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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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8. Originator Remarks: The attached document is submitted for release. Pages 1-276 NCNP 4A Pages 277-372 ANSYS 5.0A, END LHG 7/2/97		9. Equip./Component No.: N/A
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No		10. System/Bldg./Facility: N/A
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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	HNF-SD-SNF-CSWD-005		0	Multi-Canister Overpack Design Software Verification and Validation	Q	1,2	1	

16. KEY			
Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority	L.H. Goldmann	7/2/97	R3-86			SNF Project Files			R3-11
		Design Agent									
		Cog.Eng.									
1	1	Cog. Mgr.	K.E. Smith	5/20/97	R3-86						
1	1	QA	J.I. Diehl	11/3/97	X3-80						
		Safety									
		Env.									

18. L.H. Goldmann <i>LHG 7/2/97</i> Signature of EDT Originator Date	19. Authorized Representative Date for Receiving Organization	20. K.E. Smith <i>KES 5/20/97</i> Design Authority/ Cognizant Manager Date	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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MULTI-CANISTER OVERPACK PROJECT - VERIFICATION AND VALIDATION, MCNP 4A

L. H. Goldmann

DE&S HANFORD, INC., Richland, WA 99352

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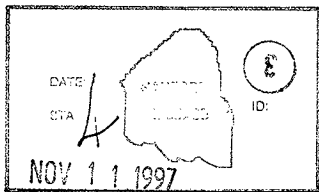
Abstract: This supporting document contains the software verification and validation (V&V) package used for Phase 2 design of the Spent Nuclear Fuel Multi-Canister Overpack. V&V packages for both ANSYS and MCNP are included.

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Release Approval

Date



Approved for Public Release

MULTI-CANISTER OVERPACK PROJECT

VERIFICATION AND VALIDATION MCNP 4A

Parsons Engineering Science

AVLIS Program, Lawrence Livermore National Laboratory
 Safety Engineering and Analysis Support Services, Group B Task
 USEC Contract No. USEC-96-C-0012

Form 1A

Computer Software Verification Record

Verification # PD-A-VV-003

Software Title: MCNP 4A : A Monte Carlo N Particle Transport CodeRelease Version: 4A Release Date: November 1993Software Developed By: Los Alamos National LabComputer System ID (PC CPU Serial Number): 501981-801 056AVO000189 (DOE 6246264)Additional Computer ID : 501981-801 056AVO000238 (DOE 6246271)Additional Computer ID : 501981-801 056AVO000041 (DOE 6239600)Additional Computer ID : 501981-801 056AVO000088 (DOE 6246288)

Computer System Processor: 586 (Pentium) Clock Speed: 166 (MHZ)
 Memory: 32 MB Hard Drive Capacity: 1,600 (MB)
 Operating System: Windows 95
 Language/compiler: Lahey Fortran 77

Computer System ID (PC CPU Serial Number): 0012358

Computer System Processor: 586 (Pentium) Clock Speed: 100 (MHZ)
 Memory: 48 MB Hard Drive Capacity: 1,080 (MB)
 Operating System: Windows 95
 Language/compiler: Lahey Fortran 77

Description of Verification Run(s): This software requires that it be compiled specifically for the machine it is to be used on. Therefore to facilitate ease in the verification process the software automatically runs 25 sample problems to ensure proper installation and compilation. Once the runs are completed the software checks for verification by performing a file comparison on the new output file and the old output file. Any differences between any of the files will cause a verification error. Due to the manner in which the verification is completed (by file comparison) a verification error does not necessarily indicate a problem, this indicates that a closer look at the output files is needed to determine the cause of the error(s).

Input File Name: See MCNP-4A documentationOutput File Name: See MCNP-4A documentationDisk Name and Path: C:\MCNP 4A or C:\MCNP (this is computer specific)

Results of Verification Run: The verification runs produced a verification error. This occurred on all 5 systems that MCNP was installed. Upon further investigation of all 5 systems, 4 of the 25 sample problems had output files that differed from those supplied. However, these problems do not invalidate the verification runs. Using the file comparison method for verification is a good beginning, but will result in errors if any additional output is requested, thereby moving the positions of the rows to be compared causing errors even when the final results are exactly the same. This was the case with the runs that were found to have problems. It appears that additional output was requested by the code developers after the sample problems were already created. In order to confirm this the final results of these four cases were compared and no difference was found. Therefore MCNP-4A is verified and may be used as needed. Attachment A has the file comparison results. Attachment B has the full output of those files that showed any discrepancy.

Verified By: Ronald J M Conn Jr

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Signature

Date: 12/18/98Checked By: Steven W Woolfolk

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Signature

Date: 12/18/96

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Parsons Engineering Science

AVLIS Program, Lawrence Livermore National Laboratory
 Safety Engineering and Analysis Support Services, Group B Task
 USEC Contract No. USEC-96-C-0012

Form 1B

Computer Software Validation Record

Software Title: MCNP 4A : A Monte Carlo N Particle Transport CodeRelease Version: 4ARelease Date: November 1993Software Developed By: Los Alamos National Lab

Software Description: MCNP is a general purpose Monte Carlo N-Particle program that can be used for neutron, photon, electron, or coupled neutron/photon/electron transport, including the capability to calculate for critical systems. The code treats an arbitrary three-dimensional configuration of materials in geometric cells bounded by first- and second-degree surface and fourth-degree elliptical tori. Pointwise cross-section data are used. For neutrons, all reactions given in a particular cross-section evaluation (such as ENDF/B-VI) are accounted for. Thermal neutrons are described by both the free gas and $S(\alpha, \beta)$ models. For photons, the code takes account of incoherent and coherent scattering, the possibility of fluorescent emission after photoelectric absorption, absorption in pair production with local emission of annihilation radiation, transport that includes positrons, k x-rays, and bremsstrahlung but does not include external or self-induced fields. Important standard features that make MCNP very versatile and easy to use include a powerful general source, criticality source, and surface source; both geometry and output tally plotters; a rich collection of variance reduction techniques; a flexible tally structure; and an extensive collection of cross-section data.

Computer System ID (PC CPU Serial Number): 501981-801 056AVO000189 (DOE 6246264)Additional Computer ID : 501981-801 056AVO000238 (DOE 6246271)Additional Computer ID : 501981-801 056AVO000041 (DOE 6239600)Additional Computer ID : 501981-801 056AVO000088 (DOE 6246288)

Computer System Processor: 586 (Pentium) Clock Speed: 166 (MHz)
 Memory: 32 MB Hard Drive Capacity: 1,600 (MB)
 Operating System: Windows 95
 Language/compiler: Lahey Fortran 77

Computer System ID (PC CPU Serial Number): 0012358

Computer System Processor: 586 (Pentium) Clock Speed: 100 (MHz)
 Memory: 48 MB Hard Drive Capacity: 1,080 (MB)
 Operating System: Windows 95
 Language/compiler: Lahey Fortran 77

Software Model Validation: The model set up was to determine the energy deposition, and thereby the dose, to numerous detectors from a box-like gamma emitting source through various shields. This is one of the situations that MCNP was developed to calculate. See the MCNP 4A user's manual for further information. MCNP is a Monte Carlo program which traces the collision history of particles and photons based on the basic principles of nuclear physics as discussed in Chapter 2 of "MCNPTM--A General Monte Carlo N-Particle Transport Code", "Version 4 A" by Judith F. Briesmeister (LA-12625), which is included in the "MCNP 4A Monte Carlo N-Particle Transport Code System," RSIC (CCC-200). The recent development of MCNP is described in "Recent MCNP Developments" by J. S. Hendricks and J. F. Briesmeister (see IEEE Transactions of Nuclear Science, Vol 39 # 4, 1992) (which is attached to this record). As specified in the

Prepared By: Ronald J. McConn Jr.

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Signature

Date: 12/18/96Checked By: Steven W. Wolfelt

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Signature

Date: 12/18/96

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Parsons Engineering Science
 AVLIS Program, Lawrence Livermore National Laboratory
 Safety Engineering and Analysis Support Services, Group B Task
 USEC Contract No. USEC-96-C-0012

Form 1B (Continued)
 Computer Software Validation Record

Software Model Validation (cont.):

RSIC Newsletter of October 22, 1993 (see Section 3 of the MCNP manual [CCC-200]). "The last version of MCNP released to RSIC, MCNP 4.2, was so robust that in over two years of use by over a thousand users at hundreds of institutions around the world no important errors were found. MCNP 4A raises the standard of quality even higher. The code can be made to track MCNP 4.2 identically (except for MCNP 4.2 bugs), indicating that no new bugs have been added (new DBCN(20) option). The test set has been upgraded and the installation procedure has been tightened further, and include END/B-IV and ENDL data. These has been more testing and benchmarking of MCNP 4A than any prerelease MCNP version in history. The code has undergone eight months of testing with preliminary versions at Los Alamos. Many significant changes from MCNP 4.2 have been documented and can be traced. Most Software Quality Assurance guidelines of IEEE and European ISO-9000 have been applied, including for the first time, multiple reviews of all coding.

The MCNP Team continues to pay cash to anyone who can find the slightest flaw in the code. There were 59 such cash awards made for MCNP 4.2."

The neutron transport portions of this software has been validated by comparison with benchmark problems as described in "MCNP: Neutron Benchmark Problems" (LA-72212) which is also included in the RSIC MCNP 4A manual (CCC-200). Benchmark problem comparison for neutrons can also be found in "MCNP Neutron Benchmarks," by J. S. Hendricks, D. J. Whalen, D. A. Cardon, and J. L. Uhle (see *Trans. Am. Nucl. Soc.* 63 426 [June 1991]) and "Benchmarking Study of the MCNP Code Against Cold Critical Experiments," by S. Sitaraman (see *Trans. Am. Nucl. Soc.* 63 426 [June 1991]) both of which are attached to this record.

The photon transport portion of this software has been validated by comparison with benchmark problems as described in:

- J.S. Hendricks and J.F. Briesmeister, "Recent MCNP Developments", *IEEE Transactions on Nuclear Science*, Vol. 39, No. 4, pg. 1035-1040, 1992.
- R. Guaraldi, F. Padoani, K. W. Burn, and G. Gualdrini, "Monte Carlo Applications to Photon Radiation Protection and Dosimetry At ENEA," *Progress In Nuclear Energy*, Vol 24, pg. 365-376, 1990.
- D. J. Whalen, D. E. Hollowell, and J. S. Hendricks, "Monte Carlo Photon Benchmark Problems," *Proceedings of the International Topical Meeting on Advances in Mathematics, Computations, and Reactor Physics*, 5, 301, 5-1 (April 1991)
- S. Sitaraman, "Benchmarking Study of the MCNP Code Against Cold Critical Experiments", *Transactions of the American Nuclear Society*, Vol. 63, pg. 426-429, 1991.
- J.S. Hendricks, D.J. Whalen, D.A. Cardon, J.L. Uhle, "MCNP Neutron Benchmarks", *Transactions of the American Nuclear Society*, Vol. 65, pg. 262-263, 1992.
- D. J. Whalen, D. E. Hollowell, and J. S. Hendricks, "MCNP: Photon Benchmark Problems," LA-12196 (September 1991).

Copies of these papers are attached.

The validation of the beta (i.e., electron) transport portion of this software is discussed in "Monte Carlo Applications To Photon Radiation Protection and Dosimetry At ENEA" as discussed above.

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Attachment A

File Comparison Results

Attached are the actual file comparison results from the five computers listed above. These are broken down by system with the files that have discrepancies being listed in fully in Attachment B.

Computer System ID : 501981-801 056AVO000189 (DOE 6246264)

Difm01

Comparing files INP01M and mctl01

FC: no differences encountered

Difm02

Comparing files INP02M and mctl02

FC: no differences encountered

Difm03

Comparing files INP03M and mctl03

FC: no differences encountered

Difm04

Comparing files INP04M and mctl04

FC: no differences encountered

Difm05

Comparing files INP05M and mctl05

FC: no differences encountered

Difm06

Comparing files INP06M and mctl06

FC: no differences encountered

Difm07

Comparing files INP07M and mctl07

FC: no differences encountered

Difm08

Comparing files INP08M and mctl08

FC: no differences encountered

Difm09

Comparing files INP09M and mctl09

FC: no differences encountered

Difm10

Comparing files INP10M and mctl10

FC: no differences encountered

Difm11

Comparing files INP11M and mctl11

FC: no differences encountered

Difm12

Comparing files INP12M and mctl12

FC: no differences encountered

Difm13

Comparing files INP13M and mctl13
FC: no differences encountered

Difm14

Comparing files INP14M and mctl14
FC: no differences encountered

Difm15

Comparing files INP15M and mctl15
FC: no differences encountered

Difm16

Comparing files INP16M and mctl16
FC: no differences encountered

Difm17

Comparing files INP17M and mctl17
FC: no differences encountered

Difm18

Comparing files INP18M and mctl18
FC: no differences encountered

Difm19

Comparing files INP19M and mctl19
FC: no differences encountered

Difm20

File(s) not found : inp20m

Difm21

Comparing files INP21M and mctl21
FC: no differences encountered

Difm22

Comparing files INP22M and mctl22
FC: no differences encountered

Difm23

Comparing files INP23M and mctl23
FC: no differences encountered

Difm24

Comparing files INP24M and mctl24
FC: no differences encountered

Difm25

Comparing files INP25M and mctl25
FC: no differences encountered

Difo01

Comparing files INP01O and outp01
FC: no differences encountered

Difo02
Comparing files INP02O and outp02
FC: no differences encountered

Difo03
Comparing files INP03O and outp03
FC: no differences encountered

Difo04
Comparing files INP04O and outp04
FC: no differences encountered

Difo05
Comparing files INP05O and outp05
FC: no differences encountered

Difo06
Comparing files INP06O and outp06
FC: no differences encountered

Difo07
Comparing files INP07O and outp07
FC: no differences encountered

Difo08
Comparing files INP08O and outp08
FC: no differences encountered

Difo09
Comparing files INP09O and outp09
FC: no differences encountered

Difo10
Comparing files INP10O and outp10
FC: no differences encountered

Difo11
Comparing files INP11O and outp11
FC: no differences encountered

Difo12
Comparing files INP12O and outp12
FC: no differences encountered

Difo13
Comparing files INP13O and outp13
FC: no differences encountered

Difo14
Comparing files INP14O and outp14
FC: no differences encountered

Difo15
Comparing files INP15O and outp15

FC: no differences encountered

Difo16

Comparing files INP16O and outp16

FC: no differences encountered

Difo17

Comparing files INP17O and outp17

FC: no differences encountered

Difo18

Comparing files INP18O and outp18

***** INP18O

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

***** outp18

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

Difo19

Comparing files INP19O and outp19

FC: no differences encountered

Difo20

Comparing files INP20O and outp20

***** INP20O

***** outp20

8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00
28	0.000E+00	0.000E+00	0.000E+00	1	1	8.706E-01	-3.198E-01	3.738E-01	1.000E+00	1.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	1	1	-8.188E-01	2.059E-01	5.359E-01	1.000E+00	1.000E+00	0.000E+00
30	0.000E+00	0.000E+00	0.000E+00	1	1	5.727E-01	8.124E-01	1.100E-01	1.000E+00	1.000E+00	0.000E+00
31	0.000E+00	0.000E+00	0.000E+00	1	1	5.390E-02	5.914E-01	8.046E-01	1.000E+00	1.000E+00	0.000E+00
32	0.000E+00	0.000E+00	0.000E+00	1	1	-5.778E-01	5.375E-01	6.141E-01	1.000E+00	1.000E+00	0.000E+00

```

33 0.000E+00 0.000E+00 0.000E+00 1 1 -7.198E-01 -2.890E-01 6.311E-01 1.000E+00 1.000E+00 0.000E+00
34 0.000E+00 0.000E+00 0.000E+00 1 1 2.210E-01 2.482E-01 9.432E-01 1.000E+00 1.000E+00 0.000E+00
35 0.000E+00 0.000E+00 0.000E+00 1 1 4.339E-01 7.515E-02 8.978E-01 1.000E+00 1.000E+00 0.000E+00
36 0.000E+00 0.000E+00 0.000E+00 1 1 -4.263E-01 8.490E-01 3.123E-01 1.000E+00 1.000E+00 0.000E+00
37 0.000E+00 0.000E+00 0.000E+00 1 1 -3.933E-01 -9.179E-01 5.266E-02 1.000E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 1 -4.846E-01 4.378E-01 7.573E-01 1.000E+00 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 1 -5.950E-01 -5.730E-01 5.636E-01 1.000E+00 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 1 -7.252E-01 -5.143E-01 4.578E-01 1.000E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 1 -7.156E-01 4.734E-01 5.136E-01 1.000E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 1 -1.771E-01 9.229E-01 3.417E-01 1.000E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 1 -1.149E-01 -4.206E-01 8.999E-01 1.000E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 1 4.509E-01 8.630E-02 8.884E-01 1.000E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 1 -7.358E-01 2.500E-01 6.294E-01 1.000E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 1 -8.448E-01 3.645E-01 3.917E-01 1.000E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 1 1.958E-01 -2.769E-01 9.407E-01 1.000E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 1 2.788E-01 -7.325E-03 9.603E-01 1.000E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 1 -3.201E-01 4.174E-01 8.505E-01 1.000E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 1 8.960E-01 -1.641E-01 4.126E-01 1.000E+00 1.000E+00 0.000E+00

```

1problem summary

run terminated when 10000 particle histories were done.

0

photon creation	tracks	weight	energy	photon loss	tracks	weight	energy
source	(per source particle)			(per source particle)			
0	0.	0.	0.	escape	575	5.7500E-02	1.5476E-02
			energy cutoff	0	0.	0.	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtan	0	0.	0.	dxtan	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
from neutrons	0	0.	0.	compton scatter	0	0.	6.6993E-05
bremsstrahlung	694	6.9400E-02	1.7315E-02	capture	119	1.1900E-02	1.7720E-03
p-annihilation	0	0.	0.	pair production	0	0.	0.
electron x-rays	0	0.	0.				
1st fluorescence	0	0.	0.				
2nd fluorescence	0	0.	0.				
total	694	6.9400E-02	1.7315E-02	total	694	6.9400E-02	1.7315E-02
number of photons banked	694			average lifetime, shakes			cutoffs
photon tracks per source particle	6.9400E-02			escape	6.7786E-05	tco	1.0000E+34
photon collisions per source particle	1.3000E-02			capture	8.3325E-05	eco	1.0000E-01
total photon collisions	130			capture or escape	7.0450E-05	wc1	0.0000E+00
			any termination	7.0450E-05	wc2	0.0000E+00	

0

electron creation	tracks	weight	energy	electron loss	tracks	weight	energy
source	(per source particle)			(per source particle)			
10000	1.0000E+00		1.0000E+00	escape	9464	9.4640E-01	7.1762E-01
			energy cutoff	2046	2.0460E-01	2.0141E-02	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.

energy importance	0	0.	0.	energy importance	0	0.	0.
air production	0	0.	0.	scattering	0	0.	2.6560E-01
compton recoil	2	2.0000E-04	3.7815E-05	bremsstrahlung	0	0.	2.4158E-02
photo-electric	29	2.9000E-03	4.7387E-04				
photon auger	0	0.	0.				
electron auger	0	0.	0.				
knock-on	1479	1.4790E-01	2.7007E-02				
total	11510	1.1510E+00	1.0275E+00	total	11510	1.1510E+00	1.0275E+00
number of electrons banked		1510		cutoffs			
electron tracks per source particle		1.1510E+00		tco		1.0000E+34	
electron sub-steps per source particle		7.7164E+01		eco		1.0000E-01	
total electron sub-steps		771636		wc1		0.0000E+00	
				wc2		0.0000E+00	
computer time so far in this run	0.00 minutes			maximum number ever in bank		4	
computer time in mcrun	0.00 minutes			bank overflows to backup file		0	
source particles per minute	0.0000E+00			field length		0	
random numbers generated	4748878			most random numbers used was	4277 in history	7375	
range of sampled source weights =	1.0000E+00 to 1.0000E+00						

Difo21

Comparing files INP21O and outp21

FC: no differences encountered

Difo22

Comparing files INP22O and outp22

FC: no differences encountered

Difo23

Comparing files INP23O and outp23

FC: no differences encountered

Difo24

Comparing files INP24O and outp24

***** INP24O

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253
 estimator cycle 4 ave of 2 cycles combination simple average combined average corr

***** outp24

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253
 source distribution written to file inp24s cycle = 3
 estimator cycle 4 ave of 2 cycles combination simple average combined average corr

***** INP24O

tally type 6 track length estimate of heating. units mev/gram
 tally for neutrons

***** outp24

tally type 6 track length estimate of heating. units mev/gram
 tally for neutrons

Difo25

Comparing files INP25O and outp25

FC: no differences encountered

Computer System ID : 501981-801 056AVO000238 (DOE 6246271)

Difm01

Comparing files INP01M and mctl01

FC: no differences encountered

Difm02

Comparing files INP02M and mctl02

FC: no differences encountered

Difm03

Comparing files INP03M and mctl03

FC: no differences encountered

Difm04

Comparing files INP04M and mctl04

FC: no differences encountered

Difm05

Comparing files INP05M and mctl05

FC: no differences encountered

Difm06

Comparing files INP06M and mctl06

FC: no differences encountered

Difm07

Comparing files INP07M and mctl07

FC: no differences encountered

Difm08

Comparing files INP08M and mctl08

FC: no differences encountered

Difm09

Comparing files INP09M and mctl09

FC: no differences encountered

Difm10

Comparing files INP10M and mctl10

FC: no differences encountered

Difm11

Comparing files INP11M and mctl11

FC: no differences encountered

Difm12

Comparing files INP12M and mctl12

FC: no differences encountered

Difm13

Comparing files INP13M and mctl13

FC: no differences encountered

Difm14

Comparing files INP14M and mctl14

FC: no differences encountered

Difm15

Comparing files INP15M and mctl15

FC: no differences encountered

Difm16

Comparing files INP16M and mctl16

FC: no differences encountered

Difm17

Comparing files INP17M and mctl17

FC: no differences encountered

Difm18

Comparing files INP18M and mctl18

FC: no differences encountered

Difm19

Comparing files INP19M and mctl19

FC: no differences encountered

Difm20

File(s) not found : inp20m

Difm21

Comparing files INP21M and mctl21

FC: no differences encountered

Difm22

Comparing files INP22M and mctl22

FC: no differences encountered

Difm23

Comparing files INP23M and mctl23

FC: no differences encountered

Difm24

Comparing files INP24M and mctl24

FC: no differences encountered

Difm25

Comparing files INP25M and mctl25

FC: no differences encountered

Difo01

Comparing files INP01O and outp01

FC: no differences encountered

Difo02

Comparing files INP02O and outp02

FC: no differences encountered

Difo03

Comparing files INP03O and outp03

FC: no differences encountered

Difo04

Comparing files INP04O and outp04

FC: no differences encountered

Difo05

Comparing files INP05O and outp05

FC: no differences encountered

Difo06

Comparing files INP06O and outp06

FC: no differences encountered

Difo07

Comparing files INP07O and outp07

FC: no differences encountered

Difo08

Comparing files INP08O and outp08

FC: no differences encountered

Difo09

Comparing files INP09O and outp09

FC: no differences encountered

Difo10

Comparing files INP10O and outp10

FC: no differences encountered

Difo11

Comparing files INP11O and outp11

FC: no differences encountered

Difo12

Comparing files INP12O and outp12

FC: no differences encountered

Difo13

Comparing files INP13O and outp13

FC: no differences encountered

Difo14

Comparing files INP14O and outp14

FC: no differences encountered

Difo15

Comparing files INP15O and outp15

FC: no differences encountered

Difo16

Comparing files INP16O and outp16

FC: no differences encountered

Difo17

Comparing files INP17O and outp17

FC: no differences encountered

Difo18

Comparing files INP18O and outp18

***** INP18O

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

***** outp18

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

Difo19

Comparing files INP19O and outp19

FC: no differences encountered

Difo20

Comparing files INP20O and outp20

***** INP20O

***** outp20

8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00
28	0.000E+00	0.000E+00	0.000E+00	1	1	8.706E-01	-3.198E-01	3.738E-01	1.000E+00	1.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	1	1	-8.188E-01	2.059E-01	5.359E-01	1.000E+00	1.000E+00	0.000E+00
30	0.000E+00	0.000E+00	0.000E+00	1	1	5.727E-01	8.124E-01	1.100E-01	1.000E+00	1.000E+00	0.000E+00
31	0.000E+00	0.000E+00	0.000E+00	1	1	5.390E-02	5.914E-01	8.046E-01	1.000E+00	1.000E+00	0.000E+00
32	0.000E+00	0.000E+00	0.000E+00	1	1	-5.778E-01	5.375E-01	6.141E-01	1.000E+00	1.000E+00	0.000E+00
33	0.000E+00	0.000E+00	0.000E+00	1	1	-7.198E-01	-2.890E-01	6.311E-01	1.000E+00	1.000E+00	0.000E+00
34	0.000E+00	0.000E+00	0.000E+00	1	1	2.210E-01	2.482E-01	9.432E-01	1.000E+00	1.000E+00	0.000E+00
35	0.000E+00	0.000E+00	0.000E+00	1	1	4.339E-01	7.515E-02	8.978E-01	1.000E+00	1.000E+00	0.000E+00
36	0.000E+00	0.000E+00	0.000E+00	1	1	-4.263E-01	8.490E-01	3.123E-01	1.000E+00	1.000E+00	0.000E+00

```

37 0.000E+00 0.000E+00 0.000E+00 1 1 -3.933E-01 -9.179E-01 5.266E-02 1.000E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 1 -4.846E-01 4.378E-01 7.573E-01 1.000E+00 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 1 -5.950E-01 -5.730E-01 5.636E-01 1.000E+00 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 1 -7.252E-01 -5.143E-01 4.578E-01 1.000E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 1 -7.156E-01 4.734E-01 5.136E-01 1.000E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 1 -1.771E-01 9.229E-01 3.417E-01 1.000E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 1 -1.149E-01 -4.206E-01 8.999E-01 1.000E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 1 4.509E-01 8.630E-02 8.884E-01 1.000E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 1 -7.358E-01 2.500E-01 6.294E-01 1.000E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 1 -8.448E-01 3.645E-01 3.917E-01 1.000E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 1 1.958E-01 -2.769E-01 9.407E-01 1.000E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 1 2.788E-01 -7.325E-03 9.603E-01 1.000E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 1 -3.201E-01 4.174E-01 8.505E-01 1.000E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 1 8.960E-01 -1.641E-01 4.126E-01 1.000E+00 1.000E+00 0.000E+00

```

Iproblem summary

run terminated when 10000 particle histories were done.

0

photon creation	tracks	weight	energy	photon loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	0	0.	0.	escape	575	5.7500E-02	1.5476E-02
				energy cutoff	0	0.	0.
				time cutoff	0	0.	0.
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
extran	0	0.	0.	dextran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
from neutrons	0	0.	0.	compton scatter	0	0.	6.6993E-05
bremsstrahlung	694	6.9400E-02	1.7315E-02	capture	119	1.1900E-02	1.7720E-03
p-annihilation	0	0.	0.	pair production	0	0.	0.
electron x-rays	0	0.	0.				
1st fluorescence	0	0.	0.				
2nd fluorescence	0	0.	0.				
total	694	6.9400E-02	1.7315E-02	total	694	6.9400E-02	1.7315E-02
number of photons banked			694	average lifetime, shakes			cutoffs
photon tracks per source particle			6.9400E-02	escape		6.7786E-05	tco 1.0000E+34
photon collisions per source particle			1.3000E-02	capture		8.3325E-05	eco 1.0000E-01
total photon collisions			130	capture or escape		7.0450E-05	wc1 0.0000E+00
				any termination		7.0450E-05	wc2 0.0000E+00

0

electron creation	tracks	weight	energy	electron loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	10000	1.0000E+00	1.0000E+00	escape	9464	9.4640E-01	7.1762E-01
				energy cutoff	2046	2.0460E-01	2.0141E-02
				time cutoff	0	0.	0.
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
pair production	0	0.	0.	scattering	0	0.	2.6560E-01
compton recoil	2	2.0000E-04	3.7815E-05	bremsstrahlung	0	0.	2.4158E-02
photo-electric	29	2.9000E-03	4.7387E-04				

proton auger	0	0.	0.				
electron auger	0	0.	0.				
knock-on	1479	1.4790E-01	2.7007E-02				
total	11510	1.1510E+00	1.0275E+00	total	11510	1.1510E+00	1.0275E+00
number of electrons banked	1510			cutoffs			
electron tracks per source particle	1.1510E+00			tco	1.0000E+34		
electron sub-steps per source particle	7.7164E+01			eco	1.0000E-01		
total electron sub-steps	771636			wc1	0.0000E+00		
				wc2	0.0000E+00		
computer time so far in this run	0.00 minutes			maximum number ever in bank	4		
computer time in mcrun	0.00 minutes			bank overflows to backup file	0		
source particles per minute	0.0000E+00			field length	0		
random numbers generated	4748878			most random numbers used was	4277 in history	7375	
range of sampled source weights =	1.0000E+00 to 1.0000E+00						

Difo21

Comparing files INP21O and outp21

FC: no differences encountered

Difo22

Comparing files INP22O and outp22

FC: no differences encountered

Difo23

Comparing files INP23O and outp23

no differences encountered

Difo24

Comparing files INP24O and outp24

***** INP24O

cycle	3	k(collision)	0.551862	removal lifetime(abs)	3.8422E+03	source points generated	253
estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average
						corr	

***** outp24

cycle	3	k(collision)	0.551862	removal lifetime(abs)	3.8422E+03	source points generated	253
source distribution written to file	inp24s	cycle =	3				
estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average
						corr	

***** INP24O

tally type	6	track length estimate of heating.	units	mev/gram
tally for	neutrons			

***** outp24

tally type	6	track length estimate of heating.	units	mev/gram
tally for	neutrons			

Difo25

Comparing files INP25O and outp25

FC: no differences encountered

Computer System ID : 501981-801 056AVO000041 (DOE 6239600)

Difm01

Comparing files INP01M and mctl01

FC: no differences encountered

Difm02

Comparing files INP02M and mctl02

FC: no differences encountered

Difm03

Comparing files INP03M and mctl03

FC: no differences encountered

Difm04

Comparing files INP04M and mctl04

FC: no differences encountered

Difm05

Comparing files INP05M and mctl05

FC: no differences encountered

Difm06

Comparing files INP06M and mctl06

FC: no differences encountered

Difm07

Comparing files INP07M and mctl07

FC: no differences encountered

Difm08

Comparing files INP08M and mctl08

FC: no differences encountered

Difm09

Comparing files INP09M and mctl09

FC: no differences encountered

Difm10

Comparing files INP10M and mctl10

FC: no differences encountered

Difm11

Comparing files INP11M and mctl11

FC: no differences encountered

Difm12

Comparing files INP12M and mctl12

FC: no differences encountered

Difm13

Comparing files INP13M and mctl13

FC: no differences encountered

Difm14
Comparing files INP14M and mctl14
FC: no differences encountered

Difm15
Comparing files INP15M and mctl15
FC: no differences encountered

Difm16
Comparing files INP16M and mctl16
FC: no differences encountered

Difm17
Comparing files INP17M and mctl17
FC: no differences encountered

Difm18
Comparing files INP18M and mctl18
FC: no differences encountered

Difm19
Comparing files INP19M and mctl19
FC: no differences encountered

Difm20
File(s) not found : inp20m

Difm21
Comparing files INP21M and mctl21
FC: no differences encountered

Difm22
Comparing files INP22M and mctl22
FC: no differences encountered

Difm23
Comparing files INP23M and mctl23
FC: no differences encountered

Difm24
Comparing files INP24M and mctl24
FC: no differences encountered

Difm25
Comparing files INP25M and mctl25
FC: no differences encountered

Difo01
Comparing files INP01O and outp01
FC: no differences encountered

Difo02
Comparing files INP02O and outp02
FC: no differences encountered

Difo03

Comparing files INP03O and outp03
FC: no differences encountered

Difo04

Comparing files INP04O and outp04
FC: no differences encountered

Difo05

Comparing files INP05O and outp05
FC: no differences encountered

Difo06

Comparing files INP06O and outp06
FC: no differences encountered

Difo07

Comparing files INP07O and outp07
FC: no differences encountered

Difo08

Comparing files INP08O and outp08
FC: no differences encountered

Difo09

Comparing files INP09O and outp09
FC: no differences encountered

Difo10

Comparing files INP10O and outp10
FC: no differences encountered

Difo11

Comparing files INP11O and outp11
FC: no differences encountered

Difo12

Comparing files INP12O and outp12
FC: no differences encountered

Difo13

Comparing files INP13O and outp13
FC: no differences encountered

Difo14

Comparing files INP14O and outp14
FC: no differences encountered

Difo15

Comparing files INP15O and outp15
FC: no differences encountered

Difo16

Comparing files INP16O and outp16

FC: no differences encountered

Difo17

Comparing files INP17O and outp17

FC: no differences encountered

Difo18

Comparing files INP18O and outp18

***** INP18O

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

***** outp18

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

Difo19

Comparing files INP19O and outp19

FC: no differences encountered

Difo20

Comparing files INP20O and outp20

***** INP20O

***** outp20

8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00
28	0.000E+00	0.000E+00	0.000E+00	1	1	8.706E-01	-3.198E-01	3.738E-01	1.000E+00	1.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	1	1	-8.188E-01	2.059E-01	5.359E-01	1.000E+00	1.000E+00	0.000E+00
30	0.000E+00	0.000E+00	0.000E+00	1	1	5.727E-01	8.124E-01	1.100E-01	1.000E+00	1.000E+00	0.000E+00
31	0.000E+00	0.000E+00	0.000E+00	1	1	5.390E-02	5.914E-01	8.046E-01	1.000E+00	1.000E+00	0.000E+00
32	0.000E+00	0.000E+00	0.000E+00	1	1	-5.778E-01	5.375E-01	6.141E-01	1.000E+00	1.000E+00	0.000E+00
33	0.000E+00	0.000E+00	0.000E+00	1	1	-7.198E-01	-2.890E-01	6.311E-01	1.000E+00	1.000E+00	0.000E+00
34	0.000E+00	0.000E+00	0.000E+00	1	1	2.210E-01	2.482E-01	9.432E-01	1.000E+00	1.000E+00	0.000E+00
35	0.000E+00	0.000E+00	0.000E+00	1	1	4.339E-01	7.515E-02	8.978E-01	1.000E+00	1.000E+00	0.000E+00
36	0.000E+00	0.000E+00	0.000E+00	1	1	-4.263E-01	8.490E-01	3.123E-01	1.000E+00	1.000E+00	0.000E+00

37	0.000E+00	0.000E+00	0.000E+00	1	1	-3.933E-01	-9.179E-01	5.266E-02	1.000E+00	1.000E+00	0.000E+00
38	0.000E+00	0.000E+00	0.000E+00	1	1	-4.846E-01	4.378E-01	7.573E-01	1.000E+00	1.000E+00	0.000E+00
39	0.000E+00	0.000E+00	0.000E+00	1	1	-5.950E-01	-5.730E-01	5.636E-01	1.000E+00	1.000E+00	0.000E+00
40	0.000E+00	0.000E+00	0.000E+00	1	1	-7.252E-01	-5.143E-01	4.578E-01	1.000E+00	1.000E+00	0.000E+00
41	0.000E+00	0.000E+00	0.000E+00	1	1	-7.156E-01	4.734E-01	5.136E-01	1.000E+00	1.000E+00	0.000E+00
42	0.000E+00	0.000E+00	0.000E+00	1	1	-1.771E-01	9.229E-01	3.417E-01	1.000E+00	1.000E+00	0.000E+00
43	0.000E+00	0.000E+00	0.000E+00	1	1	-1.149E-01	-4.206E-01	8.999E-01	1.000E+00	1.000E+00	0.000E+00
44	0.000E+00	0.000E+00	0.000E+00	1	1	4.509E-01	8.630E-02	8.884E-01	1.000E+00	1.000E+00	0.000E+00
45	0.000E+00	0.000E+00	0.000E+00	1	1	-7.358E-01	2.500E-01	6.294E-01	1.000E+00	1.000E+00	0.000E+00
46	0.000E+00	0.000E+00	0.000E+00	1	1	-8.448E-01	3.645E-01	3.917E-01	1.000E+00	1.000E+00	0.000E+00
47	0.000E+00	0.000E+00	0.000E+00	1	1	1.958E-01	-2.769E-01	9.407E-01	1.000E+00	1.000E+00	0.000E+00
48	0.000E+00	0.000E+00	0.000E+00	1	1	2.788E-01	-7.325E-03	9.603E-01	1.000E+00	1.000E+00	0.000E+00
49	0.000E+00	0.000E+00	0.000E+00	1	1	-3.201E-01	4.174E-01	8.505E-01	1.000E+00	1.000E+00	0.000E+00
50	0.000E+00	0.000E+00	0.000E+00	1	1	8.960E-01	-1.641E-01	4.126E-01	1.000E+00	1.000E+00	0.000E+00

Problem summary

run terminated when 10000 particle histories were done.

photon creation	tracks	weight	energy	photon loss	tracks	weight	energy
source	(per source particle)			(per source particle)			
	0	0.	0.	escape	575	5.7500E-02	1.5476E-02
				energy cutoff	0	0.	0.
				time cutoff	0	0.	0.
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtran	0	0.	0.	dxtran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
from neutrons	0	0.	0.	compton scatter	0	0.	6.6993E-05
bremsstrahlung	694	6.9400E-02	1.7315E-02	capture	119	1.1900E-02	1.7720E-03
p-annihilation	0	0.	0.	pair production	0	0.	0.
electron x-rays	0	0.	0.				
1st fluorescence	0	0.	0.				
2nd fluorescence	0	0.	0.				
total	694	6.9400E-02	1.7315E-02	total	694	6.9400E-02	1.7315E-02
number of photons banked	694			average lifetime, shakes			
photon tracks per source particle	6.9400E-02			escape	6.7786E-05	tco	1.0000E+34
photon collisions per source particle	1.3000E-02			capture	8.3325E-05	eco	1.0000E-01
total photon collisions	130			capture or escape	7.0450E-05	wc1	0.0000E+00
				any termination	7.0450E-05	wc2	0.0000E+00

electron creation	tracks	weight	energy	electron loss	tracks	weight	energy
source	(per source particle)			(per source particle)			
	10000	1.0000E+00	1.0000E+00	escape	9464	9.4640E-01	7.1762E-01
				energy cutoff	2046	2.0460E-01	2.0141E-02
				time cutoff	0	0.	0.
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
pair production	0	0.	0.	scattering	0	0.	2.6560E-01
compton recoil	2	2.0000E-04	3.7815E-05	bremsstrahlung	0	0.	2.4158E-02
photo-electric	29	2.9000E-03	4.7387E-04				

photon auger	0	0.	0.				
electron auger	0	0.	0.				
knock-on	1479	1.4790E-01	2.7007E-02				
total	11510	1.1510E+00	1.0275E+00	total	11510	1.1510E+00	1.0275E+00
number of electrons banked		1510		cutoffs			
electron tracks per source particle		1.1510E+00		tco		1.0000E+34	
electron sub-steps per source particle		7.7164E+01		eco		1.0000E-01	
total electron sub-steps		771636		wc1		0.0000E+00	
				wc2		0.0000E+00	
computer time so far in this run	0.00 minutes			maximum number ever in bank		4	
computer time in mcrun	0.00 minutes			bank overflows to backup file		0	
source particles per minute	0.0000E+00			field length		0	
random numbers generated	4748878			most random numbers used was	4277	in history	7375
range of sampled source weights	= 1.0000E+00 to 1.0000E+00						

Difo21

Comparing files INP21O and outp21

FC: no differences encountered

Difo22

Comparing files INP22O and outp22

FC: no differences encountered

Difo23

Comparing files INP23O and outp23

FC: no differences encountered

Difo24

Comparing files INP24O and outp24

***** INP24O

cycle	3	k(collision)	0.551862	removal lifetime(abs)	3.8422E+03	source points generated	253
estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average
						corr	

***** outp24

cycle	3	k(collision)	0.551862	removal lifetime(abs)	3.8422E+03	source points generated	253
source distribution written to file	inp24s	cycle =	3				
estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average
						corr	

***** INP24O

tally type	6	track length estimate of heating.	units	mev/gram
tally for	neutrons			

***** outp24

tally type	6	track length estimate of heating.	units	mev/gram
tally for	neutrons			

Difo25

Comparing files INP25O and outp25

FC: no differences encountered

Computer System ID : 501981-801 056AVO000088 (DOE 6246288)

Difm01

Comparing files INP01M and mctl01

FC: no differences encountered

Difm02

Comparing files INP02M and mctl02

FC: no differences encountered

Difm03

Comparing files INP03M and mctl03

FC: no differences encountered

Difm04

Comparing files INP04M and mctl04

FC: no differences encountered

Difm05

Comparing files INP05M and mctl05

FC: no differences encountered

Difm06

Comparing files INP06M and mctl06

FC: no differences encountered

Difm07

Comparing files INP07M and mctl07

FC: no differences encountered

Difm08

Comparing files INP08M and mctl08

FC: no differences encountered

Difm09

Comparing files INP09M and mctl09

FC: no differences encountered

Difm10

Comparing files INP10M and mctl10

FC: no differences encountered

Difm11

Comparing files INP11M and mctl11

FC: no differences encountered

Difm12

Comparing files INP12M and mctl12

FC: no differences encountered

Difm13

Comparing files INP13M and mctl13

FC: no differences encountered

Difm14
Comparing files INP14M and mctl14
FC: no differences encountered

Difm15
Comparing files INP15M and mctl15
FC: no differences encountered

Difm16
Comparing files INP16M and mctl16
FC: no differences encountered

Difm17
Comparing files INP17M and mctl17
FC: no differences encountered

Difm18
Comparing files INP18M and mctl18
FC: no differences encountered

Difm19
Comparing files INP19M and mctl19
FC: no differences encountered

Difm20
File(s) not found : inp20m

Difm21
Comparing files INP21M and mctl21
FC: no differences encountered

Difm22
Comparing files INP22M and mctl22
FC: no differences encountered

Difm23
Comparing files INP23M and mctl23
FC: no differences encountered

Difm24
Comparing files INP24M and mctl24
FC: no differences encountered

Difm25
Comparing files INP25M and mctl25
FC: no differences encountered

Difo01
Comparing files INP01O and outp01
FC: no differences encountered

Difo02
Comparing files INP02O and outp02
FC: no differences encountered

Difo03
Comparing files INP03O and outp03
FC: no differences encountered

Difo04
Comparing files INP04O and outp04
FC: no differences encountered

Difo05
Comparing files INP05O and outp05
FC: no differences encountered

Difo06
Comparing files INP06O and outp06
FC: no differences encountered

Difo07
Comparing files INP07O and outp07
FC: no differences encountered

Difo08
Comparing files INP08O and outp08
FC: no differences encountered

Difo09
Comparing files INP09O and outp09
FC: no differences encountered

Difo10
Comparing files INP10O and outp10
FC: no differences encountered

Difo11
Comparing files INP11O and outp11
FC: no differences encountered

Difo12
Comparing files INP12O and outp12
FC: no differences encountered

Difo13
Comparing files INP13O and outp13
FC: no differences encountered

Difo14
Comparing files INP14O and outp14
FC: no differences encountered

Difo15
Comparing files INP15O and outp15
FC: no differences encountered

Difo16
Comparing files INP16O and outp16

no differences encountered

Difo17

Comparing files INP170 and outp17

FC: no differences encountered

Difo18

Comparing files INP180 and outp18

***** INP180

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

***** outp18

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

Difo19

Comparing files INP190 and outp19

FC: no differences encountered

Difo20

Comparing files INP200 and outp20

***** INP200

***** outp20

8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00
28	0.000E+00	0.000E+00	0.000E+00	1	1	8.706E-01	-3.198E-01	3.738E-01	1.000E+00	1.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	1	1	-8.188E-01	2.059E-01	5.359E-01	1.000E+00	1.000E+00	0.000E+00
30	0.000E+00	0.000E+00	0.000E+00	1	1	5.727E-01	8.124E-01	1.100E-01	1.000E+00	1.000E+00	0.000E+00
31	0.000E+00	0.000E+00	0.000E+00	1	1	5.390E-02	5.914E-01	8.046E-01	1.000E+00	1.000E+00	0.000E+00
32	0.000E+00	0.000E+00	0.000E+00	1	1	-5.778E-01	5.375E-01	6.141E-01	1.000E+00	1.000E+00	0.000E+00
33	0.000E+00	0.000E+00	0.000E+00	1	1	-7.198E-01	-2.890E-01	6.311E-01	1.000E+00	1.000E+00	0.000E+00
34	0.000E+00	0.000E+00	0.000E+00	1	1	2.210E-01	2.482E-01	9.432E-01	1.000E+00	1.000E+00	0.000E+00
35	0.000E+00	0.000E+00	0.000E+00	1	1	4.339E-01	7.515E-02	8.978E-01	1.000E+00	1.000E+00	0.000E+00
36	0.000E+00	0.000E+00	0.000E+00	1	1	-4.263E-01	8.490E-01	3.123E-01	1.000E+00	1.000E+00	0.000E+00

37	0.000E+00	0.000E+00	0.000E+00	1	1	-3.933E-01	-9.179E-01	5.266E-02	1.000E+00	1.000E+00	0.000E+00
38	0.000E+00	0.000E+00	0.000E+00	1	1	-4.846E-01	4.378E-01	7.573E-01	1.000E+00	1.000E+00	0.000E+00
39	0.000E+00	0.000E+00	0.000E+00	1	1	-5.950E-01	-5.730E-01	5.636E-01	1.000E+00	1.000E+00	0.000E+00
40	0.000E+00	0.000E+00	0.000E+00	1	1	-7.252E-01	-5.143E-01	4.578E-01	1.000E+00	1.000E+00	0.000E+00
41	0.000E+00	0.000E+00	0.000E+00	1	1	-7.156E-01	4.734E-01	5.136E-01	1.000E+00	1.000E+00	0.000E+00
42	0.000E+00	0.000E+00	0.000E+00	1	1	-1.771E-01	9.229E-01	3.417E-01	1.000E+00	1.000E+00	0.000E+00
43	0.000E+00	0.000E+00	0.000E+00	1	1	-1.149E-01	-4.206E-01	8.999E-01	1.000E+00	1.000E+00	0.000E+00
44	0.000E+00	0.000E+00	0.000E+00	1	1	4.509E-01	8.630E-02	8.884E-01	1.000E+00	1.000E+00	0.000E+00
45	0.000E+00	0.000E+00	0.000E+00	1	1	-7.358E-01	2.500E-01	6.294E-01	1.000E+00	1.000E+00	0.000E+00
46	0.000E+00	0.000E+00	0.000E+00	1	1	-8.448E-01	3.645E-01	3.917E-01	1.000E+00	1.000E+00	0.000E+00
47	0.000E+00	0.000E+00	0.000E+00	1	1	1.958E-01	-2.769E-01	9.407E-01	1.000E+00	1.000E+00	0.000E+00
48	0.000E+00	0.000E+00	0.000E+00	1	1	2.788E-01	-7.325E-03	9.603E-01	1.000E+00	1.000E+00	0.000E+00
49	0.000E+00	0.000E+00	0.000E+00	1	1	-3.201E-01	4.174E-01	8.505E-01	1.000E+00	1.000E+00	0.000E+00
50	0.000E+00	0.000E+00	0.000E+00	1	1	8.960E-01	-1.641E-01	4.126E-01	1.000E+00	1.000E+00	0.000E+00

problem summary

run terminated when 10000 particle histories were done.

0

photon creation	tracks	weight	energy	photon loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	0	0.	0.	escape	575	5.7500E-02	1.5476E-02
			energy cutoff	0	0.	0.	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtran	0	0.	0.	dxtran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
from neutrons	0	0.	0.	compton scatter	0	0.	6.6993E-05
bremsstrahlung	694	6.9400E-02	1.7315E-02	capture	119	1.1900E-02	1.7720E-03
p-annihilation	0	0.	0.	pair production	0	0.	0.
electron x-rays	0	0.	0.				
1st fluorescence	0	0.	0.				
2nd fluorescence	0	0.	0.				
total	694	6.9400E-02	1.7315E-02	total	694	6.9400E-02	1.7315E-02
number of photons banked			694	average lifetime, shakes			cutoffs
photon tracks per source particle			6.9400E-02	escape	6.7786E-05	tco	1.0000E+34
photon collisions per source particle			1.3000E-02	capture	8.3325E-05	eco	1.0000E-01
total photon collisions			130	capture or escape	7.0450E-05	wc1	0.0000E+00
			any termination	7.0450E-05	wc2	0.0000E+00	

0

electron creation	tracks	weight	energy	electron loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	10000	1.0000E+00	1.0000E+00	escape	9464	9.4640E-01	7.1762E-01
			energy cutoff	2046	2.0460E-01	2.0141E-02	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
pair production	0	0.	0.	scattering	0	0.	2.6560E-01
compton recoil	2	2.0000E-04	3.7815E-05	bremsstrahlung	0	0.	2.4158E-02
photo-electric	29	2.9000E-03	4.7387E-04				

```

photon auger      0 0. 0.
electron auger    0 0. 0.
knock-on          1479 1.4790E-01 2.7007E-02
total             11510 1.1510E+00 1.0275E+00
number of electrons banked 1510
electron tracks per source particle 1.1510E+00
electron sub-steps per source particle 7.7164E+01
total electron sub-steps 771636
total             11510 1.1510E+00 1.0275E+00
cutoffs
tco 1.0000E+34
eco 1.0000E-01
wc1 0.0000E+00
wc2 0.0000E+00
computer time so far in this run 0.00 minutes
computer time in mcrun 0.00 minutes
source particles per minute 0.0000E+00
random numbers generated 4748878
range of sampled source weights = 1.0000E+00 to 1.0000E+00
maximum number ever in bank 4
bank overflows to backup file 0
field length 0
most random numbers used was 4277 in history 7375
*****

```

Difo21
Comparing files INP21O and outp21
FC: no differences encountered

Difo22
Comparing files INP22O and outp22
FC: no differences encountered

Difo23
Comparing files INP23O and outp23
FC: no differences encountered

Difo24
Comparing files INP24O and outp24
***** INP24O

```

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253
estimator cycle 4 ave of 2 cycles combination simple average combined average corr
***** outp24
cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253
source distribution written to file inp24s cycle = 3
estimator cycle 4 ave of 2 cycles combination simple average combined average corr
*****

```

```

***** INP24O
tally type 6 track length estimate of heating. units mev/gram
tally for neutrons
***** outp24
tally type 6 track length estimate of heating. units mev/gram
tally for neutrons
*****

```

Difo25
Comparing files INP25O and outp25
FC: no differences encountered

Computer System ID : 0012358

Difm01

Comparing files INP01M and mctl01

FC: no differences encountered

Difm02

Comparing files INP02M and mctl02

FC: no differences encountered

Difm03

Comparing files INP03M and mctl03

FC: no differences encountered

Difm04

Comparing files INP04M and mctl04

FC: no differences encountered

Difm05

Comparing files INP05M and mctl05

FC: no differences encountered

Difm06

Comparing files INP06M and mctl06

FC: no differences encountered

Difm07

Comparing files INP07M and mctl07

FC: no differences encountered

Difm08

Comparing files INP08M and mctl08

FC: no differences encountered

Difm09

Comparing files INP09M and mctl09

FC: no differences encountered

Difm10

Comparing files INP10M and mctl10

FC: no differences encountered

Difm11

Comparing files INP11M and mctl11

FC: no differences encountered

Difm12

Comparing files INP12M and mctl12

FC: no differences encountered

Difm13

Comparing files INP13M and mctl13

FC: no differences encountered

Difm14
Comparing files INP14M and mctl14
FC: no differences encountered

Difm15
Comparing files INP15M and mctl15
FC: no differences encountered

Difm16
Comparing files INP16M and mctl16
FC: no differences encountered

Difm17
Comparing files INP17M and mctl17
FC: no differences encountered

Difm18
Comparing files INP18M and mctl18
FC: no differences encountered

Difm19
Comparing files INP19M and mctl19
FC: no differences encountered

Difm20
File(s) not found : inp20m

Difm21
Comparing files INP21M and mctl21
FC: no differences encountered

Difm22
Comparing files INP22M and mctl22
FC: no differences encountered

Difm23
Comparing files INP23M and mctl23
FC: no differences encountered

Difm24
Comparing files INP24M and mctl24
FC: no differences encountered

Difm25
Comparing files INP25M and mctl25
FC: no differences encountered

Difo01
Comparing files INP01O and outp01
FC: no differences encountered

Difo02
Comparing files INP02O and outp02
FC: no differences encountered

Difo03
Comparing files INP03O and outp03
FC: no differences encountered

Difo04
Comparing files INP04O and outp04
FC: no differences encountered

Difo05
Comparing files INP05O and outp05
FC: no differences encountered

Difo06
Comparing files INP06O and outp06
FC: no differences encountered

Difo07
Comparing files INP07O and outp07
FC: no differences encountered

Difo08
Comparing files INP08O and outp08
FC: no differences encountered

Difo09
Comparing files INP09O and outp09
FC: no differences encountered

Difo10
Comparing files INP10O and outp10
FC: no differences encountered

Difo11
Comparing files INP11O and outp11
FC: no differences encountered

Difo12
Comparing files INP12O and outp12
FC: no differences encountered

Difo13
Comparing files INP13O and outp13
FC: no differences encountered

Difo14
Comparing files INP14O and outp14
FC: no differences encountered

Difo15
Comparing files INP15O and outp15
FC: no differences encountered

Difo16
Comparing files INP16O and outp16

FC: no differences encountered

Difo17

Comparing files INP170 and outp17

FC: no differences encountered

Difo18

Comparing files INP180 and outp18

***** INP180

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

***** outp18

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

Difo19

Comparing files INP190 and outp19

FC: no differences encountered

Difo20

Comparing files INP200 and outp20

***** INP200

***** outp20

8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	9.036E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00
28	0.000E+00	0.000E+00	0.000E+00	1	1	8.706E-01	-3.198E-01	3.738E-01	1.000E+00	1.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	1	1	-8.188E-01	2.059E-01	5.359E-01	1.000E+00	1.000E+00	0.000E+00
30	0.000E+00	0.000E+00	0.000E+00	1	1	5.727E-01	8.124E-01	1.100E-01	1.000E+00	1.000E+00	0.000E+00
31	0.000E+00	0.000E+00	0.000E+00	1	1	5.390E-02	5.914E-01	8.046E-01	1.000E+00	1.000E+00	0.000E+00
32	0.000E+00	0.000E+00	0.000E+00	1	1	-5.778E-01	5.375E-01	6.141E-01	1.000E+00	1.000E+00	0.000E+00
33	0.000E+00	0.000E+00	0.000E+00	1	1	-7.198E-01	-2.890E-01	6.311E-01	1.000E+00	1.000E+00	0.000E+00
34	0.000E+00	0.000E+00	0.000E+00	1	1	2.210E-01	2.482E-01	9.432E-01	1.000E+00	1.000E+00	0.000E+00
35	0.000E+00	0.000E+00	0.000E+00	1	1	4.339E-01	7.515E-02	8.978E-01	1.000E+00	1.000E+00	0.000E+00
36	0.000E+00	0.000E+00	0.000E+00	1	1	-4.263E-01	8.490E-01	3.123E-01	1.000E+00	1.000E+00	0.000E+00

```

37 0.000E+00 0.000E+00 0.000E+00 1 1 -3.933E-01 -9.179E-01 5.266E-02 1.000E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 1 -4.846E-01 4.378E-01 7.573E-01 1.000E+00 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 1 -5.950E-01 -5.730E-01 5.636E-01 1.000E+00 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 1 -7.252E-01 -5.143E-01 4.578E-01 1.000E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 1 -7.156E-01 4.734E-01 5.136E-01 1.000E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 1 -1.771E-01 9.229E-01 3.417E-01 1.000E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 1 -1.149E-01 -4.206E-01 8.999E-01 1.000E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 1 4.509E-01 8.630E-02 8.884E-01 1.000E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 1 -7.358E-01 2.500E-01 6.294E-01 1.000E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 1 -8.448E-01 3.645E-01 3.917E-01 1.000E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 1 1.958E-01 -2.769E-01 9.407E-01 1.000E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 1 2.788E-01 -7.325E-03 9.603E-01 1.000E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 1 -3.201E-01 4.174E-01 8.505E-01 1.000E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 1 8.960E-01 -1.641E-01 4.126E-01 1.000E+00 1.000E+00 0.000E+00

```

problem summary

run terminated when 10000 particle histories were done.

```

0
photon creation  tracks  weight  energy  photon loss  tracks  weight  energy
                  (per source particle)                  (per source particle)
source           0  0.  0.  escape 575 5.7500E-02 1.5476E-02
                  energy cutoff 0 0. 0.
                  time cutoff 0 0. 0.
weight window    0 0. 0.  weight window 0 0. 0.
cell importance  0 0. 0.  cell importance 0 0. 0.
weight cutoff    0 0. 0.  weight cutoff 0 0. 0.
energy importance 0 0. 0.  energy importance 0 0. 0.
tran            0 0. 0.  dxtran 0 0. 0.
forced collisions 0 0. 0.  forced collisions 0 0. 0.
exp. transform  0 0. 0.  exp. transform 0 0. 0.
from neutrons   0 0. 0.  compton scatter 0 0. 6.6993E-05
bremsstrahlung  694 6.9400E-02 1.7315E-02 capture 119 1.1900E-02 1.7720E-03
p-annihilation  0 0. 0.  pair production 0 0. 0.
electron x-rays 0 0. 0.
1st fluorescence 0 0. 0.
2nd fluorescence 0 0. 0.
total           694 6.9400E-02 1.7315E-02 total 694 6.9400E-02 1.7315E-02
number of photons banked 694 average lifetime, shakes cutoffs
photon tracks per source particle 6.9400E-02 escape 6.7786E-05 tco 1.0000E+34
photon collisions per source particle 1.3000E-02 capture 8.3325E-05 eco 1.0000E-01
total photon collisions 130 capture or escape 7.0450E-05 wc1 0.0000E+00
any termination 7.0450E-05 wc2 0.0000E+00

```

```

0
electron creation tracks  weight  energy  electron loss  tracks  weight  energy
                  (per source particle)                  (per source particle)
source           10000 1.0000E+00 1.0000E+00 escape 9464 9.4640E-01 7.1762E-01
                  energy cutoff 2046 2.0460E-01 2.0141E-02
                  time cutoff 0 0. 0.
weight window    0 0. 0.  weight window 0 0. 0.
cell importance  0 0. 0.  cell importance 0 0. 0.
weight cutoff    0 0. 0.  weight cutoff 0 0. 0.
energy importance 0 0. 0.  energy importance 0 0. 0.
pair production  0 0. 0.  scattering 0 0. 2.6560E-01
neutron recoil   2 2.0000E-04 3.7815E-05 bremsstrahlung 0 0. 2.4158E-02
photo-electric   29 2.9000E-03 4.7387E-04

```



```

proton auger      0 0. 0.
electron auger    0 0. 0.
knock-on          1479 1.4790E-01 2.7007E-02
total            11510 1.1510E+00 1.0275E+00
number of electrons banked 1510
electron tracks per source particle 1.1510E+00
electron sub-steps per source particle 7.7164E+01
total electron sub-steps 771636
total            11510 1.1510E+00 1.0275E+00
cutoffs
tco 1.0000E+34
eco 1.0000E-01
wcl 0.0000E+00
wc2 0.0000E+00
computer time so far in this run 0.00 minutes
maximum number ever in bank 4
computer time in mcrun 0.00 minutes
bank overflows to backup file 0
source particles per minute 0.0000E+00
field length 0
random numbers generated 4748878
most random numbers used was 4277 in history 7375
range of sampled source weights = 1.0000E+00 to 1.0000E+00
*****

```

Difo21

Comparing files INP21O and outp21

FC: no differences encountered

Difo22

Comparing files INP22O and outp22

FC: no differences encountered

Difo23

Comparing files INP23O and outp23

no differences encountered

Difo24

Comparing files INP24O and outp24

***** INP24O

```

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253
estimator cycle 4 ave of 2 cycles combination simple average combined average corr

```

***** outp24

```

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253
source distribution written to file inp24s cycle = 3
estimator cycle 4 ave of 2 cycles combination simple average combined average corr

```

***** INP24O

```

tally type 6 track length estimate of heating. units mev/gram
tally for neutrons

```

***** outp24

```

tally type 6 track length estimate of heating. units mev/gram
tally for neutrons

```

Difo25

Comparing files INP25O and outp25

FC: no differences encountered

Attachment B

Full Output for In-Depth Comparison

Computer System ID : 501981-801 056AVO000189 (DOE 6246264)

File: Inp18o

```

1-  prob18 -- kcode in a hexagonal prism lattice.
2-  c  three half control rods and five whole control rods.
3-  30  0 -905 -19 29 1  fill=1
4-  31  0 -906 -19 29 1  fill=1 (16.7113 0 0)
5-  37  0 -907 -19 29 1  fill=1 (-16.7113 0 0)
6-  34  0 -913 -19 29  fill=1 (0 11.9185 0)
7-  32  0 -914 -19 29  fill=1 (10.3217 5.9592 0)
8-  33  0 -915 -19 29  fill=1 (8.3557 14.4724 0)
9-  35  0 -916 -19 29  fill=1 (-8.3557 14.4724 0)
10- 36  0 -917 -19 29  fill=1 (-10.3217 5.9592 0)
11- c  universe 1: structure of control rod.
12- 38  11 -2.02  -880 u=1  $ control rod core
13- 39  6 -8.4  880 -881 u=1  $ control rod cladding
14- 40  12 -1.00  881 -882 u=1  $ control rod gap
15- 41  6 -8.4  882  u=1  $ control rod sheath
16- c  the space between the control rods, filled with lattice.
17- 140  0 -17 1 29 -19 905 906 907 913 914 915 916 917  fill=2
18- c  universe 2: lattice of fuel rods with water in between.
19- 42  12 -1.00 -301 302 -303 304 -305 306  u=2  lat=2  fill=
20- -37:27 -1:33 0:0 &
21- 2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22- 2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23- 2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24- 2 3r 3 57r 2 2r &
25- 2 2r 3 58r 2 2r
26- 2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27- 2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28- 2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29- 2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30- 2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31- 2 1r 3 54r 2 7r &
32- c  can code remember & thru comment?
33- 2 3 55r 2 7r
34- 2 3 25r 2 2r 3 25r 2 8r
35- 2 3 24r 2 3r 3 24r 2 9r
36- 2 3 23r 2 4r 3 23r 2 10r
37- 2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38- 2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39- 2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40- 2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41- 2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42- 2 3 46r 2 16r
43- 2 3 45r 2 17r
44- 2 3 44r 2 18r
45- 2 1r 3 41r 2 20r
46- 2 1r 3 40r 2 21r
47- 2 1r 3 39r 2 22r
48- 2 2r 3 36r 2 24r
49- 2 2r 3 35r 2 25r
50- 2 3r 3 32r 2 27r
51- 2 4r 3 29r 2 29r
52- 2 5r 3 26r 2 31r
53- 2 6r 3 23r 2 33r
54- 2 8r 3 18r 2 36r
55- 2 11r 3 11r 2 40r
56- 2 64r
57- c  universe 3: structure of fuel rod lattice elements.
58- 154 2 -13.75  -58  u=3  $ fuel element
59- 149 12 -1.00  58 -268  u=3  $ gap
60- 144 7 -19.66  268 -478  u=3  $ liner
61- 159 6 -8.4  478 -698  u=3  $ cladding
62- 141 12 -1.00  698  u=3  $ water between the fuel rods

```

```

162 0 17:-29:19:-1 $ outside world
65- *1 py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0 11.9185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- m12 hwt:01 lwtr:01
98- kcode 200 1 5 6

```

warning. tallies are normed per fission neutron for one generation.

```

99- ksrc 3 .2 .2 3 .2 -3 .2 .2 3 .2 4 3 .2 -4 3 .2 4 3 .1 -4 3 .2
100- e .01 .1 1 .10.
101- fq fe
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<(42[-10:-6 -1 0])) $ average 5 x elements at j=-1
104- (154<(42[-10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<(42[-10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<(42[-10:-6 21 0])) $ average 5 x elements at j=21
107- (154<(42[-10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdnp 2j -1
111- ptrac buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points 8
points not in any cell 0
points in cells of zero importance 0
points in void cells 0
points in ambiguous cells 0
total points rejected 0
points remaining 8
points after expansion or contraction 200
nominal source size 200

initial guess for k(eff.) 1.000000

```

```

cycles to skip before tallying 5
number of keff cycles that can be stored 201

```

```
print table 30
```

cells (154<(42[-10:-6 -1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6 29 0]))

```
0.00000E+00 to 1.00000E-02 mev
1.00000E-02 to 1.00000E-01 mev
1.00000E-01 to 1.00000E+00 mev
1.00000E+00 to 1.00000E+01 mev
total bin
```

print table 40

the sum of the fractions of material 12 was 3.000000E+00

2	92235, 0.37504	92238, 0.12499	7014, 0.49997
6	41093, 0.98982	40000, 0.01018	
7	74000, 1.00000		
11	5010, 0.71977	5011, 0.08004	6012, 0.20019
12	1001, 0.33333	1002, 0.33333	8016, 0.33333

Associated thermal s(a,b) data sets: hwtr.01t lwtr.01t

2	92235, 0.70574	92238, 0.23821	7014, 0.05605
6	41093, 0.99000	40000, 0.01000	
7	74000, 1.00000		
11	5010, 0.68700	5011, 0.08400	6012, 0.22900
12	1001, 0.05300	1002, 0.10591	8016, 0.84109

```
print table 50
```

38

```

15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
16 149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
17 144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
Isurface areas                                     print table 50

```

```

surface input calculated reason area
area area not calculated

1 1 0.00000E+00 0.00000E+00 asymmetric
2 17 0.00000E+00 0.00000E+00 asymmetric
3 19 0.00000E+00 0.00000E+00 asymmetric
4 29 0.00000E+00 0.00000E+00 asymmetric
5 58 0.00000E+00 0.00000E+00 infinite
6 268 0.00000E+00 0.00000E+00 infinite
7 478 0.00000E+00 0.00000E+00 infinite
8 698 0.00000E+00 0.00000E+00 infinite
9 880 0.00000E+00 0.00000E+00 infinite
10 881 0.00000E+00 0.00000E+00 infinite
11 882 0.00000E+00 0.00000E+00 infinite
12 905 0.00000E+00 0.00000E+00 asymmetric
13 906 0.00000E+00 0.00000E+00 asymmetric
14 907 0.00000E+00 0.00000E+00 asymmetric
15 913 0.00000E+00 8.40057E+02
16 914 0.00000E+00 8.40057E+02
17 915 0.00000E+00 8.40057E+02
18 916 0.00000E+00 8.40057E+02
19 917 0.00000E+00 8.40057E+02
20 301 0.00000E+00 0.00000E+00 infinite
21 302 0.00000E+00 0.00000E+00 infinite
22 303 0.00000E+00 0.00000E+00 infinite
23 304 0.00000E+00 0.00000E+00
24 305 0.00000E+00 0.00000E+00
25 306 0.00000E+00 0.00000E+00
Icells                                     print table 60

```

```

atom gram neutron
cell mat density density volume mass pieces importance

1 30 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
2 31 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
3 37 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
4 34 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
5 32 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
6 33 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
7 35 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
8 36 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
9 38 11 1.15958E-02 2.02000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
10 39 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
11 40 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
12 41 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
13 140 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
14 42 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
15 154 2 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
16 149 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
17 144 7 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
18 159 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
20 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

```

```

total 4.42185E+03 0.00000E+00
Isurfaces

```

print table 70

```

surface trans type surface coefficients

```

```

1 1 refl. py 0.0000000E+00
17 cz 2.9135000E+01
19 pz 3.1750000E+01
29 pz -3.1750000E+01
58 c/z 3.4414000E+00 8.5150000E-01 3.2400000E-01
268 c/z 3.4414000E+00 8.5150000E-01 3.3450000E-01
478 c/z 3.4414000E+00 8.5150000E-01 3.4750000E-01
698 c/z 3.4414000E+00 8.5150000E-01 4.3180000E-01
880 cz 1.7251000E+00
10881 cz 1.8051000E+00
11882 cz 1.9051000E+00
12905 cz 2.1055000E+00
13906 c/z 1.6711300E+01 0.0000000E+00 2.1055000E+00
14907 c/z -1.6711300E+01 0.0000000E+00 2.1055000E+00
15913 c/z 0.0000000E+00 1.1918500E+01 2.1055000E+00
16914 c/z 1.0321700E+01 5.9592000E+00 2.1055000E+00
17915 c/z 8.3557000E+00 1.4472400E+01 2.1055000E+00
18916 c/z -8.3557000E+00 1.4472400E+01 2.1055000E+00
19917 c/z -1.0321700E+01 5.9592000E+00 2.1055000E+00
20301 px 3.9330000E+00
21302 px 2.9498000E+00
22303 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 5.8994000E+00
23304 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 3.9330000E+00
24305 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -9.8340000E-01
25306 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -2.9498000E+00

```

1 cell temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

icross-section tables

print table 100

table length

tables from file testlib

```

1001.00c 1782 1-h-1 from endf-vi.1 mat 125 05/26/93
1002.55c 4102 njoy ( 120) 04/26/82
5011.40c 3229 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
6012.40c 4858 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
7014.40c 8535 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
8016.40c 5358 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
40000.40c 93372 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900323
41093.40c 42746 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
74000.40c 91244 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
92235.40c 34772 ENDL library name: nd900719 MCNP translation: 9total nu 10:05 900503
92238.40c 40834 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
5010.03d 3682 b-10 endf/b-iv new gamma production format ( 1273) 14 oct 75
lwtr.01t 10193 deuterium in heavy water at 300 degrees kelvin 1002 0 010/22/85
lwtr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

```

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp18s cycle = 0

3 warning messages so far.

starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob18 -- kcode in a hexagonal prism lattice.

	x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.085E-01	4.733E-01	7.193E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.5085E-01	4.733E-01	7.193E-01		
2	3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		8.952E-01	-4.447E-01	-2.944E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0.8952E-01	-4.447E-01	-2.944E-02		
3	3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.184E-01	-4.495E-01	6.446E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-6.184E-01	-4.495E-01	6.446E-01		
4	3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		9.710E-01	-5.665E-02	-2.323E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.9710E-01	-5.665E-02	-2.323E-01		
5	3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.861E-01	1.496E-01	-7.963E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.5861E-01	1.496E-01	-7.963E-01		
6	3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.489E-02	-1.626E-01	9.845E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-6.489E-02	-1.626E-01	9.845E-01		
7	3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-7.068E-02	3.263E-02	-9.970E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-7.068E-02	3.263E-02	-9.970E-01		
8	3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-3.915E-01	4.664E-01	-7.932E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-3.915E-01	4.664E-01	-7.932E-01		
9	3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.368E-01	9.215E-01	-3.079E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-2.368E-01	9.215E-01	-3.079E-01		
10	3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.946E-01	-3.204E-01	9.271E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.1.946E-01	-3.204E-01	9.271E-01		
11	3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.698E-01	-7.177E-01	-1.905E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-6.698E-01	-7.177E-01	-1.905E-01		
12	3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-8.398E-01	-4.129E-01	3.524E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-8.398E-01	-4.129E-01	3.524E-01		
13	3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.714E-01	-8.572E-01	4.857E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-1.714E-01	-8.572E-01	4.857E-01		
14	3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.489E-01	-5.118E-01	-8.222E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-2.489E-01	-5.118E-01	-8.222E-01		
15	3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.959E-01	2.119E-01	9.314E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-2.959E-01	2.119E-01	9.314E-01		
16	3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.395E-01	-9.829E-01	1.202E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.1.395E-01	-9.829E-01	1.202E-01		
17	3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		6.909E-01	-7.110E-01	1.307E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6.909E-01	-7.110E-01	1.307E-01		
18	3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.580E-01	5.320E-01	-5.329E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.-6.580E-01	5.320E-01	-5.329E-01		
19	3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-9.903E-01	-1.380E-01	1.353E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0.-9.903E-01	-1.380E-01	1.353E-02		
20	3.000E+00	2.000E-01	2.000E-01	140			7.462E-01	4.859E-01	-4.551E-01	1.000E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		7.462E-01	4.859E-01	-4.551E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.7.462E-01	4.859E-01	-4.551E-01		
21	3.000E+00	2.000E-01	2.000E-01	140			-1.977E-01	9.797E-01	3.360E-02	3.990E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.977E-01	9.797E-01	3.360E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0.-1.977E-01	9.797E-01	3.360E-02		
22	3.000E+00	2.000E-01	2.000E-01	140			-9.117E-01	-3.647E-01	-1.891E-01	2.665E-01	1.000E+00 0.000E+00

range of sampled source weights = 7.7821E-01 to 1.0989E+00
neutron activity in each cell

print table 126

HNF-SD-SNF-CSWD-005, Rev. 0

cell	tracks entering	population	collisions (per history)	collisions * weight energy	number weighted energy	flux weighted (relative)	average track weight (cm)	average track mfp
1	30	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6977E-01
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01

total 266059 9765 22764 1.1324E+01

In neutron weight balance in each cell -- external events

print table 130

cell	entering	source	energy cutoff	time cutoff	exiting	total
30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
38	4.8822E-01	0.0000E+00	0.0000E+00	0.0000E+00	-3.3091E-01	1.5731E-01
39	8.4996E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.4933E-01	6.2750E-04
40	8.9904E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.9904E-01	3.9460E-06
41	9.7260E-01	0.0000E+00	0.0000E+00	0.0000E+00	-9.6978E-01	2.8204E-03
140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
42	1.0907E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.0913E+00	-5.9111E-04
154	1.2943E+01	8.4067E-01	0.0000E+00	0.0000E+00	-1.3171E+01	6.1278E-01
149	2.6508E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.6508E+01	3.5884E-05
144	2.7419E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.7405E+01	1.4572E-02
159	3.1331E+01	8.0064E-02	0.0000E+00	0.0000E+00	-3.1361E+01	5.0067E-02
141	3.9111E+01	4.0032E-02	0.0000E+00	0.0000E+00	-3.9150E+01	4.5860E-04

total 1.4161E+02 9.6077E-01 0.0000E+00 0.0000E+00 -1.4174E+02 8.3809E-01

In neutron weight balance in each cell -- variance reduction events

print table 130

cell	weight window	cell importance	weight cutoff	energy importance	dxtran	forced collision	exponential transform	total
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
 24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
 25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
 26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
 27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
 28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
 29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
 30 2.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
 31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
 32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
 34 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
 35 2.000E-01 3.000E+00 2.000E-01 140 -4.048E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -4.048E-02 8.831E-01 4.675E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -4.048E-02 8.831E-01 4.675E-01
 36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
 37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
 38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
 39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
 40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
 41 2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -3.212E-01 -7.678E-01 -5.543E-01
 42 2.000E-01 3.000E+00 2.000E-01 140 5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 5.039E-01 -1.460E-01 8.513E-01
 43 2.000E-01 3.000E+00 2.000E-01 140 6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 6.080E-01 5.487E-01 5.738E-01
 2.000E-01 3.000E+00 2.000E-01 140 -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01

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3.641E+00 4.456E-01 2.000E-01 141      0 -2.932E-01 9.304E-01 -2.199E-01
2.000E-01 3.000E+00 2.000E-01 140      -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140      1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141      0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140      7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141      0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140      4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141      0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140      5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140      -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -1.053E-01 -9.805E-01 1.658E-01
1estimated keff results by cycle                                print table 175

```

```

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257
cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195
cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193
cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182
cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222
cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

```

source distribution written to file inp18s cycle = 6
 problem summary

run terminated when 6 kcode cycles were done.

```

0
neutron creation  tracks  weight  energy      neutron loss  tracks  weight  energy
                (per source particle)                (per source particle)

source          1249  9.6077E-01 1.8661E+00 escape      220  1.2268E-01 1.2054E-01
                energy cutoff 0 0. 0.
                time cutoff 0 0. 0.

weight window  0 0. 0. weight window 0 0. 0.
cell importance 0 0. 0. cell importance 0 0. 0.
weight cutoff  0 1.3743E-01 3.8498E-03 weight cutoff 1034 1.2791E-01 5.1920E-03
energy importance 0 0. 0. energy importance 0 0. 0.
dxtan          0 0. 0. dxtan          0 0. 0.
forced collisions 0 0. 0. forced collisions 0 0. 0.
exp. transform 0 0. 0. exp. transform 0 0. 0.
upscattering   0 0. 5.3884E-11 downscattering 0 0. 1.3605E+00
                capture      0 3.9980E-01 1.1590E-01
(n,xn)         10 6.1640E-03 6.1355E-03 loss to (n,xn) 5 3.0820E-03 2.4027E-02
fission        0 0. 0. loss to fission 0 4.5089E-01 2.4987E-01
total          1259 1.1044E+00 1.8761E+00 total      1259 1.1044E+00 1.8761E+00

```

```

number of neutrons banked      5 average lifetime, shakes      cutoffs
neutron tracks per source particle 1.0080E+00 escape 3.7027E+00 tco 1.0000E+34
neutron collisions per source particle 1.8226E+01 capture 1.2954E+01 eco 0.0000E+00
total neutron collisions      22764 capture or escape 1.1788E+01 wc1 -5.0000E-01
net multiplication      1.0032E+00 0.0035 any termination 1.2744E+01 wc2 -2.5000E-01

```

```

computer time so far in this run 0.00 minutes maximum number ever in bank 1
computer time in mcrun 0.00 minutes bank overflows to backup file 0
source particles per minute 0.0000E+00 field length 0
random numbers generated 500880 most random numbers used was 1298 in history 14

```

9	38	0.0000E+00	0.0000E+00	1.2447E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.2447E-03
10	39	0.0000E+00	0.0000E+00	2.0097E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.0097E-04
11	40	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	41	0.0000E+00	0.0000E+00	2.9100E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.9100E-04
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	154	0.0000E+00	0.0000E+00	8.0354E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	8.0354E-03
16	149	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	144	0.0000E+00	0.0000E+00	-3.0848E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-3.0848E-06
18	159	0.0000E+00	0.0000E+00	-2.5216E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-2.5216E-04
19	141	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03
 Neutron weight balance in each cell -- physical events print table 130

cell	(n,xn)	fission	capture (n,xn)	loss to fission	loss to	total
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	-1.5855E-01
10	39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	-8.2847E-04
11	40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	-3.9460E-06
12	41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	-3.1114E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	5.9111E-04
15	154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-03	-4.5089E-01
16	149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	-3.5884E-05
17	144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	-1.4569E-02
18	159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	-4.9815E-02
19	141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	-4.5860E-04

total 6.1640E-03 0.0000E+00 -3.9980E-01 -3.0820E-03 -4.5089E-01 -8.4760E-01
 Neutron activity of each nuclide in each cell, per source particle print table 140

cell	nuclides fraction	atom collisions	total collisions	collisions * weight	weight lost to capture	weight loss to fission	weight gain by (n,xn)
9	38	5010.03d 7.1977E-01	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00
		5011.40c 8.0041E-02	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
		6012.40c 2.0019E-01	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
10	39	41093.40c 9.8982E-01	128	6.2802E-02	8.2814E-04	0.0000E+00	0.0000E+00
		40000.40c 1.0183E-02	2	9.7676E-04	3.3160E-07	0.0000E+00	0.0000E+00
11	40	1001.00c 3.3333E-01	111	5.1533E-02	3.9251E-06	0.0000E+00	0.0000E+00
		1002.55c 3.3333E-01	33	1.5373E-02	2.0884E-08	0.0000E+00	0.0000E+00
		8016.40c 3.3333E-01	40	2.1271E-02	0.0000E+00	0.0000E+00	0.0000E+00
12	41	41093.40c 9.8982E-01	313	1.5623E-01	3.1072E-03	0.0000E+00	0.0000E+00
		40000.40c 1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00
14	42	1001.00c 3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00	0.0000E+00
		1002.55c 3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00	6.2306E-04
		8016.40c 3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00	0.0000E+00
15	154	92235.40c 3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
		92238.40c 1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
		7014.40c 4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
16	149	1001.00c 3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00	0.0000E+00

1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00	0.0000E+00
8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00	0.0000E+00
17 144	74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00 0.0000E+00
18 159	41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00 0.0000E+00
	40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00 0.0000E+00
19 141	1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00 0.0000E+00
	1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00 0.0000E+00
	8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00 0.0000E+00
total	22764		1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03

total over all cells for each nuclide	total collisions	* weight	collisions to capture	weight lost to fission	weight loss by (n,xn)	weight gain
1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00	
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04	
5011.40c	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00	
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00	
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00	
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00	
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00	
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00	
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00	
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04	
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03	
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00	

the initial fission neutron source distribution used the 8 source points that were input on the ksrc card.
 criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.
 problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.
 all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.
 individual and average keff estimator results by cycle

keff	neutron	keff estimators by cycle	average keff estimators and deviations	average k(c/a/t)
cycle	histories	k(coll) k(abs) k(track)	k(coll) st dev k(abs) st dev k(track) st dev	k(c/a/t) st dev fom

1	200	1.25311 1.26302 1.22009		
2	257	1.21200 1.25252 1.12957		
3	195	1.20026 1.14326 1.13006		
4	193	1.12953 1.16269 1.10757		
5	182	1.13599 1.12465 1.11238		
----- begin active keff cycles -----				
6	222	1.07701 1.04669 1.07528		

Italy 4 nps = 1249

+ fuel rod flux in 5 y locations averaged over 5 x elements
 tally type 4 track length estimate of particle flux. units 1/cm**2
 tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])
 cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])
 cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])
 cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])
 cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

```

energy:  1.0000E-02    1.0000E-01    1.0000E+00    1.0000E+01    total
cell
a  0.00000E+00 0.0000  2.84017E-05 0.9975  1.86420E-04 0.4656  1.36846E-04 0.5743  3.51668E-04 0.3877
b  1.07442E-05 0.9975  1.58576E-04 0.5120  2.32928E-04 0.3945  4.44462E-05 0.5872  4.46694E-04 0.2855
c  2.16778E-05 0.7232  9.40943E-05 0.5519  5.37835E-05 0.5876  1.51034E-04 0.7075  3.20589E-04 0.3937
d  1.47903E-05 0.5831  0.00000E+00 0.0000  1.15515E-04 0.5838  1.69653E-04 0.5071  2.99958E-04 0.3718
e  8.04943E-06 0.9975  0.00000E+00 0.0000  0.00000E+00 0.0000  6.81909E-05 0.7477  7.62403E-05 0.6763
analysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

```

```

normed average tally per history = 3.51668E-04    unnormed average tally per history = 3.68228E-02
estimated tally relative error = 0.3877    estimated variance of the variance = 0.1752
relative error from zero tallies = 0.3464    relative error from nonzero scores = 0.1740

number of nonzero history tallies = 8    efficiency for the nonzero tallies = 0.0400
history number of largest tally = 1034    largest unnormalized history tally = 1.41575E+00
(largest tally)/(average tally) = 3.84476E+01    (largest tally)/(avg nonzero tally)= 1.53791E+00

(confidence interval shift)/mean = 0.0793    shifted confidence interval center = 3.79539E-04

```

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	3.51668E-04	4.10723E-04	0.167927
relative error	3.87653E-01	3.61597E-01	-0.067213
variance of the variance	1.75161E-01	1.47665E-01	-0.156976
shifted center	3.79539E-04	3.77169E-04	-0.006244
figure of merit	0.00000E+00	0.00000E+00	0.000000

There is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
The history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

tfc bin	mean--	relative error-----	variance of the variance----	figure of merit--	pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope
desired	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant	random >3.00
observed	random	0.39 yes yes	0.18 yes yes		0.00
passed?	yes	no yes yes	no yes yes	no	

warning: the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.

Unnormed tally density for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally number	num den	log den	d-
1.00-01	1	2.43-01	-0.614
1.26-01	0	0.00+00	0.000
1.58-01	0	0.00+00	0.000
2.00-01	0	0.00+00	0.000
2.51-01	0	0.00+00	0.000
3.16-01	0	0.00+00	0.000

3.98-01	0 0.00+00	0.000
-01	0 0.00+00	0.000
-1-01	2 7.71-02	-1.113
7.94-01	0 0.00+00	0.000
1.00+00	1 2.43-02	-1.614 m
1.26+00	0 0.00+00	0.000
1.58+00	4 6.14-02	-1.212
total	8 4.00-02	d

cumulative tally number for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162

abscissa tally	cum number	ordinate cum pct	plot of the cumulative number of tallies in the tally fluctuation chart bin from 0 to 100 percent
1.00000E-01	1	12.500	*****
1.25893E-01	1	12.500	*****
1.58489E-01	1	12.500	*****
1.99526E-01	1	12.500	*****
2.51189E-01	1	12.500	*****
3.16228E-01	1	12.500	*****
3.98108E-01	1	12.500	*****
5.01188E-01	1	12.500	*****
6.30958E-01	3	37.500	*****
7.94329E-01	3	37.500	*****
1.00000E+00	4	50.000	*****
1.25893E+00	4	50.000	*****
1.58489E+00	8	100.000	*****
total	8	100.000	*****

cumulative unnormed tally for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162

abscissa tally	cum nps	ordinate cum pct	plot of the cumulative tally in the tally fluctuation chart bin from 0 to 100 percent
1.000E-01	4.632E-04	1.258	*
1.259E-01	4.632E-04	1.258	*
1.585E-01	4.632E-04	1.258	*
1.995E-01	4.632E-04	1.258	*
2.512E-01	4.632E-04	1.258	*
3.162E-01	4.632E-04	1.258	*
3.981E-01	4.632E-04	1.258	*
5.012E-01	4.632E-04	1.258	*
6.310E-01	6.195E-03	16.825	*****
7.943E-01	6.195E-03	16.825	*****
1.000E+00	1.017E-02	27.628	*****
1.259E+00	1.017E-02	27.628	*****
1.585E+00	3.682E-02	100.000	*****
total	3.68228E-02	100.000	*****

status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the ttc bin (the first check not passed is listed) and error magnitude check for all bins

- 4 missed 3 of 10 ttc bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies
missed all bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 4
nps mean error vov slope form

```

1000 0.0000E+00 0.0000 0.0000 0.0
1249 3.5167E-04 0.3877 0.1752 0.0
only data written to file inp18m
ascii file inp18p written with 5 events from 5 histories.

```

6 warning messages so far.

run terminated when 6 kcode cycles were done.

File: Outp18

```

1-  prob18 -- kcode in a hexagonal prism lattice.
2-  c   three half control rods and five whole control rods.
3-    30  0 -905 -19 29 1 fill=1
4-    31  0 -906 -19 29 1 fill=1 (16.7113 0 0)
5-    37  0 -907 -19 29 1 fill=1 (-16.7113 0 0)
6-    34  0 -913 -19 29 fill=1 (0 11.9185 0)
7-    32  0 -914 -19 29 fill=1 (10.3217 5.9592 0)
8-    33  0 -915 -19 29 fill=1 (8.3557 14.4724 0)
9-    35  0 -916 -19 29 fill=1 (-8.3557 14.4724 0)
10-   36  0 -917 -19 29 fill=1 (-10.3217 5.9592 0)
11-  c   universe 1: structure of control rod.
12-    38  11 -2.02 -880 u=1 $ control rod core
13-    39  6 -8.4 880 -881 u=1 $ control rod cladding
14-    40  12 -1.00 881 -882 u=1 $ control rod gap
15-    41  6 -8.4 882 u=1 $ control rod sheath
16-  c   the space between the control rods, filled with lattice.
17-   140  0 -17 1 29 -19 905 906 907 913 914 915 916 917 fill=2
18-  c   universe 2: lattice of fuel rods with water in between.
19-    42  12 -1.00 -301 302 -303 304 -305 306 u=2 lat=2 fill=
20-      -37.27 -1.33 0:0 &
21-      2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22-      2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23-      2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24-      2 3r 3 57r 2 2r &
25-      2 2r 3 58r 2 2r
26-      2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27-      2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28-      2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29-      2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30-      2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31-      2 1r 3 54r 2 7r &
32-  c   can code remember & thru comment?
33-    2 3 55r 2 7r
34-      2 3 25r 2 2r 3 25r 2 8r
35-      2 3 24r 2 3r 3 24r 2 9r
36-      2 3 23r 2 4r 3 23r 2 10r
37-      2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38-      2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39-      2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40-      2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41-      2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42-      2 3 46r 2 16r
43-      2 3 45r 2 17r
44-      2 3 44r 2 18r
45-      2 1r 3 41r 2 20r
46-      2 1r 3 40r 2 21r
47-      2 1r 3 39r 2 22r
48-      2 2r 3 36r 2 24r
49-      2 2r 3 35r 2 25r
50-      2 3r 3 32r 2 27r
51-      2 4r 3 29r 2 29r
52-      2 5r 3 26r 2 31r
53-      2 6r 3 23r 2 33r
54-      2 8r 3 18r 2 36r
55-      2 11r 3 11r 2 40r

```



