   7.613E-14 1.744E-09 8.154E-02 2.684E-07 2.602E-12 1.351E-12
2.896E-21 6.793E-21 1.907E-02 3.934E-02 2.268E-03 1.222E-02
  3.250E+02   7.613E-14 2.060E-09 8.842E-02 3.154E-07 3.005E-12 1.351E-12
2.901E-21 7.482E-21 2.102E-02 4.261E-02 2.667E-03 1.324E-02
  3.500E+02   7.613E-14 2.402E-09 9.527E-02 3.661E-07 3.477E-12 1.351E-12
2.893E-21 8.185E-21 2.297E-02 4.588E-02 3.096E-03 1.426E-02
  3.850E+02   7.613E-14 2.925E-09 1.049E-01 4.434E-07 4.266E-12 1.351E-12
2.897E-21 9.158E-21 2.571E-02 5.046E-02 3.746E-03 1.569E-02
  3.860E+02   7.613E-14 2.938E-09 1.051E-01 4.434E-07 4.266E-12 1.351E-12
1.010E-22 9.182E-21 2.579E-02 5.047E-02 3.766E-03 1.572E-02
  3.870E+02   7.613E-14 2.947E-09 1.053E-01 4.434E-07 4.265E-12 1.351E-12
3.519E-24 9.189E-21 2.586E-02 5.047E-02 3.785E-03 1.575E-02
  3.880E+02   7.613E-14 2.954E-09 1.054E-01 4.434E-07 4.265E-12 1.351E-12
1.227E-25 9.184E-21 2.594E-02 5.047E-02 3.805E-03 1.577E-02
  3.890E+02   7.613E-14 2.959E-09 1.055E-01 4.434E-07 4.264E-12 1.351E-12
4.328E-27 9.167E-21 2.601E-02 5.047E-02 3.824E-03 1.578E-02
  3.900E+02   7.613E-14 2.963E-09 1.056E-01 4.434E-07 4.264E-12 1.351E-12
2.021E-28 9.140E-21 2.608E-02 5.047E-02 3.844E-03 1.579E-02
  3.910E+02   7.613E-14 2.965E-09 1.057E-01 4.434E-07 4.263E-12 1.351E-12
5.877E-29 9.103E-21 2.615E-02 5.047E-02 3.863E-03 1.580E-02
  3.920E+02   7.613E-14 2.967E-09 1.057E-01 4.434E-07 4.262E-12 1.351E-12
5.392E-29 9.057E-21 2.622E-02 5.047E-02 3.883E-03 1.581E-02
  3.930E+02   7.613E-14 2.968E-09 1.057E-01 4.434E-07 4.262E-12 1.351E-12
5.350E-29 9.003E-21 2.629E-02 5.047E-02 3.903E-03 1.581E-02
  3.940E+02   7.613E-14 2.969E-09 1.057E-01 4.434E-07 4.261E-12 1.351E-12
5.393E-29 8.941E-21 2.636E-02 5.047E-02 3.922E-03 1.581E-02
  3.950E+02   7.613E-14 2.970E-09 1.058E-01 4.434E-07 4.261E-12 1.351E-12
5.339E-29 8.872E-21 2.643E-02 5.047E-02 3.942E-03 1.581E-02
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
  1.000E+00   9.479E-10 2.161E-01 1.033E-05 1.027E-05 1.625E+03 1.972E+05
1.036E+03 7.999E+05 6.431E-05 6.886E-07 7.708E-05 3.920E-07
  2.000E+00   2.111E-09 2.161E-01 2.082E-05 4.870E-05 1.625E+03 1.972E+05
1.036E+03 7.999E+05 2.024E-04 1.964E-06 1.122E-04 4.163E-07
  3.000E+00   3.338E-09 2.162E-01 3.131E-05 1.120E-04 1.625E+03 1.972E+05
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1.036E+03 7.999E+05 3.605E-04 3.242E-06 1.197E-04 4.183E-07
5.000E+00 6.063E-09 2.162E-01 5.212E-05 2.929E-04 1.625E+03 1.972E+05
1.036E+03 7.999E+05 6.661E-04 5.252E-06 1.212E-04 4.151E-07
1.000E+01 1.571E-08 2.162E-01 1.039E-04 9.151E-04 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.176E-03 7.176E-06 1.211E-04 4.120E-07
1.500E+01 2.888E-08 2.163E-01 1.557E-04 1.632E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.439E-03 7.562E-06 1.211E-04 4.120E-07
2.000E+01 4.579E-08 2.163E-01 2.074E-04 2.375E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.574E-03 7.641E-06 1.211E-04 4.120E-07
3.000E+01 9.006E-08 2.165E-01 3.108E-04 3.879E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.667E-03 7.579E-06 1.211E-04 4.114E-07
4.000E+01 1.489E-07 2.166E-01 4.142E-04 5.387E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.691E-03 7.574E-06 1.211E-04 4.114E-07
5.000E+01 2.223E-07 2.167E-01 5.176E-04 6.895E-03 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.698E-03 7.574E-06 1.211E-04 4.114E-07
7.500E+01 4.673E-07 2.170E-01 7.758E-04 1.077E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
1.000E+02 8.013E-07 2.172E-01 1.034E-03 1.465E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
1.250E+02 1.224E-06 2.175E-01 1.292E-03 1.853E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