```

56-      2 64r
57- c   universe 3: structure of fuel rod lattice elements.
58- 154 2 -13.75   -58 u=3 $ fuel element
59- 149 12 -1.00  58-268 u=3 $ gap
60- 144 7 -19.66 268 -478 u=3 $ liner
61- 159 6 -8.4   478 -698 u=3 $ cladding
62- 141 12 -1.00  698   u=3 $ water between the fuel rods
63- 162 0 17:-29:19:-1 $ outside world
64-
65- *1 py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0 11.9185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- mt12 hwtr.01 lwtr.01
98- kcode 200 1 5 6
warning. tallies are normed per fission neutron for one generation.
99- ksrc 3 .2 .2 3 .2 -3 .2 .2 3 .2 4 3 .2 -4 3 .2 4 3 .1 -4 3 .2
100- e .01 .1 1 .10.
101- fq f e
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<[42]-[10:-6 -1 0])) $ average 5 x elements at j=-1
104- (154<[42]-[10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<[42]-[10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<[42]-[10:-6 21 0])) $ average 5 x elements at j=21
107- (154<[42]-[10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdmp 2j -1
111- pracc buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points      8
points not in any cell        0
points in cells of zero importance  0
points in void cells          0
points in ambiguous cells      0
points rejected                0
points remaining                8
points after expansion or contraction 200

```

nominal source size 200

initial guess for k(eff.) 1.000000

cycles to skip before tallying 5

number of keff cycles that can be stored 201

total fission nubar data are being used.

tally 4 print table 30

+ fuel rod flux in 5 y locations averaged over 5 x elements

tally type 4 track length estimate of particle flux.

tally for neutrons

order of printing: f e

cells (154<(42[-10:-6 -1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6 29 0]))

energy bins

0.00000E+00 to 1.00000E-02 mev

1.00000E-02 to 1.00000E-01 mev

1.00000E-01 to 1.00000E+00 mev

1.00000E+00 to 1.00000E+01 mev

total bin

1material composition print table 40

the sum of the fractions of material 2 was 9.999900E-01

the sum of the fractions of material 7 was 7.400000E-01

the sum of the fractions of material 12 was 3.000000E+00

material

number	component nuclide, atom fraction			
2	92235, 0.37504	92238, 0.12499	7014, 0.49997	
6	41093, 0.98982	40000, 0.01018		
7	74000, 1.00000			
11	5010, 0.71977	5011, 0.08004	6012, 0.20019	
12	1001, 0.33333	1002, 0.33333	8016, 0.33333	

associated thermal s(a,b) data sets: hwtr.01t lwtr.01t

material

number	component nuclide, mass fraction			
2	92235, 0.70574	92238, 0.23821	7014, 0.05605	
6	41093, 0.99000	40000, 0.01000		
7	74000, 1.00000			
11	5010, 0.68700	5011, 0.08400	6012, 0.22900	
12	1001, 0.05300	1002, 0.10591	8016, 0.84109	

warning. 3 of the materials had unnormalized fractions.

1cell volumes and masses print table 50

cell	atom density	gram density	input volume	calculated volume	mass	reason	volume pieces	not calculated	
1 30	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0		asymmetric
2 31	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0		asymmetric
3 37	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0		asymmetric
4 34	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00		1		
32	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00		1		
6 33	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00		1		

```

7 35 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
36 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
9 38 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
10 39 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
11 40 5.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
12 41 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
13 140 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
14 42 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
16 149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
17 144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric

```

1surface areas print table 50

surface	input	calculated	reason	area
area	area	area	not calculated	

1	1	0.00000E+00	0.00000E+00	asymmetric
2	17	0.00000E+00	0.00000E+00	asymmetric
3	19	0.00000E+00	0.00000E+00	asymmetric
4	29	0.00000E+00	0.00000E+00	asymmetric
5	58	0.00000E+00	0.00000E+00	infinite
6	268	0.00000E+00	0.00000E+00	infinite
7	478	0.00000E+00	0.00000E+00	infinite
8	698	0.00000E+00	0.00000E+00	infinite
9	880	0.00000E+00	0.00000E+00	infinite
10	881	0.00000E+00	0.00000E+00	infinite
11	882	0.00000E+00	0.00000E+00	infinite
12	905	0.00000E+00	0.00000E+00	asymmetric
13	906	0.00000E+00	0.00000E+00	asymmetric
14	907	0.00000E+00	0.00000E+00	asymmetric
15	913	0.00000E+00	8.40057E+02	
16	914	0.00000E+00	8.40057E+02	
17	915	0.00000E+00	8.40057E+02	
18	916	0.00000E+00	8.40057E+02	
19	917	0.00000E+00	8.40057E+02	
20	301	0.00000E+00	0.00000E+00	infinite
21	302	0.00000E+00	0.00000E+00	infinite
22	303	0.00000E+00	0.00000E+00	infinite
23	304	0.00000E+00	0.00000E+00	
24	305	0.00000E+00	0.00000E+00	
25	306	0.00000E+00	0.00000E+00	

1cells print table 60

cell	mat	atom	gram	neutron	importance
		density	density	mass	pieces

1	30	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
2	31	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
3	37	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
4	34	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
5	32	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
6	33	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
7	35	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
8	36	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
9	38	11	1.15958E-01	2.02000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
10	39	6	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
11	40	12s	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
12	41	6	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
13	140	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
14	42	12s	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
15	154	2	6.62920E-02	1.37500E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
16	149	12s	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
17	144	7	6.43969E-02	1.96600E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
18	159	6	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00

19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
 0 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

total 4.42185E+03 0.00000E+00

isurfaces

print table 70

surface trans type surface coefficients

1	1	refl.	py	0.0000000E+00			
2	17		cz	2.9135000E+01			
3	19		pz	3.1750000E+01			
4	29		pz	-3.1750000E+01			
5	58		c/z	3.4414000E+00	8.5150000E-01	3.2400000E-01	
6	268		c/z	3.4414000E+00	8.5150000E-01	3.3450000E-01	
7	478		c/z	3.4414000E+00	8.5150000E-01	3.4750000E-01	
8	698		c/z	3.4414000E+00	8.5150000E-01	4.3180000E-01	
9	880		cz	1.7251000E+00			
10	881		cz	1.8051000E+00			
11	882		cz	1.9051000E+00			
12	905		cz	2.1055000E+00			
13	906		c/z	1.6711300E+01	0.0000000E+00	2.1055000E+00	
14	907		c/z	-1.6711300E+01	0.0000000E+00	2.1055000E+00	
15	913		c/z	0.0000000E+00	1.1918500E+01	2.1055000E+00	
16	914		c/z	1.0321700E+01	5.9592000E+00	2.1055000E+00	
17	915		c/z	8.3557000E+00	1.4472400E+01	2.1055000E+00	
18	916		c/z	-8.3557000E+00	1.4472400E+01	2.1055000E+00	
19	917		c/z	-1.0321700E+01	5.9592000E+00	2.1055000E+00	
20	301		px	3.9330000E+00			
21	302		px	2.9498000E+00			
22	303		p	1.0000000E+00	1.7320508E+00	0.0000000E+00	5.8994000E+00
23	304		p	1.0000000E+00	1.7320508E+00	0.0000000E+00	3.9330000E+00
24	305		p	-1.0000000E+00	1.7320508E+00	0.0000000E+00	-9.8340000E+00
25	306		p	-1.0000000E+00	1.7320508E+00	0.0000000E+00	-2.9498000E+00

all temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

cross-section tables

print table 100

table length

tables from file testlib1

1001.00c	1782	1-h-1 from endf-vi.1	mat 125	05/26/93	
1002.55c	4102	njoy	(120)	04/26/82	
5011.40c	3229	ENDL library name: nd900719 MCNP translation: 900831 14:10:05			900207
6012.40c	4858	ENDL library name: nd900719 MCNP translation: 900831 14:10:05			900207
7014.40c	8535	ENDL library name: nd900719 MCNP translation: 900831 14:10:05			900207
8016.40c	5358	ENDL library name: nd900719 MCNP translation: 900831 14:10:05			900207
40000.40c	93372	ENDL library name: nd900719 MCNP translation: 900831 14:10:05			900323
41093.40c	42746	ENDL library name: nd900719 MCNP translation: 900831 14:10:05			900208
74000.40c	91244	ENDL library name: nd900719 MCNP translation: 900831 14:10:05			900208
92235.40c	34772	ENDL library name: nd900719 MCNP translation: 9total nu 10:05			900503
92238.40c	40834	ENDL library name: nd901118 MCNP translation: 9total nu 56:49			901119
5010.03d	3682	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
hwtr.01t	10193	deuterium in heavy water at 300 degrees kelvin	1002	0	010/22/85
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin	1001	0	010/22/85

total 354900

warning. neutron energy cutoff is below some cross-section tables.

imal words of dynamically allocated storage

HNF-SD-SNF-CSWD-005, Rev. 0

source distribution written to file inp18s cycle = 0

3 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob18 — kcode in a hexagonal prism lattice.

mps	x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time	
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.085E-01	4.733E-01	7.193E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 5.085E-01	4.733E-01	7.193E-01			
2	3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		8.952E-01	-4.447E-01	-2.944E-02			
	3.492E+00	1.051E+00	2.000E-01	154			0 8.952E-01	-4.447E-01	-2.944E-02			
3	3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.184E-01	-4.495E-01	6.446E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.184E-01	-4.495E-01	6.446E-01			
4	3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		9.710E-01	-5.665E-02	-2.323E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 9.710E-01	-5.665E-02	-2.323E-01			
5	3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.861E-01	1.496E-01	-7.963E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 5.861E-01	1.496E-01	-7.963E-01			
6	3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.489E-02	-1.626E-01	9.845E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.489E-02	-1.626E-01	9.845E-01			
7	3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-7.068E-02	3.263E-02	-9.970E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -7.068E-02	3.263E-02	-9.970E-01			
8	3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-3.915E-01	4.664E-01	-7.932E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -3.915E-01	4.664E-01	-7.932E-01			
9	3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.368E-01	9.215E-01	-3.079E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.368E-01	9.215E-01	-3.079E-01			
10	3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.946E-01	-3.204E-01	9.271E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 1.946E-01	-3.204E-01	9.271E-01			
11	3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.698E-01	-7.177E-01	-1.905E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.698E-01	-7.177E-01	-1.905E-01			
12	3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-8.398E-01	-4.129E-01	3.524E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -8.398E-01	-4.129E-01	3.524E-01			
13	3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.714E-01	-8.572E-01	4.857E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -1.714E-01	-8.572E-01	4.857E-01			
14	3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.489E-01	-5.118E-01	-8.222E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.489E-01	-5.118E-01	-8.222E-01			
15	3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.959E-01	2.119E-01	9.314E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.959E-01	2.119E-01	9.314E-01			
16	3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.395E-01	-9.829E-01	1.202E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 1.395E-01	-9.829E-01	1.202E-01			
17	3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		6.909E-01	-7.110E-01	1.307E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 6.909E-01	-7.110E-01	1.307E-01			
18	3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00	0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.580E-01	5.320E-01	-5.329E-01			
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.580E-01	5.320E-01	-5.329E-01			
19	3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00	0.000E+00

3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)	-9.903E-01	-1.380E-01	1.353E-02	
3.492E+00	1.051E+00	2.000E-01	154	0	-9.903E-01	-1.380E-01	1.353E-02
3.000E+00	2.000E-01	2.000E-01	140		7.462E-01	4.859E-01	-4.551E-01
3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)	7.462E-01	4.859E-01	-4.551E-01	1.000E+00 1.000E+00 0.000E+00
3.492E+00	1.051E+00	2.000E-01	154	0	7.462E-01	4.859E-01	-4.551E-01
21 3.000E+00	2.000E-01	2.000E-01	140		-1.977E-01	9.797E-01	3.360E-02
3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)	-1.977E-01	9.797E-01	3.360E-02	3.990E+00 1.000E+00 0.000E+00
3.492E+00	1.051E+00	2.000E-01	154	0	-1.977E-01	9.797E-01	3.360E-02
22 3.000E+00	2.000E-01	2.000E-01	140		-9.117E-01	-3.647E-01	-1.891E-01
3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)	-9.117E-01	-3.647E-01	-1.891E-01	2.665E-01 1.000E+00 0.000E+00
3.492E+00	1.051E+00	2.000E-01	154	0	-9.117E-01	-3.647E-01	-1.891E-01
23 3.000E+00	2.000E-01	2.000E-01	140		-4.287E-01	8.361E-01	-3.423E-01
3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)	-4.287E-01	8.361E-01	-3.423E-01	1.156E+00 1.000E+00 0.000E+00
3.492E+00	1.051E+00	2.000E-01	154	0	-4.287E-01	8.361E-01	-3.423E-01
24 3.000E+00	2.000E-01	2.000E-01	140		1.080E-01	3.412E-01	-9.338E-01
3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)	1.080E-01	3.412E-01	-9.338E-01	2.669E+00 1.000E+00 0.000E+00
3.492E+00	1.051E+00	2.000E-01	154	0	1.080E-01	3.412E-01	-9.338E-01
25 3.000E+00	2.000E-01	2.000E-01	140		-9.111E-01	-9.012E-03	-4.122E-01
3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)	-9.111E-01	-9.012E-03	-4.122E-01	2.185E+00 1.000E+00 0.000E+00
3.492E+00	1.051E+00	2.000E-01	154	0	-9.111E-01	-9.012E-03	-4.122E-01
26 2.000E-01	3.000E+00	2.000E-01	140		-2.568E-01	-6.391E-01	-7.249E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-2.568E-01	-6.391E-01	-7.249E-01	7.280E-01 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-2.568E-01	-6.391E-01	-7.249E-01
27 2.000E-01	3.000E+00	2.000E-01	140		-2.912E-01	8.086E-01	5.113E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-2.912E-01	8.086E-01	5.113E-01	1.404E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-2.912E-01	8.086E-01	5.113E-01
28 2.000E-01	3.000E+00	2.000E-01	140		1.472E-01	-9.514E-01	2.705E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	1.472E-01	-9.514E-01	2.705E-01	1.090E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	1.472E-01	-9.514E-01	2.705E-01
29 2.000E-01	3.000E+00	2.000E-01	140		-6.135E-01	-7.645E-01	-1.978E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-6.135E-01	-7.645E-01	-1.978E-01	2.483E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-6.135E-01	-7.645E-01	-1.978E-01
2.000E-01	3.000E+00	2.000E-01	140		-5.702E-01	5.651E-01	-5.963E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-5.702E-01	5.651E-01	-5.963E-01	3.767E-01 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-5.702E-01	5.651E-01	-5.963E-01
31 2.000E-01	3.000E+00	2.000E-01	140		-6.607E-01	5.373E-01	-5.242E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-6.607E-01	5.373E-01	-5.242E-01	1.019E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-6.607E-01	5.373E-01	-5.242E-01
32 2.000E-01	3.000E+00	2.000E-01	140		-9.742E-02	-3.639E-01	-9.263E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-9.742E-02	-3.639E-01	-9.263E-01	1.879E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-9.742E-02	-3.639E-01	-9.263E-01
33 2.000E-01	3.000E+00	2.000E-01	140		-1.965E-01	-3.145E-01	-9.287E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-1.965E-01	-3.145E-01	-9.287E-01	4.700E-01 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-1.965E-01	-3.145E-01	-9.287E-01
34 2.000E-01	3.000E+00	2.000E-01	140		4.097E-01	8.465E-01	-3.399E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	4.097E-01	8.465E-01	-3.399E-01	1.530E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	4.097E-01	8.465E-01	-3.399E-01
35 2.000E-01	3.000E+00	2.000E-01	140		-4.048E-02	8.831E-01	4.675E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-4.048E-02	8.831E-01	4.675E-01	2.675E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-4.048E-02	8.831E-01	4.675E-01
36 2.000E-01	3.000E+00	2.000E-01	140		3.371E-01	-9.269E-01	-1.652E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	3.371E-01	-9.269E-01	-1.652E-01	9.222E-01 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	3.371E-01	-9.269E-01	-1.652E-01
37 2.000E-01	3.000E+00	2.000E-01	140		-1.867E-01	9.756E-01	-1.155E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-1.867E-01	9.756E-01	-1.155E-01	9.702E-01 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-1.867E-01	9.756E-01	-1.155E-01
38 2.000E-01	3.000E+00	2.000E-01	140		-2.616E-01	2.336E-01	-9.365E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-2.616E-01	2.336E-01	-9.365E-01	1.230E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-2.616E-01	2.336E-01	-9.365E-01
39 2.000E-01	3.000E+00	2.000E-01	140		9.780E-01	-7.641E-02	-1.939E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	9.780E-01	-7.641E-02	-1.939E-01	1.083E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	9.780E-01	-7.641E-02	-1.939E-01
40 2.000E-01	3.000E+00	2.000E-01	140		2.580E-01	-7.076E-01	6.578E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	2.580E-01	-7.076E-01	6.578E-01	8.313E-01 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	2.580E-01	-7.076E-01	6.578E-01
2.000E-01	3.000E+00	2.000E-01	140		-3.212E-01	-7.678E-01	-5.543E-01
3.641E+00	4.456E-01	2.000E-01	42(-5, 3, 0)	-3.212E-01	-7.678E-01	-5.543E-01	1.081E+00 1.000E+00 0.000E+00
3.641E+00	4.456E-01	2.000E-01	141	0	-3.212E-01	-7.678E-01	-5.543E-01

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3.641E+00 4.456E-01 2.000E-01 141 0 -3.212E-01 -7.678E-01 -5.543E-01
2.000E-01 3.000E+00 2.000E-01 140 5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
3.641E+00 4.456E-01 2.000E-01 141 0 5.039E-01 -1.460E-01 8.513E-01
43 2.000E-01 3.000E+00 2.000E-01 140 6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
3.641E+00 4.456E-01 2.000E-01 141 0 6.080E-01 5.487E-01 5.738E-01
44 2.000E-01 3.000E+00 2.000E-01 140 -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -2.932E-01 9.304E-01 -2.199E-01
45 2.000E-01 3.000E+00 2.000E-01 140 -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140 1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141 0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140 7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141 0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140 4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141 0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140 5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141 0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140 -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -1.053E-01 -9.805E-01 1.658E-01

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estimated keff results by cycle

print table 175

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257

cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195

cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193

cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

source distribution written to file inp18s cycle = 6

1problem summary

run terminated when 6 kcode cycles were done.

```

0
neutron creation  tracks  weight  energy  neutron loss  tracks  weight  energy
(per source particle)  (per source particle)

source      1249  9.6077E-01  1.8661E+00  escape      220  1.2268E-01  1.2054E-01
              energy cutoff  0 0.
              time cutoff    0 0.
weight window  0 0. 0.  weight window  0 0. 0.
cell importance 0 0. 0.  cell importance 0 0. 0.
weight cutoff  0 1.3743E-01 3.8498E-03  weight cutoff 1034 1.2791E-01 5.1920E-03
energy importance 0 0. 0.  energy importance 0 0. 0.
dxtran 0 0. 0.  dxtran 0 0. 0.
forced collisions 0 0. 0.  forced collisions 0 0. 0.
exp. transform 0 0. 0.  exp. transform 0 0. 0.
upscattering 0 0. 5.3884E-11  downscattering 0 0. 1.3605E+00
              capture 0 3.9980E-01 1.1590E-01
(n) 10 6.1640E-03 6.1355E-03  loss to (n,xn) 5 3.0820E-03 2.4027E-02
ion 0 0. 0.  loss to fission 0 4.5089E-01 2.4987E-01
total 1259 1.1044E+00 1.8761E+00  total 1259 1.1044E+00 1.8761E+00

```

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number of neutrons banked          5      average lifetime, shakes      cutoffs
neutron tracks per source particle  1.0080E+00      escape  3.7027E+00      tco  1.0000E+34
neutron collisions per source particle 1.8226E+01      capture  1.2954E+01      eco  0.0000E+00
total neutron collisions            22764      capture or escape 1.1788E+01      wcl  -5.0000E-01
net multiplication                  1.0032E+00 0.0035      any termination 1.2744E+01      wc2  -2.5000E-01

computer time so far in this run  0.00 minutes      maximum number ever in bank      1
computer time in mcrun            0.00 minutes      bank overflows to backup file    0
source particles per minute        0.0000E+00      field length                      0
random numbers generated           500880      most random numbers used was     1298 in history    14

```

range of sampled source weights = 7.7821E-01 to 1.0989E+00

Ineutron activity in each cell

print table 126

cell	entering	tracks	population	collisions	collisions	number	flux	average	average
				* weight	weighted	weighted	track weight	track weight	track mfp
				(per history)	energy	energy	(relative)	(cm)	
1	30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01	2.6324E+00
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01	2.6947E+00
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01	2.5146E+00
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01	2.6940E+00
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01	2.5091E+00
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01	2.4712E+00
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01	2.5408E+00
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6971E-01	2.2391E+00
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01	2.7541E+00
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01	2.5056E+00

total 266059 9765 22764 1.1324E+01

Ineutron weight balance in each cell -- external events

print table 130

cell	entering	source	energy	time	exiting	total
		cutoff	cutoff			
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	4.8822E-01	0.0000E+00	0.0000E+00	0.0000E+00	-3.3091E-01
10	39	8.4996E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.4933E-01
11	40	8.9904E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.9904E-01
12	41	9.7260E-01	0.0000E+00	0.0000E+00	0.0000E+00	-9.6978E-01
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.0907E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.0913E+00
15	154	1.2943E+01	8.4067E-01	0.0000E+00	0.0000E+00	-1.3171E+01
16	149	2.6508E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.6508E+01
17	144	2.7419E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.7405E+01
18	159	3.1331E+01	8.0064E-02	0.0000E+00	0.0000E+00	-3.1361E+01
19	141	3.9111E+01	4.0032E-02	0.0000E+00	0.0000E+00	-3.9150E+01

total 1.4161E+02 9.6077E-01 0.0000E+00 0.0000E+00 -1.4174E+02 8.3809E-01

Ineutron weight balance in each cell -- variance reduction events

print table 130

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

tally fluctuation charts

tally 4

nps mean error vov slope fom

1000 0.0000E+00 0.0000 0.0000 0.0

1249 3.5167E-04 0.3877 0.1752 0.0

tally data written to file inp18m

ascii file inp18p written with 5 events from 5 histories.

6 warning messages so far.

run terminated when 6 kcode cycles were done.

File: Inp200

1- prob20 - continuous energy electron version of problem prob19.

2- 1 1 -19.3 1 -2 3 -4 5 -6

3- 2 0 #1

4-

5- 1 z 0 2

plane

+

6- 2 pz .00635

7- 3 px -10

8- 4 x 10 0

plane

+

9- 5 y -10 3

plane

10- 6 p 0 10 0 1 10 0 0 10 1

11-

12- ml 74184.1

13- sdef erg=1 sur=i vec=0 0 1 par=3

14- imp:p,e 1 0

15- mode p e

16- *f1:p 1 2

17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

18- *f1:e 1 2

19- tr9 0 0 0 1 0 0 0 0 0 0 1

warning. non-orthogonality of surface transformation 9 > 2.e-6

20- f4 e f

21- f21:e 1 2

22- *f28:p 1

23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

25- f58:e 1

26- f6:p 1

27- f31:e 1 2

28- f31 elc 1

29- f41:e 1 2

30- f41 elc 2

31- f51:e 1 2

32- f51 elc 3

33- e8 1000 nt

34- *f8:p,e 1

35- nps 10000

36- ctme 30

37- prdmp 2j -1

38- cut:p 1j .1

39- cut:e 1j .1

40- print 110 70

41-

Warning. tr 9 card unused.

Warning. 1 energy bins of tally 1 are below energy cutoff.

Warning. tally 8 needs zero energy bin for negative f8 scores.

1cells print table 60

			atom	gram		photon	electron		
	cell	mat	density	density	volume	mass	pieces	importance	importance
1	1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0	1.0000E+00	1.0000E+00
2	2	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00	0.0000E+00

total 2.54000E+00 4.90220E+01 print table 70
1surfaces

		surface	trans	type	surface	coefficients		
1	1		pz		0.0000000E+00			
2	2		pz		6.3500000E-03			
3	3		px		-1.0000000E+01			
4	4		px		1.0000000E+01			
5	5		py		-1.0000000E+01			
6	6		p		0.0000000E+00	1.0000000E-01	0.0000000E+00	1.0000000E+00

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

1cross-section tables print table 100

table length
tables from file testlib1

74000.02p 755 01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1
74000.01e 478 11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00 print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00

File: Outp20

```

- prob20 - continuous energy electron version of problem prob19.
2- 1 1 -19.3 1 -2 3 -4 5 -6
3- 2 0 #1
4-
5- 1 z 0 2
+
6- 2 pz .00635
7- 3 px -10
8- 4 x 10 0
+
9- 5 y -10 3
+
10- 6 p 0 10 0 1 10 0 0 10 1
11-
12- m1 74184.1
13- sdef erg=1 sur=1 vec=0 0 1 par=3
14- imp:p,e 1 0
15- mode p e
16- *fl:p 1 2
17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
18- *fl1:e 1 2
19- tr9 0 0 0 1 0 0 0 1 0 0 0 1

```

warning. non-orthogonality of surface transformation 9 > 2.e-6

```

20- fq e f
21- f21:e 1 2
22- *f28:p 1
23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
25- f58:e 1
26- f6:p 1
27- f31:e 1 2
28- ft31 elc 1
29- f41:e 1 2
30- ft41 elc 2
31- f51:e 1 2
32- ft51 elc 3
33- e8 1000 nt
34- *f8:p,e 1
35- nps 10000
36- ctme 30
37- prdmp 2j -1
38- cut:p lj .1
39- cut:e lj .1
40- print 110 70
41-

```

warning. tr 9 card unused.

warning. 1 energy bins of tally 1 are below energy cutoff.

warning. tally 8 needs zero energy bin for negative f8 scores.

lcells print table 60

cell	mat	atom density	gram density	volume	photon mass	electron pieces	importance	importance
1	1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0	1.0000E+00
2	0	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 2.54000E+00 4.90220E+01

1surfaces print table 70

surface trans type surface coefficients

```

1 1 pz 0.0000000E+00
2 2 pz 6.3500000E-03
3 3 px -1.0000000E+01
4 4 px 1.0000000E+01
5 5 py -1.0000000E+01
6 6 p 0.0000000E+00 1.0000000E-01 0.0000000E+00 1.0000000E+00

```

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

cross-section tables

print table 100

table length

tables from file testlib1

74000.02p 755

01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478

11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00

```

28 0.000E+00 0.000E+00 0.000E+00 1 1 8.706E-01 -3.198E-01 3.738E-01 1.000E+00 1.000E+00 0.000E+00
29 0.000E+00 0.000E+00 0.000E+00 1 1 -8.188E-01 2.059E-01 5.359E-01 1.000E+00 1.000E+00 0.000E+00
30 0.000E+00 0.000E+00 0.000E+00 1 1 5.727E-01 8.124E-01 1.100E-01 1.000E+00 1.000E+00 0.000E+00
31 0.000E+00 0.000E+00 0.000E+00 1 1 5.390E-02 5.914E-01 8.046E-01 1.000E+00 1.000E+00 0.000E+00
32 0.000E+00 0.000E+00 0.000E+00 1 1 -5.778E-01 5.375E-01 6.141E-01 1.000E+00 1.000E+00 0.000E+00
33 0.000E+00 0.000E+00 0.000E+00 1 1 -7.198E-01 -2.890E-01 6.311E-01 1.000E+00 1.000E+00 0.000E+00
34 0.000E+00 0.000E+00 0.000E+00 1 1 2.210E-01 2.482E-01 9.432E-01 1.000E+00 1.000E+00 0.000E+00
35 0.000E+00 0.000E+00 0.000E+00 1 1 4.339E-01 7.515E-02 8.978E-01 1.000E+00 1.000E+00 0.000E+00
36 0.000E+00 0.000E+00 0.000E+00 1 1 -4.263E-01 8.490E-01 3.123E-01 1.000E+00 1.000E+00 0.000E+00
37 0.000E+00 0.000E+00 0.000E+00 1 1 -3.933E-01 -9.179E-01 5.266E-02 1.000E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 1 -4.846E-01 4.378E-01 7.573E-01 1.000E+00 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 1 -5.950E-01 -5.730E-01 5.636E-01 1.000E+00 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 1 -7.252E-01 -5.143E-01 4.578E-01 1.000E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 1 -7.156E-01 4.734E-01 5.136E-01 1.000E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 1 -1.771E-01 9.229E-01 3.417E-01 1.000E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 1 -1.149E-01 -4.206E-01 8.999E-01 1.000E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 1 4.509E-01 8.630E-02 8.884E-01 1.000E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 1 -7.358E-01 2.500E-01 6.294E-01 1.000E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 1 -8.448E-01 3.645E-01 3.917E-01 1.000E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 1 1.958E-01 -2.769E-01 9.407E-01 1.000E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 1 2.788E-01 -7.325E-03 9.603E-01 1.000E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 1 -3.201E-01 4.174E-01 8.505E-01 1.000E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 1 8.960E-01 -1.641E-01 4.126E-01 1.000E+00 1.000E+00 0.000E+00

```

1problem summary

run terminated when 10000 particle histories were done.

```

0
photon creation      tracks  weight  energy      photon loss      tracks  weight  energy
                   (per source particle)                   (per source particle)

source              0  0.  0.      escape 575 5.7500E-02 1.5476E-02
                   energy cutoff 0 0.  0.
                   time cutoff 0 0.  0.

weight window      0  0.  0.      weight window 0 0.  0.
importance         0  0.  0.      cell importance 0 0.  0.
weight cutoff      0  0.  0.      weight cutoff 0 0.  0.
energy importance  0  0.  0.      energy importance 0 0.  0.
dxtan              0  0.  0.      dxtan 0 0.  0.

forced collisions  0  0.  0.      forced collisions 0 0.  0.
exp. transform    0  0.  0.      exp. transform 0 0.  0.
from neutrons     0  0.  0.      compton scatter 0 0.  6.6993E-05
bremsstrahlung    694 6.9400E-02 1.7315E-02 capture 119 1.1900E-02 1.7720E-03
p-annihilation    0  0.  0.      pair production 0 0.  0.
electron x-rays   0  0.  0.
1st fluorescence  0  0.  0.
2nd fluorescence  0  0.  0.
total             694 6.9400E-02 1.7315E-02      total 694 6.9400E-02 1.7315E-02

number of photons banked 694 average lifetime, shakes cutoffs
photon tracks per source particle 6.9400E-02 escape 6.7786E-05 tco 1.0000E+34
photon collisions per source particle 1.3000E-02 capture 8.3325E-05 eco 1.0000E-01
total photon collisions 130 capture or escape 7.0450E-05 wcl 0.0000E+00
any termination 7.0450E-05 wc2 0.0000E+00

```

```

0
electron creation  tracks  weight  energy      electron loss  tracks  weight  energy
                  (per source particle)                  (per source particle)

source            10000 1.0000E+00 1.0000E+00 escape 9464 9.4640E-01 7.1762E-01
                  energy cutoff 2046 2.0460E-01 2.0141E-02
                  time cutoff 0 0.  0.

weight window    0  0.  0.      weight window 0 0.  0.
cell importance  0  0.  0.      cell importance 0 0.  0.
weight cutoff    0  0.  0.      weight cutoff 0 0.  0.
energy importance 0  0.  0.      energy importance 0 0.  0.
pair production  0  0.  0.      scattering 0 0.  2.6560E-01
photon recoil    2  2.0000E-04 3.7815E-05 bremsstrahlung 0 0.  2.4158E-02
photoelectric    29 2.9000E-03 4.7387E-04

```

photon auger	0	0.	0.				
neutron auger	0	0.	0.				
back-on	1479	1.4790E-01	2.7007E-02				
total	11510	1.1510E+00	1.0275E+00	total	11510	1.1510E+00	1.0275E+00

number of electrons banked	1510	cutoffs	
electron tracks per source particle	1.1510E+00	tco	1.0000E+34
electron sub-steps per source particle	7.7164E+01	eco	1.0000E-01
total electron sub-steps	771636	wc1	0.0000E+00
		wc2	0.0000E+00

computer time so far in this run	0.00 minutes	maximum number ever in bank	4
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	4748878	most random numbers used was	4277 in history 7375

range of sampled source weights = 1.0000E+00 to 1.0000E+00

lphoton activity in each cell print table 126

cell	entering	tracks population	collisions * weight (per history)	collisions weighted energy	number weighted energy	flux weighted track (relative)	average weight (cm)	average track mfp
1	1	0	694	130	1.3000E-02	2.8286E-01	2.8286E-01	1.0000E+00 1.6113E-01
total	0	694	130	1.3000E-02				

lelectron activity in each cell print table 126

cell	entering	tracks population	substeps * weight (per history)	substeps weighted energy	number weighted energy	flux weighted track (relative)	average weight (cm)	average track mfp
1	1	10000	11510	771636	7.7164E+01	7.4988E-01	7.6821E-01	1.0000E+00 2.5110E-04
total	10000	11510	771636	7.7164E+01				

lally 1 nps = 10000
tally type 1* energy crossing a surface. units mev
tally for photons

surface: 1 2
energy
1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 1.20113E-03 0.1079 2.16688E-03 0.0814
2.8200E-01 8.17217E-04 0.1673 2.04350E-03 0.1062
3.7300E-01 9.52191E-04 0.1829 1.82060E-03 0.1357
4.6400E-01 1.03815E-03 0.2001 1.00234E-03 0.2043
5.5500E-01 5.66295E-04 0.3018 8.02842E-04 0.2503
6.4500E-01 6.09365E-04 0.3162 6.54966E-04 0.3016
7.3600E-01 3.45345E-04 0.4472 4.20131E-04 0.4085
8.2700E-01 7.79347E-05 0.9999 7.03770E-04 0.3334
9.1800E-01 1.70096E-04 0.7070 8.29418E-05 0.9999
1.1000E+00 0.00000E+00 0.0000 0.00000E+00 0.0000
total 5.77773E-03 0.0811 9.69798E-03 0.0608

lally 6 nps = 10000
tally type 6 track length estimate of heating. units mev/gram
tally for photons

masses
cell: 1
4.90220E+01

cell: 1
energy
1.0000E-01 0.00000E+00 0.0000
1.9100E-01 1.80395E-05 0.0935
2.8200E-01 4.79830E-06 0.1242
3.7300E-01 1.64870E-06 0.2061

```

4.6400E-01 1.76412E-06 0.4116
5.5500E-01 6.34259E-07 0.4736
4.4500E-01 2.47457E-07 0.3129
7.3600E-01 2.58011E-07 0.6571
8.2700E-01 1.16245E-07 0.3470
9.1800E-01 4.46610E-08 0.6403
1.1000E+00 0.00000E+00 0.0000
total 2.75512E-05 0.0722

```

tally 28 nps = 10000

tally type 8* energy deposition units mev
tally for photons electrons

cell: 1

energy

```

-1.0000E-03 -8.72550E-04 0.1508
0.0000E+00 0.00000E+00 0.0000
1.0000E-06 0.00000E+00 0.0000
1.0000E-01 1.08193E-02 0.0227
1.9100E-01 3.91016E-02 0.0170
2.8200E-01 4.36100E-02 0.0210
3.7300E-01 3.53763E-02 0.0286
4.6400E-01 2.66881E-02 0.0382
5.5500E-01 2.21833E-02 0.0468
6.4500E-01 1.58947E-02 0.0606
7.3600E-01 1.08330E-02 0.0790
8.2700E-01 8.71177E-03 0.0940
9.1800E-01 6.65495E-03 0.1136
1.1000E+00 4.79000E-02 0.0446
total 2.66900E-01 0.0090

```

tally 11 nps = 10000

tally type 1* energy crossing a surface. units mev
tally for electrons

surface: 1 2

energy

```

1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 1.08698E-03 0.1176 6.53601E-04 0.1495
2.8200E-01 2.19643E-03 0.1039 1.83325E-03 0.1165
3.7300E-01 3.60063E-03 0.0956 3.37231E-03 0.0988
4.6400E-01 6.94424E-03 0.0774 6.18557E-03 0.0823
5.5500E-01 1.32283E-02 0.0615 1.27247E-02 0.0628
6.4500E-01 2.19441E-02 0.0516 1.93787E-02 0.0550
7.3600E-01 3.87821E-02 0.0411 4.62743E-02 0.0374
8.2700E-01 6.96113E-02 0.0321 9.53277E-02 0.0269
9.1800E-01 1.17955E-01 0.0253 9.53443E-02 0.0284
1.1000E+00 1.58764E-01 0.0225 2.41655E-03 0.1959
total 4.34113E-01 0.0097 2.83511E-01 0.0130

```

tally 21 nps = 10000

tally type 1 number of particles crossing a surface.
tally for electrons

surface: 1 2

energy

```

1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 7.70000E-03 0.1165 4.60000E-03 0.1471
2.8200E-01 9.30000E-03 0.1032 7.60000E-03 0.1158
3.7300E-01 1.09000E-02 0.0953 1.02000E-02 0.0985
4.6400E-01 1.65000E-02 0.0772 1.46000E-02 0.0822
5.5500E-01 2.58000E-02 0.0614 2.48000E-02 0.0627
6.4500E-01 3.63000E-02 0.0515 3.21000E-02 0.0549
7.3600E-01 5.59000E-02 0.0411 6.67000E-02 0.0374
8.2700E-01 8.86000E-02 0.0321 1.21300E-01 0.0269
9.1800E-01 1.34800E-01 0.0253 1.10600E-01 0.0284
1.1000E+00 1.65500E-01 0.0225 2.60000E-03 0.1959
total 5.51300E-01 0.0094 3.95100E-01 0.0126

```

tally 31 nps = 10000

tally type 1 number of particles crossing a surface.

tally for electrons
this tally is modified by ft elc

surface: 1 2

energy

1.0000E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.9100E-01	-7.70000E-03	0.1165	-4.60000E-03	0.1471
2.8200E-01	-9.30000E-03	0.1032	-7.60000E-03	0.1158
3.7300E-01	-1.09000E-02	0.0953	-1.02000E-02	0.0985
4.6400E-01	-1.65000E-02	0.0772	-1.46000E-02	0.0822
5.5500E-01	-2.58000E-02	0.0614	-2.48000E-02	0.0627
6.4500E-01	-3.63000E-02	0.0515	-3.21000E-02	0.0549
7.3600E-01	-5.59000E-02	0.0411	-6.67000E-02	0.0374
8.2700E-01	-8.86000E-02	0.0321	-1.21300E-01	0.0269
9.1800E-01	-1.34800E-01	0.0253	-1.10600E-01	0.0284
1.1000E+00	-1.65500E-01	0.0225	-2.60000E-03	0.1959
total	-5.51300E-01	0.0094	-3.95100E-01	0.0126

tally 41 nps = 10000

tally type 1 number of particles crossing a surface.

tally for electrons

this tally is modified by ft elc

surface: 1 2

energy

1.0000E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.9100E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
2.8200E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
3.7300E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
4.6400E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
5.5500E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
6.4500E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
7.3600E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
8.2700E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
9.1800E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.1000E+00	0.00000E+00	0.0000	0.00000E+00	0.0000
total	0.00000E+00	0.0000	0.00000E+00	0.0000

surface: 1 2

energy

1.0000E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.9100E-01	7.70000E-03	0.1165	4.60000E-03	0.1471
2.8200E-01	9.30000E-03	0.1032	7.60000E-03	0.1158
3.7300E-01	1.09000E-02	0.0953	1.02000E-02	0.0985
4.6400E-01	1.65000E-02	0.0772	1.46000E-02	0.0822
5.5500E-01	2.58000E-02	0.0614	2.48000E-02	0.0627
6.4500E-01	3.63000E-02	0.0515	3.21000E-02	0.0549
7.3600E-01	5.59000E-02	0.0411	6.67000E-02	0.0374
8.2700E-01	8.86000E-02	0.0321	1.21300E-01	0.0269
9.1800E-01	1.34800E-01	0.0253	1.10600E-01	0.0284
1.1000E+00	1.65500E-01	0.0225	2.60000E-03	0.1959
total	5.51300E-01	0.0094	3.95100E-01	0.0126

surface: 1 2

energy

1.0000E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.9100E-01	7.70000E-03	0.1165	4.60000E-03	0.1471
2.8200E-01	9.30000E-03	0.1032	7.60000E-03	0.1158
3.7300E-01	1.09000E-02	0.0953	1.02000E-02	0.0985
4.6400E-01	1.65000E-02	0.0772	1.46000E-02	0.0822
5.5500E-01	2.58000E-02	0.0614	2.48000E-02	0.0627
6.4500E-01	3.63000E-02	0.0515	3.21000E-02	0.0549
7.3600E-01	5.59000E-02	0.0411	6.67000E-02	0.0374
8.2700E-01	8.86000E-02	0.0321	1.21300E-01	0.0269
9.1800E-01	1.34800E-01	0.0253	1.10600E-01	0.0284
1.1000E+00	1.65500E-01	0.0225	2.60000E-03	0.1959
total	5.51300E-01	0.0094	3.95100E-01	0.0126

tally 51 nps = 10000

tally type 1 number of particles crossing a surface.
 tally for electrons
 this tally is modified by ft elc

surface:	1	2
energy		
1.0000E-01	0.00000E+00	0.00000E+00
1.9100E-01	0.00000E+00	0.00000E+00
2.8200E-01	0.00000E+00	0.00000E+00
3.7300E-01	0.00000E+00	0.00000E+00
4.6400E-01	0.00000E+00	0.00000E+00
5.5500E-01	0.00000E+00	0.00000E+00
6.4500E-01	0.00000E+00	0.00000E+00
7.3600E-01	0.00000E+00	0.00000E+00
8.2700E-01	0.00000E+00	0.00000E+00
9.1800E-01	0.00000E+00	0.00000E+00
1.1000E+00	0.00000E+00	0.00000E+00
total	0.00000E+00	0.00000E+00

surface:	1	2
energy		
1.0000E-01	0.00000E+00	0.00000E+00
1.9100E-01	-7.70000E-03	-4.60000E-03
2.8200E-01	-9.30000E-03	-7.60000E-03
3.7300E-01	-1.09000E-02	-1.02000E-02
4.6400E-01	-1.65000E-02	-1.46000E-02
5.5500E-01	-2.58000E-02	-2.48000E-02
6.4500E-01	-3.63000E-02	-3.21000E-02
7.3600E-01	-5.59000E-02	-6.67000E-02
8.2700E-01	-8.86000E-02	-1.21300E-01
9.1800E-01	-1.34800E-01	-1.10600E-01
1.1000E+00	-1.65500E-01	-2.60000E-03
total	-5.51300E-01	0.0094 -3.95100E-01

surface:	1	2
energy		
1.0000E-01	0.00000E+00	0.00000E+00
1.9100E-01	-7.70000E-03	-4.60000E-03
2.8200E-01	-9.30000E-03	-7.60000E-03
3.7300E-01	-1.09000E-02	-1.02000E-02
4.6400E-01	-1.65000E-02	-1.46000E-02
5.5500E-01	-2.58000E-02	-2.48000E-02
6.4500E-01	-3.63000E-02	-3.21000E-02
7.3600E-01	-5.59000E-02	-6.67000E-02
8.2700E-01	-8.86000E-02	-1.21300E-01
9.1800E-01	-1.34800E-01	-1.10600E-01
1.1000E+00	-1.65500E-01	-2.60000E-03
total	-5.51300E-01	0.0094 -3.95100E-01

Italy 58 nps = 10000

tally type 8 pulse height distribution. units number
 tally for photons electrons

cell:	1
energy	
-1.0000E-03	7.40000E-03
0.0000E+00	0.00000E+00
1.0000E-06	0.00000E+00
1.0000E-01	2.12600E-01
1.9100E-01	2.65500E-01
2.8200E-01	1.87700E-01
3.7300E-01	1.09500E-01
4.6400E-01	6.44000E-02
5.5500E-01	4.37000E-02
6.4500E-01	2.66000E-02
7.3600E-01	1.58000E-02
8.2700E-01	1.12000E-02
9.1800E-01	7.70000E-03

1.1000E+00 4.79000E-02 0.0446
total 1.00000E+00 0.0000
y 8 nps = 10000
tally type 8* energy deposition
tally for photons electrons

HNF-SD-SNF-CSWD-005, Rev. 0

units mev

cell: 1

energy

1.0000E+03 2.66900E-01 0.0090

1 status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tlc bin (the first check not passed is listed) and error magnitude check for all bins

- 1 missed 1 of 10 tlc bin checks: there is insufficient tlc bin tally information to estimate the large tally slope reliably
missed all bin error check: 24 tally bins had 4 bins with zeros and 17 bins with relative errors exceeding 0.10
- 6 missed 1 of 10 tlc bin checks: the variance of the variance appears not to decrease as 1/nps for the last half of problem
missed all bin error check: 12 tally bins had 2 bins with zeros and 8 bins with relative errors exceeding 0.10
- 28 passed the 10 statistical checks for the tally fluctuation chart bin result
missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 11 missed 1 of 10 tlc bin checks: the slope of decrease of largest tallies is less than the minimum acceptable value of 3.0
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 21 missed 1 of 10 tlc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 31 missed 2 of 10 tlc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 41 missed 1 of 10 tlc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 51 missed 2 of 10 tlc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 58 passed the 10 statistical checks for the tally fluctuation chart bin result
missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 8 passed the 10 statistical checks for the tally fluctuation chart bin result
passed all bin error check: 1 tally bins all have relative errors less than 0.10 with no zero bins

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 7 of the 10 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 9 of the 10 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 1					tally 6					tally 28					
nps	mean	error	vov	slope	fom	mean	error	vov	slope	fom	mean	error	vov	slope	fom
1000	6.7975E-03	0.2399	0.0835	0.0		2.0857E-05	0.1589	0.0525	0.0		2.6993E-01	0.0279	0.0044	10.0	
2000	5.5780E-03	0.1884	0.0641	0.0		2.4397E-05	0.1701	0.1693	0.0		2.6475E-01	0.0199	0.0022	10.0	
3000	5.8779E-03	0.1455	0.0373	0.0		2.6650E-05	0.1343	0.1060	0.0		2.6433E-01	0.0161	0.0015	10.0	
4000	5.7880E-03	0.1317	0.0311	0.0		2.7894E-05	0.1145	0.0656	0.0		2.6224E-01	0.0140	0.0011	10.0	
5000	5.9924E-03	0.1168	0.0239	0.0		2.7855E-05	0.1020	0.0485	0.0		2.6175E-01	0.0126	0.0009	10.0	
6000	5.9423E-03	0.1055	0.0195	0.0		2.7793E-05	0.0931	0.0418	0.0		2.6496E-01	0.0116	0.0007	10.0	
7000	5.9749E-03	0.0968	0.0170	0.0		2.8647E-05	0.0919	0.0581	0.0		2.6691E-01	0.0107	0.0006	10.0	
8000	5.7670E-03	0.0913	0.0154	0.0		2.8249E-05	0.0838	0.0524	10.0		2.6739E-01	0.0100	0.0005	10.0	
9000	5.7398E-03	0.0864	0.0135	0.0		2.7485E-05	0.0779	0.0491	10.0		2.6699E-01	0.0095	0.0005	10.0	
10000	5.7777E-03	0.0811	0.0120	0.0		2.7551E-05	0.0722	0.0436	10.0		2.6690E-01	0.0090	0.0004	10.0	

tally 11					tally 21					tally 31				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	4.4504E-01	0.0296	0.0002	2.1	5.6500E-01	0.0286	0.0004	4.4	-5.6500E-01	0.0286	0.0004	0.0		
2000	4.4489E-01	0.0211	0.0001	2.0	5.6500E-01	0.0204	0.0003	4.4	-5.6500E-01	0.0204	0.0003	0.0		
3000	4.4226E-01	0.0173	0.0001	1.8	5.6400E-01	0.0168	0.0002	10.0	-5.6400E-01	0.0168	0.0002	0.0		
4000	4.4011E-01	0.0151	0.0000	1.8	5.6100E-01	0.0147	0.0002	10.0	-5.6100E-01	0.0147	0.0002	0.0		
5000	4.4004E-01	0.0135	0.0000	1.9	5.5860E-01	0.0131	0.0001	10.0	-5.5860E-01	0.0131	0.0001	0.0		
6000	4.3549E-01	0.0125	0.0000	1.8	5.5433E-01	0.0121	0.0001	10.0	-5.5433E-01	0.0121	0.0001	0.0		
7000	4.3477E-01	0.0115	0.0000	1.9	5.5386E-01	0.0112	0.0001	10.0	-5.5386E-01	0.0112	0.0001	0.0		
8000	4.3339E-01	0.0108	0.0000	1.8	5.5238E-01	0.0105	0.0001	10.0	-5.5238E-01	0.0105	0.0001	0.0		
9000	4.3428E-01	0.0102	0.0000	1.7	5.5200E-01	0.0099	0.0001	10.0	-5.5200E-01	0.0099	0.0001	0.0		
10000	4.3411E-01	0.0097	0.0000	1.6	5.5130E-01	0.0094	0.0001	10.0	-5.5130E-01	0.0094	0.0001	0.0		

tally 41					tally 51					tally 58				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	5.6500E-01	0.0286	0.0004	4.4	-5.6500E-01	0.0286	0.0004	0.0	1.0000E+00	0.0000	0.0000	10.0		
2000	5.6500E-01	0.0204	0.0003	4.4	-5.6500E-01	0.0204	0.0003	0.0	1.0000E+00	0.0000	0.0000	10.0		
3000	5.6400E-01	0.0168	0.0002	10.0	-5.6400E-01	0.0168	0.0002	0.0	1.0000E+00	0.0000	0.0000	10.0		
4000	5.6100E-01	0.0147	0.0002	10.0	-5.6100E-01	0.0147	0.0002	0.0	1.0000E+00	0.0000	0.0000	10.0		
5000	5.5860E-01	0.0131	0.0001	10.0	-5.5860E-01	0.0131	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
6000	5.5433E-01	0.0121	0.0001	10.0	-5.5433E-01	0.0121	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
7000	5.5386E-01	0.0112	0.0001	10.0	-5.5386E-01	0.0112	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
8000	5.5238E-01	0.0105	0.0001	10.0	-5.5238E-01	0.0105	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
9000	5.5200E-01	0.0099	0.0001	10.0	-5.5200E-01	0.0099	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
10000	5.5130E-01	0.0094	0.0001	10.0	-5.5130E-01	0.0094	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		

tally 8

nps	mean	error	vov	slope fom
1000	2.6993E-01	0.0279	0.0044	10.0
2000	2.6475E-01	0.0199	0.0022	10.0
3000	2.6433E-01	0.0161	0.0015	10.0
4000	2.6224E-01	0.0140	0.0011	10.0
5000	2.6175E-01	0.0126	0.0009	10.0
6000	2.6496E-01	0.0116	0.0007	10.0
7000	2.6691E-01	0.0107	0.0006	10.0
8000	2.6739E-01	0.0100	0.0005	10.0
9000	2.6699E-01	0.0095	0.0005	10.0
10000	2.6690E-01	0.0090	0.0004	10.0

tally data written to file inp20m

6 warning messages so far.

run terminated when 10000 particle histories were done.

File: Inp24o

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1-10.182 -1 u=2
3- 2 2 -.001 1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14:15 u=3
7- 6 3 -6.55 14 -15 u=3
8- 7 4 -1.0 -4 +5 -6 +7 u=1 lat=1 fill=-8:8 -8:8 0:0
9- 1 17r 2 14r 1 1 2 14r 1 1 2 3 2 2 3 2 2r 3 2 2
10- 3 2 2 1 1 2 6r 3 2 6r 1 1 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 2 14r 1 17r
17- 8 0-8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4

```

```

19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
29- 20 0 -28:-29:+21:-22:+25
30-
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250 .7 2 4 4500 0
warning tallies are normed per fission neutron for one generation.
64- ksrc 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- m4 lwtr.01t
73- drxs
74- prdmp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2
76- sd6 14r
77-
total fission nubar data are being used.

warning continuous-energy cross-section table used for 1001.00d
warning continuous-energy cross-section table used for 5011.40d
warning continuous-energy cross-section table used for 6012.40d

```

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells print table 60

		atom		gram		neutron	
cell	mat	density	density	volume	mass	pieces	importance
1	1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0 1.0000E+00
2	2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0 1.0000E+00
3	3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
4	4	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
5	5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
6	6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
7	7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
8	8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
9	9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
12	12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
13	13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
14	14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
15	15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 0.0000E+00

total 0.00000E+00 0.00000E+00

11 warning messages so far.

1cross-section tables print table 100

table length

tables from file testlib1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
26000.40c	1846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	11279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503
92238.40c	48310	ENDL library name: nd901118 MCNP translation:	9total nu 56:49		901119
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin	1001 0	010/22/85	

total 261165

warning. neutron energy cutoff is below some cross-section tables.

initial words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.
1 estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

estimator	cycle	ave of	2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886	0.568374	0.0291	k(col/abs)	0.000000	0.000000	0.0000
k(absorption)	0.583788	0.591169	0.0125	k(abs/ik ln)	0.000000	0.000000	0.0000
k(trk length)	0.582547	0.568877	0.0240	k(ik ln/col)	0.000000	0.000000	0.0000
rem life(col)	3.9485E+03	3.8951E+03	0.0137				
rem life(abs)	4.0658E+03	3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000E+00	0.0000
source points generated	264						

source distribution written to file inp24s cycle = 4

1 problem summary

run terminated when 4 kcode cycles were done.

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)				(per source particle)		

source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
				energy cutoff	0	0.	0.
				time cutoff	0	0.	0.
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtan	0	0.	0.	dxtan	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
				capture	0	8.1698E-01	1.8384E-02
(n,nx)	8	6.9970E-03	3.6428E-03	loss to (n,nx)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00 tco 1.0000E+34
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03 eco 0.0000E+00
total neutron collisions	57706	capture or escape	4.1766E+03 wc1 -5.0000E-01
net multiplication	1.0033E+00 0.0030	any termination	4.4650E+03 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	690539	most random numbers used was	3677 in history 21

range of sampled source weights = 9.8814E-01 to 1.1962E+00

1 neutron activity in each cell

print table 126

cell	entering	tracks population	collisions	collisions	number	flux	average	average
			* weight	weighted	weighted	track	weight	track mfp
			(per history)	energy	energy	(relative)	(cm)	
1	1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01 3.8971E+00
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01 9.6437E+03
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01 3.6368E+00

4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01	1.4858E+00
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01	1.3256E+00
5	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01	3.6398E+00
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01	1.7232E+00
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01	3.1777E+00
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01	1.0087E+00
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total		138515	6658	57706	4.4801E+01				

the initial fission neutron source distribution used the 1 source points that were input on the ksre card.
 the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.
 this problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.
 all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev fom
1	250	0.65821 0.61995 0.71299		
2	228	0.54932 0.55922 0.57971		
----- begin active keff cycles -----				
3	209	0.55186 0.59855 0.55521		
4	253	0.58489 0.58379 0.58255	0.56837 0.01651 0.59117 0.00738 0.56888 0.01367	

the largest active cycle keffs by estimator are:

the smallest active cycle keffs by estimator are:

collision	0.58489 on cycle 4	collision	0.55186 on cycle 3
absorption	0.59855 on cycle 3	absorption	0.58379 on cycle 4
track length	0.58255 on cycle 4	track length	0.55521 on cycle 3
totaly 6	nps = 940		
tally type 6	track length estimate of heating.	units	mev/gram
tally for neutrons			
number of histories used for normalizing tallies =	500.00		

masses

cell:	8	12	13	14	15
	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

cell 8

4.02566E+01 0.0434

cell 12
2.65224E+01 0.0629

cell 13
1.32494E+01 0.0904

cell 14
9.78180E-01 0.4014

cell 15
1.20234E-01 0.9710

1 analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
(largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

(confidence interval shift)/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	mean--	relative error-----	variance of the variance----	figure of merit--	pdf-				
behavior	value decrease	decrease rate	value decrease	decrease rate	behavior slope				
desired random	<0.10	yes	1/sqrt(nps)	<0.10	yes	1/nps	constant	random	>3.00
observed random	0.04	yes	yes	0.01	yes	yes		0.00	
passed?	yes	yes	yes	yes	yes	yes		no	

warnings. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

1 unnormed tally density for tally 6 nonzero tally mean(m) = 4.357E+01 nps = 940 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally number	den	log den	d	d
2 51-01	1 3.87-02	-1.412		
01	2 6.15-02	-1.211		
01	1 2.44-02	-1.612		


```

5.01-01 1 1.94-02 -1.712 *****
4-01 2 3.08-02 -1.511 *****
4-01 3 3.67-02 -1.435 *****
1.00+00 5 4.86-02 -1.313 *****
1.26+00 1 7.72-03 -2.112 *****
1.58+00 5 3.07-02 -1.513 *****
2.00+00 7 3.41-02 -1.467 *****
2.51+00 6 2.32-02 -1.634 *****
3.16+00 8 2.46-02 -1.609 *****
3.98+00 11 2.69-02 -1.571 *****
5.01+00 14 2.72-02 -1.566 *****
6.31+00 10 1.54-02 -1.812 *****
7.94+00 14 1.71-02 -1.766 *****
1.00+01 13 1.26-02 -1.898 *****
1.26+01 16 1.24-02 -1.908 *****
1.58+01 11 6.75-03 -2.171 *****
2.00+01 20 9.75-03 -2.011 *****
2.51+01 32 1.24-02 -1.907 *****
3.16+01 41 1.26-02 -1.899 *****
3.98+01 24 5.86-03 -2.232 *****
5.01+01 48 9.31-03 -2.031 *****
6.31+01 54 8.32-03 -2.080 *****
7.94+01 40 4.90-03 -2.310 *****
1.00+02 28 2.72-03 -2.565 *****
1.26+02 20 1.54-03 -2.811 *****
1.58+02 21 1.29-03 -2.890 *****
2.00+02 2 9.75-05 -4.011 *****
2.51+02 0 0.00+00 0.000 *****
3.16+02 1 3.08-05 -4.512 *****
total 462 9.24-01 d-----d-----d-----d-----

```

1 status of the statistical checks used to form confidence intervals for the mean for each tally bin

1 tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

```

6 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

```

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.
1 tally fluctuation charts

tally 6

```

nps mean error vov slope fom
940 4.0257E+01 0.0434 0.0095 0.0

```

tally data written to file inp24m

15 warning messages so far.

run terminated when 4 kcode cycles were done.

File: Outp24

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1 -10.182 -1 u=2
3- 2 2 -.001 1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14:15 u=3
7- 6 3 -6.55 14 -15 u=3
7 4 -1.0 -4 +5 -6 +7 u=1 lat=1 fill=-8-8-8:8 0:0
9- 1 17r 2 14r 1 1 2 14r 1 1 2 2 3 2 2 3 2 2 2

```

```

10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 2 14r 1 17r
17- 8 0 -8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4
19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- :(+28 +29 -19 +24 -25)
29- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
30- 20 0 -28:-29:+21:-22:+25
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250 .7 2 4 4500 0
warning. tallies are normed per fission neutron for one generation.
64- ksro 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- mt4 lwtr.01t
73- drxs
74- prdmp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2

```

76- sd6 1 4r

fission nubar data are being used.

warning. continuous-energy cross-section table used for 1001.00d

warning. continuous-energy cross-section table used for 5011.40d

warning. continuous-energy cross-section table used for 6012.40d

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells

print table 60

		atom		gram		neutron		
cell	mat	density	density	volume	mass	pieces	importance	
1	1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
2	2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0	1.0000E+00
3	3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
4	4	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
5	5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
7	7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
8	8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
12	12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
13	13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
14	14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
15	15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 0.00000E+00 0.00000E+00

11 warning messages so far.

1cross-section tables

print table 100

table length

tables from file testlib1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format		(1273)	14 oct 75
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503

92238.40c 48310 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
 tr:01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85
 total 261165

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.

1 estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

source distribution written to file inp24s cycle = 3

estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886	0.568374	0.0291	k(col/abs)	0.000000	0.0000	0.0000	0.0000
k(absorption)	0.583788	0.591169	0.0125	k(abs/tk ln)	0.000000	0.0000	0.0000	0.0000
k(trk length)	0.582547	0.568877	0.0240	k(tk ln/col)	0.000000	0.0000	0.0000	0.0000
rem life(col)	3.9485E+03	3.8951E+03	0.0137					
rem life(abs)	4.0658E+03	3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000	0.0000E+00	0.0000
source points generated	264							

source distribution written to file inp24s cycle = 4
 1 problem summary

run terminated when 4 kcode cycles were done.

0

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
			energy cutoff	0	0.	0.	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtan	0	0.	0.	dxtan	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
			capture	0	8.1698E-01	1.8384E-02	
(n,xn)	8	6.9970E-03	3.6428E-03	loss to (n,xn)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00 tco 1.0000E+34
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03 eco 0.0000E+00
total neutron collisions	57706	capture or escape	4.1766E+03 wcl -5.0000E-01
net multiplication	1.0033E+00 0.0030	any termination	4.4650E+03 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0

random numbers generated

690539

most random numbers used was

3677 in history 21

age of sampled source weights = 9.8814E-01 to 1.1962E+00

Inertion activity in each cell

print table 126

cell	tracks entering	population	collisions * weight (per history)	collisions weighted energy	number weighted energy	flux weighted (relative)	average track weight (cm)	average track mfp
1	1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01
4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01
6	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total		138515	6658	57706	4.4801E+01			

the initial fission neutron source distribution used the 1 source points that were input on the ksrc card.

the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.
the problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev fom
1	250	0.65821 0.61995 0.71299		
2	228	0.54932 0.55922 0.57971		
----- begin active keff cycles				
3	209	0.55186 0.59855 0.55521		
4	253	0.58489 0.58379 0.58255	0.56837 0.01651 0.59117 0.00738 0.56888 0.01367	

the largest active cycle keffs by estimator are:

collision 0.58489 on cycle 4
absorption 0.59855 on cycle 3
track length 0.58255 on cycle 4

the smallest active cycle keffs by estimator are:

collision 0.55186 on cycle 3
absorption 0.58379 on cycle 4
track length 0.55521 on cycle 3

tally 6 nps = 940
tally type 6 track length estimate of heating. units mev/gram
tally for neutrons
number of histories used for normalizing tallies = 500.00

masses
cell: 8 12 13 14 15
1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00

cell 8
4.02566E+01 0.0434

cell 12
2.65224E+01 0.0629

cell 13
1.32494E+01 0.0904

cell 14
9.78180E-01 0.4014

cell 15
1.20234E-01 0.9710

analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
(largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

confidence interval shift/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	--mean--	-----relative error-----	----variance of the variance----	--figure of merit--	--pdf--
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope
desired	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant	random >3.00
desired	random	0.04 yes yes	0.01 yes yes		0.00
desired	yes	yes yes yes	yes yes yes	no	

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

```
1 unnormed tally density for tally 6      nonzero tally mean(m) = 4.357E+01  nps = 940  print table 161
```

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

[illegible]

1 status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

Itally fluctuation charts

```

tally 6
nps mean error vov slope fom
940 4.0257E+01 0.0434 0.0095 0.0
tally data written to file inp24m

```

15 warning messages so far.

terminated when 4 kcode cycles were done.

Computer System ID : 501981-801 056AVO000238 (DOE 6246271)

File: Inp18o

```

1-  prob18 -- kcode in a hexagonal prism lattice.
2-  c  three half control rods and five whole control rods.
3-  30  0 -905 -19 29 1  fill=1
4-  31  0 -906 -19 29 1  fill=1 (16.7113 0 0)
5-  37  0 -907 -19 29 1  fill=1 (-16.7113 0 0)
6-  34  0 -913 -19 29  fill=1 (0 11.9185 0)
7-  32  0 -914 -19 29  fill=1 (10.3217 5.9592 0)
8-  33  0 -915 -19 29  fill=1 (8.3557 14.4724 0)
9-  35  0 -916 -19 29  fill=1 (-8.3557 14.4724 0)
10- 36  0 -917 -19 29  fill=1 (-10.3217 5.9592 0)
11-  c  universe 1: structure of control rod.
12- 38  11 -2.02  -880 u=1  $ control rod core
13- 39  6 -8.4  880 -881 u=1  $ control rod cladding
14- 40  12 -1.00 881 -882 u=1  $ control rod gap
15- 41  6 -8.4  882  u=1  $ control rod sheath
16-  c  the space between the control rods, filled with lattice.
17- 140 0 -17 1 29 -19 905 906 907 913 914 915 916 917  fill=2
18-  c  universe 2: lattice of fuel rods with water in between.
19- 42  12 -1.00 -301 302 -303 304 -305 306  u=2  lat=2  fill=
20-      -37.27 -1.33 0 0 &
21-      2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22-      2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23-      2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24-      2 3r 3 57r 2 2r &
25-      2 2r 3 58r 2 2r
26-      2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27-      2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28-      2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29-      2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30-      2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31-      2 1r 3 54r 2 7r &
32-  c  can code remember & thru comment?
33-  2 3 55r 2 7r
34-      2 3 25r 2 2r 3 25r 2 8r
35-      2 3 24r 2 3r 3 24r 2 9r
36-      2 3 23r 2 4r 3 23r 2 10r
37-      2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38-      2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39-      2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40-      2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41-      2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42-      2 3 46r 2 16r
43-      2 3 45r 2 17r
44-      2 3 44r 2 18r
45-      2 1r 3 41r 2 20r
46-      2 1r 3 40r 2 21r
47-      2 1r 3 39r 2 22r
48-      2 2r 3 36r 2 24r
49-      2 2r 3 35r 2 25r
50-      2 3r 3 32r 2 27r
51-      2 4r 3 29r 2 29r
52-      2 5r 3 26r 2 31r
53-      2 6r 3 23r 2 33r
54-      2 8r 3 18r 2 36r
55-      2 11r 3 11r 2 40r
56-      2 64r
57-  c  universe 3: structure of fuel rod lattice elements.
58- 154 2 -13.75  -58 u=3  $ fuel element
59- 149 12 -1.00 58 -268 u=3  $ gap
60- 144 7 -19.66 268 -478 u=3  $ liner
61- 159 6 -8.4  478 -698 u=3  $ cladding
62- 141 12 -1.00 698  u=3  $ water between the fuel rods

```



```

63- 162 0 17:-29:19:-1 $ outside world
64-
65- *1 py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0 11.9185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- mt12 hwtr:01 lwtr:01
98- keode 200 1 5 6
warning. tallies are normed per fission neutron for one generation.
99- ksrc 3 2 2 2 3 2 -3 2 2 2 3 2 4 3 2 -4 3 3 1 -4 3 2
100- e .01 1 1 10.
101- fq fe
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<(42[-10:-6 -1 0])) $ average 5 x elements at j=-1
104- (154<(42[-10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<(42[-10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<(42[-10:-6 21 0])) $ average 5 x elements at j=21
107- (154<(42[-10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdmp 2j -1
111- ptrac buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points      8
points not in any cell         0
points in cells of zero importance  0
points in void cells           0
points in ambiguous cells      0
total points rejected          0
points remaining               8
points after expansion or contraction 200
nominal source size           200

```

```

initial guess for k(eff.)      1.000000

```

```

cycles to skip before tallying  5

```

```

number of keff cycles that can be stored 201

```

total fission nubar data are being used.

print table 30

fuel rod flux in 5 y locations averaged over 5 x elements
tally type 4 track length estimate of particle flux.

tally for neutrons

order of printing: f e

cells (154<(42[-10:-6 -1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6 29 0]))

energy bins

0.00000E+00 to 1.00000E-02 mev
1.00000E-02 to 1.00000E-01 mev
1.00000E-01 to 1.00000E+00 mev
1.00000E+00 to 1.00000E+01 mev
total bin

print table 40

material composition

the sum of the fractions of material 2 was 9.999900E-01

the sum of the fractions of material 7 was 7.400000E-01

the sum of the fractions of material 12 was 3.000000E+00

material

number component nuclide, atom fraction

2	92235, 0.37504	92238, 0.12499	7014, 0.49997
6	41093, 0.98982	40000, 0.01018	
7	74000, 1.00000		
11	5010, 0.71977	5011, 0.08004	6012, 0.20019
12	1001, 0.33333	1002, 0.33333	8016, 0.33333

associated thermal s(a,b) data sets: lwtr.01t lwtr.01t

material

number component nuclide, mass fraction

2	92235, 0.70574	92238, 0.23821	7014, 0.05605
6	41093, 0.99000	40000, 0.01000	
7	74000, 1.00000		
11	5010, 0.68700	5011, 0.08400	6012, 0.22900
12	1001, 0.05300	1002, 0.10591	8016, 0.84109

warning. 3 of the materials had unnormalized fractions.

1 cell volumes and masses

print table 50

cell	atom density	gram density	input volume	calculated volume	mass	reason volume pieces	not calculated	
1	30	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
2	31	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
3	37	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
4	34	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
5	32	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
6	33	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
7	35	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
8	36	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
9	38	1.15958E-01	2.02000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
10	39	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
11	40	5.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
12	41	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
13	140	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
14	42	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite

```

15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
surface areas print table 50

```

```

surface input calculated reason area
area area not calculated

```

```

1 1 0.00000E+00 0.00000E+00 asymmetric
2 17 0.00000E+00 0.00000E+00 asymmetric
3 19 0.00000E+00 0.00000E+00 asymmetric
4 29 0.00000E+00 0.00000E+00 asymmetric
5 58 0.00000E+00 0.00000E+00 infinite
6 268 0.00000E+00 0.00000E+00 infinite
7 478 0.00000E+00 0.00000E+00 infinite
8 698 0.00000E+00 0.00000E+00 infinite
9 880 0.00000E+00 0.00000E+00 infinite
10 881 0.00000E+00 0.00000E+00 infinite
11 882 0.00000E+00 0.00000E+00 infinite
12 905 0.00000E+00 0.00000E+00 asymmetric
13 906 0.00000E+00 0.00000E+00 asymmetric
14 907 0.00000E+00 0.00000E+00 asymmetric
15 913 0.00000E+00 8.40057E+02
16 914 0.00000E+00 8.40057E+02
17 915 0.00000E+00 8.40057E+02
18 916 0.00000E+00 8.40057E+02
19 917 0.00000E+00 8.40057E+02
20 301 0.00000E+00 0.00000E+00 infinite
21 302 0.00000E+00 0.00000E+00 infinite
22 303 0.00000E+00 0.00000E+00 infinite
304 0.00000E+00 0.00000E+00
305 0.00000E+00 0.00000E+00
25 306 0.00000E+00 0.00000E+00

```

```

1cells print table 60

```

```

atom gram neutron
cell mat density density volume mass pieces importance

```

```

1 30 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
2 31 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
3 37 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
4 34 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
5 32 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
6 33 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
7 35 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
8 36 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
9 38 11 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
10 39 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
11 40 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
12 41 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
13 140 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
14 42 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
15 154 2 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
16 149 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
17 144 7 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
18 159 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
20 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

```

```

total 4.2185E+03 0.00000E+00

```

```

1surfaces

```

```

print table 70

```

```

surface trans type surface coefficients

```

```

1 1 refl. py 0.000000E+00
2 17 cz 2.9135000E+01
3 19 pz 3.1750000E+01
4 29 pz -3.1750000E+01
5 58 c/z 3.4414000E+00 8.5150000E-01 3.2400000E-01
6 268 c/z 3.4414000E+00 8.5150000E-01 3.3450000E-01
7 478 c/z 3.4414000E+00 8.5150000E-01 3.4750000E-01
8 698 c/z 3.4414000E+00 8.5150000E-01 4.3180000E-01
9 880 cz 1.7251000E+00
10 881 cz 1.8051000E+00
11 882 cz 1.9051000E+00
12 905 cz 2.1055000E+00
13 906 c/z 1.6711300E+01 0.0000000E+00 2.1055000E+00
14 907 c/z -1.6711300E+01 0.0000000E+00 2.1055000E+00
15 913 c/z 0.0000000E+00 1.1918500E+01 2.1055000E+00
16 914 c/z 1.0321700E+01 5.9592000E+00 2.1055000E+00
17 915 c/z 8.3557000E+00 1.4472400E+01 2.1055000E+00
18 916 c/z -8.3557000E+00 1.4472400E+01 2.1055000E+00
19 917 c/z -1.0321700E+01 5.9592000E+00 2.1055000E+00
20 301 px 3.9330000E+00
21 302 px 2.9498000E+00
22 303 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 5.8994000E+00
23 304 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 3.9330000E+00
24 305 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -9.8340000E-01
25 306 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -2.9498000E+00

```

1 cell temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

1 cross-section tables

print table 100

table length

tables from file testlib1

```

1001.00c 1782 1-h-1 from endf-vi.1 mat 125 05/26/93
1002.55c 4102 njoy ( 120) 04/26/82
5011.40c 3229 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
6012.40c 4858 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
7014.40c 8535 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
8016.40c 5358 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
40000.40c 93372 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900323
41093.40c 42746 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
74000.40c 91244 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
92235.40c 34772 ENDL library name: nd900719 MCNP translation: 9total nu 10:05 900503
92238.40c 40834 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
5010.03d 3682 b-10 endf/b-iv new gamma production format ( 1273) 14 oct 75
lwtr.01t 10193 deuterium in heavy water at 300 degrees kelvin 1002 0 010/22/85
lwtr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

```

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp18s cycle = 0

3 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00

print table 110

1 prob18 - kcode in a hexagonal prism lattice.

x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140		5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	5.085E-01	4.733E-01	7.193E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 5.085E-01	4.733E-01	7.193E-01		
2	3.000E+00	2.000E-01	2.000E-01	140		8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	8.952E-01	-4.447E-01	-2.944E-02		
	3.492E+00	1.051E+00	2.000E-01	154		0 8.952E-01	-4.447E-01	-2.944E-02		
3	3.000E+00	2.000E-01	2.000E-01	140		-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-6.184E-01	-4.495E-01	6.446E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -6.184E-01	-4.495E-01	6.446E-01		
4	3.000E+00	2.000E-01	2.000E-01	140		9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	9.710E-01	-5.665E-02	-2.323E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 9.710E-01	-5.665E-02	-2.323E-01		
5	3.000E+00	2.000E-01	2.000E-01	140		5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	5.861E-01	1.496E-01	-7.963E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 5.861E-01	1.496E-01	-7.963E-01		
6	3.000E+00	2.000E-01	2.000E-01	140		-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-6.489E-02	-1.626E-01	9.845E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -6.489E-02	-1.626E-01	9.845E-01		
7	3.000E+00	2.000E-01	2.000E-01	140		-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-7.068E-02	3.263E-02	-9.970E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -7.068E-02	3.263E-02	-9.970E-01		
8	3.000E+00	2.000E-01	2.000E-01	140		-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-3.915E-01	4.664E-01	-7.932E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -3.915E-01	4.664E-01	-7.932E-01		
9	3.000E+00	2.000E-01	2.000E-01	140		-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-2.368E-01	9.215E-01	-3.079E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -2.368E-01	9.215E-01	-3.079E-01		
10	3.000E+00	2.000E-01	2.000E-01	140		1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	1.946E-01	-3.204E-01	9.271E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 1.946E-01	-3.204E-01	9.271E-01		
	3.000E+00	2.000E-01	2.000E-01	140		-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-6.698E-01	-7.177E-01	-1.905E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -6.698E-01	-7.177E-01	-1.905E-01		
12	3.000E+00	2.000E-01	2.000E-01	140		-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-8.398E-01	-4.129E-01	3.524E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -8.398E-01	-4.129E-01	3.524E-01		
13	3.000E+00	2.000E-01	2.000E-01	140		-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-1.714E-01	-8.572E-01	4.857E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -1.714E-01	-8.572E-01	4.857E-01		
14	3.000E+00	2.000E-01	2.000E-01	140		-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-2.489E-01	-5.118E-01	-8.222E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -2.489E-01	-5.118E-01	-8.222E-01		
15	3.000E+00	2.000E-01	2.000E-01	140		-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-2.959E-01	2.119E-01	9.314E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -2.959E-01	2.119E-01	9.314E-01		
16	3.000E+00	2.000E-01	2.000E-01	140		1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	1.395E-01	-9.829E-01	1.202E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 1.395E-01	-9.829E-01	1.202E-01		
17	3.000E+00	2.000E-01	2.000E-01	140		6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	6.909E-01	-7.110E-01	1.307E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 6.909E-01	-7.110E-01	1.307E-01		
18	3.000E+00	2.000E-01	2.000E-01	140		-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-6.580E-01	5.320E-01	-5.329E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 -6.580E-01	5.320E-01	-5.329E-01		
19	3.000E+00	2.000E-01	2.000E-01	140		-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-9.903E-01	-1.380E-01	1.353E-02		
	3.492E+00	1.051E+00	2.000E-01	154		0 -9.903E-01	-1.380E-01	1.353E-02		
20	3.000E+00	2.000E-01	2.000E-01	140		7.462E-01	4.859E-01	-4.551E-01	1.000E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	7.462E-01	4.859E-01	-4.551E-01		
	3.492E+00	1.051E+00	2.000E-01	154		0 7.462E-01	4.859E-01	-4.551E-01		
21	3.000E+00	2.000E-01	2.000E-01	140		-1.977E-01	9.797E-01	3.360E-02	3.990E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)	-1.977E-01	9.797E-01	3.360E-02		
	3.492E+00	1.051E+00	2.000E-01	154		0 -1.977E-01	9.797E-01	3.360E-02		
	3.000E+00	2.000E-01	2.000E-01	140		-9.117E-01	-3.647E-01	-1.891E-01	2.665E-01	1.000E+00 0.000E+00

3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
 24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
 25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
 26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
 27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
 28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
 29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
 30 2.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
 31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
 32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
 33 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
 34 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
 35 2.000E-01 3.000E+00 2.000E-01 140 -4.048E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -4.048E-02 8.831E-01 4.675E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -4.048E-02 8.831E-01 4.675E-01
 36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
 37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
 38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
 39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
 40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
 41 2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -3.212E-01 -7.678E-01 -5.543E-01
 42 2.000E-01 3.000E+00 2.000E-01 140 5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 5.039E-01 -1.460E-01 8.513E-01
 43 2.000E-01 3.000E+00 2.000E-01 140 6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 6.080E-01 5.487E-01 5.738E-01
 44 2.000E-01 3.000E+00 2.000E-01 140 -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01

```

3.641E+00 4.456E-01 2.000E-01 141 0 -2.932E-01 9.304E-01 -2.199E-01
2.000E-01 3.000E+00 2.000E-01 140 -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140 1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141 0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140 7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141 0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140 4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141 0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140 5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141 0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140 -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -1.053E-01 -9.805E-01 1.658E-01
estimated keff results by cycle print table 175

```

```

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7575E+01 source points generated 257
cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195
cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193
cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182
cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222
cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

```

```

source distribution written to file inp18s cycle = 6
problem summary

```

```

run terminated when 6 kcode cycles were done.

```

```

neutron creation tracks weight energy neutron loss tracks weight energy
(per source particle) (per source particle)

source 1249 9.6077E-01 1.8661E+00 escape 220 1.2268E-01 1.2054E-01
energy cutoff 0 0. 0.
time cutoff 0 0. 0.

weight window 0 0. 0. weight window 0 0. 0.
cell importance 0 0. 0. cell importance 0 0. 0.
weight cutoff 0 1.3743E-01 3.8498E-03 weight cutoff 1034 1.2791E-01 5.1920E-03
energy importance 0 0. 0. energy importance 0 0. 0.
dxtran 0 0. 0. dxtran 0 0. 0.

forced collisions 0 0. 0. forced collisions 0 0. 0.
exp. transform 0 0. 0. exp. transform 0 0. 0.
upscattering 0 0. 5.3884E-11 downscattering 0 0. 1.3605E+00
capture 0 3.9980E-01 1.1590E-01
(n,xn) 10 6.1640E-03 6.1355E-03 loss to (n,xn) 5 3.0820E-03 2.4027E-02
fission 0 0. 0. loss to fission 0 4.5089E-01 2.4987E-01
total 1259 1.1044E+00 1.8761E+00 total 1259 1.1044E+00 1.8761E+00

```

```

number of neutrons banked 5 average lifetime, shakes cutoffs
neutron tracks per source particle 1.0080E+00 escape 3.7027E+00 tco 1.0000E+34
neutron collisions per source particle 1.8226E+01 capture 1.2954E+01 eco 0.0000E+00
total neutron collisions 22764 capture or escape 1.1788E+01 wcl -5.0000E-01
net multiplication 1.0032E+00 0.0035 any termination 1.2744E+01 wc2 -2.5000E-01

```

```

computer time so far in this run 0.00 minutes maximum number ever in bank 1
computer time in mcrun 0.00 minutes bank overflows to backup file 0
source particles per minute 0.0000E+00 field length 0
random numbers generated 500880 most random numbers used was 1298 in history 14

```

range of sampled source weights = 7.7821E-01 to 1.0989E+00
neutron activity in each cell

print table 126

cell	tracks entering	population	collisions (per history)	collisions * weight energy	number weighted energy	flux weighted energy	average track weight (relative)	average track mfp (cm)
1	30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6971E-01
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01

total 266059 9765 22764 1.1324E+01

In neutron weight balance in each cell -- external events

print table 130

cell	entering	source cutoff	energy cutoff	time	exiting	total
30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
38	4.8822E-01	0.0000E+00	0.0000E+00	0.0000E+00	-3.3091E-01	1.5731E-01
39	8.4996E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.4933E-01	6.2750E-04
40	8.9904E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.9904E-01	3.9460E-06
41	9.7260E-01	0.0000E+00	0.0000E+00	0.0000E+00	-9.6978E-01	2.8204E-03
140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
42	1.0907E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.0913E+00	-5.9111E-04
154	1.2943E+01	8.4067E-01	0.0000E+00	0.0000E+00	-1.3171E+01	6.1278E-01
149	2.6508E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.6508E+01	3.5884E-05
144	2.7419E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.7405E+01	1.4572E-02
159	3.1331E+01	8.0064E-02	0.0000E+00	0.0000E+00	-3.1361E+01	5.0067E-02
141	3.9111E+01	4.0032E-02	0.0000E+00	0.0000E+00	-3.9150E+01	4.5860E-04

total 1.4161E+02 9.6077E-01 0.0000E+00 0.0000E+00 -1.4174E+02 8.3809E-01

In neutron weight balance in each cell -- variance reduction events

print table 130

cell	weight window	cell importance	weight cutoff	energy importance	dextran collision	forced exponential transform	total
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

38	0.0000E+00	0.0000E+00	1.2447E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.2447E-03
39	0.0000E+00	0.0000E+00	2.0097E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.0097E-04
40	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
41	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	41	0.0000E+00	0.0000E+00	2.9100E-04	0.0000E+00	0.0000E+00	0.0000E+00	2.9100E-04
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	154	0.0000E+00	0.0000E+00	8.0354E-03	0.0000E+00	0.0000E+00	0.0000E+00	8.0354E-03
16	149	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	144	0.0000E+00	0.0000E+00	-3.0848E-06	0.0000E+00	0.0000E+00	0.0000E+00	-3.0848E-06
18	159	0.0000E+00	0.0000E+00	-2.5216E-04	0.0000E+00	0.0000E+00	0.0000E+00	-2.5216E-04
19	141	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03
 In neutron weight balance in each cell -- physical events print table 130

cell	(n,xn)	fission	capture (n,xn)	loss to fission	loss to	total
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	-1.5855E-01
10	39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	-8.2847E-04
11	40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	-3.9460E-06
12	41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	-3.1114E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	5.9111E-04
15	154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-03	-6.2082E-01
16	149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	-3.5884E-05
17	144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	-1.4569E-02
18	159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	-4.9815E-02
19	141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	-4.5860E-04

total 6.1640E-03 0.0000E+00 -3.9980E-01 -3.0820E-03 -4.5089E-01 -8.4760E-01
 In neutron activity of each nuclide in each cell, per source particle print table 140

cell	nuclides	atom fraction	total collisions	collisions * weight	weight lost to capture	weight loss to fission	weight gain by (n,xn)
9	38	5010.03d 7.1977E-01	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00
		5011.40c 8.0041E-02	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
		6012.40c 2.0019E-01	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
10	39	41093.40c 9.8982E-01	128	6.2802E-02	8.2814E-04	0.0000E+00	0.0000E+00
		40000.40c 1.0183E-02	2	9.7676E-04	3.3160E-07	0.0000E+00	0.0000E+00
11	40	1001.00c 3.3333E-01	111	5.1533E-02	3.9251E-06	0.0000E+00	0.0000E+00
		1002.55c 3.3333E-01	33	1.5373E-02	2.0884E-08	0.0000E+00	0.0000E+00
		8016.40c 3.3333E-01	40	2.1271E-02	0.0000E+00	0.0000E+00	0.0000E+00
12	41	41093.40c 9.8982E-01	313	1.5623E-01	3.1072E-03	0.0000E+00	0.0000E+00
		40000.40c 1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00
14	42	1001.00c 3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00	0.0000E+00
		1002.55c 3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00	6.2306E-04
		8016.40c 3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00	0.0000E+00
15	154	92235.40c 3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
		92238.40c 1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
		7014.40c 4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
16	149	1001.00c 3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00	0.0000E+00

1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00	0.0000E+00
8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00	0.0000E+00
17 144	74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00 0.0000E+00
18 159	41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00 0.0000E+00
	40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00 0.0000E+00
19 141	1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00 0.0000E+00
	1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00 0.0000E+00
	8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00 0.0000E+00
total		22764	1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03

total over all cells for each nuclide	collisions	total * weight	collisions to capture	weight lost to fission	weight loss by (n,xn)	weight gain
1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00	
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04	
5011.40c	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00	
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00	
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00	
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00	
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00	
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00	
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00	
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04	
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03	
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00	

the initial fission neutron source distribution used the 8 source points that were input on the ksre card.

the criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.
the problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.
individual and average keff estimator results by cycle

keff	neutron	keff estimators by cycle	average keff estimators and deviations	average k(c/a/t)
cycle	histories	k(coll) k(abs) k(track)	k(coll) st dev k(abs) st dev k(track) st dev	k(c/a/t) st dev fom

1	200	1.25311 1.26302 1.22009
2	257	1.21200 1.25252 1.12957
3	195	1.20026 1.14326 1.13006
4	193	1.12953 1.16269 1.10757
5	182	1.13599 1.12465 1.11238

begin active keff cycles
6 222 | 1.07701 1.04669 1.07528 |

tally 4 nps = 1249

+ fuel rod flux in 5 y locations averaged over 5 x elements

tally type 4 track length estimate of particle flux. units 1/cm**2

tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])
cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])
cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])
cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])
cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

```

energy: 1.0000E-02 1.0000E-01 1.0000E+00 1.0000E+01 total
cell
a 0.00000E+00 0.0000 2.84017E-05 0.9975 1.86420E-04 0.4656 1.36846E-04 0.5743 3.51668E-04 0.3877
b 1.07442E-05 0.9975 1.58576E-04 0.5120 2.32928E-04 0.3945 4.44462E-05 0.5872 4.46694E-04 0.2855
c 2.16778E-05 0.7232 9.40943E-05 0.5519 5.37835E-05 0.5876 1.51034E-04 0.7075 3.20589E-04 0.3937
d 1.47903E-05 0.5831 0.00000E+00 0.0000 1.15515E-04 0.5838 1.69653E-04 0.5071 2.99958E-04 0.3718
e 8.04943E-06 0.9975 0.00000E+00 0.0000 0.00000E+00 0.0000 6.81909E-05 0.7477 7.62403E-05 0.6763

```

analysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

```

normed average tally per history = 3.51668E-04      unnormed average tally per history = 3.68228E-02
estimated tally relative error = 0.3877      estimated variance of the variance = 0.1752
relative error from zero tallies = 0.3464      relative error from nonzero scores = 0.1740

number of nonzero history tallies = 8      efficiency for the nonzero tallies = 0.0400
history number of largest tally = 1034      largest unnormalized history tally = 1.41575E+00
(largest tally)/(average tally) = 3.84476E+01      (largest tally)/(avg nonzero tally) = 1.53791E+00

(confidence interval shift)/mean = 0.0793      shifted confidence interval center = 3.79539E-04

```

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	3.51668E-04	4.10723E-04	0.167927
relative error	3.87653E-01	3.61597E-01	-0.067213
variance of the variance	1.75161E-01	1.47665E-01	-0.156976
shifted center	3.79539E-04	3.77169E-04	-0.006244
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

tfc bin	--mean--	-----relative error-----	---variance of the variance---	--figure of merit--	pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope
desired	random	<0.10 yes	1/sqrt(nps)	<0.10 yes	1/nps
observed	random	0.39 yes	yes	0.18 yes	yes
passed?	yes	no yes	yes	no yes	yes

warning. the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.
unnormalized tally density for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 161

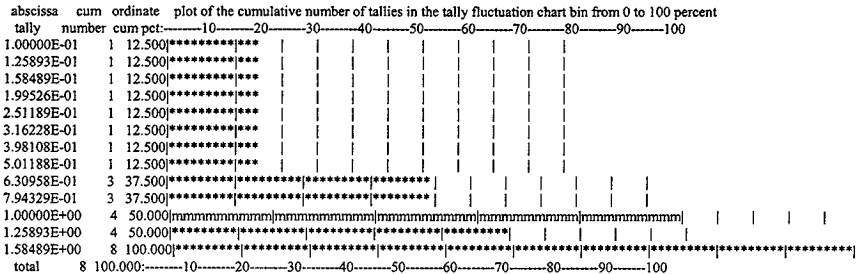
```

abscissa      ordinate      log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)
tally number num den log den:d-----d-----
1.00-01      1 2.43-01 -0.614 *****
1.26-01      0 0.00+00 0.000
1.58-01      0 0.00+00 0.000
2.00-01      0 0.00+00 0.000
2.50-01      0 0.00+00 0.000
3.16-01      0 0.00+00 0.000
3.98-01      0 0.00+00 0.000

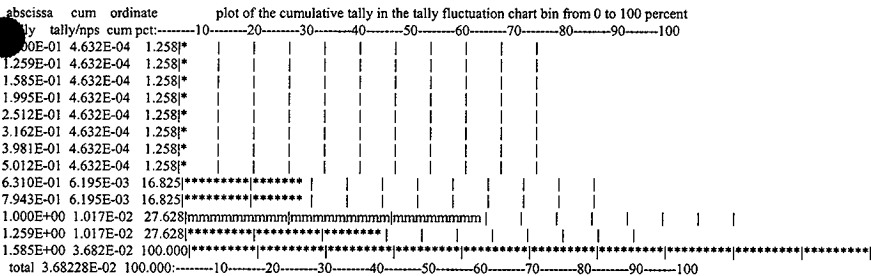
```

3.98-01	0 0.00+00	0.000	
1-01	0 0.00+00	0.000	
7-01	2 7.71-02	-1.113	
7.94-01	0 0.00+00	0.000	
1.00+00	1 2.43-02	-1.614 m	
1.26+00	0 0.00+00	0.000	
1.58+00	4 6.14-02	-1.212	
total	8 4.00-02	d	

cumulative tally number for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162



```
cumulative unnormed tally for tally 4      nonzero tally mean(m) = 9.206E-01  nps = 1249  print table 162
```



1status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

4 missed 3 of 10 tlc bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies
missed all bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks

warning.	1 of the	1 tally had bins with relative errors greater than recommended.
----------	----------	---

Itally fluctuation charts

tally 4

```

1000 0.0000E+00 0.0000 0.0000 0.0
1249 3.5167E-04 0.3877 0.1752 0.0
y data written to file inp18m
ascii file inp18p written with 5 events from 5 histories.

```

6 warning messages so far.

run terminated when 6 kcode cycles were done.

File: Outp18

```

1-  prob18 -- kcode in a hexagonal prism lattice.
2-  c  three half control rods and five whole control rods.
3-  30  0 -905 -19 29 1 fill=1
4-  31  0 -906 -19 29 1 fill=1 (16.7113 0 0)
5-  37  0 -907 -19 29 1 fill=1 (-16.7113 0 0)
6-  34  0 -913 -19 29 fill=1 (0 11.9185 0)
7-  32  0 -914 -19 29 fill=1 (10.3217 5.9592 0)
8-  33  0 -915 -19 29 fill=1 (8.3557 14.4724 0)
9-  35  0 -916 -19 29 fill=1 (-8.3557 14.4724 0)
10- 36  0 -917 -19 29 fill=1 (-10.3217 5.9592 0)
11-  c  universe 1: structure of control rod.
12-  38  11 -2.02 -880 u=1 $ control rod core
13-  39  6 -8.4 880 -881 u=1 $ control rod cladding
14-  40  12 -1.00 881 -882 u=1 $ control rod gap
15-  41  6 -8.4 882 u=1 $ control rod sheath
16-  c  the space between the control rods, filled with lattice.
17-  140 0 -17 1 29 -19 905 906 907 913 914 915 916 917 fill=2
18-  c  universe 2: lattice of fuel rods with water in between.
19-  42  12 -1.00 -301 302 -303 304 -305 306 u=2 lat=2 fill=
20-  -37:27 -1:33 0 0 &
21-  2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22-  2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23-  2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24-  2 3r 3 57r 2 2r &
25-  2 2r 3 58r 2 2r
26-  2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27-  2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28-  2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29-  2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30-  2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31-  2 1r 3 54r 2 7r &
32-  c  can code remember & thru comment?
33-  2 3 55r 2 7r
34-  2 3 25r 2 2r 3 25r 2 8r
35-  2 3 24r 2 3r 3 24r 2 9r
36-  2 3 23r 2 4r 3 23r 2 10r
37-  2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38-  2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39-  2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40-  2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41-  2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42-  2 3 46r 2 16r
43-  2 3 45r 2 17r
44-  2 3 44r 2 18r
45-  2 1r 3 41r 2 20r
46-  2 1r 3 40r 2 21r
47-  2 1r 3 39r 2 22r
48-  2 2r 3 36r 2 24r
49-  2 2r 3 35r 2 25r
50-  2 3r 3 32r 2 27r
51-  2 4r 3 29r 2 29r
52-  2 5r 3 26r 2 31r
53-  2 6r 3 23r 2 33r
54-  2 8r 3 18r 2 36r
55-  2 11r 3 11r 2 40r

```

```

26-      2 64r
c universe 3: structure of fuel rod lattice elements.
58- 154 2 -13.75   -58 u=3 $ fuel element
59- 149 12 -1.00  58 -268 u=3 $ gap
60- 144 7 -19.66 268 -478 u=3 $ liner
61- 159 6 -8.4   478 -698 u=3 $ cladding
62- 141 12 -1.00 698   u=3 $ water between the fuel rods
63- 162 0 17:-29:19:-1 $ outside world
64-
65- *1 py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0 11.9185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- mt12 hwtr.01 lwtr.01
98- kcode 200 1 5 6
warning. tallies are normed per fission neutron for one generation.
99- ksrc 3 2 2 2 3 2 -3 2 2 2 2 3 2 4 3 2 -4 3 2 4 3 1 -4 3 2
100- e .01 1 1. 10.
101- fq f e
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<-(42[-10:-6 -1 0])) $ average 5 x elements at j=1
104- (154<-(42[-10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<-(42[-10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<-(42[-10:-6 21 0])) $ average 5 x elements at j=21
107- (154<-(42[-10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdmp 2j -1
111- ptrac buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points      8
points not in any cell        0
points in cells of zero importance 0
points in void cells          0
points in ambiguous cells      0
points rejected                0
points remaining               8
points after expansion or contraction 200

```

```

terminal source size          200
initial guess for k(eff.)     1.000000

cycles to skip before tallying      5

number of keff cycles that can be stored      201

total fission nubar data are being used.
1 tally 4                                print table 30
+      fuel rod flux in 5 y locations averaged over 5 x elements
      tally type 4 track length estimate of particle flux.
      tally for neutrons

order of printing: f e
cells (154<(42[-10:-6 -1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6
29 0]))

energy bins
0.00000E+00 to 1.00000E-02 mev
1.00000E-02 to 1.00000E-01 mev
1.00000E-01 to 1.00000E+00 mev
1.00000E+00 to 1.00000E+01 mev
total bin
1 material composition                                print table 40

the sum of the fractions of material 2 was 9.999900E-01

the sum of the fractions of material 7 was 7.400000E-01

the sum of the fractions of material 12 was 3.000000E+00

material
number component nuclide, atom fraction
2 92235, 0.37504 92238, 0.12499 7014, 0.49997
6 41093, 0.98982 40000, 0.01018
7 74000, 1.00000
11 5010, 0.71977 5011, 0.08004 6012, 0.20019
12 1001, 0.33333 1002, 0.33333 8016, 0.33333
associated thermal s(a,b) data sets: hwtr.01t lwtr.01t

```

```

material
number component nuclide, mass fraction
2 92235, 0.70574 92238, 0.23821 7014, 0.05605
6 41093, 0.99000 40000, 0.01000
7 74000, 1.00000
11 5010, 0.68700 5011, 0.08400 6012, 0.22900
12 1001, 0.05300 1002, 0.10591 8016, 0.84109

```

```

warning. 3 of the materials had unnormalized fractions.
1 cell volumes and masses                                print table 50

```

cell	atom density	gram density	input volume	calculated volume	mass	reason	volume pieces	not calculated
1	30	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
2	31	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
3	37	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
4	34	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
5	32	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
6	33	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	

```

7 35 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
36 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
38 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
10 39 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
11 40 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
12 41 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
13 140 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
14 42 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
16 149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
17 144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
1surface areas print table 50

```

surface	input area	calculated area	reason area not calculated
---------	------------	-----------------	----------------------------

```

1 1 0.00000E+00 0.00000E+00 asymmetric
2 17 0.00000E+00 0.00000E+00 asymmetric
3 19 0.00000E+00 0.00000E+00 asymmetric
4 29 0.00000E+00 0.00000E+00 asymmetric
5 58 0.00000E+00 0.00000E+00 infinite
6 268 0.00000E+00 0.00000E+00 infinite
7 478 0.00000E+00 0.00000E+00 infinite
8 698 0.00000E+00 0.00000E+00 infinite
9 880 0.00000E+00 0.00000E+00 infinite
10 881 0.00000E+00 0.00000E+00 infinite
11 882 0.00000E+00 0.00000E+00 infinite
12 905 0.00000E+00 0.00000E+00 asymmetric
13 906 0.00000E+00 0.00000E+00 asymmetric
14 907 0.00000E+00 0.00000E+00 asymmetric
15 913 0.00000E+00 8.40057E+02
16 914 0.00000E+00 8.40057E+02
17 915 0.00000E+00 8.40057E+02
18 916 0.00000E+00 8.40057E+02
19 917 0.00000E+00 8.40057E+02
20 301 0.00000E+00 0.00000E+00 infinite
21 302 0.00000E+00 0.00000E+00 infinite
22 303 0.00000E+00 0.00000E+00 infinite
23 304 0.00000E+00 0.00000E+00
24 305 0.00000E+00 0.00000E+00
25 306 0.00000E+00 0.00000E+00

```

1cells print table 60

cell	atom mat	gram density	volume	neutron mass	pieces importance
------	----------	--------------	--------	--------------	-------------------

```

1 30 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
2 31 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
3 37 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
4 34 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
5 32 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
6 33 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
7 35 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
8 36 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
9 38 11 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
10 39 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
11 40 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
12 41 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
13 140 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
14 42 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
15 154 2 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
16 149 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
17 144 7 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
18 159 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00

```


19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
 0 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

total 4.42185E+03 0.00000E+00

1surfaces

print table 70

surface trans type surface coefficients

1	1	refl.	py	0.0000000E+00			
2	17		cz	2.9135000E+01			
3	19		pz	3.1750000E+01			
4	29		pz	-3.1750000E+01			
5	58		c/z	3.4414000E+00	8.5150000E-01	3.2400000E-01	
6	268		c/z	3.4414000E+00	8.5150000E-01	3.3450000E-01	
7	478		c/z	3.4414000E+00	8.5150000E-01	3.4750000E-01	
8	698		c/z	3.4414000E+00	8.5150000E-01	4.3180000E-01	
9	880		cz	1.7251000E+00			
10	881		cz	1.8051000E+00			
11	882		cz	1.9051000E+00			
12	905		cz	2.1055000E+00			
13	906		c/z	1.6711300E+01	0.0000000E+00	2.1055000E+00	
14	907		c/z	-1.6711300E+01	0.0000000E+00	2.1055000E+00	
15	913		c/z	0.0000000E+00	1.1918500E+01	2.1055000E+00	
16	914		c/z	1.0321700E+01	5.9592000E+00	2.1055000E+00	
17	915		c/z	8.3557000E+00	1.4472400E+01	2.1055000E+00	
18	916		c/z	-8.3557000E+00	1.4472400E+01	2.1055000E+00	
19	917		c/z	-1.0321700E+01	5.9592000E+00	2.1055000E+00	
20	301		px	3.9330000E+00			
21	302		px	2.9498000E+00			
22	303		p	1.0000000E+00	1.7320508E+00	0.0000000E+00	5.8994000E+00
23	304		p	1.0000000E+00	1.7320508E+00	0.0000000E+00	3.9330000E+00
24	305		p	-1.0000000E+00	1.7320508E+00	0.0000000E+00	-9.8340000E-01
25	306		p	-1.0000000E+00	1.7320508E+00	0.0000000E+00	-2.9498000E+00

cell temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

1cross-section tables

print table 100

table length

tables from file testlib1

1001.00c	1782	1-h-1 from endf-vi.1	mat 125	05/26/93	
1002.55c	4102	njoy	(120)	04/26/82	
5011.40c	3229	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	4858	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
7014.40c	8535	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5358	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	93372	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
41093.40c	42746	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900208
74000.40c	91244	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900208
92235.40c	34772	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503
92238.40c	40834	ENDL library name: nd901118 MCNP translation:	9total nu 56:49		901119
5010.03d	3682	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
hwtr.01t	10193	deuterium in heavy water at 300 degrees kelvin	1002	0 010/22/85	
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin	1001	0 010/22/85	

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

force distribution written to file inp18s cycle = 0

3 warning messages so far.

1 starting merun. field length = 0 cp0 = 0.00

print table 110

prob18 -- kcode in a hexagonal prism lattice.

nps	x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.085E-01	4.733E-01	7.193E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.5085E-01	4.733E-01	7.193E-01		
2	3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		8.952E-01	-4.447E-01	-2.944E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0.8952E-01	-4.447E-01	-2.944E-02		
3	3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.184E-01	-4.495E-01	6.446E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6184E-01	-4.495E-01	6.446E-01		
4	3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		9.710E-01	-5.665E-02	-2.323E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.9710E-01	-5.665E-02	-2.323E-01		
5	3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.861E-01	1.496E-01	-7.963E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.5861E-01	1.496E-01	-7.963E-01		
6	3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.489E-02	-1.626E-01	9.845E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6489E-02	-1.626E-01	9.845E-01		
7	3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-7.068E-02	3.263E-02	-9.970E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.7068E-02	3.263E-02	-9.970E-01		
8	3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-3.915E-01	4.664E-01	-7.932E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.3915E-01	4.664E-01	-7.932E-01		
9	3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.368E-01	9.215E-01	-3.079E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.2368E-01	9.215E-01	-3.079E-01		
10	3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.946E-01	-3.204E-01	9.271E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.1946E-01	-3.204E-01	9.271E-01		
11	3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.698E-01	-7.177E-01	-1.905E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6698E-01	-7.177E-01	-1.905E-01		
12	3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-8.398E-01	-4.129E-01	3.524E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.8398E-01	-4.129E-01	3.524E-01		
13	3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.714E-01	-8.572E-01	4.857E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.1714E-01	-8.572E-01	4.857E-01		
14	3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.489E-01	-5.118E-01	-8.222E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.2489E-01	-5.118E-01	-8.222E-01		
15	3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.959E-01	2.119E-01	9.314E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.2959E-01	2.119E-01	9.314E-01		
16	3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.395E-01	-9.829E-01	1.202E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.1395E-01	-9.829E-01	1.202E-01		
17	3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		6.909E-01	-7.110E-01	1.307E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6909E-01	-7.110E-01	1.307E-01		
18	3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.580E-01	5.320E-01	-5.329E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6580E-01	5.320E-01	-5.329E-01		
	3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00

3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.903E-01 -1.380E-01 1.353E-02
 3.492E+00 1.051E+00 2.000E-01 154 -9.903E-01 -1.380E-01 1.353E-02
 3.000E+00 2.000E-01 2.000E-01 140 7.462E-01 4.859E-01 -4.551E-01 1.000E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 7.462E-01 4.859E-01 -4.551E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 7.462E-01 4.859E-01 -4.551E-01
 21 3.000E+00 2.000E-01 2.000E-01 140 -1.977E-01 9.797E-01 3.360E-02 3.990E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -1.977E-01 9.797E-01 3.360E-02
 3.492E+00 1.051E+00 2.000E-01 154 0 -1.977E-01 9.797E-01 3.360E-02
 22 3.000E+00 2.000E-01 2.000E-01 140 -9.117E-01 -3.647E-01 -1.891E-01 2.665E-01 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
 23 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
 24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
 25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
 26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
 27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
 28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
 29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
 3.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
 31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
 32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
 33 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
 34 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
 35 2.000E-01 3.000E+00 2.000E-01 140 -0.408E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -0.408E-02 8.831E-01 4.675E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -0.408E-02 8.831E-01 4.675E-01
 36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
 37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
 38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
 39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
 40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
 2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01

```

3.641E+00 4.456E-01 2.000E-01 141      0 -3.212E-01 -7.678E-01 -5.543E-01
3.000E-01 3.000E+00 2.000E-01 140      5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.039E-01 -1.460E-01 8.513E-01
43 2.000E-01 3.000E+00 2.000E-01 140      6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
3.641E+00 4.456E-01 2.000E-01 141      0 6.080E-01 5.487E-01 5.738E-01
44 2.000E-01 3.000E+00 2.000E-01 140      -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -2.932E-01 9.304E-01 -2.199E-01
45 2.000E-01 3.000E+00 2.000E-01 140      -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140      1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141      0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140      7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141      0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140      4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141      0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140      5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140      -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -1.053E-01 -9.805E-01 1.658E-01

```

Estimated keff results by cycle

print table 175

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257

cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195

cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193

cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

source distribution written to file inp18s cycle = 6

!problem summary

run terminated when 6 kcode cycles were done.

```

0
neutron creation      tracks   weight   energy      neutron loss      tracks   weight   energy
      (per source particle)
source      1249  9.6077E-01  1.8661E+00  escape      220  1.2268E-01  1.2054E-01
              energy cutoff      0  0.
              time cutoff      0  0.
weight window      0  0.  0.  weight window      0  0.  0.
cell importance      0  0.  0.  cell importance      0  0.  0.
weight cutoff      0  1.3743E-01  3.8498E-03  weight cutoff      1034  1.2791E-01  5.1920E-03
energy importance      0  0.  0.  energy importance      0  0.  0.
dxtran      0  0.  0.  dxtran      0  0.  0.
forced collisions      0  0.  0.  forced collisions      0  0.  0.
exp. transform      0  0.  0.  exp. transform      0  0.  0.
upscattering      0  0.  5.3884E-11  downscattering      0  0.  1.3605E+00
              capture      0  3.9980E-01  1.1590E-01
(xn)      10  6.1640E-03  6.1355E-03  loss to (n,xn)      5  3.0820E-03  2.4027E-02
ion      0  0.  0.  loss to fission      0  4.5089E-01  2.4987E-01
total      1259  1.1044E+00  1.8761E+00  total      1259  1.1044E+00  1.8761E+00

```

number of neutrons banked	5	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0080E+00	escape	3.7027E+00 tco 1.0000E+34
neutron collisions per source particle	1.8226E+01	capture	1.2954E+01 eco 0.0000E+00
total neutron collisions	22764	capture or escape	1.1788E+01 wcl -5.0000E-01
net multiplication	1.0032E+00 0.0035	any termination	1.2744E+01 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	500880	most random numbers used was	1298 in history 14

range of sampled source weights = 7.7821E-01 to 1.0989E+00

In neutron activity in each cell

print table 126

cell	entering	population	collisions	collisions	number	flux	average	average
			* weight	weighted	weighted	weighted	track weight	track mfp
			(per history)	energy	energy	(relative)	(cm)	
1	30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01 2.6324E+00
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01 2.6947E+00
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01 2.5146E+00
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01 2.6940E+00
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01 2.5091E+00
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01 2.4712E+00
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01 2.5408E+00
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6971E-01 2.2391E+00
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01 2.7541E+00
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01 2.5056E+00
total	266059	9765	22764	1.1324E+01				

In neutron weight balance in each cell -- external events

print table 130

cell	entering	source	energy	time	exiting	total
		cutoff	cutoff			
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	4.8822E-01	0.0000E+00	0.0000E+00	-3.3091E-01	1.5731E-01
10	39	8.4996E-01	0.0000E+00	0.0000E+00	-8.4933E-01	6.2750E-04
11	40	8.9904E-01	0.0000E+00	0.0000E+00	-8.9904E-01	3.9460E-06
12	41	9.7260E-01	0.0000E+00	0.0000E+00	-9.6978E-01	2.8204E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.0907E+00	0.0000E+00	0.0000E+00	-1.0913E+00	-5.9111E-04
15	154	1.2943E+01	8.4067E-01	0.0000E+00	0.0000E+00	6.1278E-01
16	149	2.6508E+01	0.0000E+00	0.0000E+00	0.0000E+00	3.5884E-05
17	144	2.7419E+01	0.0000E+00	0.0000E+00	-2.7405E+01	1.4572E-02
18	159	3.1331E+01	8.0064E-02	0.0000E+00	-3.1361E+01	5.0067E-02
19	141	3.9111E+01	4.0032E-02	0.0000E+00	-3.9150E+01	4.5860E-04
total	1.4161E+02	9.6077E-01	0.0000E+00	0.0000E+00	-1.4174E+02	8.3809E-01

In neutron weight balance in each cell -- variance reduction events

print table 130

	cell	weight	cell	weight	energy	dxtran	forced	exponential	total
	window	importance	importance	cutoff	importance		collision	transform	
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	1.2447E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.2447E-03
10	39	0.0000E+00	0.0000E+00	2.0097E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.0097E-04
11	40	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	41	0.0000E+00	0.0000E+00	2.9100E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.9100E-04
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	154	0.0000E+00	0.0000E+00	8.0354E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	8.0354E-03
16	149	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	144	0.0000E+00	0.0000E+00	-3.0848E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-3.0848E-06
18	159	0.0000E+00	0.0000E+00	-2.5216E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-2.5216E-04
19	141	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03
 Neutron weight balance in each cell -- physical events print table 130

	cell	(n,xn)	fission	capture	loss to	loss to	total
				(n,xn)	fission		
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	0.0000E+00	-1.5855E-01
10	39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	0.0000E+00	-8.2847E-04
11	40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	0.0000E+00	-3.9460E-06
12	41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	0.0000E+00	-3.1114E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	0.0000E+00	5.9111E-04
15	154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-03	-4.5089E-01	-6.2082E-01
16	149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	0.0000E+00	-3.5884E-05
17	144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	0.0000E+00	-1.4569E-02
18	159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	0.0000E+00	-4.9815E-02
19	141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	0.0000E+00	-4.5860E-04

total 6.1640E-03 0.0000E+00 -3.9980E-01 -3.0820E-03 -4.5089E-01 -8.4760E-01
 Neutron activity of each nuclide in each cell, per source particle print table 140

	cell	nuclides	atom	total	collisions	weight lost	weight loss	weight gain
					* weight	to capture	to fission	by (n,xn)
9	38	5010.03d	7.1977E-01		941	4.4212E-01	1.5853E-01	0.0000E+00
		5011.40c	8.0041E-02		76	3.6073E-02	1.3591E-07	0.0000E+00
		6012.40c	2.0019E-01		232	1.1297E-01	1.8446E-05	0.0000E+00
10	39	41093.40c	9.8982E-01		128	6.2802E-02	8.2814E-04	0.0000E+00
		40000.40c	1.0183E-02		2	9.7676E-04	3.3160E-07	0.0000E+00
11	40	1001.00c	3.3333E-01		111	5.1533E-02	3.9251E-06	0.0000E+00
		1002.55c	3.3333E-01		33	1.5373E-02	2.0884E-08	0.0000E+00
		8016.40c	3.3333E-01		40	2.1271E-02	0.0000E+00	0.0000E+00
41	41093.40c	9.8982E-01			313	1.5623E-01	3.1072E-03	0.0000E+00

40000.40c	1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00
42	1001.00c	3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00
	1002.55c	3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00
	8016.40c	3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00
15	92235.40c	3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01
	92238.40c	1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03
	7014.40c	4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00
16	1001.00c	3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00
	1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00
	8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00
17	74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00
18	41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00
	40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00
19	1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00
	1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00
	8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00
total		22764	1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03

total over all cells for each nuclide	total collisions	weight lost	weight loss	weight gain
collisions	* weight	to capture	to fission	by (n,xn)

1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04
5011.40c	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00

the initial fission neutron source distribution used the 8 source points that were input on the ksrc card.
the criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.
this problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.
1 individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle	average keff estimators and deviations	average k(c/a/t)
		k(coll) k(abs) k(track)	k(coll) st dev k(abs) st dev k(track) st dev	k(c/a/t) st dev fom
1	200	1.25311 1.26302 1.22009		
2	257	1.21200 1.25252 1.12957		
3	195	1.20026 1.14326 1.13006		
4	193	1.12953 1.16269 1.10757		
5	182	1.13599 1.12465 1.11238		
----- begin active keff cycles -----				
6	222	1.07701 1.04669 1.07528		
Italy 4	nps =	1249		

fuel rod flux in 5 y locations averaged over 5 x elements
tally type 4 track length estimate of particle flux. units 1/cm**2

tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])

cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])

cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])

cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])

cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

energy:	1.0000E-02	1.0000E-01	1.0000E+00	1.0000E+01	total
cell					
a	0.0000E+00 0.0000	2.84017E-05 0.9975	1.86420E-04 0.4656	1.36846E-04 0.5743	3.51668E-04 0.3877
b	1.07442E-05 0.9975	1.58576E-04 0.5120	2.32928E-04 0.3945	4.44462E-05 0.5872	4.46694E-04 0.2855
c	2.16778E-05 0.7232	9.40943E-05 0.5519	5.37835E-05 0.5876	1.51034E-04 0.7075	3.20589E-04 0.3937
d	1.47903E-05 0.5831	0.00000E+00 0.0000	1.15515E-04 0.5838	1.69653E-04 0.5071	2.99958E-04 0.3718
e	8.04943E-06 0.9975	0.00000E+00 0.0000	0.00000E+00 0.0000	6.81909E-05 0.7477	7.62403E-05 0.6763

analysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

normed average tally per history = 3.51668E-04	unnormed average tally per history = 3.68228E-02
estimated tally relative error = 0.3877	estimated variance of the variance = 0.1752
relative error from zero tallies = 0.3464	relative error from nonzero scores = 0.1740

number of nonzero history tallies = 8	efficiency for the nonzero tallies = 0.0400
history number of largest tally = 1034	largest unnormalized history tally = 1.41575E+00
(largest tally)/(average tally) = 3.84476E+01	(largest tally)/(avg nonzero tally) = 1.53791E+00

(confidence interval shift)/mean = 0.0793	shifted confidence interval center = 3.79539E-04
---	--

the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
 = 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	3.51668E-04	4.10723E-04	0.167927
relative error	3.87653E-01	3.61597E-01	-0.067213
variance of the variance	1.75161E-01	1.47665E-01	-0.156976
shifted center	3.79539E-04	3.77169E-04	-0.006244
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
 the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

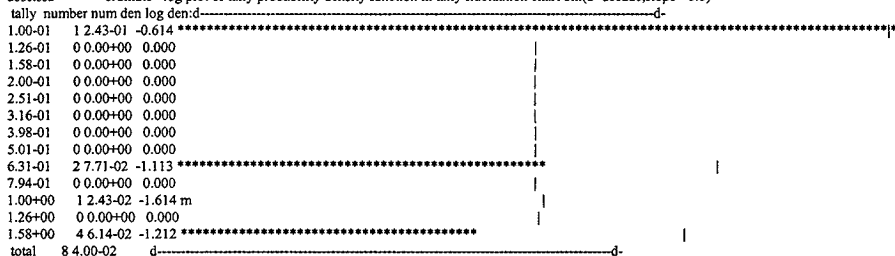
results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

tfc bin	-mean-	-----relative error-----	----variance of the variance----	-figure of merit-	-pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior slope	
desired	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant	random >3.00
observed	random	0.39 yes yes	0.18 yes yes		0.00
passed?	yes	no yes yes	no yes yes		no

warning, the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.

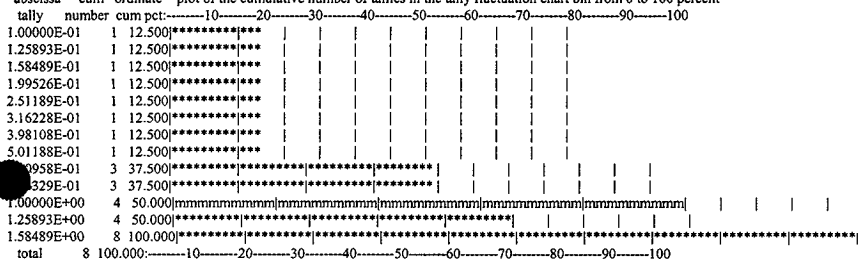
normed tally density for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope=0.0)



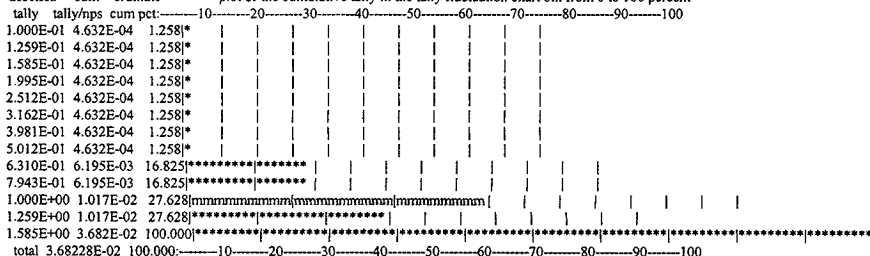
cumulative tally number for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162

abscissa cum ordinate plot of the cumulative number of tallies in the tally fluctuation chart bin from 0 to 100 percent



cumulative unnormed tally for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162

abscissa cum ordinate plot of the cumulative tally in the tally fluctuation chart bin from 0 to 100 percent



status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the t/c bin (the first check not passed is listed) and error magnitude check for all bins

- 4 missed 3 of 10 t/c bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies
missed all bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins. HNF-SD-SNF-CSWD-005, Rev. 0

tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 4

nps mean error vov slope fom

1000 0.0000E+00 0.0000 0.0000 0.0

1249 3.5167E-04 0.3877 0.1752 0.0

tally data written to file inp18m

ascii file inp18p written with 5 events from 5 histories.

6 warning messages so far.

run terminated when 6 kcode cycles were done.

File: Inp20o

1- prob20 - continuous energy electron version of problem prob19.

2- 1 1 -19.3 1 -2 3 -4 5 -6

3- 2 0 #1

4-

5- 1 z 0 2

+ plane

6- 2 pz .00635

7- 3 px -10

8- 4 x 10 0

+ plane

9- 5 y -10 3

+ plane

6 p 0 100 1 100 0 10 1

11-

12- m1 74184.1

13- sdef erg=1 sur=1 vec=0 0 1 par=3

14- imp:p,e 1 0

15- rmode p e

16- *f1:p 1 2

17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

18- *f11:e 1 2

19- tr9 0 0 0 1 0 0 0 10 0 0 0 1

warning. non-orthogonality of surface transformation 9 > 2.e-6

20- fq e f

21- f21:e 1 2

22- *f28:p 1

23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

25- f58:e 1

26- f6:p 1

27- f31:e 1 2

28- f31 elc 1

29- f41:e 1 2

30- f41 elc 2

31- f51:e 1 2

32- f51 elc 3

33- e8 1000 nt

34- *f8:p,e 1

35- nps 10000

36- ctme 30

37- prdmp 2j -1

38- cutp lj .1

cut:e lj .1

print 110 70

41-

Warning, tr 9 card unused.

Warning, 1 energy bins of tally 1 are below energy cutoff.

Warning, tally 8 needs zero energy bin for negative f8 scores.

1cells print table 60

		atom	gram	photon		electron	
cell	mat	density	density	volume	mass	pieces	importance
1	1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0 1.0000E+00 1.0000E+00
2	2	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 0.0000E+00 0.0000E+00

total 2.54000E+00 4.90220E+01
1surfaces print table 70

surface	trans	type	surface coefficients			
1	1	pz	0.0000000E+00			
2	2	pz	6.3500000E-03			
3	3	px	-1.0000000E+01			
4	4	px	1.0000000E+01			
5	5	py	-1.0000000E+01			
6	6	p	0.0000000E+00	1.0000000E-01	0.0000000E+00	1.0000000E+00

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

1cross-section tables print table 100

table length

tables from file testlib1

74000.02p 755 01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478 11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00 print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00

File: Outp20

```
prob20 - continuous energy electron version of problem prob19.
1 1 -19.3 1 -2.3 -4.5 -6
2 0 #1
3-
4-
5- 1 z 0.2
+
6- 2 pz .00635
7- 3 px -10
8- 4 x 10.0
+
9- 5 y -10.3
+
10- 6 p 0 10.0 1 10.0 0 10.1
11-
12- ml 74184.1
13- sdef erg=1 sur=1 vec=0 0 1 par=3
14- imp:p,e 1 0
15- mode p e
16- *f1:p 1 2
17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
18- *f11:e 1 2
19- tr9 0.00 1.00 0.10 0.00 0.00 1
```

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warning. non-orthogonality of surface transformation 9 > 2.e-6

```
20- f9:e f
21- f21:e 1 2
22- *f28:p 1
23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
25- f58:e 1
26- f6:p 1
27- f31:e 1 2
28- f31:elc 1
29- f41:e 1 2
30- f41:elc 2
31- f51:e 1 2
32- f51:elc 3
33- e8 1000 nt
34- *f8:p,e 1
35- nps 10000
36- ctme 30
37- prdmp 2j -1
38- cut:p lj .1
39- cut:e lj .1
40- print 110 70
41-
```

warning. tr 9 card unused.

warning. 1 energy bins of tally 1 are below energy cutoff.

warning. tally 8 needs zero energy bin for negative f8 scores.

1cells print table 60

	atom	gram		photon	electron	
cell	mat	density	density	volume	mass	pieces importance importance
1	1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01 0 1.0000E+00 1.0000E+00
2	2	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0.0000E+00 0.0000E+00

total 2.54000E+00 4.90220E+01

1surfaces print table 70

surface trans type surface coefficients

```

1 1 pz 0.0000000E+00
2 pz 6.3500000E-03
3 px -1.0000000E+01
4 px 1.0000000E+01
5 py -1.0000000E+01
6 p 0.0000000E+00 1.0000000E-01 0.0000000E+00 1.0000000E+00

```

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

1cross-section tables

print table 100

table length

tables from file testlib1

74000.02p 755

01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478

11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00

```

28 0.000E+00 0.000E+00 0.000E+00 1 1 8.706E-01 -3.198E-01 3.738E-01 1.000E+00 1.000E+00 0.000E+00
29 0.000E+00 0.000E+00 0.000E+00 1 1 -8.188E-01 2.059E-01 5.359E-01 1.000E+00 1.000E+00 0.000E+00
30 0.000E+00 0.000E+00 0.000E+00 1 1 5.727E-01 8.124E-01 1.100E-01 1.000E+00 1.000E+00 0.000E+00
31 0.000E+00 0.000E+00 0.000E+00 1 1 5.390E-02 5.914E-01 8.046E-01 1.000E+00 1.000E+00 0.000E+00
32 0.000E+00 0.000E+00 0.000E+00 1 1 -5.778E-01 5.375E-01 6.141E-01 1.000E+00 1.000E+00 0.000E+00
33 0.000E+00 0.000E+00 0.000E+00 1 1 -7.198E-01 -2.890E-01 6.311E-01 1.000E+00 1.000E+00 0.000E+00
34 0.000E+00 0.000E+00 0.000E+00 1 1 2.210E-01 2.482E-01 9.432E-01 1.000E+00 1.000E+00 0.000E+00
35 0.000E+00 0.000E+00 0.000E+00 1 1 4.339E-01 7.515E-02 8.978E-01 1.000E+00 1.000E+00 0.000E+00
36 0.000E+00 0.000E+00 0.000E+00 1 1 -4.263E-01 8.490E-01 3.123E-01 1.000E+00 1.000E+00 0.000E+00
37 0.000E+00 0.000E+00 0.000E+00 1 1 -3.933E-01 -9.179E-01 5.266E-02 1.000E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 1 -4.846E-01 4.378E-01 7.573E-01 1.000E+00 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 1 -5.950E-01 -5.730E-01 5.636E-01 1.000E+00 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 1 -7.252E-01 -5.143E-01 4.578E-01 1.000E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 1 -7.156E-01 4.734E-01 5.136E-01 1.000E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 1 -1.771E-01 9.229E-01 3.417E-01 1.000E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 1 -1.149E-01 -4.206E-01 8.999E-01 1.000E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 1 4.509E-01 8.630E-02 8.884E-01 1.000E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 1 -7.358E-01 2.500E-01 6.294E-01 1.000E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 1 -8.448E-01 3.645E-01 3.917E-01 1.000E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 1 1.958E-01 -2.769E-01 9.407E-01 1.000E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 1 2.788E-01 -7.325E-03 9.603E-01 1.000E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 1 -3.201E-01 4.174E-01 8.505E-01 1.000E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 1 8.960E-01 -1.641E-01 4.126E-01 1.000E+00 1.000E+00 0.000E+00

```

problem summary

run terminated when 10000 particle histories were done.

0

photon creation	tracks	weight	energy	photon loss	tracks	weight	energy
(per source particle)				(per source particle)			
source	0	0.	0.	escape energy cutoff time cutoff	575 0	5.7500E-02 0.	1.5476E-02
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtan	0	0.	0.	dxtan	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
from neutrons	0	0.	0.	compton scatter	0	0.	6.6993E-05
bremsstrahlung	694	6.9400E-02	1.7315E-02	capture	119	1.1900E-02	1.7720E-03
p-annihilation	0	0.	0.	pair production	0	0.	0.
electron x-rays	0	0.	0.				
1st fluorescence	0	0.	0.				
2nd fluorescence	0	0.	0.				
total	694	6.9400E-02	1.7315E-02	total	694	6.9400E-02	1.7315E-02

number of photons banked	694	average lifetime, shakes	cutoffs
photon tracks per source particle	6.9400E-02	escape 6.7786E-05	teo 1.0000E+34
photon collisions per source particle	1.3000E-02	capture 8.3325E-05	eco 1.0000E-01
total photon collisions	130	capture or escape 7.0450E-05	wc1 0.0000E+00
	any termination 7.0450E-05	wc2 0.0000E+00	

0

electron creation	tracks	weight	energy	electron loss	tracks	weight	energy
(per source particle)				(per source particle)			
source	10000	1.0000E+00	1.0000E+00	escape energy cutoff time cutoff	9464 2046 0	9.4640E-01 2.0460E-01 0.	7.1762E-01
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	0.	0.	weight cutoff	0	0.	0.
energy importance	0	0.	0.	energy importance	0	0.	0.
pair production	0	0.	0.	scattering	0	0.	2.6560E-01
compton recoil	2	2.0000E-04	3.7815E-05	bremsstrahlung	0	0.	2.4158E-02
photo-electric	29	2.9000E-03	4.7387E-04				

```

photon auger      0 0. 0.
electron auger    0 0. 0.
back-on          1479 1.4790E-01 2.7007E-02
total            11510 1.1510E+00 1.0275E+00      total      11510 1.1510E+00 1.0275E+00

```

```

number of electrons banked      1510      cutoffs
electron tracks per source particle 1.1510E+00      tco 1.0000E+34
electron sub-steps per source particle 7.7164E+01      eco 1.0000E-01
total electron sub-steps      771636      wc1 0.0000E+00
                                wc2 0.0000E+00

```

```

computer time so far in this run 0.00 minutes      maximum number ever in bank      4
computer time in mcrun          0.00 minutes      bank overflows to backup file      0
source particles per minute      0.0000E+00      field length      0
random numbers generated         4748878      most random numbers used was 4277 in history 7375

```

range of sampled source weights = 1.0000E+00 to 1.0000E+00

lphoton activity in each cell

print table 126

```

      tracks population collisions collisions number flux average average
      cell entering      * weight weighted weighted track weight track mfp
                        (per history) energy energy (relative) (cm)
1 1 0 694 130 1.3000E-02 2.8286E-01 2.8286E-01 1.0000E+00 1.6113E-01
total 0 694 130 1.3000E-02

```

lelectron activity in each cell

print table 126

```

      tracks population substeps substeps number flux average average
      cell entering      * weight weighted weighted track weight track mfp
                        (per history) energy energy (relative) (cm)
1 1 10000 11510 771636 7.7164E+01 7.4988E-01 7.6821E-01 1.0000E+00 2.5110E-04
total 10000 11510 771636 7.7164E+01

```

lally 1 nps = 10000

tally type 1* energy crossing a surface. units mev

tally for photons

```

surface: 1 2
energy
1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 1.20113E-03 0.1079 2.16688E-03 0.0814
2.8200E-01 8.17217E-04 0.1673 2.04350E-03 0.1062
3.7300E-01 9.52191E-04 0.1829 1.82060E-03 0.1357
4.6400E-01 1.03815E-03 0.2001 1.00234E-03 0.2043
5.5500E-01 5.66295E-04 0.3018 8.02842E-04 0.2503
6.4500E-01 6.09365E-04 0.3162 6.54966E-04 0.3016
7.3600E-01 3.45345E-04 0.4472 4.20131E-04 0.4085
8.2700E-01 7.79347E-05 0.9999 7.03770E-04 0.3334
9.1800E-01 1.70096E-04 0.7070 8.29418E-05 0.9999
1.1000E+00 0.00000E+00 0.0000 0.00000E+00 0.0000
total 5.77773E-03 0.0811 9.69798E-03 0.0608

```

lally 6 nps = 10000

tally type 6 track length estimate of heating. units mev/gram

tally for photons

masses

```

cell: 1
4.90220E+01

```

cell: 1

```

energy
1.0000E-01 0.00000E+00 0.0000
1.9100E-01 1.80395E-05 0.0935
2.8200E-01 4.79830E-06 0.1242
3.7300E-01 1.64870E-06 0.2061

```

4.6400E-01 1.76412E-06 0.4116
 5.5500E-01 6.34259E-07 0.4736
 6.4500E-01 2.47457E-07 0.3129
 7.3600E-01 2.58011E-07 0.6571
 8.2700E-01 1.16245E-07 0.3470
 9.1800E-01 4.46610E-08 0.6403
 1.1000E+00 0.00000E+00 0.0000
 total 2.75512E-05 0.0722

Itally 28 nps = 10000

tally type 8* energy deposition
 tally for photons electrons

units mev

cell: 1

energy

-1.0000E-03 -8.72550E-04 0.1508
 0.0000E+00 0.00000E+00 0.0000
 1.0000E-06 0.00000E+00 0.0000
 1.0000E-01 1.08193E-02 0.0227
 1.9100E-01 3.91016E-02 0.0170
 2.8200E-01 4.36100E-02 0.0210
 3.7300E-01 3.53763E-02 0.0286
 4.6400E-01 2.66881E-02 0.0382
 5.5500E-01 2.21833E-02 0.0468
 6.4500E-01 1.58947E-02 0.0606
 7.3600E-01 1.08330E-02 0.0790
 8.2700E-01 8.71177E-03 0.0940
 9.1800E-01 6.65495E-03 0.1136
 1.1000E+00 4.79000E-02 0.0446
 total 2.66900E-01 0.0090

Itally 11 nps = 10000

tally type 1* energy crossing a surface.
 tally for electrons

units mev

surface: 1 2

energy

1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
 1.9100E-01 1.08698E-03 0.1176 6.53601E-04 0.1495
 2.8200E-01 2.19643E-03 0.1039 1.83325E-03 0.1165
 3.7300E-01 3.60063E-03 0.0956 3.37231E-03 0.0988
 4.6400E-01 6.94424E-03 0.0774 6.18557E-03 0.0823
 5.5500E-01 1.32283E-02 0.0615 1.27247E-02 0.0628
 6.4500E-01 2.19441E-02 0.0516 1.93787E-02 0.0550
 7.3600E-01 3.87821E-02 0.0411 4.62743E-02 0.0374
 8.2700E-01 6.96113E-02 0.0321 9.53277E-02 0.0269
 9.1800E-01 1.17955E-01 0.0253 9.53443E-02 0.0284
 1.1000E+00 1.58764E-01 0.0225 2.41655E-03 0.1959
 total 4.34113E-01 0.0097 2.83511E-01 0.0130

Itally 21 nps = 10000

tally type 1 number of particles crossing a surface.
 tally for electrons

surface: 1 2

energy

1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
 1.9100E-01 7.70000E-03 0.1165 4.60000E-03 0.1471
 2.8200E-01 9.30000E-03 0.1032 7.60000E-03 0.1158
 3.7300E-01 1.09000E-02 0.0953 1.02000E-02 0.0985
 4.6400E-01 1.65000E-02 0.0772 1.46000E-02 0.0822
 5.5500E-01 2.58000E-02 0.0614 2.48000E-02 0.0627
 6.4500E-01 3.63000E-02 0.0515 3.21000E-02 0.0549
 7.3600E-01 5.59000E-02 0.0411 6.67000E-02 0.0374
 8.2700E-01 8.86000E-02 0.0321 1.21300E-01 0.0269
 9.1800E-01 1.34800E-01 0.0253 1.10600E-01 0.0284
 1.1000E+00 1.65500E-01 0.0225 2.60000E-03 0.1959
 total 5.51300E-01 0.0094 3.95100E-01 0.0126

Itally 31 nps = 10000

tally type 1 number of particles crossing a surface.

tally for electrons
this tally is modified by ft elc

surface:	1	2
energy		
1.0000E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.9100E-01	-7.70000E-03 0.1165	-4.60000E-03 0.1471
2.8200E-01	-9.30000E-03 0.1032	-7.60000E-03 0.1158
3.7300E-01	-1.09000E-02 0.0953	-1.02000E-02 0.0985
4.6400E-01	-1.65000E-02 0.0772	-1.46000E-02 0.0822
5.5500E-01	-2.58000E-02 0.0614	-2.48000E-02 0.0627
6.4500E-01	-3.63000E-02 0.0515	-3.21000E-02 0.0549
7.3600E-01	-5.59000E-02 0.0411	-6.67000E-02 0.0374
8.2700E-01	-8.86000E-02 0.0321	-1.21300E-01 0.0269
9.1800E-01	-1.34800E-01 0.0253	-1.10600E-01 0.0284
1.1000E+00	-1.65500E-01 0.0225	-2.60000E-03 0.1959
total	-5.51300E-01 0.0094	-3.95100E-01 0.0126

Italy 41 nps = 10000

tally type 1 number of particles crossing a surface.
tally for electrons
this tally is modified by ft elc

surface:	1	2
energy		
1.0000E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.9100E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
2.8200E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
3.7300E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
4.6400E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
5.5500E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
6.4500E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
7.3600E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
8.2700E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
9.1800E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.1000E+00	0.00000E+00 0.0000	0.00000E+00 0.0000
total	0.00000E+00 0.0000	0.00000E+00 0.0000

surface:	1	2
energy		
1.0000E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.9100E-01	7.70000E-03 0.1165	4.60000E-03 0.1471
2.8200E-01	9.30000E-03 0.1032	7.60000E-03 0.1158
3.7300E-01	1.09000E-02 0.0953	1.02000E-02 0.0985
4.6400E-01	1.65000E-02 0.0772	1.46000E-02 0.0822
5.5500E-01	2.58000E-02 0.0614	2.48000E-02 0.0627
6.4500E-01	3.63000E-02 0.0515	3.21000E-02 0.0549
7.3600E-01	5.59000E-02 0.0411	6.67000E-02 0.0374
8.2700E-01	8.86000E-02 0.0321	1.21300E-01 0.0269
9.1800E-01	1.34800E-01 0.0253	1.10600E-01 0.0284
1.1000E+00	1.65500E-01 0.0225	2.60000E-03 0.1959
total	5.51300E-01 0.0094	3.95100E-01 0.0126

surface:	1	2
energy		
1.0000E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.9100E-01	7.70000E-03 0.1165	4.60000E-03 0.1471
2.8200E-01	9.30000E-03 0.1032	7.60000E-03 0.1158
3.7300E-01	1.09000E-02 0.0953	1.02000E-02 0.0985
4.6400E-01	1.65000E-02 0.0772	1.46000E-02 0.0822
5.5500E-01	2.58000E-02 0.0614	2.48000E-02 0.0627
6.4500E-01	3.63000E-02 0.0515	3.21000E-02 0.0549
7.3600E-01	5.59000E-02 0.0411	6.67000E-02 0.0374
8.2700E-01	8.86000E-02 0.0321	1.21300E-01 0.0269
9.1800E-01	1.34800E-01 0.0253	1.10600E-01 0.0284
1.1000E+00	1.65500E-01 0.0225	2.60000E-03 0.1959
total	5.51300E-01 0.0094	3.95100E-01 0.0126

51 nps = 10000

tally type 1 number of particles crossing a surface.
 tally for electrons
 this tally is modified by ft elc

surface:	1	2
energy		
1.0000E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.9100E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
2.8200E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
3.7300E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
4.6400E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
5.5500E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
6.4500E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
7.3600E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
8.2700E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
9.1800E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.1000E+00	0.00000E+00 0.0000	0.00000E+00 0.0000
total	0.00000E+00 0.0000	0.00000E+00 0.0000

surface:	1	2
energy		
1.0000E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.9100E-01	-7.70000E-03 0.1165	-4.60000E-03 0.1471
2.8200E-01	-9.30000E-03 0.1032	-7.60000E-03 0.1158
3.7300E-01	-1.09000E-02 0.0953	-1.02000E-02 0.0985
4.6400E-01	-1.65000E-02 0.0772	-1.46000E-02 0.0822
5.5500E-01	-2.58000E-02 0.0614	-2.48000E-02 0.0627
6.4500E-01	-3.63000E-02 0.0515	-3.21000E-02 0.0549
7.3600E-01	-5.59000E-02 0.0411	-6.67000E-02 0.0374
8.2700E-01	-8.86000E-02 0.0321	-1.21300E-01 0.0269
9.1800E-01	-1.34800E-01 0.0253	-1.10600E-01 0.0284
1.1000E+00	-1.65500E-01 0.0225	-2.60000E-03 0.1959
total	-5.51300E-01 0.0094	-3.95100E-01 0.0126

surface:	1	2
energy		
1.0000E-01	0.00000E+00 0.0000	0.00000E+00 0.0000
1.9100E-01	-7.70000E-03 0.1165	-4.60000E-03 0.1471
2.8200E-01	-9.30000E-03 0.1032	-7.60000E-03 0.1158
3.7300E-01	-1.09000E-02 0.0953	-1.02000E-02 0.0985
4.6400E-01	-1.65000E-02 0.0772	-1.46000E-02 0.0822
5.5500E-01	-2.58000E-02 0.0614	-2.48000E-02 0.0627
6.4500E-01	-3.63000E-02 0.0515	-3.21000E-02 0.0549
7.3600E-01	-5.59000E-02 0.0411	-6.67000E-02 0.0374
8.2700E-01	-8.86000E-02 0.0321	-1.21300E-01 0.0269
9.1800E-01	-1.34800E-01 0.0253	-1.10600E-01 0.0284
1.1000E+00	-1.65500E-01 0.0225	-2.60000E-03 0.1959
total	-5.51300E-01 0.0094	-3.95100E-01 0.0126

Itally 58 nps = 10000

tally type 8 pulse height distribution. units number
 tally for photons electrons

cell:	1
energy	
-1.0000E-03	7.40000E-03 0.1158
0.0000E+00	0.00000E+00 0.0000
1.0000E-06	0.00000E+00 0.0000
1.0000E-01	2.12600E-01 0.0192
1.9100E-01	2.65500E-01 0.0166
2.8200E-01	1.87700E-01 0.0208
3.7300E-01	1.09500E-01 0.0285
4.6400E-01	6.44000E-02 0.0381
5.5500E-01	4.37000E-02 0.0468
6.4500E-01	2.66000E-02 0.0605
7.3600E-01	1.58000E-02 0.0789
8.2700E-01	1.12000E-02 0.0940
9.1800E-01	7.70000E-03 0.1135

1.1000E+00 4.79000E-02 0.0446

total 1.00000E+00 0.0000

y 8 nps = 10000

tally type 8* energy deposition

units mev

tally for photons electrons

cell: 1

energy

1.0000E+03 2.66900E-01 0.0090

1 status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

- 1 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 24 tally bins had 4 bins with zeros and 17 bins with relative errors exceeding 0.10
- 6 missed 1 of 10 tfc bin checks: the variance of the variance appears not to decrease as 1/nps for the last half of problem
missed all bin error check: 12 tally bins had 2 bins with zeros and 8 bins with relative errors exceeding 0.10
- 28 passed the 10 statistical checks for the tally fluctuation chart bin result
missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 11 missed 1 of 10 tfc bin checks: the slope of decrease of largest tallies is less than the minimum acceptable value of 3.0
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 21 missed 1 of 10 tfc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 31 missed 2 of 10 tfc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 41 missed 1 of 10 tfc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 51 missed 2 of 10 tfc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 58 passed the 10 statistical checks for the tally fluctuation chart bin result
missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 8 passed the 10 statistical checks for the tally fluctuation chart bin result
passed all bin error check: 1 tally bins all have relative errors less than 0.10 with no zero bins

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 7 of the 10 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 9 of the 10 tallies had bins with relative errors greater than recommended.

tally fluctuation charts

tally 1					tally 6					tally 28				
nps	mean	error	vov	slope fom	nps	mean	error	vov	slope fom	nps	mean	error	vov	slope fom
1000	6.7975E-03	0.2399	0.0835	0.0	2.0857E-05	0.1589	0.0525	0.0	2.6993E-01	0.0279	0.0044	10.0		
2000	5.5780E-03	0.1884	0.0641	0.0	2.4397E-05	0.1701	0.1693	0.0	2.6475E-01	0.0199	0.0022	10.0		
3000	5.8779E-03	0.1455	0.0373	0.0	2.6650E-05	0.1343	0.1060	0.0	2.6433E-01	0.0161	0.0015	10.0		
4000	5.7880E-03	0.1317	0.0311	0.0	2.7894E-05	0.1145	0.0656	0.0	2.6224E-01	0.0140	0.0011	10.0		
5000	5.9924E-03	0.1168	0.0239	0.0	2.7855E-05	0.1020	0.0485	0.0	2.6175E-01	0.0126	0.0009	10.0		
6000	5.9423E-03	0.1055	0.0195	0.0	2.7793E-05	0.0931	0.0418	0.0	2.6496E-01	0.0116	0.0007	10.0		
7000	5.9749E-03	0.0968	0.0170	0.0	2.8647E-05	0.0919	0.0581	0.0	2.6691E-01	0.0107	0.0006	10.0		
8000	5.7670E-03	0.0913	0.0154	0.0	2.8249E-05	0.0838	0.0524	10.0	2.6739E-01	0.0100	0.0005	10.0		
9000	5.7398E-03	0.0864	0.0135	0.0	2.7485E-05	0.0779	0.0491	10.0	2.6699E-01	0.0095	0.0005	10.0		
10000	5.7777E-03	0.0811	0.0120	0.0	2.7551E-05	0.0722	0.0436	10.0	2.6690E-01	0.0090	0.0004	10.0		

tally 11					tally 21					tally 31				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	4.4504E-01	0.0296	0.0002	2.1	5.6500E-01	0.0286	0.0004	4.4	-5.6500E-01	0.0286	0.0004	0.0		
2000	4.4489E-01	0.0211	0.0001	2.0	5.6500E-01	0.0204	0.0003	4.4	-5.6500E-01	0.0204	0.0003	0.0		
3000	4.4226E-01	0.0173	0.0001	1.8	5.6400E-01	0.0168	0.0002	10.0	-5.6400E-01	0.0168	0.0002	0.0		
4000	4.4011E-01	0.0151	0.0000	1.8	5.6100E-01	0.0147	0.0002	10.0	-5.6100E-01	0.0147	0.0002	0.0		
5000	4.4004E-01	0.0135	0.0000	1.9	5.5860E-01	0.0131	0.0001	10.0	-5.5860E-01	0.0131	0.0001	0.0		
6000	4.3549E-01	0.0125	0.0000	1.8	5.5433E-01	0.0121	0.0001	10.0	-5.5433E-01	0.0121	0.0001	0.0		
7000	4.3477E-01	0.0115	0.0000	1.9	5.5386E-01	0.0112	0.0001	10.0	-5.5386E-01	0.0112	0.0001	0.0		
8000	4.3339E-01	0.0108	0.0000	1.8	5.5238E-01	0.0105	0.0001	10.0	-5.5238E-01	0.0105	0.0001	0.0		
9000	4.3428E-01	0.0102	0.0000	1.7	5.5200E-01	0.0099	0.0001	10.0	-5.5200E-01	0.0099	0.0001	0.0		
10000	4.3411E-01	0.0097	0.0000	1.6	5.5130E-01	0.0094	0.0001	10.0	-5.5130E-01	0.0094	0.0001	0.0		

tally 41					tally 51					tally 58				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	5.6500E-01	0.0286	0.0004	4.4	-5.6500E-01	0.0286	0.0004	0.0	1.0000E+00	0.0000	0.0000	10.0		
2000	5.6500E-01	0.0204	0.0003	4.4	-5.6500E-01	0.0204	0.0003	0.0	1.0000E+00	0.0000	0.0000	10.0		
3000	5.6400E-01	0.0168	0.0002	10.0	-5.6400E-01	0.0168	0.0002	0.0	1.0000E+00	0.0000	0.0000	10.0		
4000	5.6100E-01	0.0147	0.0002	10.0	-5.6100E-01	0.0147	0.0002	0.0	1.0000E+00	0.0000	0.0000	10.0		
5000	5.5860E-01	0.0131	0.0001	10.0	-5.5860E-01	0.0131	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
6000	5.5433E-01	0.0121	0.0001	10.0	-5.5433E-01	0.0121	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
7000	5.5386E-01	0.0112	0.0001	10.0	-5.5386E-01	0.0112	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
8000	5.5238E-01	0.0105	0.0001	10.0	-5.5238E-01	0.0105	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
9000	5.5200E-01	0.0099	0.0001	10.0	-5.5200E-01	0.0099	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
10000	5.5130E-01	0.0094	0.0001	10.0	-5.5130E-01	0.0094	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		

tally 8

nps	mean	error	vov	slope fom
1000	2.6993E-01	0.0279	0.0044	10.0
2000	2.6475E-01	0.0199	0.0022	10.0
3000	2.6433E-01	0.0161	0.0015	10.0
4000	2.6224E-01	0.0140	0.0011	10.0
5000	2.6175E-01	0.0126	0.0009	10.0
6000	2.6496E-01	0.0116	0.0007	10.0
7000	2.6691E-01	0.0107	0.0006	10.0
8000	2.6739E-01	0.0100	0.0005	10.0
9000	2.6699E-01	0.0095	0.0005	10.0
10000	2.6690E-01	0.0090	0.0004	10.0

tally data written to file inp20m

6 warning messages so far.

run terminated when 10000 particle histories were done.

File: Inp24o

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1-10.182 -1 u=2
3- 2 2 -.001 1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14:15 u=3
7- 6 3 -6.55 14 -15 u=3
8- 7 4 -1.0 -4 +5 -6 +7 u=1 la=1 fill=-8:8 -8:8 0:0
9- 1 17r 2 14r 1 1 2 14r 1 1 2 2 3 2 2 3 2 2r 3 2 2
10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 2 14r 1 17r
17- 8 0-8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4

```

```

19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
29- 20 0 -28 -29;+21 -22;+25
30-
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250 7 2 4 4500 0
warning: tallies are normed per fission neutron for one generation.
64- ksrc 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- mt4 lwtr.01t
73- drxs
74- prdmp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2
76- sd6 1 4r
77-
total fission nubar data are being used.

warning: continuous-energy cross-section table used for 1001.00d
warning: continuous-energy cross-section table used for 5011.40d
warning: continuous-energy cross-section table used for 6012.40d

```

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells print table 60

		atom		gram		neutron		
cell	mat	density	density	volume	mass	pieces	importance	
1	1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
2	2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0	1.0000E+00
3	3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
4	4	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
5	5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
6	6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
7	7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
8	8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
9	9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
12	12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
13	13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
14	14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
15	15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 0.00000E+00 0.00000E+00

11 warning messages so far.

1cross-section tables print table 100

table length

tables from file testlib1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503
92238.40c	48310	ENDL library name: nd901118 MCNP translation:	9total nu 56:49		901119
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin	1001 0	010/22/85	

total 261165

warning. neutron energy cutoff is below some cross-section tables.

initial words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.
1 estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886		0.568374	0.0291	k(col/abs)	0.000000	0.000000	0.0000
k(absorption)	0.583788		0.591169	0.0125	k(abs/tk ln)	0.000000	0.000000	0.0000
k(tk length)	0.582547		0.568877	0.0240	k(tk ln/col)	0.000000	0.000000	0.0000
rem life(col)	3.9485E+03		3.8951E+03	0.0137				
rem life(abs)	4.0658E+03		3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000E+00	0.0000
source points generated	264							

source distribution written to file inp24s cycle = 4
1 problem summary

run terminated when 4 kcode cycles were done.

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)				(per source particle)		

source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
			energy cutoff	0	0.	0.	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtan	0	0.	0.	dxtan	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
			capture	0	8.1698E-01	1.8384E-02	
(n,xn)	8	6.9970E-03	3.6428E-03	loss to (n,xn)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03
total neutron collisions	57706	capture or escape	4.1766E+03
net multiplication	1.0033E+00	any termination	4.4650E+03
			wc1 -5.0000E-01
			wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	690539	most random numbers used was	3677 in history 21

range of sampled source weights = 9.8814E-01 to 1.1962E+00

neutron activity in each cell

print table 126

tracks	population	collisions	collisions	number	flux	average	average
cell entering		* weight	weighted	weighted	track weight	track mfp	
		(per history)	energy	energy	(relative)	(cm)	
1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01
2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01
3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01
							3.6368E+00

4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01	1.4858E+00
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01	1.3256E+00
6	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01	3.6398E+00
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01	1.7232E+00
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01	3.1777E+00
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01	1.0087E+00
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total		138515	6658	57706	4.4801E+01				

the initial fission neutron source distribution used the 1 source points that were input on the ksre card.
the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.
this problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

individual and average keff estimator results by cycle

keff	neutron	keff estimators by cycle			average keff estimators and deviations			average k(c/a/t)	
cycle	histories	k(coll)	k(abs)	k(track)	k(coll) st dev	k(abs) st dev	k(track) st dev	k(c/a/t)	st dev
1	250	0.65821	0.61995	0.71299					
2	228	0.54932	0.55922	0.57971					

begin active keff cycles									
3	209	0.55186	0.59855	0.55521					
4	253	0.58489	0.58379	0.58255		0.56837 0.01651	0.59117 0.00738	0.56888 0.01367	

the largest active cycle keffs by estimator are: the smallest active cycle keffs by estimator are:

collision 0.58489 on cycle 4	collision 0.55186 on cycle 3
absorption 0.59855 on cycle 3	absorption 0.58379 on cycle 4
track length 0.58255 on cycle 4	track length 0.55521 on cycle 3

tally 6 nps = 940

tally type 6 track length estimate of heating. units mev/gram
tally for neutrons

number of histories used for normalizing tallies = 500.00

masses

cell:	8	12	13	14	15
	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

cell 8

4.02566E+01 0.0434

cell 12
2.65224E+01 0.0629

cell 13
1.32494E+01 0.0904

cell 14
9.78180E-01 0.4014

cell 15
1.20234E-01 0.9710

lanalysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
(largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

(confidence interval shift)/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest. history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	mean--	relative error-----	variance of the variance----	figure of merit--	pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior slope	
desired	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant	random >3.00
observed	random	0.04 yes yes	0.01 yes yes		0.00
passed?	yes	yes yes yes	yes yes yes		no

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.
lunormed tally density for tally 6 nonzero tally mean(m) = 4.357E+01 nps = 940 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally	number	num den	log den:d	d	d
51-01	1	3.87-02	-1.412	*****	*****
56-01	2	6.15-02	-1.211	*****	*****
58-01	1	2.44-02	-1.612	*****	*****

id	mean	lower bound	upper bound
5.01+01	1.194-02	-1.712	
5.01+01	2.308-02	-1.511	
5.01+01	3.367-02	-1.435	
1.00+00	5.486-02	-1.313	
1.26+00	1.772-03	-2.112	
1.58+00	5.307-02	-1.513	
2.00+00	7.341-02	-1.467	
2.51+00	6.232-02	-1.634	
3.16+00	8.246-02	-1.609	
3.98+00	11.269-02	-1.571	
5.01+00	14.272-02	-1.566	
6.31+00	10.154-02	-1.812	
7.94+00	14.171-02	-1.766	
1.00+01	13.126-02	-1.898	
1.26+01	16.124-02	-1.908	
1.58+01	11.675-03	-2.171	
2.00+01	20.975-03	-2.011	
2.51+01	32.124-02	-1.907	
3.16+01	41.126-02	-1.899	
3.98+01	24.586-03	-2.232	
5.01+01	48.931-03	-2.031	

6.31+01	54.832-03	-2.080	
7.94+01	40.490-03	-2.310	
1.00+02	28.272-03	-2.565	
1.26+02	20.154-03	-2.811	
1.58+02	21.129-03	-2.890	
2.00+02	2.975-05	-4.011	
2.51+02	0.000+00	0.000	
3.16+02	1.308-05	-4.512	

total 462 9.24-01			

status of the statistical checks used to form confidence intervals for the mean for each tally bin

by result of statistical checks for the t/c bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning.	1 of the	1 daily fluctuation chart bins did not pass an 1% significance test.
warning.	1 of the	1 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 6

nps	mean	error	vov	slope	fom
-----	------	-------	-----	-------	-----

940 4.0257E+01 0.0434 0.0095 0.0

tally data written to file inp24m

15 warning messages so far.

run terminated when 4 kcode cycles were done.

File: Outp24

```

1- prob 24 - reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 -10.182 -1 u=2
3- 2 -.0011 -2 u=2
4- 3 -6.552 -3 u=2
5- 4 -1.0 3 u=2
6- 5 -4.0 -14:15 u=3
7- 6 -6.55 14:15 u=3
7 7 -4.0 -4+5 -6 +7 u=1 lat=1 fill=-8:8 -8:8 0:0
117r 214r 1 12 14 1r 1 1 2 2 3 2 3 2 2 3 2 2

```

```

10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 2 14r 1 17r
17- 8 0 -8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4
19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- :(+28 +29 -19 +24 -25)
29- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
30- 20 0 -28:-29:+21:-22:+25
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250 .7 2 4 4500 0
warning. tallies are normed per fission neutron for one generation.
64- ksrc 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- mt4 lwtr.01t
73- drxs
74- prdmp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2

```

76- sd6 1 4r

fission nubar data are being used.

warning. continuous-energy cross-section table used for 1001.00d

warning. continuous-energy cross-section table used for 5011.40d

warning. continuous-energy cross-section table used for 6012.40d

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells

print table 60

		atom	gram		neutron	
cell	mat	density	density	volume	mass	pieces importance
1	1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00 0 1.0000E+00
2	2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00 0 1.0000E+00
3	3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
4	4	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
5	5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00 0 1.0000E+00
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00 0 0.0000E+00

total 0.00000E+00 0.00000E+00

11 warning messages so far.

1cross-section tables

print table 100

table length

tables from file testlib1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503

92238.40c 48310 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
 tr:01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

total 261165

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.

1 estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

source distribution written to file inp24s cycle = 3

estimator	cycle 4	ave of 2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886	0.568374	0.0291 k(col/abs)	0.000000	0.000000	0.0000
k(absorption)	0.583788	0.591169	0.0125 k(abs/tk ln)	0.000000	0.000000	0.0000
k(trk length)	0.582547	0.568877	0.0240 k(tk ln/col)	0.000000	0.000000	0.0000
rem life(col)	3.9485E+03	3.8951E+03	0.0137			
rem life(abs)	4.0658E+03	3.9540E+03	0.0283 life(col/abs)	0.0000E+00	0.0000E+00	0.0000
source points generated	264					

source distribution written to file inp24s cycle = 4

1 problem summary

run terminated when 4 kcode cycles were done.

0

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
			energy cutoff	0	0.		
			time cutoff	0	0.		
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dextran	0	0.	0.	dextran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
			capture	0	8.1698E-01	1.8384E-02	
(n,xn)	8	6.9970E-03	3.6428E-03	loss to (n,xn)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00 tco 1.0000E+34
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03 eco 0.0000E+00
total neutron collisions	57706	capture or escape	4.1766E+03 wcl -5.0000E-01
net multiplication	1.0033E+00 0.0030	any termination	4.4650E+03 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun <td>0.00 minutes <td>bank overflows to backup file <td>0</td> </td></td>	0.00 minutes <td>bank overflows to backup file <td>0</td> </td>	bank overflows to backup file <td>0</td>	0
source particles per minute <td>0.0000E+00 <td>field length <td>0</td> </td></td>	0.0000E+00 <td>field length <td>0</td> </td>	field length <td>0</td>	0

random numbers generated 690539 most random numbers used was 3677 in history 21
 range of sampled source weights = 9.8814E-01 to 1.1962E+00
 neutron activity in each cell print table 126

cell	tracks entering	population	collisions (per history)	collisions * weight energy	number weighted energy	flux weighted (relative)	average track weight (cm)	average track mfp
1	1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01
4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01
6	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total		138515	6658	57706	4.4801E+01			

the initial fission neutron source distribution used the 1 source points that were input on the kscc card.
 the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.
 the problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.
 all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

1 individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev	form
1	250	0.65821 0.61995 0.71299			
2	228	0.54932 0.55922 0.57971			
----- begin active keff cycles -----					
3	209	0.55186 0.59855 0.55521			
4	253	0.58489 0.58379 0.58255	0.56837 0.01651 0.59117 0.00738 0.56888 0.01367		

the largest active cycle keffs by estimator are:

collision 0.58489 on cycle 4
 absorption 0.59855 on cycle 3
 track length 0.58255 on cycle 4

the smallest active cycle keffs by estimator are:

collision 0.55186 on cycle 3
 absorption 0.58379 on cycle 4
 track length 0.55521 on cycle 3

tally 6 nps = 940
 tally type 6 track length estimate of heating. units mev/gram
 tally for neutrons
 number of histories used for normalizing tallies = 500.00

masses
 cell: 8 12 13 14 15
 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00

cell 8
 4.02566E+01 0.0434

cell 12
 2.65224E+01 0.0629

cell 13
 1.32494E+01 0.0904

cell 14
 9.78180E-01 0.4014

cell 15
 1.20234E-01 0.9710

analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
 estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
 relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
 history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
 (largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

confidence interval shift/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
 nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
 the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	—mean—	-----relative error-----	---variance of the variance---	—figure of merit--	-pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior slope	
desired	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant random	>3.00
observed	random	0.04 yes yes	0.01 yes yes	0.00	
passed?	yes	yes yes yes	yes yes yes	no	

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

```
1unnormed tally density for tally 6      nonzero tally mean(m) = 4.357E+01  nps =    940  print table 161
```

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally	number	num den	log den	den
2.51-01	1	3.87-02	-1.412	
3.16-01	2	6.15-02	-1.211	
3.98-01	1	1.24-02	-1.612	
5.01-01	1	1.94-02	-1.712	
6.31-01	2	2.08-02	-1.511	
7.94-01	3	3.67-02	-1.435	
1.00+00	5	4.86-02	-1.313	
1.26+00	1	7.72-03	-2.112	
1.58+00	5	3.07-02	-1.513	
2.00+00	7	3.41-02	-1.467	
2.51+00	6	2.32-02	-1.634	
3.16+00	8	2.46-02	-1.609	
3.98+00	11	2.69-02	-1.571	
5.01+00	14	2.72-02	-1.566	
6.31+00	10	1.54-02	-1.812	
7.94+00	14	1.71-02	-1.766	
1.00+01	13	1.26-02	-1.898	
1.26+01	16	1.24-02	-1.908	
1.58+01	11	6.75-03	-2.171	
2.00+01	20	9.75-03	-2.011	
2.51+01	32	1.24-02	-1.907	
3.16+01	41	1.26-02	-1.899	
3.98+01	24	5.86-03	-2.232	
5.01+01	48	9.31-03	-2.031	
total	462	9.24-01		

status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

Itally fluctuation charts

```
tally 6
nps mean error vov slope form
940 4.0257E+01 0.0434 0.0095 0.0
tally data written to file inp24m
```

15 warning messages so far.

terminated when 4 kcode cycles were done.

Computer System ID : 501981-801 056AVO000041 (DOE 6239600)

File: Inp18o

```

1-  prob18 -- kcode in a hexagonal prism lattice.
2-  c   three half control rods and five whole control rods.
3-  30  0 -905 -19 29 1  fill=1
4-  31  0 -906 -19 29 1  fill=1 (16.7113 0 0)
5-  37  0 -907 -19 29 1  fill=1 (-16.7113 0 0)
6-  34  0 -913 -19 29 1  fill=1 (0 11.9185 0)
7-  32  0 -914 -19 29 1  fill=1 (10.3217 5.9592 0)
8-  33  0 -915 -19 29 1  fill=1 (8.3557 14.4724 0)
9-  35  0 -916 -19 29 1  fill=1 (-8.3557 14.4724 0)
10- 36  0 -917 -19 29 1  fill=1 (-10.3217 5.9592 0)
11-  c   universe 1: structure of control rod.
12-  38  11 -2.02  -880 u=1  $ control rod core
13-  39  6 -8.4  880 -881 u=1  $ control rod cladding
14-  40  12 -1.00  881 -882 u=1  $ control rod gap
15-  41  6 -8.4  882  u=1  $ control rod sheath
16-  c   the space between the control rods, filled with lattice.
17-  140 0 -17 1 29 -19 905 906 907 913 914 915 916 917  fill=2
18-  c   universe 2: lattice of fuel rods with water in between.
19-  42  12 -1.00  -301 302 -303 304 -305 306  u=2  lat=2  fill=
20-    -37:27 -1:33 0 0 &
21-    2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22-    2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23-    2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24-    2 3r 3 57r 2 2r &
25-    2 2r 3 58r 2 2r
26-    2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27-    2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28-    2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29-    2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30-    2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31-    2 1r 3 54r 2 7r &
32-  c   can code remember & thru comment?
33-  2 3 55r 2 7r
34-    2 3 25r 2 2r 3 25r 2 8r
35-    2 3 24r 2 3r 3 24r 2 9r
36-    2 3 23r 2 4r 3 23r 2 10r
37-    2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38-    2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39-    2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40-    2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41-    2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42-    2 3 46r 2 16r
43-    2 3 45r 2 17r
44-    2 3 44r 2 18r
45-    2 1r 3 41r 2 20r
46-    2 1r 3 40r 2 21r
47-    2 1r 3 39r 2 22r
48-    2 2r 3 36r 2 24r
49-    2 2r 3 35r 2 25r
50-    2 3r 3 32r 2 27r
51-    2 4r 3 29r 2 29r
52-    2 5r 3 26r 2 31r
53-    2 6r 3 23r 2 33r
54-    2 8r 3 18r 2 36r
55-    2 11r 3 11r 2 40r
56-    2 64r
57-  c   universe 3: structure of fuel rod lattice elements.
58-  154 2 -13.75  -58  u=3  $ fuel element
59-  149 12 -1.00  58 -268  u=3  $ gap
60-  144 7 -19.66  268 -478  u=3  $ liner
61-  159 6 -8.4  478 -698  u=3  $ cladding
62-  141 12 -1.00  698  u=3  $ water between the fuel rods

```

```

63- 162 0 17:-29:19:-1 $ outside world
64-
65- *1 py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0.119185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- mt12 hwtr.01 lwtr.01
98- kcode 200 1 5 6
warning. tallies are normed per fission neutron for one generation.
99- ksrc 3 .2 .2 .2 3 .2 -3 .2 .2 .2 3 .2 4 3 .2 -4 3 .2
100- e .01 .1 1. 10.
101- fq f e
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<-(42[-10:-6 -1 0])) $ average 5 x elements at j=-1
104- (154<-(42[-10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<-(42[-10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<-(42[-10:-6 21 0])) $ average 5 x elements at j=21
107- (154<-(42[-10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdmp 2j -1
111- ptrac buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points      8
points not in any cell         0
points in cells of zero importance  0
points in void cells           0
points in ambiguous cells      0
total points rejected          0
points remaining               8
points after expansion or contraction 200
nominal source size           200

```

```
initial guess for k(eff.)      1.000000
```

```
cycles to skip before tallying  5
```

```
number of keff cycles that can be stored 201
```

total fission nuclide data are being used.

fuel rod flux in 5 y locations averaged over 5 x elements
tally type 4 track length estimate of particle flux.
tally for neutrons

order of printing: f e

cells (154<(42[-10:-6-1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6 29 0]))

energy bins

0.00000E+00 to 1.00000E-02 mev

1.00000E-02 to 1.00000E-01 mev

1.000000E-01 to 1.000000E+00 mev

1.000000E+00 to 1.000000E+01 mev

total bin

1material composition

```
print table 40
```

the sum of the fractions of material 2 was 9.999900E-01

the sum of the fractions of material 7 was 7.400000E-01

the sum of the fractions of material 12 was 3.000000E+00

material number	component nuclide, atom fraction
1	100% ^{235}U
2	100% ^{238}U
3	100% ^{235}U
4	100% ^{238}U
5	100% ^{235}U
6	100% ^{238}U
7	100% ^{235}U
8	100% ^{238}U
9	100% ^{235}U
10	100% ^{238}U
11	100% ^{235}U
12	100% ^{238}U
13	100% ^{235}U
14	100% ^{238}U
15	100% ^{235}U
16	100% ^{238}U
17	100% ^{235}U
18	100% ^{238}U
19	100% ^{235}U
20	100% ^{238}U
21	100% ^{235}U
22	100% ^{238}U
23	100% ^{235}U
24	100% ^{238}U
25	100% ^{235}U
26	100% ^{238}U
27	100% ^{235}U
28	100% ^{238}U
29	100% ^{235}U
30	100% ^{238}U
31	100% ^{235}U
32	100% ^{238}U
33	100% ^{235}U
34	100% ^{238}U
35	100% ^{235}U
36	100% ^{238}U
37	100% ^{235}U
38	100% ^{238}U
39	100% ^{235}U
40	100% ^{238}U
41	100% ^{235}U
42	100% ^{238}U
43	100% ^{235}U
44	100% ^{238}U
45	100% ^{235}U
46	100% ^{238}U
47	100% ^{235}U
48	100% ^{238}U
49	100% ^{235}U
50	100% ^{238}U
51	100% ^{235}U
52	100% ^{238}U
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54	100% ^{238}U
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56	100% ^{238}U
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61	100% ^{235}U
62	100% ^{238}U
63	100% ^{235}U
64	100% ^{238}U
65	100% ^{235}U
66	100% ^{238}U
67	100% ^{235}U
68	100% ^{238}U
69	100% ^{235}U
70	100% ^{238}U
71	100% ^{235}U
72	100% ^{238}U
73	100% ^{235}U
74	100% ^{238}U
75	100% ^{235}U
76	100% ^{238}U
77	100% ^{235}U
78	100% ^{238}U
79	100% ^{235}U
80	100% ^{238}U
81	100% ^{235}U
82	100% ^{238}U
83	100% ^{235}U
84	100% ^{238}U
85	100% ^{235}U
86	100% ^{238}U
87	100% ^{235}U
88	100% ^{238}U
89	100% ^{235}U
90	100% ^{238}U
91	100% ^{235}U
92	100% ^{238}U
93	100% ^{235}U
94	100% ^{238}U
95	100% ^{235}U
96	100% ^{238}U
97	100% ^{235}U
98	100% ^{238}U
99	100% ^{235}U
100	100% ^{238}U

2	92235, 0.37504	92238, 0.12499	7014, 0.49997
---	----------------	----------------	---------------

6	41093, 0.98982	40000, 0.01018
---	----------------	----------------

6	41095, 0.98982	40000, 0.98982
7	74000, 1.00000	74000, 1.00000

11	5010	0.71977	5011	0.08004	6012	0.20019
----	------	---------	------	---------	------	---------

11	5010, 0.71977	5011, 0.68804	8012, 0.20019
12	1001, 0.33333	1002, 0.33333	8016, 0.33333

associated thermal s(a,b) data sets: hwtr.01t lwtr.01t

material number	component nuclide, mass fraction
1	U-235, 0.711
2	U-238, 0.289
3	Th-232, 0.0000014
4	Pa-231, 0.0000000001
5	U-235, 0.0000000001
6	U-238, 0.0000000001
7	Th-232, 0.0000000001
8	Pa-231, 0.0000000001
9	U-235, 0.0000000001
10	U-238, 0.0000000001
11	Th-232, 0.0000000001
12	Pa-231, 0.0000000001
13	U-235, 0.0000000001
14	U-238, 0.0000000001
15	Th-232, 0.0000000001
16	Pa-231, 0.0000000001
17	U-235, 0.0000000001
18	U-238, 0.0000000001
19	Th-232, 0.0000000001
20	Pa-231, 0.0000000001
21	U-235, 0.0000000001
22	U-238, 0.0000000001
23	Th-232, 0.0000000001
24	Pa-231, 0.0000000001
25	U-235, 0.0000000001
26	U-238, 0.0000000001
27	Th-232, 0.0000000001
28	Pa-231, 0.0000000001
29	U-235, 0.0000000001
30	U-238, 0.0000000001
31	Th-232, 0.0000000001
32	Pa-231, 0.0000000001
33	U-235, 0.0000000001
34	U-238, 0.0000000001
35	Th-232, 0.0000000001
36	Pa-231, 0.0000000001
37	U-235, 0.0000000001
38	U-238, 0.0000000001
39	Th-232, 0.0000000001
40	Pa-231, 0.0000000001
41	U-235, 0.0000000001
42	U-238, 0.0000000001
43	Th-232, 0.0000000001
44	Pa-231, 0.0000000001
45	U-235, 0.0000000001
46	U-238, 0.0000000001
47	Th-232, 0.0000000001
48	Pa-231, 0.0000000001
49	U-235, 0.0000000001
50	U-238, 0.0000000001
51	Th-232, 0.0000000001
52	Pa-231, 0.0000000001
53	U-235, 0.0000000001
54	U-238, 0.0000000001
55	Th-232, 0.0000000001
56	Pa-231, 0.0000000001
57	U-235, 0.0000000001
58	U-238, 0.0000000001
59	Th-232, 0.0000000001
60	Pa-231, 0.0000000001
61	U-235, 0.0000000001
62	U-238, 0.0000000001
63	Th-232, 0.0000000001
64	Pa-231, 0.0000000001
65	U-235, 0.0000000001
66	U-238, 0.0000000001
67	Th-232, 0.0000000001
68	Pa-231, 0.0000000001
69	U-235, 0.0000000001
70	U-238, 0.0000000001
71	Th-232, 0.0000000001
72	Pa-231, 0.0000000001
73	U-235, 0.0000000001
74	U-238, 0.0000000001
75	Th-232, 0.0000000001
76	Pa-231, 0.0000000001
77	U-235, 0.0000000001
78	U-238, 0.0000000001
79	Th-232, 0.0000000001
80	Pa-231, 0.0000000001
81	U-235, 0.0000000001
82	U-238, 0.0000000001
83	Th-232, 0.0000000001
84	Pa-231, 0.0000000001
85	U-235, 0.0000000001
86	U-238, 0.0000000001
87	Th-232, 0.0000000001
88	Pa-231, 0.0000000001
89	U-235, 0.0000000001
90	U-238, 0.0000000001
91	Th-232, 0.0000000001
92	Pa-231, 0.0000000001
93	U-235, 0.0000000001
94	U-238, 0.0000000001
95	Th-232, 0.0000000001
96	Pa-231, 0.0000000001
97	U-235, 0.0000000001
98	U-238, 0.0000000001
99	Th-232, 0.0000000001
100	Pa-231, 0.0000000001

2	92235, 0.70574	92238, 0.23821	7014, 0.05605
---	----------------	----------------	---------------

6	41093. 0.99000	40000. 0.01000
---	----------------	----------------

6	41095, 0.99000	10000,
7	74000, 1.00000	

11	5010	0.68700	5011	0.08400	6012	0.22900
----	------	---------	------	---------	------	---------

11	5010, 0.08700	5011, 0.08700	5012, 0.08700
12	1001, 0.05300	1002, 0.10591	8016, 0.84109

warning. 3 of the materials had unnormalized fractions.

1 cell volumes and masses

```
print table 50
```

cell	atom	gram	input	calculated	reason	volume
	density	density	volume	volume	mass	pieces not calculated

```
1 30 0.000000E+00 0.000000E+00 0.000000E+00 0.000000E+00 0.000000E+00 0 asymmetric
```

1	50	$0.000000\text{E}+00$	$0.000000\text{E}+00$	$0.000000\text{E}+00$	$0.000000\text{E}+00$	$0.000000\text{E}+00$	0	asymmetric
2	31	$0.000000\text{E}+00$	$0.000000\text{E}+00$	$0.000000\text{E}+00$	$0.000000\text{E}+00$	$0.000000\text{E}+00$	0	asymmetric

2	51	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0	asymmetric
3	37	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0	asymmetric

3	37	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0	Lognormal
4	34	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1	

4	34	0.000000E+00	0.000000E+00	0.000000E+00	8.94370E+02	0.000000E+00	1
5	32	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1

5	32	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1
6	33	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1

6	33	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1
7	35	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1

7	35	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1
8	36	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1

8	36	0.000000E+00	0.000000E+00	0.000000E+00	8.84370E+02	0.000000E+00	1
9	38	1.15958E-01	2.02000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0 infinite

9	38	1.15958E-01	2.02000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
10	39	5.44575E-03	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite

10	39	3.44375E-02	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
11	40	0.500007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite

11	40	9.500007E-02	1.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0	infinite
12	41	5.446735E-02	8.400000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0	infinite

12	41	5.4457E-02	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
13	110	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	assymetry

140	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0	asymmetr.
142	0.500000E+00	1.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	0	infinite

```

15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
16 149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
17 144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
1surface areas                                print table 50

```

```

surface input calculated reason area
area area not calculated

```

```

1 1 0.00000E+00 0.00000E+00 asymmetric
2 17 0.00000E+00 0.00000E+00 asymmetric
3 19 0.00000E+00 0.00000E+00 asymmetric
4 29 0.00000E+00 0.00000E+00 asymmetric
5 58 0.00000E+00 0.00000E+00 infinite
6 268 0.00000E+00 0.00000E+00 infinite
7 478 0.00000E+00 0.00000E+00 infinite
8 698 0.00000E+00 0.00000E+00 infinite
9 880 0.00000E+00 0.00000E+00 infinite
10 881 0.00000E+00 0.00000E+00 infinite
11 882 0.00000E+00 0.00000E+00 infinite
12 905 0.00000E+00 0.00000E+00 asymmetric
13 906 0.00000E+00 0.00000E+00 asymmetric
14 907 0.00000E+00 0.00000E+00 asymmetric
15 913 0.00000E+00 8.40057E+02
16 914 0.00000E+00 8.40057E+02
17 915 0.00000E+00 8.40057E+02
18 916 0.00000E+00 8.40057E+02
19 917 0.00000E+00 8.40057E+02
20 301 0.00000E+00 0.00000E+00 infinite
21 302 0.00000E+00 0.00000E+00 infinite
22 303 0.00000E+00 0.00000E+00 infinite
23 304 0.00000E+00 0.00000E+00
24 305 0.00000E+00 0.00000E+00
25 306 0.00000E+00 0.00000E+00

```

```

1cells                                print table 60

```

```

atom gram neutron
cell mat density density volume mass pieces importance

```

```

1 30 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
2 31 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
3 37 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
4 34 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
5 32 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
6 33 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
7 35 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
8 36 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
9 38 11 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
10 39 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
11 40 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
12 41 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
13 140 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
14 42 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
15 154 2 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
16 149 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
17 144 7 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
18 159 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
20 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

```

```

total 4.42185E+03 0.00000E+00
1surfaces

```

```

print table 70

```

```

surface trans type surface coefficients

```

```

1 1 refl. py 0.000000E+00
2 17 cz 2.9135000E+01
3 19 pz 3.1750000E+01
4 29 pz -3.1750000E+01
5 58 c/z 3.4414000E+00 8.5150000E-01 3.2400000E-01
6 268 c/z 3.4414000E+00 8.5150000E-01 3.3450000E-01
7 478 c/z 3.4414000E+00 8.5150000E-01 3.4750000E-01
8 698 c/z 3.4414000E+00 8.5150000E-01 4.3180000E-01
9 880 cz 1.7251000E+00
10 881 cz 1.8051000E+00
11 882 cz 1.9051000E+00
12 905 cz 2.1055000E+00
13 906 c/z 1.6711300E+01 0.0000000E+00 2.1055000E+00
14 907 c/z -1.6711300E+01 0.0000000E+00 2.1055000E+00
15 913 c/z 0.0000000E+00 1.1918500E+01 2.1055000E+00
16 914 c/z 1.0321700E+01 5.9592000E+00 2.1055000E+00
17 915 c/z 8.3557000E+00 1.4472400E+01 2.1055000E+00
18 916 c/z -8.3557000E+00 1.4472400E+01 2.1055000E+00
19 917 c/z -1.0321700E+01 5.9592000E+00 2.1055000E+00
20 301 px 3.9330000E+00
21 302 px 2.9498000E+00
22 303 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 5.8994000E+00
23 304 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 3.9330000E+00
24 305 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -9.8340000E-01
25 306 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -2.9498000E+00
1 cell temperatures in mev for the free-gas thermal neutron treatment. print table 72

```

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

1 cross-section tables

print table 100

table length

tables from file testlib1