1.500E+02 1.735E-06 2.178E-01 1.550E-03 2.241E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
1.750E+02 2.334E-06 2.181E-01 1.809E-03 2.628E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
2.000E+02 3.023E-06 2.183E-01 2.067E-03 3.016E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
2.250E+02 3.800E-06 2.186E-01 2.325E-03 3.404E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
2.500E+02 4.666E-06 2.189E-01 2.583E-03 3.792E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
2.750E+02 5.621E-06 2.192E-01 2.842E-03 4.180E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
3.000E+02 6.665E-06 2.195E-01 3.100E-03 4.567E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
3.250E+02 7.796E-06 2.197E-01 3.358E-03 4.955E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
3.500E+02 9.015E-06 2.200E-01 3.617E-03 5.343E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.688E-03 7.517E-06 1.211E-04 4.114E-07
3.850E+02 1.087E-05 2.204E-01 3.978E-03 5.884E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.685E-03 7.508E-06 1.211E-04 4.114E-07
3.860E+02 1.087E-05 2.204E-01 3.978E-03 5.899E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.623E-03 6.841E-06 4.425E-05 2.645E-08
3.870E+02 1.087E-05 2.204E-01 3.978E-03 5.910E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.489E-03 5.602E-06 9.126E-06 2.103E-09
3.880E+02 1.087E-05 2.204E-01 3.978E-03 5.919E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.335E-03 4.359E-06 1.634E-06 1.672E-10
3.890E+02 1.087E-05 2.204E-01 3.978E-03 5.925E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.184E-03 3.301E-06 2.771E-07 1.330E-11
3.900E+02 1.087E-05 2.204E-01 3.978E-03 5.931E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 1.044E-03 2.461E-06 4.588E-08 1.064E-12
3.910E+02 1.087E-05 2.204E-01 3.978E-03 5.935E-02 1.625E+03 1.972E+05

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1.036E+03 7.999E+05 9.180E-04 1.819E-06 7.514E-09 9.167E-14
  3.920E+02   1.087E-05 2.204E-01 3.978E-03 5.938E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 8.060E-04 1.337E-06 1.225E-09 1.435E-14
  3.930E+02   1.087E-05 2.204E-01 3.978E-03 5.940E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 7.070E-04 9.790E-07 2.009E-10 8.208E-15
  3.940E+02   1.087E-05 2.204E-01 3.978E-03 5.942E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 6.200E-04 7.157E-07 3.445E-11 7.720E-15
  3.950E+02   1.087E-05 2.204E-01 3.978E-03 5.944E-02 1.625E+03 1.972E+05
1.036E+03 7.999E+05 5.435E-04 5.225E-07 7.451E-12 7.681E-15
1
0                  units of measure: grams
                   units of time(1st column):   time (d)
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time	subtotal	total
0.000E+00	9.998E+05	1.590E+06
1.000E+00	9.998E+05	1.590E+06
2.000E+00	9.998E+05	1.590E+06
3.000E+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
3.000E+01	9.998E+05	1.590E+06
4.000E+01	9.998E+05	1.590E+06
5.000E+01	9.998E+05	1.590E+06
7.500E+01	9.998E+05	1.590E+06
1.000E+02	9.998E+05	1.590E+06
1.250E+02	9.998E+05	1.590E+06
1.500E+02	9.998E+05	1.590E+06
1.750E+02	9.998E+05	1.590E+06
2.000E+02	9.998E+05	1.590E+06
2.250E+02	9.998E+05	1.590E+06
2.500E+02	9.998E+05	1.590E+06
2.750E+02	9.998E+05	1.590E+06
3.000E+02	9.998E+05	1.590E+06
3.250E+02	9.998E+05	1.590E+06
3.500E+02	9.998E+05	1.590E+06
3.850E+02	9.998E+05	1.590E+06
3.860E+02	9.998E+05	1.590E+06
3.870E+02	9.998E+05	1.590E+06
3.880E+02	9.998E+05	1.590E+06
3.890E+02	9.998E+05	1.590E+06
3.900E+02	9.998E+05	1.590E+06
3.910E+02	9.998E+05	1.590E+06
3.920E+02	9.998E+05	1.590E+06
3.930E+02	9.998E+05	1.590E+06
3.940E+02	9.998E+05	1.590E+06
3.950E+02	9.998E+05	1.590E+06