```

1001.00c 1782 1-h-1 from endf-vi.1 mat 125 05/26/93
1002.55c 4102 njoy ( 120) 04/26/82
5011.40c 3229 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
6012.40c 4858 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
7014.40c 8535 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
8016.40c 5358 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
40000.40c 93372 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900323
41093.40c 42746 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
74000.40c 91244 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
92235.40c 34772 ENDL library name: nd900719 MCNP translation: 9total nu 10:05 900503
92238.40c 40834 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
5010.03d 3682 b-10 endf-b-iv new gamma production format ( 1273) 14 oct 75
hwtr.01t 10193 deuterium in heavy water at 300 degrees kelvin 1002 0 010/22/85
lwtr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

```

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp18s cycle = 0

3 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob18 -- kcode in a hexagonal prism lattice.

	x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.085E-01	4.733E-01	7.193E-01		
	3.492E+00	1.051E+00	2.000E-01	154			5.085E-01	4.733E-01	7.193E-01		
2	3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		8.952E-01	-4.447E-01	-2.944E-02		
	3.492E+00	1.051E+00	2.000E-01	154			8.952E-01	-4.447E-01	-2.944E-02		
3	3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.184E-01	-4.495E-01	6.446E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-6.184E-01	-4.495E-01	6.446E-01		
4	3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		9.710E-01	-5.665E-02	-2.323E-01		
	3.492E+00	1.051E+00	2.000E-01	154			9.710E-01	-5.665E-02	-2.323E-01		
5	3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.861E-01	1.496E-01	-7.963E-01		
	3.492E+00	1.051E+00	2.000E-01	154			5.861E-01	1.496E-01	-7.963E-01		
6	3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.489E-02	-1.626E-01	9.845E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-6.489E-02	-1.626E-01	9.845E-01		
7	3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-7.068E-02	3.263E-02	-9.970E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-7.068E-02	3.263E-02	-9.970E-01		
8	3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-3.915E-01	4.664E-01	-7.932E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-3.915E-01	4.664E-01	-7.932E-01		
9	3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.368E-01	9.215E-01	-3.079E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-2.368E-01	9.215E-01	-3.079E-01		
10	3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.946E-01	-3.204E-01	9.271E-01		
	3.492E+00	1.051E+00	2.000E-01	154			1.946E-01	-3.204E-01	9.271E-01		
	3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.698E-01	-7.177E-01	-1.905E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-6.698E-01	-7.177E-01	-1.905E-01		
12	3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-8.398E-01	-4.129E-01	3.524E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-8.398E-01	-4.129E-01	3.524E-01		
13	3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.714E-01	-8.572E-01	4.857E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-1.714E-01	-8.572E-01	4.857E-01		
14	3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.489E-01	-5.118E-01	-8.222E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-2.489E-01	-5.118E-01	-8.222E-01		
15	3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.959E-01	2.119E-01	9.314E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-2.959E-01	2.119E-01	9.314E-01		
16	3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.395E-01	-9.829E-01	1.202E-01		
	3.492E+00	1.051E+00	2.000E-01	154			1.395E-01	-9.829E-01	1.202E-01		
17	3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		6.909E-01	-7.110E-01	1.307E-01		
	3.492E+00	1.051E+00	2.000E-01	154			6.909E-01	-7.110E-01	1.307E-01		
18	3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.580E-01	5.320E-01	-5.329E-01		
	3.492E+00	1.051E+00	2.000E-01	154			-6.580E-01	5.320E-01	-5.329E-01		
19	3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-9.903E-01	-1.380E-01	1.353E-02		
	3.492E+00	1.051E+00	2.000E-01	154			-9.903E-01	-1.380E-01	1.353E-02		
20	3.000E+00	2.000E-01	2.000E-01	140			7.462E-01	4.859E-01	-4.551E-01	1.000E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		7.462E-01	4.859E-01	-4.551E-01		
	3.492E+00	1.051E+00	2.000E-01	154			7.462E-01	4.859E-01	-4.551E-01		
21	3.000E+00	2.000E-01	2.000E-01	140			-1.977E-01	9.797E-01	3.360E-02	3.990E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.977E-01	9.797E-01	3.360E-02		
	3.492E+00	1.051E+00	2.000E-01	154			-1.977E-01	9.797E-01	3.360E-02		
	3.000E+00	2.000E-01	2.000E-01	140			-9.117E-01	-3.647E-01	-1.891E-01	2.665E-01	1.000E+00 0.000E+00

3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
 24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
 25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
 26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
 27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
 28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
 29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
 30 2.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
 31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
 32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
 33 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
 34 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
 35 2.000E-01 3.000E+00 2.000E-01 140 -4.048E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -4.048E-02 8.831E-01 4.675E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -4.048E-02 8.831E-01 4.675E-01
 36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
 37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
 38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
 39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
 40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
 41 2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -3.212E-01 -7.678E-01 -5.543E-01
 42 2.000E-01 3.000E+00 2.000E-01 140 5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 5.039E-01 -1.460E-01 8.513E-01
 43 2.000E-01 3.000E+00 2.000E-01 140 6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 6.080E-01 5.487E-01 5.738E-01
 2.000E-01 3.000E+00 2.000E-01 140 -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01

```

3.641E+00 4.456E-01 2.000E-01 141 0 -2.932E-01 9.304E-01 -2.199E-01
2.000E-01 3.000E+00 2.000E-01 140 -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140 1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141 0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140 7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141 0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140 4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141 0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140 5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141 0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140 -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -1.053E-01 -9.805E-01 1.658E-01
Estimated keff results by cycle print table 175

```

```

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257
cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195
cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193
cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182
cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222
cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

```

```

Source distribution written to file inp18s cycle = 6
Problem summary

```

```

run terminated when 6 kcode cycles were done.

```

neutron creation				neutron loss				
tracks	weight	energy	tracks	weight	energy	tracks	weight	energy
(per source particle)				(per source particle)				
source	1249	9.6077E-01	1.8661E+00	escape	220	1.2268E-01	1.2054E-01	
			energy cutoff	0 0.	0.			
			time cutoff	0 0.	0.			
weight window	0 0.	0.	weight window	0 0.	0.			
cell importance	0 0.	0.	cell importance	0 0.	0.			
weight cutoff	0 1.3743E-01	3.8498E-03	weight cutoff	1034	1.2791E-01	5.1920E-03		
energy importance	0 0.	0.	energy importance	0 0.	0.			
dxtan	0 0.	0.	dxtan	0 0.	0.			
forced collisions	0 0.	0.	forced collisions	0 0.	0.			
exp. transform	0 0.	0.	exp. transform	0 0.	0.			
upscattering	0 0.	5.3884E-11	downscattering	0 0.	1.3605E+00			
			capture	0 3.9980E-01	1.1590E-01			
(n,xn)	10	6.1640E-03	6.1355E-03	loss to (n,xn)	5	3.0820E-03	2.4027E-02	
fission	0 0.	0.	loss to fission	0 4.5089E-01	2.4987E-01			
total	1259	1.1044E+00	1.8761E+00	total	1259	1.1044E+00	1.8761E+00	

```

number of neutrons banked 5 average lifetime, shakes cutoffs
neutron tracks per source particle 1.0080E+00 escape 3.7027E+00 tco 1.0000E+34
neutron collisions per source particle 1.8226E+01 capture 1.2954E+01 eco 0.0000E+00
total neutron collisions 22764 capture or escape 1.1788E+01 wcl -5.0000E-01
net multiplication 1.0032E+00 0.0035 any termination 1.2744E+01 wc2 -2.5000E-01

```

```

computer time so far in this run 0.00 minutes maximum number ever in bank 1
computer time in mcrun 0.00 minutes bank overflows to backup file 0
source particles per minute 0.0000E+00 field length 0
random numbers generated 500880 most random numbers used was 1298 in history 14

```


range of sampled source weights = 7.7821E-01 to 1.0989E+00

neutron activity in each cell

print table 126

cell	tracks entering	population	collisions (per history)	collisions * weight (energy)	number weighted energy	flux weighted energy (relative)	average track weight (cm)	average track mfp
1	30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6971E-01
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01
total	266059	9765	22764	1.1324E+01				

Neutron weight balance in each cell -- external events

print table 130

cell	entering	source cutoff	energy	time	exiting	total
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	4.8822E-01	0.0000E+00	0.0000E+00	0.0000E+00	-3.3091E-01
10	39	8.4996E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.4933E-01
11	40	8.9904E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.9904E-01
12	41	9.7260E-01	0.0000E+00	0.0000E+00	0.0000E+00	-9.6978E-01
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.0907E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.0913E+00
15	154	1.2943E+01	8.4067E-01	0.0000E+00	0.0000E+00	-1.3171E+01
16	149	2.6508E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.6508E+01
17	144	2.7419E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.7405E+01
18	159	3.1331E+01	8.0064E-02	0.0000E+00	0.0000E+00	-3.1361E+01
19	141	3.9111E+01	4.0032E-02	0.0000E+00	0.0000E+00	-3.9150E+01
total	141	1.4161E+02	9.6077E-01	0.0000E+00	0.0000E+00	-1.4174E+02

Neutron weight balance in each cell -- variance reduction events

print table 130

cell	weight window	cell importance	weight cutoff	energy importance	dextran	forced collision	exponential transform	total
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

```

9 38 0.0000E+00 0.0000E+00 1.2447E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2447E-03
0 39 0.0000E+00 0.0000E+00 2.0097E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 2.0097E-04
1 40 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
12 41 0.0000E+00 0.0000E+00 2.9100E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 2.9100E-04
13 140 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
14 42 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
15 154 0.0000E+00 0.0000E+00 8.0354E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.0354E-03
16 149 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
17 144 0.0000E+00 0.0000E+00 -3.0848E-06 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 -3.0848E-06
18 159 0.0000E+00 0.0000E+00 -2.5216E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 -2.5216E-04
19 141 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00

```

total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03
neutron weight balance in each cell -- physical events print table 130

cell	(n,xn)	fission	capture (n,xn)	loss to fission	loss to	total
1 30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2 31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3 37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4 34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5 32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6 33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7 35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8 36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9 38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	0.0000E+00	-1.5855E-01
10 39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	0.0000E+00	-8.2847E-04
11 40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	0.0000E+00	-3.9460E-06
12 41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	0.0000E+00	-3.1114E-03
13 140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14 42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	0.0000E+00	5.9111E-04
15 154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-03	-4.5089E-01	-6.2082E-01
16 149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	0.0000E+00	-3.5884E-05
17 144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	0.0000E+00	-1.4569E-02
18 159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	0.0000E+00	-4.9815E-02
19 141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	0.0000E+00	-4.5860E-04

total 6.1640E-03 0.0000E+00 -3.9980E-01 -3.0820E-03 -4.5089E-01 -8.4760E-01
neutron activity of each nuclide in each cell, per source particle print table 140

cell	nuclides fraction	atom collisions	total collisions	collisions * weight	weight lost to capture	weight loss to fission	weight gain by (n,xn)
9 38	5010.03d 7.1977E-01	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00	0.0000E+00
	5011.40c 8.0041E-02	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00	0.0000E+00
	6012.40c 2.0019E-01	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00	0.0000E+00
10 39	41093.40c 9.8982E-01	128	6.2802E-02	8.2814E-04	0.0000E+00	0.0000E+00	0.0000E+00
	40000.40c 1.0183E-02	2	9.7676E-04	3.3160E-07	0.0000E+00	0.0000E+00	0.0000E+00
11 40	1001.00c 3.3333E-01	111	5.1533E-02	3.9251E-06	0.0000E+00	0.0000E+00	0.0000E+00
	1002.55c 3.3333E-01	33	1.5373E-02	2.0884E-08	0.0000E+00	0.0000E+00	0.0000E+00
	8016.40c 3.3333E-01	40	2.1271E-02	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12 41	41093.40c 9.8982E-01	313	1.5623E-01	3.1072E-03	0.0000E+00	0.0000E+00	0.0000E+00
	40000.40c 1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00	0.0000E+00
14 42	1001.00c 3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00	0.0000E+00	0.0000E+00
	1002.55c 3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00	6.2306E-04	0.0000E+00
	8016.40c 3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00	0.0000E+00	0.0000E+00
15 154	92235.40c 3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04	0.0000E+00
	92238.40c 1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03	0.0000E+00
	7014.40c 4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00	0.0000E+00
16 149	1001.00c 3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00	0.0000E+00	0.0000E+00

1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00	0.0000E+00
8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00	0.0000E+00
17 144	74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00 0.0000E+00
18 159	41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00 0.0000E+00
	40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00 0.0000E+00
19 141	1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00 0.0000E+00
	1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00 0.0000E+00
	8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00 0.0000E+00
total		22764	1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03

total over all cells for each nuclide	total collisions	weight * weight	lost to capture	weight loss to fission	weight gain by (n,xn)
---------------------------------------	------------------	-----------------	-----------------	------------------------	-----------------------

1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04
5011.40c	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00

the initial fission neutron source distribution used the 8 source points that were input on the ksrc card.

the criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.

the problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev	form
------------	-------------------	--	---	----------------------------------	------

1	200	1.25311 1.26302 1.22009
2	257	1.21200 1.25252 1.12957
3	195	1.20026 1.14326 1.13006
4	193	1.12953 1.16269 1.10757
5	182	1.13599 1.12465 1.11238

-----begin active keff cycles-----

6	222	1.07701 1.04669 1.07528
---	-----	-------------------------

1 tally 4	nps = 1249
-----------	------------

+ fuel rod flux in 5 y locations averaged over 5 x elements

tally type 4 track length estimate of particle flux. units 1/cm**2

tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])

cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])

cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])

cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])

cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

```

energy: 1.0000E-02 1.0000E-01 1.0000E+00 1.0000E+01 total
cell
a 0.00000E+00 0.0000 2.84017E-05 0.9975 1.86420E-04 0.4656 1.36846E-04 0.5743 3.51668E-04 0.3877
b 1.07442E-05 0.9975 1.58576E-04 0.5120 2.32928E-04 0.3945 4.44462E-05 0.5872 4.46694E-04 0.2855
c 2.16778E-05 0.7232 9.40943E-05 0.5519 5.37835E-05 0.5876 1.51034E-04 0.7075 3.20589E-04 0.3937
d 1.47903E-05 0.5831 0.00000E+00 0.0000 1.15515E-04 0.5838 1.69653E-04 0.5071 2.99958E-04 0.3718
e 8.04943E-06 0.9975 0.00000E+00 0.0000 0.00000E+00 0.0000 6.81909E-05 0.7477 7.62403E-05 0.6763

```

analysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

```

normed average tally per history = 3.51668E-04      unnormed average tally per history = 3.68228E-02
estimated tally relative error = 0.3877      estimated variance of the variance = 0.1752
relative error from zero tallies = 0.3464      relative error from nonzero scores = 0.1740

```

```

number of nonzero history tallies = 8      efficiency for the nonzero tallies = 0.0400
history number of largest tally = 1034      largest unnormalized history tally = 1.41575E+00
(largest tally)/(average tally) = 3.84476E+01      (largest tally)/(avg nonzero tally)= 1.53791E+00

```

```

(confidence interval shift)/mean = 0.0793      shifted confidence interval center = 3.79539E-04

```

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

```

estimated quantities      value at nps      value at nps+1      value(nps+1)/value(nps)-1.

```

```

mean      3.51668E-04      4.10723E-04      0.167927
relative error      3.87653E-01      3.61597E-01      -0.067213
variance of the variance      1.75161E-01      1.47665E-01      -0.156976
shifted center      3.79539E-04      3.77169E-04      -0.006244
figure of merit      0.00000E+00      0.00000E+00      0.000000

```

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

tfc bin	--mean--	relative error	variance of the variance	figure of merit	pdf
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope
desired	random	<0.10 yes	1/sqrt(nps) <0.10 yes	1/nps constant	random >3.00
observed	random	0.39 yes	yes	0.18 yes	yes 0.00
passed?	yes	no yes	yes	no yes	yes no

warning. the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.

unnormed tally density for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

```

tally number num den log den:d-----d-
1.00-01 1 2.43-01 -0.614 *****
1.26-01 0 0.00+00 0.000 |
1.58-01 0 0.00+00 0.000 |
2.00-01 0 0.00+00 0.000 |
2.51-01 0 0.00+00 0.000 |
3.16-01 0 0.00+00 0.000 |

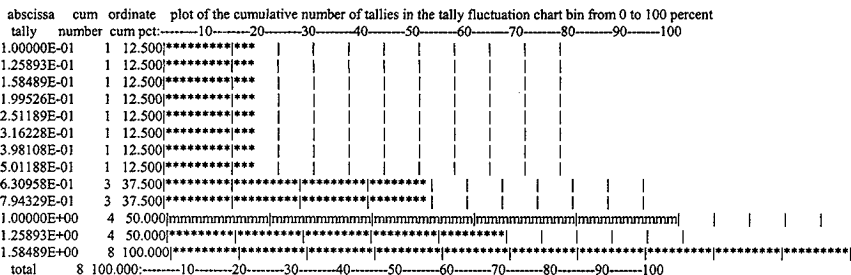
```

Time	Position	Velocity	Acceleration	Distance
3.98-01	0.00+00	0.000		
1.01-01	0.00+00	0.000		
7.01-01	2.77-02	-1.113		
7.94-01	0.00+00	0.000		
1.00+00	1.243-02	-1.614 m		
1.26+00	0.00+00	0.000		
1.58+00	4.614-02	-2.212		
total	8.4.00-02	d		d

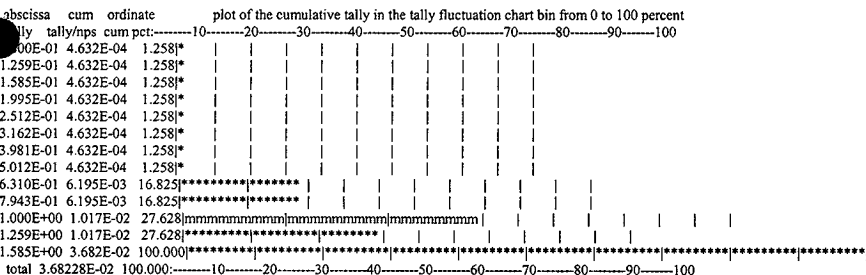
```

cumulative tally number for tally 4      nonzero tally mean(m) = 9.206E-01  nps =    1249  print table 162

```



```
cumulative unnormed tally for tally 4      nonzero tally mean(m) = 9.206E-01  nps = 1249  print table 162
```



1status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

4 missed 3 of 10 tlc bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies
missed all bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning.	1 of the	1 tally had bins that did not pass an 10 statistical checks.
warning.	1 of the	1 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally		4	
nps	mean	error	voy slope form

1000 0.0000E+00 0.0000 0.0000 0.0
1249 3.5167E-04 0.3877 0.1752 0.0

by data written to file inp18m
ascii file inp18p written with 5 events from 5 histories.

6 warning messages so far.

run terminated when 6 kcode cycles were done.

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File: Outp18

```
1- prob18 -- kcode in a hexagonal prism lattice.
2- c three half control rods and five whole control rods.
3- 30 0 -905 -19 29 1 fill=1
4- 31 0 -906 -19 29 1 fill=1 (16.7113 0 0)
5- 37 0 -907 -19 29 1 fill=1 (-16.7113 0 0)
6- 34 0 -913 -19 29 fill=1 (0 11.9185 0)
7- 32 0 -914 -19 29 fill=1 (10.3217 5.9592 0)
8- 33 0 -915 -19 29 fill=1 (8.3557 14.4724 0)
9- 35 0 -916 -19 29 fill=1 (-8.3557 14.4724 0)
10- 36 0 -917 -19 29 fill=1 (-10.3217 5.9592 0)
11- c universe 1: structure of control rod.
12- 38 11 -2.02 -880 u=1 $ control rod core
13- 39 6 -8.4 880 -881 u=1 $ control rod cladding
14- 40 12 -1.00 881 -882 u=1 $ control rod gap
15- 41 6 -8.4 882 u=1 $ control rod sheath
16- c the space between the control rods, filled with lattice.
17- 140 0 -17 1 29 -19 905 906 907 913 914 915 916 917 fill=2
18- c universe 2: lattice of fuel rods with water in between.
19- 42 12 -1.00 -301 302 -303 304 -305 306 u=2 lat=2 fill=
20- -37.27 -1.33 0 0 &
21- 2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22- 2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23- 2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24- 2 3r 3 57r 2 2r &
25- 2 2r 3 58r 2 2r
26- 2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27- 2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28- 2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29- 2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30- 2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31- 2 1r 3 54r 2 7r &
32- c can code remember & thru comment?
33- 2 3 55r 2 7r
34- 2 3 25r 2 2r 3 25r 2 8r
35- 2 3 24r 2 3r 3 24r 2 9r
36- 2 3 23r 2 4r 3 23r 2 10r
37- 2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38- 2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39- 2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40- 2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41- 2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42- 2 3 46r 2 16r
43- 2 3 45r 2 17r
44- 2 3 44r 2 18r
45- 2 1r 3 41r 2 20r
46- 2 1r 3 40r 2 21r
47- 2 1r 3 39r 2 22r
48- 2 2r 3 36r 2 24r
49- 2 2r 3 35r 2 25r
50- 2 3r 3 32r 2 27r
51- 2 4r 3 29r 2 29r
52- 2 5r 3 26r 2 31r
53- 2 6r 3 23r 2 33r
54- 2 8r 3 18r 2 36r
55- 2 11r 3 11r 2 40r
```

```

56-      2 64r
57- c universe 3: structure of fuel rod lattice elements.
58- 154 2 -13.75 -58 u=3 $ fuel element
59- 149 12 -1.00 58 -268 u=3 $ gap
60- 144 7 -19.66 268 -478 u=3 $ liner
61- 159 6 -8.4 478 -698 u=3 $ cladding
62- 141 12 -1.00 698 u=3 $ water between the fuel rods
63- 162 0 17:-29:19:-1 $ outside world
64-
65- *I py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0 11.9185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- mt12 hwtr.01 lwtr.01
98- kcode 200 1 5 6
warning. tallies are normed per fission neutron for one generation.
99- ksrc 3 .2 .2 .3 .2 .3 .2 .2 .2 .3 .2 .4 3 .2 -4 3 .2 4 3 .1 -4 3 .2
100- e .01 .1 1. 10.
101- fq fe
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<(42[-10:-6 -1 0])) $ average 5 x elements at j=-1
104- (154<(42[-10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<(42[-10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<(42[-10:-6 21 0])) $ average 5 x elements at j=21
107- (154<(42[-10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdmp 2j -1
111- ptrac buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points      8
points not in any cell        0
points in cells of zero importance 0
points in void cells          0
points in ambiguous cells      0
total points rejected          0
points remaining               8
points after expansion or contraction 200

```

nominal source size 200
 initial guess for k(eff.) 1.000000

cycles to skip before tallying 5

number of keff cycles that can be stored 201

total fission nubar data are being used.

1 tally 4 print table 30

+ fuel rod flux in 5 y locations averaged over 5 x elements

tally type 4 track length estimate of particle flux.

tally for neutrons

order of printing: f e

cells (154<(42[-10:-6 -1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6 29 0]))

energy bins

0.00000E+00 to 1.00000E-02 mev

1.00000E-02 to 1.00000E-01 mev

1.00000E-01 to 1.00000E+00 mev

1.00000E+00 to 1.00000E+01 mev

total bin

1 material composition

print table 40

the sum of the fractions of material 2 was 9.999900E-01

the sum of the fractions of material 7 was 7.400000E-01

the sum of the fractions of material 12 was 3.000000E+00

material

number component nuclide, atom fraction

2	92235, 0.37504	92238, 0.12499	7014, 0.49997
6	41093, 0.98982	40000, 0.01018	
7	74000, 1.00000		
11	5010, 0.71977	5011, 0.08004	6012, 0.20019
12	1001, 0.33333	1002, 0.33333	8016, 0.33333

associated thermal s(a,b) data sets: hwtr.01t lwtr.01t

material

number component nuclide, mass fraction

2	92235, 0.70574	92238, 0.23821	7014, 0.05605
6	41093, 0.99000	40000, 0.01000	
7	74000, 1.00000		
11	5010, 0.68700	5011, 0.08400	6012, 0.22900
12	1001, 0.05300	1002, 0.10591	8016, 0.84109

warning. 3 of the materials had unnormalized fractions.

1 cell volumes and masses

print table 50

cell	atom density	gram density	input volume	calculated volume	mass	reason	volume pieces	not calculated
1	30	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
2	31	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
3	37	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
4	34	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
32	32	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
33	33	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	

1surface areas print table 50

```
1cells                                     print table 60
```

```

8 159 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00

```

19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
 20 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

total 4.42185E+03 0.00000E+00
 isurfaces

print table 70

surface trans type surface coefficients

1 1 refl. py 0.000000E+00
 2 17 cz 2.913500E+01
 3 19 pz 3.175000E+01
 4 29 pz -3.175000E+01
 5 58 c/z 3.441400E+00 8.515000E-01 3.240000E-01
 6 268 c/z 3.441400E+00 8.515000E-01 3.345000E-01
 7 478 c/z 3.441400E+00 8.515000E-01 3.475000E-01
 8 698 c/z 3.441400E+00 8.515000E-01 4.318000E-01
 9 880 cz 1.725100E+00
 10 881 cz 1.805100E+00
 11 882 cz 1.905100E+00
 12 905 cz 2.105500E+00
 13 906 c/z 1.671130E+01 0.000000E+00 2.105500E+00
 14 907 c/z -1.671130E+01 0.000000E+00 2.105500E+00
 15 913 c/z 0.000000E+00 1.191850E+01 2.105500E+00
 16 914 c/z 1.032170E+01 5.959200E+00 2.105500E+00
 17 915 c/z 8.355700E+00 1.447240E+01 2.105500E+00
 18 916 c/z -8.355700E+00 1.447240E+01 2.105500E+00
 19 917 c/z -1.032170E+01 5.959200E+00 2.105500E+00
 20 301 px 3.933000E+00
 21 302 px 2.949800E+00
 22 303 p 1.000000E+00 1.732050E+00 0.000000E+00 5.899400E+00
 23 304 p 1.000000E+00 1.732050E+00 0.000000E+00 3.933000E+00
 24 305 p -1.000000E+00 1.732050E+00 0.000000E+00 -9.834000E-01
 25 306 p -1.000000E+00 1.732050E+00 0.000000E+00 -2.949800E+00

all temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

1 cross-section tables

print table 100

table length

tables from file testtbl

1001.00e 1782 1-h-1 from endf-vi.1 mat 125 05/26/93
 1002.55c 4102 njoy (120) 04/26/82
 5011.40c 3229 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
 6012.40c 4858 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
 7014.40c 8535 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
 8016.40c 5358 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
 40000.40c 93372 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900323
 41093.40c 42746 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
 74000.40c 91244 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
 92235.40c 34772 ENDL library name: nd900719 MCNP translation: 9total nu 10:05 900503
 92238.40c 40834 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
 5010.03d 3682 b-10 endf/b-iv new gamma production format (1273) 14 oct 75
 hwtv.01t 10193 deuterium in heavy water at 300 degrees kelvin 1002 0 010/22/85
 lwtr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

force distribution written to file inpl18s cycle = 0

3 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob18 -- kcode in a hexagonal prism lattice.

nps	x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.085E-01	4.733E-01	7.193E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 5.085E-01	4.733E-01	7.193E-01		
2	3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		8.952E-01	-4.447E-01	-2.944E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0 8.952E-01	-4.447E-01	-2.944E-02		
3	3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.184E-01	-4.495E-01	6.446E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.184E-01	-4.495E-01	6.446E-01		
4	3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		9.710E-01	-5.665E-02	-2.323E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 9.710E-01	-5.665E-02	-2.323E-01		
5	3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.861E-01	1.496E-01	-7.963E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 5.861E-01	1.496E-01	-7.963E-01		
6	3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.489E-02	-1.626E-01	9.845E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.489E-02	-1.626E-01	9.845E-01		
7	3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-7.068E-02	3.263E-02	-9.970E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -7.068E-02	3.263E-02	-9.970E-01		
8	3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-3.915E-01	4.664E-01	-7.932E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -3.915E-01	4.664E-01	-7.932E-01		
9	3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.368E-01	9.215E-01	-3.079E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.368E-01	9.215E-01	-3.079E-01		
10	3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.946E-01	-3.204E-01	9.271E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 1.946E-01	-3.204E-01	9.271E-01		
11	3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.698E-01	-7.177E-01	-1.905E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.698E-01	-7.177E-01	-1.905E-01		
12	3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-8.398E-01	-4.129E-01	3.524E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -8.398E-01	-4.129E-01	3.524E-01		
13	3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.714E-01	-8.572E-01	4.857E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -1.714E-01	-8.572E-01	4.857E-01		
14	3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.489E-01	-5.118E-01	-8.222E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.489E-01	-5.118E-01	-8.222E-01		
15	3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.959E-01	2.119E-01	9.314E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.959E-01	2.119E-01	9.314E-01		
16	3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.395E-01	-9.829E-01	1.202E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 1.395E-01	-9.829E-01	1.202E-01		
17	3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		6.909E-01	-7.110E-01	1.307E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 6.909E-01	-7.110E-01	1.307E-01		
18	3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.580E-01	5.320E-01	-5.329E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.580E-01	5.320E-01	-5.329E-01		
19	3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00

```

3.492E+00 1.051E+00 2.000E-01 42( 0, -1, 0) -9.903E-01 -1.380E-01 1.353E-02
3.492E+00 1.051E+00 2.000E-01 154 0 -9.903E-01 -1.380E-01 1.353E-02
3.000E+00 2.000E-01 2.000E-01 140 7.462E-01 4.859E-01 -4.551E-01 1.000E+00 1.000E+00 0.000E+00
3.492E+00 1.051E+00 2.000E-01 42( 0, -1, 0) 7.462E-01 4.859E-01 -4.551E-01
3.492E+00 1.051E+00 2.000E-01 154 0 7.462E-01 4.859E-01 -4.551E-01
21 3.000E+00 2.000E-01 2.000E-01 140 -1.977E-01 9.797E-01 3.360E-02 3.990E+00 1.000E+00 0.000E+00
3.492E+00 1.051E+00 2.000E-01 42( 0, -1, 0) -1.977E-01 9.797E-01 3.360E-02
3.492E+00 1.051E+00 2.000E-01 154 0 -1.977E-01 9.797E-01 3.360E-02
22 3.000E+00 2.000E-01 2.000E-01 140 -9.117E-01 -3.647E-01 -1.891E-01 2.665E-01 1.000E+00 0.000E+00
3.492E+00 1.051E+00 2.000E-01 42( 0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
23 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
3.492E+00 1.051E+00 2.000E-01 42( 0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
3.492E+00 1.051E+00 2.000E-01 42( 0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
3.492E+00 1.051E+00 2.000E-01 42( 0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
30 2.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
33 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
34 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
35 2.000E-01 3.000E+00 2.000E-01 140 -4.048E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -4.048E-02 8.831E-01 4.675E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -4.048E-02 8.831E-01 4.675E-01
36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01

```

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3.641E+00 4.456E-01 2.000E-01 141 0 -3.212E-01 -7.678E-01 -5.543E-01
2.000E-01 3.000E+00 2.000E-01 140 5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
3.641E+00 4.456E-01 2.000E-01 141 0 5.039E-01 -1.460E-01 8.513E-01
43 2.000E-01 3.000E+00 2.000E-01 140 6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
3.641E+00 4.456E-01 2.000E-01 141 0 6.080E-01 5.487E-01 5.738E-01
44 2.000E-01 3.000E+00 2.000E-01 140 -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -2.932E-01 9.304E-01 -2.199E-01
45 2.000E-01 3.000E+00 2.000E-01 140 -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140 1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141 0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140 7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141 0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140 4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141 0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140 5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141 0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140 -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141 0 -1.053E-01 -9.805E-01 1.658E-01

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Estimated keff results by cycle

print table 175

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257

cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195

cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193

cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

source distribution written to file inp18s cycle = 6

problem summary

run terminated when 6 kcode cycles were done.

0

neutron creation				neutron loss			
tracks	weight	energy	tracks	weight	energy		
(per source particle)			(per source particle)				
source	1249	9.6077E-01	1.8661E+00	escape	220	1.2268E-01	1.2054E-01
			energy cutoff	0 0.	0.		
			time cutoff	0 0.	0.		
weight window	0 0.	0.	weight window	0 0.	0.		
cell importance	0 0.	0.	cell importance	0 0.	0.		
weight cutoff	0 1.3743E-01	3.8498E-03	weight cutoff	1034	1.2791E-01	5.1920E-03	
energy importance	0 0.	0.	energy importance	0 0.	0.		
dxttran	0 0.	0.	dxttran	0 0.	0.		
forced collisions	0 0.	0.	forced collisions	0 0.	0.		
exp. transform	0 0.	0.	exp. transform	0 0.	0.		
upscattering	0 0.	5.3884E-11	downscattering	0 0.	1.3605E+00		
			capture	0 3.9980E-01	1.1590E-01		
(n,n)	10	6.1640E-03	6.1355E-03	loss to (n,n)	5	3.0820E-03	2.4027E-02
non	0 0.	0.	loss to fission	0 4.5089E-01	2.4987E-01		
total	1259	1.1044E+00	1.8761E+00	total	1259	1.1044E+00	1.8761E+00

```

number of neutrons banked          5      average lifetime, shakes      cutoffs
neutron tracks per source particle  1.0080E+00      escape  3.7027E+00      tco  1.0000E+34
neutron collisions per source particle 1.8226E+01      capture  1.2954E+01      eco  0.0000E+00
total neutron collisions            22764      capture or escape 1.1788E+01      wcl -5.0000E-01
net multiplication                  1.0032E+00 0.0035      any termination 1.2744E+01      wc2 -2.5000E-01

computer time so far in this run  0.00 minutes      maximum number ever in bank      1
computer time in mcrun            0.00 minutes      bank overflows to backup file    0
source particles per minute        0.0000E+00      field length                      0
random numbers generated           500880      most random numbers used was     1298 in history  14

```

range of sampled source weights = 7.7821E-01 to 1.0989E+00

In neutron activity in each cell

print table 126

cell	entering	population	collisions	collisions	number	flux	average	average
			* weight	weighted	weighted	track	weight	track mfp
			(per history)	energy	energy	(relative)	(cm)	
1	30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6971E-01
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01

total 266059 9765 22764 1.1324E+01

In neutron weight balance in each cell -- external events

print table 130

cell	entering	source	energy	time	exiting	total
		cutoff	cutoff			
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	4.8822E-01	0.0000E+00	0.0000E+00	-3.3091E-01	1.5731E-01
10	39	8.4996E-01	0.0000E+00	0.0000E+00	-8.4933E-01	6.2750E-04
11	40	8.9904E-01	0.0000E+00	0.0000E+00	-8.9904E-01	3.9460E-06
12	41	9.7260E-01	0.0000E+00	0.0000E+00	-9.6978E-01	2.8204E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.0907E+00	0.0000E+00	0.0000E+00	-1.0913E+00	-5.9111E-04
15	154	1.2943E+01	8.4067E-01	0.0000E+00	-1.3171E+01	6.1278E-01
16	149	2.6508E+01	0.0000E+00	0.0000E+00	-2.6508E+01	3.5884E-05
17	144	2.7419E+01	0.0000E+00	0.0000E+00	-2.7405E+01	1.4572E-02
18	159	3.1331E+01	8.0064E-02	0.0000E+00	-3.1361E+01	5.0067E-02
19	141	3.9111E+01	4.0032E-02	0.0000E+00	-3.9150E+01	4.5860E-04

total 1.4161E+02 9.6077E-01 0.0000E+00 0.0000E+00 -1.4174E+02 8.3809E-01

In neutron weight balance in each cell -- variance reduction events

print table 130

	cell	weight	cell	weight	energy	dxtran	forced	exponential	total
	window	importance	cutoff	importance	importance	collision	transform		
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	1.2447E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.2447E-03
10	39	0.0000E+00	0.0000E+00	2.0097E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.0097E-04
11	40	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	41	0.0000E+00	0.0000E+00	2.9100E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.9100E-04
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	154	0.0000E+00	0.0000E+00	8.0354E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	8.0354E-03
16	149	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	144	0.0000E+00	0.0000E+00	-3.0848E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-3.0848E-06
18	159	0.0000E+00	0.0000E+00	-2.5216E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-2.5216E-04
19	141	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03									

neutron weight balance in each cell -- physical events print table 130

	cell	(n,xn)	fission	capture	loss to	loss to	total
			(n,xn)	fission			
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	0.0000E+00	-1.5855E-01
10	39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	0.0000E+00	-8.2847E-04
11	40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	0.0000E+00	-3.9460E-06
12	41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	0.0000E+00	-3.1114E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	0.0000E+00	5.9111E-04
15	154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-03	-4.5089E-01	-6.2082E-01
16	149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	0.0000E+00	-3.5884E-05
17	144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	0.0000E+00	-1.4569E-02
18	159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	0.0000E+00	-4.9815E-02
19	141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	0.0000E+00	-4.5860E-04
total 6.1640E-03 0.0000E+00 -3.9980E-01 -3.0820E-03 -4.5089E-01 -8.4760E-01							

Inertion activity of each nuclide in each cell, per source particle print table 140

	cell	nuclides	atom	total	collisions	weight lost	weight loss	weight gain
		fraction	collisions	* weight	to capture	to fission	by (n,xn)	
9	38	5010.03d	7.1977E-01	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00
		5011.40c	8.0041E-02	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
		6012.40c	2.0019E-01	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
10	39	41093.40c	9.8982E-01	128	6.2802E-02	8.2814E-04	0.0000E+00	0.0000E+00
		40000.40c	1.0183E-02	2	9.7676E-04	3.3160E-07	0.0000E+00	0.0000E+00
11	40	1001.00c	3.3333E-01	111	5.1533E-02	3.9251E-06	0.0000E+00	0.0000E+00
		1002.55c	3.3333E-01	33	1.5373E-02	2.0884E-08	0.0000E+00	0.0000E+00
		8016.40c	3.3333E-01	40	2.1271E-02	0.0000E+00	0.0000E+00	0.0000E+00
12	41	41093.40c	9.8982E-01	313	1.5623E-01	3.1072E-03	0.0000E+00	0.0000E+00

40000.40c	1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00		
42	1001.00c	3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00	0.0000E+00	
	1002.55c	3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00	6.2306E-04	
	8016.40c	3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00	0.0000E+00	
15	92235.40c	3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04	
	92238.40c	1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03	
	7014.40c	4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00	
16	149	1001.00c	3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00	0.0000E+00
	1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00	0.0000E+00	
	8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00	0.0000E+00	
17	144	74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
18	159	41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00	0.0000E+00
	40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00	0.0000E+00	
19	141	1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00	0.0000E+00
	1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00	0.0000E+00	
	8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00	0.0000E+00	
total		22764	1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03		

total over all cells for each nuclide	total collisions	* weight	collisions to capture	weight lost to fission	weight loss by (n,xn)	weight gain
---------------------------------------	------------------	----------	-----------------------	------------------------	-----------------------	-------------

1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00	
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04	
5011.40c	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00	
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00	
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00	
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00	
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00	
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00	
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00	
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04	
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03	
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00	

the initial fission neutron source distribution used the 8 source points that were input on the ksrc card.
the criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.
this problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.
1 individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle	average keff estimators and deviations	average k(c/a/t)
		k(coll) k(abs) k(track)	k(coll) st dev k(abs) st dev k(track) st dev	k(c/a/t) st dev fom
1	200	1.25311 1.26302 1.22009		
2	257	1.21200 1.25252 1.12957		
3	195	1.20026 1.14326 1.13006		
4	193	1.12953 1.16269 1.10757		
5	182	1.13599 1.12465 1.11238		
----- begin active keff cycles -----				
6	222	1.07701 1.04669 1.07528		
total	1249			
fuel rod flux in 5 y locations averaged over 5 x elements				
total type 4			track length estimate of particle flux.	units 1/cm**2

tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])

cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])

cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])

cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])

cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

energy:	1.0000E-02	1.0000E-01	1.0000E+00	1.0000E+01	total
---------	------------	------------	------------	------------	-------

cell

a 0.0000E+00 0.0000 2.84017E-05 0.9975 1.86420E-04 0.4656 1.36846E-04 0.5743 3.51668E-04 0.3877

b 1.07442E-05 0.9975 1.58576E-04 0.5120 2.32928E-04 0.3945 4.44462E-05 0.5872 4.46694E-04 0.2855

c 2.16778E-05 0.7232 9.40943E-05 0.5519 5.37835E-05 0.5876 1.51034E-04 0.7075 3.20589E-04 0.3937

d 1.47903E-05 0.5831 0.00000E+00 0.0000 1.15515E-04 0.5838 1.69653E-04 0.5071 2.99958E-04 0.3718

e 8.04943E-06 0.9975 0.00000E+00 0.0000 0.00000E+00 0.0000 6.81909E-05 0.7477 7.62403E-05 0.6763

analysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

normed average tally per history = 3.51668E-04

unnormed average tally per history = 3.68228E-02

estimated tally relative error = 0.3877

estimated variance of the variance = 0.1752

relative error from zero tallies = 0.3464

relative error from nonzero scores = 0.1740

number of nonzero history tallies = 8

efficiency for the nonzero tallies = 0.0400

history number of largest tally = 1034

largest unnormalized history tally = 1.41575E+00

(largest tally)/(average tally) = 3.84476E+01

(largest tally)/(avg nonzero tally) = 1.53791E+00

(confidence interval shift)/mean = 0.0793

shifted confidence interval center = 3.79539E-04

the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:

s = 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
----------------------	--------------	----------------	----------------------------

mean 3.51668E-04 4.10723E-04 0.167927

relative error 3.87653E-01 3.61597E-01 -0.067213

variance of the variance 1.75161E-01 1.47665E-01 -0.156976

shifted center 3.79539E-04 3.77169E-04 -0.006244

figure of merit 0.00000E+00 0.00000E+00 0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
 the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

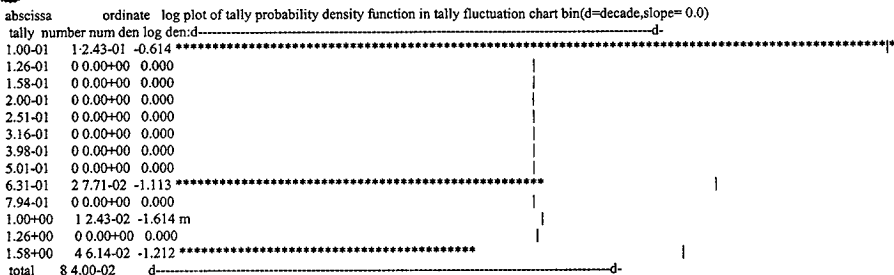
***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

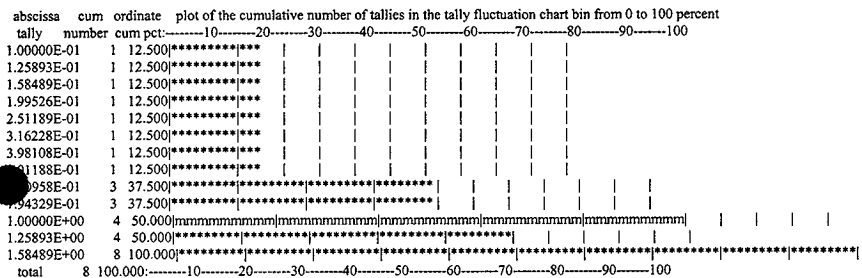
tfc bin	--mean--	-----relative error-----	---variance of the variance---	--figure of merit--	-pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value	behavior slope
desired	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant	random >3.00
observed	random	0.39 yes yes	0.18 yes yes	0.00	
passed?	yes	no yes yes	no yes yes	no	

Warning: the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.

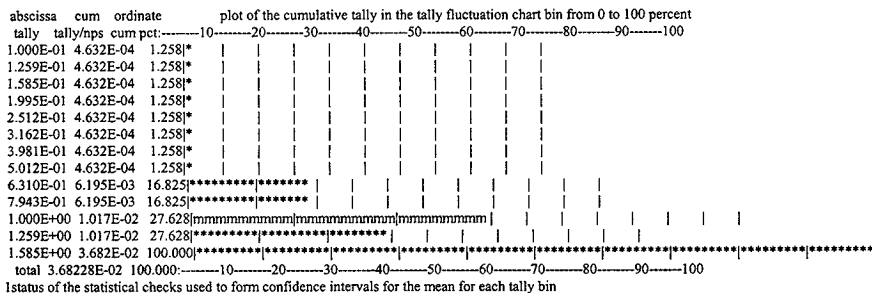
normed tally density for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 161



cumulative tally number for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162



cumulative unnormed tally for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162



status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the ttc bin (the first check not passed is listed) and error magnitude check for all bins

missed 3 of 10 ttc bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies
missed all bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 4

nps mean error vov slope fom

1000 0.0000E+00 0.0000 0.0000 0.0

1249 3.5167E-04 0.3877 0.1752 0.0

tally data written to file inp18m

ascii file inp18p written with 5 events from 5 histories.

6 warning messages so far.

run terminated when 6 kcode cycles were done.

File: Inp20o

1- prob20 - continuous energy electron version of problem prob19.

2- 1 1 -19.3 1 -2.3 -4.5 -6

3- 2 0 #1

4-

5- 1 z 0 2

plane

+

6- 2 pz .00635

7- 3 px -10

8- 4 x 10 0

plane

+

9- 5 y -10.3

plane

10- 6 p 0 10 0 1 10 0 0 10 1

11- m1 74184.1

13- sdefergr=1 sur=1 vec=0 0 1 par=3

14- imp:p,e 1 0

15- mode p e

16- *fl:p 1 2

17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

18- *fl1:e 1 2

19- w9 0 0 0 1 0 0 0 0 0 0 1

warning. non-orthogonality of surface transformation 9 > 2.e-6

20- fq e f

21- f21:e 1 2

22- *f28:p 1

23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

25- f58:e 1

26- f6:p 1

27- f31:e 1 2

28- f31 elc 1

29- f41:e 1 2

30- f41 elc 2

31- f51:e 1 2

32- f51 elc 3

33- e8 1000 nt

34- *f18:p,e 1

35- nps 10000

36- ctme 30

37- prdmp 2j -1

38- cut:p lj .1

39- cut:e lj .1

40- print 110 70

41-

warning. tr 9 card unused.

warning. 1 energy bins of tally 1 are below energy cutoff.

warning. tally 8 needs zero energy bin for negative f8 scores.

1cells print table 60

		atom	gram			photon	electron
cell	mat	density	density	volume	mass	pieces	importance

1	1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0
2	2	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0

total 2.54000E+00 4.90220E+01

1surfaces print table 70

surface	trans	type	surface coefficients
---------	-------	------	----------------------

1	1	pz	0.0000000E+00
2	2	pz	6.3500000E-03
3	3	px	-1.0000000E+01
4	4	px	1.0000000E+01
5	5	py	-1.0000000E+01
6	6	p	0.0000000E+00

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

1cross-section tables print table 100

table length

tables from file testlib1

74000.02p 755 01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478 11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00 print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
-----	---	---	---	------	------	---	---	---	--------	--------	------

1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00

File: Outp20

```

1- prob20 - continuous energy electron version of problem prob19.
2- 1 1-19.3 1-2 3-4 5-6
3- 2 0 #1
4-
5- 1 z 0 2
+ plane
6- 2 pz .00635
7- 3 px -10
8- 4 x 10 0
+ plane
9- 5 y -10 3
+ plane
10- 6 p 0 10 0 1 10 0 0 10 1
11-
12- m1 74184.1
13- sdef erg=1 sur=1 vec=0 0 1 par=3
14- imp:p,e 1 0
15- mode p e
16- *fl:p 1 2
17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
18- *fl1:e 1 2
19- tr 9 0 0 0 1 0 0 0 0 0 0 1

```

warning. non-orthogonality of surface transformation 9 > 2.e-6

```

20- fq e f
21- f21:e 1 2
22- *f28:p 1
23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
25- f58:e 1
26- f6:p 1
27- f31:e 1 2
28- f31 elc 1
29- f41:e 1 2
30- f41 elc 2
31- f51:e 1 2
32- f51 elc 3
33- e8 1000 nt
34- *f8:p,e 1
35- nps 10000
36- ctme 30
37- prdmp 2j -1
38- cut:p lj .1
39- cut:e lj .1
40- print 110 70
41-

```

warning. tr 9 card unused.

warning. 1 energy bins of tally 1 are below energy cutoff.

warning. tally 8 needs zero energy bin for negative f8 scores.

1cells print table 60

		atom	gram	photon		electron	
cell	mat	density	density	volume	mass	pieces	importance
1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0	1.0000E+00
2	2	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 2.54000E+00 4.90220E+01

1surfaces print table 70

surface trans type surface coefficients

```

1 1 pz 0.0000000E+00
2 pz 6.3500000E-03
3 px -1.0000000E+01
4 4 px 1.0000000E+01
5 5 py -1.0000000E+01
6 6 p 0.0000000E+00 1.0000000E-01 0.0000000E+00 1.0000000E+00

```

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

icross-section tables

print table 100

table length

tables from file testlib1

74000.02p 755

01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478

11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00

```

28 0.000E+00 0.000E+00 0.000E+00 1 1 8.706E-01 -3.198E-01 3.738E-01 1.000E+00 1.000E+00 0.000E+00
29 0.000E+00 0.000E+00 0.000E+00 1 1 -8.188E-01 2.059E-01 5.359E-01 1.000E+00 1.000E+00 0.000E+00
30 0.000E+00 0.000E+00 0.000E+00 1 1 5.727E-01 8.124E-01 1.100E-01 1.000E+00 1.000E+00 0.000E+00
31 0.000E+00 0.000E+00 0.000E+00 1 1 5.390E-02 5.914E-01 8.046E-01 1.000E+00 1.000E+00 0.000E+00
32 0.000E+00 0.000E+00 0.000E+00 1 1 -5.778E-01 5.375E-01 6.141E-01 1.000E+00 1.000E+00 0.000E+00
33 0.000E+00 0.000E+00 0.000E+00 1 1 -7.198E-01 -2.890E-01 6.311E-01 1.000E+00 1.000E+00 0.000E+00
34 0.000E+00 0.000E+00 0.000E+00 1 1 2.210E-01 2.482E-01 9.432E-01 1.000E+00 1.000E+00 0.000E+00
35 0.000E+00 0.000E+00 0.000E+00 1 1 4.339E-01 7.515E-02 8.978E-01 1.000E+00 1.000E+00 0.000E+00
36 0.000E+00 0.000E+00 0.000E+00 1 1 -4.263E-01 8.490E-01 3.123E-01 1.000E+00 1.000E+00 0.000E+00
37 0.000E+00 0.000E+00 0.000E+00 1 1 -3.933E-01 -9.179E-01 5.266E-02 1.000E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 1 -4.846E-01 4.378E-01 7.573E-01 1.000E+00 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 1 -5.950E-01 -5.730E-01 5.636E-01 1.000E+00 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 1 -7.252E-01 -5.143E-01 4.578E-01 1.000E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 1 -7.156E-01 4.734E-01 5.136E-01 1.000E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 1 -1.771E-01 9.229E-01 3.417E-01 1.000E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 1 -1.149E-01 -4.206E-01 8.999E-01 1.000E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 1 4.509E-01 8.630E-02 8.884E-01 1.000E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 1 -7.358E-01 2.500E-01 6.294E-01 1.000E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 1 -8.448E-01 3.645E-01 3.917E-01 1.000E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 1 1.958E-01 -2.769E-01 9.407E-01 1.000E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 1 2.788E-01 -7.325E-03 9.603E-01 1.000E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 1 -3.201E-01 4.174E-01 8.505E-01 1.000E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 1 8.960E-01 -1.641E-01 4.126E-01 1.000E+00 1.000E+00 0.000E+00

```

Problem summary

run terminated when 10000 particle histories were done.

```

0
photon creation  tracks  weight  energy      photon loss  tracks  weight  energy
                (per source particle)                (per source particle)

source          0  0.    0.      escape      575  5.7500E-02  1.5476E-02
                energy cutoff  0  0.    0.
                time cutoff    0  0.    0.

weight window  0  0.    0.      weight window  0  0.    0.
cell importance 0  0.    0.      cell importance 0  0.    0.
weight cutoff   0  0.    0.      weight cutoff   0  0.    0.
energy importance 0  0.    0.      energy importance 0  0.    0.
dxtran          0  0.    0.      dxtran          0  0.    0.

forced collisions 0  0.    0.      forced collisions 0  0.    0.
exp. transform  0  0.    0.      exp. transform  0  0.    0.
from neutrons   0  0.    0.      compton scatter 0  0.    6.6993E-05
bremsstrahlung  694  6.9400E-02  1.7315E-02 capture      119  1.1900E-02  1.7720E-03
p-annihilation  0  0.    0.      pair production 0  0.    0.
electron x-rays 0  0.    0.
1st fluorescence 0  0.    0.
2nd fluorescence 0  0.    0.
total           694  6.9400E-02  1.7315E-02      total           694  6.9400E-02  1.7315E-02

```

```

number of photons banked 694 average lifetime, shakes cutoffs
photon tracks per source particle 6.9400E-02 escape 6.7786E-05 tco 1.0000E+34
photon collisions per source particle 1.3000E-02 capture 8.3325E-05 eco 1.0000E-01
total photon collisions 130 capture or escape 7.0450E-05 wcl 0.0000E+00
any termination 7.0450E-05 wc2 0.0000E+00

```

```

0
electron creation  tracks  weight  energy      electron loss  tracks  weight  energy
                  (per source particle)                  (per source particle)

source          10000  1.0000E+00  1.0000E+00  escape      9464  9.4640E-01  7.1762E-01
                  energy cutoff  2046  2.0460E-01  2.0141E-02
                  time cutoff    0  0.    0.

weight window  0  0.    0.      weight window  0  0.    0.
cell importance 0  0.    0.      cell importance 0  0.    0.
weight cutoff   0  0.    0.      weight cutoff   0  0.    0.
energy importance 0  0.    0.      energy importance 0  0.    0.
pair production 0  0.    0.      scattering      0  0.    2.6560E-01
compton recoil  2  2.0000E-04  3.7815E-05 bremsstrahlung 0  0.    2.4158E-02
photo-electric  29  2.9000E-03  4.7387E-04

```

```

photon auger      0 0. 0.
electron auger    0 0. 0.
back-on          1479 1.4790E-01 2.7007E-02
total            11510 1.1510E+00 1.0275E+00      total      11510 1.1510E+00 1.0275E+00

number of electrons banked      1510      cutoffs
electron tracks per source particle 1.1510E+00      tco 1.0000E+34
electron sub-steps per source particle 7.7164E+01      eco 1.0000E-01
total electron sub-steps      771636      wc1 0.0000E+00
                                wc2 0.0000E+00

computer time so far in this run 0.00 minutes      maximum number ever in bank 4
computer time in mcrun          0.00 minutes      bank overflows to backup file 0
source particles per minute      0.0000E+00      field length 0
random numbers generated         4748878      most random numbers used was 4277 in history 7375

```

range of sampled source weights = 1.0000E+00 to 1.0000E+00

lphoton activity in each cell

print table 126

cell	entering	tracks population	collisions * weight (per history)	collisions weighted energy	number weighted energy	flux weighted track (relative)	average track weight (cm)	average track mfp
1	1	0	694	130	1.3000E-02	2.8286E-01	2.8286E-01	1.0000E+00 1.6113E-01
total	0	694	130	1.3000E-02				

lphoton activity in each cell

print table 126

cell	entering	tracks population	substeps * weight (per history)	substeps weighted energy	number weighted energy	flux weighted track (relative)	average track weight (cm)	average track mfp
1	1	10000	11510	771636	7.7164E+01	7.4988E-01	7.6821E-01	1.0000E+00 2.5110E-04
total	10000	11510	771636	7.7164E+01				

lphoton activity in each cell

tally type 1* energy crossing a surface. units mev

tally for photons

```

surface:      1      2
energy
1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 1.20113E-03 0.1079 2.16688E-03 0.0814
2.8200E-01 8.17217E-04 0.1673 2.04350E-03 0.1062
3.7300E-01 9.52191E-04 0.1829 1.82060E-03 0.1357
4.6400E-01 1.03815E-03 0.2001 1.00234E-03 0.2043
5.5500E-01 5.66295E-04 0.3018 8.02842E-04 0.2503
6.4500E-01 6.09365E-04 0.3162 6.54966E-04 0.3016
7.3600E-01 3.45345E-04 0.4472 4.20131E-04 0.4085
8.2700E-01 7.79347E-05 0.9999 7.03770E-04 0.3334
9.1800E-01 1.70096E-04 0.7070 8.29418E-05 0.9999
1.1000E+00 0.00000E+00 0.0000 0.00000E+00 0.0000
total      5.77773E-03 0.0811 9.69798E-03 0.0608

```

lphoton activity in each cell

tally type 6 track length estimate of heating. units mev/gram

tally for photons

masses

cell: 1
4.90220E+01

cell: 1

```

energy
1.0000E-01 0.00000E+00 0.0000
1.9100E-01 1.80395E-05 0.0935
2.8200E-01 4.79830E-06 0.1242
3.7300E-01 1.64870E-06 0.2061

```



```

4.6400E-01 1.76412E-06 0.4116
.5500E-01 6.34259E-07 0.4736
4.500E-01 2.47457E-07 0.3129
7.3600E-01 2.58011E-07 0.6571
8.2700E-01 1.16245E-07 0.3470
9.1800E-01 4.46610E-08 0.6403
1.1000E+00 0.00000E+00 0.0000
total 2.75512E-05 0.0722

```

```

tally 28 nps = 10000

```

```

tally type 8* energy deposition
tally for photons electrons

```

```

units mev

```

```

cell: 1

```

```

energy

```

```

-1.0000E-03 -8.72550E-04 0.1508
0.0000E+00 0.00000E+00 0.0000
1.0000E-06 0.00000E+00 0.0000
1.0000E-01 1.08193E-02 0.0227
1.9100E-01 3.91016E-02 0.0170
2.8200E-01 4.36100E-02 0.0210
3.7300E-01 3.53763E-02 0.0286
4.6400E-01 2.66881E-02 0.0382
5.5500E-01 2.21833E-02 0.0468
6.4500E-01 1.58947E-02 0.0606
7.3600E-01 1.08330E-02 0.0790
8.2700E-01 8.71177E-03 0.0940
9.1800E-01 6.65495E-03 0.1136
1.1000E+00 4.79000E-02 0.0446
total 2.66900E-01 0.0090

```

```

tally 11 nps = 10000

```

```

tally type 1* energy crossing a surface.
tally for electrons

```

```

units mev

```

```

surface: 1 2

```

```

energy

```

```

1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 1.08698E-03 0.1176 6.53601E-04 0.1495
2.8200E-01 2.19643E-03 0.1039 1.83325E-03 0.1165
3.7300E-01 3.60063E-03 0.0956 3.37231E-03 0.0988
4.6400E-01 6.94424E-03 0.0774 6.18557E-03 0.0823
5.5500E-01 1.32283E-02 0.0615 1.27247E-02 0.0628
6.4500E-01 2.19441E-02 0.0516 1.93787E-02 0.0550
7.3600E-01 3.87821E-02 0.0411 4.62743E-02 0.0374
8.2700E-01 6.96113E-02 0.0321 9.53277E-02 0.0269
9.1800E-01 1.17955E-01 0.0253 9.53443E-02 0.0284
1.1000E+00 1.58764E-01 0.0225 2.41655E-03 0.1959
total 4.34113E-01 0.0097 2.83511E-01 0.0130

```

```

tally 21 nps = 10000

```

```

tally type 1 number of particles crossing a surface.
tally for electrons

```

```

surface: 1 2

```

```

energy

```

```

1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 7.70000E-03 0.1165 4.60000E-03 0.1471
2.8200E-01 9.30000E-03 0.1032 7.60000E-03 0.1158
3.7300E-01 1.09000E-02 0.0953 1.02000E-02 0.0985
4.6400E-01 1.65000E-02 0.0772 1.46000E-02 0.0822
5.5500E-01 2.58000E-02 0.0614 2.48000E-02 0.0627
6.4500E-01 3.63000E-02 0.0515 3.21000E-02 0.0549
7.3600E-01 5.59000E-02 0.0411 6.67000E-02 0.0374
8.2700E-01 8.86000E-02 0.0321 1.21300E-01 0.0269
9.1800E-01 1.34800E-01 0.0253 1.10600E-01 0.0284
1.1000E+00 1.65500E-01 0.0225 2.60000E-03 0.1959
total 5.51300E-01 0.0094 3.95100E-01 0.0126

```

```

tally 31 nps = 10000

```

```

tally type 1 number of particles crossing a surface.

```

tally for electrons
this tally is modified by ft elc

```

surface:      1      2
energy
1.0000E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
1.9100E-01  -7.70000E-03 0.1165  -4.60000E-03 0.1471
2.8200E-01  -9.30000E-03 0.1032  -7.60000E-03 0.1158
3.7300E-01  -1.09000E-02 0.0953  -1.02000E-02 0.0985
4.6400E-01  -1.65000E-02 0.0772  -1.46000E-02 0.0822
5.5500E-01  -2.58000E-02 0.0614  -2.48000E-02 0.0627
6.4500E-01  -3.63000E-02 0.0515  -3.21000E-02 0.0549
7.3600E-01  -5.59000E-02 0.0411  -6.67000E-02 0.0374
8.2700E-01  -8.86000E-02 0.0321  -1.21300E-01 0.0269
9.1800E-01  -1.34800E-01 0.0253  -1.10600E-01 0.0284
1.1000E+00  -1.65500E-01 0.0225  -2.60000E-03 0.1959
total  -5.51300E-01 0.0094  -3.95100E-01 0.0126

```

lally 41 nps = 10000

tally type i number of particles crossing a surface.
tally for electrons
this tally is modified by ft elc

```

surface:      1      2
energy
1.0000E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
1.9100E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
2.8200E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
3.7300E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
4.6400E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
5.5500E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
6.4500E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
7.3600E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
8.2700E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
9.1800E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
1.1000E+00  0.00000E+00 0.0000  0.00000E+00 0.0000
total  0.00000E+00 0.0000  0.00000E+00 0.0000

```

```

surface:      1      2
energy
1.0000E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
1.9100E-01  7.70000E-03 0.1165  4.60000E-03 0.1471
2.8200E-01  9.30000E-03 0.1032  7.60000E-03 0.1158
3.7300E-01  1.09000E-02 0.0953  1.02000E-02 0.0985
4.6400E-01  1.65000E-02 0.0772  1.46000E-02 0.0822
5.5500E-01  2.58000E-02 0.0614  2.48000E-02 0.0627
6.4500E-01  3.63000E-02 0.0515  3.21000E-02 0.0549
7.3600E-01  5.59000E-02 0.0411  6.67000E-02 0.0374
8.2700E-01  8.86000E-02 0.0321  1.21300E-01 0.0269
9.1800E-01  1.34800E-01 0.0253  1.10600E-01 0.0284
1.1000E+00  1.65500E-01 0.0225  2.60000E-03 0.1959
total  5.51300E-01 0.0094  3.95100E-01 0.0126

```

```

surface:      1      2
energy
1.0000E-01  0.00000E+00 0.0000  0.00000E+00 0.0000
1.9100E-01  7.70000E-03 0.1165  4.60000E-03 0.1471
2.8200E-01  9.30000E-03 0.1032  7.60000E-03 0.1158
3.7300E-01  1.09000E-02 0.0953  1.02000E-02 0.0985
4.6400E-01  1.65000E-02 0.0772  1.46000E-02 0.0822
5.5500E-01  2.58000E-02 0.0614  2.48000E-02 0.0627
6.4500E-01  3.63000E-02 0.0515  3.21000E-02 0.0549
7.3600E-01  5.59000E-02 0.0411  6.67000E-02 0.0374
8.2700E-01  8.86000E-02 0.0321  1.21300E-01 0.0269
9.1800E-01  1.34800E-01 0.0253  1.10600E-01 0.0284
1.1000E+00  1.65500E-01 0.0225  2.60000E-03 0.1959
total  5.51300E-01 0.0094  3.95100E-01 0.0126

```

y 51 nps = 10000

tally type 1 number of particles crossing a surface.
 tally for electrons
 this tally is modified by ft elc

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
2.8200E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
3.7300E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
4.6400E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
5.5500E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
6.4500E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
7.3600E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
8.2700E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
9.1800E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.1000E+00  0.0000E+00 0.0000  0.0000E+00 0.0000
total      0.0000E+00 0.0000  0.0000E+00 0.0000

```

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01 -7.7000E-03 0.1165 -4.6000E-03 0.1471
2.8200E-01 -9.3000E-03 0.1032 -7.6000E-03 0.1158
3.7300E-01 -1.0900E-02 0.0953 -1.0200E-02 0.0985
4.6400E-01 -1.6500E-02 0.0772 -1.4600E-02 0.0822
5.5500E-01 -2.5800E-02 0.0614 -2.4800E-02 0.0627
6.4500E-01 -3.6300E-02 0.0515 -3.2100E-02 0.0549
7.3600E-01 -5.5900E-02 0.0411 -6.6700E-02 0.0374
8.2700E-01 -8.8600E-02 0.0321 -1.2130E-01 0.0269
9.1800E-01 -1.3480E-01 0.0253 -1.1060E-01 0.0284
1.1000E+00 -1.6550E-01 0.0225 -2.6000E-03 0.1959
total      -5.5130E-01 0.0094 -3.9510E-01 0.0126

```

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01 -7.7000E-03 0.1165 -4.6000E-03 0.1471
2.8200E-01 -9.3000E-03 0.1032 -7.6000E-03 0.1158
3.7300E-01 -1.0900E-02 0.0953 -1.0200E-02 0.0985
4.6400E-01 -1.6500E-02 0.0772 -1.4600E-02 0.0822
5.5500E-01 -2.5800E-02 0.0614 -2.4800E-02 0.0627
6.4500E-01 -3.6300E-02 0.0515 -3.2100E-02 0.0549
7.3600E-01 -5.5900E-02 0.0411 -6.6700E-02 0.0374
8.2700E-01 -8.8600E-02 0.0321 -1.2130E-01 0.0269
9.1800E-01 -1.3480E-01 0.0253 -1.1060E-01 0.0284
1.1000E+00 -1.6550E-01 0.0225 -2.6000E-03 0.1959
total      -5.5130E-01 0.0094 -3.9510E-01 0.0126

```

l tally 58 nps = 10000
 tally type 8 pulse height distribution. units number
 tally for photons electrons

```

cell:      1
energy
-1.0000E-03  7.4000E-03 0.1158
0.0000E+00  0.0000E+00 0.0000
1.0000E-06  0.0000E+00 0.0000
1.0000E-01  2.1260E-01 0.0192
1.9100E-01  2.6550E-01 0.0166
2.8200E-01  1.8770E-01 0.0208
3.7300E-01  1.0950E-01 0.0285
4.6400E-01  6.4400E-02 0.0381
5.5500E-01  4.3700E-02 0.0468
6.4500E-01  2.6600E-02 0.0605
7.3600E-01  1.5800E-02 0.0789
8.2700E-01  1.1200E-02 0.0940
9.1800E-01  7.7000E-03 0.1135

```

1.1000E+00 4.79000E-02 0.0446
 total 1.00000E+00 0.0000
 tally 8 nps = 10000
 tally type 8* energy deposition units mev
 tally for photons electrons

cell: 1
 energy
 1.0000E+03 2.66900E-01 0.0090

1 status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the ttc bin (the first check not passed is listed) and error magnitude check for all bins

- 1 missed 1 of 10 ttc bin checks: there is insufficient ttc bin tally information to estimate the large tally slope reliably
 missed all bin error check: 24 tally bins had 4 bins with zeros and 17 bins with relative errors exceeding 0.10
- 6 missed 1 of 10 ttc bin checks: the variance of the variance appears not to decrease as $1/nps$ for the last half of problem
 missed all bin error check: 12 tally bins had 2 bins with zeros and 8 bins with relative errors exceeding 0.10
- 28 passed the 10 statistical checks for the tally fluctuation chart bin result
 missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 11 missed 1 of 10 ttc bin checks: the slope of decrease of largest tallies is less than the minimum acceptable value of 3.0
 missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 21 missed 1 of 10 ttc bin checks: the estimated mean has a trend during the last half of the problem
 missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 31 missed 2 of 10 ttc bin checks: the estimated mean has a trend during the last half of the problem
 missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 41 missed 1 of 10 ttc bin checks: the estimated mean has a trend during the last half of the problem
 missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 51 missed 2 of 10 ttc bin checks: the estimated mean has a trend during the last half of the problem
 missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 58 passed the 10 statistical checks for the tally fluctuation chart bin result
 missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 8 passed the 10 statistical checks for the tally fluctuation chart bin result
 passed all bin error check: 1 tally bins all have relative errors less than 0.10 with no zero bins

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning: 7 of the 10 tally fluctuation chart bins did not pass all 10 statistical checks.

warning: 9 of the 10 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 1					tally 6					tally 28					
nps	mean	error	vov	slope	fom	mean	error	vov	slope	fom	mean	error	vov	slope	fom
1000	6.7975E-03	0.2399	0.0835	0.0		2.0857E-05	0.1589	0.0525	0.0		2.6993E-01	0.0279	0.0044	10.0	
2000	5.5780E-03	0.1884	0.0641	0.0		2.4397E-05	0.1701	0.1693	0.0		2.6475E-01	0.0199	0.0022	10.0	
3000	5.8779E-03	0.1455	0.0373	0.0		2.6650E-05	0.1343	0.1060	0.0		2.6433E-01	0.0161	0.0015	10.0	
4000	5.7880E-03	0.1317	0.0311	0.0		2.7894E-05	0.1145	0.0656	0.0		2.6224E-01	0.0140	0.0011	10.0	
5000	5.9924E-03	0.1168	0.0239	0.0		2.7855E-05	0.1020	0.0485	0.0		2.6175E-01	0.0126	0.0009	10.0	
6000	5.9423E-03	0.1055	0.0195	0.0		2.7793E-05	0.0931	0.0418	0.0		2.6496E-01	0.0116	0.0007	10.0	
7000	5.9749E-03	0.0968	0.0170	0.0		2.8647E-05	0.0919	0.0581	0.0		2.6691E-01	0.0107	0.0006	10.0	
8000	5.7670E-03	0.0913	0.0154	0.0		2.8249E-05	0.0838	0.0524	10.0		2.6739E-01	0.0100	0.0005	10.0	
9000	5.7398E-03	0.0864	0.0135	0.0		2.7485E-05	0.0779	0.0491	10.0		2.6699E-01	0.0095	0.0005	10.0	
10000	5.7777E-03	0.0811	0.0120	0.0		2.7551E-05	0.0722	0.0436	10.0		2.6690E-01	0.0090	0.0004	10.0	

tally 11					tally 21					tally 31				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	4.4504E-01	0.0296	0.0002	2.1	5.6500E-01	0.0286	0.0004	4.4	-5.6500E-01	0.0286	0.0004	0.0		
2000	4.4489E-01	0.0211	0.0001	2.0	5.6500E-01	0.0204	0.0003	4.4	-5.6500E-01	0.0204	0.0003	0.0		
3000	4.4226E-01	0.0173	0.0001	1.8	5.6400E-01	0.0168	0.0002	10.0	-5.6400E-01	0.0168	0.0002	0.0		
4000	4.4011E-01	0.0151	0.0000	1.8	5.6100E-01	0.0147	0.0002	10.0	-5.6100E-01	0.0147	0.0002	0.0		
5000	4.4004E-01	0.0135	0.0000	1.9	5.5860E-01	0.0131	0.0001	10.0	-5.5860E-01	0.0131	0.0001	0.0		
6000	4.3549E-01	0.0125	0.0000	1.8	5.5433E-01	0.0121	0.0001	10.0	-5.5433E-01	0.0121	0.0001	0.0		
7000	4.3477E-01	0.0115	0.0000	1.9	5.5386E-01	0.0112	0.0001	10.0	-5.5386E-01	0.0112	0.0001	0.0		
8000	4.3339E-01	0.0108	0.0000	1.8	5.5238E-01	0.0105	0.0001	10.0	-5.5238E-01	0.0105	0.0001	0.0		
9000	4.3428E-01	0.0102	0.0000	1.7	5.5200E-01	0.0099	0.0001	10.0	-5.5200E-01	0.0099	0.0001	0.0		
10000	4.3411E-01	0.0097	0.0000	1.6	5.5130E-01	0.0094	0.0001	10.0	-5.5130E-01	0.0094	0.0001	0.0		

tally 41					tally 51					tally 58				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	5.6500E-01	0.0286	0.0004	4.4	-5.6500E-01	0.0286	0.0004	0.0	1.0000E+00	0.0000	0.0000	10.0		
2000	5.6500E-01	0.0204	0.0003	4.4	-5.6500E-01	0.0204	0.0003	0.0	1.0000E+00	0.0000	0.0000	10.0		
3000	5.6400E-01	0.0168	0.0002	10.0	-5.6400E-01	0.0168	0.0002	0.0	1.0000E+00	0.0000	0.0000	10.0		
4000	5.6100E-01	0.0147	0.0002	10.0	-5.6100E-01	0.0147	0.0002	0.0	1.0000E+00	0.0000	0.0000	10.0		
5000	5.5860E-01	0.0131	0.0001	10.0	-5.5860E-01	0.0131	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
6000	5.5433E-01	0.0121	0.0001	10.0	-5.5433E-01	0.0121	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
7000	5.5386E-01	0.0112	0.0001	10.0	-5.5386E-01	0.0112	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
8000	5.5238E-01	0.0105	0.0001	10.0	-5.5238E-01	0.0105	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
9000	5.5200E-01	0.0099	0.0001	10.0	-5.5200E-01	0.0099	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
10000	5.5130E-01	0.0094	0.0001	10.0	-5.5130E-01	0.0094	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		

tally 8

nps	mean	error	vov	slope fom
1000	2.6993E-01	0.0279	0.0044	10.0
2000	2.6475E-01	0.0199	0.0022	10.0
3000	2.6433E-01	0.0161	0.0015	10.0
4000	2.6224E-01	0.0140	0.0011	10.0
5000	2.6175E-01	0.0126	0.0009	10.0
6000	2.6496E-01	0.0116	0.0007	10.0
7000	2.6691E-01	0.0107	0.0006	10.0
8000	2.6739E-01	0.0100	0.0005	10.0
9000	2.6699E-01	0.0095	0.0005	10.0
10000	2.6690E-01	0.0090	0.0004	10.0

tally data written to file inp20m

6 warning messages so far.

run terminated when 10000 particle histories were done.

File: Inp24o

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1 -10.182 -1 u=2
3- 2 2 -.001 1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14:15 u=3
7- 6 3 -6.55 14 -15 u=3
8- 7 4 -1.0 -4 +5 -6 +7 u=1 lat=1 fill=-8:8 -8:8 0:0
9- 1 17r 2 14r 1 1 2 14r 1 1 2 2 3 2 2 3 2 2 2
10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 2 2 1 1 2 14r 1 1 2 14r 1 17r
17- 8 0-8 -10 -12 u=4 fill=1
18- 9 5-7.9 8:10 u=4

```

```

19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- 19 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
29- 20 0 -28;-29;+21;-22;+25
30-
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250.7 2.4 4500 0
warning. tallies are normed per fission neutron for one generation.
64- ksrc 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- mt4 lwtr.01t
73- drxs
74- prdmp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2
76- sd6 1 4r
77-
total fission nubar data are being used.

warning. continuous-energy cross-section table used for 1001.00d
warning. continuous-energy cross-section table used for 5011.40d
warning. continuous-energy cross-section table used for 6012.40d

```

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells print table 60

		atom		gram		neutron	
cell	mat	density	density	volume	mass	pieces	importance
1	1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0 1.0000E+00
2	2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0 1.0000E+00
3	3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
4	4s	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
5	5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
6	6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
7	7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
8	8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
9	9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
12	12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
13	13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
14	14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
15	15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0 1.0000E+00
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 0.0000E+00
total			0.00000E+00	0.00000E+00			

11 warning messages so far.

1cross-section tables print table 100

table length

tables from file testtbl1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503
92238.40c	48310	ENDL library name: nd901118 MCNP translation:	9total nu 56:49		901119
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin	1001 0	010/22/85	

total 261165

warning. neutron energy cutoff is below some cross-section tables.

imal words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.
 1 estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

estimator	cycle	4	ave of 2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886	0.568374	0.0291	k(col/abs)	0.000000	0.000000	0.0000
k(absorption)	0.583788	0.591169	0.0125	k(abs/tk ln)	0.000000	0.000000	0.0000
k(trk length)	0.582547	0.568877	0.0240	k(tk ln/col)	0.000000	0.000000	0.0000
rem life(col)	3.9485E+03	3.8951E+03	0.0137				
rem life(abs)	4.0658E+03	3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000E+00	0.0000
source points generated	264						

source distribution written to file inp24s cycle = 4

1 problem summary

run terminated when 4 kcode cycles were done.

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)			(per source particle)			
source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
			energy cutoff	0	0.	0.	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtran	0	0.	0.	dxtran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
			capture	0	8.1698E-01	1.8384E-02	
(n,nx)	8	6.9970E-03	3.6428E-03	loss to (n,nx)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03
total neutron collisions	57706	capture or escape	4.1766E+03
net multiplication	1.0033E+00	any termination	4.4650E+03
			wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	690539	most random numbers used was	3677 in history 21

range of sampled source weights = 9.8814E-01 to 1.1962E+00

1 neutron activity in each cell

print table 126

cell	entering	population	collisions	collisions	number	flux	average	average
			* weight	weighted	weighted	track weight	track mfp	
			(per history)	energy	energy	(relative)	(cm)	
1	1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01
								3.6368E+00

4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01	1.4858E+00
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01	1.3256E+00
6	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01	3.6398E+00
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01	1.7232E+00
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01	3.1777E+00
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01	1.0087E+00
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total 138515 6658 57706 4.4801E+01									

the initial fission neutron source distribution used the 1 source points that were input on the kscc card.
the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.
this problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev	form
1	250	0.65821 0.61995 0.71299			
2	228	0.54932 0.55922 0.57971			
----- begin active keff cycles -----					
3	209	0.55186 0.59855 0.55521			
4	253	0.58489 0.58379 0.58255	0.56837 0.01651	0.59117 0.00738	0.56888 0.01367

the largest active cycle keffs by estimator are:

the smallest active cycle keffs by estimator are:

collision 0.58489 on cycle 4	collision 0.55186 on cycle 3
absorption 0.59855 on cycle 3	absorption 0.58379 on cycle 4
track length 0.58255 on cycle 4	track length 0.55521 on cycle 3
Italy 6 nps = 940	
tally type 6 track length estimate of heating.	units mev/gram
tally for neutrons	
number of histories used for normalizing tallies =	500.00

masses

cell:	8	12	13	14	15
	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

cell 8

4.02566E+01 0.0434

cell 12
2.65224E+01 0.0629

cell 13
1.32494E+01 0.0904

cell 14
9.78180E-01 0.4014

cell 15
1.20234E-01 0.9710

analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
(largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

(confidence interval shift)/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	mean--	relative error-----	variance of the variance---	figure of merit--	pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope
desired	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant	random >3.00
observed	random	0.04 yes yes	0.01 yes yes		0.00
passed?	yes	yes yes yes	yes yes yes		no

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

unnormalized tally density for tally 6 nonzero tally mean(m) = 4.357E+01 nps = 940 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally	number	num den	log den	d-----	d-----	d-----
2.51-01	1	3.87-02	-1.412	*****	*****	*****
6-01	2	6.15-02	-1.211	*****	*****	*****
98-01	1	2.44-02	-1.612	*****	*****	*****

```

5.01-01 1 1.94-02 -1.712 *****
4-01 2 3.08-02 -1.511 *****
4-01 3 3.67-02 -1.435 *****
1.00+00 5 4.86-02 -1.313 *****
1.26+00 1 7.72-03 -2.112 *****
1.58+00 5 3.07-02 -1.513 *****
2.00+00 7 3.41-02 -1.467 *****
2.51+00 6 2.32-02 -1.634 *****
3.16+00 8 2.46-02 -1.609 *****
3.98+00 11 2.69-02 -1.571 *****
5.01+00 14 2.72-02 -1.566 *****
6.31+00 10 1.54-02 -1.812 *****
7.94+00 14 1.71-02 -1.766 *****
1.00+01 13 1.26-02 -1.898 *****
1.26+01 16 1.24-02 -1.908 *****
1.58+01 11 6.75-03 -2.171 *****
2.00+01 20 9.75-03 -2.011 *****
2.51+01 32 1.24-02 -1.907 *****
3.16+01 41 1.26-02 -1.899 *****
3.98+01 24 5.86-03 -2.232 *****
5.01+01 48 9.31-03 -2.031 *****
6.31+01 54 8.32-03 -2.080 *****
7.94+01 40 4.90-03 -2.310 *****
1.00+02 28 2.72-03 -2.565 *****
1.26+02 20 1.54-03 -2.811 *****
1.58+02 21 1.29-03 -2.890 *****
2.00+02 2 9.75-05 -4.011 *****
2.51+02 0 0.00+00 0.000 *****
3.16+02 1 3.08-05 -4.512 *
total 462 9.24-01 d-----d-----d-----

```

status of the statistical checks used to form confidence intervals for the mean for each tally bin

result of statistical checks for the ttc bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of 10 ttc bin checks: there is insufficient ttc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

tally fluctuation charts

```

tally 6
nps mean error vov slope fom
940 4.0257E+01 0.0434 0.0095 0.0
tally data written to file inp24m

```

15 warning messages so far.

run terminated when 4 kcode cycles were done.

File: Outp24

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1 -10.182 -1 u=2
3- 2 2 -.001 1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14:15 u=3
7- 6 3 -6.55 14 -15 u=3
7 4 -1.0 -4 +5 -6 +7 u=1 lat=1 fill=-8:8 -8:8 0:0
1 17r 2 14r 1 1 2 14r 1 1 2 2 3 2 2 3 2 2r 3 2 2

```

```

10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 2r 1 17r
17- 8 0 -8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4
19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- :(+28 +29 -19 +24 -25)
29- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
30- 20 0 -28 -29;+21:-22;+25
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250.7 2 4 4500 0
warning. tallies are normed per fission neutron for one generation.
64- ksrc 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- m14 lwr:01t
73- drxs
74- prdmp 2j -1
f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2

```

76- sd6 1 4r

77-

fission nubar data are being used.

warning. continuous-energy cross-section table used for 1001.00d

warning. continuous-energy cross-section table used for 5011.40d

warning. continuous-energy cross-section table used for 6012.40d

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells

print table 60

cell	mat	atom density	gram density	volume	neutron mass	pieces	importance
1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0	1.0000E+00
3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
4	4	4s 1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
10	10	4s 1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
11	11	4s 1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
15	15	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
16	16	4s 1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
17	17	4s 1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
18	18	6.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
19	19	7.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
20	20	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 0.00000E+00 0.00000E+00

11 warning messages so far.

1cross-section tables

print table 100

table length

tables from file testtbl1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831	14:10:05	900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831	14:10:05	900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831	14:10:05	900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831	14:10:05	900207
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831	14:10:05	900207
40000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831	14:10:05	900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu	10:05	900503

92238.40c 48310 ENDL library name: nd901118 MCNP translation: 9total nu 56.49 901119
 011 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85
 total 261165

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.

Estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

source distribution written to file inp24s cycle = 3

estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886	0.568374	0.0291	k(col/abs)	0.000000	0.000000	0.000000	0.0000
k(absorption)	0.583788	0.591169	0.0125	k(abs/tk ln)	0.000000	0.000000	0.000000	0.0000
k(trk length)	0.582547	0.568877	0.0240	k(tk ln/col)	0.000000	0.000000	0.000000	0.0000
rem life(col)	3.9485E+03	3.8951E+03	0.0137					
rem life(abs)	4.0658E+03	3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000E+00	0.0000E+00	0.0000
source points generated	264							

source distribution written to file inp24s cycle = 4

problem summary

run terminated when 4 kcode cycles were done.

0

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
				energy cutoff	0	0.	0.
				time cutoff	0	0.	0.
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dextran	0	0.	0.	dextran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
				capture	0	8.1698E-01	1.8384E-02
(n,xn)	8	6.9970E-03	3.6428E-03	loss to (n,xn)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00 tco 1.0000E+34
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03 eco 0.0000E+00
total neutron collisions	57706	capture or escape	4.1766E+03 wc1 -5.0000E-01
net multiplication	1.0033E+00 0.0030	any termination	4.4650E+03 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0

random numbers generated

690539

most random numbers used was

3677 in history 21

age of sampled source weights = 9.8814E-01 to 1.1962E+00

neutron activity in each cell

print table 126

cell	tracks entering	population	collisions (per history)	collisions * weight energy	collisions weighted energy	number flux weighted (relative)	average track weight (cm)	average track mfp
1	1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01
4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01
6	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total		138515	6658	57706	4.4801E+01			

the initial fission neutron source distribution used the 1 source points that were input on the ksrc card.

the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.

the problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.

all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev
1	250	0.65821 0.61995 0.71299		
2	228	0.54932 0.55922 0.57971		
----- begin active keff cycles -----				
3	209	0.55186 0.59855 0.55521		
4	253	0.58489 0.58379 0.58255	0.56837 0.01651 0.59117 0.00738 0.56888 0.01367	

the largest active cycle keffs by estimator are:

collision 0.58489 on cycle 4
absorption 0.59855 on cycle 3
track length 0.58255 on cycle 4

the smallest active cycle keffs by estimator are:

collision 0.55186 on cycle 3
absorption 0.58379 on cycle 4
track length 0.55521 on cycle 3

tally 6 nps = 940
 tally type 6 track length estimate of heating. units mev/gram
 tally for neutrons
 number of histories used for normalizing tallies = 500.00

masses
 cell: 8 12 13 14 15
 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00

cell 8
 4.02566E+01 0.0434

cell 12
 2.65224E+01 0.0629

cell 13
 1.32494E+01 0.0904

cell 14
 9.78180E-01 0.4014

cell 15
 1.20234E-01 0.9710

analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
 estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
 relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
 history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
 (largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

confidence interval shift/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
 nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
 the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	mean--	relative error-----	variance of the variance----	figure of merit--	-pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior slope	
desired	random	<0.10 yes	1/sqrt(nps) yes	1/nps	constant random >3.00
observed	random	0.04 yes	0.01 yes	yes	0.00
passed?	yes	yes yes	yes yes	yes	no

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

unnormed tally density for tally 6 nonzero tally mean(m) = 4.357E+01 nps = 940 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally number	num den	log den	d
2.51-01	1	3.87-02	-1.412
3.16-01	2	6.15-02	-1.211
3.98-01	1	2.44-02	-1.612
5.01-01	1	1.94-02	-1.712
6.31-01	2	3.08-02	-1.511
7.94-01	3	3.67-02	-1.435
1.00+00	5	4.86-02	-1.313
1.26+00	1	7.72-03	-2.112
1.58+00	5	5.07-02	-1.513
2.00+00	7	3.41-02	-1.467
2.51+00	6	2.32-02	-1.634
3.16+00	8	2.46-02	-1.609
3.98+00	11	2.69-02	-1.571
5.01+00	14	2.72-02	-1.566
6.31+00	10	1.54-02	-1.812
7.94+00	14	1.71-02	-1.766
1.00+01	13	1.26-02	-1.898
1.26+01	16	1.24-02	-1.908
1.58+01	11	6.75-03	-2.171
2.00+01	20	9.75-03	-2.011
2.51+01	32	1.24-02	-1.907
3.16+01	41	1.26-02	-1.899
3.98+01	24	5.86-03	-2.232
5.01+01	48	9.31-03	-2.031
6.31+01	54	8.32-03	-2.080
7.94+01	40	4.90-03	-2.310
1.00+02	28	2.72-03	-2.565
1.26+02	20	1.54-03	-2.811
1.58+02	21	1.29-03	-2.890
2.00+02	2	9.75-05	-4.011
2.51+02	0	0.00+00	0.000
3.16+02	1	3.08-05	-4.512
total	462	9.24-01	d

status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 6
nps mean error vov slope fom
940 4.0257E+01 0.0434 0.0095 0.0
tally data written to file inp24m

15 warning messages so far.

terminated when 4 kcode cycles were done.

Computer System ID : 501981-801 056AVO000088 (DOE 6246288)

File: Inp18o

```

1-  prob18 -- kcode in a hexagonal prism lattice.
2-  c   three half control rods and five whole control rods.
3-  30  0 -905 -19 29 1  fill=1
4-  31  0 -906 -19 29 1  fill=1 (16.7113 0 0)
5-  37  0 -907 -19 29 1  fill=1 (-16.7113 0 0)
6-  34  0 -913 -19 29 1  fill=1 (0 11.9185 0)
7-  32  0 -914 -19 29 1  fill=1 (10.3217 5.9592 0)
8-  33  0 -915 -19 29 1  fill=1 (8.3557 14.4724 0)
9-  35  0 -916 -19 29 1  fill=1 (-8.3557 14.4724 0)
10- 36  0 -917 -19 29 1  fill=1 (-10.3217 5.9592 0)
11-  c   universe 1: structure of control rod.
12-  38  11 -2.02  -880 u=1  $ control rod core
13-  39  6 -8.4  880 -881 u=1  $ control rod cladding
14-  40  12 -1.00  881 -882 u=1  $ control rod gap
15-  41  6 -8.4  882  u=1  $ control rod sheath
16-  c   the space between the control rods, filled with lattice.
17-  140  0 -17 1 29 -19 905 906 907 913 914 915 916 917  fill=2
18-  c   universe 2: lattice of fuel rods with water in between.
19-  42  12 -1.00  -301 302 -303 304 -305 306  u=2  lat=2  fill=
20-  -37.27 -1.33 0 0 &
21-  2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22-  2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23-  2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24-  2 3r 3 57r 2 2r &
25-  2 2r 3 58r 2 2r
26-  2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27-  2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28-  2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29-  2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30-  2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31-  2 1r 3 54r 2 7r &
32-  c   can code remember & thru comment?
33-  2 3 55r 2 7r
34-  2 3 25r 2 2r 3 25r 2 8r
35-  2 3 24r 2 3r 3 24r 2 9r
36-  2 3 23r 2 4r 3 23r 2 10r
37-  2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38-  2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39-  2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40-  2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41-  2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42-  2 3 46r 2 16r
43-  2 3 45r 2 17r
44-  2 3 44r 2 18r
45-  2 1r 3 41r 2 20r
46-  2 1r 3 40r 2 21r
47-  2 1r 3 39r 2 22r
48-  2 2r 3 36r 2 24r
49-  2 2r 3 35r 2 25r
50-  2 3r 3 32r 2 27r
51-  2 4r 3 29r 2 29r
52-  2 5r 3 26r 2 31r
53-  2 6r 3 23r 2 33r
54-  2 8r 3 18r 2 36r
55-  2 11r 3 11r 2 40r
56-  2 64r
57-  c   universe 3: structure of fuel rod lattice elements.
58-  154  2 -13.75  -58  u=3  $ fuel element
59-  149  12 -1.00  58 -268  u=3  $ gap
60-  144  7 -19.66  268 -478  u=3  $ liner
61-  159  6 -8.4  478 -698  u=3  $ cladding
62-  141  12 -1.00  698  u=3  $ water between the fuel rods

```


total fission nubar data are being used.

print table 30

tally 4 fuel rod flux in 5 y locations averaged over 5 x elements
 tally type 4 track length estimate of particle flux.
 tally for neutrons

order of printing: f e

cells (154<(42[-10:-6 -1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6
 29 0]))

energy bins

0.00000E+00 to 1.00000E-02 mev
 1.00000E-02 to 1.00000E-01 mev
 1.00000E-01 to 1.00000E+00 mev
 1.00000E+00 to 1.00000E+01 mev
 total bin

material composition

print table 40

the sum of the fractions of material 2 was 9.999900E-01

the sum of the fractions of material 7 was 7.400000E-01

the sum of the fractions of material 12 was 3.000000E+00

material

number component nuclide, atom fraction

2	92235, 0.37504	92238, 0.12499	7014, 0.49997
6	41093, 0.98982	40000, 0.01018	
7	74000, 1.00000		
11	5010, 0.71977	5011, 0.08004	6012, 0.20019
12	1001, 0.33333	1002, 0.33333	8016, 0.33333

associated thermal s(a,b) data sets: hwtr.01t lwtr.01t

material

number component nuclide, mass fraction

2	92235, 0.70574	92238, 0.23821	7014, 0.05605
6	41093, 0.99000	40000, 0.01000	
7	74000, 1.00000		
11	5010, 0.68700	5011, 0.08400	6012, 0.22900
12	1001, 0.05300	1002, 0.10591	8016, 0.84109

warning. 3 of the materials had unnormalized fractions.

1 cell volumes and masses

print table 50

	cell	atom density	gram density	input volume	calculated volume	mass	reason volume pieces not calculated	
1	30	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
2	31	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
3	37	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
4	34	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
5	32	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
6	33	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
7	35	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
8	36	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
9	38	1.15958E-01	2.02000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
10	39	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
11	40	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
12	41	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
13	140	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
14	42	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite

```

15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
16 149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
17 144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
isurface areas print table 50

```

```

surface input calculated reason area
area area not calculated

1 1 0.00000E+00 0.00000E+00 asymmetric
2 17 0.00000E+00 0.00000E+00 asymmetric
3 19 0.00000E+00 0.00000E+00 asymmetric
4 29 0.00000E+00 0.00000E+00 asymmetric
5 58 0.00000E+00 0.00000E+00 infinite
6 268 0.00000E+00 0.00000E+00 infinite
7 478 0.00000E+00 0.00000E+00 infinite
8 698 0.00000E+00 0.00000E+00 infinite
9 880 0.00000E+00 0.00000E+00 infinite
10 881 0.00000E+00 0.00000E+00 infinite
11 882 0.00000E+00 0.00000E+00 infinite
12 905 0.00000E+00 0.00000E+00 asymmetric
13 906 0.00000E+00 0.00000E+00 asymmetric
14 907 0.00000E+00 0.00000E+00 asymmetric
15 913 0.00000E+00 8.40057E+02
16 914 0.00000E+00 8.40057E+02
17 915 0.00000E+00 8.40057E+02
18 916 0.00000E+00 8.40057E+02
19 917 0.00000E+00 8.40057E+02
20 301 0.00000E+00 0.00000E+00 infinite
21 302 0.00000E+00 0.00000E+00 infinite
22 303 0.00000E+00 0.00000E+00 infinite
23 304 0.00000E+00 0.00000E+00
24 305 0.00000E+00 0.00000E+00
25 306 0.00000E+00 0.00000E+00

```

```

icells print table 60

```

```

atom gram neutron
cell mat density density volume mass pieces importance

1 30 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
2 31 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
3 37 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
4 34 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
5 32 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
6 33 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
7 35 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
8 36 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
9 38 11 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
10 39 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
11 40 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
12 41 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
13 140 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
14 42 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
15 154 2 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
16 149 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
17 144 7 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
18 159 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
20 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

```

```

total 4.42185E+03 0.00000E+00

```

```

isurfaces print table 70

```

```

surface trans type surface coefficients

```

```

1 1 refl. py 0.0000000E+00
2 17 cz 2.9135000E+01
4 19 pz 3.1750000E+01
4 29 pz -3.1750000E+01
5 58 c/z 3.4414000E+00 8.5150000E-01 3.2400000E-01
6 268 c/z 3.4414000E+00 8.5150000E-01 3.3450000E-01
7 478 c/z 3.4414000E+00 8.5150000E-01 3.4750000E-01
8 698 c/z 3.4414000E+00 8.5150000E-01 4.3180000E-01
9 880 cz 1.7251000E+00
10 881 cz 1.8051000E+00
11 882 cz 1.9051000E+00
12 905 cz 2.1055000E+00
13 906 c/z 1.6711300E+01 0.0000000E+00 2.1055000E+00
14 907 c/z -1.6711300E+01 0.0000000E+00 2.1055000E+00
15 913 c/z 0.0000000E+00 1.1918500E+01 2.1055000E+00
16 914 c/z 1.0321700E+01 5.9592000E+00 2.1055000E+00
17 915 c/z 8.3557000E+00 1.4472400E+01 2.1055000E+00
18 916 c/z -8.3557000E+00 1.4472400E+01 2.1055000E+00
19 917 c/z -1.0321700E+01 5.9592000E+00 2.1055000E+00
20 301 px 3.9330000E+00
21 302 px 2.9498000E+00
22 303 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 5.8994000E+00
23 304 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 3.9330000E+00
24 305 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -9.8340000E-01
25 306 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -2.9498000E+00

```

1 cell temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

1 cross-section tables

print table 100

table length

tables from file testlib1

```

1001.00c 1782 1-h-1 from endf-vi.1 mat 125 05/26/93
1002.55c 4102 njoy ( 120) 04/26/82
5011.40c 3229 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
6012.40c 4858 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
7014.40c 8535 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
8016.40c 5358 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
40000.40c 93372 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900323
41093.40c 42746 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
74000.40c 91244 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
92235.40c 34772 ENDL library name: nd900719 MCNP translation: 9total nu 10:05 900503
92238.40c 40834 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
5010.03d 3682 b-10 endf/b-iv new gamma production format ( 1273) 14 oct 75
hwtr.01t 10193 deuterium in heavy water at 300 degrees kelvin 1002 0 010/22/85
lwtr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

```

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file imp18s cycle = 0

3 warning messages so far.

1 starting mcrcn. field length = 0 cp0 = 0.00

print table 110

prob18 -- kcode in a hexagonal prism lattice.

id	x	y	z	cell lattice (i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
2	3.492E+00	2.000E-01	2.000E-01	42(0, -1, 0)			5.085E-01	4.733E-01	7.193E-01		
3	3.492E+00	1.051E+00	2.000E-01	154			0 5.085E-01	4.733E-01	7.193E-01		
4	2 3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
5	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			8.952E-01	-4.447E-01	-2.944E-02		
6	3.492E+00	1.051E+00	2.000E-01	154			0 8.952E-01	-4.447E-01	-2.944E-02		
7	3 3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
8	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-6.184E-01	-4.495E-01	6.446E-01		
9	3.492E+00	1.051E+00	2.000E-01	154			0 -6.184E-01	-4.495E-01	6.446E-01		
10	4 3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
11	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			9.710E-01	-5.665E-02	-2.323E-01		
12	3.492E+00	1.051E+00	2.000E-01	154			0 9.710E-01	-5.665E-02	-2.323E-01		
13	5 3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
14	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			5.861E-01	1.496E-01	-7.963E-01		
15	3.492E+00	1.051E+00	2.000E-01	154			0 5.861E-01	1.496E-01	-7.963E-01		
16	6 3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
17	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-6.489E-02	-1.626E-01	9.845E-01		
18	3.492E+00	1.051E+00	2.000E-01	154			0 -6.489E-02	-1.626E-01	9.845E-01		
19	7 3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
20	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-7.068E-02	3.263E-02	-9.970E-01		
21	3.492E+00	1.051E+00	2.000E-01	154			0 -7.068E-02	3.263E-02	-9.970E-01		
22	8 3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
23	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-3.915E-01	4.664E-01	-7.932E-01		
24	3.492E+00	1.051E+00	2.000E-01	154			0 -3.915E-01	4.664E-01	-7.932E-01		
25	9 3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
26	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-2.368E-01	9.215E-01	-3.079E-01		
27	3.492E+00	1.051E+00	2.000E-01	154			0 -2.368E-01	9.215E-01	-3.079E-01		
28	10 3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
29	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			1.946E-01	-3.204E-01	9.271E-01		
30	3.492E+00	1.051E+00	2.000E-01	154			0 1.946E-01	-3.204E-01	9.271E-01		
31	11 3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
32	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-6.698E-01	-7.177E-01	-1.905E-01		
33	3.492E+00	1.051E+00	2.000E-01	154			0 -6.698E-01	-7.177E-01	-1.905E-01		
34	12 3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
35	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-8.398E-01	-4.129E-01	3.524E-01		
36	3.492E+00	1.051E+00	2.000E-01	154			0 -8.398E-01	-4.129E-01	3.524E-01		
37	13 3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
38	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-1.714E-01	-8.572E-01	4.857E-01		
39	3.492E+00	1.051E+00	2.000E-01	154			0 -1.714E-01	-8.572E-01	4.857E-01		
40	14 3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
41	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-2.489E-01	-5.118E-01	-8.222E-01		
42	3.492E+00	1.051E+00	2.000E-01	154			0 -2.489E-01	-5.118E-01	-8.222E-01		
43	15 3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
44	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-2.959E-01	2.119E-01	9.314E-01		
45	3.492E+00	1.051E+00	2.000E-01	154			0 -2.959E-01	2.119E-01	9.314E-01		
46	16 3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
47	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			1.395E-01	-9.829E-01	1.202E-01		
48	3.492E+00	1.051E+00	2.000E-01	154			0 1.395E-01	-9.829E-01	1.202E-01		
49	17 3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
50	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			6.909E-01	-7.110E-01	1.307E-01		
51	3.492E+00	1.051E+00	2.000E-01	154			0 6.909E-01	-7.110E-01	1.307E-01		
52	18 3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
53	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-6.580E-01	5.320E-01	-5.329E-01		
54	3.492E+00	1.051E+00	2.000E-01	154			0 -6.580E-01	5.320E-01	-5.329E-01		
55	19 3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00
56	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-9.903E-01	-1.380E-01	1.353E-02		
57	3.492E+00	1.051E+00	2.000E-01	154			0 -9.903E-01	-1.380E-01	1.353E-02		
58	20 3.000E+00	2.000E-01	2.000E-01	140			7.462E-01	4.859E-01	-4.551E-01	1.000E+00	1.000E+00 0.000E+00
59	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			7.462E-01	4.859E-01	-4.551E-01		
60	3.492E+00	1.051E+00	2.000E-01	154			0 7.462E-01	4.859E-01	-4.551E-01		
61	21 3.000E+00	2.000E-01	2.000E-01	140			-1.977E-01	9.797E-01	3.360E-02	3.990E+00	1.000E+00 0.000E+00
62	3.492E+00	1.051E+00	2.000E-01	42(0, -1, 0)			-1.977E-01	9.797E-01	3.360E-02		
63	3.492E+00	1.051E+00	2.000E-01	154			0 -1.977E-01	9.797E-01	3.360E-02		
64	22 3.000E+00	2.000E-01	2.000E-01	140			-9.117E-01	-3.647E-01	-1.891E-01	2.665E-01	1.000E+00 0.000E+00

3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
 24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
 25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
 26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
 27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
 28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
 29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
 30 2.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
 31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
 32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
 33 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
 34 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
 35 2.000E-01 3.000E+00 2.000E-01 140 -0.408E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -0.408E-02 8.831E-01 4.675E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -0.408E-02 8.831E-01 4.675E-01
 36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
 37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
 38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
 39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
 40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
 41 2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -3.212E-01 -7.678E-01 -5.543E-01
 42 2.000E-01 3.000E+00 2.000E-01 140 5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 5.039E-01 -1.460E-01 8.513E-01
 43 2.000E-01 3.000E+00 2.000E-01 140 6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 6.080E-01 5.487E-01 5.738E-01
 2.000E-01 3.000E+00 2.000E-01 140 -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01


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3.641E+00 4.456E-01 2.000E-01 141      0 -2.932E-01 9.304E-01 -2.199E-01
2.000E-01 3.000E+00 2.000E-01 140      -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140      1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141      0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140      7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141      0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140      4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141      0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140      5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140      -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -1.053E-01 -9.805E-01 1.658E-01
estimated keff results by cycle                                print table 175

```

```

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257
cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195
cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193
cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182
cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222
cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

```

```

source distribution written to file inpl8s      cycle = 6
problem summary

```

```

run terminated when 6 kcode cycles were done.

```

```

neutron creation      tracks      weight      energy      neutron loss      tracks      weight      energy
                    (per source particle)                    (per source particle)

source      1249      9.6077E-01      1.8661E+00      escape      220      1.2268E-01      1.2054E-01
                    energy cutoff      0 0.      0.
                    time cutoff      0 0.      0.
weight window      0 0.      0.      weight window      0 0.      0.
cell importance      0 0.      0.      cell importance      0 0.      0.
weight cutoff      0 1.3743E-01      3.8498E-03      weight cutoff      1034      1.2791E-01      5.1920E-03
energy importance      0 0.      0.      energy importance      0 0.      0.
dxtan      0 0.      0.      dxtan      0 0.      0.
forced collisions      0 0.      0.      forced collisions      0 0.      0.
exp. transform      0 0.      0.      exp. transform      0 0.      0.
upscattering      0 0.      5.3884E-11      downscattering      0 0.      1.3605E+00
                    capture      0 3.9980E-01      1.1590E-01
(n,nx)      10      6.1640E-03      6.1355E-03      loss to (n,nx)      5      3.0820E-03      2.4027E-02
fission      0 0.      0.      loss to fission      0 4.5089E-01      2.4987E-01
total      1259      1.1044E+00      1.8761E+00      total      1259      1.1044E+00      1.8761E+00

```

```

number of neutrons banked      5      average lifetime, shakes      cutoffs
neutron tracks per source particle      1.0080E+00      escape      3.7027E+00      tco      1.0000E+34
neutron collisions per source particle      1.8226E+01      capture      1.2954E+01      eco      0.0000E+00
total neutron collisions      22764      capture or escape      1.1788E+01      wc1      -5.0000E-01
net multiplication      1.0032E+00 0.0035      any termination      1.2744E+01      wc2      -2.5000E-01

```

```

computer time so far in this run      0.00 minutes      maximum number ever in bank      1
computer time in mcrun      0.00 minutes      bank overflows to backup file      0
source particles per minute      0.0000E+00      field length      0
random numbers generated      500880      most random numbers used was      1298 in history      14

```

range of sampled source weights = 7.7821E-01 to 1.0989E+00

neutron activity in each cell

print table 126

cell	tracks entering	population	collisions	collisions	number	flux	average	average
			* weight	weighted	weighted	weighted	track weight	track mfp
			(per history)	energy	energy	(relative)	(cm)	
1	30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6977E-01
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01

total 266059 9765 22764 1.1324E+01

neutron weight balance in each cell -- external events

print table 130

cell	entering	source	energy	time	exiting	total
			cutoff	cutoff		
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	4.8822E-01	0.0000E+00	0.0000E+00	0.0000E+00	-3.3091E-01
10	39	8.4996E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.4933E-01
11	40	8.9904E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.9904E-01
12	41	9.7260E-01	0.0000E+00	0.0000E+00	0.0000E+00	-9.6978E-01
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.0907E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.0913E+00
15	154	1.2943E+01	8.4067E-01	0.0000E+00	0.0000E+00	-1.3171E+01
16	149	2.6508E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.6508E+01
17	144	2.7419E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.7405E+01
18	159	3.1331E+01	8.0064E-02	0.0000E+00	0.0000E+00	-3.1361E+01
19	141	3.9111E+01	4.0032E-02	0.0000E+00	0.0000E+00	-3.9150E+01

total 1.4161E+02 9.6077E-01 0.0000E+00 0.0000E+00 -1.4174E+02 8.3809E-01

neutron weight balance in each cell -- variance reduction effects

print table 130

cell	weight	cell	weight	energy	dextran	forced	exponential	total
window	importance	importance	cutoff	importance	collision	transform		
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

```

9 38 0.0000E+00 0.0000E+00 1.2447E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2447E-03
39 0.0000E+00 0.0000E+00 2.0097E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 2.0097E-04
40 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
12 41 0.0000E+00 0.0000E+00 2.9100E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 2.9100E-04
13 140 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
14 42 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
15 154 0.0000E+00 0.0000E+00 8.0354E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.0354E-03
16 149 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
17 144 0.0000E+00 0.0000E+00 -3.0848E-06 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 -3.0848E-06
18 159 0.0000E+00 0.0000E+00 -2.5216E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 -2.5216E-04
19 141 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00

total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03
Neutron weight balance in each cell — physical events print table 130

```

cell	(n,xn)	fission	capture (n,xn)	loss to fission	total
1 30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2 31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3 37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4 34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5 32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6 33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7 35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8 36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9 38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	0.0000E+00
10 39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	0.0000E+00
11 40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	0.0000E+00
12 41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	0.0000E+00
13 140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14 42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	5.9111E-04
15 154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-03	-4.5089E-01
16 149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	0.0000E+00
17 144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	0.0000E+00
18 159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	0.0000E+00
19 141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	0.0000E+00
total	6.1640E-03	0.0000E+00	-3.9980E-01	-3.0820E-03	-4.5089E-01

neutron activity of each nuclide in each cell, per source particle print table 140

cell	nuclides	atom fraction	total collisions	collisions * weight	weight lost to capture	weight loss to fission	weight gain by (n,xn)
9 38	5010.03d	7.1977E-01	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00
	5011.40c	8.0041E-02	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
	6012.40c	2.0019E-01	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
10 39	41093.40c	9.8982E-01	128	6.2802E-02	8.2814E-04	0.0000E+00	0.0000E+00
	40000.40c	1.0183E-02	2	9.7676E-04	3.3160E-07	0.0000E+00	0.0000E+00
11 40	1001.00c	3.3333E-01	111	5.1533E-02	3.9251E-06	0.0000E+00	0.0000E+00
	1002.55c	3.3333E-01	33	1.5373E-02	2.0884E-08	0.0000E+00	0.0000E+00
	8016.40c	3.3333E-01	40	2.1271E-02	0.0000E+00	0.0000E+00	0.0000E+00
12 41	41093.40c	9.8982E-01	313	1.5623E-01	3.1072E-03	0.0000E+00	0.0000E+00
	40000.40c	1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00
14 42	1001.00c	3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00	0.0000E+00
	1002.55c	3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00	6.2306E-04
	8016.40c	3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00	0.0000E+00
15 154	92235.40c	3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
	92238.40c	1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
	7014.40c	4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
16 149	1001.00c	3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00	0.0000E+00

1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00	0.0000E+00
8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00	0.0000E+00
17 144	74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00 0.0000E+00
18 159	41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00 0.0000E+00
	40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00 0.0000E+00
19 141	1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00 0.0000E+00
	1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00 0.0000E+00
	8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00 0.0000E+00
total		22764	1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03

total over all cells for each nuclide	total collisions	collisions * weight	weight lost to capture	weight loss to fission	weight gain by (n,xn)
1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04
5011.40c	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00

the initial fission neutron source distribution used the 8 source points that were input on the ksrc card.
the criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.
the problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.
individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev
1	200	1.25311 1.26302 1.22009		
2	257	1.21200 1.25252 1.12957		
3	195	1.20026 1.14326 1.13006		
4	193	1.12953 1.16269 1.10757		
5	182	1.13599 1.12465 1.11238		

----- begin active keff cycles -----

6	222	1.07701 1.04669 1.07528
Italy 4	nps =	1249

+ fuel rod flux in 5 y locations averaged over 5 x elements
tally type 4 track length estimate of particle flux. units 1/cm**2
tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])
cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])
cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])
cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])
cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

```

energy: 1.0000E-02 1.0000E-01 1.0000E+00 1.0000E+01 total
cell
a 0.00000E+00 0.0000 2.84017E-05 0.9975 1.86420E-04 0.4656 1.36846E-04 0.5743 3.51668E-04 0.3877
b 1.07442E-05 0.9975 1.58576E-04 0.5120 2.32928E-04 0.3945 4.44462E-05 0.5872 4.46694E-04 0.2855
c 2.16778E-05 0.7232 9.40943E-05 0.5519 5.37835E-05 0.5876 1.51034E-04 0.7075 3.20589E-04 0.3937
d 1.47903E-05 0.5831 0.00000E+00 0.0000 1.15515E-04 0.5838 1.69653E-04 0.5071 2.99958E-04 0.3718
e 8.04943E-06 0.9975 0.00000E+00 0.0000 0.00000E+00 0.0000 6.81909E-05 0.7477 7.62403E-05 0.6763

```

lanalysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

```

normed average tally per history = 3.51668E-04    unnormed average tally per history = 3.68228E-02
estimated tally relative error = 0.3877    estimated variance of the variance = 0.1752
relative error from zero tallies = 0.3464    relative error from nonzero scores = 0.1740

number of nonzero history tallies = 8    efficiency for the nonzero tallies = 0.0400
history number of largest tally = 1034    largest unnormalized history tally = 1.41575E+00
(largest tally)/(average tally) = 3.84476E+01    (largest tally)/(avg nonzero tally)= 1.53791E+00

(confidence interval shift)/mean = 0.0793    shifted confidence interval center = 3.79539E-04

```

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	3.51668E-04	4.10723E-04	0.167927
relative error	3.87653E-01	3.61597E-01	-0.067213
variance of the variance	1.75161E-01	1.47665E-01	-0.156976
shifted center	3.79539E-04	3.77169E-04	-0.006244
figure of merit	0.00000E+00	0.00000E+00	0.000000

There is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
The history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

tfc bin	--mean--	-----relative error-----	---variance of the variance---	--figure of merit--	-pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope
desired	random	<0.10 yes	1/sqrt(nps) <0.10 yes	1/nps constant	random >3.00
observed	random	0.39 yes	0.18 yes	yes	0.00
passed?	yes	no yes	yes no	yes yes	no

warning. the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.

1 unnormed tally density for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally number	num den log den	d
1.00-01	1.243-01 -0.614	*****
1.26-01	0.00+00 0.000	
1.58-01	0.00+00 0.000	
2.00-01	0.00+00 0.000	
2.51-01	0.00+00 0.000	
3.16-01	0.00+00 0.000	

```

3.98-01 0 0.00+00 0.000
-01 0 0.00+00 0.000
-01 2 7.71-02 -1.113
7.94-01 0 0.00+00 0.000
1.00+00 1 2.43-02 -1.614 m
1.26+00 0 0.00+00 0.000
1.58+00 4 6.14-02 -1.212
total 8 4.00-02 d

```

cumulative tally number for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table i62

```

abscissa cum ordinate plot of the cumulative number of tallies in the tally fluctuation chart bin from 0 to 100 percent
tally number cum pct:-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
1.00000E-01 1 12.500|*****|
1.25893E-01 1 12.500|*****|
1.58489E-01 1 12.500|*****|
1.99526E-01 1 12.500|*****|
2.51189E-01 1 12.500|*****|
3.16228E-01 1 12.500|*****|
3.98108E-01 1 12.500|*****|
5.01188E-01 1 12.500|*****|
6.30958E-01 3 37.500|*****|
7.94329E-01 3 37.500|*****|
1.00000E+00 4 50.000|*****|
1.25893E+00 4 50.000|*****|
1.58489E+00 8 100.000|*****|
total 8 100.000|-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100

```

cumulative unnormed tally for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table i62

```

abscissa cum ordinate plot of the cumulative tally in the tally fluctuation chart bin from 0 to 100 percent
tally tally/nps cum pct:-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
1.00E-01 4.632E-04 1.258|*|
1.259E-01 4.632E-04 1.258|*|
1.585E-01 4.632E-04 1.258|*|
1.995E-01 4.632E-04 1.258|*|
2.512E-01 4.632E-04 1.258|*|
3.162E-01 4.632E-04 1.258|*|
3.981E-01 4.632E-04 1.258|*|
5.012E-01 4.632E-04 1.258|*|
6.310E-01 6.195E-03 16.825|*****|
7.943E-01 6.195E-03 16.825|*****|
1.000E+00 1.017E-02 27.628|*****|
1.259E+00 1.017E-02 27.628|*****|
1.585E+00 3.682E-02 100.000|*****|
total 3.68228E-02 100.000|-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100

```

status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tlc bin (the first check not passed is listed) and error magnitude check for all bins

4 missed 3 of 10 tlc bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies
missed bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

tally fluctuation charts

```

tally 4
nps mean error vov slope fom

```

1000 0.0000E+00 0.0000 0.0000 0.0

249 3.5167E-04 0.3877 0.1752 0.0

data written to file inp18m

ascii file inp18p written with 5 events from 5 histories.

6 warning messages so far.

run terminated when 6 kcode cycles were done.

HNF-SD-SNF-CSWD-005, Rev. 0

File: Outp18

```
1- prob18 -- kcode in a hexagonal prism lattice.
2- c three half control rods and five whole control rods.
3- 30 0 -905 -19 29 1 fill=1
4- 31 0 -906 -19 29 1 fill=1 (16.7113 0 0)
5- 37 0 -907 -19 29 1 fill=1 (-16.7113 0 0)
6- 34 0 -913 -19 29 fill=1 (0 11.9185 0)
7- 32 0 -914 -19 29 fill=1 (10.3217 5.9592 0)
8- 33 0 -915 -19 29 fill=1 (8.3557 14.4724 0)
9- 35 0 -916 -19 29 fill=1 (-8.3557 14.4724 0)
10- 36 0 -917 -19 29 fill=1 (-10.3217 5.9592 0)
11- c universe 1: structure of control rod.
12- 38 11 -2.02 -880 u=1 $ control rod core
13- 39 6 -8.4 880 -881 u=1 $ control rod cladding
14- 40 12 -1.00 881 -882 u=1 $ control rod gap
15- 41 6 -8.4 882 u=1 $ control rod sheath
16- c the space between the control rods, filled with lattice.
17- 140 0 -17 1 29 -19 905 906 907 913 914 915 916 917 fill=2
18- c universe 2: lattice of fuel rods with water in between.
19- 42 12 -1.00 -301 302 -303 304 -305 306 u=2 lat=2 fill=
20- -37.27 -1.33 0:0 &
21- 2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22- 2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23- 2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24- 2 3r 3 57r 2 2r &
25- 2 2r 3 58r 2 2r
26- 2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27- 2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28- 2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29- 2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30- 2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31- 2 1r 3 54r 2 7r &
32- c can code remember & thru comment?
33- 2 3 55r 2 7r
34- 2 3 25r 2 2r 3 25r 2 8r
35- 2 3 24r 2 3r 3 24r 2 9r
36- 2 3 23r 2 4r 3 23r 2 10r
37- 2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38- 2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39- 2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40- 2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41- 2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42- 2 3 46r 2 16r
43- 2 3 45r 2 17r
44- 2 3 44r 2 18r
45- 2 1r 3 41r 2 20r
46- 2 1r 3 40r 2 21r
47- 2 1r 3 39r 2 22r
48- 2 2r 3 36r 2 24r
49- 2 2r 3 35r 2 25r
50- 2 3r 3 32r 2 27r
51- 2 4r 3 29r 2 29r
52- 2 5r 3 26r 2 31r
53- 2 6r 3 23r 2 33r
54- 2 8r 3 18r 2 36r
55- 2 11r 3 11r 2 40r
```

```

56-      2 64r
57- c universe 3: structure of fuel rod lattice elements.
58- 154 2 -13.75 -58 u=3 $ fuel element
59- 149 12 -1.00 58 -268 u=3 $ gap
60- 144 7 -19.66 268 -478 u=3 $ liner
61- 159 6 -8.4 478 -698 u=3 $ cladding
62- 141 12 -1.00 698 u=3 $ water between the fuel rods
63- 162 0 17:-29:19:-1 $ outside world
64-
65- *1 py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0 11.9185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- m12 hwt.01 lwtr.01
98- kcode 200 1 5 6
warning, tallies are normed per fission neutron for one generation.
99- ksrc 3 2 .2 .2 3 .2 -3 .2 .2 .2 3 .2 4 3 .2 -4 3 .2 4 3 .1 -4 3 .2
100- e .01 .1 1 .10.
101- fq fe
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<(42[-10:-6 -1 0])) $ average 5 x elements at j=-1
104- (154<(42[-10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<(42[-10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<(42[-10:-6 21 0])) $ average 5 x elements at j=21
107- (154<(42[-10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdmp 2j -1
111- ptrac buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points      8
points not in any cell        0
points in cells of zero importance 0
points in void cells          0
points in ambiguous cells     0
total points rejected         0
points remaining              8
points after expansion or contraction 200

```


nominal source size 200
 initial guess for k(eff.) 1.000000
 cycles to skip before tallying 5
 number of keff cycles that can be stored 201

total fission nubar data are being used.
 tally 4 print table 30
 + fuel rod flux in 5 y locations averaged over 5 x elements
 tally type 4 track length estimate of particle flux.
 tally for neutrons

order of printing: f e
 cells (154<(42[-10:-6 -1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6 29 0]))

energy bins
 0.00000E+00 to 1.00000E-02 mev
 1.00000E-02 to 1.00000E-01 mev
 1.00000E-01 to 1.00000E+00 mev
 1.00000E+00 to 1.00000E+01 mev
 total bin

1 material composition print table 40

the sum of the fractions of material 2 was 9.999900E-01

the sum of the fractions of material 7 was 7.400000E-01

the sum of the fractions of material 12 was 3.000000E+00

material
 number component nuclide, atom fraction
 2 92235, 0.37504 92238, 0.12499 7014, 0.49997
 6 41093, 0.98982 40000, 0.01018
 7 74000, 1.00000
 11 5010, 0.71977 5011, 0.08004 6012, 0.20019
 12 1001, 0.33333 1002, 0.33333 8016, 0.33333
 associated thermal s(a,b) data sets: hwtr.01t lwtr.01t

material
 number component nuclide, mass fraction
 2 92235, 0.70574 92238, 0.23821 7014, 0.05605
 6 41093, 0.99000 40000, 0.01000
 7 74000, 1.00000
 11 5010, 0.68700 5011, 0.08400 6012, 0.22900
 12 1001, 0.05300 1002, 0.10591 8016, 0.84109

warning. 3 of the materials had unnormalized fractions.

1 cell volumes and masses print table 50

cell	atom density	gram density	input volume	calculated volume	mass	reason volume pieces	not calculated	
1	30	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
2	31	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
3	37	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
4	34	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
5	32	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
6	33	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	

```

7 35 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
8 36 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
9 38 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
10 39 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
11 40 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
12 41 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
13 140 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
14 42 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
16 149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
17 144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
1surface areas print table 50

```

	surface area	input area	calculated area	reason area not calculated
1	1	0.00000E+00	0.00000E+00	asymmetric
2	17	0.00000E+00	0.00000E+00	asymmetric
3	19	0.00000E+00	0.00000E+00	asymmetric
4	29	0.00000E+00	0.00000E+00	asymmetric
5	58	0.00000E+00	0.00000E+00	infinite
6	268	0.00000E+00	0.00000E+00	infinite
7	478	0.00000E+00	0.00000E+00	infinite
8	698	0.00000E+00	0.00000E+00	infinite
9	880	0.00000E+00	0.00000E+00	infinite
10	881	0.00000E+00	0.00000E+00	infinite
11	882	0.00000E+00	0.00000E+00	infinite
12	905	0.00000E+00	0.00000E+00	asymmetric
13	906	0.00000E+00	0.00000E+00	asymmetric
14	907	0.00000E+00	0.00000E+00	asymmetric
15	913	0.00000E+00	8.40057E+02	
16	914	0.00000E+00	8.40057E+02	
17	915	0.00000E+00	8.40057E+02	
18	916	0.00000E+00	8.40057E+02	
19	917	0.00000E+00	8.40057E+02	
20	301	0.00000E+00	0.00000E+00	infinite
21	302	0.00000E+00	0.00000E+00	infinite
22	303	0.00000E+00	0.00000E+00	infinite
23	304	0.00000E+00	0.00000E+00	
24	305	0.00000E+00	0.00000E+00	
25	306	0.00000E+00	0.00000E+00	

```

1cells print table 60

```

cell	mat	atom		gram		neutron		importance
		density	density	volume	mass	pieces		
1	30	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
2	31	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
3	37	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
4	34	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
5	32	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
6	33	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
7	35	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
8	36	0	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	1.0000E+00
9	38	11	1.15958E-01	2.02000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
10	39	6	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
11	40	12s	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
12	41	6	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
13	140	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
14	42	12s	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
15	154	2	6.62920E-02	1.37500E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
16	149	12s	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
17	144	7	6.43969E-02	1.96600E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
18	159	6	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00

```

19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.00000E+00
20 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.00000E+00

```

total 4.42185E+03 0.00000E+00

1surfaces

print table 70

surface trans type surface coefficients

```

1 1 refl. py 0.0000000E+00
2 17 cz 2.9135000E+01
3 19 pz 3.1750000E+01
4 29 pz -3.1750000E+01
5 58 c/z 3.4414000E+00 8.5150000E-01 3.2400000E-01
6 268 c/z 3.4414000E+00 8.5150000E-01 3.3450000E-01
7 478 c/z 3.4414000E+00 8.5150000E-01 3.4750000E-01
8 698 c/z 3.4414000E+00 8.5150000E-01 4.3180000E-01
9 880 cz 1.7251000E+00
10 881 cz 1.8051000E+00
11 882 cz 1.9051000E+00
12 905 cz 2.1055000E+00
13 906 c/z 1.6711300E+01 0.0000000E+00 2.1055000E+00
14 907 c/z -1.6711300E+01 0.0000000E+00 2.1055000E+00
15 913 c/z 0.0000000E+00 1.1918500E+01 2.1055000E+00
16 914 c/z 1.0321700E+01 5.9592000E+00 2.1055000E+00
17 915 c/z 8.3557000E+00 1.4472400E+01 2.1055000E+00
18 916 c/z -8.3557000E+00 1.4472400E+01 2.1055000E+00
19 917 c/z -1.0321700E+01 5.9592000E+00 2.1055000E+00
20 301 px 3.9330000E+00
21 302 px 2.9498000E+00
22 303 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 5.8994000E+00
23 304 p 1.0000000E+00 1.7320508E+00 0.0000000E+00 3.9330000E+00
24 305 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -9.8340000E-01
25 306 p -1.0000000E+00 1.7320508E+00 0.0000000E+00 -2.9498000E+00

```

all temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

1cross-section tables

print table 100

table length

tables from file testlib1

```

1001.00c 1782 1-h-1 from endf-vi.1 mat 125 05/26/93
1002.55c 4102 njoy ( 120) 04/26/82
5011.40c 3229 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
6012.40c 4858 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
7014.40c 8535 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
8016.40c 5358 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
40000.40c 93372 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900323
41093.40c 42746 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
74000.40c 91244 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
92235.40c 34772 ENDL library name: nd900719 MCNP translation: 9total nu 10:05 900503
92238.40c 40834 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
5010.03d 3682 b-10 endf/b-iv new gamma production format ( 1273) 14 oct 75
hwtv.01t 10193 deuterium in heavy water at 300 degrees kelvin 1002 0 010/22/85
lwtr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

```

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

surface distribution written to file inp18s cycle = 0

3 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob18 -- kcode in a hexagonal prism lattice.

nps	x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.085E-01	4.733E-01	7.193E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 5.085E-01	4.733E-01	7.193E-01		
2	3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		8.952E-01	-4.447E-01	-2.944E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0 8.952E-01	-4.447E-01	-2.944E-02		
3	3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.184E-01	-4.495E-01	6.446E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.184E-01	-4.495E-01	6.446E-01		
4	3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		9.710E-01	-5.665E-02	-2.323E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 9.710E-01	-5.665E-02	-2.323E-01		
5	3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.861E-01	1.496E-01	-7.963E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 5.861E-01	1.496E-01	-7.963E-01		
6	3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.489E-02	-1.626E-01	9.845E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.489E-02	-1.626E-01	9.845E-01		
7	3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-7.068E-02	3.263E-02	-9.970E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -7.068E-02	3.263E-02	-9.970E-01		
	3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-3.915E-01	4.664E-01	-7.932E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -3.915E-01	4.664E-01	-7.932E-01		
9	3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.368E-01	9.215E-01	-3.079E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.368E-01	9.215E-01	-3.079E-01		
10	3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.946E-01	-3.204E-01	9.271E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 1.946E-01	-3.204E-01	9.271E-01		
11	3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.698E-01	-7.177E-01	-1.905E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.698E-01	-7.177E-01	-1.905E-01		
12	3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-8.398E-01	-4.129E-01	3.524E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -8.398E-01	-4.129E-01	3.524E-01		
13	3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.714E-01	-8.572E-01	4.857E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -1.714E-01	-8.572E-01	4.857E-01		
14	3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.489E-01	-5.118E-01	-8.222E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.489E-01	-5.118E-01	-8.222E-01		
15	3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.959E-01	2.119E-01	9.314E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.959E-01	2.119E-01	9.314E-01		
16	3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.395E-01	-9.829E-01	1.202E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 1.395E-01	-9.829E-01	1.202E-01		
17	3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		6.909E-01	-7.110E-01	1.307E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 6.909E-01	-7.110E-01	1.307E-01		
18	3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.580E-01	5.320E-01	-5.329E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.580E-01	5.320E-01	-5.329E-01		
	3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00

3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.903E-01 -1.380E-01 1.353E-02
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.903E-01 -1.380E-01 1.353E-02
 3.000E+00 2.000E-01 2.000E-01 140 7.462E-01 4.859E-01 -4.551E-01 1.000E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 7.462E-01 4.859E-01 -4.551E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 7.462E-01 4.859E-01 -4.551E-01
 21 3.000E+00 2.000E-01 2.000E-01 140 -1.977E-01 9.797E-01 3.360E-02 3.990E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -1.977E-01 9.797E-01 3.360E-02
 3.492E+00 1.051E+00 2.000E-01 154 0 -1.977E-01 9.797E-01 3.360E-02
 22 3.000E+00 2.000E-01 2.000E-01 140 -9.117E-01 -3.647E-01 -1.891E-01 2.665E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
 23 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
 24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
 25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
 26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
 27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
 28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
 29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
 30 2.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
 31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
 32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
 33 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
 34 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
 35 2.000E-01 3.000E+00 2.000E-01 140 -4.048E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -4.048E-02 8.831E-01 4.675E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -4.048E-02 8.831E-01 4.675E-01
 36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
 37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
 38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
 39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
 40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
 41 2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01

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3.641E+00 4.456E-01 2.000E-01 141      0 -3.212E-01 -7.678E-01 -5.543E-01
2.000E-01 3.000E+00 2.000E-01 140      5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.039E-01 -1.460E-01 8.513E-01
43 2.000E-01 3.000E+00 2.000E-01 140      6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
3.641E+00 4.456E-01 2.000E-01 141      0 6.080E-01 5.487E-01 5.738E-01
44 2.000E-01 3.000E+00 2.000E-01 140      -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -2.932E-01 9.304E-01 -2.199E-01
45 2.000E-01 3.000E+00 2.000E-01 140      -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140      1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141      0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140      7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141      0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140      4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141      0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140      5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140      -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -1.053E-01 -9.805E-01 1.658E-01

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Estimated keff results by cycle

print table 175

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257

cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195

cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193

cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182

cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

source distribution written to file inp18s cycle = 6

Iproblem summary

run terminated when 6 kcode cycles were done.

0

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
(per source particle)				(per source particle)			
source	1249	9.6077E-01	1.8661E+00	escape	220	1.2268E-01	1.2054E-01
			energy cutoff	0 0.			
			time cutoff	0 0.			
weight window	0 0.	0.	weight window	0 0.	0.		
cell importance	0 0.	0.	cell importance	0 0.	0.		
weight cutoff	0 1.3743E-01	3.8498E-03	weight cutoff	1034	1.2791E-01	5.1920E-03	
energy importance	0 0.	0.	energy importance	0 0.	0.		
dxtran	0 0.	0.	dxtran	0 0.	0.		
forced collisions	0 0.	0.	forced collisions	0 0.	0.		
exp. transform	0 0.	0.	exp. transform	0 0.	0.		
upscattering	0 0.	5.3884E-11	downscattering	0 0.	1.3605E+00		
			capture	0 3.9980E-01	1.1590E-01		
(n,xn)	10	6.1640E-03	6.1355E-03	loss to (n,xn)	5	3.0820E-03	2.4027E-02
ion	0 0.	0.	loss to fission	0 4.5089E-01	2.4987E-01		
total	1259	1.1044E+00	1.8761E+00	total	1259	1.1044E+00	1.8761E+00

```

number of neutrons banked          5      average lifetime, shakes      cutoffs
neutron tracks per source particle  1.0080E+00      escape  3.7027E+00      tco  1.0000E+34
neutron collisions per source particle 1.8226E+01      capture  1.2954E+01      eco  0.0000E+00
total neutron collisions            22764      capture or escape 1.1788E+01      wcl  -5.0000E-01
net multiplication                  1.0032E+00 0.0035      any termination 1.2744E+01      wc2  -2.5000E-01

```

```

computer time so far in this run  0.00 minutes      maximum number ever in bank      1
computer time in mcrun            0.00 minutes      bank overflows to backup file    0
source particles per minute        0.0000E+00      field length                      0
random numbers generated           500880      most random numbers used was     1298 in history    14

```

range of sampled source weights = 7.7821E-01 to 1.0989E+00

Ineutron activity in each cell

print table 126

cell	entering	tracks population	collisions * weight (per history)	collisions weighted energy	number weighted energy	flux weighted energy	average track weight (relative)	average track mfp (cm)
1	30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6971E-01
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01

total 266059 9765 22764 1.1324E+01

Ineutron weight balance in each cell -- external events

print table 130

cell	entering	source cutoff	energy cutoff	time	exiting	total
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	4.8822E-01	0.0000E+00	0.0000E+00	-3.3091E-01	1.5731E-01
10	39	8.4996E-01	0.0000E+00	0.0000E+00	-8.4933E-01	6.2750E-04
11	40	8.9904E-01	0.0000E+00	0.0000E+00	-8.9904E-01	3.9460E-06
12	41	9.7260E-01	0.0000E+00	0.0000E+00	-9.6978E-01	2.8204E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.0907E+00	0.0000E+00	0.0000E+00	-1.0913E+00	-5.9111E-04
15	154	1.2943E+01	8.4067E-01	0.0000E+00	-1.3171E+01	6.1278E-01
16	149	2.6508E+01	0.0000E+00	0.0000E+00	-2.6508E+01	3.5884E-05
17	144	2.7419E+01	0.0000E+00	0.0000E+00	-2.7405E+01	1.4572E-02
18	159	3.1331E+01	8.0064E-02	0.0000E+00	-3.1361E+01	5.0067E-02
19	141	3.9111E+01	4.0032E-02	0.0000E+00	-3.9150E+01	4.5860E-04

total 1.4161E+02 9.6077E-01 0.0000E+00 0.0000E+00 -1.4174E+02 8.3809E-01

Ineutron weight balance in each cell -- variance reduction events

print table 130

cell	weight	cell	weight	energy	dextran	forced	exponential	total
window	importance	cutoff	importance	collision	transform			
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	1.2447E-03	0.0000E+00	0.0000E+00	0.0000E+00	1.2447E-03
10	39	0.0000E+00	0.0000E+00	2.0097E-04	0.0000E+00	0.0000E+00	0.0000E+00	2.0097E-04
11	40	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	41	0.0000E+00	0.0000E+00	2.9100E-04	0.0000E+00	0.0000E+00	0.0000E+00	2.9100E-04
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	154	0.0000E+00	0.0000E+00	8.0354E-03	0.0000E+00	0.0000E+00	0.0000E+00	8.0354E-03
16	149	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	144	0.0000E+00	0.0000E+00	-3.0848E-06	0.0000E+00	0.0000E+00	0.0000E+00	-3.0848E-06
18	159	0.0000E+00	0.0000E+00	-2.5216E-04	0.0000E+00	0.0000E+00	0.0000E+00	-2.5216E-04
19	141	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03								

Neutron weight balance in each cell -- physical events

print table 130

cell	(n,xn)	fission	capture	loss to	loss to	total
			(n,xn)	fission		
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	-1.5855E-01
10	39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	-8.2847E-04
11	40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	-3.9460E-06
12	41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	-3.1114E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	5.9111E-04
15	154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-03	-4.5089E-01
16	149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	-3.5884E-05
17	144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	-1.4569E-02
18	159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	-4.9815E-02
19	141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	-4.5860E-04

total 6.1640E-03 0.0000E+00 -3.9980E-01 -3.0820E-03 -4.5089E-01 -8.4760E-01

Neutron activity of each nuclide in each cell, per source particle

print table 140

cell	nuclides	atom	total	collisions	weight lost	weight loss	weight gain
	fraction	collisions		* weight	to capture	to fission	by (n,xn)
9	38	5010.03d 7.1977E-01	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00
		5011.40c 8.0041E-02	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
		6012.40c 2.0019E-01	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
10	39	41093.40c 9.8982E-01	128	6.2802E-02	8.2814E-04	0.0000E+00	0.0000E+00
		40000.40c 1.0183E-02	2	9.7676E-04	3.3160E-07	0.0000E+00	0.0000E+00
11	40	1001.00c 3.3333E-01	111	5.1533E-02	3.9251E-06	0.0000E+00	0.0000E+00
		1002.55c 3.3333E-01	33	1.5373E-02	2.0884E-08	0.0000E+00	0.0000E+00
		8016.40c 3.3333E-01	40	2.1271E-02	0.0000E+00	0.0000E+00	0.0000E+00
12	41	41093.40c 9.8982E-01	313	1.5623E-01	3.1072E-03	0.0000E+00	0.0000E+00

40000.40c	1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00
42 1001.00c	3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00	0.0000E+00
1002.55c	3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00	6.2306E-04
8016.40c	3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00	0.0000E+00
15 154 92235.40c	3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
92238.40c	1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
7014.40c	4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
16 149 1001.00c	3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00	0.0000E+00
1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00	0.0000E+00
8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00	0.0000E+00
17 144 74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
18 159 41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00	0.0000E+00
40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00	0.0000E+00
19 141 1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00	0.0000E+00
1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00	0.0000E+00
8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00	0.0000E+00
total		22764	1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03

total over all cells for each nuclide	total collisions	collisions * weight	weight lost to capture	weight loss to fission	weight gain by (n,xn)
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1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04
5011.40c	76	3.6075E-02	1.3591E-07	0.0000E+00	0.0000E+00
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00

the initial fission neutron source distribution used the 8 source points that were input on the kscc card.

the criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.

this problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.

all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle	average keff estimators and deviations	average k(c/a/t)
		k(coll) k(abs) k(track)	k(coll) st dev k(abs) st dev k(track) st dev	k(c/a/t) st dev fom

1	200	1.25311 1.26302 1.22009
2	257	1.21200 1.25252 1.12957
3	195	1.20026 1.14326 1.13006
4	193	1.12953 1.16269 1.10757
5	182	1.13599 1.12465 1.11238

----- begin active keff cycles -----

6	222	1.07701 1.04669 1.07528
---	-----	-----------------------------

totaly 4 nps = 1249

fuel rod flux in 5 y locations averaged over 5 x elements

totaly 4 track length estimate of particle flux. units 1/cm**2

tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])

cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])

cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])

cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])

cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

energy:	1.0000E-02	1.0000E-01	1.0000E+00	1.0000E+01	total
---------	------------	------------	------------	------------	-------

cell

a 0.00000E+00 0.0000 2.84017E-05 0.9975 1.86420E-04 0.4656 1.36846E-04 0.5743 3.51668E-04 0.3877

b 1.07442E-05 0.9975 1.58576E-04 0.5120 2.32928E-04 0.3945 4.44462E-05 0.5872 4.46694E-04 0.2855

c 2.16778E-05 0.7232 9.40943E-05 0.5519 5.37835E-05 0.5876 1.51034E-04 0.7075 3.20589E-04 0.3937

d 1.47903E-05 0.5831 0.00000E+00 0.0000 1.15515E-04 0.5838 1.69653E-04 0.5071 2.99958E-04 0.3718

e 8.04943E-06 0.9975 0.00000E+00 0.0000 0.00000E+00 0.0000 6.81909E-05 0.7477 7.62403E-05 0.6763

analysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

normed average tally per history = 3.51668E-04

unnormed average tally per history = 3.68228E-02

estimated tally relative error = 0.3877

estimated variance of the variance = 0.1752

relative error from zero tallies = 0.3464

relative error from nonzero scores = 0.1740

number of nonzero history tallies = 8

efficiency for the nonzero tallies = 0.0400

history number of largest tally = 1034

largest unnormalized history tally = 1.41575E+00

(largest tally)/(average tally) = 3.84476E+01

(largest tally)/(avg nonzero tally) = 1.53791E+00

(confidence interval shift)/mean = 0.0793

shifted confidence interval center = 3.79539E-04

the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:

= 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
----------------------	--------------	----------------	----------------------------

mean 3.51668E-04 4.10723E-04 0.167927

relative error 3.87653E-01 3.61597E-01 -0.067213

variance of the variance 1.75161E-01 1.47665E-01 -0.156976

shifted center 3.79539E-04 3.77169E-04 -0.006244

figure of merit 0.00000E+00 0.00000E+00 0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.

the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

tfc bin	mean--	relative error-----	variance of the variance----	figure of merit--	pdf-
behavior	value decrease	decrease rate	value decrease	decrease rate	behavior slope
desired	random	<0.10 yes	1/sqrt(nps)	<0.10 yes	1/nps
observed	random	0.39 yes	yes	0.18 yes	yes
passed?	yes	no yes	yes	no yes	yes
					no

warning. the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.

unnormalized tally density for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally	number	num den	log den	d
1.00E-01	1	2.43E-01	-0.614	
1.26E-01	0	0.00E+00	0.000	
1.58E-01	0	0.00E+00	0.000	
2.00E-01	0	0.00E+00	0.000	
2.51E-01	0	0.00E+00	0.000	
3.16E-01	0	0.00E+00	0.000	
3.98E-01	0	0.00E+00	0.000	
5.01E-01	0	0.00E+00	0.000	
6.31E-01	2	7.71E-02	-1.113	
7.94E-01	0	0.00E+00	0.000	
1.00E+00	1	2.43E-02	-1.614	m
1.26E+00	0	0.00E+00	0.000	
1.58E+00	4	6.14E-02	-1.212	
total	8	4.00E-02		d

cumulative tally number for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162

abscissa cum ordinate plot of the cumulative number of tallies in the tally fluctuation chart bin from 0 to 100 percent

tally	number	cum pct	10	20	30	40	50	60	70	80	90	100	
1.00000E-01	1	12.500	*****										
1.25893E-01	1	12.500	*****										
1.58489E-01	1	12.500	*****										
1.99526E-01	1	12.500	*****										
2.51189E-01	1	12.500	*****										
3.16228E-01	1	12.500	*****										
3.98108E-01	1	12.500	*****										
5.01188E-01	1	12.500	*****										
6.0958E-01	3	37.500	*****										
7.44329E-01	3	37.500	*****										
1.00000E+00	4	50.000	*****										
1.25893E+00	4	50.000	*****										
1.58489E+00	8	100.000	*****										
total	8	100.000	-----	10	20	30	40	50	60	70	80	90	100

cumulative unnormalized tally for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162

abscissa cum ordinate plot of the cumulative tally in the tally fluctuation chart bin from 0 to 100 percent

tally	tally/nps	cum pct	10	20	30	40	50	60	70	80	90	100	
1.000E-01	4.632E-04	1.258	*										
1.259E-01	4.632E-04	1.258	*										
1.585E-01	4.632E-04	1.258	*										
1.995E-01	4.632E-04	1.258	*										
2.512E-01	4.632E-04	1.258	*										
3.162E-01	4.632E-04	1.258	*										
3.981E-01	4.632E-04	1.258	*										
5.012E-01	4.632E-04	1.258	*										
6.310E-01	6.195E-03	16.825	*****										
7.943E-01	6.195E-03	16.825	*****										
1.000E+00	1.017E-02	27.628	*****										
1.259E+00	1.017E-02	27.628	*****										
1.585E+00	3.682E-02	100.000	*****										
total	3.68228E-02	100.000	-----	10	20	30	40	50	60	70	80	90	100

1status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

4 missed 3 of 10 tfc bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies missed all bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

tally bins with zeros may or may not be correct: compare the source, cutoffs, *multipliers*, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins *did not pass* all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

Tally fluctuation charts

tally 4

nps mean error vov slope fom

1000 0.0000E+00 0.0000 0.0000 0.0

1249 3.5167E-04 0.3877 0.1752 0.0

tally data written to file inp18m

ascii file inp18p written with 5 events from 5 histories.

6 warning messages so far.

run terminated when 6 kcode cycles were done.

File: Inp20o

1- prob20 - continuous energy electron version of problem prob19.

2- 1 1 -19.3 1 -2 3 -4 5 -6

3- 2 0 #1

4-

5- I z 0 2

+ plane

6- 2 pz .00635

7- 3 px -10

8- 4 x 10 0

+ plane

9- 5 y -10 3

+ plane

10- 6 p 0 10 0 1 10 0 0 10 1

11-

12- m1 74184.1

13- sdef erg=1 sur=1 vec=0 0 1 par=3

14- imp:p,e 1 0

15- mode p e

16- *f1:p 1 2

17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

18- *f11:e 1 2

19- tr9 0 0 0 1 0 0 0 10 0 0 0 1

warning. non-orthogonality of surface transformation 9 > 2.e-6

20- fq e f

21- f21:e 1 2

22- *f28:p 1

23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1

25- f58:e 1

26- f6:p 1

27- f31:e 1 2

28- f31 elc 1

29- f41:e 1 2

30- f41 elc 2

31- f51:e 1 2

32- f51 elc 3

33- e8 1000 nt

34- *f8:p,e 1

35- nps 10000

36- ctme 30

37- prdmp 2j -1

38- cutp 1j .1

39- cut:e 1j .1

40- print 110 70

41-

ing. tr 9 card unused.

warning. 1 energy bins of tally 1 are below energy cutoff.

warning. tally 8 needs zero energy bin for negative f8 scores.

lcells print table 60

cell		atom	gram	photon		electron	
mat	density	density	volume	mass	pieces	importance	importance
1 1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0	1.0000E+00 1.0000E+00
2 2	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00 0.0000E+00

total 2.54000E+00 4.90220E+01 print table 70

1surfaces

surface	trans	type	surface coefficients			
1 1		pz	0.0000000E+00			
2 2		pz	6.3500000E-03			
3 3		px	-1.0000000E+01			
4 4		px	1.0000000E+01			
5 5		py	-1.0000000E+01			
6 6		p	0.0000000E+00	1.0000000E-01	0.0000000E+00	1.0000000E+00

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

1cross-section tables print table 100

table length

tables from file testlib1

74000.02p 755 01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478 11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

1 starting merun. field length = 0 cp0 = 0.00 print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00

File: Outp20

```

1- prob20 - continuous energy electron version of problem prob19.
2- 1 1-19.3 1-2 3-4 5-6
3- 2 0#1
4-
5- 1 z 0 2
+
6- 2 pz .00635
7- 3 px -10
8- 4 x 10 0
+
9- 5 y -10 3
+
10- 6 p 0 10 0 1 10 0 0 10 1
11-
12- m1 74184.1
13- sdef erg=1 sur=1 vec=0 0 1 par=3
14- imp:p,e 1 0
15- mode p e
16- *f1:p 1 2
17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
18- *f11:e 1 2
19- tr9 0 0 0 1 0 0 0 1 0 0 0 1

```

warning. non-orthogonality of surface transformation 9 > 2.e-6

```

20- fq e f
21- f21:e 1 2
22- *f28:p 1
23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
25- f58:e 1
26- f6:p 1
27- f31:e 1 2
28- f31 elc 1
29- f41:e 1 2
30- f41 elc 2
31- f51:e 1 2
32- f51 elc 3
33- e8 1000 nt
34- *f8:p,e 1
35- nps 10000
36- ctme 30
37- prdmp 2j -1
38- cut:p lj .1
39- cut:e lj .1
40- print 110 70
41-

```

warning. tr 9 card unused.

warning. 1 energy bins of tally 1 are below energy cutoff.

warning. tally 8 needs zero energy bin for negative f8 scores.

1cells print table 60

		atom	gram	photon		electron	
cell	mat	density	density	volume	mass	pieces	importance
1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0	1.0000E+00
2	2	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 2.54000E+00 4.90220E+01

1surfaces

print table 70

surface trans type surface coefficients

```

1 1 pz 0.000000E+00
2 2 pz 6.350000E-03
3 3 px -1.000000E+01
4 4 px 1.000000E+01
5 5 py -1.000000E+01
6 6 p 0.000000E+00 1.000000E-01 0.000000E+00 1.000000E+00

```

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

1 cross-section tables

print table 100

table length

tables from file testlib1

74000.02p 755

01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478

11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00

```

28 0.000E+00 0.000E+00 0.000E+00 1 1 8.706E-01 -3.198E-01 3.738E-01 1.000E+00 1.000E+00 0.000E+00
29 0.000E+00 0.000E+00 0.000E+00 1 1 -8.188E-01 2.059E-01 5.359E-01 1.000E+00 1.000E+00 0.000E+00
30 0.000E+00 0.000E+00 0.000E+00 1 1 5.727E-01 8.124E-01 1.100E-01 1.000E+00 1.000E+00 0.000E+00
31 0.000E+00 0.000E+00 0.000E+00 1 1 5.390E-02 5.914E-01 8.046E-01 1.000E+00 1.000E+00 0.000E+00
32 0.000E+00 0.000E+00 0.000E+00 1 1 -5.778E-01 5.375E-01 6.141E-01 1.000E+00 1.000E+00 0.000E+00
33 0.000E+00 0.000E+00 0.000E+00 1 1 -7.198E-01 -2.890E-01 6.311E-01 1.000E+00 1.000E+00 0.000E+00
34 0.000E+00 0.000E+00 0.000E+00 1 1 2.210E-01 2.482E-01 9.432E-01 1.000E+00 1.000E+00 0.000E+00
35 0.000E+00 0.000E+00 0.000E+00 1 1 4.339E-01 7.515E-02 8.978E-01 1.000E+00 1.000E+00 0.000E+00
36 0.000E+00 0.000E+00 0.000E+00 1 1 -4.263E-01 8.490E-01 3.123E-01 1.000E+00 1.000E+00 0.000E+00
37 0.000E+00 0.000E+00 0.000E+00 1 1 -3.933E-01 -9.179E-01 5.266E-02 1.000E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 1 -4.846E-01 4.378E-01 7.573E-01 1.000E+00 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 1 -5.950E-01 -5.730E-01 5.636E-01 1.000E+00 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 1 -7.252E-01 -5.143E-01 4.578E-01 1.000E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 1 -7.156E-01 4.734E-01 5.136E-01 1.000E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 1 -1.771E-01 9.229E-01 3.417E-01 1.000E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 1 -1.149E-01 -4.206E-01 8.999E-01 1.000E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 1 4.509E-01 8.630E-02 8.884E-01 1.000E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 1 -7.338E-01 2.500E-01 6.294E-01 1.000E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 1 -8.448E-01 3.645E-01 3.917E-01 1.000E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 1 1.958E-01 -2.769E-01 9.407E-01 1.000E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 1 2.788E-01 -7.325E-03 9.603E-01 1.000E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 1 -3.201E-01 4.174E-01 8.505E-01 1.000E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 1 8.960E-01 -1.641E-01 4.126E-01 1.000E+00 1.000E+00 0.000E+00

```

problem summary

run terminated when 10000 particle histories were done.

```

0
photon creation      tracks  weight  energy      photon loss      tracks  weight  energy
                   (per source particle)                   (per source particle)

source              0  0.      0.      escape          575  5.7500E-02  1.5476E-02
                   energy cutoff      0  0.      0.
                   time cutoff        0  0.      0.

weight window      0  0.      0.      weight window    0  0.      0.
importance         0  0.      0.      cell importance   0  0.      0.
weight cutoff      0  0.      0.      weight cutoff    0  0.      0.
energy importance  0  0.      0.      energy importance 0  0.      0.
dxtan              0  0.      0.      dxtan            0  0.      0.

forced collisions  0  0.      0.      forced collisions 0  0.      0.
exp. transform    0  0.      0.      exp. transform    0  0.      0.
from neutrons     0  0.      0.      compton scatter   0  0.      6.6993E-05
bremsstrahlung    694  6.9400E-02  1.7315E-02  capture          119  1.1900E-02  1.7720E-03
p-annihilation    0  0.      0.      pair production   0  0.      0.
electron x-rays   0  0.      0.
1st fluorescence  0  0.      0.
2nd fluorescence  0  0.      0.
total             694  6.9400E-02  1.7315E-02  total             694  6.9400E-02  1.7315E-02

```

```

number of photons banked      694  average lifetime, shakes      cutoffs
photon tracks per source particle 6.9400E-02  escape  6.7786E-05  tco 1.0000E+34
photon collisions per source particle 1.3000E-02  capture 8.3325E-05  eco 1.0000E-01
total photon collisions      130  capture or escape 7.0450E-05  wc1 0.0000E+00
any termination 7.0450E-05  wc2 0.0000E+00

```

```

0
electron creation  tracks  weight  energy      electron loss  tracks  weight  energy
                  (per source particle)                  (per source particle)

source            10000  1.0000E+00  1.0000E+00  escape          9464  9.4640E-01  7.1762E-01
                  energy cutoff      2046  2.0460E-01  2.0141E-02
                  time cutoff        0  0.      0.

weight window      0  0.      0.      weight window    0  0.      0.
cell importance    0  0.      0.      cell importance   0  0.      0.
weight cutoff      0  0.      0.      weight cutoff    0  0.      0.
energy importance  0  0.      0.      energy importance 0  0.      0.
pair production    0  0.      0.      scattering        0  0.      2.6560E-01
pton recoil       2  2.0000E-04  3.7815E-05  bremsstrahlung   0  0.      2.4158E-02
photo-electric    29  2.9000E-03  4.7387E-04

```


photon auger	0	0.	0.			
electron auger	0	0.	0.			
back-on	1479	1.4790E-01	2.7007E-02			
total	11510	1.1510E+00	1.0275E+00	total	11510	1.1510E+00 1.0275E+00

number of electrons banked	1510	cutoffs	
electron tracks per source particle	1.1510E+00	teo	1.0000E+34
electron sub-steps per source particle	7.7164E+01	eco	1.0000E-01
total electron sub-steps	771636	wc1	0.0000E+00
		wc2	0.0000E+00

computer time so far in this run	0.00 minutes	maximum number ever in bank	4
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	4748878	most random numbers used was	4277 in history 7375

range of sampled source weights = 1.0000E+00 to 1.0000E+00

lphoton activity in each cell print table 126

cell	tracks entering	population	collisions	* weight (per history)	collisions weighted energy	number weighted energy	flux weighted (relative)	average track weight (cm)	average track mfp
1 1	0	694	130	1.3000E-02	2.8286E-01	2.8286E-01	1.0000E+00	1.6113E-01	
total	0	694	130	1.3000E-02					

lelectron activity in each cell print table 126

cell	tracks entering	population	substeps	* weight (per history)	substeps weighted energy	number weighted energy	flux weighted (relative)	average track weight (cm)	average track mfp
1 1	10000	11510	771636	7.7164E+01	7.4988E-01	7.6821E-01	1.0000E+00	2.5110E-04	
total	10000	11510	771636	7.7164E+01					

lally 1 nps = 10000
tally type 1* energy crossing a surface. units mev
tally for photons

surface: 1 2
energy
1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 1.20113E-03 0.1079 2.16688E-03 0.0814
2.8200E-01 8.17217E-04 0.1673 2.04350E-03 0.1062
3.7300E-01 9.52191E-04 0.1829 1.82060E-03 0.1357
4.6400E-01 1.03815E-03 0.2001 1.00234E-03 0.2043
5.5500E-01 5.66295E-04 0.3018 8.02842E-04 0.2503
6.4500E-01 6.09365E-04 0.3162 6.54966E-04 0.3016
7.3600E-01 3.45345E-04 0.4472 4.20131E-04 0.4085
8.2700E-01 7.79347E-05 0.9999 7.03770E-04 0.3334
9.1800E-01 1.70096E-04 0.7070 8.29418E-05 0.9999
1.1000E+00 0.00000E+00 0.0000 0.00000E+00 0.0000
total 5.77773E-03 0.0811 9.69798E-03 0.0608
lally 6 nps = 10000
tally type 6 track length estimate of heating. units mev/gram
tally for photons

masses
cell: 1
4.90220E+01

cell: 1
energy
1.0000E-01 0.00000E+00 0.0000
1.9100E-01 1.80395E-05 0.0935
2.8200E-01 4.79830E-06 0.1242
3.7300E-01 1.64870E-06 0.2061

4.6400E-01 1.76412E-06 0.4116
 6.500E-01 6.34259E-07 0.4736
 4.500E-01 2.47457E-07 0.3129
 7.3600E-01 2.58011E-07 0.6571
 8.2700E-01 1.16245E-07 0.3470
 9.1800E-01 4.46610E-08 0.6403
 1.1000E+00 0.00000E+00 0.0000
 total 2.75512E-05 0.0722

Italy 28 nps = 10000

tally type 8* energy deposition
 tally for photons electrons

units mev

cell: 1

energy

-1.0000E-03 -8.72550E-04 0.1508
 0.0000E+00 0.00000E+00 0.0000
 1.0000E-06 0.00000E+00 0.0000
 1.0000E-01 1.08193E-02 0.0227
 1.9100E-01 3.91016E-02 0.0170
 2.8200E-01 4.36100E-02 0.0210
 3.7300E-01 3.53763E-02 0.0286
 4.6400E-01 2.66881E-02 0.0382
 5.5500E-01 2.21833E-02 0.0468
 6.4500E-01 1.58947E-02 0.0606
 7.3600E-01 1.08330E-02 0.0790
 8.2700E-01 8.71177E-03 0.0940
 9.1800E-01 6.65495E-03 0.1136
 1.1000E+00 4.79000E-02 0.0446
 total 2.66900E-01 0.0090

Italy 11 nps = 10000

tally type 1* energy crossing a surface.
 tally for electrons

units mev

surface: 1 2

energy

1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
 1.9100E-01 1.08698E-03 0.1176 6.53601E-04 0.1495
 2.8200E-01 2.19643E-03 0.1039 1.83325E-03 0.1165
 3.7300E-01 3.60063E-03 0.0956 3.37231E-03 0.0988
 4.6400E-01 6.94424E-03 0.0774 6.18557E-03 0.0823
 5.5500E-01 1.32283E-02 0.0615 1.27247E-02 0.0628
 6.4500E-01 2.19441E-02 0.0516 1.93787E-02 0.0550
 7.3600E-01 3.87821E-02 0.0411 4.62743E-02 0.0374
 8.2700E-01 6.96113E-02 0.0321 9.53277E-02 0.0269
 9.1800E-01 1.17955E-01 0.0253 9.53443E-02 0.0284
 1.1000E+00 1.58764E-01 0.0225 2.41655E-03 0.1959
 total 4.34113E-01 0.0097 2.83511E-01 0.0130

Italy 21 nps = 10000

tally type 1 number of particles crossing a surface.
 tally for electrons

surface: 1 2

energy

1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
 1.9100E-01 7.70000E-03 0.1165 4.60000E-03 0.1471
 2.8200E-01 9.30000E-03 0.1032 7.60000E-03 0.1158
 3.7300E-01 1.09000E-02 0.0953 1.02000E-02 0.0985
 4.6400E-01 1.65000E-02 0.0772 1.46000E-02 0.0822
 5.5500E-01 2.58000E-02 0.0614 2.48000E-02 0.0627
 6.4500E-01 3.63000E-02 0.0515 3.21000E-02 0.0549
 7.3600E-01 5.59000E-02 0.0411 6.67000E-02 0.0374
 8.2700E-01 8.86000E-02 0.0321 1.21300E-01 0.0269
 9.1800E-01 1.34800E-01 0.0253 1.10600E-01 0.0284
 1.1000E+00 1.65500E-01 0.0225 2.60000E-03 0.1959
 total 5.51300E-01 0.0094 3.95100E-01 0.0126

Italy 31 nps = 10000

tally type 1 number of particles crossing a surface.

tally for electrons
this tally is modified by ft elc

HNF-SD-SNF-CSWD-005, Rev. 0

surface: 1 2

energy

1.0000E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
1.9100E-01	-7.7000E-03	0.1165	-4.6000E-03	0.1471
2.8200E-01	-9.3000E-03	0.1032	-7.6000E-03	0.1158
3.7300E-01	-1.0900E-02	0.0953	-1.0200E-02	0.0985
4.6400E-01	-1.6500E-02	0.0772	-1.4600E-02	0.0822
5.5500E-01	-2.5800E-02	0.0614	-2.4800E-02	0.0627
6.4500E-01	-3.6300E-02	0.0515	-3.2100E-02	0.0549
7.3600E-01	-5.5900E-02	0.0411	-6.6700E-02	0.0374
8.2700E-01	-8.8600E-02	0.0321	-1.2130E-01	0.0269
9.1800E-01	-1.3480E-01	0.0253	-1.1060E-01	0.0284
1.1000E+00	-1.6550E-01	0.0225	-2.6000E-03	0.1959
total	-5.5130E-01	0.0094	-3.9510E-01	0.0126

ltally 41 nps = 10000

tally type 1 number of particles crossing a surface.

tally for electrons

this tally is modified by ft elc

surface: 1 2

energy

1.0000E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
1.9100E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
2.8200E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
3.7300E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
4.6400E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
5.5500E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
6.4500E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
7.3600E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
8.2700E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
9.1800E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
1.1000E+00	0.0000E+00	0.0000	0.0000E+00	0.0000
total	0.0000E+00	0.0000	0.0000E+00	0.0000

surface: 1 2

energy

1.0000E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
1.9100E-01	7.7000E-03	0.1165	4.6000E-03	0.1471
2.8200E-01	9.3000E-03	0.1032	7.6000E-03	0.1158
3.7300E-01	1.0900E-02	0.0953	1.0200E-02	0.0985
4.6400E-01	1.6500E-02	0.0772	1.4600E-02	0.0822
5.5500E-01	2.5800E-02	0.0614	2.4800E-02	0.0627
6.4500E-01	3.6300E-02	0.0515	3.2100E-02	0.0549
7.3600E-01	5.5900E-02	0.0411	6.6700E-02	0.0374
8.2700E-01	8.8600E-02	0.0321	1.2130E-01	0.0269
9.1800E-01	1.3480E-01	0.0253	1.1060E-01	0.0284
1.1000E+00	1.6550E-01	0.0225	2.6000E-03	0.1959
total	5.5130E-01	0.0094	3.9510E-01	0.0126

surface: 1 2

energy

1.0000E-01	0.0000E+00	0.0000	0.0000E+00	0.0000
1.9100E-01	7.7000E-03	0.1165	4.6000E-03	0.1471
2.8200E-01	9.3000E-03	0.1032	7.6000E-03	0.1158
3.7300E-01	1.0900E-02	0.0953	1.0200E-02	0.0985
4.6400E-01	1.6500E-02	0.0772	1.4600E-02	0.0822
5.5500E-01	2.5800E-02	0.0614	2.4800E-02	0.0627
6.4500E-01	3.6300E-02	0.0515	3.2100E-02	0.0549
7.3600E-01	5.5900E-02	0.0411	6.6700E-02	0.0374
8.2700E-01	8.8600E-02	0.0321	1.2130E-01	0.0269
9.1800E-01	1.3480E-01	0.0253	1.1060E-01	0.0284
1.1000E+00	1.6550E-01	0.0225	2.6000E-03	0.1959
total	5.5130E-01	0.0094	3.9510E-01	0.0126

y 51 nps = 10000

tally type 1 number of particles crossing a surface.
 tally for electrons
 this tally is modified by ft elc

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
2.8200E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
3.7300E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
4.6400E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
5.5500E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
6.4500E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
7.3600E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
8.2700E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
9.1800E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.1000E+00  0.0000E+00 0.0000  0.0000E+00 0.0000
total      0.0000E+00 0.0000  0.0000E+00 0.0000

```

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01 -7.7000E-03 0.1165 -4.6000E-03 0.1471
2.8200E-01 -9.3000E-03 0.1032 -7.6000E-03 0.1158
3.7300E-01 -1.0900E-02 0.0953 -1.0200E-02 0.0985
4.6400E-01 -1.6500E-02 0.0772 -1.4600E-02 0.0822
5.5500E-01 -2.5800E-02 0.0614 -2.4800E-02 0.0627
6.4500E-01 -3.6300E-02 0.0515 -3.2100E-02 0.0549
7.3600E-01 -5.5900E-02 0.0411 -6.6700E-02 0.0374
8.2700E-01 -8.8600E-02 0.0321 -1.2130E-01 0.0269
9.1800E-01 -1.3480E-01 0.0253 -1.1060E-01 0.0284
1.1000E+00 -1.6550E-01 0.0225 -2.6000E-03 0.1959
total      -5.5130E-01 0.0094 -3.9510E-01 0.0126

```

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01 -7.7000E-03 0.1165 -4.6000E-03 0.1471
2.8200E-01 -9.3000E-03 0.1032 -7.6000E-03 0.1158
3.7300E-01 -1.0900E-02 0.0953 -1.0200E-02 0.0985
4.6400E-01 -1.6500E-02 0.0772 -1.4600E-02 0.0822
5.5500E-01 -2.5800E-02 0.0614 -2.4800E-02 0.0627
6.4500E-01 -3.6300E-02 0.0515 -3.2100E-02 0.0549
7.3600E-01 -5.5900E-02 0.0411 -6.6700E-02 0.0374
8.2700E-01 -8.8600E-02 0.0321 -1.2130E-01 0.0269
9.1800E-01 -1.3480E-01 0.0253 -1.1060E-01 0.0284
1.1000E+00 -1.6550E-01 0.0225 -2.6000E-03 0.1959
total      -5.5130E-01 0.0094 -3.9510E-01 0.0126

```

tally 58 nps = 10000
 tally type 8 pulse height distribution. units number
 tally for photons electrons

```

cell:      1
energy
-1.0000E-03  7.4000E-03 0.1158
0.0000E+00  0.0000E+00 0.0000
1.0000E-06  0.0000E+00 0.0000
1.0000E-01  2.1260E-01 0.0192
1.9100E-01  2.6550E-01 0.0166
2.8200E-01  1.8770E-01 0.0208
3.7300E-01  1.0950E-01 0.0285
4.6400E-01  6.4400E-02 0.0381
5.5500E-01  4.3700E-02 0.0468
6.4500E-01  2.6600E-02 0.0605
7.3600E-01  1.5800E-02 0.0789
8.2700E-01  1.1200E-02 0.0940
9.1800E-01  7.7000E-03 0.1135

```

```

1.1000E+00 4.79000E-02 0.0446
total 1.00000E+00 0.0000
y 8 nps = 10000
tally type 8* energy deposition units mev
tally for photons electrons

cell: 1
energy
1.0000E+03 2.66900E-01 0.0090
1 status of the statistical checks used to form confidence intervals for the mean for each tally bin

```

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

- 1 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 24 tally bins had 4 bins with zeros and 17 bins with relative errors exceeding 0.10
- 6 missed 1 of 10 tfc bin checks: the variance of the variance appears not to decrease as 1/nps for the last half of problem
missed all bin error check: 12 tally bins had 2 bins with zeros and 8 bins with relative errors exceeding 0.10
- 28 passed the 10 statistical checks for the tally fluctuation chart bin result
missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 11 missed 1 of 10 tfc bin checks: the slope of decrease of largest tallies is less than the minimum acceptable value of 3.0
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 21 missed 1 of 10 tfc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 31 missed 2 of 10 tfc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 41 missed 1 of 10 tfc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 51 missed 2 of 10 tfc bin checks: the estimated mean has a trend during the last half of the problem
missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 58 passed the 10 statistical checks for the tally fluctuation chart bin result
missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 8 passed the 10 statistical checks for the tally fluctuation chart bin result
passed all bin error check: 1 tally bins all have relative errors less than 0.10 with no zero bins

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 7 of the 10 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 9 of the 10 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 1						tally 6						tally 28					
nps	mean	error	vov	slope	fom	mean	error	vov	slope	fom	mean	error	vov	slope	fom		
1000	6.7975E-03	0.2399	0.0835	0.0		2.0857E-05	0.1589	0.0525	0.0		2.6993E-01	0.0279	0.0044	10.0			
2000	5.3780E-03	0.1884	0.0641	0.0		2.4397E-05	0.1701	0.1693	0.0		2.6475E-01	0.0199	0.0022	10.0			
3000	5.8779E-03	0.1455	0.0373	0.0		2.6650E-05	0.1343	0.1060	0.0		2.6433E-01	0.0161	0.0015	10.0			
4000	5.7880E-03	0.1317	0.0311	0.0		2.7894E-05	0.1145	0.0656	0.0		2.6224E-01	0.0140	0.0011	10.0			
5000	5.9924E-03	0.1168	0.0239	0.0		2.7855E-05	0.1020	0.0485	0.0		2.6175E-01	0.0126	0.0009	10.0			
6000	5.9423E-03	0.1055	0.0195	0.0		2.7793E-05	0.0931	0.0418	0.0		2.6496E-01	0.0116	0.0007	10.0			
7000	5.9749E-03	0.0968	0.0170	0.0		2.8647E-05	0.0919	0.0581	0.0		2.6691E-01	0.0107	0.0006	10.0			
8000	5.7670E-03	0.0913	0.0154	0.0		2.8249E-05	0.0838	0.0524	10.0		2.6739E-01	0.0100	0.0005	10.0			
9000	5.7398E-03	0.0864	0.0135	0.0		2.7485E-05	0.0779	0.0491	10.0		2.6699E-01	0.0095	0.0005	10.0			
10000	5.7777E-03	0.0811	0.0120	0.0		2.7551E-05	0.0722	0.0436	10.0		2.6690E-01	0.0090	0.0004	10.0			

tally 11					tally 21					tally 31					
nps	mean	error	vov	slope	fom	mean	error	vov	slope	fom	mean	error	vov	slope	fom
1000	4.4504E-01	0.0296	0.0002	2.1		5.6500E-01	0.0286	0.0004	4.4		-5.6500E-01	0.0286	0.0004	0.0	
2000	4.4489E-01	0.0211	0.0001	2.0		5.6500E-01	0.0204	0.0003	4.4		-5.6500E-01	0.0204	0.0003	0.0	
3000	4.4226E-01	0.0173	0.0001	1.8		5.6400E-01	0.0168	0.0002	10.0		-5.6400E-01	0.0168	0.0002	0.0	
4000	4.4011E-01	0.0151	0.0000	1.8		5.6100E-01	0.0147	0.0002	10.0		-5.6100E-01	0.0147	0.0002	0.0	
5000	4.4004E-01	0.0135	0.0000	1.9		5.5860E-01	0.0131	0.0001	10.0		-5.5860E-01	0.0131	0.0001	0.0	
6000	4.3549E-01	0.0125	0.0000	1.8		5.5433E-01	0.0121	0.0001	10.0		-5.5433E-01	0.0121	0.0001	0.0	
7000	4.3477E-01	0.0115	0.0000	1.9		5.5386E-01	0.0112	0.0001	10.0		-5.5386E-01	0.0112	0.0001	0.0	
8000	4.3339E-01	0.0108	0.0000	1.8		5.5238E-01	0.0105	0.0001	10.0		-5.5238E-01	0.0105	0.0001	0.0	
9000	4.3428E-01	0.0102	0.0000	1.7		5.5200E-01	0.0099	0.0001	10.0		-5.5200E-01	0.0099	0.0001	0.0	
10000	4.3411E-01	0.0097	0.0000	1.6		5.5130E-01	0.0094	0.0001	10.0		-5.5130E-01	0.0094	0.0001	0.0	

tally 41					tally 51					tally 58					
nps	mean	error	vov	slope	fom	mean	error	vov	slope	fom	mean	error	vov	slope	fom
1000	5.6500E-01	0.0286	0.0004	4.4		-5.6500E-01	0.0286	0.0004	0.0		1.0000E+00	0.0000	0.0000	10.0	
2000	5.6500E-01	0.0204	0.0003	4.4		-5.6500E-01	0.0204	0.0003	0.0		1.0000E+00	0.0000	0.0000	10.0	
3000	5.6400E-01	0.0168	0.0002	10.0		-5.6400E-01	0.0168	0.0002	0.0		1.0000E+00	0.0000	0.0000	10.0	
4000	5.6100E-01	0.0147	0.0002	10.0		-5.6100E-01	0.0147	0.0002	0.0		1.0000E+00	0.0000	0.0000	10.0	
5000	5.5860E-01	0.0131	0.0001	10.0		-5.5860E-01	0.0131	0.0001	0.0		1.0000E+00	0.0000	0.0000	10.0	
6000	5.5433E-01	0.0121	0.0001	10.0		-5.5433E-01	0.0121	0.0001	0.0		1.0000E+00	0.0000	0.0000	10.0	
7000	5.5386E-01	0.0112	0.0001	10.0		-5.5386E-01	0.0112	0.0001	0.0		1.0000E+00	0.0000	0.0000	10.0	
8000	5.5238E-01	0.0105	0.0001	10.0		-5.5238E-01	0.0105	0.0001	0.0		1.0000E+00	0.0000	0.0000	10.0	
9000	5.5200E-01	0.0099	0.0001	10.0		-5.5200E-01	0.0099	0.0001	0.0		1.0000E+00	0.0000	0.0000	10.0	
10000	5.5130E-01	0.0094	0.0001	10.0		-5.5130E-01	0.0094	0.0001	0.0		1.0000E+00	0.0000	0.0000	10.0	

tally 8					
nps	mean	error	vov	slope	fom
1000	2.6993E-01	0.0279	0.0044	10.0	
2000	2.6475E-01	0.0199	0.0022	10.0	
3000	2.6433E-01	0.0161	0.0015	10.0	
4000	2.6224E-01	0.0140	0.0011	10.0	
5000	2.6175E-01	0.0126	0.0009	10.0	
6000	2.6496E-01	0.0116	0.0007	10.0	
7000	2.6691E-01	0.0107	0.0006	10.0	
8000	2.6739E-01	0.0100	0.0005	10.0	
9000	2.6699E-01	0.0095	0.0005	10.0	
10000	2.6690E-01	0.0090	0.0004	10.0	

tally data written to file inp20m

6 warning messages so far.

run terminated when 10000 particle histories were done.

File: Inp24o

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1 -10.182 -1 u=2
3- 2 2 -.001 1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14.15 u=3
7- 6 3 -6.55 14 -15 u=3
8- 7 4 -1.0 -4 +5 -6 +7 u=1 lat=1 fill=-8:8 -8:8 0:0
9- 1 17r 2 14r 1 1 2 14r 1 1 2 2 3 2 2 3 2 2r 3 2 2
10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 2 14r 1 17r
17- 8 0 -8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4

```

```

19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- 19 (+28 +29 -19 +24 -25)
29- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
30- 20 0 -28 -29 +21 -22 +25
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250.7 2 4 4500 0
warning. tallies are normed per fission neutron for one generation.
64- ksrc 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- mt4 lwtr.01t
73- drxs
74- prdmp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2
76- sd6 1 4r
77-
total fission nubar data are being used.

```

warning. continuous-energy cross-section table used for 1001.00d

warning. continuous-energy cross-section table used for 5011.40d

warning. continuous-energy cross-section table used for 6012.40d

warning. continuous-energy cross-section table used for 8016.40d
 warning. continuous-energy cross-section table used for 14000.40d
 warning. continuous-energy cross-section table used for 26000.40d
 warning. continuous-energy cross-section table used for 40000.40d
 warning. continuous-energy cross-section table used for 92235.40d
 warning. continuous-energy cross-section table used for 92238.40d
 warning. 4 of the materials had unnormalized fractions.
 1cells

print table 60

		atom		gram		neutron		
cell	mat	density	density	volume	mass	pieces	importance	
1	1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
2	2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0	1.0000E+00
3	3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
4	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
5	5s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
6	6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
7	7s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
8	8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
9	9s	5.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
12	12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
13	13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
14	14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
15	15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00
total						0.00000E+00	0.00000E+00	

11 warning messages so far.

print table 100

1cross-section tables

table length

tables from file testlib1

			mat 125	05/26/93	
1001.00c	2139	1-b-1 from endf-vi.1			
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503
92238.40c	48310	ENDL library name: nd901118 MCNP translation:	9total nu 56:49		901119
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin	1001 0	010/22/85	

total 261165

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.
1 estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886		0.568374	0.0291	k(col/abs)	0.000000	0.000000	0.0000
k(absorption)	0.583788		0.591169	0.0125	k(abs/tk ln)	0.000000	0.000000	0.0000
k(trk length)	0.582547		0.568877	0.0240	k(tk ln/col)	0.000000	0.000000	0.0000
rem life(col)	3.9485E+03		3.8951E+03	0.0137				
rem life(abs)	4.0658E+03		3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000E+00	0.0000
source points generated	264							

source distribution written to file inp24s cycle = 4

1 problem summary

run terminated when 4 kcode cycles were done.

0

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
			energy cutoff	0	0.	0.	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtran	0	0.	0.	dxtran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
			capture	0	8.1698E-01	1.8384E-02	
(n,nx)	8	6.9970E-03	3.6428E-03	loss to (n,nx)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00 tco 1.0000E+34
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03 eco 0.0000E+00
total neutron collisions	57706	capture or escape	4.1766E+03 wc1 -5.0000E-01
net multiplication	1.0033E+00 0.0030	any termination	4.4650E+03 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	690539	most random numbers used was	3677 in history 21

range of sampled source weights = 9.8814E-01 to 1.1962E+00

1 neutron activity in each cell

print table 126

cell	entering	tracks	population	collisions	collisions	number	flux	average	average
				* weight	weighted	weighted	track weight	track	mfp
				(per history)	energy	energy	(relative)	(cm)	
1	1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01	3.8971E+00
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01	9.6437E+03
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01	3.6368E+00

4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01	1.4858E+00
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01	1.3256E+00
6	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01	3.6398E+00
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01	1.7232E+00
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01	3.1777E+00
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01	1.0087E+00
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total 138515 6658 57706 4.4801E+01									

the initial fission neutron source distribution used the 1 source points that were input on the ksrc card.
 the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.
 this problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.
 all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev fom
1	250	0.65821 0.61995 0.71299		
2	228	0.54932 0.55922 0.57971		
----- begin active keff cycles -----				
3	209	0.55186 0.59855 0.55521		
4	253	0.58489 0.58379 0.58255	0.56837 0.01651 0.59117 0.00738 0.56888 0.01367	

the largest active cycle keffs by estimator are:

the smallest active cycle keffs by estimator are:

collision 0.58489 on cycle 4
 absorption 0.59855 on cycle 3
 track length 0.58255 on cycle 4

collision 0.55186 on cycle 3
 absorption 0.58379 on cycle 4
 track length 0.55521 on cycle 3

total tally 6 nps = 940

tally type 6 track length estimate of heating, units mev/gram
 tally for neutrons

number of histories used for normalizing tallies = 500.00

masses

cell:	8	12	13	14	15
	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

cell 8

4.02566E+01 0.0434

cell 12
2.65224E+01 0.0629

cell 13
1.32494E+01 0.0904

cell 14
9.78180E-01 0.4014

cell 15
1.20234E-01 0.9710

1 analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
(largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

(confidence interval shift)/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	--mean--	-----relative error-----	---variance of the variance---	--figure of merit--	-pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope
desired	random	<0.10 yes	1/sqrt(nps) <0.10 yes	1/nps constant	random >3.00
observed	random	0.04 yes	0.01 yes	yes	0.00
passed?	yes	yes yes	yes yes	yes	no

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

1 unnormed tally density for tally 6 nonzero tally mean(m) = 4.357E+01 nps = 940 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally	number	num den	log den:d	d	d	d	d
2.51-01	1	3.87-02	-1.412	*****	*****	*****	*****
1.6-01	2	6.15-02	-1.211	*****	*****	*****	*****
8-01	1	2.44-02	-1.612	*****	*****	*****	*****

id	mean	lower bound	upper bound
5.01-01	1.194-02	-1.712	
6.31-01	2.308-02	-1.511	
7.94-01	3.367-02	-1.435	
1.00+00	5.486-02	-2.313	
1.26+00	1.772-03	-2.112	
1.58+00	5.307-02	-1.513	
2.00+00	7.341-02	-1.467	
2.51+00	6.232-02	-1.634	
3.16+00	8.246-02	-1.609	
3.98+00	11.269-02	-1.571	
5.01+00	14.272-02	-1.566	
6.31+00	10.154-02	-1.812	
7.94+00	14.171-02	-1.766	
1.00+01	13.126-02	-1.898	
1.26+01	16.124-02	-1.908	
1.58+01	11.675-03	-2.171	
2.00+01	20.975-03	-2.011	
2.51+01	32.124-02	-1.907	
3.16+01	41.126-02	-1.899	
3.98+01	24.586-03	-2.232	
5.01+01	48.931-03	-2.031	

6.31+01	54.832-03	-2.080	
7.94+01	40.490-03	-2.310	
1.00+02	28.272-03	-2.565	
1.26+02	20.154-03	-2.811	
1.58+02	21.129-03	-2.890	
2.00+02	2.975-05	-4.011	
2.51+02	0.00+00	0.000	
3.16+02	3.308-05	-4.512	*

total	462.924-01		

1 status of the statistical checks used to form confidence intervals for the mean for each tally bin

by result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

```
tally 6
nps mean error vov slope form
940 4.0257E+01 0.0434 0.0095 0.0
tally data written to file inp24m
```

15 warning messages so far.

run terminated when 4 kcode cycles were done.

File: Outp24

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1 -1.0 182 -1 u=2
3- 2 2 -.001 1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14:15 u=3
7- 6 3 -6.55 14 -15 u=3
8- 7 4 -1.0 -4 +5 -6 +7 u=1 lat=1 fill=-8:8 -8:8 0:0
9- 1 17r 2 14r 1 1 2 14r 1 1 2 2 3 2 2 2 2r 3 2 2

```

```

10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
    1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
    3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 2 14r 1 17r
17- 8 0 -8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4
19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- :(+28 +29 -19 +24 -25)
29- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
30- 20 0 -28:-29:+21:-22:+25
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 ez 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250.7 2 4 4500 0
warning: tallies are normed per fission neutron for one generation.
64- xsre 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- m14 lwtr.01t
73- drxs
74- prdmp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2

```

76- sd6 1 4r

77-

all fission nubar data are being used.

warning. continuous-energy cross-section table used for 1001.00d

warning. continuous-energy cross-section table used for 5011.40d

warning. continuous-energy cross-section table used for 6012.40d

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells

print table 60

		atom		gram		neutron		
cell	mat	density	density	volume	mass	pieces	importance	
1	1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0	1.0000E+00
2	2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0	1.0000E+00
3	3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
4	4	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
5	5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
6	6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
7	7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
8	8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
9	9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
12	12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
13	13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
14	14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
15	15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 0.00000E+00 0.00000E+00

11 warning messages so far.

1cross-section tables

print table 100

table length

tables from file testlib1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05	900207	
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05	900207	
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05	900207	
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05	900207	
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05	900207	
9000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05	900323	
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	900831 14:10:05	900503	

92238.40c 48310 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85
 total 261165

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.
 1estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

source distribution written to file inp24s cycle = 3

estimator	cycle	4	ave of	2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886	0.568374	0.0291	k(col/abs)	0.000000	0.0000	0.000000	0.0000
k(absorption)	0.583788	0.591169	0.0125	k(abs/tk ln)	0.000000	0.0000	0.000000	0.0000
k(trk length)	0.582547	0.568877	0.0240	k(tk ln/col)	0.000000	0.0000	0.000000	0.0000
rem life(col)	3.9485E+03	3.8951E+03	0.0137					
rem life(abs)	4.0658E+03	3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000	0.0000E+00	0.0000
source points generated	264							

source distribution written to file inp24s cycle = 4

problem summary

run terminated when 4 kcode cycles were done.

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
				energy cutoff	0	0.	0.
				time cutoff	0	0.	0.
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtran	0	0.	0.	dxtran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
				capture	0	8.1698E-01	1.8384E-02
(n,xn)	8	6.9970E-03	3.6428E-03	loss to (n,xn)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00 tco 1.0000E+34
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03 eco 0.0000E+00
total neutron collisions	57706	capture or escape	4.1766E+03 wc1 -5.0000E-01
net multiplication	1.0033E+00 0.0030	any termination	4.4650E+03 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0

random numbers generated 690539 most random numbers used was 3677 in history 21

age of sampled source weights = 9.8814E-01 to 1.1962E+00

neutron activity in each cell

print table 126

cell	tracks entering	population	collisions (per history)	collisions * weight energy	number weighted energy	flux weighted (relative)	average track weight (cm)	average track mfp
1	1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01
4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01
6	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total		138515	6658	57706	4.4801E+01			

the initial fission neutron source distribution used the 1 source points that were input on the ksrc card.

the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.

this problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.

all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

Individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev	form
1	250	[0.65821 0.61995 0.71299]			
2	228	[0.54932 0.55922 0.57971]			
----- begin active keff cycles -----					
3	209	[0.55186 0.59855 0.55521]			
4	253	[0.58489 0.58379 0.58255]	0.56837 0.01651 0.59117 0.00738 0.56888 0.01367		

the largest active cycle keffs by estimator are:

collision 0.58489 on cycle 4
absorption 0.59855 on cycle 3
track length 0.58255 on cycle 4

the smallest active cycle keffs by estimator are:

collision 0.55186 on cycle 3
absorption 0.58379 on cycle 4
track length 0.55521 on cycle 3

l tally 6 nps = 940
 tally type 6 track length estimate of heating. units mev/gram
 tally for neutrons
 number of histories used for normalizing tallies = 500.00

masses
 cell: 8 12 13 14 15
 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00

cell 8
 4.02566E+01 0.0434

cell 12
 2.65224E+01 0.0629

cell 13
 1.32494E+01 0.0904

cell 14
 9.78180E-01 0.4014

cell 15
 1.20234E-01 0.9710

l analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
 estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
 relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
 history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
 (largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

confidence interval shift/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
 nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
 the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	--mean--	-----relative error-----	---variance of the variance---	--figure of merit--	pdf-			
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope			
desired	random	<0.10 yes	1/sqrt(nps)	<0.10 yes	1/nps	constant	random	>3.00
observed	random	0.04 yes	yes	0.01 yes	yes		0.00	
passed?	yes	yes	yes	yes	yes	yes	no	

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

unnormalized tally density for tally 6 nonzero tally mean(m) = 4.357E+01 nps = 940 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally	number	num	den	log	den	d
2.51-01	1	3.87-02	-1.412	*		
3.16-01	2	6.15-02	-1.211	*		
3.98-01	1	2.44-02	-1.612	*		
5.01-01	1	1.94-02	-1.712	*		
6.31-01	2	3.08-02	-1.511	*		
7.94-01	3	3.67-02	-1.435	*		
1.00+00	5	4.86-02	-1.313	*		
1.26+00	1	7.72-02	-2.112	*		
1.58+00	5	3.07-02	-1.513	*		
2.00+00	7	3.41-02	-1.467	*		
2.51+00	6	2.32-02	-1.634	*		
3.16+00	8	2.46-02	-1.609	*		
3.98+00	11	2.69-02	-1.571	*		
5.01+00	14	2.72-02	-1.566	*		
6.31+00	10	1.54-02	-1.812	*		
7.94+00	14	1.71-02	-1.766	*		
1.00+01	13	1.26-02	-1.898	*		
1.26+01	16	1.24-02	-1.908	*		
1.58+01	11	6.75-03	-2.171	*		
2.00+01	20	9.75-03	-2.011	*		
2.51+01	32	1.24-02	-1.907	*		
3.16+01	41	1.26-02	-1.899	*		
3.98+01	24	5.86-03	-2.232	*		
5.01+01	48	9.31-03	-2.031	*		
6.31+01	54	8.32-03	-2.080	*		
7.94+01	40	4.90-03	-2.310	*		
1.00+02	28	2.72-03	-2.565	*		
1.26+02	20	1.54-03	-2.811	*		
1.58+02	21	1.29-03	-2.890	*		
2.00+02	2	9.75-05	-4.011	*		
2.51+02	0	0.00+00	0.000			
3.16+02	1	3.08-05	-4.512	*		
total	462	9.24-01				

status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of the 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

Italy fluctuation charts

tally 6

nps mean error vov slope fom
940 4.0257E+01 0.0434 0.0095 0.0

tally data written to file inp24m

15 warning messages so far.

terminated when 4 kcode cycles were done.

Computer System ID : 0012358

File: Inp18o

```

1-  prob18 -- kcode in a hexagonal prism lattice.
2-  c   three half control rods and five whole control rods.
3-  30  0 -905 -19 29 1 fill=1
4-  31  0 -906 -19 29 1 fill=1 (16.7113 0 0)
5-  37  0 -907 -19 29 1 fill=1 (-16.7113 0 0)
6-  34  0 -913 -19 29 fill=1 (0 11.9185 0)
7-  32  0 -914 -19 29 fill=1 (10.3217 5.9592 0)
8-  33  0 -915 -19 29 fill=1 (-8.3557 14.4724 0)
9-  35  0 -916 -19 29 fill=1 (-8.3557 14.4724 0)
10- 36  0 -917 -19 29 fill=1 (-10.3217 5.9592 0)
11-  c   universe 1: structure of control rod.
12-  38  11 -2.02 -880 u=1 $ control rod core
13-  39  6 -8.4 880 -881 u=1 $ control rod cladding
14-  40  12 -1.00 881 -882 u=1 $ control rod gap
15-  41  6 -8.4 882 u=1 $ control rod sheath
16-  c   the space between the control rods, filled with lattice.
17-  140 0 -17 1 29 -19 905 906 907 913 914 915 916 917 fill=2
18-  c   universe 2: lattice of fuel rods with water in between.
19-  42  12 -1.00 -301 302 -303 304 -305 306 u=2 lat=2 fill=
20-  -37:27 -1:33 0:0 &
21-  2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22-  2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23-  2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24-  2 3r 3 57r 2 2r &
25-  2 2r 3 58r 2 2r
26-  2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27-  2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28-  2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29-  2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30-  2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31-  2 1r 3 54r 2 7r &
32-  c   can code remember & thru comment?
33-  2 3 55r 2 7r
34-  2 3 25r 2 2r 3 25r 2 8r
35-  2 3 24r 2 3r 3 24r 2 9r
36-  2 3 23r 2 4r 3 23r 2 10r
37-  2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38-  2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39-  2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40-  2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41-  2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42-  2 3 46r 2 16r
43-  2 3 45r 2 17r
44-  2 3 44r 2 18r
45-  2 1r 3 41r 2 20r
46-  2 1r 3 40r 2 21r
47-  2 1r 3 39r 2 22r
48-  2 2r 3 36r 2 24r
49-  2 2r 3 35r 2 25r
50-  2 3r 3 32r 2 27r
51-  2 4r 3 29r 2 29r
52-  2 5r 3 26r 2 31r
53-  2 6r 3 23r 2 33r
54-  2 8r 3 18r 2 36r
55-  2 11r 3 11r 2 40r
56-  2 64r
57-  c   universe 3: structure of fuel rod lattice elements.
58-  154 2 -13.75 -58 u=3 $ fuel element
59-  149 12 -1.00 58 -268 u=3 $ gap
60-  144 7 -19.66 268 -478 u=3 $ liner
61-  159 6 -8.4 478 -698 u=3 $ cladding
62-  141 12 -1.00 698 u=3 $ water between the fuel rods

```

```

63- 162 0 17-29:19:-1 $ outside world
64-
65- *1 py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0 11.9185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- mt12 hwtr.01 lwtr.01
98- kcode 200 1 5 6
warning: tallies are normed per fission neutron for one generation.
99- ksrc 3 .2 .2 .2 3 .2 -.3 .2 .2 .2 3 .2 4 3 .2 -.4 3 .2 4 3 .1 -.4 3 .2
100- e .01 .1 1 .10.
101- fq f e
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<(42[-10:-6 -1 0])) $ average 5 x elements at j=-1
104- (154<(42[-10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<(42[-10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<(42[-10:-6 21 0])) $ average 5 x elements at j=21
107- (154<(42[-10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdmp 2j -1
111- ptrac buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points      8
points not in any cell         0
points in cells of zero importance 0
points in void cells           0
points in ambiguous cells      0
total points rejected          0
points remaining                8
points after expansion or contraction 200
nominal source size            200

```

initial guess for k(eff.) 1.000000

cycles to skip before tallying 5

number of keff cycles that can be stored 201

total fission nubar data are being used.

print table 30

tally 4

fuel rod flux in 5 y locations averaged over 5 x elements

tally type 4 track length estimate of particle flux.

tally for neutrons

order of printing: f e

cells (154<(42[-10:-6 -1 0]))(154<(42[-10:-6 3 0]))(154<(42[-10:-6 10 0]))(154<(42[-10:-6 21 0]))(154<(42[-10:-6 29 0]))

energy bins

0.00000E+00 to 1.00000E-02 mev

1.00000E-02 to 1.00000E-01 mev

1.00000E-01 to 1.00000E+00 mev

1.00000E+00 to 1.00000E+01 mev

total bin

print table 40

material composition

the sum of the fractions of material 2 was 9.999900E-01

the sum of the fractions of material 7 was 7.400000E-01

the sum of the fractions of material 12 was 3.000000E+00

material

number	component nuclide, atom fraction
2	92235, 0.37504 92238, 0.12499 7014, 0.49997
6	41093, 0.98982 40000, 0.01018
7	74000, 1.00000
11	5010, 0.71977 5011, 0.08004 6012, 0.20019
12	1001, 0.33333 1002, 0.33333 8016, 0.33333

associated thermal s(a,b) data sets: hwtr.01t hwtr.01t

material

number	component nuclide, mass fraction
2	92235, 0.70574 92238, 0.23821 7014, 0.05605
6	41093, 0.99000 40000, 0.01000
7	74000, 1.00000
11	5010, 0.68700 5011, 0.08400 6012, 0.22900
12	1001, 0.05300 1002, 0.10591 8016, 0.84109

warning. 3 of the materials had unnormalized fractions.

print table 50

icell volumes and masses

cell	atom density	gram density	input volume	calculated volume	mass	reason	volume pieces	not calculated
1	30	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
2	31	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
3	37	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
4	34	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
5	32	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
6	33	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
7	35	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
8	36	0.00000E+00	0.00000E+00	0.00000E+00	8.84370E+02	0.00000E+00	1	
9	38	1.15958E-01	2.02000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
10	39	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
11	40	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
12	41	5.44575E-02	8.40000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite
13	140	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	asymmetric
14	42	9.50007E-02	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	infinite

```

15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
16 149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
17 144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
1surface areas                                print table 50

```

```

surface input calculated reason area
area area not calculated

1 1 0.00000E+00 0.00000E+00 asymmetric
2 17 0.00000E+00 0.00000E+00 asymmetric
3 19 0.00000E+00 0.00000E+00 asymmetric
4 29 0.00000E+00 0.00000E+00 asymmetric
5 58 0.00000E+00 0.00000E+00 infinite
6 268 0.00000E+00 0.00000E+00 infinite
7 478 0.00000E+00 0.00000E+00 infinite
8 698 0.00000E+00 0.00000E+00 infinite
9 880 0.00000E+00 0.00000E+00 infinite
10 881 0.00000E+00 0.00000E+00 infinite
11 882 0.00000E+00 0.00000E+00 infinite
12 905 0.00000E+00 0.00000E+00 asymmetric
13 906 0.00000E+00 0.00000E+00 asymmetric
14 907 0.00000E+00 0.00000E+00 asymmetric
15 913 0.00000E+00 8.40057E+02
16 914 0.00000E+00 8.40057E+02
17 915 0.00000E+00 8.40057E+02
18 916 0.00000E+00 8.40057E+02
19 917 0.00000E+00 8.40057E+02
20 301 0.00000E+00 0.00000E+00 infinite
21 302 0.00000E+00 0.00000E+00 infinite
22 303 0.00000E+00 0.00000E+00 infinite
23 304 0.00000E+00 0.00000E+00
24 305 0.00000E+00 0.00000E+00
25 306 0.00000E+00 0.00000E+00
1cells

```

print table 60

```

atom gram neutron
cell mat density density volume mass pieces importance

1 30 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
2 31 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
3 37 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
4 34 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
5 32 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
6 33 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
7 35 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
8 36 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
9 38 11 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
10 39 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
11 40 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
12 41 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
13 140 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
14 42 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
15 154 2 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
16 149 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
17 144 7 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
18 159 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
20 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

```

```

total 4.42185E+03 0.00000E+00
1surfaces

```

print table 70

```

surface trans type surface coefficients

```

```

1 1 refl. py 0.000000E+00
2 17 cz 2.913500E+01
3 19 pz 3.175000E+01
4 29 pz -3.175000E+01
5 58 c/z 3.441400E+00 8.515000E-01 3.240000E-01
6 268 c/z 3.441400E+00 8.515000E-01 3.345000E-01
7 478 c/z 3.441400E+00 8.515000E-01 3.475000E-01
8 698 c/z 3.441400E+00 8.515000E-01 4.318000E-01
9 880 cz 1.725100E+00
10 881 cz 1.805100E+00
11 882 cz 1.905100E+00
12 905 cz 2.105500E+00
13 906 c/z 1.671130E+01 0.000000E+00 2.105500E+00
14 907 c/z -1.671130E+01 0.000000E+00 2.105500E+00
15 913 c/z 0.000000E+00 1.191850E+01 2.105500E+00
16 914 c/z 1.032170E+01 5.959200E+00 2.105500E+00
17 915 c/z 8.355700E+00 1.447240E+01 2.105500E+00
18 916 c/z -8.355700E+00 1.447240E+01 2.105500E+00
19 917 c/z -1.032170E+01 5.959200E+00 2.105500E+00
20 301 px 3.933000E+00
21 302 px 2.949800E+00
22 303 p 1.000000E+00 1.732050E+00 0.000000E+00 5.899400E+00
23 304 p 1.000000E+00 1.732050E+00 0.000000E+00 3.933000E+00
24 305 p -1.000000E+00 1.732050E+00 0.000000E+00 -9.834000E-01
25 306 p -1.000000E+00 1.732050E+00 0.000000E+00 -2.949800E+00
1 cell temperatures in mev for the free-gas thermal neutron treatment. print table 72

```

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

```

2 warning messages so far.
1 cross-section tables print table 100

```

table length

tables from file testlib1

```

1001.00c 1782 1-h-1 from endf-vi.1 mat 125 05/26/93
1002.55c 4102 njoy ( 120) 04/26/82
5011.40c 3229 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
6012.40c 4858 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
7014.40c 8535 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
8016.40c 5358 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900207
40090.40c 93372 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900323
41093.40c 42746 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
74000.40c 91244 ENDL library name: nd900719 MCNP translation: 900831 14:10:05 900208
92235.40c 34772 ENDL library name: nd900719 MCNP translation: 9total nu 10:05 900503
92238.40c 40834 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
5010.03d 3682 b-10 endf/b-iv new gamma production format ( 1273) 14 oct 75
hwr.01t 10193 deuterium in heavy water at 300 degrees kelvin 1002 0 010/22/85
lwr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

```

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inpl8s cycle = 0

```

3 warning messages so far.
1 starting mcrun. field length = 0 cp0 = 0.00 print table 110
1 prob18 -- kcode in a hexagonal prism lattice.

```

	x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.085E-01	4.733E-01	7.193E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.5085E-01	4.733E-01	7.193E-01		
2	3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		8.952E-01	-4.447E-01	-2.944E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0.8952E-01	-4.447E-01	-2.944E-02		
3	3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.184E-01	-4.495E-01	6.446E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6184E-01	-4.495E-01	6.446E-01		
4	3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		9.710E-01	-5.665E-02	-2.323E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.9710E-01	-5.665E-02	-2.323E-01		
5	3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.861E-01	1.496E-01	-7.963E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.5861E-01	1.496E-01	-7.963E-01		
6	3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.489E-02	-1.626E-01	9.845E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6489E-02	-1.626E-01	9.845E-01		
7	3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-7.068E-02	3.263E-02	-9.970E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.7068E-02	3.263E-02	-9.970E-01		
8	3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-3.915E-01	4.664E-01	-7.932E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.3915E-01	4.664E-01	-7.932E-01		
9	3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.368E-01	9.215E-01	-3.079E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.2368E-01	9.215E-01	-3.079E-01		
10	3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.946E-01	-3.204E-01	9.271E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.1946E-01	-3.204E-01	9.271E-01		
11	3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.698E-01	-7.177E-01	-1.905E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6698E-01	-7.177E-01	-1.905E-01		
12	3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-8.398E-01	-4.129E-01	3.524E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.8398E-01	-4.129E-01	3.524E-01		
13	3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.714E-01	-8.572E-01	4.857E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.1714E-01	-8.572E-01	4.857E-01		
14	3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.489E-01	-5.118E-01	-8.222E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.2489E-01	-5.118E-01	-8.222E-01		
15	3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.959E-01	2.119E-01	9.314E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.2959E-01	2.119E-01	9.314E-01		
16	3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.395E-01	-9.829E-01	1.202E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.1395E-01	-9.829E-01	1.202E-01		
17	3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		6.909E-01	-7.110E-01	1.307E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6909E-01	-7.110E-01	1.307E-01		
18	3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.580E-01	5.320E-01	-5.329E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.6580E-01	5.320E-01	-5.329E-01		
19	3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-9.903E-01	-1.380E-01	1.353E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0.9903E-01	-1.380E-01	1.353E-02		
20	3.000E+00	2.000E-01	2.000E-01	140			7.462E-01	4.859E-01	-4.551E-01	1.000E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		7.462E-01	4.859E-01	-4.551E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0.7462E-01	4.859E-01	-4.551E-01		
21	3.000E+00	2.000E-01	2.000E-01	140			-1.977E-01	9.797E-01	3.360E-02	3.990E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.977E-01	9.797E-01	3.360E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0.1977E-01	9.797E-01	3.360E-02		
	3.000E+00	2.000E-01	2.000E-01	140			-9.117E-01	-3.647E-01	-1.891E-01	2.665E-01	1.000E+00 0.000E+00

3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
 24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
 25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
 26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
 27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
 28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
 29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
 30 2.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
 31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
 32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
 33 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
 35 2.000E-01 3.000E+00 2.000E-01 140 -4.048E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -4.048E-02 8.831E-01 4.675E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -4.048E-02 8.831E-01 4.675E-01
 36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
 37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
 38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
 39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
 40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
 41 2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -3.212E-01 -7.678E-01 -5.543E-01
 42 2.000E-01 3.000E+00 2.000E-01 140 5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 5.039E-01 -1.460E-01 8.513E-01
 43 2.000E-01 3.000E+00 2.000E-01 140 6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 6.080E-01 5.487E-01 5.738E-01
 2.000E-01 3.000E+00 2.000E-01 140 -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01

```

3.641E+00 4.456E-01 2.000E-01 141      0 -2.932E-01 9.304E-01 -2.199E-01
2.000E-01 3.000E+00 2.000E-01 140      -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140      1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141      0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140      7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141      0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140      4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141      0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140      5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140      -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -1.053E-01 -9.805E-01 1.658E-01

```

Estimated keff results by cycle print table 175

```

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257
cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195
cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193
cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182
cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222
cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

```

Source distribution written to file imp18s cycle = 6
 Problem summary

run terminated when 6 kcode cycles were done.

```

0
neutron creation      tracks      weight      energy      neutron loss      tracks      weight      energy
      (per source particle)
source      1249  9.6077E-01  1.8661E+00  escape      220  1.2268E-01  1.2054E-01
      energy cutoff      0  0.  0.
      time cutoff      0  0.  0.
weight window      0  0.  0.  weight window      0  0.  0.
cell importance      0  0.  0.  cell importance      0  0.  0.
weight cutoff      0  1.3743E-01  3.8498E-03  weight cutoff      1034  1.2791E-01  5.1920E-03
energy importance      0  0.  0.  energy importance      0  0.  0.
dxtran      0  0.  0.  dxtran      0  0.  0.
forced collisions      0  0.  0.  forced collisions      0  0.  0.
exp. transform      0  0.  0.  exp. transform      0  0.  0.
upscattering      0  0.  5.3884E-11  downscattering      0  0.  1.3605E+00
      capture      0  3.9980E-01  1.1590E-01
(n,xn)      10  6.1640E-03  6.1355E-03  loss to (n,xn)      5  3.0820E-03  2.4027E-02
fission      0  0.  0.  loss to fission      0  4.5089E-01  2.4987E-01
total      1259  1.1044E+00  1.8761E+00  total      1259  1.1044E+00  1.8761E+00

```

```

number of neutrons banked      5  average lifetime, shakes      cutoffs
neutron tracks per source particle  1.0080E+00  escape  3.7027E+00  tco  1.0000E+34
neutron collisions per source particle  1.8226E+01  capture  1.2954E+01  eco  0.0000E+00
total neutron collisions      22764  capture or escape  1.1788E+01  wc1  -5.0000E-01
net multiplication      1.0032E+00 0.0035  any termination  1.2744E+01  wc2  -2.5000E-01

```

```

computer time so far in this run  0.00 minutes  maximum number ever in bank      1
computer time in mcrun      0.00 minutes  bank overflows to backup file      0
source particles per minute      0.0000E+00  field length      0
random numbers generated      500880  most random numbers used was      1298 in history      14

```

range of sampled source weights = 7.7821E-01 to 1.0989E+00
neutron activity in each cell

print table 126

cell	tracks entering	population	collisions * weight (per history)	collisions weighted energy	number weighted energy	flux weighted (relative)	average track weight (cm)	average track mfp
1 30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2 31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3 37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4 34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5 32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6 33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7 35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8 36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9 38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01	2.6324E+00
10 39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01	2.6947E+00
11 40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01	2.5146E+00
12 41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01	2.6940E+00
13 140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14 42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01	2.5091E+00
15 154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01	2.4712E+00
16 149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01	2.5408E+00
17 144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6971E-01	2.2391E+00
18 159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01	2.7541E+00
19 141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01	2.5056E+00

total 266059 9765 22764 1.1324E+01
neutron weight balance in each cell -- external events

print table 130

cell	entering	source cutoff	energy cutoff	time	exiting	total
1 30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2 31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3 37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4 34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5 32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6 33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7 35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8 36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9 38	4.8822E-01	0.0000E+00	0.0000E+00	0.0000E+00	-3.3091E-01	1.5731E-01
10 39	8.4996E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.4933E-01	6.2750E-04
11 40	8.9904E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.9904E-01	3.9460E-06
12 41	9.7260E-01	0.0000E+00	0.0000E+00	0.0000E+00	-9.6978E-01	2.8204E-03
13 140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14 42	1.0907E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.0913E+00	-5.9111E-04
15 154	1.2943E+01	8.4067E-01	0.0000E+00	0.0000E+00	-1.3171E+01	6.1278E-01
16 149	2.6508E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.6508E+01	3.5884E-05
17 144	2.7419E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.7405E+01	1.4572E-02
18 159	3.1331E+01	8.0064E-02	0.0000E+00	0.0000E+00	-3.1361E+01	5.0067E-02
19 141	3.9111E+01	4.0032E-02	0.0000E+00	0.0000E+00	-3.9150E+01	4.5860E-04

total 1.4161E+02 9.6077E-01 0.0000E+00 0.0000E+00 -1.4174E+02 8.3809E-01
neutron weight balance in each cell -- variance reduction events

print table 130

cell	weight window	cell importance	weight cutoff	energy importance	dxtran	forced collision	exponential transform	total
1 30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2 31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3 37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4 34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5 32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6 33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7 35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8 36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

```

9 38 0.0000E+00 0.0000E+00 1.2447E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 1.2447E-03
10 39 0.0000E+00 0.0000E+00 2.0097E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 2.0097E-04
11 40 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
12 41 0.0000E+00 0.0000E+00 2.9100E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 2.9100E-04
13 140 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
14 42 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
15 154 0.0000E+00 0.0000E+00 8.0354E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 8.0354E-03
16 149 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
17 144 0.0000E+00 0.0000E+00 -3.0848E-06 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 -3.0848E-06
18 159 0.0000E+00 0.0000E+00 -2.5216E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 -2.5216E-04
19 141 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00

```

total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03
Inertion weight balance in each cell -- physical events print table 130

cell	(n,xn)	fission	capture (n,xn)	loss to fission	loss to	total
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	-1.5855E-01
10	39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	-8.2847E-04
11	40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	-3.9460E-06
12	41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	-3.1114E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	5.9111E-04
15	154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-01	-6.2082E-01
16	149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	-3.5884E-05
17	144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	-1.4569E-02
18	159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	-4.9815E-02
19	141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	-4.5860E-04

total 6.1640E-03 0.0000E+00 -3.9980E-01 -3.0820E-03 -4.5089E-01 -8.4760E-01
Inertion activity of each nuclide in each cell, per source particle print table 140

cell	nuclides fraction	atom collisions	total	collisions * weight	weight lost to capture	weight loss to fission	weight gain by (n,xn)
9	38	5010.03d 7.1977E-01	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00
		5011.40c 8.0041E-02	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
		6012.40c 2.0019E-01	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
10	39	41093.40c 9.8982E-01	128	6.2802E-02	8.2814E-04	0.0000E+00	0.0000E+00
		40000.40c 1.0183E-02	2	9.7676E-04	3.3160E-07	0.0000E+00	0.0000E+00
11	40	1001.00c 3.3333E-01	111	5.1533E-02	3.9251E-06	0.0000E+00	0.0000E+00
		1002.55c 3.3333E-01	33	1.5373E-02	2.0884E-08	0.0000E+00	0.0000E+00
		8016.40c 3.3333E-01	40	2.1271E-02	0.0000E+00	0.0000E+00	0.0000E+00
12	41	41093.40c 9.8982E-01	313	1.5623E-01	3.1072E-03	0.0000E+00	0.0000E+00
		40000.40c 1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00
14	42	1001.00c 3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00	0.0000E+00
		1002.55c 3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00	6.2306E-04
		8016.40c 3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00	0.0000E+00
15	154	92235.40c 3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
		92238.40c 1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
		7014.40c 4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
16	149	1001.00c 3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00	0.0000E+00

1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00	0.0000E+00
8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00	0.0000E+00
17 144	74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00 0.0000E+00
18 159	41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00 0.0000E+00
	40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00 0.0000E+00
19 141	1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00 0.0000E+00
	1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00 0.0000E+00
	8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00 0.0000E+00
total		22764	1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03

total over all cells for each nuclide	total collisions	collisions * weight	weight lost to capture	weight loss to fission	weight gain by (n,xn)
1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04
5011.40c	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00

the initial fission neutron source distribution used the 8 source points that were input on the ksrc card.

the criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.

the problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.
individual and average keff estimator results by cycle

keff cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev fom
------------	-------------------	---	--	---

1	200 1.25311	1.26302	1.22009
2	257 1.21200	1.25252	1.12957
3	195 1.20026	1.14326	1.13006
4	193 1.12953	1.16269	1.10757
5	182 1.13599	1.12465	1.11238

----- begin active keff cycles -----

6	222 1.07701	1.04669	1.07528
---	---------------	---------	---------

1 tally 4 nps = 1249

+ fuel rod flux in 5 y locations averaged over 5 x elements

tally type 4 track length estimate of particle flux. units 1/cm**2

tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])

cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])

cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])

cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])

cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

```

energy:  1.0000E-02    1.0000E-01    1.0000E+00    1.0000E+01    total
cell
a  0.0000E+00 0.0000  2.84017E-05 0.9975  1.86420E-04 0.4656  1.36846E-04 0.5743  3.51668E-04 0.3877
b  1.07442E-05 0.9975  1.58576E-04 0.5120  2.32928E-04 0.3945  4.44462E-05 0.5872  4.46694E-04 0.2855
c  2.16778E-05 0.7232  9.40943E-05 0.5519  5.37835E-05 0.5876  1.51034E-04 0.7075  3.20589E-04 0.3937
d  1.47903E-05 0.5831  0.00000E+00 0.0000  1.15515E-04 0.5838  1.69653E-04 0.5071  2.99958E-04 0.3718
e  8.04943E-06 0.9975  0.00000E+00 0.0000  0.00000E+00 0.0000  6.81909E-05 0.7477  7.62403E-05 0.6763
analysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

```

```

normed average tally per history = 3.51668E-04    unnormed average tally per history = 3.68228E-02
estimated tally relative error = 0.3877    estimated variance of the variance = 0.1752
relative error from zero tallies = 0.3464    relative error from nonzero scores = 0.1740

number of nonzero history tallies = 8    efficiency for the nonzero tallies = 0.0400
history number of largest tally = 1034    largest unnormalized history tally = 1.41575E+00
(largest tally)/(average tally) = 3.84476E+01    (largest tally)/(avg nonzero tally)= 1.53791E+00

(confidence interval shift)/mean = 0.0793    shifted confidence interval center = 3.79539E-04

```

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	3.51668E-04	4.10723E-04	0.167927
relative error	3.87653E-01	3.61597E-01	-0.067213
variance of the variance	1.75161E-01	1.47665E-01	-0.156976
shifted center	3.79539E-04	3.77169E-04	-0.006244
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

tfc bin	--mean--	-----relative error-----	----variance of the variance----	--figure of merit--	pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior slope	
desired	random	<0.10 yes	1/sqrt(nps)	<0.10 yes	1/nps
observed	random	0.39 yes	yes	0.18 yes	yes
passed?	yes	no yes	yes	no yes	yes

warning. the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.
lunormed tally density for tally 4 nonzero tally mean(m)=9.206E-01 nps = 1249 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally	number	num den	log den:d
1.00-01	1	2.43-01	-0.614
1.26-01	0	0.00+00	0.000
1.58-01	0	0.00+00	0.000
2.00-01	0	0.00+00	0.000
2.51-01	0	0.00+00	0.000
3.16-01	0	0.00+00	0.000

abscissa cum ordinate plot of the cumulative number of tallies in the tally fluctuation chart bin from 0 to 100 percent
tally number cum pct

abscissa	cum	ordinate
tally	number	cum pct
1.00000E-01	1	12.500
1.25893E-01	1	12.500
1.58489E-01	1	12.500
1.99526E-01	1	12.500
2.51189E-01	1	12.500
3.16228E-01	1	12.500
3.98108E-01	1	12.500
5.01188E-01	1	12.500
6.30958E-01	3	37.500
7.94329E-01	3	37.500
1.00000E+00	4	50.000
1.25893E+00	4	50.000
1.58489E+00	8	100.000
total	\$	100.000

abscissa cum ordinate plot of the cumulative tally in the tally fluctuation chart bin from 0 to 100 percent

tally	tally/nps	cum pct
1.00E-01	4.632E-04	1.258*
1.259E-01	4.632E-04	1.258*
1.585E-01	4.632E-04	1.258*
1.995E-01	4.632E-04	1.258*
2.512E-01	4.632E-04	1.258*
3.162E-01	4.632E-04	1.258*
3.981E-01	4.632E-04	1.258*
5.012E-01	4.632E-04	1.258*
6.310E-01	6.195E-03	16.825*
7.943E-01	6.195E-03	16.825*
1.000E+00	1.017E-02	27.628
1.259E+00	1.017E-02	27.628
1.585E+00	3.682E-02	100.000
total	3.68228E-02	100.000

status of the statistical checks used to form confidence intervals for the mean for each tally bin

1status of the statistical checks used to form confidence intervals for the mean for each tally bin

4 missed 3 of 10 tlc bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies
missed all bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

	tally	4	
nps	mean	error	vov slope form

```

1000 0.0000E+00 0.0000 0.0000 0.0
1249 3.5167E-04 0.3877 0.1752 0.0
data written to file inp18m
ascii file inp18p written with 5 events from 5 histories.

```

6 warning messages so far.

run terminated when 6 kcode cycles were done.

File: Outp18

```

1-  prob18 -- kcode in a hexagonal prism lattice.
2-  c   three half control rods and five whole control rods.
3-  30  0 -905 -19 29 1 fill=1
4-  31  0 -906 -19 29 1 fill=1 (16.7113 0 0)
5-  37  0 -907 -19 29 1 fill=1 (-16.7113 0 0)
6-  34  0 -913 -19 29 fill=1 (0 11.9185 0)
7-  32  0 -914 -19 29 fill=1 (10.3217 5.9592 0)
8-  33  0 -915 -19 29 fill=1 (8.3557 14.4724 0)
9-  35  0 -916 -19 29 fill=1 (-8.3557 14.4724 0)
10- 36  0 -917 -19 29 fill=1 (-10.3217 5.9592 0)
11-  c   universe 1: structure of control rod.
12-  38  11 -2.02 -880 u=1 $ control rod core
13-  39  6 -8.4 880 -881 u=1 $ control rod cladding
14-  40  12 -1.00 881 -882 u=1 $ control rod gap
15-  41  6 -8.4 882 u=1 $ control rod sheath
16-  c   the space between the control rods, filled with lattice.
17- 140 0 -17 1 29 -19 905 906 907 913 914 915 916 917 fill=2
18-  c   universe 2: lattice of fuel rods with water in between.
19- 42  12 -1.00 -301 302 -303 304 -305 306 u=2 lat=2 fill=
20-  -37.27 -1.33 0.0 &
21-  2 4r 3 9r 2 4r 3 11r 2 4r 3 11r 2 4r 3 9r 2
22-  2 4r 3 9r 2 3r 3 12r 2 3r 3 12r 2 3r 3 9r 2 1r
23-  2 3r 3 10r 2 2r 3 13r 2 2r 3 13r 2 2r 3 10r 2 1r
24-  2 3r 3 57r 2 2r &
25-  2 2r 3 58r 2 2r
26-  2 2r 3 16r 2 2r 3 17r 2 2r 3 16r 2 3r
27-  2 2r 3 15r 2 3r 3 16r 2 3r 3 15r 2 4r
28-  2 1r 3 15r 2 4r 3 15r 2 4r 3 15r 2 4r
29-  2 1r 3 15r 2 3r 3 16r 2 3r 3 15r 2 5r
30-  2 1r 3 15r 2 2r 3 17r 2 2r 3 15r 2 6r
31-  2 1r 3 54r 2 7r &
32-  c   can code remember & thru comment?
33-  2 3 55r 2 7r
34-  2 3 25r 2 2r 3 25r 2 8r
35-  2 3 24r 2 3r 3 24r 2 9r
36-  2 3 23r 2 4r 3 23r 2 10r
37-  2 3 15r 2 2r 3 4r 2 3r 3 4r 2 2r 3 15r 2 11r
38-  2 3 14r 2 3r 3 4r 2 2r 3 4r 2 3r 3 14r 2 12r
39-  2 3 13r 2 4r 3 11r 2 4r 3 13r 2 13r
40-  2 3 13r 2 3r 3 12r 2 3r 3 13r 2 14r
41-  2 3 13r 2 2r 3 13r 2 2r 3 13r 2 15r
42-  2 3 46r 2 16r
43-  2 3 45r 2 17r
44-  2 3 44r 2 18r
45-  2 1r 3 41r 2 20r
46-  2 1r 3 40r 2 21r
47-  2 1r 3 39r 2 22r
48-  2 2r 3 36r 2 24r
49-  2 2r 3 35r 2 25r
50-  2 3r 3 32r 2 27r
51-  2 4r 3 29r 2 29r
52-  2 5r 3 26r 2 31r
53-  2 6r 3 23r 2 33r
54-  2 8r 3 18r 2 36r
55-  2 11r 3 11r 2 40r

```



```

56- 2 64r
57- c universe 3: structure of fuel rod lattice elements.
58- 154 2 -13.75 -58 u=3 $ fuel element
59- 149 12 -1.00 58 -268 u=3 $ gap
60- 144 7 -19.66 268 -478 u=3 $ liner
61- 159 6 -8.4 478 -698 u=3 $ cladding
62- 141 12 -1.00 698 u=3 $ water between the fuel rods
63- 162 0 17:-29:19:-1 $ outside world
64-
65- *1 py 0 $ x-z plane, reflective
66- 17 cz 29.135
67- 19 pz 31.75 $ top of reactor
68- 29 pz -31.75 $ bottom of reactor
69- 58 c/z 3.4414 .8515 .3240
70- 268 c/z 3.4414 .8515 .3345
71- 478 c/z 3.4414 .8515 .3475
72- 698 c/z 3.4414 .8515 .4318
73- 880 cz 1.7251
74- 881 cz 1.8051
75- 882 cz 1.9051
76- 905 cz 2.1055
77- 906 c/z 16.7113 0 2.1055
78- 907 c/z -16.7113 0 2.1055
79- 913 c/z 0 11.9185 2.1055
80- 914 c/z 10.3217 5.9592 2.1055
81- 915 c/z 8.3557 14.4724 2.1055
82- 916 c/z -8.3557 14.4724 2.1055
83- 917 c/z -10.3217 5.9592 2.1055
84- 301 px 3.9330
85- 302 px 2.9498
86- 303 p 1 1.7320508076 0 5.8994
87- 304 p 1 1.7320508076 0 3.9330
88- 305 p -1 1.7320508076 0 -.9834
89- 306 p -1 1.7320508076 0 -2.9498
90-
91- imp:n 1 18r 0
92- m2 92235.40c -.70573 92238.40c -.23821 7014.40c -.05605
93- m6 41093.40c -.99000 40000.40c -.01000
94- m7 74000.40c -.74000
95- m11 5010.03d -.6870 5011.40c -.0840 6012.40c -.2290
96- m12 1001.00c 1 1002.55c 1 8016.40c 1
97- m12 hwtr.01 lwtr.01
98- kcode 200 1 5 6
warning, tallies are normed per fission neutron for one generation.
99- ksrc 3 .2 .2 .3 .2 -.3 .2 .2 .2 .3 .2 .4 3 .2 .4 3 .2
100- e .01 .1 1 .10.
101- fq f e
102- fc4 fuel rod flux in 5 y locations averaged over 5 x elements
103- f4:n (154<-(42[-10:-6 -1 0])) $ average 5 x elements at j=-1
104- (154<-(42[-10:-6 3 0])) & $ average 5 x elements at j=3
105- (154<-(42[-10:-6 10 0])) $ average 5 x elements at j=10 &
106- (154<-(42[-10:-6 21 0])) $ average 5 x elements at j=21 &
107- (154<-(42[-10:-6 29 0])) $ average 5 x elements at j=29
108- sd4 104.7089062 4r $ 5 times the volume of cell 154
109- print -98
110- prdmp 2j -1
111- ptrac buffer=20 file=asc write=all event=bnk
1 initial source from ksrc card.

```

print table 90

```

original number of points      8
points not in any cell        0
points in cells of zero importance 0
points in void cells          0
points in ambiguous cells     0
total points rejected         0
points remaining              8
points after expansion or contraction 200

```

```

nominal source size          200
initial guess for k(eff.)    1.000000
cycles to skip before tallying      5
number of keff cycles that can be stored      201

total fission nubar data are being used.
tally 4                      print table 30
+      fuel rod flux in 5 y locations averaged over 5 x elements
      tally type 4 track length estimate of particle flux.
      tally for neutrons

order of printing: f e
cells (154<-(42[-10:-6 -1 0]))(154<-(42[-10:-6 3 0]))(154<-(42[-10:-6 10 0]))(154<-(42[-10:-6 21 0]))(154<-(42[-10:-6
29 0]))

energy bins
0.000000E+00 to 1.000000E-02 mev
1.000000E-02 to 1.000000E-01 mev
1.000000E-01 to 1.000000E+00 mev
1.000000E+00 to 1.000000E+01 mev
total bin

material composition                      print table 40

the sum of the fractions of material 2 was 9.999900E-01
the sum of the fractions of material 7 was 7.400000E-01
the sum of the fractions of material 12 was 3.000000E+00

material
number component nuclide, atom fraction
2 92235, 0.37504 92238, 0.12499 7014, 0.49997
6 41093, 0.98982 40000, 0.01018
7 74000, 1.00000
11 5010, 0.71977 5011, 0.08004 6012, 0.20019
12 1001, 0.33333 1002, 0.33333 8016, 0.33333
associated thermal s(a,b) data sets: hwtvr.01t lwtr.01t

material
number component nuclide, mass fraction
2 92235, 0.70574 92238, 0.23821 7014, 0.05605
6 41093, 0.99000 40000, 0.01000
7 74000, 1.00000
11 5010, 0.68700 5011, 0.08400 6012, 0.22900
12 1001, 0.05300 1002, 0.10591 8016, 0.84109

warning: 3 of the materials had unnormalized fractions.
cell volumes and masses                      print table 50

cell atom gram input calculated reason volume
density density density volume volume mass pieces not calculated
1 30 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
2 31 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
3 37 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
4 34 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
5 32 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
6 33 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1

```

```

7 35 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
8 36 0.00000E+00 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1
38 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
10 39 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
11 40 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
12 41 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
13 140 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
14 42 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
15 154 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
16 149 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
17 144 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
18 159 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
19 141 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite
20 162 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 asymmetric
1surface areas print table 50

```

```

surface input calculated reason area
area area not calculated
1 1 0.00000E+00 0.00000E+00 asymmetric
2 17 0.00000E+00 0.00000E+00 asymmetric
3 19 0.00000E+00 0.00000E+00 asymmetric
4 29 0.00000E+00 0.00000E+00 asymmetric
5 58 0.00000E+00 0.00000E+00 infinite
6 268 0.00000E+00 0.00000E+00 infinite
7 478 0.00000E+00 0.00000E+00 infinite
8 698 0.00000E+00 0.00000E+00 infinite
9 880 0.00000E+00 0.00000E+00 infinite
10 881 0.00000E+00 0.00000E+00 infinite
11 882 0.00000E+00 0.00000E+00 infinite
12 905 0.00000E+00 0.00000E+00 asymmetric
13 906 0.00000E+00 0.00000E+00 asymmetric
14 907 0.00000E+00 0.00000E+00 asymmetric
15 913 0.00000E+00 8.40057E+02
16 914 0.00000E+00 8.40057E+02
17 915 0.00000E+00 8.40057E+02
18 916 0.00000E+00 8.40057E+02
19 917 0.00000E+00 8.40057E+02
20 301 0.00000E+00 0.00000E+00 infinite
21 302 0.00000E+00 0.00000E+00 infinite
22 303 0.00000E+00 0.00000E+00 infinite
23 304 0.00000E+00 0.00000E+00
24 305 0.00000E+00 0.00000E+00
25 306 0.00000E+00 0.00000E+00

```

```
1cells print table 60
```

```

atom gram neutron
cell mat density density volume mass pieces importance
1 30 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
2 31 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
3 37 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
4 34 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
5 32 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
6 33 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
7 35 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
8 36 0 0.00000E+00 0.00000E+00 8.84370E+02 0.00000E+00 1 1.0000E+00
9 38 11 1.15958E-01 2.02000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
10 39 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
11 40 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
12 41 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
13 140 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
14 42 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
15 154 2 6.62920E-02 1.37500E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
16 149 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
17 144 7 6.43969E-02 1.96600E+01 0.00000E+00 0.00000E+00 0 1.0000E+00
18 159 6 5.44575E-02 8.40000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00

```

19 141 12s 9.50007E-02 1.00000E+00 0.00000E+00 0.00000E+00 0 1.0000E+00
 20 162 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

total 4.42185E+03 0.00000E+00

1surfaces

print table 70

surface trans type surface coefficients

1	1	refl.	py	0.000000E+00					
2	17		cz	2.913500E+01					
3	19		pz	3.175000E+01					
4	29		pz	-3.175000E+01					
5	58		c/z	3.441400E+00	8.515000E-01	3.240000E-01			
6	268		c/z	3.441400E+00	8.515000E-01	3.345000E-01			
7	478		c/z	3.441400E+00	8.515000E-01	3.475000E-01			
8	698		c/z	3.441400E+00	8.515000E-01	4.318000E-01			
9	880		cz	1.725100E+00					
10	881		cz	1.805100E+00					
11	882		cz	1.905100E+00					
12	905		cz	2.105500E+00					
13	906		c/z	1.671130E+01	0.000000E+00	2.105500E+00			
14	907		c/z	-1.671130E+01	0.000000E+00	2.105500E+00			
15	913		c/z	0.000000E+00	1.191850E+01	2.105500E+00			
16	914		c/z	1.032170E+01	5.959200E+00	2.105500E+00			
17	915		c/z	8.355700E+00	1.447240E+01	2.105500E+00			
18	916		c/z	-8.355700E+00	1.447240E+01	2.105500E+00			
19	917		c/z	-1.032170E+01	5.959200E+00	2.105500E+00			
20	301		px	3.933000E+00					
21	302		px	2.949800E+00					
22	303		p	1.000000E+00	1.732050E+00	0.000000E+00	5.899400E+00		
23	304		p	1.000000E+00	1.732050E+00	0.000000E+00	3.933000E+00		
24	305		p	-1.000000E+00	1.732050E+00	0.000000E+00	-9.834000E-01		
25	306		p	-1.000000E+00	1.732050E+00	0.000000E+00	-2.949800E+00		

cell temperatures in mev for the free-gas thermal neutron treatment.

print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.

2 warning messages so far.

print table 100

1cross-section tables

table length

tables from file testlib1

1001.00e	1782	1-h-1	from endf-vi.1	mat 125	05/26/93		
1002.55e	4102	njoy		(120)	04/26/82		
5011.40e	3229	ENDL library name:	nd900719	MCNP translation:	900831 14:10:05	900207	
6012.40e	4858	ENDL library name:	nd900719	MCNP translation:	900831 14:10:05	900207	
7014.40e	8535	ENDL library name:	nd900719	MCNP translation:	900831 14:10:05	900207	
8016.40e	5358	ENDL library name:	nd900719	MCNP translation:	900831 14:10:05	900207	
40000.40e	93372	ENDL library name:	nd900719	MCNP translation:	900831 14:10:05	900323	
41093.40e	42746	ENDL library name:	nd900719	MCNP translation:	900831 14:10:05	900208	
74000.40e	91244	ENDL library name:	nd900719	MCNP translation:	900831 14:10:05	900208	
92235.40e	34772	ENDL library name:	nd900719	MCNP translation:	9total nu 10:05	900503	
92238.40e	40834	ENDL library name:	nd901118	MCNP translation:	9total nu 56:49	901119	
5010.03d	3682	b-10 endf/b-iv	new gamma production format	(1273)	14 oct 75		
hwtr.01t	10193	deuterium in heavy water at 300 degrees kelvin		1002	0 010/22/85		
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin		1001	0 010/22/85		

total 354900

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

HNF-SD-SNF-CSWD-005, Rev. 0

force distribution written to file inpl8s cycle = 0

3 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00

print table 110

probl8 -- kcode in a hexagonal prism lattice.

nps	x	y	z	cell lattice(i,j,k)	surface	u	v	w	energy	weight	time
1	3.000E+00	2.000E-01	2.000E-01	140			5.085E-01	4.733E-01	7.193E-01	2.209E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.085E-01	4.733E-01	7.193E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 5.085E-01	4.733E-01	7.193E-01		
2	3.000E+00	2.000E-01	2.000E-01	140			8.952E-01	-4.447E-01	-2.944E-02	4.904E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		8.952E-01	-4.447E-01	-2.944E-02		
	3.492E+00	1.051E+00	2.000E-01	154			0 8.952E-01	-4.447E-01	-2.944E-02		
3	3.000E+00	2.000E-01	2.000E-01	140			-6.184E-01	-4.495E-01	6.446E-01	3.809E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.184E-01	-4.495E-01	6.446E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.184E-01	-4.495E-01	6.446E-01		
4	3.000E+00	2.000E-01	2.000E-01	140			9.710E-01	-5.665E-02	-2.323E-01	1.331E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		9.710E-01	-5.665E-02	-2.323E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 9.710E-01	-5.665E-02	-2.323E-01		
5	3.000E+00	2.000E-01	2.000E-01	140			5.861E-01	1.496E-01	-7.963E-01	1.902E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		5.861E-01	1.496E-01	-7.963E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 5.861E-01	1.496E-01	-7.963E-01		
6	3.000E+00	2.000E-01	2.000E-01	140			-6.489E-02	-1.626E-01	9.845E-01	4.410E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.489E-02	-1.626E-01	9.845E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.489E-02	-1.626E-01	9.845E-01		
7	3.000E+00	2.000E-01	2.000E-01	140			-7.068E-02	3.263E-02	-9.970E-01	4.750E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-7.068E-02	3.263E-02	-9.970E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -7.068E-02	3.263E-02	-9.970E-01		
8	3.000E+00	2.000E-01	2.000E-01	140			-3.915E-01	4.664E-01	-7.932E-01	4.136E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-3.915E-01	4.664E-01	-7.932E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -3.915E-01	4.664E-01	-7.932E-01		
9	3.000E+00	2.000E-01	2.000E-01	140			-2.368E-01	9.215E-01	-3.079E-01	7.453E-02	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.368E-01	9.215E-01	-3.079E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.368E-01	9.215E-01	-3.079E-01		
10	3.000E+00	2.000E-01	2.000E-01	140			1.946E-01	-3.204E-01	9.271E-01	3.128E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.946E-01	-3.204E-01	9.271E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 1.946E-01	-3.204E-01	9.271E-01		
11	3.000E+00	2.000E-01	2.000E-01	140			-6.698E-01	-7.177E-01	-1.905E-01	1.014E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.698E-01	-7.177E-01	-1.905E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.698E-01	-7.177E-01	-1.905E-01		
12	3.000E+00	2.000E-01	2.000E-01	140			-8.398E-01	-4.129E-01	3.524E-01	1.395E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-8.398E-01	-4.129E-01	3.524E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -8.398E-01	-4.129E-01	3.524E-01		
13	3.000E+00	2.000E-01	2.000E-01	140			-1.714E-01	-8.572E-01	4.857E-01	7.748E-01	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-1.714E-01	-8.572E-01	4.857E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -1.714E-01	-8.572E-01	4.857E-01		
14	3.000E+00	2.000E-01	2.000E-01	140			-2.489E-01	-5.118E-01	-8.222E-01	1.101E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.489E-01	-5.118E-01	-8.222E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.489E-01	-5.118E-01	-8.222E-01		
15	3.000E+00	2.000E-01	2.000E-01	140			-2.959E-01	2.119E-01	9.314E-01	1.951E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-2.959E-01	2.119E-01	9.314E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -2.959E-01	2.119E-01	9.314E-01		
16	3.000E+00	2.000E-01	2.000E-01	140			1.395E-01	-9.829E-01	1.202E-01	2.186E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		1.395E-01	-9.829E-01	1.202E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 1.395E-01	-9.829E-01	1.202E-01		
17	3.000E+00	2.000E-01	2.000E-01	140			6.909E-01	-7.110E-01	1.307E-01	1.865E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		6.909E-01	-7.110E-01	1.307E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 6.909E-01	-7.110E-01	1.307E-01		
18	3.000E+00	2.000E-01	2.000E-01	140			-6.580E-01	5.320E-01	-5.329E-01	1.229E+00	1.000E+00 0.000E+00
	3.492E+00	1.051E+00	2.000E-01	42(	0, -1, 0)		-6.580E-01	5.320E-01	-5.329E-01		
	3.492E+00	1.051E+00	2.000E-01	154			0 -6.580E-01	5.320E-01	-5.329E-01		
	3.000E+00	2.000E-01	2.000E-01	140			-9.903E-01	-1.380E-01	1.353E-02	1.305E+00	1.000E+00 0.000E+00

3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.903E-01 -1.380E-01 1.353E-02
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.903E-01 -1.380E-01 1.353E-02
 3.000E+00 2.000E-01 2.000E-01 140 7.462E-01 4.859E-01 -4.551E-01 1.000E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 7.462E-01 4.859E-01 -4.551E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 7.462E-01 4.859E-01 -4.551E-01
 21 3.000E+00 2.000E-01 2.000E-01 140 -1.977E-01 9.797E-01 3.360E-02 3.990E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -1.977E-01 9.797E-01 3.360E-02
 3.492E+00 1.051E+00 2.000E-01 154 0 -1.977E-01 9.797E-01 3.360E-02
 22 3.000E+00 2.000E-01 2.000E-01 140 -9.117E-01 -3.647E-01 -1.891E-01 2.665E-01 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.117E-01 -3.647E-01 -1.891E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.117E-01 -3.647E-01 -1.891E-01
 23 3.000E+00 2.000E-01 2.000E-01 140 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -4.287E-01 8.361E-01 -3.423E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -4.287E-01 8.361E-01 -3.423E-01
 24 3.000E+00 2.000E-01 2.000E-01 140 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) 1.080E-01 3.412E-01 -9.338E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 1.080E-01 3.412E-01 -9.338E-01
 25 3.000E+00 2.000E-01 2.000E-01 140 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
 3.492E+00 1.051E+00 2.000E-01 42(0, -1, 0) -9.111E-01 -9.012E-03 -4.122E-01
 3.492E+00 1.051E+00 2.000E-01 154 0 -9.111E-01 -9.012E-03 -4.122E-01
 26 2.000E-01 3.000E+00 2.000E-01 140 -2.568E-01 -6.391E-01 -7.249E-01 7.280E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.568E-01 -6.391E-01 -7.249E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.568E-01 -6.391E-01 -7.249E-01
 27 2.000E-01 3.000E+00 2.000E-01 140 -2.912E-01 8.086E-01 5.113E-01 1.404E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.912E-01 8.086E-01 5.113E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.912E-01 8.086E-01 5.113E-01
 28 2.000E-01 3.000E+00 2.000E-01 140 1.472E-01 -9.514E-01 2.705E-01 1.090E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.472E-01 -9.514E-01 2.705E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 1.472E-01 -9.514E-01 2.705E-01
 29 2.000E-01 3.000E+00 2.000E-01 140 -6.135E-01 -7.645E-01 -1.978E-01 2.483E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.135E-01 -7.645E-01 -1.978E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.135E-01 -7.645E-01 -1.978E-01
 30 2.000E-01 3.000E+00 2.000E-01 140 -5.702E-01 5.651E-01 -5.963E-01 3.767E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -5.702E-01 5.651E-01 -5.963E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -5.702E-01 5.651E-01 -5.963E-01
 31 2.000E-01 3.000E+00 2.000E-01 140 -6.607E-01 5.373E-01 -5.242E-01 1.019E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -6.607E-01 5.373E-01 -5.242E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -6.607E-01 5.373E-01 -5.242E-01
 32 2.000E-01 3.000E+00 2.000E-01 140 -9.742E-02 -3.639E-01 -9.263E-01 1.879E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -9.742E-02 -3.639E-01 -9.263E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -9.742E-02 -3.639E-01 -9.263E-01
 33 2.000E-01 3.000E+00 2.000E-01 140 -1.965E-01 -3.145E-01 -9.287E-01 4.700E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.965E-01 -3.145E-01 -9.287E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.965E-01 -3.145E-01 -9.287E-01
 34 2.000E-01 3.000E+00 2.000E-01 140 4.097E-01 8.465E-01 -3.399E-01 1.530E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.097E-01 8.465E-01 -3.399E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 4.097E-01 8.465E-01 -3.399E-01
 35 2.000E-01 3.000E+00 2.000E-01 140 -0.408E-02 8.831E-01 4.675E-01 2.675E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -0.408E-02 8.831E-01 4.675E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -0.408E-02 8.831E-01 4.675E-01
 36 2.000E-01 3.000E+00 2.000E-01 140 3.371E-01 -9.269E-01 -1.652E-01 9.222E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 3.371E-01 -9.269E-01 -1.652E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 3.371E-01 -9.269E-01 -1.652E-01
 37 2.000E-01 3.000E+00 2.000E-01 140 -1.867E-01 9.756E-01 -1.155E-01 9.702E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.867E-01 9.756E-01 -1.155E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -1.867E-01 9.756E-01 -1.155E-01
 38 2.000E-01 3.000E+00 2.000E-01 140 -2.616E-01 2.336E-01 -9.365E-01 1.230E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.616E-01 2.336E-01 -9.365E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 -2.616E-01 2.336E-01 -9.365E-01
 39 2.000E-01 3.000E+00 2.000E-01 140 9.780E-01 -7.641E-02 -1.939E-01 1.083E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 9.780E-01 -7.641E-02 -1.939E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 9.780E-01 -7.641E-02 -1.939E-01
 40 2.000E-01 3.000E+00 2.000E-01 140 2.580E-01 -7.076E-01 6.578E-01 8.313E-01 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 2.580E-01 -7.076E-01 6.578E-01
 3.641E+00 4.456E-01 2.000E-01 141 0 2.580E-01 -7.076E-01 6.578E-01
 2.000E-01 3.000E+00 2.000E-01 140 -3.212E-01 -7.678E-01 -5.543E-01 1.081E+00 1.000E+00 0.000E+00
 3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -3.212E-01 -7.678E-01 -5.543E-01

```

3.641E+00 4.456E-01 2.000E-01 141      0 -3.212E-01 -7.678E-01 -5.543E-01
2.000E-01 3.000E+00 2.000E-01 140      5.039E-01 -1.460E-01 8.513E-01 3.341E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.039E-01 -1.460E-01 8.513E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.039E-01 -1.460E-01 8.513E-01
43 2.000E-01 3.000E+00 2.000E-01 140      6.080E-01 5.487E-01 5.738E-01 4.097E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 6.080E-01 5.487E-01 5.738E-01
3.641E+00 4.456E-01 2.000E-01 141      0 6.080E-01 5.487E-01 5.738E-01
44 2.000E-01 3.000E+00 2.000E-01 140      -2.932E-01 9.304E-01 -2.199E-01 2.229E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -2.932E-01 9.304E-01 -2.199E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -2.932E-01 9.304E-01 -2.199E-01
45 2.000E-01 3.000E+00 2.000E-01 140      -8.475E-01 -3.993E-01 -3.497E-01 1.362E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -8.475E-01 -3.993E-01 -3.497E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -8.475E-01 -3.993E-01 -3.497E-01
46 2.000E-01 3.000E+00 2.000E-01 140      1.200E-01 -9.195E-01 -3.743E-01 1.010E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 1.200E-01 -9.195E-01 -3.743E-01
3.641E+00 4.456E-01 2.000E-01 141      0 1.200E-01 -9.195E-01 -3.743E-01
47 2.000E-01 3.000E+00 2.000E-01 140      7.085E-01 5.879E-01 3.904E-01 7.068E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 7.085E-01 5.879E-01 3.904E-01
3.641E+00 4.456E-01 2.000E-01 141      0 7.085E-01 5.879E-01 3.904E-01
48 2.000E-01 3.000E+00 2.000E-01 140      4.261E-01 9.046E-01 9.254E-03 3.122E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 4.261E-01 9.046E-01 9.254E-03
3.641E+00 4.456E-01 2.000E-01 141      0 4.261E-01 9.046E-01 9.254E-03
49 2.000E-01 3.000E+00 2.000E-01 140      5.431E-01 4.270E-01 -7.230E-01 5.484E-01 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) 5.431E-01 4.270E-01 -7.230E-01
3.641E+00 4.456E-01 2.000E-01 141      0 5.431E-01 4.270E-01 -7.230E-01
50 2.000E-01 3.000E+00 2.000E-01 140      -1.053E-01 -9.805E-01 1.658E-01 1.545E+00 1.000E+00 0.000E+00
3.641E+00 4.456E-01 2.000E-01 42(-5, 3, 0) -1.053E-01 -9.805E-01 1.658E-01
3.641E+00 4.456E-01 2.000E-01 141      0 -1.053E-01 -9.805E-01 1.658E-01

```

Estimated keff results by cycle

print table 175

```

cycle 1 k(collision) 1.253108 removal lifetime(abs) 1.7557E+01 source points generated 257
cycle 2 k(collision) 1.211997 removal lifetime(abs) 1.1671E+01 source points generated 195
cycle 3 k(collision) 1.200265 removal lifetime(abs) 9.6992E+00 source points generated 193
cycle 4 k(collision) 1.129530 removal lifetime(abs) 9.3720E+00 source points generated 182
cycle 5 k(collision) 1.135994 removal lifetime(abs) 1.1136E+01 source points generated 222

source distribution written to file inp18s cycle = 5

cycle 6 k(collision) 1.077014 removal lifetime(abs) 1.2222E+01 source points generated 204

source distribution written to file inp18s cycle = 6

```

problem summary

run terminated when 6 kcode cycles were done.

```

0
neutron creation      tracks weight energy      neutron loss      tracks weight energy
      (per source particle)      (per source particle)

source      1249  9.6077E-01  1.8661E+00      escape      220  1.2268E-01  1.2054E-01
              energy cutoff      0 0.
              time cutoff      0 0.

weight window      0 0. 0.      weight window      0 0. 0.
cell importance      0 0. 0.      cell importance      0 0. 0.
weight cutoff      0 1.3743E-01  3.8498E-03      weight cutoff      1034  1.2791E-01  5.1920E-03
energy importance      0 0. 0.      energy importance      0 0. 0.
dxtran      0 0. 0.      dxtran      0 0. 0.
forced collisions      0 0. 0.      forced collisions      0 0. 0.
exp. transfer      0 0. 0.      exp. transfer      0 0. 0.
upscattering      0 0. 5.3884E-11      downscattering      0 0. 1.3605E+00
              capture      0 3.9980E-01  1.1590E-01
(n,xn)      10  6.1640E-03  6.1355E-03      loss to (n,xn)      5  3.0820E-03  2.4027E-02
fission      0 0. 0.      loss to fission      0  4.5089E-01  2.4987E-01
total      1259  1.1044E+00  1.8761E+00      total      1259  1.1044E+00  1.8761E+00

```

number of neutrons banked 5 average lifetime, shakes cutoffs
 neutron tracks per source particle 1.0080E+00 escape 3.7027E+00 tco 1.0000E+34
 neutron collisions per source particle 1.8226E+01 capture 1.2954E+01 eco 0.0000E+00
 total neutron collisions 22764 capture or escape 1.1788E+01 wcl -5.0000E-01
 net multiplication 1.0032E+00 0.0035 any termination 1.2744E+01 wc2 -2.5000E-01

computer time so far in this run 0.00 minutes maximum number ever in bank 1
 computer time in mcrun 0.00 minutes bank overflows to backup file 0
 source particles per minute 0.0000E+00 field length 0
 random numbers generated 500880 most random numbers used was 1298 in history 14

range of sampled source weights = 7.7821E-01 to 1.0989E+00

In neutron activity in each cell

print table 126

cell	entering	tracks	population	collisions	collisions	number	flux	average	average
				* weight	weighted	weighted	track weight	track weight	mfp
				(per history)	energy	energy	(relative)	(cm)	
1	30	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	920	618	1249	5.9116E-01	3.0414E-01	8.9304E-01	6.4212E-01	2.6324E+00
10	39	1635	637	130	6.3779E-02	8.8236E-02	7.6766E-01	6.4931E-01	2.6947E+00
11	40	1728	663	184	8.8176E-02	7.6162E-02	7.6184E-01	6.4437E-01	2.5146E+00
12	41	1867	712	317	1.5811E-01	8.6238E-02	7.9306E-01	6.5030E-01	2.6940E+00
13	140	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	2069	867	441	2.1911E-01	8.9382E-02	7.8771E-01	6.6777E-01	2.5091E+00
15	154	25302	1253	8436	4.1390E+00	1.2606E-01	8.5005E-01	6.6920E-01	2.4712E+00
16	149	49542	1253	580	2.8963E-01	1.0795E-01	8.2361E-01	6.7129E-01	2.5408E+00
17	144	51224	1254	885	4.2652E-01	1.0541E-01	8.1599E-01	6.6971E-01	2.2391E+00
18	159	58650	1254	4019	2.1254E+00	9.8931E-02	8.1154E-01	6.6977E-01	2.7541E+00
19	141	73122	1254	6523	3.2229E+00	9.4499E-02	8.0639E-01	6.6810E-01	2.5056E+00

total 266059 9765 22764 1.1324E+01

In neutron weight balance in each cell - external events

print table 130

cell	entering	source	energy	time	exiting	total
		cutoff	cutoff			
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	4.8822E-01	0.0000E+00	0.0000E+00	0.0000E+00	-3.3091E-01
10	39	8.4996E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.4933E-01
11	40	8.9904E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.9904E-01
12	41	9.7260E-01	0.0000E+00	0.0000E+00	0.0000E+00	-9.6978E-01
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.0907E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.0913E+00
15	154	1.2943E+01	8.4067E-01	0.0000E+00	0.0000E+00	-1.3171E+01
16	149	2.6508E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.6508E+01
17	144	2.7419E+01	0.0000E+00	0.0000E+00	0.0000E+00	-2.7405E+01
18	159	3.1331E+01	8.0064E-02	0.0000E+00	0.0000E+00	-3.1361E+01
19	141	3.9111E+01	4.0032E-02	0.0000E+00	0.0000E+00	-3.9150E+01

total 1.4161E+02 9.6077E-01 0.0000E+00 0.0000E+00 -1.4174E+02 8.3809E-01

In neutron weight balance in each cell - variance reduction events

print table 130

	cell	weight	cell	weight	energy	dxtran	forced	exponential	total
	window	importance	cutoff	importance	importance		collision	transform	
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	1.2447E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
10	39	0.0000E+00	0.0000E+00	2.0097E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.0097E-04
11	40	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	41	0.0000E+00	0.0000E+00	2.9100E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.9100E-04
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	154	0.0000E+00	0.0000E+00	8.0354E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	8.0354E-03
16	149	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	144	0.0000E+00	0.0000E+00	-3.0848E-06	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-3.0848E-06
18	159	0.0000E+00	0.0000E+00	-2.5216E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-2.5216E-04
19	141	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total 0.0000E+00 0.0000E+00 9.5169E-03 0.0000E+00 0.0000E+00 0.0000E+00 9.5169E-03									

neutron weight balance in each cell -- physical events

print table 130

	cell	(n,xn)	fission	capture	loss to	loss to	total
				(n,xn)	fission		
1	30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	38	0.0000E+00	0.0000E+00	-1.5855E-01	0.0000E+00	0.0000E+00	-1.5855E-01
10	39	0.0000E+00	0.0000E+00	-8.2847E-04	0.0000E+00	0.0000E+00	-8.2847E-04
11	40	0.0000E+00	0.0000E+00	-3.9460E-06	0.0000E+00	0.0000E+00	-3.9460E-06
12	41	0.0000E+00	0.0000E+00	-3.1114E-03	0.0000E+00	0.0000E+00	-3.1114E-03
13	140	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	42	1.2461E-03	0.0000E+00	-3.1955E-05	-6.2306E-04	0.0000E+00	5.9111E-04
15	154	4.9179E-03	0.0000E+00	-1.7239E-01	-2.4589E-03	-4.5089E-01	-6.2082E-01
16	149	0.0000E+00	0.0000E+00	-3.5884E-05	0.0000E+00	0.0000E+00	-3.5884E-05
17	144	0.0000E+00	0.0000E+00	-1.4569E-02	0.0000E+00	0.0000E+00	-1.4569E-02
18	159	0.0000E+00	0.0000E+00	-4.9815E-02	0.0000E+00	0.0000E+00	-4.9815E-02
19	141	0.0000E+00	0.0000E+00	-4.5860E-04	0.0000E+00	0.0000E+00	-4.5860E-04
total 6.1640E-03 0.0000E+00 -3.9980E-01 -3.0820E-03 -4.5089E-01 -8.4760E-01							

neutron activity of each nuclide in each cell, per source particle

print table 140

	cell	nuclides	atom	total	collisions	weight lost	weight loss	weight gain
		fraction	collisions		* weight	to capture	to fission	by (n,xn)
9	38	5010.03d	7.1977E-01	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00
		5011.40c	8.0041E-02	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
		6012.40c	2.0019E-01	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
10	39	41093.40c	9.8982E-01	128	6.2802E-02	8.2814E-04	0.0000E+00	0.0000E+00
		40000.40c	1.0183E-02	2	9.7676E-04	3.3160E-07	0.0000E+00	0.0000E+00
11	40	1001.00c	3.3333E-01	111	5.1533E-02	3.9251E-06	0.0000E+00	0.0000E+00
		1002.55c	3.3333E-01	33	1.5373E-02	2.0884E-08	0.0000E+00	0.0000E+00
		8016.40c	3.3333E-01	40	2.1271E-02	0.0000E+00	0.0000E+00	0.0000E+00
12	41	41093.40c	9.8982E-01	313	1.5623E-01	3.1072E-03	0.0000E+00	0.0000E+00

	40000.40c	1.0183E-02	4	1.8747E-03	4.2322E-06	0.0000E+00	0.0000E+00	
42	1001.00c	3.3333E-01	257	1.2131E-01	4.3914E-06	0.0000E+00	0.0000E+00	
	1002.55c	3.3333E-01	86	4.6121E-02	6.8027E-08	0.0000E+00	6.2306E-04	
	8016.40c	3.3333E-01	98	5.1682E-02	2.7495E-05	0.0000E+00	0.0000E+00	
15	92235.40c	3.7504E-01	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04	
	92238.40c	1.2499E-01	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03	
	7014.40c	4.9997E-01	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00	
16	1001.00c	3.3333E-01	345	1.6812E-01	4.4875E-06	0.0000E+00	0.0000E+00	
	1002.55c	3.3333E-01	110	5.8433E-02	9.1921E-08	0.0000E+00	0.0000E+00	
	8016.40c	3.3333E-01	125	6.3072E-02	3.1305E-05	0.0000E+00	0.0000E+00	
17	144	74000.40c	1.0000E+00	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
18	159	41093.40c	9.8982E-01	3965	2.1009E+00	4.9769E-02	0.0000E+00	0.0000E+00
	40000.40c	1.0183E-02	54	2.4590E-02	4.6175E-05	0.0000E+00	0.0000E+00	
19	141	1001.00c	3.3333E-01	4029	1.9096E+00	7.9511E-05	0.0000E+00	0.0000E+00
	1002.55c	3.3333E-01	1122	5.8206E-01	9.0056E-07	0.0000E+00	0.0000E+00	
	8016.40c	3.3333E-01	1372	7.3131E-01	3.7819E-04	0.0000E+00	0.0000E+00	
total			22764	1.1324E+01	3.9980E-01	4.5089E-01	3.0820E-03	

total over all cells for each nuclide total collisions weight lost weight loss weight gain
 collisions * weight to capture to fission by (n,xn)

1001.00c	4742	2.2505E+00	9.2315E-05	0.0000E+00	0.0000E+00
1002.55c	1351	7.0199E-01	1.0814E-06	0.0000E+00	6.2306E-04
5011.40c	76	3.6073E-02	1.3591E-07	0.0000E+00	0.0000E+00
6012.40c	232	1.1297E-01	1.8446E-05	0.0000E+00	0.0000E+00
7014.40c	2207	1.0775E+00	1.6682E-02	0.0000E+00	0.0000E+00
8016.40c	1635	8.6733E-01	4.3699E-04	0.0000E+00	0.0000E+00
40000.40c	60	2.7441E-02	5.0739E-05	0.0000E+00	0.0000E+00
41093.40c	4406	2.3199E+00	5.3704E-02	0.0000E+00	0.0000E+00
74000.40c	885	4.2652E-01	1.4569E-02	0.0000E+00	0.0000E+00
92235.40c	4759	2.3227E+00	1.3244E-01	4.4247E-01	5.8410E-04
92238.40c	1470	7.3870E-01	2.3272E-02	8.4162E-03	1.8748E-03
5010.03d	941	4.4212E-01	1.5853E-01	0.0000E+00	0.0000E+00

the initial fission neutron source distribution used the 8 source points that were input on the ksrc card.
 the criticality problem was scheduled to skip 5 cycles and run a total of 6 cycles with nominally 200 neutrons per cycle.
 this problem has run 5 inactive cycles with 1027 neutron histories and 1 active cycles with 222 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 1249 fission neutron source histories.
 all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 1 active cycles were run.
 individual and average keff estimator results by cycle

keff	neutron	keff estimators by cycle				average keff estimators and deviations				average k(c/a/t)	
cycle	histories	k(coll)	k(abs)	k(track)	k(coll) st dev	k(abs) st dev	k(track) st dev	k(c/a/t) st dev	k(c/a/t) st dev	form	

1	200	1.25311	1.26302	1.22009							
2	257	1.21200	1.25252	1.12957							
3	195	1.20026	1.14326	1.13006							
4	193	1.12953	1.16269	1.10757							
5	182	1.13599	1.12465	1.11238							

begin active keff cycles

6	222	1.07701	1.04669	1.07528							
---	-----	---------	---------	---------	--	--	--	--	--	--	--

total nps = 1249

fuel rod flux in 5 y locations averaged over 5 x elements

tally type 4 track length estimate of particle flux. units 1/cm**2

tally for neutrons

number of histories used for normalizing tallies = 200.00

cell a is (154<42[-10 -1 0] 42[-9 -1 0] 42[-8 -1 0] 42[-7 -1 0] 42[-6 -1 0])

cell b is (154<42[-10 3 0] 42[-9 3 0] 42[-8 3 0] 42[-7 3 0] 42[-6 3 0])

cell c is (154<42[-10 10 0] 42[-9 10 0] 42[-8 10 0] 42[-7 10 0] 42[-6 10 0])

cell d is (154<42[-10 21 0] 42[-9 21 0] 42[-8 21 0] 42[-7 21 0] 42[-6 21 0])

cell e is (154<42[-10 29 0] 42[-9 29 0] 42[-8 29 0] 42[-7 29 0] 42[-6 29 0])

volumes

cell:	a	b	c	d	e
	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02	1.04709E+02

energy:	1.0000E-02	1.0000E-01	1.0000E+00	1.0000E+01	total
cell					
a	0.0000E+00 0.0000	2.84017E-05 0.9975	1.86420E-04 0.4656	1.36846E-04 0.5743	3.51668E-04 0.3877
b	1.07442E-05 0.9975	1.58576E-04 0.5120	2.32928E-04 0.3945	4.44462E-05 0.5872	4.46694E-04 0.2855
c	2.16778E-05 0.7232	9.40943E-05 0.5519	5.37835E-05 0.5876	1.51034E-04 0.7075	3.20589E-04 0.3937
d	1.47903E-05 0.5831	0.00000E+00 0.0000	1.15515E-04 0.5838	1.69653E-04 0.5071	2.99958E-04 0.3718
e	8.04943E-06 0.9975	0.00000E+00 0.0000	0.00000E+00 0.0000	6.81909E-05 0.7477	7.62403E-05 0.6763

analysis of the results in the tally fluctuation chart bin (tfc) for tally 4 with nps = 1249 print table 160

normed average tally per history = 3.51668E-04	unnormed average tally per history = 3.68228E-02
estimated tally relative error = 0.3877	estimated variance of the variance = 0.1752
relative error from zero tallies = 0.3464	relative error from nonzero scores = 0.1740

number of nonzero history tallies = 8	efficiency for the nonzero tallies = 0.0400
history number of largest tally = 1034	largest unnormalized history tally = 1.41575E+00
(largest tally)/(average tally) = 3.84476E+01	(largest tally)/(avg nonzero tally) = 1.53791E+00

(confidence interval shift)/mean = 0.0793	shifted confidence interval center = 3.79539E-04
---	--

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
 = 222 for this table because 5 keff cycles and 1027 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	3.51668E-04	4.10723E-04	0.167927
relative error	3.87653E-01	3.61597E-01	-0.067213
variance of the variance	1.75161E-01	1.47665E-01	-0.156976
shifted center	3.79539E-04	3.77169E-04	-0.006244
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
 the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 4

tfc bin	--mean--	-----relative error-----	----variance of the variance----	--figure of merit--	-pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior slope	
desired	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant	random
observed	random	0.39 yes yes	0.18 yes yes	0.00	0.00
passed?	yes	no yes yes	no yes yes		no

warning, the tally in the tally fluctuation chart bin did not pass 3 of the 10 statistical checks.

unormed tally density for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally	number	num den	log den:d
1.00E-01	1	2.43E-01	-0.614
1.26E-01	0	0.00E+00	0.000
1.58E-01	0	0.00E+00	0.000
2.00E-01	0	0.00E+00	0.000
2.51E-01	0	0.00E+00	0.000
3.16E-01	0	0.00E+00	0.000
3.98E-01	0	0.00E+00	0.000
5.01E-01	0	0.00E+00	0.000
6.31E-01	2	7.71E-02	-1.113
7.94E-01	0	0.00E+00	0.000
1.00E+00	1	2.43E-02	-1.614 m
1.26E+00	0	0.00E+00	0.000
1.58E+00	4	6.14E-02	-1.212
total	8	4.00E-02	d

cumulative tally number for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162

abscissa cum ordinate plot of the cumulative number of tallies in the tally fluctuation chart bin from 0 to 100 percent

tally	number	cum pct:	10	20	30	40	50	60	70	80	90	100
1.00000E-01	1	12.500 *****										
1.25893E-01	1	12.500 *****										
1.58489E-01	1	12.500 *****										
1.99526E-01	1	12.500 *****										
2.51189E-01	1	12.500 *****										
3.16228E-01	1	12.500 *****										
3.98108E-01	1	12.500 *****										
5.01188E-01	1	12.500 *****										
6.30958E-01	3	37.500 *****										
7.94329E-01	3	37.500 *****										
1.00000E+00	4	50.000 *****										
1.25893E+00	4	50.000 *****										
1.58489E+00	8	100.000 *****										
total	8	100.000	10	20	30	40	50	60	70	80	90	100

cumulative unormed tally for tally 4 nonzero tally mean(m) = 9.206E-01 nps = 1249 print table 162

abscissa cum ordinate plot of the cumulative tally in the tally fluctuation chart bin from 0 to 100 percent

tally	tally/nps	cum pct:	10	20	30	40	50	60	70	80	90	100
1.000E-01	4.632E-04	1.258 *										
1.259E-01	4.632E-04	1.258 *										
1.585E-01	4.632E-04	1.258 *										
1.995E-01	4.632E-04	1.258 *										
2.512E-01	4.632E-04	1.258 *										
3.162E-01	4.632E-04	1.258 *										
3.981E-01	4.632E-04	1.258 *										
5.012E-01	4.632E-04	1.258 *										
6.310E-01	6.195E-03	16.825 *****										
7.943E-01	6.195E-03	16.825 *****										
1.000E+00	1.017E-02	27.628 *****										
1.259E+00	1.017E-02	27.628 *****										
1.585E+00	3.682E-02	100.000 *****										
total	3.68228E-02	100.000	10	20	30	40	50	60	70	80	90	100

Istatus of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the ttc bin (the first check not passed is listed) and error magnitude check for all bins

4 missed 3 of 10 ttc bin checks: the relative error exceeds the recommended value of 0.1 for nonpoint detector tallies
missed all bin error check: 25 tally bins had 4 bins with zeros and 21 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

Itally fluctuation charts

```

      tally 4
      nps mean error vov slope fom
1000 0.0000E+00 0.0000 0.0000 0.0
1249 3.5167E-04 0.3877 0.1752 0.0
tally data written to file inp18m
ascii file inp18p written with 5 events from 5 histories.

```

6 warning messages so far.

run terminated when 6 kcode cycles were done.

File: Inp20o

```

1- prob20 - continuous energy electron version of problem prob19.
2- 1 1 -19.3 1 -2.3 -4.5 -6
3- 2 0 #1
4-
5- 1 z 0.2
+
6- 2 pz .00635 plane
7- 3 px -10
8- 4 x 10.0
+
9- 5 y -10.3 plane
+
10- 6 p 0 10.0 1 10.0 0 10.1
11-
12- m1 74184.1
13- sdef erg=1 sur=1 vec=0 0 1 par=3
14- imp:p,e 1 0
15- mode p e
16- *fl:p 1 2
17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
18- *fl1:e 1 2
19- tr9 0.00 1.00 0.10 0.00 1

```

warning. non-orthogonality of surface transformation 9 > 2.e-6

```

20- fq e f
21- f21:e 1 2
22- *f28:p 1
23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
25- f58:e 1
26- f6:p 1
27- f31:e 1 2
28- fl31 elc 1
29- f41:e 1 2
30- fl41 elc 2
31- f51:e 1 2
32- fl51 elc 3
33- e8 1000 nt
34- *f8:p,e 1
35- nps 10000
36- ctme 30
37- prdmp 2j -1
38- cutp lj .1
39- cutc lj .1
40- print 110 70

```

41-

warning. tr 9 card unused.

warning. 1 energy bins of tally 1 are below energy cutoff.

warning. tally 8 needs zero energy bin for negative f8 scores.

1 cells print table 60

atom			gram		photon		electron	
cell	mat	density	density	volume	mass	pieces	importance	importance

1	1	1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0	1.0000E+00	1.0000E+00
2	2	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00	0.0000E+00

total 2.54000E+00 4.90220E+01

1 surfaces print table 70

surface	trans	type	surface coefficients
---------	-------	------	----------------------

1	1	pz	0.0000000E+00
2	2	pz	6.3500000E-03
3	3	px	-1.0000000E+01
4	4	px	1.0000000E+01
5	5	py	-1.0000000E+01
6	6	p	0.0000000E+00 1.0000000E-01 0.0000000E+00 1.0000000E+00

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

1 cross-section tables print table 100

table length

tables from file testlib1

74000.02p 755 01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478 11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

1 starting mcrun. field length = 0 cp0 = 0.00 print table 110

prob20 - continuous electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
-----	---	---	---	------	------	---	---	---	--------	--------	------

1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00

File: Outp20

prob20 - continuous energy electron version of problem prob19.
1 1-19.3 1-2 3-4 5-6
2 0#1
4-
5- 1 z 0 2
+ plane
6- 2 pz .00635
7- 3 px -10
8- 4 x 10 0
+ plane
9- 5 y -10 3
+ plane
10- 6 p 0 10 0 1 10 0 0 10 1
11-
12- m1 74184.1
13- sdef erg=1 sur=1 vec=0 0 1 par=3
14- imp:p,e 1 0
15- mode p e
16- *fl:p 1 2
17- e0 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
18- *fl:1:e 1 2
19- tr9 0 0 0 10 0 0 10 0 0 0 1

warning. non-orthogonality of surface transformation 9 > 2.e-6
fq e f
21- f21:e 1 2
22- *f28:p 1
23- e28 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
24- e58 -.001 0 1.e-6 .1 .191 .282 .373 .464 .555 .645 .736 .827 .918 1.1
25- f58:e 1
26- f6:p 1
27- f31:e 1 2
28- f31 elc 1
29- f41:e 1 2
30- f41 elc 2
31- f51:e 1 2
32- f51 elc 3
33- e8 1000 nt
34- *f8:p,e 1
35- nps 10000
36- ctme 30
37- prdmp 2j -1
38- cutp lj .1
39- cutc lj .1
40- print 110 70
41-

warning. tr 9 card unused.

warning. 1 energy bins of tally 1 are below energy cutoff.

warning. tally 8 needs zero energy bin for negative f8 scores.
1 cells print table 60

	atom	gram		photon	electron
cell mat	density	density	volume	mass	pieces importance importance
1 1 1	6.31828E-02	1.93000E+01	2.54000E+00	4.90220E+01	0 1.0000E+00 1.0000E+00
2 2 0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0 0.0000E+00 0.0000E+00

total 2.54000E+00 4.90220E+01
1surfaces print table 70

surface trans type surface coefficients

```

1 1 pz 0.0000000E+00
2 2 pz 6.3500000E-03
3 3 px -1.0000000E+01
4 4 px 1.0000000E+01
5 5 py -1.0000000E+01
6 6 p 0.0000000E+00 1.0000000E-01 0.0000000E+00 1.0000000E+00

```

minimum source weight = 1.0000E+00 maximum source weight = 1.0000E+00

4 warning messages so far.

1 cross-section tables

print table 100

table length

tables from file testlib1

74000.02p 755

01/15/93

total 755

maximum photon energy set to 100.0 mev (maximum electron energy)

tables from file testlib1

74000.01e 478

11/16/88

decimal words of dynamically allocated storage

4 warning messages so far.

starting mcrun. field length = 0 cp0 = 0.00

print table 110

prob20 - continuous energy electron version of problem prob19.

nps	x	y	z	cell	surf	u	v	w	energy	weight	time
1	0.000E+00	0.000E+00	0.000E+00	1	1	3.096E-01	-4.068E-01	8.595E-01	1.000E+00	1.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	1	1	9.871E-01	1.062E-01	1.197E-01	1.000E+00	1.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	1	1	-1.347E-01	5.198E-01	8.436E-01	1.000E+00	1.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	1	1	-6.548E-02	7.832E-01	6.184E-01	1.000E+00	1.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	1	1	1.554E-01	-9.204E-01	3.588E-01	1.000E+00	1.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	1	1	2.608E-01	-6.984E-01	6.665E-01	1.000E+00	1.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	1	1	6.931E-01	-9.170E-02	7.149E-01	1.000E+00	1.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	1	1	-3.604E-01	4.799E-01	7.999E-01	1.000E+00	1.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	1	1	-2.241E-01	3.960E-01	8.905E-01	1.000E+00	1.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	1	1	-2.928E-01	-7.352E-01	6.114E-01	1.000E+00	1.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	1	1	8.260E-01	1.184E-01	5.510E-01	1.000E+00	1.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	1	1	7.540E-01	-1.976E-01	6.264E-01	1.000E+00	1.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	1	1	8.140E-01	-3.427E-01	4.690E-01	1.000E+00	1.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	1	1	-1.257E-01	8.038E-01	5.814E-01	1.000E+00	1.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	1	1	-1.464E-01	-1.070E-01	9.834E-01	1.000E+00	1.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	1	1	1.310E-02	-1.617E-02	9.998E-01	1.000E+00	1.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	1	1	-8.843E-01	-4.126E-01	2.187E-01	1.000E+00	1.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	1	1	4.260E-01	4.153E-01	8.038E-01	1.000E+00	1.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	1	1	-7.311E-01	-1.136E-02	6.822E-01	1.000E+00	1.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	1	1	-2.370E-01	3.207E-01	9.171E-01	1.000E+00	1.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	1	1	4.276E-01	-2.485E-02	9.036E-01	1.000E+00	1.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	1	1	7.662E-01	7.908E-02	6.378E-01	1.000E+00	1.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	1	1	-4.247E-01	2.688E-01	8.645E-01	1.000E+00	1.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	1	1	2.096E-01	5.730E-01	7.923E-01	1.000E+00	1.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	1	1	-2.665E-03	-5.270E-01	8.499E-01	1.000E+00	1.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	1	1	7.228E-01	4.233E-01	5.463E-01	1.000E+00	1.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	1	1	3.484E-01	-3.564E-01	8.669E-01	1.000E+00	1.000E+00	0.000E+00


```

28 0.000E+00 0.000E+00 0.000E+00 1 1 8.706E-01 -3.198E-01 3.738E-01 1.000E+00 1.000E+00 0.000E+00
29 0.000E+00 0.000E+00 0.000E+00 1 1 -8.188E-01 2.059E-01 5.359E-01 1.000E+00 1.000E+00 0.000E+00
30 0.000E+00 0.000E+00 0.000E+00 1 1 5.727E-01 8.124E-01 1.100E-01 1.000E+00 1.000E+00 0.000E+00
31 0.000E+00 0.000E+00 0.000E+00 1 1 5.390E-02 5.914E-01 8.046E-01 1.000E+00 1.000E+00 0.000E+00
32 0.000E+00 0.000E+00 0.000E+00 1 1 -5.778E-01 5.375E-01 6.141E-01 1.000E+00 1.000E+00 0.000E+00
33 0.000E+00 0.000E+00 0.000E+00 1 1 -7.198E-01 -2.890E-01 6.311E-01 1.000E+00 1.000E+00 0.000E+00
34 0.000E+00 0.000E+00 0.000E+00 1 1 2.210E-01 2.482E-01 9.432E-01 1.000E+00 1.000E+00 0.000E+00
35 0.000E+00 0.000E+00 0.000E+00 1 1 4.339E-01 7.515E-02 8.978E-01 1.000E+00 1.000E+00 0.000E+00
36 0.000E+00 0.000E+00 0.000E+00 1 1 -4.263E-01 8.490E-01 3.123E-01 1.000E+00 1.000E+00 0.000E+00
37 0.000E+00 0.000E+00 0.000E+00 1 1 -3.933E-01 -9.179E-01 5.266E-02 1.000E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 1 -4.846E-01 4.378E-01 7.573E-01 1.000E+00 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 1 -5.950E-01 -5.730E-01 5.636E-01 1.000E+00 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 1 -7.252E-01 -5.143E-01 4.578E-01 1.000E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 1 -7.156E-01 4.734E-01 5.136E-01 1.000E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 1 -1.771E-01 9.229E-01 3.417E-01 1.000E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 1 -1.149E-01 -4.206E-01 8.999E-01 1.000E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 1 4.509E-01 8.630E-02 8.884E-01 1.000E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 1 -7.358E-01 2.500E-01 6.294E-01 1.000E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 1 -8.448E-01 3.645E-01 3.917E-01 1.000E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 1 1.958E-01 -2.769E-01 9.407E-01 1.000E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 1 2.788E-01 -7.325E-03 9.603E-01 1.000E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 1 -3.201E-01 4.174E-01 8.505E-01 1.000E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 1 8.960E-01 -1.641E-01 4.126E-01 1.000E+00 1.000E+00 0.000E+00

```

problem summary

run terminated when 10000 particle histories were done.

```

0
photon creation  tracks  weight  energy  photon loss  tracks  weight  energy
                (per source particle)                (per source particle)

source          0  0.  0.  escape 575 5.7500E-02 1.5476E-02
                energy cutoff 0 0. 0.
                time cutoff 0 0. 0.

weight window  0 0. 0.  weight window 0 0. 0.
importance     0 0. 0.  cell importance 0 0. 0.
weight cutoff  0 0. 0.  weight cutoff 0 0. 0.
energy importance 0 0. 0.  energy importance 0 0. 0.
dxtan          0 0. 0.  dxtan 0 0. 0.

forced collisions 0 0. 0.  forced collisions 0 0. 0.
exp. transform 0 0. 0.  exp. transform 0 0. 0.
from neutrons 0 0. 0.  compton scatter 0 0. 6.6993E-05
bremsstrahlung 694 6.9400E-02 1.7315E-02 capture 119 1.1900E-02 1.7720E-03
p-annihilation 0 0. 0.  pair production 0 0. 0.
electron x-rays 0 0. 0.
1st fluorescence 0 0. 0.
2nd fluorescence 0 0. 0.
total          694 6.9400E-02 1.7315E-02 total 694 6.9400E-02 1.7315E-02

number of photons banked 694 average lifetime, shakes cutoffs
photon tracks per source particle 6.9400E-02 escape 6.7786E-05 tco 1.0000E+34
photon collisions per source particle 1.3000E-02 capture 8.3325E-05 eco 1.0000E-01
total photon collisions 130 capture or escape 7.0450E-05 wc1 0.0000E+00
any termination 7.0450E-05 wc2 0.0000E+00

```

```

0
electron creation  tracks  weight  energy  electron loss  tracks  weight  energy
                  (per source particle)                  (per source particle)

source          10000 1.0000E+00 1.0000E+00 escape 9464 9.4640E-01 7.1762E-01
                  energy cutoff 2046 2.0460E-01 2.0141E-02
                  time cutoff 0 0. 0.

weight window  0 0. 0.  weight window 0 0. 0.
cell importance 0 0. 0.  cell importance 0 0. 0.
weight cutoff  0 0. 0.  weight cutoff 0 0. 0.
energy importance 0 0. 0.  energy importance 0 0. 0.
pair production 0 0. 0.  scattering 0 0. 2.6560E-01
gamma recoil    2 2.0000E-04 3.7815E-05 bremsstrahlung 0 0. 2.4158E-02
photoelectric   29 2.9000E-03 4.7387E-04

```

photon auger	0	0.	0.				
electron auger	0	0.	0.				
back-on	1479	1.4790E-01	2.7007E-02				
total	11510	1.1510E+00	1.0275E+00	total	11510	1.1510E+00	1.0275E+00

number of electrons banked	1510	cutoffs	
electron tracks per source particle	1.1510E+00	teo	1.0000E+34
electron sub-steps per source particle	7.7164E+01	eco	1.0000E-01
total electron sub-steps	771636	wc1	0.0000E+00
		wc2	0.0000E+00

computer time so far in this run	0.00 minutes	maximum number ever in bank	4
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	4748878	most random numbers used was	4277 in history 7375

range of sampled source weights = 1.0000E+00 to 1.0000E+00

1photon activity in each cell

print table 126

cell	entering	tracks	population	collisions	collisions	number	flux	average	average
				* weight	weighted	weighted	track weight	track mfp	
				(per history)	energy	energy	(relative)	(cm)	
1	1	0	694	130	1.3000E-02	2.8286E-01	2.8286E-01	1.0000E+00	1.6113E-01

total	0	694	130	1.3000E-02
-------	---	-----	-----	------------

electron activity in each cell

print table 126

cell	entering	tracks	population	substeps	substeps	number	flux	average	average
				* weight	weighted	weighted	track weight	track mfp	
				(per history)	energy	energy	(relative)	(cm)	
1	1	10000	11510	771636	7.7164E+01	7.4988E-01	7.6821E-01	1.0000E+00	2.5110E-04

total	10000	11510	771636	7.7164E+01
-------	-------	-------	--------	------------

tally 1 nps = 10000

tally type 1* energy crossing a surface.

units mev

tally for photons

surface:	1	2
energy		
1.0000E-01	0.00000E+00	0.00000E+00
1.9100E-01	1.20113E-03	0.1079
2.8200E-01	8.17217E-04	0.1673
3.7300E-01	9.52191E-04	0.1829
4.6400E-01	1.03815E-03	0.2001
5.5500E-01	5.66295E-04	0.3018
6.4500E-01	6.09365E-04	0.3162
7.3600E-01	3.45345E-04	0.4472
8.2700E-01	7.79347E-05	0.9999
9.1800E-01	1.70096E-04	0.7070
1.000E+00	0.00000E+00	0.0000
total	5.77773E-03	0.0811

tally 6 nps = 10000

tally type 6 track length estimate of heating.

units mev/gram

tally for photons

masses

cell:	1
	4.90220E+01

cell: 1

energy	
1.0000E-01	0.00000E+00
1.9100E-01	1.80395E-05
2.8200E-01	4.79830E-06
3.7300E-01	1.64870E-06

```

4.6400E-01 1.76412E-06 0.4116
5.5500E-01 6.34259E-07 0.4736
4.500E-01 2.47457E-07 0.3129
7.3600E-01 2.58011E-07 0.6571
8.2700E-01 1.16245E-07 0.3470
9.1800E-01 4.46610E-08 0.6403
1.1000E+00 0.00000E+00 0.0000
total 2.75512E-05 0.0722
l tally 28 nps = 10000
tally type 8* energy deposition units mev
tally for photons electrons

```

```

cell: 1
energy
-1.0000E-03 -8.72550E-04 0.1508
0.0000E+00 0.00000E+00 0.0000
1.0000E-06 0.00000E+00 0.0000
1.0000E-01 1.08193E-02 0.0227
1.9100E-01 3.91016E-02 0.0170
2.8200E-01 4.36100E-02 0.0210
3.7300E-01 3.53763E-02 0.0286
4.6400E-01 2.66881E-02 0.0382
5.5500E-01 2.21833E-02 0.0468
6.4500E-01 1.58947E-02 0.0606
7.3600E-01 1.08330E-02 0.0790
8.2700E-01 8.71177E-03 0.0940
9.1800E-01 6.65495E-03 0.1136
1.1000E+00 4.79000E-02 0.0446
total 2.66900E-01 0.0090
l tally 11 nps = 10000
tally type 1* energy crossing a surface. units mev
tally for electrons

```

```

surface: 1 2
energy
1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 1.08698E-03 0.1176 6.53601E-04 0.1495
2.8200E-01 2.19643E-03 0.1039 1.83325E-03 0.1165
3.7300E-01 3.60063E-03 0.0956 3.37231E-03 0.0988
4.6400E-01 6.94424E-03 0.0774 6.18557E-03 0.0823
5.5500E-01 1.32283E-02 0.0615 1.27247E-02 0.0628
6.4500E-01 2.19441E-02 0.0516 1.93787E-02 0.0550
7.3600E-01 3.87821E-02 0.0411 4.62743E-02 0.0374
8.2700E-01 6.96113E-02 0.0321 9.53277E-02 0.0269
9.1800E-01 1.17955E-01 0.0253 9.53443E-02 0.0284
1.1000E+00 1.58764E-01 0.0225 2.41655E-03 0.1959
total 4.34113E-01 0.0097 2.83511E-01 0.0130
l tally 21 nps = 10000
tally type 1 number of particles crossing a surface.
tally for electrons

```

```

surface: 1 2
energy
1.0000E-01 0.00000E+00 0.0000 0.00000E+00 0.0000
1.9100E-01 7.70000E-03 0.1165 4.60000E-03 0.1471
2.8200E-01 9.30000E-03 0.1032 7.60000E-03 0.1158
3.7300E-01 1.09000E-02 0.0953 1.02000E-02 0.0985
4.6400E-01 1.65000E-02 0.0772 1.46000E-02 0.0822
5.5500E-01 2.58000E-02 0.0614 2.48000E-02 0.0627
6.4500E-01 3.63000E-02 0.0515 3.21000E-02 0.0549
7.3600E-01 5.59000E-02 0.0411 6.67000E-02 0.0374
8.2700E-01 8.86000E-02 0.0321 1.21300E-01 0.0269
9.1800E-01 1.34800E-01 0.0253 1.10600E-01 0.0284
1.1000E+00 1.65500E-01 0.0225 2.60000E-03 0.1959
total 5.51300E-01 0.0094 3.95100E-01 0.0126
l tally 31 nps = 10000
tally type 1 number of particles crossing a surface.

```

tally for electrons
this tally is modified by ft ele

surface: 1 2

energy

1.0000E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.9100E-01	-7.70000E-03	0.1165	-4.60000E-03	0.1471
2.8200E-01	-9.30000E-03	0.1032	-7.60000E-03	0.1158
3.7300E-01	-1.09000E-02	0.0953	-1.02000E-02	0.0985
4.6400E-01	-1.65000E-02	0.0772	-1.46000E-02	0.0822
5.5500E-01	-2.58000E-02	0.0614	-2.48000E-02	0.0627
6.4500E-01	-3.63000E-02	0.0515	-3.21000E-02	0.0549
7.3600E-01	-5.59000E-02	0.0411	-6.67000E-02	0.0374
8.2700E-01	-8.86000E-02	0.0321	-1.21300E-01	0.0269
9.1800E-01	-1.34800E-01	0.0253	-1.10600E-01	0.0284
1.1000E+00	-1.65500E-01	0.0225	-2.60000E-03	0.1959
total	-5.51300E-01	0.0094	-3.95100E-01	0.0126

tally 41 nps = 10000

tally type 1 number of particles crossing a surface.

tally for electrons

this tally is modified by ft ele

surface: 1 2

energy

1.0000E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.9100E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
2.8200E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
3.7300E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
4.6400E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
5.5500E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
6.4500E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
7.3600E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
8.2700E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
9.1800E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.1000E+00	0.00000E+00	0.0000	0.00000E+00	0.0000
total	0.00000E+00	0.0000	0.00000E+00	0.0000

surface: 1 2

energy

1.0000E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.9100E-01	7.70000E-03	0.1165	4.60000E-03	0.1471
2.8200E-01	9.30000E-03	0.1032	7.60000E-03	0.1158
3.7300E-01	1.09000E-02	0.0953	1.02000E-02	0.0985
4.6400E-01	1.65000E-02	0.0772	1.46000E-02	0.0822
5.5500E-01	2.58000E-02	0.0614	2.48000E-02	0.0627
6.4500E-01	3.63000E-02	0.0515	3.21000E-02	0.0549
7.3600E-01	5.59000E-02	0.0411	6.67000E-02	0.0374
8.2700E-01	8.86000E-02	0.0321	1.21300E-01	0.0269
9.1800E-01	1.34800E-01	0.0253	1.10600E-01	0.0284
1.1000E+00	1.65500E-01	0.0225	2.60000E-03	0.1959
total	5.51300E-01	0.0094	3.95100E-01	0.0126

surface: 1 2

energy

1.0000E-01	0.00000E+00	0.0000	0.00000E+00	0.0000
1.9100E-01	7.70000E-03	0.1165	4.60000E-03	0.1471
2.8200E-01	9.30000E-03	0.1032	7.60000E-03	0.1158
3.7300E-01	1.09000E-02	0.0953	1.02000E-02	0.0985
4.6400E-01	1.65000E-02	0.0772	1.46000E-02	0.0822
5.5500E-01	2.58000E-02	0.0614	2.48000E-02	0.0627
6.4500E-01	3.63000E-02	0.0515	3.21000E-02	0.0549
7.3600E-01	5.59000E-02	0.0411	6.67000E-02	0.0374
8.2700E-01	8.86000E-02	0.0321	1.21300E-01	0.0269
9.1800E-01	1.34800E-01	0.0253	1.10600E-01	0.0284
1.1000E+00	1.65500E-01	0.0225	2.60000E-03	0.1959
total	5.51300E-01	0.0094	3.95100E-01	0.0126

y 51 nps = 10000

tally type 1 number of particles crossing a surface.

tally for electrons

this tally is modified by ft elc

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
2.8200E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
3.7300E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
4.6400E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
5.5500E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
6.4500E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
7.3600E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
8.2700E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
9.1800E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.1000E+00  0.0000E+00 0.0000  0.0000E+00 0.0000
total      0.0000E+00 0.0000  0.0000E+00 0.0000

```

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01  -7.7000E-03 0.1165 -4.6000E-03 0.1471
2.8200E-01  -9.3000E-03 0.1032 -7.6000E-03 0.1158
3.7300E-01  -1.0900E-02 0.0953 -1.0200E-02 0.0985
4.6400E-01  -1.6500E-02 0.0772 -1.4600E-02 0.0822
5.5500E-01  -2.5800E-02 0.0614 -2.4800E-02 0.0627
6.4500E-01  -3.6300E-02 0.0515 -3.2100E-02 0.0549
7.3600E-01  -5.5900E-02 0.0411 -6.6700E-02 0.0374
8.2700E-01  -8.8600E-02 0.0321 -1.2130E-01 0.0269
9.1800E-01  -1.3480E-01 0.0253 -1.1060E-01 0.0284
1.1000E+00  -1.6550E-01 0.0225 -2.6000E-03 0.1959
total      -5.51300E-01 0.0094 -3.95100E-01 0.0126

```

```

surface:      1      2
energy
1.0000E-01  0.0000E+00 0.0000  0.0000E+00 0.0000
1.9100E-01  -7.7000E-03 0.1165 -4.6000E-03 0.1471
2.8200E-01  -9.3000E-03 0.1032 -7.6000E-03 0.1158
3.7300E-01  -1.0900E-02 0.0953 -1.0200E-02 0.0985
4.6400E-01  -1.6500E-02 0.0772 -1.4600E-02 0.0822
5.5500E-01  -2.5800E-02 0.0614 -2.4800E-02 0.0627
6.4500E-01  -3.6300E-02 0.0515 -3.2100E-02 0.0549
7.3600E-01  -5.5900E-02 0.0411 -6.6700E-02 0.0374
8.2700E-01  -8.8600E-02 0.0321 -1.2130E-01 0.0269
9.1800E-01  -1.3480E-01 0.0253 -1.1060E-01 0.0284
1.1000E+00  -1.6550E-01 0.0225 -2.6000E-03 0.1959
total      -5.51300E-01 0.0094 -3.95100E-01 0.0126

```

Itally 58 nps = 10000

tally type 8 pulse height distribution.

units number

tally for photons electrons

```

cell:      1
energy
-1.0000E-03  7.40000E-03 0.1158
0.0000E+00  0.0000E+00 0.0000
1.0000E-06  0.00000E+00 0.0000
1.0000E-01  2.12600E-01 0.0192
1.9100E-01  2.65500E-01 0.0166
2.8200E-01  1.87700E-01 0.0208
3.7300E-01  1.09500E-01 0.0285
4.6400E-01  6.44000E-02 0.0381
5.5500E-01  4.37000E-02 0.0468
6.4500E-01  2.66000E-02 0.0605
7.3600E-01  1.58000E-02 0.0789
8.2700E-01  1.12000E-02 0.0940
9.1800E-01  7.70000E-03 0.1135

```

1.1000E+00 4.79000E-02 0.0446
 total 1.00000E+00 0.0000
 tally 8 nps = 10000
 tally type 8* energy deposition units mev
 tally for photons electrons

cell: 1
 energy
 1.0000E+03 2.66900E-01 0.0090

1 status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the ttc bin (the first check not passed is listed) and error magnitude check for all bins

- 1 missed 1 of 10 ttc bin checks: there is insufficient ttc bin tally information to estimate the large tally slope reliably
 missed all bin error check: 24 tally bins had 4 bins with zeros and 17 bins with relative errors exceeding 0.10
- 6 missed 1 of 10 ttc bin checks: the variance of the variance appears not to decrease as 1/nps for the last half of problem
 missed all bin error check: 12 tally bins had 2 bins with zeros and 8 bins with relative errors exceeding 0.10
- 28 passed the 10 statistical checks for the tally fluctuation chart bin result
 missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 11 missed 1 of 10 ttc bin checks: the slope of decrease of largest tallies is less than the minimum acceptable value of 3.0
 missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 21 missed 1 of 10 ttc bin checks: the estimated mean has a trend during the last half of the problem
 missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 31 missed 2 of 10 ttc bin checks: the estimated mean has a trend during the last half of the problem
 missed all bin error check: 24 tally bins had 2 bins with zeros and 5 bins with relative errors exceeding 0.10
- 41 missed 1 of 10 ttc bin checks: the estimated mean has a trend during the last half of the problem
 missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 51 missed 2 of 10 ttc bin checks: the estimated mean has a trend during the last half of the problem
 missed all bin error check: 72 tally bins had 28 bins with zeros and 10 bins with relative errors exceeding 0.10
- 58 passed the 10 statistical checks for the tally fluctuation chart bin result
 missed all bin error check: 15 tally bins had 2 bins with zeros and 2 bins with relative errors exceeding 0.10
- 8 passed the 10 statistical checks for the tally fluctuation chart bin result
 passed all bin error check: 1 tally bins all have relative errors less than 0.10 with no zero bins

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

the tally bins with zeros may or may not be correct: compare the source, cutoffs, multipliers, et cetera with the tally bins.

warning. 7 of the 10 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 9 of the 10 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

tally 1					tally 6					tally 28				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	6.7975E-03	0.2399	0.0835	0.0	2.0857E-05	0.1589	0.0525	0.0	2.6993E-01	0.0279	0.0044	10.0		
2000	5.5780E-03	0.1884	0.0641	0.0	2.4397E-05	0.1701	0.1693	0.0	2.6475E-01	0.0199	0.0022	10.0		
3000	5.8779E-03	0.1455	0.0373	0.0	2.6650E-05	0.1343	0.1060	0.0	2.6433E-01	0.0161	0.0015	10.0		
4000	5.7880E-03	0.1317	0.0311	0.0	2.7894E-05	0.1145	0.0656	0.0	2.6224E-01	0.0140	0.0011	10.0		
5000	5.9924E-03	0.1168	0.0239	0.0	2.7855E-05	0.1020	0.0485	0.0	2.6175E-01	0.0126	0.0009	10.0		
6000	5.9423E-03	0.1055	0.0195	0.0	2.7793E-05	0.0931	0.0418	0.0	2.6496E-01	0.0116	0.0007	10.0		
7000	5.9749E-03	0.0968	0.0170	0.0	2.8647E-05	0.0919	0.0581	0.0	2.6691E-01	0.0107	0.0006	10.0		
8000	5.7670E-03	0.0913	0.0154	0.0	2.8249E-05	0.0838	0.0524	10.0	2.6739E-01	0.0100	0.0005	10.0		
9000	5.7398E-03	0.0864	0.0135	0.0	2.7485E-05	0.0779	0.0491	10.0	2.6699E-01	0.0095	0.0005	10.0		
10000	5.7777E-03	0.0811	0.0120	0.0	2.7551E-05	0.0722	0.0436	10.0	2.6690E-01	0.0090	0.0004	10.0		

tally 11					tally 21					tally 31				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	4.4504E-01	0.0296	0.0002	2.1	5.6500E-01	0.0286	0.0004	4.4	-5.6500E-01	0.0286	0.0004	0.0		
2000	4.4489E-01	0.0211	0.0001	2.0	5.6500E-01	0.0204	0.0003	4.4	-5.6500E-01	0.0204	0.0003	0.0		
3000	4.4226E-01	0.0173	0.0001	1.8	5.6400E-01	0.0168	0.0002	10.0	-5.6400E-01	0.0168	0.0002	0.0		
4000	4.4011E-01	0.0151	0.0000	1.8	5.6100E-01	0.0147	0.0002	10.0	-5.6100E-01	0.0147	0.0002	0.0		
5000	4.4004E-01	0.0135	0.0000	1.9	5.5860E-01	0.0131	0.0001	10.0	-5.5860E-01	0.0131	0.0001	0.0		
6000	4.3549E-01	0.0125	0.0000	1.8	5.5433E-01	0.0121	0.0001	10.0	-5.5433E-01	0.0121	0.0001	0.0		
7000	4.3477E-01	0.0115	0.0000	1.9	5.5386E-01	0.0112	0.0001	10.0	-5.5386E-01	0.0112	0.0001	0.0		
8000	4.3339E-01	0.0108	0.0000	1.8	5.5238E-01	0.0105	0.0001	10.0	-5.5238E-01	0.0105	0.0001	0.0		
9000	4.3428E-01	0.0102	0.0000	1.7	5.5200E-01	0.0099	0.0001	10.0	-5.5200E-01	0.0099	0.0001	0.0		
10000	4.3411E-01	0.0097	0.0000	1.6	5.5130E-01	0.0094	0.0001	10.0	-5.5130E-01	0.0094	0.0001	0.0		

tally 41					tally 51					tally 58				
nps	mean	error	vov	slope fom	mean	error	vov	slope fom	mean	error	vov	slope fom		
1000	5.6500E-01	0.0286	0.0004	4.4	-5.6500E-01	0.0286	0.0004	0.0	1.0000E+00	0.0000	0.0000	10.0		
2000	5.6500E-01	0.0204	0.0003	4.4	-5.6500E-01	0.0204	0.0003	0.0	1.0000E+00	0.0000	0.0000	10.0		
3000	5.6400E-01	0.0168	0.0002	10.0	-5.6400E-01	0.0168	0.0002	0.0	1.0000E+00	0.0000	0.0000	10.0		
4000	5.6100E-01	0.0147	0.0002	10.0	-5.6100E-01	0.0147	0.0002	0.0	1.0000E+00	0.0000	0.0000	10.0		
5000	5.5860E-01	0.0131	0.0001	10.0	-5.5860E-01	0.0131	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
6000	5.5433E-01	0.0121	0.0001	10.0	-5.5433E-01	0.0121	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
7000	5.5386E-01	0.0112	0.0001	10.0	-5.5386E-01	0.0112	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
8000	5.5238E-01	0.0105	0.0001	10.0	-5.5238E-01	0.0105	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
9000	5.5200E-01	0.0099	0.0001	10.0	-5.5200E-01	0.0099	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		
10000	5.5130E-01	0.0094	0.0001	10.0	-5.5130E-01	0.0094	0.0001	0.0	1.0000E+00	0.0000	0.0000	10.0		

tally 8

nps	mean	error	vov	slope fom
1000	2.6993E-01	0.0279	0.0044	10.0
2000	2.6475E-01	0.0199	0.0022	10.0
3000	2.6433E-01	0.0161	0.0015	10.0
4000	2.6224E-01	0.0140	0.0011	10.0
5000	2.6175E-01	0.0126	0.0009	10.0
6000	2.6496E-01	0.0116	0.0007	10.0
7000	2.6691E-01	0.0107	0.0006	10.0
8000	2.6739E-01	0.0100	0.0005	10.0
9000	2.6699E-01	0.0095	0.0005	10.0
10000	2.6690E-01	0.0090	0.0004	10.0

tally data written to file inp20m

6 warning messages so far.

run terminated when 10000 particle histories were done.

File: Inp24o

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1 -10.182 -1 u=2
3- 2 2 -.001 1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14:15 u=3
7- 6 3 -6.55 14 -15 u=3
8- 7 4 -1.0 -4 +5 -6 +7 u=1 lat=1 fill=-8:8 -8:8 0:0
9- 1 17r 2 14r 1 1 2 14r 1 1 2 2 3 2 2 3 2 2r 3 2 2
10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 2 14r 1 17r
17- 8 0 -8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4

```

```

19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- ;(+28 +29 -19 +24 -25)
29- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
30- 20 0 -28;-29+21;-22+25
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250.7 2 4 4500 0
warning, tallies are normed per fission neutron for one generation.
64- ksre 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- mt4 lwtr.01t
73- drxs
74- prdmp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2
76- sd6 1 4r
77-
total fission nubar data are being used.

```

warning, continuous-energy cross-section table used for 1001.00d

warning, continuous-energy cross-section table used for 5011.40d

warning, continuous-energy cross-section table used for 6012.40d

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells print table 60

		atom		gram		neutron			
cell	mat	density	density	volume	mass	pieces	importance		
1	1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0	1.0000E+00	
2	2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0	1.0000E+00	
3	3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
4	4	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
5	5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
6	6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
7	7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
8	8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
9	9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
12	12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
13	13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
14	14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
15	15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00	

total 0.00000E+00 0.00000E+00

!! warning messages so far.

1cross-section tables print table 100

table length

tables from file testlib1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503
92238.40c	48310	ENDL library name: nd901118 MCNP translation:	9total nu 56:49		901119
lwtr.01t	10193	hydrogen in light water at 300 degrees kelvin	1001 0	010/22/85	

total 261165

warning. neutron energy cutoff is below some cross-section tables.

initial words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.
1 estimated keff results by cycle

print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

estimator	cycle	4	ave of 2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886	0.568374	0.0291	k(col/abs)	0.000000	0.000000	0.0000
k(absorption)	0.583788	0.591169	0.0125	k(abs/tk ln)	0.000000	0.000000	0.0000
k(trk length)	0.582547	0.568877	0.0240	k(tk ln/col)	0.000000	0.000000	0.0000
rem life(col)	3.9485E+03	3.8951E+03	0.0137				
rem life(abs)	4.0658E+03	3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000E+00	0.0000
source points generated	264						

source distribution written to file inp24s cycle = 4

1 problem summary

run terminated when 4 kcode cycles were done.

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)			(per source particle)			
source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
			energy cutoff	0	0.	0.	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dextran	0	0.	0.	dextran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
			capture	0	8.1698E-01	1.8384E-02	
(n,xn)	8	6.9970E-03	3.6428E-03	loss to (n,xn)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00 tco 1.0000E+34
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03 eco 0.0000E+00
total neutron collisions	57706	capture or escape	4.1766E+03 wc1 -5.0000E-01
net multiplication	1.0033E+00 0.0030	any termination	4.4650E+03 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun	0.00 minutes	bank overflows to backup file	0
source particles per minute	0.0000E+00	field length	0
random numbers generated	690539	most random numbers used was	3677 in history 21

range of sampled source weights = 9.8814E-01 to 1.1962E+00

1 neutron activity in each cell

print table 126

cell	entering	tracks population	collisions	collisions * weight (per history)	number flux weighted energy	average track weight (relative)	average track mfp (cm)
1	1	15187	944	4054	3.5039E+00	6.3699E-04	6.5723E-01 8.4316E-01 3.8971E+00
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01 8.4006E-01 9.6437E+03
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01 8.3961E-01 3.6368E+00

```

4 4 44969 944 40660 3.0973E+01 3.0008E-04 5.9877E-01 8.3882E-01 1.4858E+00
5 5 8213 845 8775 6.4600E+00 2.0190E-04 5.0976E-01 8.1000E-01 1.3256E+00
6 6 4924 791 109 9.6195E-02 2.0789E-04 5.2658E-01 8.2057E-01 3.6398E+00
7 7 2832 638 1607 1.4612E+00 8.5166E-04 7.1930E-01 9.4163E-01 1.7232E+00
8 8 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
9 9 1333 607 1347 1.2836E+00 3.8320E-03 8.0017E-01 9.7093E-01 3.1777E+00
10 10 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
11 11 7 1 126 9.7846E-02 9.0288E-05 3.2866E-01 7.7027E-01 1.0087E+00
12 12 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
13 13 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
14 14 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
15 15 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
16 16 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
17 17 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
18 18 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
19 19 0 0 0 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00

total 138515 6658 57706 4.4801E+01

```

the initial fission neutron source distribution used the 1 source points that were input on the ksrc card.
the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.
this problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

individual and average keff estimator results by cycle

cycle	neutron histories	keff estimators by cycle			average keff estimators and deviations			average k(c/a/t)	
		k(coll)	k(abs)	k(track)	k(coll) st dev	k(abs) st dev	k(track) st dev	k(c/a/t) st dev	form
1	250	0.65821	0.61995	0.71299					
2	228	0.54932	0.55922	0.57971					
----- begin active keff cycles -----									
3	209	0.55186	0.59855	0.55521					
4	253	0.58489	0.58379	0.58255	0.56837	0.01651	0.59117	0.00738	0.56888 0.01367

the largest active cycle keffs by estimator are:

the smallest active cycle keffs by estimator are:

collision 0.58489 on cycle 4	collision 0.55186 on cycle 3
absorption 0.59855 on cycle 3	absorption 0.58379 on cycle 4
track length 0.58255 on cycle 4	track length 0.55521 on cycle 3

l tally 6 nps = 940
tally type 6 track length estimate of heating. units mev/gram
tally for neutrons
number of histories used for normalizing tallies = 500.00

masses
cell: 8 12 13 14 15
1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00

cell 8
4.02566E+01 0.0434

cell 12
2.65224E+01 0.0629

cell 13
1.32494E+01 0.0904

cell 14
9.78180E-01 0.4014

cell 15
1.20234E-01 0.9710

analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
(largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

(confidence interval shift)/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	--mean--	-----relative error-----	---variance of the variance---	---figure of merit---	pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior slope	
desired	random	<0.10 yes	1/sqrt(nps) <0.10 yes	1/nps	constant random >3.00
observed	random	0.04 yes	yes	0.01 yes	yes
passed?	yes	yes yes	yes	yes yes	no

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

unnormed tally density for tally 6 nonzero tally mean(m) = 4.357E+01 nps = 940 print table 161

abscissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally number	num den	log den	d-----d-----d-----
5-01	1	3.87-02	-1.412 *****
5-01	2	6.15-02	-1.211 *****
5-01	1	2.44-02	-1.612 *****

```

5.01-01 1 1.94-02 -1.712 *****
5.01-01 2 3.08-02 -1.511 *****
5.01-01 3 3.67-02 -1.435 *****
1.00+00 5 4.86-02 -1.313 *****
1.26+00 1 7.72-03 -2.112 *****
1.58+00 5 3.07-02 -1.513 *****
2.00+00 7 3.41-02 -1.467 *****
2.51+00 6 2.32-02 -1.634 *****
3.16+00 8 2.46-02 -1.609 *****
3.98+00 11 2.69-02 -1.571 *****
5.01+00 14 2.72-02 -1.566 *****
6.31+00 10 1.54-02 -1.812 *****
7.94+00 14 1.71-02 -1.766 *****
1.00+01 13 1.26-02 -1.898 *****
1.26+01 16 1.24-02 -1.908 *****
1.58+01 11 6.75-03 -2.171 *****
2.00+01 20 9.75-03 -2.011 *****
2.51+01 32 1.24-02 -1.907 *****
3.16+01 41 1.26-02 -1.899 *****
3.98+01 24 5.86-03 -2.232 *****
5.01+01 48 9.31-03 -2.031 *****
6.31+01 54 8.32-03 -2.080 *****
7.94+01 40 4.90-03 -2.310 *****
1.00+02 28 2.72-03 -2.565 *****
1.26+02 20 1.54-03 -2.811 *****
1.58+02 21 1.29-03 -2.890 *****
2.00+02 2 9.75-05 -4.011 *****
2.51+02 0 0.00+00 0.000 *****
3.16+02 1 3.08-05 -4.512 *
total 462 9.24-01 d-----d-----d-----d-----
|status of the statistical checks used to form confidence intervals for the mean for each tally bin

```

result of statistical checks for the ttc bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of 10 ttc bin checks: there is insufficient ttc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

1 tally fluctuation charts

```

tally 6
nps mean error vov slope fom
940 4.0257E+01 0.0434 0.0095 0.0
tally data written to file inp24m

```

15 warning messages so far.

run terminated when 4 kcode cycles were done.

File: Outp24

```

1- prob 24 -- reflecting lattice. 15x15 at 3.75 w/o u-235 enrichment.
2- 1 1 -10.182 -1 u=2
3- 2 2 -.001 -1 -2 u=2
4- 3 3 -6.55 2 -3 u=2
5- 4 4 -1.0 3 u=2
6- 5 4 -1.0 -14:15 u=3
7- 6 3 -6.55 14 -15 u=3
7 4 -1.0 -4 +5 -6 +7 u=1 lat=1 fill=-8:8 -8:8 0:0
1 17r 2 14r 1 12 14r 1 1 2 2 3 2 2 3 2 2 3 2 2

```

```

10- 3 2 2 1 1 2 6r 3 2 6r 1 1 2 3r 3
11- 2 4r 3 2 3r 1 1 2 2 3 2 8r 3 2 2
12- 1 1 2 14r 1 1 2 2r 3 2 2r 3 2 2r
13- 3 2 2r 1 1 2 14r 1 1 2 2 3 2 8r 3
14- 2 2 1 1 2 3r 3 2 4r 3 2 3r 1 1
15- 2 6r 3 2 6r 1 1 2 2 3 2 2 3
16- 2 2r 3 2 2 3 2 2 1 1 2 14r 1 1 17r
17- 8 0 -8 -10 -12 u=4 fill=1
18- 9 5 -7.9 8:10 u=4
19- 10 4 -1.0 -8 -10 +12 u=4
20- 11 4 -1.0 -16 +9 u=5 lat=1 fill=0:6 0:0 0:0 4 3r 5 2r
21- 12 0 +28 +29 -19 -17 +13 -18 fill=5
22- 13 0 +28 -19 +17 -31 +13 -18 fill=5 (-11.5 23 0)
23- 14 0 +28 -19 +31 -32 +13 -18 fill=5 (-23 46 0)
24- 15 0 +28 -19 +32 -33 +13 -18 fill=5 (-69 69 0)
25- 16 4 -1.0 +28 -19 +33 +13 -18
26- 17 4 -1.0 +28 +29 -19 -24 +18
27- 18 6 -7.9 (+28 +29 +19 -20 +23 -25);(+28 +29 -19 +23 -13)
28- ;(+28 +29 -19 +24 -25)
29- 19 7 -7.088254305 (+28 +29 +20 -21 +22 -25);(+28 +29 -20 +22 -23)
30- 20 0 -28 -29 +21 -22 +25
31-
32- 1 cz .464693
33- 2 cz .483743
34- 3 cz .535940
35- 4 px .71501
36- 5 px -.71501
37- 6 py .71501
38- 7 py -.71501
39- 8 px 11.0
40- 9 px -11.0
41- 10 py 11.0
42- 12 pz 400.903
43- 13 pz 34.0
44- 14 cz .652018
45- 15 cz .690118
46- 16 px 12.0
47- 17 py 12.0
48- 18 pz 439.0
49- 19 cz 82.25
50- 20 cz 83.25
51- 21 cz 116.35
52- 22 pz 0.0
53- 23 pz 33.0
54- 24 pz 447.9
55- 25 pz 485.9
56- *28 px 0.0
57- *29 py 0.0
58- 31 py 35.0
59- 32 py 58.0
60- 33 py 81.0
61-
62- imp:n 1 18r 0
63- kcode 250.7 2 4 4500 0
warning. tallies are normed per fission neutron for one generation.
64- ksre 1.5 1.5 217.4515
65- m1 92235.40c 1.31964e20 92238.40c 2.15905e22
66- m2 8016.40c 1.00000000
67- m3 40000.40c 1.
68- m4 1001.00c .666666667 8016.40c .333333333
69- m5 26000.40c -.68874500 5010. -.00178200 5011.40c -.00721800
70- m6 26000.40c -.69500000
71- m7 26000.40c .830266962 6012.40c .133437328 14000.40c .002370386
72- mt4 lwtr 011
73- drxs
74- prdnp 2j -1
75- f6:n 8 12 13 14 15 $ heating in mat=0 cells kills mcnp4.2

```

76- sd6 1 4r

fission nubar data are being used.

warning. continuous-energy cross-section table used for 1001.00d

warning. continuous-energy cross-section table used for 5011.40d

warning. continuous-energy cross-section table used for 6012.40d

warning. continuous-energy cross-section table used for 8016.40d

warning. continuous-energy cross-section table used for 14000.40d

warning. continuous-energy cross-section table used for 26000.40d

warning. continuous-energy cross-section table used for 40000.40d

warning. continuous-energy cross-section table used for 92235.40d

warning. continuous-energy cross-section table used for 92238.40d

warning. 4 of the materials had unnormalized fractions.

1cells print table 60

atom			gram		neutron			
cell	mat	density	density	volume	mass	pieces	importance	
1	1	2.57597E-02	1.01820E+01	0.00000E+00	0.00000E+00	0	1.0000E+00	
2	2	3.76497E-05	1.00000E-03	0.00000E+00	0.00000E+00	0	1.0000E+00	
3	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
4	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
5	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
6	3	4.32392E-02	6.55000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
7	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
8	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
9	5	8.97738E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00	
10	10	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
11	11	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
12	12	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
13	13	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
14	14	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
15	15	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
16	16	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
17	17	4s	1.00309E-01	1.00000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
18	18	6	8.51890E-02	7.90000E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
19	19	7	8.58502E-02	7.08825E+00	0.00000E+00	0.00000E+00	0	1.0000E+00
20	20	0	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0	0.0000E+00

total 0.00000E+00 0.00000E+00

11 warning messages so far.

1 cross-section tables print table 100

table length

tables from file testlib1

1001.00c	2139	1-h-1 from endf-vi.1	mat 125	05/26/93	
5010.03d	3945	b-10 endf/b-iv new gamma production format	(1273)	14 oct 75	
5011.40c	3473	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
6012.40c	5049	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
8016.40c	5693	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
14000.40c	8732	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
26000.40c	21846	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900207
40000.40c	111279	ENDL library name: nd900719 MCNP translation:	900831 14:10:05		900323
92235.40c	40506	ENDL library name: nd900719 MCNP translation:	9total nu 10:05		900503

02238.40c 48310 ENDL library name: nd901118 MCNP translation: 9total nu 56:49 901119
 str.01: 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85
 total 261165

warning. neutron energy cutoff is below some cross-section tables.

decimal words of dynamically allocated storage

source distribution written to file inp24s cycle = 0

12 warning messages so far.
 1 estimated keff results by cycle print table 175

cycle 1 k(collision) 0.658210 removal lifetime(abs) 5.1517E+03 source points generated 228

cycle 2 k(collision) 0.549318 removal lifetime(abs) 3.7645E+03 source points generated 209

cycle 3 k(collision) 0.551862 removal lifetime(abs) 3.8422E+03 source points generated 253

source distribution written to file inp24s cycle = 3

estimator	cycle	4	ave of 2 cycles	combination	simple average	combined average	corr
k(collision)	0.584886	0.568374	0.0291	k(col/abs)	0.000000	0.000000	0.0000
k(absorption)	0.583788	0.591169	0.0125	k(abs/tk in)	0.000000	0.000000	0.0000
k(trk length)	0.582547	0.568877	0.0240	k(tk in/col)	0.000000	0.000000	0.0000
rem life(col)	3.9485E+03	3.8951E+03	0.0137				
rem life(abs)	4.0658E+03	3.9540E+03	0.0283	life(col/abs)	0.0000E+00	0.0000E+00	0.0000
source points generated	264						

source distribution written to file inp24s cycle = 4

1 problem summary

run terminated when 4 kcode cycles were done.

0

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
	(per source particle)				(per source particle)		
source	940	1.0638E+00	1.9444E+00	escape	0	0.	0.
			energy cutoff	0	0.	0.	
			time cutoff	0	0.	0.	
weight window	0	0.	0.	weight window	0	0.	0.
cell importance	0	0.	0.	cell importance	0	0.	0.
weight cutoff	0	5.6409E-02	1.1284E-06	weight cutoff	944	5.2413E-02	7.1769E-07
energy importance	0	0.	0.	energy importance	0	0.	0.
dxtran	0	0.	0.	dxtran	0	0.	0.
forced collisions	0	0.	0.	forced collisions	0	0.	0.
exp. transform	0	0.	0.	exp. transform	0	0.	0.
upscattering	0	0.	1.4710E-07	downscattering	0	0.	1.8098E+00
			capture	0	8.1698E-01	1.8384E-02	
(n,xn)	8	6.9970E-03	3.6428E-03	loss to (n,xn)	4	3.4985E-03	2.8025E-02
fission	0	0.	0.	loss to fission	0	2.5434E-01	9.1864E-02
total	948	1.1272E+00	1.9481E+00	total	948	1.1272E+00	1.9481E+00

number of neutrons banked	4	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0085E+00	escape	0.0000E+00 tco 1.0000E+34
neutron collisions per source particle	6.1389E+01	capture	4.1766E+03 eco 0.0000E+00
total neutron collisions	57706	capture or escape	4.1766E+03 wc1 -5.0000E-01
net multiplication	1.0033E+00 0.0030	any termination	4.4650E+03 wc2 -2.5000E-01

computer time so far in this run	0.00 minutes	maximum number ever in bank	1
computer time in mcrun <td>0.00 minutes <td>bank overflows to backup file <td>0</td> </td></td>	0.00 minutes <td>bank overflows to backup file <td>0</td> </td>	bank overflows to backup file <td>0</td>	0
source particles per minute <td>0.0000E+00 <td>field length <td>0</td> </td></td>	0.0000E+00 <td>field length <td>0</td> </td>	field length <td>0</td>	0

random numbers generated 690539 most random numbers used was 3677 in history 21

age of sampled source weights = 9.8814E-01 to 1.1962E+00
neutron activity in each cell

print table 126

cell	tracks entering	population	collisions * weight (per history)	collisions weighted energy	number weighted energy	flux weighted (relative)	average track weight (cm)	average track mfp	
1	1	15187	944	4054	3.5039E+00	3.6399E-04	6.5723E-01	8.4316E-01	3.8971E+00
2	2	29440	944	0	0.0000E+00	3.3819E-04	6.3029E-01	8.4006E-01	9.6437E+03
3	3	31610	944	1028	9.2538E-01	3.1626E-04	6.0475E-01	8.3961E-01	3.6368E+00
4	4	44969	944	40660	3.0973E+01	3.0008E-04	5.9877E-01	8.3882E-01	1.4858E+00
5	5	8213	845	8775	6.4600E+00	2.0190E-04	5.0976E-01	8.1000E-01	1.3256E+00
6	6	4924	791	109	9.6195E-02	2.0789E-04	5.2658E-01	8.2057E-01	3.6398E+00
7	7	2832	638	1607	1.4612E+00	8.5166E-04	7.1930E-01	9.4163E-01	1.7232E+00
8	8	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	9	1333	607	1347	1.2836E+00	3.8320E-03	8.0017E-01	9.7093E-01	3.1777E+00
10	10	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	11	7	1	126	9.7846E-02	9.0288E-05	3.2866E-01	7.7027E-01	1.0087E+00
12	12	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	13	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	14	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	15	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	16	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	17	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	18	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	19	0	0	0	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
total		138515	6658	57706	4.4801E+01				

the initial fission neutron source distribution used the 1 source points that were input on the ksrc card.

the criticality problem was scheduled to skip 2 cycles and run a total of 4 cycles with nominally 250 neutrons per cycle.
the problem has run 2 inactive cycles with 478 neutron histories and 2 active cycles with 462 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 940 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

there is no combined collision/absorption/track-length estimate for keff because only 2 active cycles were run.

the estimated average keffs, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence	corr
collision	0.56837	0.01651	0.53834 to 0.59841	0.35851 to 0.77824	0.00000 to 1.61951	
absorption	0.59117	0.00738	0.57774 to 0.60460	0.49735 to 0.68498	0.12129 to 1.06105	
track length	0.56888	0.01367	0.54401 to 0.59374	0.39513 to 0.74263	0.00000 to 1.43912	

individual and average keff estimator results by cycle

cycle	neutron histories	keff estimators by cycle k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	average k(c/a/t) k(c/a/t) st dev fom
1	250	0.65821 0.61995 0.71299		
2	228	0.54932 0.55922 0.57971		
----- begin active keff cycles -----				
3	209	0.55186 0.59855 0.55521		
4	253	0.58489 0.58379 0.58255	0.56837 0.01651 0.59117 0.00738 0.56888 0.01367	

the largest active cycle keffs by estimator are:

collision 0.58489 on cycle 4
absorption 0.59855 on cycle 3
track length 0.58255 on cycle 4

the smallest active cycle keffs by estimator are:

collision 0.55186 on cycle 3
absorption 0.58379 on cycle 4
track length 0.55521 on cycle 3

tally 6 nps = 940
 tally type 6 track length estimate of heating. units mev/gram
 tally for neutrons
 number of histories used for normalizing tallies = 500.00

masses

cell: 8 12 13 14 15
 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00

cell 8
 4.02566E+01 0.0434

cell 12
 2.65224E+01 0.0629

cell 13
 1.32494E+01 0.0904

cell 14
 9.78180E-01 0.4014

cell 15
 1.20234E-01 0.9710

analysis of the results in the tally fluctuation chart bin (tfc) for tally 6 with nps = 940 print table 160

normed average tally per history = 4.02566E+01 unnormed average tally per history = 4.02566E+01
 estimated tally relative error = 0.0434 estimated variance of the variance = 0.0095
 relative error from zero tallies = 0.0128 relative error from nonzero scores = 0.0415

number of nonzero history tallies = 462 efficiency for the nonzero tallies = 0.9240
 history number of largest tally = 641 largest unnormalized history tally = 2.71752E+02
 (largest tally)/(average tally) = 6.75049E+00 (largest tally)/(avg nonzero tally) = 6.23745E+00

confidence interval shift/mean = 0.0014 shifted confidence interval center = 4.03113E+01

if the largest history score sampled so far were to occur on the very next history, the tfc bin quantities would change as follows:
 nps = 462 for this table because 2 keff cycles and 478 histories were skipped before tally accumulation.

estimated quantities	value at nps	value at nps+1	value(nps+1)/value(nps)-1.
mean	4.02566E+01	4.07566E+01	0.012420
relative error	4.34431E-02	4.24506E-02	-0.022846
variance of the variance	9.52674E-03	1.33327E-02	0.399508
shifted center	4.03113E+01	4.03457E+01	0.000853
figure of merit	0.00000E+00	0.00000E+00	0.000000

there is not enough information in the largest history scores (usually less than 500 scores) for a reliable estimate of the slope.
 the history score probability density function appears to have an unsampled region at the largest history scores: please examine.

***** the nps-dependent tfc bin check results are suspect because there are only 1 nps tally values to analyze *****

results of 10 statistical checks for the estimated answer for the tally fluctuation chart (tfc) bin of tally 6

tfc bin	--mean--	-----relative error-----	----variance of the variance----	--figure of merit--	-pdf-
behavior	behavior	value decrease decrease rate	value decrease decrease rate	value behavior	slope
unsampled	random	<0.10 yes 1/sqrt(nps)	<0.10 yes 1/nps	constant random	>3.00
unsampled	random	0.04 yes yes	0.01 yes yes	0.00	
passed?	yes	yes yes yes	yes yes yes	no	

warning. the tally in the tally fluctuation chart bin did not pass 1 of the 10 statistical checks.

unnormalized tally density for tally 6 nonzero tally mean(m)= 4.357E+01 nps = 940 print table 161

absissa ordinate log plot of tally probability density function in tally fluctuation chart bin(d=decade,slope= 0.0)

tally number	num den	log den	d
2.51-01	1	3.87-02	-1.412
3.16-01	2	6.15-02	-1.211
3.98-01	1	2.44-02	-1.612
5.01-01	1	1.94-02	-1.712
6.31-01	2	3.08-02	-1.511
7.94-01	3	3.67-02	-1.435
1.00+00	5	4.86-02	-1.313
1.26+00	1	7.72-03	-2.112
1.58+00	5	3.07-02	-1.513
2.00+00	7	3.41-02	-1.467
2.51+00	6	2.32-02	-1.634
3.16+00	8	2.46-02	-1.609
3.98+00	11	2.69-02	-1.571
5.01+00	14	2.72-02	-1.566
6.31+00	10	1.54-02	-1.812
7.94+00	14	1.71-02	-1.766
1.00+01	13	1.26-02	-1.898
1.26+01	16	1.24-02	-1.908
1.58+01	11	6.75-03	-2.171
2.00+01	20	9.75-03	-2.011
2.51+01	32	1.24-02	-1.907
3.16+01	41	1.26-02	-1.899
3.98+01	24	5.86-03	-2.232
5.01+01	48	9.31-03	-2.031
1+01	54	8.32-03	-2.080
4+01	40	4.90-03	-2.310
1.00+02	28	2.72-03	-2.565
1.26+02	20	1.54-03	-2.811
1.58+02	21	1.29-03	-2.890
2.00+02	2	9.75-05	-4.011
2.51+02	0	0.00+00	0.000
3.16+02	1	3.08-05	-4.512
total	462	9.24-01	

status of the statistical checks used to form confidence intervals for the mean for each tally bin

tally result of statistical checks for the tfc bin (the first check not passed is listed) and error magnitude check for all bins

6 missed 1 of 10 tfc bin checks: there is insufficient tfc bin tally information to estimate the large tally slope reliably
missed all bin error check: 5 tally bins had 0 bins with zeros and 2 bins with relative errors exceeding 0.10

the 10 statistical checks are only for the tally fluctuation chart bin and do not apply to other tally bins.

warning. 1 of the 1 tally fluctuation chart bins did not pass all 10 statistical checks.

warning. 1 of the 1 tallies had bins with relative errors greater than recommended.

tally fluctuation charts

tally 6
nps mean error vov slope fom
940 4.0257E+01 0.0434 0.0095 0.0
tally data written to file inp24m

15 warning messages so far.

terminated when 4 kcode cycles were done.

MULTI-CANISTER OVERPACK PROJECT
VERIFICATION AND VALIDATION
ANSYS 5.0A

Software Verification and Validation Report
Program: ANSYS5.0A
Version: PC 386/486

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1. Software Release Information

1.1 Version

Version PC 386/486 of the ANSYS program (Revision 5.0A) was supplied by Swanson Analysis Systems (Houston, PA.) through their local representative, MCR Associates of Sunnyvale CA.).

1.2 Computer System and File Creation Date

ANSYS 5.0A, Version PC 386/486 an IBM compatible PC using the MS-DOS operating system. The verification in this documented used version 6.22 of MS-DOS running on a PC with a 90 Mhz Pentium processor (the processor is an "updated" chip obtained from Intel as a result of the "floating point" error in the original Pentium processors). The directory structure of ANSYS on the PC is shown in Table 2.

2. Program Storage Information

ANSYS Version PC 386/486 is contained on 9 (nine) 5 $\frac{1}{4}$ " floppy disks. The disks are stored in the San Jose Office of VECTRA.

3. User Documentation

Documentation for the subject Code is provided on-line.

4. Verification

Verification of the program on the Pentium PC was performed by execution of the 188 problems from the ANSYS Verification Manual (Upd0 DN-Q145:50, April 1, 1993). The element and analysis types for each problem are summarized in Table 1. Results generated by the Pentium PC were tabulated and compared to the ANSYS results published in the Verification Manual. Results of these comparisons are listed in Table 3 (In the table, the ratio column is equal to the published value divided by the analyzed value). In all cases differences between the published results and the results obtained from the Pentium PC are insignificant (differences are primarily due to round-off).

Plots generated by the sample problems are included as Figures 1 through 79 of this document. The figures were compared to the plots in the Verification Manual. No significant deviations were noted. (Minor differences between the PC generated mesh and

the published mesh were noted for Problem VM120 (Figures 38 and 39). No change in results was noted.)

5. Conclusion

As shown in Table 3, the Pentium PC results compare closely to the published results. Therefore ANSYS5.0A Version PC 386/486, running on a Pentium PC, is acceptable for production use.

Table 1
Summary of Verification Problems

Problem Number	Analysis Type	Element Type(s)
VM1	0	LINK1
VM2	0	BEAM3
VM3	0	LINK1
VM4	0	LINK1
VM5	0	PLANE42, PLANE 82
VM6	0	SHELL93
VM7	0	PIPE20, SOLID45, SHELL43
VM8		n/a
VM9	4	COMBIN14, COMBIN40
VM10	0	BEAM54
VM11	0	LINK1
VM12	0	PIPE16
VM13	0	SHELL51
VM14	0	BEAM54
VM15	0	SHELL51
VM16	0	PLANE42
VM17	0	SOLID45
VM18	0	PIPE18
VM19	0	BEAM3
VM20	0	SHELL41
VM21	0	BEAM4
VM22	0	SHELL51
VM23	0	SHELL63
VM24	0	BEAM23
VM25	0	PLANE42
VM26	0	SHELL43
VM27	0	LINK1, CONTAC12, LINK8, CONTAC52
VM28	4	PLANE77
VM29	0	CONTAC12
VM30	0	LINK8
VM31	0	LINK10
VM32	0	PLANE55, PLANE42
VM33	4	SOLID5
VM34	0	SHELL63, BEAM44
VM35	0	SHELL91
VM36	0	COMBIN40, BEAM4
VM37	0	SOLID45
VM38	0	PLANE42, SOLID45
VM39	0	SHELL63
VM40	4	BEAM3

Table 1
Summary of Verification Problems

Problem Number	Analysis Type	Element Type(s)
VM41	0	MATRIX27, BEAM3
VM42	0	SHELL93
VM43	0	PLANE25
VM44	0	SHELL61
VM45	2	COMBIN14, MASS21
VM46	2	BEAM3, MASS21
VM47	2	COMBIN14, MASS21
VM48	2	PIPE16, MASS21
VM49	2	LINK1, MASS21
VM50	2	BEAM3
VM51	2	BEAM3
VM52	2	BEAM3, COMBIN14, MASS21
VM53	0, 2	LINK10
VM54	0, 2	SHELL63
VM55	0, 2	SHELL51
VM56	0	HYPER84, HYPER86
VM57	2	PIPE16, BEAM4, MASS21
VM58	0	PLANE35, SURF19
VM59	0, 2	BEAM4
VM60	2	SHELL99
VM61	2	BEAM3
VM62	2	SHELL63
VM63	0	PLANE82, PLANE2, CONTAC26
VM64	0	CONTAC26, PLANE42
VM65	4	CONTAC26, MASS21
VM66	2	SHELL63
VM67	2	PLANE25
VM68	2, 8	COMBIN40
VM69	2	COMBIN40
VM70	2	BEAM3
VM71	4	COMBIN40
VM72	4	COMBIN40
VM73	4	COMBIN40
VM74	4	COMBIN40
VM75	4	COMBIN40
VM76	0, 2, 3	LINK1
VM77	4	BEAM3, MASS21
VM78	0	SHELL99
VM79	4	COMBIN40, GP
VM80	4	LINK1, MASS21

Table 1
Summary of Verification Problems

Problem Number	Analysis Type	Element Type(s)
VM81	4	COMBIN40, MASS21, GP
VM82	0	SHELL99, SOLID46
VM83	4	COMBIN40
VM84	4	LINK1
VM85	5	LINK1, GP
VM86	3	COMBIN40
VM87	3	COMBIN40
VM88	3	COMBIN40
VM89	2	COMBIN14, MASS21
VM90	3	COMBIN14, MASS21
VM91	4	LINK8, MASS21
VM92	0	LINK34, LINK32
VM93	0	LINK32
VM94	0	LINK32, LINK34
VM95	0	LINK33, LINK34, SOLID70
VM96	0	SOLID87
VM97	0	SHELL57, LINK34
VM98	0	PLANE55
VM99	0	PLANE55
VM100	0	PLANE55
VM101	0	SOLID70
VM102	0	PLANE55
VM103	0	SHELL57
VM104	4	PLANE55
VM105	0	PLANE55
VM106	0	LINK31
VM107	0	LINK31, LINK34
VM108	0	PLANE75
VM109	4	LINK34, MASS71
VM110	4	LINK32, LINK34
VM111	4	PLANE55
VM112	4	PLANE77
VM113	4	PLANE55
VM114	4	LINK33
VM115	4	LINK32
VM116	4	LINK34, LINK32
VM117	0	LINK68
VM118	0	PLANE55, SOLID70
VM119	0	PLANE67, SOLID69
VM120	0	PLANE77

Table 1
Summary of Verification Problems

Problem Number	Analysis Type	Element Type(s)
VM121	0	FLUID15
VM122	0	FLUID66
VM123	0	FLUID66
VM124	0	FLUID66
VM125	0, AUX12	LINK32, MATRIX50
VM126	0	FLUID66
VM127	1, 0	BEAM3
VM128	1, 0	PLANE42
VM129		none
VM130		none
VM131	0	MASS21
VM132	0	LINK1
VM133	0	BEAM23
VM134	0	BEAM24
VM135	0	BEAM54
VM136	0	BEAM3
VM137	0	SHELL51
VM138	0	SHELL51
VM139	0	SHELL63
VM140	0	PLANE83
VM141	0, 7	PLANE82, PLANE2, SHELL93, MATRIX50
VM142	0	PLANE2, PLANE42
VM143	0	SOLID95, SOLID45, PLANE82
VM144	0	SHELL99, SOLID46
VM145	0	SOLID64
VM146	0	SOLID65, LINK8, PIPE16
VM147	0	SHELL93
VM148	0	SOLID95
VM149	0	FLUID79
VM150	0	FLUID80
VM151	2	SHELL61
VM152	2, 0	SHELL61
VM153	2, 0, Macro	SHELL41
VM154	2	FLUID38, COMBIN14, FLUID81
VM155	/OPT, 0	PLANE42
VM156	4	COMBIN39, LINK1, MASS21
VM157	/OPT, 0	BEAM3
VM158	4	PIPE59
VM159	4	COMBIN37, LINK34, MASS71
VM160	0	PLANE78

Table 1
Summary of Verification Problems

Problem Number	Analysis Type	Element Type(s)
VM161	0	SOLID90
VM162	0	SOLID90
VM163	0	PLANE55
VM164	4	LINK32
VM165	0	PLANE13, INFIN9
VM166	3	PLANE13
VM167	4	PLANE13
VM168	0	SOLID5, SOURC36
VM169	0	SOLID98
VM170	0	LINK68
VM171	0	PLANE13, COMBIN14
VM172	0	PLANE13
VM173	0	SOLID5
VM174	0	PLANE13
VM175	2	SOLID5
VM176	3	SOLID5
VM177	3	FLUID30, SHELL63
VM178	0	FLUID15
VM179	4	COMBIN7, BEAM4
VM180	0	PLANE2, BEAM3
VM181	2	PLANE2
VM182	2, 4	COMBIN40
VM183	2, 3	COMBIN40
VM184	0	SOLID5, SOLID92, SOLID98
VM185	3	PLANE13
VM186	4	PLANE13
VM187	0	SOLID5, SOLID92, SOLID98
VM188	0	PLANE13

Note: Analysis Type Codes are as follows:

<u>ANTYPE</u>	<u>Analysis Type</u>
0	Static
1	Buckling
2	Modal
3	Harmonic
4	Transient
7	Substructure
8	Response Spectrum

Table 2
Directory Structure - ANSYS Version PC 386/486
(Pentium PC)

Directory of C:\ANSYS50A

BIN	<DIR>	03-08-95	10:16a
DATA	<DIR>	03-08-95	10:16a
DEMO	<DIR>	03-08-95	10:16a
DOCU	<DIR>	03-08-95	10:16a
GRDRV	<DIR>	03-08-95	9:58a
OBJECTS	<DIR>	03-08-95	10:16a
SOURCE	<DIR>	03-08-95	10:16a
PHARLAP 386		9,343 02-10-93	4:33p
SYSINFO 50A		9,887 03-08-95	10:05a
SYSINFO AP		10,696 06-15-95	4:25p
INSTALL ERR		3,073 03-08-95	10:17a
APROGRAM EXE		163,840 06-15-95	4:26p
TELLME EXE		65,389 12-11-92	5:34p

Directory of C:\ANSYS50A\BIN

ANSSPD EXE		278,820 09-30-93	4:59p
ANSYS EXE		12,473,250 01-19-95	4:45p
CMAP EXE		857,596 09-30-93	4:59p
DISPLAY EXE		961,383 05-25-94	4:03p
GENAUTH EXE		907,126 09-30-93	4:59p
MKCNF EXE		52,732 09-30-93	4:59p
QUERY EXE		47,876 09-30-93	4:59p
TRANS16 EXE		1,886,979 09-30-93	4:59p
VIEW50A EXE		937,320 09-30-93	4:59p

Directory of C:\ANSYS50A\DATA

EXAMPLES	<DIR>	03-08-95	10:17a
USERMAC	<DIR>	03-08-95	10:17a
VERIF	<DIR>	03-08-95	10:17a

Directory of C:\ANSYS50A\DATA\EXAMPLES

PM	EXE	50,922 09-30-93	4:59p
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Table 2
Directory Structure - ANSYS Version PC 386/486
(Pentium PC)

- Directory of C:\ANSYS50A\DATA\USERMAC

UAANIM	MAC	2,411	09-30-93	4:59p
UADAPT	MAC	30,494	09-30-93	4:59p
UANCONT	MAC	1,425	09-30-93	4:59p
UANDISP	MAC	1,224	09-30-93	4:59p
UANFRAM	MAC	273	09-30-93	4:59p
UANMAC	MAC	9,676	09-30-93	4:59p
UANPOST	MAC	1,168	09-30-93	4:59p
UANUSER	MAC	434	09-30-93	4:59p
UANWALK	MAC	2,244	09-30-93	4:59p
UETEXP	MAC	10,250	09-30-93	4:59p
USHELL	MAC	564	09-30-93	4:59p

Directory of C:\ANSYS50A\DATA\VERIF

VM	EXE	155,936	09-30-93	4:59p
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Directory of C:\ANSYS50A\DEMO

RUNDEMO	BAT	1,168	09-30-93	4:59p
DEMOFILE	EXE	1,728,619	09-30-93	4:59p

Directory of C:\ANSYS50A\DOCU

AUTH	50	223	12-21-92	3:13p
CMDIDX	50A	99,748	09-30-93	4:59p
DTDOCU	50A	8,843,840	09-30-93	4:59p
KOPIIDX	50A	127,488	09-30-93	4:59p
START	ANS	770	09-30-93	4:59p
F16CNVRT	DAT	542	09-30-93	4:59p
AANIM	MAC	2,408	09-30-93	4:59p
ADAPT	MAC	30,494	09-30-93	4:59p
ANCONT	MAC	1,425	09-30-93	4:59p
ANDISP	MAC	1,221	09-30-93	4:59p
ANFRAM	MAC	273	09-30-93	4:59p
ANMAC	MAC	9,672	09-30-93	4:59p
ANPOST	MAC	1,167	09-30-93	4:59p
ANUSER	MAC	434	09-30-93	4:59p
ANWALK	MAC	2,244	09-30-93	4:59p
ETEXP	MAC	10,250	09-30-93	4:59p
F16CNVRT	MAC	315	09-30-93	4:59p
HYPER	MAC	24,048	09-30-93	4:59p

Table 2
Directory Structure - ANSYS Version PC 386/486
(Pentium PC)

Directory of C:\ANSYS50A\DOCU (continued)

LSSOLVE	MAC	5,123	09-30-93	4:59p
MODCYC	MAC	4,292	09-30-93	4:59p
MODFUL	MAC	4,093	09-30-93	4:59p
SETSPEED	MAC	35	03-08-95	10:17a
SHELL	MAC	564	09-30-93	4:59p

Directory of C:\ANSYS50A\GRDRV

HALO	BAK	431	03-08-95	10:05a
HALO	CNF	431	06-15-95	4:25p
KEEPDRVS	DAT	223	06-15-95	4:25p
AHDATIL	DSP	20,507	06-23-93	4:46p
AHDATIP	DSP	23,419	06-23-93	4:46p
AHDATIU	DSP	22,023	09-27-93	2:11p
AHDIBME	DSP	23,387	09-27-93	2:11p
AHDIBMV	DSP	23,083	01-11-93	2:11p
AHDVRI	DSP	26,619	06-23-93	4:46p
AHDHP	EXE	103,164	01-29-93	2:11p
AHD010	FNT	3,584	06-23-93	4:46p
AHD011	FNT	3,072	06-23-93	4:46p
AHD012	FNT	2,560	06-23-93	4:46p
AHD013	FNT	8,192	06-23-93	4:46p
AHD102	FNT	5,042	06-23-93	4:46p
BUILTIN	FNT	2,068	06-23-93	4:46p
AHDFW32	KRN	61,520	06-23-93	4:46p
AHDMOU	LOC	360	06-23-93	4:46p
AHDBW8	PRT	6,580	06-23-93	4:46p
AHDLJT4	PRT	6,958	04-27-93	2:11p
AHDLJTP	PRT	6,748	06-23-93	4:46p

Directory of C:\ANSYS50A\OBJECTS

BINLIB	A	37,376	09-30-93	4:59p
BINTST	LNK	378	09-30-93	4:59p

Directory of C:\ANSYS50A\SOURCE

BINTRD	F	10,742	09-30-93	4:59p
BINTST	F	4,592	09-30-93	4:59p
BINTWR	F	10,168	09-30-93	4:59p

Table 3
Comparison of Calculated and Published Results

VM1: Statically Indeterminate Reaction Force Analysis

	Manual	Pentium 90	Ratio	Notes
R1, lb	900.0	900.0	1.000	Reaction Forces, Node 4
R2, lb	600.0	600.0	1.000	Reaction Forces, Node 1

VM2: Beam Stresses & Deflections

	Manual	Pentium 90	Ratio	Notes
σ , psi	-11,404	-11,404	1.000	EL=2, SBYB
δ , in	0.182	0.182463	0.997	Node 3, UY

VM3: Thermally Loaded Support Structure

	Manual	Pentium 90	Ratio	Notes
σ_{steel} , psi	19,695	19,695	1.000	EL=3, SAXL
σ_{copper} , psi	10,152	10,152	1.000	EL=1,2 , SAXL

VM4: Deflection of a Hinged Support

	Manual	Pentium 90	Ratio	Notes
σ , psi	10,000	10,000	1.000	EL=1,2, SAXL
δ , in	-0.120	-0.120	1.000	UY @ Node 2

VM5: Laterally Loaded Tapered Support Structure

Plane42	Manual	Pentium 90	Ratio	Notes
σ , psi (El. 3, Face I-J)	8,282	8281.59	1.000	EL=3, S(PAR) Face I-J)
σ , psi (Fixed End/POST1)	7,086	7086.17	1.000	Fixed End/POST1, SX6

Plane82	Manual	Pentium 90	Ratio	Notes
σ , psi (El. 3, Face I-J)	8,349	8348.6	1.000	EL=3, S(PAR) Face I-J)
σ , psi	7,410	7410.25	1.000	Fixed End/POST1, SX6

VM6: Pinched Cylinder

	Manual	Pentium 90	Ratio	Notes
δ , in	0.1138	0.11375	1.000	POST1, UY @ 34

VM7: Plastic Compression of a Pipe Assembly

PIPE20	Manual	Pentium 90	Ratio	Notes
Load for $\delta=0.032$ in	1,024,400	1,024,400	1.000	Nodes 1 & 2, POST1 Macro, (first) Value of FZ
Load for $\delta=0.05$ in	1,262,000	1,262,000	1.000	
Load for $\delta=0.10$ in	1,262,000	1,262,000	1.000	

Table 3
Comparison of Calculated and Published Results

SOLID45	Manual	Pentium 90	Ratio	Notes
Load for $\delta=0.032$ in	1,022,500	1,022,529	1.000	Nodes 101 & 118, POST1 Macro Parameter LOAD
Load for $\delta=0.05$ in	1,259,700	1,259,695	1.000	
Load for $\delta=0.10$ in	1,259,700	1,259,695	1.000	

SHELL43	Manual	Pentium 90	Ratio	Notes
Load for $\delta=0.032$ in	1,023,900	1,023,932	1.000	Nodes 201 & 212, POST1 Macro Parameter LOAD
Load for $\delta=0.05$ in	1,261,400	1,261,423	1.000	
Load for $\delta=0.10$ in	1,261,400	1,261,423	1.000	

VM8: Parametric Calculation of Point to Point Distance

	Manual	Pentium 90	Ratio
$N_1 - N_2$ distance (LEN2)	8.5849	8.5849	1.000
$K_3 - K_4$ distance (LEN1)	305.16	305.16	1.000

VM9: Large Lateral Deflection of Unequal Stiffness Springs

	Manual	Pentium 90	Ratio	Notes
Strain -Energy, N-cm	24.02	24.02	1.000	POST1 SENE
δ_x , cm	8.633	8.633	1.000	UX @ Node 2
δ_y , cm	4.532	4.533	1.000	UY @ Node 2

VM10: Bending of a Tee-Shaped Beam

	Manual	Pentium 90	Ratio	Notes
$\sigma_{\text{bend, Bot}}$, psi	300.	300.00	1.000	Element Solution, EL=1, SBYB
$\sigma_{\text{bend, Top}}$, psi	-700.	-700.00	1.000	Element Solution, EL=1, SBYT

VM11: Residual Stress Problem

	Manual	Pentium 90	Ratio	Notes
δ at F_1 , in	-0.07534	-0.075338	1.000	LS 1, UY @ 4
σ_r , psi (SAXL, El 2)	-5,650.	-5,650	1.000	LS 3, SAXL @ EL=2

VM12: Combined Bending and Torsion

	Manual	Pentium 90	Ratio	Notes
σ_{max} , psi	7,527	7526.9	1.000	PIPE16 - S1MX
τ_{max} , psi	--	7553.8	--	PIPE16 - SINTMX
	3,777	3776.9	1.000	PIPE16 - SINTMX/2

Table 3
Comparison of Calculated and Published Results

VM13: Cylindrical Shell Under Pressure

	Manual	Pentium 90	Ratio	Notes
σ_y , psi	15,000	15,000	1.000	EL=1, T(X)
σ_z , psi	29,750	29,750	1.000	EL=1, T(Z)

VM14: Large Deflection Eccentric Compression of a Slender Column

	Manual	Pentium 90	Ratio	Notes
δ , in	0.1261	0.126061	1.000	UX @ 5
σ_{tens} , psi	2,456.	2456.4	1.000	S MAX @ EL=1(I)
σ_{comp} , psi	-2,450.	-2449.5	1.000	S MIN @ EL=1(I)

VM15: Bending of a Circular Plate Using Axisymmetric Shell Elements

Case 1 (Fixed Edges w/Uniform Load)

Case 1	Manual	Pentium 90	Ratio	Notes
δ , in	-0.08737	-0.08737	1.000	UY (Max)
σ_{max} , psi	7,040.	-7040.4	-1.000	EL=10, SM @ BOT (Node 7)

Case 2 (Fixed Edges w/Point Load)

Case 2	Manual	Pentium 90	Ratio	Notes
δ , in	-0.08735	-0.08735	1.000	UY (Max)
σ_{max} , psi	3,568.	3568.3	1.000	EL=10, SM @ BOT (Node 7)

Case 3 (Pinned Edges w/Uniform Load)

Case 3	Manual	Pentium 90	Ratio	Notes
δ , in	-0.08903	-0.08903	1.000	UY (Max)
σ_{max} , psi	2,969.	-2968.6	-1.000	EL=1, SM @ TOP

VM16: Bending of a Solid Beam (Plane Elements)

Case 1	Manual	Pentium 90	Ratio	Notes
δ , in	0.00500	0.00500	1.000	UY @ 6, 16
σ_{Bend} , psi	3,000.	3000.00	1.000	S(PAR) @ EL=1, Face I-J

Case 2	Manual	Pentium 90	Ratio	Notes
δ , in	0.00505	0.00505	1.000	UY @ 6, 16
σ_{Bend} , Psi	4,050.	4050.00	1.000	S(PAR) @ EL=1, Face I-J

VM17: Bending of a Solid Beam

Case 1	Manual	Pentium 90	Ratio	Notes
δ , in	0.00500	0.00500	1.000	UZ Max.
σ_{Bend} , psi (SX, el 1)	3,000.	3000.00	1.000	EL=1, SX @ Face KLPO

Table 3
Comparison of Calculated and Published Results

VM17: Bending of a Solid Beam (continued)

Case 2	Manual	Pentium 90	Ratio	Notes
δ , in	0.00505	0.00505	1.000	UZ Max.
σ_{Bend} , psi (SX, el 1)	4,050.	4050.00	1.000	EL=1, SX @ Face KLPO

VM18: Out-Of-Plane Bending of a Curve Bar

	Manual	Pentium 90	Ratio	Notes
δ , in	-2.650	-2.64973	1.000	UZ @ 2
σ_{Bend} , psi	6,366.	6366.2	1.000	SAXL @ 0° (Element Sol.)
τ , psi	-3,183.	-3183.1	1.000	SXH @ 0° (Element Sol.)

Notes:

- σ_{Bend} from max. SAXL at 0° angle location in element solution.
- τ from SXH at 0° angle location in element solution

VM19: Propped Cantilever Under Gravity Loading

	Manual	Pentium 90	Ratio	Notes
δ , in (Node 2)	-0.01528	-0.015277	1.000	UY @ 2
θ , radians	-5.877E-04	-5.877E-04	1.000	ROTZ @ 1
σ_{Bend} , psi	594.92	594.92	1.000	EL=1, SBYB (Max.)
M_B , in-lb	-1,410.4	-1410.36	1.000	MZ @ Node 3 (Reaction)
R_A , lb	42.311	42.3108	1.000	FY @ Node 1 (Reaction)
R_B , lb	70.518	70.5180	1.000	FY @ Node 3 (Reaction)

VM20: Cylindrical Membrane Under Pressure

	Manual	Pentium 90	Ratio	Notes
σ_1 , psi	15,000.	15,000	1.000	EL=1, S(2)
σ_2 , psi	29,886.	29,886	1.000	EL=1, S(1)

VM21: Tie Rod with Lateral Loading

F != 0 (stiffened)	Manual	Pentium 90	Ratio	LS=1, Substep=4
Z_{max} , in	-0.19946	-0.19946	1.000	POST1, UZ @ 5
θ , rad	3.235E-03	0.0032353	1.000	POST1, ROTY @ 1
M_{max} , in-lb	-4,580.1	-4580.1	1.000	POST1, MY @ 5

F = 0 (unstiffened)	Manual	Pentium 90	Ratio	LS=1, Substep=1
Z_{max} , in	-0.38241	-0.38241	1.000	POST1 UZ @ 5
θ , rad	6.119E-03	6.119E-03	1.000	POST1 ROTY @ 1
M_{max} , in-lb	-8,962.6	-8962.6	1.000	POST1 MY @ 5

Table 3
Comparison of Calculated and Published Results

VM22: Small Deflection of a Belleville Spring

	Manual	Pentium 90	Ratio	Notes
y, in	-0.00284	-0.00284	1.000	UY @ 1

VM23: Thermal Stresses in a Plate

	Manual	Pentium 90	Ratio	Notes
M, lb-in/in	-625.	-625.00	1.000	Mx, My (EL=1, EL Solution)
σ_{max} , psi	-15,000.	-15,000	1.000	EL=1, S(X) & S(Y) TOP

VM24: Plastic Hinge in a Rectangular Beam

M/M _y	Manual	Pentium 90	Ratio	Notes
1	Fully Elastic	0	N/A	POST26, EPPLAXL (EPPLAXL = Plastic Strain)
1.1666	Elastic-Plastic	3.20E-04	N/A	
1.3333	Elastic-Plastic	6.40E-04	N/A	
1.5**	Fully Plastic	397	N/A	

** Solution does not converge, indicates structure has collapsed

VM25: Stresses in a Long Cylinder

Load Step 1

P=30,000 psi	Manual	Pentium 90	Ratio	Notes
δ_r , in (r = 4 in)	0.0079111	0.007911	1.000	UX @ 1 & 2, DOF Solution
s_r , psi (r = 4 in)	-30,000	-30,000	1.000	Element Sol., EL=1, S(PER), Face I-J
s_r , psi (r = 6 in)	-7,845	-7,845	1.000	Element Sol., EL=4, S(X)
s_r , psi (r = 8 in)	0	0	n/a	Element Sol., EL=7, S(PER), Face K-L
s_t , psi (r = 4 in)	46,636	46,636	1.000	Element Sol., EL=1, S(Z), Face I-J
s_t , psi (r = 6 in)	27,869	27,869	1.000	Element Sol., EL=4, S(Z)
s_t , psi (r = 8 in)	19,690	19,690	1.000	Element Sol., EL=7, S(Z), Face K-L

Load Step 2

w = 1000 rad/sec	Manual	Pentium 90	Ratio	Notes
s_r , psi (r = 4 in)	0	0	n/a	Element Sol., EL=1, S(PER), Face I-J
s_t , psi (r = 4 in)	38,885	38,885	1.000	Element Sol., EL=1, S(Z), Face I-J
s_r , psi (r = 5.43 in)	4,846	4,846	1.000	Element Sol., EL=3, S(X)
s_t , psi (r = 5.43 in)	29,778	29,778	1.000	Element Sol., EL=3, S(Z)

Table 3
Comparison of Calculated and Published Results

VM26: Large Deflection of a Cantilever

(From POST1)	Manual	Pentium 90	Ratio	Notes
UX, node 4	-2.9	-2.8678	1.011	POST1, UX @ 4
UZ, node 4	-6.8	-6.818	0.997	POST1, UZ @ 4
ROTY, node 4	1.3	1.303	0.998	POST1, ROTY @ 4
σ_x , node 1	95.56	95.56	1.000	POST1, SX @ 1

VM27: Thermal Expansion to Close a Gap

2-D Analysis (LINK1)	Manual	Pentium 90	Ratio	Notes
σ , psi	-6,125.	-6124.8	1.000	EL=1, SAXL
$\epsilon_{\text{Thermal}}$	0.00125	0.001250	1.000	EL=1, EPTHAXL

3-D Analysis (LINK8)	Manual	Pentium 90	Ratio	Notes
σ , psi	-6,125.	-6124.8	1.000	EL=1, SAXL
$\epsilon_{\text{Thermal}}$	0.00125	0.001250	1.000	EL=1, EPTHAXL

VM28: Transient Heat Transfer in an Infinite Slab

Temperature, °C	Manual	Pentium 90	Ratio	Notes
Y=.9777 (node 11)	141	140.7	1.002	POST26, T11 Max.
Y=.9141 (node 9)	99.1	99.10	1.000	POST26, T9 Max.
Y=.8134 (node 7)	51.7	51.67	1.001	POST26, T7 Max.
Y=.6538 (node 5)	14	14.03	0.998	POST26, T5 Max.

VM29: Friction on a Support Block

Load Step 1	Manual	Pentium 90	Ratio	Notes
Status	Sticking	STAT=1	n/a	STAT=1, No Sliding
F_n , lb	-95.942	-95.942	1.000	Element Solution
F_s , lb	28.783	28.783	1.000	Element Solution

Load Step 2	Manual	Pentium 90	Ratio	Notes
Status	Sliding	STAT=2	n/a	STAT=2, Sliding
F_n , lb	-95.942	-95.942	1.000	Element Solution
F_s , lb	28.783	28.783	1.000	Element Solution

VM30: Pin-Jointed Support Truss

	Manual	Pentium 90	Ratio	Notes
$\sigma_{\text{element 1}}$, psi	10.4	10.393	1.001	EL=1, MFORX
$\sigma_{\text{element 2}}$, psi	31.2	31.180	1.001	EL=2, MFORX
$\sigma_{\text{element 3}}$, psi	22.9	22.906	1.000	EL=3, MFORX

Table 3
Comparison of Calculated and Published Results

VM31: Cable Supporting Hanging Loads

	Manual	Pentium 90	Ratio	Notes
A _x , kips	-17.997	-17.9966	1.000	Reaction @ Node 1
A _y , kips	5.0009	5.00088	1.000	Reaction @ Node 1
T, kips	24.756	24.756	1.000	EL=4, MFORX

VM32: Thermal Stresses in a Long Cylinder

Thermal Analysis	Manual	Pentium 90	Ratio	Notes
T, °C at X=.1875 in	-1.0000	-1.0000	1.000	L.S. 1, Node 1
T, °C at X=.2788 in	-0.67061	-0.67061	1.000	L.S. 1, Node 3
T, °C at X=.625 in	0.0000	0.0000	n/a	L.S. 1, Node 18
Static Analysis				
σ _a , psi (x = .1875 in)	419.59	419.594	1.000	EL=1, S(PAR)
σ _t , psi (x = .1875 in)	420.51	420.511	1.000	EL=1, S(Z)
σ _a , psi (x = .625 in)	-193.76	-193.763	1.000	EL=7, S(PAR)
σ _t , psi (x = .625 in)	-189.01	-189.011	1.000	EL=7, S(Z)

VM33: Transient Thermal Stresses in a Cylinder

T = 430	Manual	Pentium 90	Ratio	Notes
σ _y , psi (r = b)	-13,086	-13,086.4	1.000	POST26, SYC @ Time=430
σ _y , psi (r = a)	10,416.2	10,416.2	1.000	POST26, SYB @ Time=430

VM34: Bending of a Tapered Beam

SHELL63	Manual	Pentium 90	Ratio	Notes
δ, in	-0.042667	0.042667	-1.000	UZ @ Node 1, POST1
(σ ₁) _{max} , psi	1600.4	1600.4	1.000	Element Sol., EL=3, S(1) TOP

BEAM44	Manual	Pentium 90	Ratio	Notes
δ, in	-0.043842	-0.043842	1.000	UZ @ Node 1, POST1
(σ ₁) _{max} , psi	1600.0	1600.0	1.000	Element Sol., EL=1-10, SMAX

VM35: Bimetallic Layered Cantilever Plate w/Thermal Loading

	Manual	Pentium 90	Ratio	Notes
free end deflection, Δz	0.750	0.7500	1.000	POST1, UZ Node 15
free end deflection, Δx	0.015	0.0150	1.000	POST1, UX Node 15
fixed end top stress, σx	7500	7500.0	1.000	POST1, S(X) Nodes 1-23

Table 3
Comparison of Calculated and Published Results**VM36: Limit Moment Analysis****Load Step 1**

P = 1000 lbs (elastic)	Manual	Pentium 90	Ratio	Notes
$\delta_{\max}$, in	-0.02829	-0.028293	1.000	UZ @ Nodes 2 & 3
R_a , lb	148.15	148.150	1.000	FZ @ Node 1 (Reactions)
M_c , in-lb	27,778	27,777.6	1.000	MY @ Node 5 (Reactions)

Load Step 2

P = 1388.8 lb.	Manual	Pentium 90	Ratio	Notes
Hinge @ B (STAT @ EL=3)	Elastic	STAT=1	N.A.	COMBIN40, STAT=1→No Sliding
Hinge @ C (STAT @ EL=4)	Sliding	STAT=2	N.A.	COMBIN40, STAT=2→Sliding

Load Step 3

P = 1390 lb.	Manual	Pentium 90	Ratio	Notes
Hinge @ B (STAT @ EL=3)	Sliding	-STAT=2	N.A.	COMBIN40, STAT=2→Sliding
Hinge @ C (STAT @ EL=4)	Sliding	STAT=2	N.A.	COMBIN40, STAT=2→Sliding

VM37: Elongation of a Solid Bar

	Manual	Pentium 90	Ratio	Notes
δ , in	0.004757	0.0047570	1.000	UY @ Node 8
σ_y , psi (elem. 4)	4,441	4441.1	1.000	EL=4, S(Y)

VM38: Plastic Loading of a Thick Cylinder Under Pressure**Fully Elastic, Load Step 1**

PLANE42	Manual	Pentium 90	Ratio	Notes
σ_r , psi (X = 4.4 in)	-9,900	-9900.4	1.000	EL=1, S(X)
σ_t , psi (X = 4.4 in)	18,820	18,820	1.000	EL=1, S(Z)
σ_r , psi (X = 7.6 in)	-458	-457.67	1.001	EL=5, S(X)
σ_t , psi (X = 7.6 in)	9,116	9115.7	1.000	EL=5, S(Z)

Fully Plastic, Load Step 2

PLANE42	Manual	Pentium 90	Ratio	Notes
σ_{eff} , psi (X = 4.4 in)	29,992	29,991	1.000	EL=1, SEQV
σ_{eff} , psi (X = 7.6 in)	30,000	30,000	1.000	EL=5, SEQV

Table 3
Comparison of Calculated and Published Results

VM38: Plastic Loading of a Thick Cylinder Under Pressure (continued)

Fully Elastic -

SOLID45	Manual	Pentium 90	Ratio	Notes
σ_r , psi (X = 4.4 in)	-9,891	-9891.4	1.000	EL=1, S(X)
σ_t , psi (X = 4.4 in)	18,811	18,811	1.000	EL=1, S(Y)
σ_r , psi (X = 7.6 in)	-455	-454.65	1.001	EL=5, S(X)
σ_t , psi (X = 7.6 in)	9,113	9112.7	1.000	EL=5, S(Y)

Fully Plastic

SOLID45	Manual	Pentium 90	Ratio	Notes
σ_{eff} , psi (X = 4.4 in)	29,982	29,982	1.000	EL=1, SEQV
σ_{eff} , psi (X = 7.6 in)	29,992	29,992	1.000	EL=5, SEQV

Note: σ_{eff} from output quantity SEQV.

VM39: Bending of a Circular Plate w/Center Hole

	Manual	Pentium 90	Ratio	Notes
δ , in	0.049218	0.0492180	1.000	UZ @ Nodes 7, 17
ϕ , rad	-0.0045249	-0.0045249	1.000	ROTY @ Nodes 7, 17

@ x = 10.81 in.	Manual	Pentium 90	Ratio	Notes
M, in-lb/in	-13.675	-13.675	1.000	EL=1, M(X)
σ_x , psi	-1312.8	-1312.8	1.000	EL=1, TOP, S(X)

@ x = 27.1 in.	Manual	Pentium 90	Ratio	Notes
M, in-lb/in	-10.133	-10.133	1.000	EL=6, M(X)
σ_x , psi	-972.72	-972.72	1.000	EL=6, TOP, S(X)

VM40: Large Deflection and Rotation of a Beam Pinned at 1 End

θ_z , deg	Manual	Pentium 90	Ratio	Notes / POST26
60° δ_x , in	-5.0	-5.000	1.000	UX @ T=0.025 (ROTZ=1.047)
90° δ_y , in	10.0	10.000	1.000	UY @ T=0.0375 (ROTZ=1.571)
180° δ_x , in	-20.0	-20.00	1.000	UX @ T=0.0750 (ROTZ=3.142)
210° δ_y , in	-5.0	-5.00	1.000	UY @ T=0.0875 (ROTZ=3.665)
315° δ_x , in	-2.93	-2.9289	1.000	UX @ T=0.13125 (ROTZ=5.498)
360° δ_y , in	0.0	1.61E-08	n/a	UY @ T=0.1500 (ROTZ=6.283)

Table 3
Comparison of Calculated and Published Results

VM41: Small Deflection of a Rigid Beam

Thick Beam	Manual	Pentium 90	Ratio	Notes
δ_x , in	0.0	0.000	n/a	Node 3, UX
δ_y , in	-0.1	-0.1000	1.000	Node 3, UY
θ , rad	-0.01	-0.0100	1.000	Node 3, ROTZ
σ_{bend} , psi	-0.5	-0.500	1.000	EL=2, SBYB @ 1(l)

Note: σ_{bend} considered negligible

Constraint Equation	Manual	Pentium 90	Ratio	Notes
δ_x , in	0.0	0.0000	n/a	Node 3, UX
δ_y , in	-0.1	-0.1000	1.000	Node 3, UY
θ , rad	-0.01	-0.0100	1.000	Node 3, ROTZ
σ_{bend} , psi	0.0	1.56E-12	0.000	EL=2, SBYB

VM42: Barrel Vault Roof Under Self Weight

	Manual	Pentium 90	Ratio	Notes
UY _A , m	-0.3053	-0.30528	1.000	POST1, Node 1, UY
UX _A , m	-0.1614	-0.16141	1.000	POST1, Node 1, UX

σ_z , Top @ A, Pa	215,980	215,980	1.000	POST1, Node 1, SZ (Top)
σ_z , Bot @ A, Pa	342,480	342,480	1.000	POST1, Node 1, SZ (Bot)
σ_θ , Bot @ B, Pa	190,710	190,710	1.000	POST1, Node 2, SY (Top)
σ_θ , Top @ B, Pa	-219,410	-219,410	1.000	POST1, Node 2, SY (Bot)

VM43: Bending of an Axisymmetric Thick Pipe

	Manual	Pentium 90	RATIO	Notes
δ_x , in ($\theta = 0$)	-0.12529	-0.125295	1.000	Node 15, UX (L.S. 1)
δ_z , in ($\theta = 90$)	0.12530	0.125296	1.000	Node 15, UZ (L.S. 1)
σ_{max} , psi ($\theta = 0^\circ$)	2652.4	2652.4	1.000	EL=1, S(PAR) @ Face I-J

VM44: Bending of an Axisymmetric Thin Pipe

	Manual	Pentium 90	RATIO	Notes
δ_x , in ($\theta = 0$)	-0.19079	-0.19079	1.000	POST1 (1st) UX @ Node 8
δ_z , in ($\theta = 90$)	0.19079	0.19079	1.000	POST1 (2nd) UZ @ Node 8
σ_{max} , psi ($\theta = 0^\circ$)	3059.1	3059.1	1.000	EL=1, S1 BOT (Sec. @ Node I)

Note: σ_{max} corresponds to S1 BOT of element 1.

Table 3
Comparison of Calculated and Published Results

VM45: Natural Frequency of a Spring-Mass System

	Manual	Pentium 90	Ratio
f, Hz	13.701	13.70105	1.000

VM46: Natural Frequency of a Cantilevered Mass

	Manual	Pentium 90	Ratio
f, Hz	33.553	33.5528	1.000

VM47: Torsional Frequency of a Suspended Disk

	Manual	Pentium 90	Ratio
f, Hz	0.63333	0.6333349	1.000

VM48: Natural Frequency of a Motor Generator

	Manual	Pentium 90	Ratio
f, Hz	48.781	48.7806	1.000

VM49: Fundamental Frequency of a Bar-Mass System

	Manual	Pentium 90	Ratio	Notes
Bar w/mass: f, Hz	12.508	12.5076	1.000	
Bar w/o mass: f, Hz	13.701	13.7011	1.000	See Problem VM45

VM50: Fundamental Frequency of a Simply Supported Beam

	Manual	Pentium 90	Ratio	Notes
f, Hz	28.767	28.7670	1.000	Mode 1

VM51: Natural Frequencies of a Cantilever Beam

	Manual	Pentium 90	Ratio	Notes
f ₁ , Hz	10.246	10.2465	1.000	
f ₂ , Hz	64.183	64.1827	1.000	
f ₃ , Hz	179.79	179.787	1.000	

VM52: Automobile Suspension System Vibration

	Manual	Pentium 90	Ratio
f ₁ , Hz	1.0981	1.09807	1.000
f ₂ , Hz	1.4406	1.44056	1.000

Table 3
Comparison of Calculated and Published Results

VM53: Vibration of a String Under Tension

Static	Manual	Pentium 90	Ratio	Notes
F, lb	500	500.00	1.000	MFORX (Element Sol.)
σ , psi	162,970	162,970.	1.000	SAXL (Element Sol.)

Modal	Manual	Pentium 90	Ratio
f_1 , Hz	75.094	75.0944	1.000
f_2 , Hz	151.29	151.286	1.000
f_3 , Hz	229.68	229.684	1.000

VM54: Vibration of a Rotating Cantilever Blade

	Manual	Pentium 90	Ratio
f, Hz	52.01	52.01099	1.000

VM55: Vibration of a Stretched Circular Membrane

Static	Manual	Pentium 90	Ratio	Notes
σ_r , psi	10,000	10,000.	1.000	SM, EL=1 to 9

Modal	Manual	Pentium 90	Ratio
f_1 , Hz	94.365	94.3649	1.000
f_2 , Hz	217.11	217.106	1.000
f_3 , Hz	342.46	342.461	1.000

VM56: Hyperelastic Thick Cylinder Under Internal Pressure

HYPER84	Manual	Pentium 90	Ratio	Note
u_r (inner radius), in	7.388	7.38758	1.000	L.S.2, UX @ 1, 14
σ_r (element 1), psi	-122.5	-122.48	1.000	EL=1, S(X)

HYPER86	Manual	Pentium 90	Ratio	Notes
u_r (inner radius), in	7.175	7.17475	1.000	L.S.2, UX @ Nodes 1,2,3,4
σ_r (element 1), psi	-122.1	-122.13	1.000	EL=1, S(X)

VM57: Torsional Frequencies of a Drill Pipe

Pipe Elements	Manual	Pentium 90	Ratio
f_1 , Hz	0.3834	0.383392	1.000
f_2 , Hz	1.264	1.26386	1.000

Table 3
Comparison of Calculated and Published Results

VM57: Torsional Frequencies of a Drill Pipe (continued)

Beam Elements	Manual	Pentium 90	Ratio
f_1 , Hz	0.3834	0.383383	1.000
f_2 , Hz	1.264	1.26385	1.000

VM58: Centerline Temperature of a Heat Generating Wire

	Manual	Pentium 90	Ratio	Notes
T_{CL} , °F	419.9	419.94	1.000	POST1, Node 1
T_s , °F	417.9	417.85	1.000	POST1, Nodes 2, 10-17
q, BTU/hr	341.5	341.5	1.000	POST1, HFLOW

VM59: Lateral Vibration of an Axially Loaded Bar

	Manual	Pentium 90	Ratio	Notes
Static				
δ , in	-0.026667	-0.026667	1.000	UX Max. (Node 14)
σ_r , psi	-10,000	-10,000	1.000	EL=1 to 13, SDIR

F = 40,000 lb.

	Manual	Pentium 90	Ratio
Modal			
f_1 , Hz	17.052	17.0515	1.000
f_2 , Hz	105.22	105.2226	1.000
f_3 , Hz	248.88	248.877	1.000

F = 0 lb.

	Manual	Pentium 90	Ratio	Notes
Modal				
f_1 , Hz	28.7670	28.7670	1.000	See Problem VM50

VM60: Natural Freq. of a Cross-Ply Laminated Spherical Shell

	Manual	Pentium 90	Ratio
f_1 , Hz	0.73149	0.731493	1.000

VM61: Longitudinal Vibration of a Free-Free Rod

	Manual	Pentium 90	Ratio
f_1 , Hz (rigid body)	0.0	0.000	n/a
f_2 , Hz	127.13	127.132	1.000
f_3 , Hz	256.86	256.859	1.000

Table 3
Comparison of Calculated and Published Results

VM62: Vibration of a Wedge

Plate Elements	Manual	Pentium 90	Ratio
f_1 , Hz	261.11	261.111	1.000

Shell Elements	Manual	Pentium 90	Ratio
f_1 , Hz	261.11	261.111	1.000

VM63: Static Hertz Contact Problem

Plate Elements	Manual	Pentium 90	Ratio	Notes
a, mm	1.0110	1.0109	1.000	POST1 Parameter AACT

VM64: Thermal Expansion to Close a Gap

Static	Manual	Pentium 90	Ratio	Notes
σ_x , psi	-13,125	-13,125	1.000	EL=3, SX
σ_y , psi	-6,125	-6,125	1.000	EL=3, SY

VM65: Trans. Response of a Ball Impacting a Flexible Surface

At Impact	Manual	Pentium 90	Ratio	Notes
Time, sec	0.072	0.072	n/a	
y displacement, in	-0.9991	-0.999137	1.000	POST26 @ T=.072 sec.
y velocity, in/sec	-27.76	-27.7594	1.000	POST26 @ T=.072 sec.
kinetic energy, lb-in	192.65	192.646	1.000	POST26 @ T=.072 sec.

At "zero" velocity	Manual	Pentium 90	Ratio	Notes
max. y displacement	-1.5503	-1.55028	1.000	Velocity Sign Change
time, sec	0.10000	0.101	0.990	POST 26 @ T=.100

VM66: Vibration of a Flat Plate

	Manual	Pentium 90	Ratio
f_1 , Hz	128.43	128.4255	1.000

VM67: Radial Vibrations of a Circular Ring

	Manual	Pentium 90	Ratio	Notes
f_0 , Hz	3226.4	3226.408	1.000	Run 1
f_1 , Hz	12.496	12.4957	1.000	Run 2

Table 3
Comparison of Calculated and Published Results

VM68: PSD Response of a 2-DOF Spring-Mass System

Modal	Manual	Pentium 90	Ratio	Notes
f_1 , Hz	20.57	20.5721	1.000	
f_2 , Hz	64.88	64.8846	1.000	
Mass 1, 1σ Std Dev.	9.059	9.0587	1.000	POST1, UX @ Node 2
Mass 2, 1σ Std Dev.	10.63	10.633	1.000	POST1, UX @ Node 3

VM69: Seismic Response

Modal	Manual	Pentium 90	Ratio	Notes
f , Hz	0.5000	0.5	1.000	
A_0 , in	1.0200	1.0200	1.000	POST1, UX @ Node 2

VM70: Seismic Response of a Beam Structure

Modal	Manual	Pentium 90	Ratio	Notes
f_1 , Hz	6.0974	6.097398	1.000	Mode 1
δ , in	0.55301	0.55301	1.000	POST1, UY @ Node 6
σ_{max} , psi	20,156	20,156	1.000	POST1, EL=4, SBYT(J)

VM71: Transient Response of a Spring-Mass-Damper System

t = 0.09 seconds	Manual	Pentium 90	Ratio	Notes
u, in (for $\zeta = 2.0$)	0.47637	0.476369	1.000	POST26, Node 1
u, in (for $\zeta = 1.0$)	0.19245	0.192447	1.000	POST26, Node 3
u, in (for $\zeta = 0.2$)	-0.51951	-0.519509	1.000	POST26, Node 5
u, in (for $\zeta = 0.0$)	-0.99498	-0.994977	1.000	POST26, Node 7

VM72: Logarithmic Decrement

Amplitude/Time	Manual	Pentium 90	Ratio	Notes
Peak 1 - Amplitude	1.00000	1.00000	1.000	Load Step 1 - Initial Conditions
Peak 1 - Time (Sec.)	0.00000	0.00000	n/a	
Peak 2 - Amplitude	0.64981	0.649805	1.000	Load Step 2
Peak 2 - Time (Sec.)	0.18600	0.18600	1.000	
Peak 3 - Amplitude	0.42306	0.423056	1.000	
Peak 3 - Time (Sec.)	0.37200	0.37200	1.000	
Peak 4 - Amplitude	0.27525	0.275246	1.000	
Peak 4 - Time (Sec.)	0.55800	0.55800	1.000	

Table 3
Comparison of Calculated and Published Results

VM73: Free Vibration with Coulomb Damping

	Manual	Pentium 90	Ratio	Notes
u, in (t = 0.09 sec)	0.87204	0.872044	1.000	POST26
u, in (t = 0.102 sec)	0.83019	0.830186	1.000	POST26
u, in (t = 0.183 sec)	-0.74875	-0.748749	1.000	POST26

VM74: Transient Response to an Impulsive Excitation

Time = 0.08s/ $\zeta = 0.0$	Manual	Pentium 90	Ratio	Notes
y _{max} , in	0.99896	0.998964	1.000	UY @ Node 2 (Time = .080)

Time = 0.1	Manual	Pentium 90	Ratio	Notes
y, in (for $\zeta = 0.0$)	0.90857	0.908572	1.000	UY @ Node 2 (Time = .1025)
y, in (for $\zeta = 0.070$)	0.34185	0.341847	1.000	UY @ Node 4 (Time = .1025)

Based on time = .1 + .0025 seconds to account for impulse duration

VM75: Transient response to a Step Excitation

Time = 0.1575 sec	Manual	Pentium 90	Ratio	Notes
u _{max} , in	1.9992	1.99915	1.000	UY @ 2, T=.1575

Time = 0.20 sec	Manual	Pentium 90	Ratio	
u, in (for $\zeta = 0.0$)	1.6723	1.67233	1.000	UY @ 2 (POST26, Time = .20)
u, in (for $\zeta = 0.5$)	1.1544	1.15439	1.000	UY @ 4 (POST26, Time = .20)

VM76: Harmonic response a a Guitar String

MODAL	Manual	Pentium 90	Ratio	
f, Hz	322.3	322.335	1.000	2nd Analysis

POST26	Response	Frequency*	Ratio	Pentium 90 Frequency
f ₁ , (322.2 Hz)	320 < f < 328	320	N.A.	322.335 Hz
f ₂ , (644.4 Hz)	No Response	-	N.A.	645.554 Hz
f ₃ , (966.6 Hz)	968 < f < 976	968	N.A.	970.543 Hz
f ₄ , (1288.8 Hz)	No Response	-	N.A.	1298.19 Hz
f ₅ , (1611.0 Hz)	1624 < f < 1632	1632	N.A.	1629.4 Hz
f ₆ , (1933.2 Hz)	No Response	-	N.A.	1724.83 Hz

*Response Frequencies from peaks in |UY| (Real Displacement) in POST26

Table 3
Comparison of Calculated and Published Results

VM77: Trans. Response to a Constant Force w/Finite Rise Time

Transient	Manual	Pentium 90	Ratio	Notes
t (@Y _{max}), sec	0.092	0.0920	1.000	Time @ L.S. 3, Substep 5
y _{max} , in	0.335	0.335459	0.999	UY @ Node 2

EXPANSION PASS	Manual	Pentium 90	Ratio	
s _{bend} , ksi	-18.9	-18.8700	1.002	SBYB, EL=1(J) & EL=2(I)

VM78: Transverse Shear Stresses in a Cantilever Beam

	Manual	Pentium 90	Ratio	
σ_{xz} , psi (z = h/2)	0.0	0.0	n/a	SXZ, Layer 1, BOT or Layer 4, TOP (any element)
σ_{xz} , psi (z = h/4)	5625.0	5625.0	1.000	ILSXZ for Layers 1 - 2 (or 3 - 4)
σ_{xz} , psi (z = 0)	7500.0	7500.0	1.000	ILSXZ for Layers 2 - 3 (also ILMX)
FC3 _{max} (FCMX)	225.0	225.0	1.000	POST1 Parameter

VM79: Transient Response of a Bilinear Spring Assembly

Time = 0.09 sec	Manual	Pentium 90	Ratio	Notes
y _{max} , in	-1.0405	-1.04047	1.000	Load Step 3, Cum. Iter. 37

Displacements	Manual	Pentium 90	Ratio	Notes
Time = .040	-0.68122	-0.681218	1.00	UY @ 2 (L.S. 3, Substep 15)
Time = .070	-0.98672	-0.986716	1.00	UY @ 2 (L.S. 3, Substep 27)
Time = .085	-1.0383	-1.03828	1.00	UY @ 2 (L.S. 3, Substep 33)
Time = .105	-1.0020	-1.00203	1.00	UY @ 2 (L.S. 3, Substep 41)

VM80: Plastic Response to a Suddenly Applied Constant Force

	Manual	Pentium 90	Ratio	Notes
y _{max} , in	0.804	0.804290	1.000	POST26, UY
Time, sec	0.0680	0.0680	1.000	POST26, UY

	Manual	Pentium 90	Ratio	Notes
y _{min} , in	0.438	0.437734	1.001	POST26, UY
Time, sec	0.122	0.1220	1.000	POST26, UY

Table 3
Comparison of Calculated and Published Results

VM81: Transient Response of a Drop Container

At Impact: -

Full Transient Dynamic	Manual	Pentium 90	Ratio	Notes
time, sec	0.072	0.072	n/a	
y, in	-1.0005	-1.00051	1.000	POST26, UY @ T=.072
vel, in/sec	-27.78	-27.7767	1.000	POST26, VEL_1UY @ T=.072

At Zero Velocity (theoretical $Y_{max} = -1.5506$ @ $t=.100366$)

Full Transient Dynamic	Manual	Pentium 90	Ratio	Notes
t = 0.100 sec / y (in)	-1.5503	-1.55033	1.000	POST26, UY @ T=.100
t = 0.101 sec / y (in)	-1.5502	-1.55024	1.000	POST26, UY @ T=.101

At Impact:

Reduced Transient Dynamic	Manual	Pentium 90	Ratio	Notes
time, sec	0.072	0.072	n/a	
y, in	-0.987	-0.98685	1.000	POST26, UY @ T=.072
vel, in/sec	-27.59	-27.5936	1.000	POST26, VEL_1UY @ T=.072

At Zero Velocity (theoretical $Y_{max} = -1.5506$ @ $t=.100366$)

Reduced Transient Dynamic	Manual	Pentium 90	Ratio	Notes
t = 0.100 sec / y (in)	-1.5495	-1.54947	1.000	POST26, UY @ T=.100
t = 0.101 sec / y (in)	-1.5503	-1.55027	1.000	POST26, UY @ T=.101

VM82: Simply Supported Laminated Plate Under Pressure

	Manual	Pentium 90	Ratio	Notes
δ , m (SHELL99)	0.0692	0.0691919	1.000	UZ @ Node 1
δ , m (SOLID46)	0.0676	0.067594	1.000	UZ @ Node 1, 51

VM83: Impact of a Block on a Spring Scale

Time = 0.689 sec	Manual	Pentium 90	Ratio	Notes
δ , in	-7.641	-7.6410	1.000	POST26, UY @ 2, T=.68897
y, in	-79.44	-79.4417	1.000	POST26, UY @ 3, T=.68897

VM84: Displacement Propagation Along a Bar w/Free Ends

Time = 0.24 sec	Manual	Pentium 90	Ratio	Notes
δ , in	4.8404	4.84035	1.000	POST26, UX @ 17

Table 3
Comparison of Calculated and Published Results

VM85: Transient Disp. in a Suddenly Stopped Moving Bar

Reduced Transient Dynamic	Manual	Pentium 90	Ratio	Notes
d, in (t = .0544)	4.7732	4.7733	1.000	POST26, Variable 4, REL_DISP
d, in (t = .0557)	4.7471	4.74715	1.000	POST26, Variable 4, REL_DISP

Expansion Pass	Manual	Pentium 90	Ratio	Notes
s _x , psi (t = .0557 sec)	14804	14805	1.000	EL=1, SAXL

VM86: Harmonic Response of a Dynamic System

	Manual	Pentium 90	Ratio	Notes
A _o , in	0.0833	0.083333	1.000	UZ @ 2, Amplitude
φ, deg	-90.0	-90.00007	1.000	UZ @ 2, Phase

VM87: Equivalent Structural Damping

	Manual	Pentium 90	Ratio	Notes
Amp, in	0.083333	0.083333	1.000	UZ @ 2, Amplitude
φ, deg	-90.000	-90.00007	1.000	UZ @ 2, Phase

VM88: Response of an Eccentric Weight Exciter

Load Step 1

f = f _n	Manual	Pentium 90	Ratio	Notes
Amp, in	0.60000	0.6000005	1.000	UX @ Node 2 - Amplitude
φ, deg	-90.000	-89.99989	1.000	UX @ Node 2 - Phase

Load Step 2

f = 100 f _n	Manual	Pentium 90	Ratio	Notes
Amp, in	0.080008	0.080008	1.000	UX @ Node 2 - Amplitude
φ, deg	-179.920	-179.9236	1.000	UX @ Node 2 - Phase

VM89: Natural Frequencies of a Two-Mass-Spring System

	Manual	Pentium 90	Ratio	Notes
f ₁ , Hz	2.5814	2.581395	1.000	Mode 1
f ₂ , Hz	8.3263	8.32630	1.000	Mode 2
Mode 1: UX ₂	--	0.771864	--	UX @ 2
UX ₃	--	0.837922	--	UX @ 3
(A1/A2) ₁ **	0.92116	0.92116	1.000	UX ₂ /UX ₃
Mode 2: UX ₂	--	1.18500	--	UX @ 2
UX ₃	--	-0.545790	--	UX @ 3
(A1/A2) ₂ **	-2.1712	-2.1712	1.000	UX ₂ /UX ₃

Table 3
Comparison of Calculated and Published Results

VM90: Harmonic Response of a Two-Mass Spring System

	Manual	Pentium 90	Ratio	Notes
X_1 , in ($f = 1.5$ Hz)	0.82272	0.8227180	1.000	UX @ Node 2 - Amplitude
ϕ_1 , in ($f = 1.5$ Hz)	0.0000	0	n/a	Phase
X_2 , in ($f = 1.5$ Hz)	0.46274	0.4627382	1.000	UX @ Node 3 - Amplitude
ϕ_2 , in ($f = 1.5$ Hz)	0.0000	0	n/a	Phase
X_1 , in ($f = 4.0$ Hz)	0.51146	0.5114553	1.000	UX @ Node 2 - Amplitude
ϕ_1 , in ($f = 4.0$ Hz)	180.00	-180.0000	-1.000	Phase
X_2 , in ($f = 4.0$ Hz)	1.2153	1.215253	1.000	UX @ Node 3 - Amplitude
ϕ_2 , in ($f = 4.0$ Hz)	180.00	180.0000	1.000	Phase
X_1 , in ($f = 6.5$ Hz)	0.58512	0.5851174	1.000	UX @ Node 2 - Amplitude
ϕ_1 , in ($f = 6.5$ Hz)	180.00	-180.0000	-1.000	Phase
X_2 , in ($f = 6.5$ Hz)	0.26965	0.2696508	1.000	UX @ Node 3 - Amplitude
ϕ_2 , in ($f = 6.5$ Hz)	0.0000	0	n/a	Phase

VM91: Large Rotation of a Swinging Pendulum

	Manual	Pentium 90	Ratio	POST26, UX & UY @ 2
δ_{x_i} , in ($t = \tau/4_i$)	-59.334	-59.3336	1.000	UX @ 2 ($t = .8207$)
δ_{y_i} , in ($t = \tau/4$)	-20.004	-20.0037	1.000	UY @ 2 ($t = .8207$)
δ_{x_i} , in ($t = \tau/2$)	-119.88	-119.878	1.000	UX @ 2 ($t = 1.6414$)
δ_{y_i} , in ($t = \tau/2$)	-0.0907	-0.09067	1.000	UY @ 2 ($t = 1.6414$)
δ_{x_i} , in ($t = 3\tau/4$)	-61.724	-61.7236	1.000	UX @ 2 ($t = 2.4621$)
δ_{y_i} , in ($t = 3\tau/4$)	-19.993	-19.9925	1.000	UY @ 2 ($t = 2.4621$)
δ_{x_i} , in ($t = \tau$)	-0.2432	-0.243156	1.000	UX @ 2 ($t = 3.2828$)
δ_{y_i} , in ($t = \tau$)	-0.1921	-0.192104	1.000	UY @ 2 ($t = 3.2828$)

VM92: Insulated Wall Temperature

	Manual	Pentium 90	Ratio	Notes
q , BTU/hr	513	513.41	0.999	POST1 Heat @ 1 & 5
T_i , °F (node 2)	2957	2957.2	1.000	POST1, Temp @ 2
T_o , °F (node 4)	337	336.7	1.001	POST1, Temp @ 4

VM93: Temperature Dependent Conductivity

	Manual	Pentium 90	Ratio	Notes
q , BTU/hr	29.76	29.76	1.000	Reaction Sol./El. Solution

Table 3
Comparison of Calculated and Published Results

VM94: Heat Generating Plate

	Manual	Pentium 90	Ratio	Notes
q , BTU/hr	2083.3	2083.3	1.000	POST1, Node 6
T_c , °F (node 1)	300.0	300	1.000	POST1, Node 3

VM95: Heat Transfer from a Cooling Spine

LINK33 & LINK34	Manual	Pentium 90	Ratio	Notes
T_i , °F (node 9)	68.618	68.618	1.000	POST1, Node 9
q , BTU/hr	17.528	-17.528	-1.000	POST1, Node 1

SOLID70	Manual	Pentium 90	Ratio	Notes
T_i , °F (el. 8)	68.618	68.618	1.000	POST1, Nodes 9,19,29,39
q , BTU/hr	--	-4.3821	--	POST1, Nodes 1,11,21,31
	17.528	-17.5284	-1.000	SUM Nodes 1,11,21,31

VM96: Temperature Distribution in a Short Solid Cylinder

At Centerline	Manual	Pentium 90	Ratio	Notes
$z = 0.0$, T (°F)	0.0	0.000	n/a	Node 1
$z = 1.5$, T (°F)	6.9	6.8943	1.001	Node 39
$z = 3.0$, T (°F)	15.4	15.391	1.001	Node 37
$z = 4.5$, T (°F)	26.7	26.740	0.999	Node 35
$z = 6.0$, T (°F)	40.0	40.000	1.000	Node 30

VM97: Temperature Distribution Along a Straight Fin

	Manual	Pentium 90	Ratio	Notes
T , °F (at $x/L = 0.0$)	1100.0	1100.000	1.000	POST1, Nodes 1 & 21
T , °F (at $x/L = 0.1$)	958.0	957.5900	1.000	POST1, Nodes 2 & 22
T , °F (at $x/L = 0.2$)	838.0	838.050	1.000	POST1, Nodes 3 & 23
T , °F (at $x/L = 0.3$)	738.0	738.190	1.000	POST1, Nodes 4 & 24
T , °F (at $x/L = 0.4$)	655.0	655.360	0.999	POST1, Nodes 5 & 25
T , °F (at $x/L = 0.5$)	587.0	587.330	0.999	POST1, Nodes 6 & 26
T , °F (at $x/L = 0.6$)	532.0	532.290	0.999	POST1, Nodes 7 & 27
T , °F (at $x/L = 0.7$)	489.0	488.780	1.000	POST1, Nodes 8 & 28
T , °F (at $x/L = 0.8$)	456.0	455.650	1.001	POST1, Nodes 9 & 29
T , °F (at $x/L = 0.9$)	432.0	431.990	1.000	POST1, Nodes 10 & 30
T , °F (at $x/L = 1.0$)	417	417.19	1.000	POST1, Nodes 11 & 31
q , BTU/hr	--	2920.2	--	POST1, Nodes 1 & 21
	5840	5840.4	1.000	SUM, Nodes 1 & 21

Table 3
Comparison of Calculated and Published Results**VM98: Temperature Distribution Along a Tapered Fin**

	Manual	Pentium 90	Ratio	Notes
T, °F (at x/L = 0.0)	1100.0	1100.000	1.000	POST1, Nodes 1 & 21
T, °F (at x/L = 0.1)	971.0	970.7400	1.000	POST1, Nodes 2 & 22
T, °F (at x/L = 0.2)	854.0	853.800	1.000	POST1, Nodes 3 & 23
T, °F (at x/L = 0.3)	748.0	748.280	1.000	POST1, Nodes 4 & 24
T, °F (at x/L = 0.4)	653.0	653.330	0.999	POST1, Nodes 5 & 25
T, °F (at x/L = 0.5)	568.0	568.160	1.000	POST1, Nodes 6 & 26
T, °F (at x/L = 0.6)	492.0	492.010	1.000	POST1, Nodes 7 & 27
T, °F (at x/L = 0.7)	424.0	424.210	1.000	POST1, Nodes 8 & 28
T, °F (at x/L = 0.8)	364.0	364.150	1.000	POST1, Nodes 9 & 29
T, °F (at x/L = 0.9)	311.0	311.360	0.999	POST1, Nodes 10 & 30
T, °F (at x/L = 1.0)	267.0	266.590	1.002	POST1, Node 11
q, BTU/hr	--	-2554.4	--	POST1, Nodes, 1 & 21
	5109	-5108.8	-1.000	SUM, Nodes 1 & 21

VM99: Temperature Distribution in a Trapezoidal Fin

	Manual	Pentium 90	Ratio	Notes
T, °F (at node 4)	27.8	27.764	1.001	POST 1 Temp. @ Node 4
T, °F (at node 5)	32.8	32.8160	1.000	POST 1 Temp. @ Node 5
T, °F (at node 6)	9.5	9.541	0.996	POST 1 Temp. @ Node 6
T, °F (at node 7)	10.7	10.736	0.997	POST 1 Temp. @ Node 7
q, BTU/hr	--	1122.100	--	POST 1 Heat @ Node 1
q, BTU/hr	--	418.260	--	POST 1 Heat @ Node 2
q, BTU/hr	--	200.640	--	POST 1 Heat @ Node 3
SUM q, BTU/hr	3482.0	3482.00	1.000	2(SUM q) (See Note)

Note: Since symmetry is used to model only half of the fin, the sum of heat transferred is factored by two.

Table 3
Comparison of Calculated and Published Results

VM100: Heat Conduction Across a Chimney Section

	Manual	Pentium 90	Ratio	Notes
T, °F (at node 1)	93.6	93.629	1.000	POST1
T, °F (at node 2)	56.8	56.7670	1.001	"
T, °F (at node 3)	22.1	22.086	1.001	"
T, °F (at node 4)	93.2	93.189	1.000	"
T, °F (at node 5)	54.9	54.945	0.999	"
T, °F (at node 6)	21.1	21.077	1.001	"
T, °F (at node 7)	87.8	87.762	1.000	"
T, °F (at node 8)	47.7	47.746	0.999	"
T, °F (at node 9)	17.3	17.302	1.000	"
T, °F (at node 11)	27.6	27.572	1.001	"
T, °F (at node 12)	12.5	12.533	0.997	"
T, °F (at node 15)	5	5.0131	0.997	"
q, BTU/hr	773.5	773.533	1.000	POST1 Parameter HEAT (HT13)

VM101: Temperature Distribution in a Short Solid Cylinder

	Manual	Pentium 90	Ratio	Notes
T, °F (at node 11)	7.4	7.4427	0.994	POST1
T, °F (at node 21)	16.4	16.361	1.002	"
T, °F (at node 31)	27.4	27.411	1.000	"
T, °F (at node 13)	5.3	5.2996	1.000	"
T, °F (at node 23)	13.0	13.033	0.997	"
T, °F (at node 33)	24.8	24.816	0.999	"

VM102: Cylinder w/Temperature Dependent Conductivity

k = constant , L.S. 1	Manual	Pentium 90	Ratio	Notes
T, °F (at node 2)	73.7	73.722	1.000	POST1 Results (L.S. 1)
T, °F (at node 3)	51.5	51.487	1.000	"
T, °F (at node 4)	32.2	32.217	0.999	"
T, °F (at node 5)	15.2	15.213	0.999	"
k = k(T) , L.S. 2				
T, °F (at node 2)	79.2	79.207	1.000	POST1 Results (L.S. 2)
T, °F (at node 3)	59.5	59.513	1.000	"
T, °F (at node 4)	40.2	40.230	0.999	"
T, °F (at node 5)	20.7	20.683	1.001	"

Table 3
Comparison of Calculated and Published Results**VM103 - Thin Plate with Central Heat Source**

	Manual	Pentium 90	Ratio	Notes
T, °F (at node 1)	227.0	226.97	1.000	Nodal Solution
T, °F (at node 2)	102.4	102.39	1.000	"
T, °F (at node 3)	73.6	73.586	1.000	"
T, °F (at node 4)	64.6	64.568	1.000	"
T, °F (at node 5)	61.6	61.583	1.000	"
T, °F (at node 6)	60.6	60.569	1.001	"
T, °F (at node 7)	60.2	60.231	0.999	"
T, °F (at node 8)	60.2	60.154	1.001	"
T, °F (at node 9)	164.9	164.85	1.000	"
T, °F (at node 10)	126.8	126.81	1.000	"

VM104 - Liquid-Solid Phase Change

	Manual	Pentium 90	Ratio	Notes
t _f , seconds	798.0 → 801.0	See Note	N.A.	Node 2, -1°C → 0°C

Note: As executed by the P90 (using auto time stepping and the input stream provided by ANSYS), the time step for problem VM104 is 10 seconds. Using the 10 second time step, the temperature at Node 2 passes -1°F between 814.92 seconds (-.969°F) and 824.9 seconds (-1.18°F). If the maximum time step is set to 3 seconds (corresponding to the step reported in the Verification Manual), -1°F is reached between 801 and 804 seconds (-.95°F and -1.03°F, respectively).

At t = 500 seconds	Manual	Pentium 90	Ratio	Notes
T, °C (x = .002 m)	-3.7	-3.696	1.001	POST1, Node 5
T, °C (x = .004 m)	-2.43	-2.4256	1.002	POST1, Node 8

VM105 - Heat Generating Coil w/Variable Conductivity

Temp, °F	Manual	Pentium 90	Ratio
Node 2	23.0	23.039	0.998
Node 3	35.5	35.526	0.999
Node 4	41.8	41.815	1.000
Node 5	43.7	43.659	1.001
Node 6	41.9	41.862	1.001
Node 7	36.8	36.756	1.001
Node 8	28.4	28.354	1.002
Node 9	16.4	16.357	1.003

VM106 - Radiant Energy Emission

Node 2	Manual	Pentium 90	Ratio	Notes
q BTU/hr	245,520	245,515	1.000	Reaction Solution, Nodes 1 & 2

Table 3
Comparison of Calculated and Published Results

VM107 - Thermocouple Radiation

Node 2	Manual	Pentium 90	Ratio	Notes
T_i , °F	999.95	999.95	1.000	Node 2, DOF Solution
q, BTU/hr	3662.24	3662.24	1.000	Element Solution/Reaction Solution

VM108 - Temperature Gradient Across Solid Cylinder

Mode = 1 ($\Theta = 0^\circ$)	Manual	Pentium 90	Ratio	Notes
T_i , °F (Node 1)	0.0	0	n/a	DOF Solution
T_i , °F (Node 2)	20.0	20.000	1.000	"
T_i , °F (Node 3)	40.0	40.000	1.000	"
T_i , °F (Node 4)	60.0	60.000	1.000	"

VM109 - Temperature Response of Cooled Wire

Node 1	Manual	Pentium 90	Ratio	Notes
T_i , °F @ .0125 hr	197.03	197.026	1.000	POST26, Node 1
T_i , °F @ .0325 hr	128.50	128.504	1.000	"
T_i , °F @ .0500 hr	109.77	109.766	1.000	"

VM110 - Transient Temperature Distribution in a Slab

Time = 14.5 hr	Manual	Pentium 90	Ratio	Notes
T_i , °F (at node 1)	503	503.01	1.000	DOF Solution
T_i , °F (at node 3)	547	547.29	0.999	"
T_i , °F (at node 5)	676	676.33	1.000	"
T_i , °F (at node 7)	879	879.17	1.000	"
T_i , °F (at node 9)	1139	1139.0	1.000	"
T_i , °F (at node 11)	1435	1435.10	1.000	"
Q, BTU/ft ²	-20,717	-20,717	1.000	POST26, TOTAL_HT @ T=14.50

VM111 - Cooling of a Spherical Body

Time = 6 hr	Manual	Pentium 90	Ratio	Notes
T_i , °F	28.3	28.349	0.998	Node 1, DOF Solution

VM112 - Cooling of a Spherical Body

Time = 6 hr	Manual	Pentium 90	Ratio	Notes
T_i , °F	28.7	28.748	0.998	Node 1, DOF Solution

Table 3
Comparison of Calculated and Published Results

VM113 - Transient Temperature Distribution in an Orthotropic Metal Bar

Time = .000833 hr	Manual	Pentium 90	Ratio	Notes
T, °F (node 1)	463	463.26	0.999	POST1
T, °F (node 7)	154	153.63	1.002	"
T, °F (node 13)	285	284.97	1.000	"
T, °F (node 2)	200	199.98	1.000	"

VM114 - Temp. Response to a Rising Surface Temperature

Time = .03333 hr	Manual	Pentium 90	Ratio	Notes
T, °F (node 1)	120.00	120.0000	1.000	POST 1 & POST26
T, °F (node 2)	0.03	0.0336	0.893	POST1
T, °F (node 3)	79.08	79.0748	1.000	POST 1 & POST26
T, °F (node 4)	46.35	46.3470	1.000	"
T, °F (node 5)	23.25	23.2486	1.000	"
T, °F (node 6)	9.52	9.5217	1.000	"

VM115 - Thermal Response of a Heat Generating Slab

Time = .2 hr	Manual	Pentium 90	Ratio	Notes
T, °F (node 1)	32.00	32.0000	1.000	DOF Solution
T, °F (node 3)	75.10	75.101	1.000	"
T, °F (node 4)	102.74	102.74	1.000	"
T, °F (node 5)	119.10	119.10	1.000	"
T, °F (node 6)	127.52	127.52	1.000	"
T, °F (node 2)	130.07	130.07	1.000	"

VM116 - Heat Conducting Plate w/Sudden Cooling

Time = 7 hr	Manual	Pentium 90	Ratio	Notes
T, °F (node 2)	287.0	287.1	1.000	POST1, POST26

VM117 - Electric Current Flowing in a Network

	Manual	Pentium 90	Ratio	Notes
V ₁ , volts	0.0	0.0000	n/a	DOF Solution, Node 1
V ₂ , volts	28.0	28.0000	1.000	DOF Solution, Node 2
V ₃ , volts	19.0	19.0000	1.000	DOF Solution, Node 3
V ₄ , volts	100.0	100.0000	1.000	DOF Solution, Node 4
I ₂₋₁ , amps	1.4	1.4000	1.000	POST1, EL = 1
I ₃₋₁ , amps	1.9	1.9000	1.000	POST1, EL = 2
I ₂₋₃ , amps	1.0	1.0000	1.000	POST1, EL = 3
I ₄₋₂ , amps	2.4	2.4000	1.000	POST1, EL = 4
I ₄₋₃ , amps	0.9	0.9000	1.000	POST1, EL = 5

Table 3
Comparison of Calculated and Published Results

I ₁₋₄ , amps	3.3	3.3000	1.000	Reaction Solution, POST1, I14
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VM118 - Centerline Temp. of Heat Generating Wire

PLANE55	Manual	Pentium 90	Ratio	Notes
T, °F (node 1)	418.7	418.65	1.000	POST1
T _s , °F (node 6, 16)	416.5	416.53	1.000	POST1
q, BTU/hr	339.8	339.77	1.000	POST1 Parameter HRATE

SOLID70	Manual	Pentium 90	Ratio	Notes
T, °F	418.7	418.65	1.000	POST1, Nodes 1 & 21
T _s , °F	416.5	416.53	1.000	POST1, Nodes 6,16,26, & 36
q, BTU/hr	339.8	339.7689	1.000	POST1 Parameter HRATE

VM119 - Centerline Temp. of an Electrical Wire

PLANE67	Manual	Pentium 90	Ratio	Notes
T, °F	420.0	419.990	1.000	POST1, Nodes 1 & 11
T _s , °F	417.9	417.850	1.000	POST1, Nodes 6 & 16
q, BTU/hr	341.5	341.500	1.000	POST1 Parameter HRATE

SOLID69	Manual	Pentium 90	Ratio	Notes
T _{CL} , °F	418.7	418.649	1.000	DOF Solution, Nodes 1 & 21
T _s , °F	416.5	416.525	1.000	DOF Solution, Nodes 6,16,26,36
q, BTU/hr	339.8	339.769	1.000	POST1 Parameter HRATE

VM120 - Microstrip Transmission Line Capacitance

	Manual	Pentium 90	Ratio	Notes
Capacitance, pF/m	179.7	179.241	1.003	POST1 Parameter C

VM121 - Flow Through a Pipe w/Uniform Heat Flux

at Y = 6 cm	Manual	Pentium 90	Ratio	Notes
V _{co} , cm/s _{sec}	6.657E-03	6.657E-03	1.000	POST1, VY @ 61
T _{co} , °C	48.32	48.319	1.000	POST1, T @ 61
T _w , °C	49.53	49.533	1.000	POST1, T @ 34

VM122 - Pressure Drop in a Turbulent Flowing Fluid

	Manual	Pentium 90	Ratio	Notes
Δp, psi (node 1)	4.69	4.69003	1.000	PRES @ Node 1

Table 3
Comparison of Calculated and Published Results

VM123: Laminar Flow in a Piping System

	Manual	Pentium 90	Ratio	Notes
Δp , lb/ft ² (node 1)	6165	6165.34	1.000	PRES @ Node 1
Re	708	708.02	1.000	Element Solution, EL=1

VM124: Discharge of Water from a Reservoir

	Manual	Pentium 90	Ratio	Notes
w, lb/sec (node 1)	29.9	29.90	1.000	Nodal Flow @ 1, (Reaction Sol.)
Re	201000	200730.00	1.001	Element Solution, EL=all

VM125: Radiation Heat Transfer between Concentric Cylinders

	Manual	Pentium 90	Ratio	Notes
Q, Btu/hr-in	36.4	-36.397	-1.000	POST 1 Total

VM126: Heat Transferred to a Flowing Fluid

	Manual	Pentium 90	Ratio	Notes
T_o , °F	121.3	121.33	1.000	POST1, Temp. @ 19
q_{in} , BTU/hr	113.28	113.28	1.000	POST1, Heat @ EL = 1
q_{out} , BTU/hr	137.44	137.44	1.000	POST1, Heat @ EL = 9

VM127: Buckling of a Bar w/Hinged Ends (Line Elements)

	Manual	Pentium 90	Ratio	Notes
F_{cr} , lb (1st mode)	38.553	38.5529	1.000	Eigenvalue Buckling Sol.

VM128: Buckling of a Bar w/Hinged Ends (Area Elements)

	Manual	Pentium 90	Ratio	Notes
F_{cr} , lb (1st mode)	38.714	38.7143	1.000	Static Load Mult. for Buckling

VM129: Numerical Differentiation & Integration

	Manual	Pentium 90	Ratio	Notes
df/dt (max)	5.554E-02	5.554E-02	1.000	Parameter DERIV1
d ² f/dt ² (max)	2.422E-03	2.422E-03	1.000	Parameter DERIV2
I_1	29.18	29.1749	1.000	Parameter Status F
I_2	381.7	381.656	1.000	Parameter Status H

Table 3
Comparison of Calculated and Published Results

VM130: Fourier Series Generation for a Saw Tooth Wave

	Manual	Pentium 90	Ratio
Mode 1 Coefficient	0.811	0.8108	1.000
Mode 3 Coefficient	-9.020E-02	-0.0902	1.000
Mode 5 Coefficient	3.260E-02	0.0326	1.000
Mode 7 Coefficient	-1.670E-02	-0.0167	1.000

VM131: Acceleration of Rotating Crane Boom

	Manual	Pentium 90	Ratio	Notes
a_x , ft/sec ²	-11.78	-11.778	1.000	Reaction Forces, FX @ 1
a_y , ft/sec ²	-5.00	-5.000	1.000	" , FY @ 1
a_z , ft/sec ²	6.00	6.000	1.000	" , FZ @ 1

VM132: Stress Relaxation of Tightened Bolt due to Creep

σ , psi	Manual	Pentium 90	Ratio	Notes
@t = 190 hour	976.	976.093	1.000	POST26, SIG
@t = 420 hour	951.	950.536	1.000	"
@t = 690 hour	926.	925.636	1.000	"
@t = 880 hour	911.	910.557	1.000	"
@t = 950 hour	905.	905.414	1.000	"

VM133: Motion of Rod due to Irradiation Induced Creep

ϵ_{CR}	Manual	Pentium 90	Ratio	Notes
t = 0.0 hr	0.00000	0.00000	n/a	POST26, EPCR
t = 0.5 hr	0.00197	0.00197	1.002	"
t = 1.0 hr	0.00316	0.00316	1.000	"
t = 5.0 hr	0.00496	0.00496	0.999	"

VM134: Plastic Bending of a Clamped I-Beam

Load Step 1

$w_1 = 2190$ lb/in	Manual	Pentium 90	Ratio	Notes
δ_{mid} , in (node 10)	-0.160	-0.160	1.001	UZ, Node 10
End Moment, in-lb	-3,784,000	-3,784,320	1.000	Reaction, MY @ 1
Mid-Moment, in-lb	-1,894,000	-1,892,160	1.001	Reaction, MY @ 10
End Status	At Yield	37,919	At Yield	SAXL v. σ_y (38 ksi) EL=1(I)
Mid Status	Elastic	18,959	Elastic	SAXL v. σ_y (38 ksi) EL=9(J)

Table 3
Comparison of Calculated and Published Results

VM134: Plastic Bending of a Clamped I-Beam (continued)
Load Step 2

$w_2 = 3771$ lb/in	Manual	Pentium 90	Ratio	
δ_{mid} , in (node 10)	-0.360	-0.35911	1.002	UZ, Node 10
End Moment, in-lb	-5,970,000	-5,974,250	0.999	Reaction, MY @ 1
Mid-Moment, in-lb	-3,800,000	-3,799,970	1.000	Reaction, MY @ 10
End Status	Plastic	59,862	Plastic	SAXL v. σ_y (38 ksi) EL=1(I)
Mid Status	At Yield	38,075	At Yield	SAXL v. σ_y (38 ksi) EL=9(J)

Load Step 3

$w_3 = 9039$ lb/in	Manual	Pentium 90	Ratio	Notes
δ_{mid} , in (node 10)	-2.110	-2.110	1.000	UZ, Node 10
End Moment, in-lb (node 1)	-15,000,000	-14,972,300	1.002	Reaction, MY @ 1
Mid-Moment, in-lb (node 10)	-8,450,000	-8,456,810	0.999	Reaction, MY @ 10
EPELAXL	--	0.005173	--	EL = 1 (Elastic Strain)
EPPLAXL	--	0.015451	--	EL = 1 (Plastic Strain)
Total End Strain	0.0206	0.020624	0.999	EL = 1, Total Strain
EPELAXL	--	0.002922	--	EL = 9 (Elastic Strain)
EPPLAXL	--	0.006446	--	EL = 9 (Plastic Strain)
Total Mid Strain	0.0094	0.009368	1.003	EL = 9, Total Strain

VM135: Bending of Beam on Elastic Foundation

	Manual	Pentium 90	Ratio
δ_{end} , in (UY node 1)	-0.03761	-0.03761	1.000

VM136: Large Deflection of a Buckled Bar

	Manual	Pentium 90	Ratio	
F = 44.413, L.S. 3				
θ , deg	--	-1.0363	--	ROTZ @ Node 11
	-59.4	-59.38	1.000	ROTZ*180/ π , Node 11
Δx , in	58.9	58.8651	1.001	UX @ Node 11
Δy , in	-25.3	-25.3393	0.998	UY @ Node 11
F = 49.849, L.S. 4				
θ , deg	--	-1.3881	--	ROTZ @ Node 11
	-79.5	-79.53	1.000	ROTZ*180/ π , Node 11
Δx , in	71.8	71.7503	1.001	UX @ Node 11
Δy , in	-43.5	-43.5032	1.000	UY @ Node 11

Table 3
Comparison of Calculated and Published Results**VM136: Large Deflection of a Buckled Bar (continued)**

F = 58.523, L.S. 5				
θ , deg	--	-1.7422	--	ROTZ @ Node 11
	-99.8	-99.82	1.000	ROTZ*180/ π , Node 11
Δx , in	79.2	79.1886	1.000	UX @ Node 11
Δy , in	-64.8	-64.7569	1.001	UY @ Node 11
F = 72.634, L.S. 6				
θ , deg	--	-2.0941	--	ROTZ @ Node 11
	-120.0	-119.99	1.000	ROTZ*180/ π , Node 11
Δx , in	80.4	80.4466	0.999	UX @ Node 11
Δy , in	-87.5	-87.4509	1.001	UY @ Node 11

VM137: Large Deflection of a Circular Membrane

Load Step 3	Manual	Pentium 90	Ratio	Notes
δ , in	-0.463	-0.4629	1.000	UY @ Node 1
σ_o , psi	61,158	61,158	1.000	SM @ Mid El 1
σ_a , psi	48,257	48,257	1.000	SM @ Mid El 10

VM138: Large Deflection Bending of Circular Plate

	Manual	Pentium 90	Ratio
δ , m (UY node 1)	-0.00124	-0.00124	1.000

VM139: Bending of a Long Uniformly Loaded Rectangular Plate

Small δ Solution	Manual	Pentium 90	Ratio	Notes
σ_x , psi (MID)	0.0	0.0	n/a	El. Sol., EL= 1 to 4, S(X) Mid.
σ_x , psi (BOT)	107,490	107,490	1.000	POST1 Max. nodal stress S(X) Bot
Large δ Solution				
σ_x , psi (MID)	10,962	10,962	1.000	POST1 Max. nodal stress, SX
σ_x , psi (BOT)	25,000	25,000	1.000	POST1 Max. nodal stress, SX

Note: Stresses are POST1 maximum nodal stresses

VM140: Stretching, Twisting, Bending of Long Shaft

Max. Stresses (node 51)	Manual	Pentium 90	Ratio	Notes
Torsion, τ , psi	1018.6	1018.6	1.000	POST1 Stress, Node 51, SYZ
Axial + Bending, σ_y	6239.9	6239.9	1.000	" , SY
Combined, σ_1 , psi	6402.1	6402.1	1.000	" , S1

Table 3
Comparison of Calculated and Published Results**VM141: Diametral Compression of a Disk**

PLANE82 & PLANE2	Manual	Pentium 90	Ratio	Notes
σ_y , psi ($x=0$, $y=0$)	-9,649	-9649.2	1.000	POST1 Path Variable, SY
σ_y , psi ($x=.1$, $y=0$)	-9,140	-9139.5	1.000	"

SHELL93	Manual	Pentium 90	Ratio	Notes
σ_y , psi ($x=0$, $y=0$)	-9,649	-9649.2	1.000	POST1 Path Variable, SY
σ_y , psi ($x=.1$, $y=0$)	-9,140	-9139.5	1.000	"

VM142: Stress Concentration at a Hole in a Plate

	Manual	Pentium 90	Ratio	Notes
Coarse Model, σ_x max	2417.	2581.2	0.936	POST1, SX Max.
Submodel, σ_x max	3004.	3004.4	1.000	"

VM143: Fracture Mechanics Stress Intensity for Crack in Finite Width Plate

SOLID95 & SOLID45	Manual	Pentium 90	Ratio	Notes
KI1	1.0620	1.0620	1.000	POST1 Parameter Status
KI2	1.0458	1.0458	1.000	"

PLANE82	Manual	Pentium 90	Ratio	Notes
KI1 (KCALC)	1.0581	1.0548	1.003	POST1 Parameter Status
KI2	1.0552	1.0596	0.996	"

VM144: Bending of a Composite Beam

SHELL99	Manual	Pentium 90	Ratio	Notes
δ , in (nodes 9,19,29)	0.832	0.83181	1.000	POST1, UZ @ 9,19,29
σ_x^{TOP} , psi	2258	2257.6	1.000	POST1, SX @ Top
σ_x^{BOT} , psi	1731	1730.6	1.000	POST1, SX @ Bottom

SOLID46	Manual	Pentium 90	Ratio	Notes
δ , in (nodes 9,19,29,39)	0.832	0.83181	1.000	POST1, UZ @ 9,19,29,39
σ_x^{TOP} , psi	2258	2257.6	1.000	POST1, SX @ Top (21-39)
σ_x^{BOT} , psi	1731	1730.6	1.000	POST1, SX @ Bottom (1-19)

Table 3
Comparison of Calculated and Published Results

VM145: Stretching of an Orthotropic Solid

Nodes 8 & 16	Manual	Pentium 90	Ratio	Notes
Δx , in	9.00E-06	9.00E-06	1.000	UX @ Nodes 8 & 16
Δy , in	9.50E-06	9.50E-06	1.000	UY @ Nodes 8 & 16
Δz , in	-1.75E-06	-1.75E-06	1.000	UZ @ Nodes 8 & 16

VM146: Bending of Reinforced Concrete Beam

	Manual	Pentium 90	Ratio	Notes
δ_{ck} , in	3.32 - 4.18	3.32-4.18	n/a	See Following Note
σ_t , psi (SAXL, el 13,14)	387.25	387.25	1.000	EL=13,14, SAXL
σ_c , psi (SX, el 1)	-18.5	-18.492	1.000	EL=1, Nodes 9,10,19,20

NOTE: The range of crack depth provided in the Verification Manual corresponds to the area between the integration points of element 4 of the analysis model. (See Chapter 13 of the ANSYS Theory Manual for 8 node brick elements). In terms of the element output, there is cracking at all points of elements 7 and 10, and at integration points 1,2,5 and 6 of element 4. All other points have no cracking.

VM147: Bending of a Curved Thick Beam

	Manual	Pentium 90	Ratio	Notes
σ_t , psi (S1 at TOP)	656.2	656.16	1.000	POST1, Nodes 1 - 21
σ_c , psi (S3 at BOT)	-556.4	-556.38	1.000	"

VM148: Bending of Parabolic Beam

	Manual	Pentium 90	Ratio	Notes
δ , in	-0.01062	-0.010619	1.000	UY @ Node 11 or 71

VM149: Rotation of a Tank of Fluid

POST1 Values	Manual	Pentium 90	Ratio	Notes
δ , in (@ X=12)	0.197	0.197	1.002	POST1 Parameter UY26
δ , in (@ X=24)	0.756	0.756	1.000	POST1 Parameter UY29
δ , in (@ X=40)	2.081	2.081	1.000	POST1 Parameter UY33
p, psi (PR60)	0.695	0.695	1.000	POST1 Parameter PR60

VM150: Acceleration of a Tank of Fluid

POST1 Values	Manual	Pentium 90	Ratio	Notes
δ , in (@ X=8)	1.863	1.8627	1.000	POST1 UZ @ 4
δ , in (@ X=24)	0.000	0.0000	0.000	POST1 UZ @ 8
δ , in (@ X=40)	-1.863	-1.8627	1.000	POST1 UZ @ 12
Θ ($\Delta Z/\Delta Y$ at y = 8 & 40)	-0.1164	-0.1164	1.000	SLOPE in POST1

Table 3
Comparison of Calculated and Published Results

p, psi (PREL)	0.7425	0.7425	1.000	POST1, EL=5, PREL
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VM151: Nonaxisymmetric Vibration of a Circular Plate

	Manual	Pentium 90	Ratio	Notes
$f_{0,1}$, Hz	267.67	267.6740	1.000	Mode 1, Analysis 1
$f_{1,1}$, Hz	753.74	753.7410	1.000	Mode 1, Analysis 2
$f_{2,1}$, Hz	1388.9	1388.8900	1.000	Mode 1, Analysis 3

VM152: Nonaxisymmetric Vibration of a Circular Membrane

	Manual	Pentium 90	Ratio	Notes
$f_{0,1}$, Hz	211.2	211.225	1.000	Analysis 1, Iteration 1
$f_{1,1}$, Hz	336.6	336.585	1.000	Analysis 2
$f_{2,1}$, Hz	451.3	451.278	1.000	Analysis 3
$f_{0,2}$, Hz	486.2	486.176	1.000	Analysis 1, Iteration 2

VM153: Nonaxisymmetric Vibration of a Stretched Membrane

	Manual	Pentium 90	Ratio	Notes
$f_{0,1}$, Hz	212.1	212.09	1.000	POST1, F01_1
$f_{0,2}$, Hz	491.7	491.69	1.000	POST1, F02_1
$f_{1,1}$, Hz	338.9	338.86	1.000	POST1, F11_1
$f_{1,2}$, Hz	629.0	629.00	1.000	POST1, F12_1

VM154: Vibration of a Fluid Coupling

	Manual	Pentium 90	Ratio
f, Hz (FLUID38)	1.5293	1.529256	1.000
f, Hz (FLUID81)	1.5228	1.522833	1.000

VM155: Shape Optimization of a Cantilever Beam

	Manual	Pentium 90	Ratio	Notes
TVOL (in ³)	3.64	3.6383	1.000	POST1 Design Sensitivity
DEFL, (δ_y) _{max}	0.498	0.498	1.000	Summary Table, Set 14
STRS, σ_{max} , psi	29,539.	29,539.	1.000	

VM156: Natural Frequency of a Nonlinear Spring-Mass System

	Manual	Pentium 90	Ratio	Notes
COMBIN39, τ , sec	0.1440	0.1440	1.000	POST26, Time @ UY2 $\approx$ -1.0
LINK1, τ , sec	0.1440	0.1440	1.000	"

Table 3
Comparison of Calculated and Published Results

VM157: Optimization of a Frame Structure

	Manual	Pentium 90	Ratio	Notes
Volume, m ³ (TVOL)	0.0775	0.07750	1.000	POST1 Design Sensitivity Summary Table, Set 9: TVOL, D1, D2
d ₁ , m	0.120	0.11996	1.000	
d ₂ , m	0.129	0.12888	1.001	

VM158: Motion of a Bobbing Bouy

	Manual	Pentium 90	Ratio	Notes
δ , m	-0.312	-0.31202	1.000	POST26, UZ @ 25.5

VM159: Temperature Controlled Heater

	Manual	Pentium 90	Ratio	Notes
First "off" Temp, °F	124.842-125.003	125.003	n/a	POST26, 2TEMP @ Stat 1→0
First "on" Temp, °F	100.854-99.564	99.564	n/a	POST26, 2TEMP @ Stat 0→1

VM160: Solid Cylinder w/Harmonic Temperature Load

Mode 2, $\Theta = 0^\circ$	Manual	Pentium 90	Ratio	Notes
T, °F (node 1)	0.0	0.0000	n/a	POST1 Temperatures
T, °F (node 3)	5.0	5.0000	1.000	"
T, °F (node 5)	20.0	20.000	1.000	"
T, °F (node 7)	45.0	45.000	1.000	"
Mode 2, $\Theta = 90^\circ$				
T, °F (node 1)	0.0	0.0000	n/a	POST1 Temperatures
T, °F (node 3)	-5.0	-5.0000	1.000	"
T, °F (node 5)	-20.0	-20.000	1.000	"
T, °F (node 7)	-45.0	-45.000	1.000	"

VM161: Heat Flow From an Insulated Pipe

	Manual	Pentium 90	Ratio	Notes
q, BTU/hr	—	30.165	—	EL. Sol., Convection Heat Rate
	362.0	362.0	1.000	Convection Heat Rate*360°/30°

VM162: Cooling of a Circular Fin of Rectangular Profile

	Manual	Pentium 90	Ratio	Notes
T ₂ , °F	52.37	52.37	1.000	Nodes 9,19,29
	52.37	52.82	0.991	Node 39,59
	52.37	52.37	1.000	Node 69, 79, 89
q, BTU/hr (Reaction Heat Flows)	—	1.41246	—	Total Reaction Heat Flow
	101.70	101.70	1.000	Total*360°/5°

Table 3
Comparison of Calculated and Published Results

VM163: Groundwater Seepage

	Manual	Pentium 90	Ratio	Notes
q, m ³ /day/radian	--	54.085	--	POST1 - TOTAL HEAT
	8.6	8.61	0.999	POST1/2 π

VM164: Drying of a Thick Wooden Slab

	Manual	Pentium 90	Ratio	Notes
c, %	10.2	10.18	1.002	EL=1, TEMP(I)

VM165: Current-Carrying Ferromagnetic Conductor

	Manual	Pentium 90	Ratio	POST1
B ₀ , T @ r = .325 in	0.45	0.4516	0.996	BY @ Nodes 15 & 21
B ₀ , T @ r = .375 in	1.02	1.017	1.003	BY @ Nodes 17 & 23
B ₀ , T @ r = .425 in	1.21	1.2139	0.997	BY @ Nodes 19 & 25

VM166: Long Cylinder in a Sinusoidal Magnetic Field

	Manual	Pentium 90	Ratio	Notes
Node 1-B _x (0,0),T (Real)	0	-2.24E-23	n/a	POST1 Mag. Flux Density Listing
(Imaginary)	0j	-2.09E-22	n/a	Complex Solution Key
B _y (0,0),T (Real)	-0.00192	-0.00192	1.000	POST1 Mag. Flux Density Listing
(Imaginary)	-0.0214j	-0.021395	1.000	Complex Solution Key
Power Loss, W/m	2340	2340.09	1.000	POST1 Label P

VM167: Transient Eddy Currents in Semi-Infinite Solid

Vector Potential (Wb/m)

t = 0.15 sec	Manual	Pentium 90	Ratio	Notes
@ x = .2517	0.840	-0.840492	-0.999	Node 4, AZ (POST26 @ T=.15)
@ x = .4547	0.286	-0.285974	-1.000	Node 6, AZ (POST26 @ T=.15)
@ x = .6914	0.047	-0.047361	-0.992	Node 8, AZ (POST26 @ T=.15)

Flux Density (T)

t = 0.15 sec	Manual	Pentium 90	Ratio	Notes
@ x = .2517	3.673	3.6731	1.000	POST1, BY @ 4
@ x = .4547	1.813	1.8127	1.000	POST1, BY @ 6
@ x = .6914	0.472	0.47199	1.000	POST1, BY @ 8

Table 3
Comparison of Calculated and Published Results

VM167: Transient Eddy Currents in Semi-Infinite Solid (continued)Eddy Current Density ($\times 10^7$ A/m²)

t = 0.15 sec	Manual	Pentium 90	Ratio	Notes
@ x = .2517	-0.762	-0.7615	1.001	POST26, JEDDY @ 4
@ x = .4547	-0.670	-0.6704	0.999	POST26, JEDDY @ 6
@ x = .6914	-0.250	-0.2503	0.999	POST26, JEDDY @ 8

VM168: Magnetic Field in a Nonferrous Solenoid

	Manual	Pentium 90	Ratio	Notes
B_z ($\times 10^5$) T, z = 0	1121.000	1120.70	1.000	POST1 LPATH, S=0
B_z ($\times 10^5$) T, z = 2.5	569.000	568.59	1.001	POST1 LPATH, S=.0635
B_z ($\times 10^5$) T, z = 7.5	2.120	2.1232	0.998	POST1 LPATH, S=.1905

VM169: Permanent Magnet Circuit w/ Air Gap

SOLID98	Manual	Pentium 90	Ratio	Notes
B , G (perm. mag.)	7386	7386	1.000	POST1, Nodes 1-28, BSUM
H , O _e (perm. mag.)	493	493	1.000	POST1, Nodes 1-28, HSUM
B , G (air gap)	7386	7386	1.000	POST1, Nodes 53-107, BSUM
H , O _e (air gap)	7386	7386	1.000	POST1, Nodes 53-107, HSUM

VM170: Magnetic Field from a Square Current Loop

flux density	Manual	Pentium 90	Ratio	Notes
BX ($\times 10^5$ Tesla)	2.010	2.00960	1.000	Parameters
BY ($\times 10^5$ Tesla)	-0.662	-0.66165	1.001	"
BZ ($\times 10^5$ Tesla)	2.010	2.00961	1.000	"

VM171: Permanent Magnet w/Elastic Keeper

	Manual	Pentium 90	Ratio	Notes
δ , cm	0.150	0.14962	1.003	POST1, UY @ 25-30
B, Gauss	2496	2495.2	1.000	POST1, Mag. Flux Density, BSUM

VM172: Stress Analysis of Long, Thick, Isotropic Solenoid

	Manual	Pentium 90	Ratio	Notes
B_0 G @ r = 1.0 cm	122.6	122.57	1.000	POST1, Nodes 2 & 7
B_0 G @ r = 1.3 cm	87.97	87.97	1.000	POST1, Nodes 19 & 39
B_0 G @ r = 1.7 cm	37.69	37.689	1.000	POST1, Nodes 27 & 47
σ_0 , Dyne/cm ² , r = 1.0 cm	1442	1441.5	1.000	POST1, SZ @ Nodes 2 & 7
σ_0 , Dyne/cm ² , r = 1.3 cm	977.0	976.91	1.000	POST1, SZ @ Nodes 19 & 39
σ_0 , Dyne/cm ² , r = 1.7 cm	626.1	626.14	1.000	POST1, SZ @ Nodes 27 & 47

Table 3
Comparison of Calculated and Published Results

VM173: Centerline Temp. of an Electric Wire

	Manual	Pentium 90	Ratio	Notes
T_{CL} , °F	418.7	418.65	1.000	POST1, Nodes 1 & 21
T_s , °F	416.5	416.53	1.000	POST1, Nodes 6,16,26,36
q, BTU/hr/ft	339.8	339.769	1.000	POST1, Parameter HRATE

VM174: Bimetallic Beam Under Thermal Load

	Manual	Pentium 90	Ratio	Notes
y, in	0.886	0.8855	1.001	POST1, UY @ 7
T, °F	400.0	400.000	1.000	POST1, Temp. @ 7

VM175: Natural Frequency of Piezoelectric Transducer

Short Circuit	Manual	Pentium 90	Ratio	Notes
f_1 , kHz	66.38	66.3767	1.000	Mode 3
f_2 , kHz	89.97	89.969	1.000	Mode 6

Open Circuit	Manual	Pentium 90	Ratio	Notes
f_1 , kHz	83.89	83.8917	1.000	Mode 5
f_2 , kHz	96.46	96.458	1.000	Mode 9

VM176: Freq. Response of Electrical Input Admittance for a Piezoelectric Transducer

	Manual	Pentium 90	Ratio	Notes
Y, mmhos @ 20 kHz	0.43	0.429157	1.002	POST26, MMHO @ Time
Y, mmhos @ 35 kHz	0.96	0.956626	1.004	"
Y, mmhos @ 42 kHz	2.80	2.80449	0.998	"
Y, mmhos @ 45 kHz	-1.7	-1.73363	0.981	"
Y, mmhos @ 50 kHz	0.33	0.325265	1.015	"
Y, mmhos @ 54 kHz	0.63	0.625656	1.007	"

VM177: Natural Frequency of a Submerged Ring

	Manual	Pentium 90	Ratio	Notes
f, Hz	10.56->10.57	10.57	—	POST26 Time @ Max. δ @ 1,41,81

VM178 : Plane Poiseuille Flow

	Manual	Pentium 90	Ratio	Notes
VX @ S = 1.0	0.0050	0.005000	1.000	POST1, Path Summary
VX @ S = 1.33	0.0044	0.004444	0.990	"
VX @ S = 1.67	0.0028	0.027778	0.101	"

Table 3
Comparison of Calculated and Published Results

VM179: Dynamic Double Rotation of a Jointed Beam

	Manual	Pentium 90	Ratio	Notes
δ_x , in ($t = 1.0$)	-0.5749	-0.5830	0.986	UX @ Node 4
δ_y , in ($t = 1.0$)	1.4032	1.4115	0.994	UY @ Node 4
Θ_z , rad ($t = 1.0$)	0.7777	0.7835	0.993	ROTZ @ Node 4
δ_x , in ($t = 2.0$)	-2.0000	-2.0000	1.000	UX @ Node 4
δ_y , in ($t = 2.0$)	2.0000	2.0000	1.000	UY @ Node 4
Θ_z , rad ($t = 2.0$)	1.5707	1.5708	1.000	ROTZ @ Node 4
δ_x , in ($t = 3.0$)	-2.0000	-2.0000	1.000	UX @ Node 4
δ_y , in ($t = 3.0$)	1.9962	1.9962	1.000	UY @ Node 4
δ_z , in ($t = 3.0$)	0.08716	0.08717	1.000	UZ @ Node 4
Θ_x , rad ($t = 3.0$)	0.08727	0.08728	1.000	ROTX @ Node 4
Θ_z , rad ($t = 3.0$)	1.5708	1.5708	1.000	ROTZ @ Node 4

VM180: Bending of a Curved Beam

Maximum (+/-)	Manual	Pentium 90	Ratio	Notes
σ_t , psi	657.9	657.93	1.000	POST1, SY Maximum, Nodes 6-54
σ_c , psi	-556.8	-556.79	1.000	POST1, SY Minimum, Nodes 66-104

VM181: Natural Frequency of a Flat Circular Plate w/Clamped Edges

	Manual	Pentium 90	Ratio	Notes
$f_{0,0}$, Hz	172.82	172.817	1.000	Eigenvalue Solution, Mode 1
$f_{0,1}$, Hz	677.86	677.857	1.000	Eigenvalue Solution, Mode 2
$f_{0,2}$, Hz	1537.92	1537.92	1.000	Eigenvalue Solution, Mode 3

VM182: Transient Response of a Spring-Mass System

	Manual	Pentium 90	Ratio	Notes
Y_1 , (@ $t = 1.3s$)	14.40	14.4037	1.000	POST26, UY1
Y_2 , (@ $t = 1.3s$)	3.95	3.95077	1.000	" , UY2
Y_1 , (@ $t = 2.4s$)	18.40	18.3984	1.000	" , UY1
Y_2 , (@ $t = 2.4s$)	6.16	6.16299	1.000	" , UY2

VM183: Harmonic Response of a Spring-Mass System

	Manual	Pentium 90	Ratio	Notes
Y_1 , (@ .226 Hz)	-1371.7000	-1371.73	1.000	POST26, UY1
Y_2 , (@ .226 Hz)	-458.0800	-458.078	1.000	" , UY2
Y_1 , (@ .910 Hz)	-0.8539	-0.853907	1.000	" , UY1
Y_2 , (@ .910 Hz)	0.1181	0.118095	1.000	" , UY2

Table 3
Comparison of Calculated and Published Results

VM184: Straight Cantilever Beam

SOLID5	Manual	Pentium 90	Ratio	Notes
δ_x , in	2.978E-05	2.978E-05	1.000	POST1, Nodes 2,12,23,34-LS1
δ_y , in	0.10683	0.10683	1.000	" (LS2)
δ_z , in	0.42554	0.42554	1.000	" (LS3)

SOLID92	Manual	Pentium 90	Ratio	Notes
δ_x , in	2.990E-05	2.988E-05	1.001	POST1, UX, LS1 (154-170)
δ_y , in	0.10547	0.10546	1.000	POST1, UY, LS2
δ_z , in	0.41988	0.41988	1.000	POST1, UZ, LS3

SOLID98	Manual	Pentium 90	Ratio	Notes
δ_x , in	2.990E-05	2.988E-05	1.001	POST1, UX, LS1 (154-170)
δ_y , in	0.10547	0.10546	1.000	POST1, UY, LS2
δ_z , in	0.41988	0.41988	1.000	POST1, UZ, LS3

VM185: AC Analysis of a Slot Embedded Conductor

	Manual	Pentium 90	Ratio	POST1 Parameters
J_s^{Re}	10135	10135.04	1.000	JSR
J_s^{Im}	27320	27336.82	0.999	JSI
Impedance (Ω/m) $\times 10^6$	--	--	--	
Real	174.7	174.728	1.000	ACRE
Imaginary	j471.4	j471.287	1.000	ACRA
Loss Ratio	2.39	2.38989	1.000	RAT

VM186: Transient Analysis of a Slot Embedded Conductor

Vector Potential	Manual	Pentium 90	Ratio	Notes
Load Step 61				
node 1 ($t = 3\pi/2$)	-15.03	-15.03	1.000	DOF Solution, Node 1, T = 4.71, AZ
node 4 ($t = 3\pi/2$)	-14.66	-14.6556	1.000	DOF Solution, Node 4, T = 4.71, AZ
node 7 ($t = 3\pi/2$)	-4.00	-4.00	1.000	DOF Solution, Node 7, T = 4.71, AZ
Load Step 81				
node 1 ($t = 2\pi$)	-3.21	-3.21082	1.000	DOF Solution, Node 1, T = 6.28, AZ
node 4 ($t = 2\pi$)	-0.91	-0.914718	0.995	DOF Solution, Node 4, T = 6.28, AZ
node 7 ($t = 2\pi$)	0.0	0	n/a	DOF Solution, Node 7, T = 6.28, AZ

Table 3
Comparison of Calculated and Published Results

VM187: Bending of a Curved Beam

Maximum δ	Manual	Pentium 90	Ratio	POST1
δ , (SOLID5)	0.08814	0.088136	1.000	UY @ 5,25,45,65
δ , (SOLID92)	0.08811	0.088110	1.000	UY @ 352 - 368
δ , (SOLID98)	0.08811	0.088110	1.000	UY @ 352 - 368

VM188: Force Calculation of a Current Carrying Conductor

	Manual	Pentium 90	Ratio	Notes
F (Lorentz)	-0.00974	-0.009699	1.004	POST1 Scalar FXL
F (Maxwell)	-0.00964	-0.009459	1.020	POST1 Scalar FXM

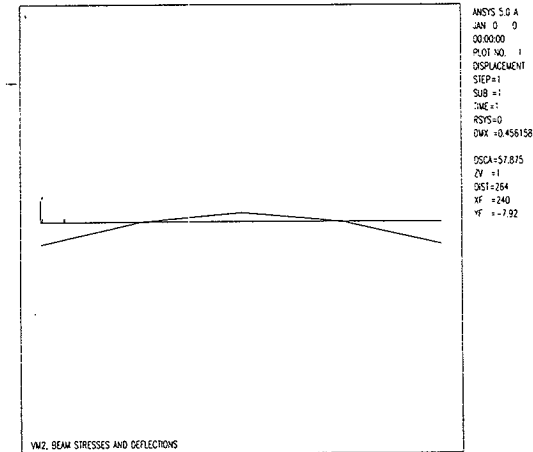


Figure 1
Problem VM2 -Plot 1

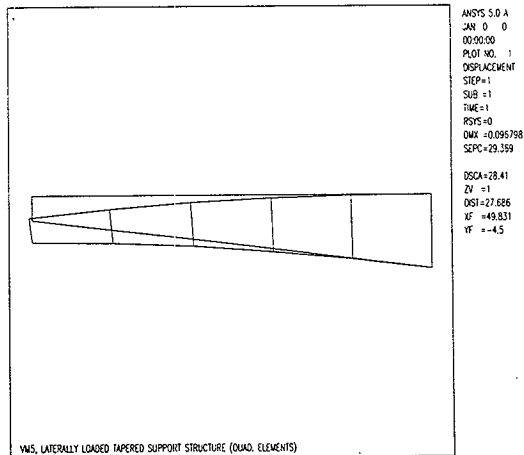


Figure 2
Problem VM5 - Plot 1

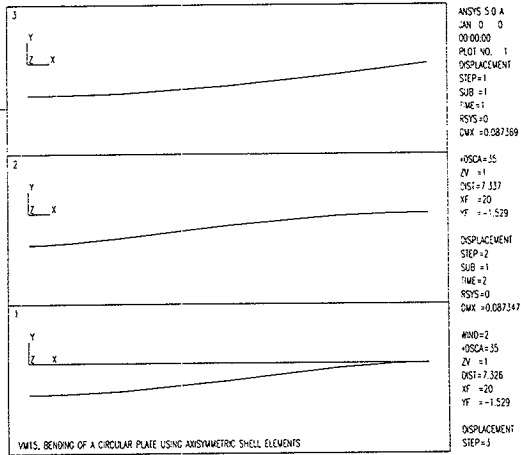


Figure 3
Problem VM15 - Plot 1

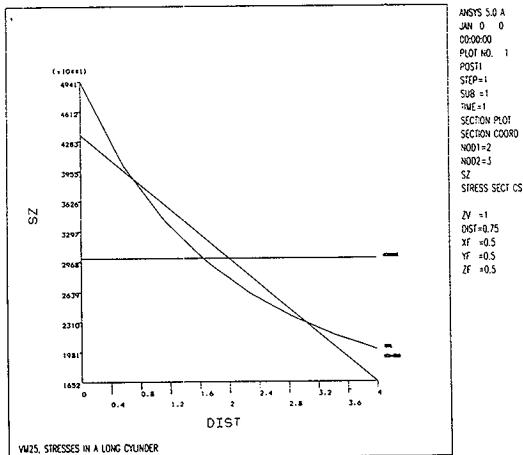


Figure 4
Problem VM25 - Plot 1

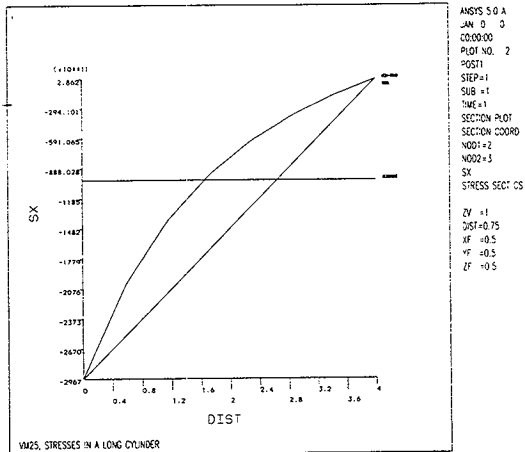


Figure 5
Problem VM25 - Plot 2

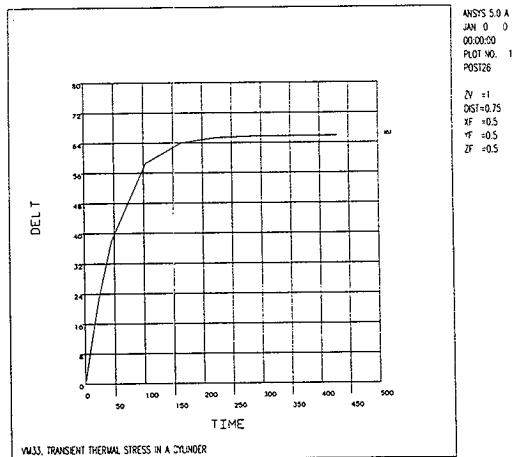


Figure 6
Problem VM33 - Plot 1

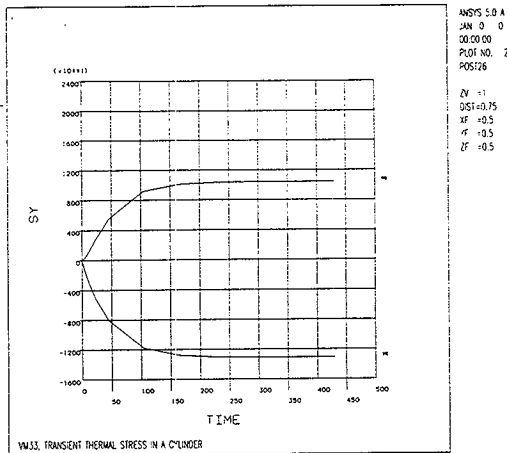


Figure 7
Problem VM33 - Plot 2

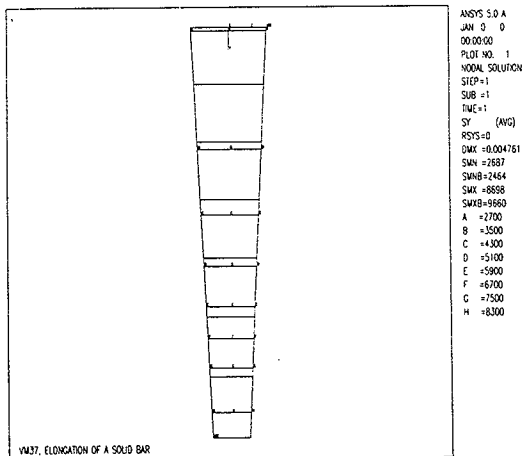


Figure 8
Problem VM37 - Plot 1

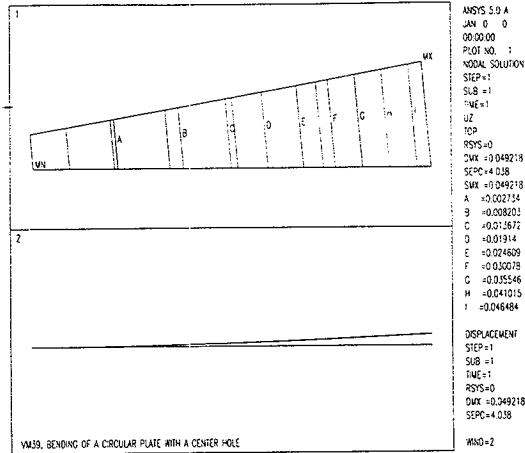


Figure 9
Problem VM39 - Plot 1

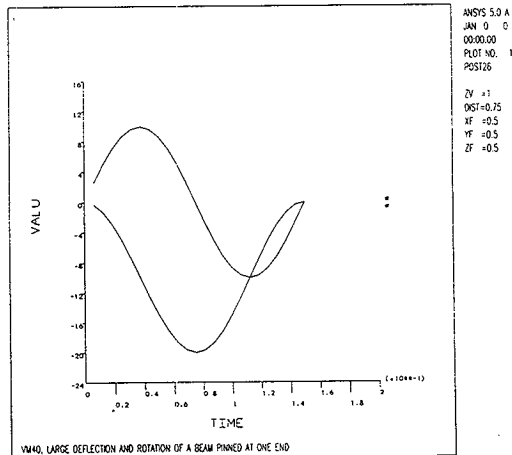


Figure 10
Problem VM40 - Plot 1

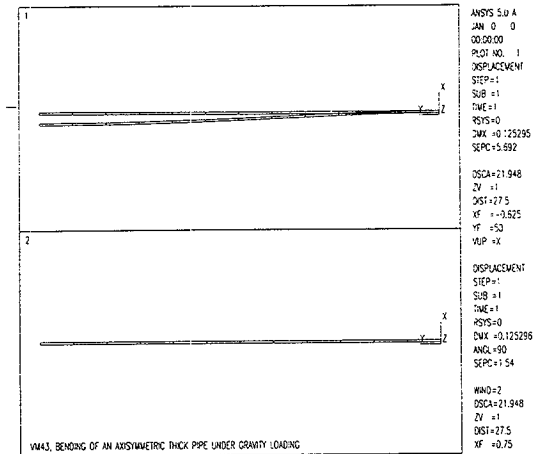


Figure 11
Problem VM43 - Plot 1

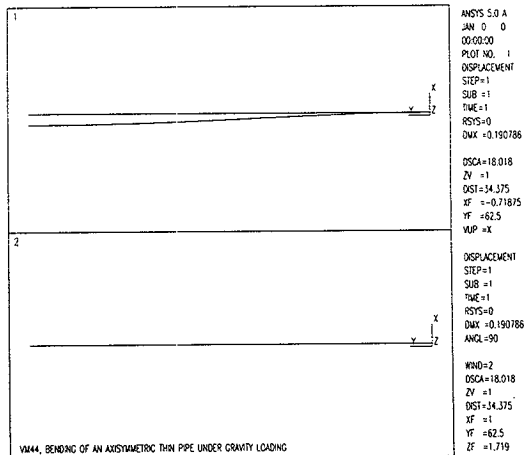


Figure 12
Problem VM44 - Plot 1

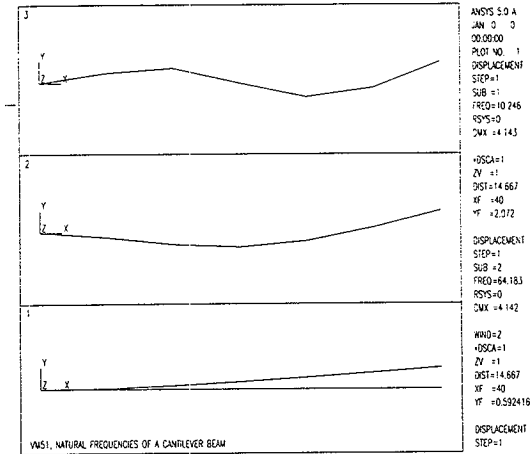


Figure 13
Problem VM51 - Plot 1

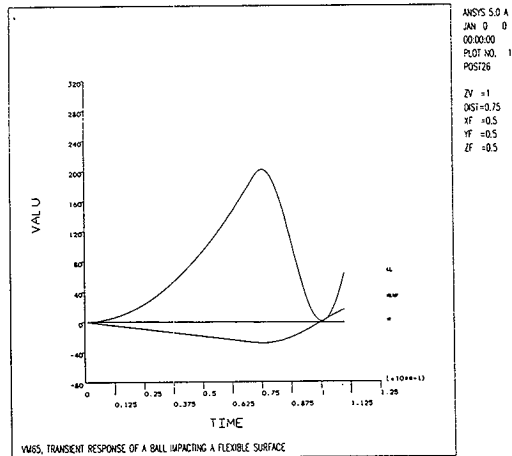


Figure 14
Problem VM65 - Plot 1

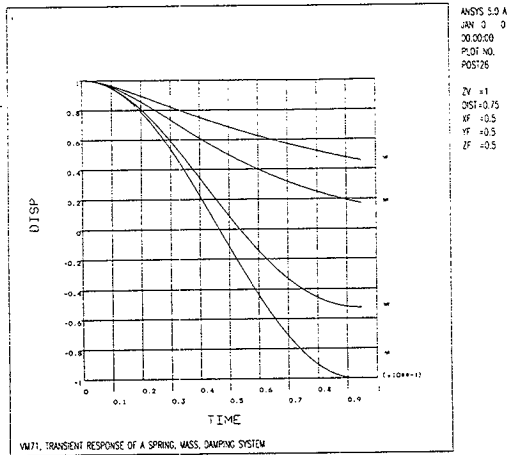


Figure 15
Problem VM71 - Plot 1

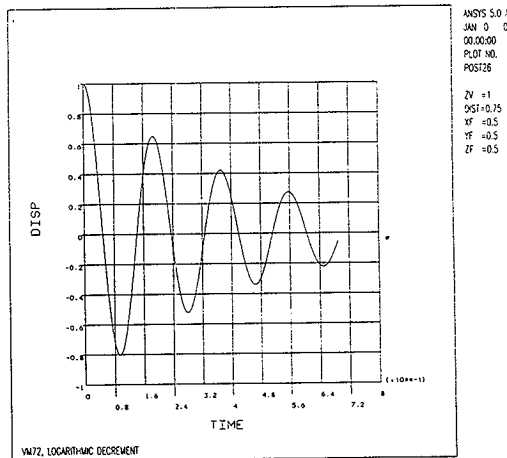


Figure 16
Problem VM72 - Plot 1

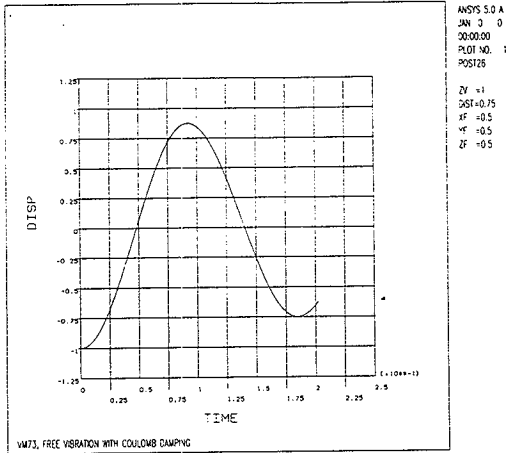


Figure 17
Problem VM73 - Plot 1

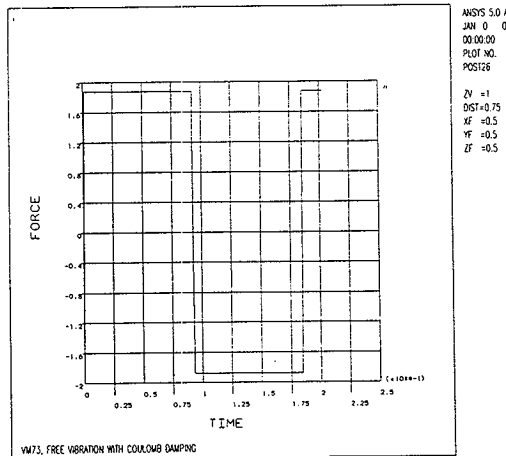


Figure 18
Problem VM73 - Plot 2

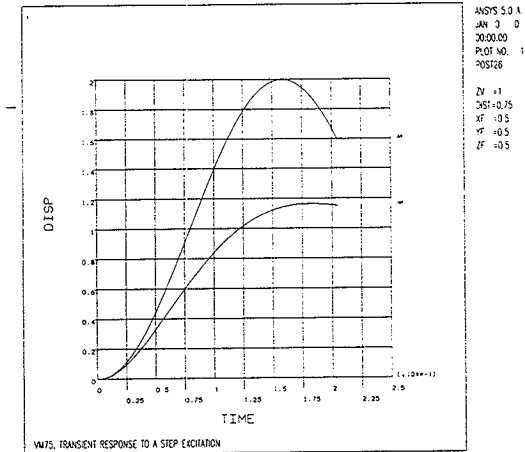


Figure 19
Problem VM75 - Plot 1

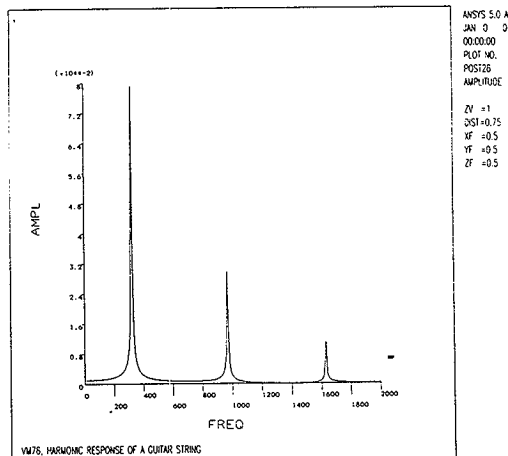


Figure 20
Problem VM76 - Plot 1

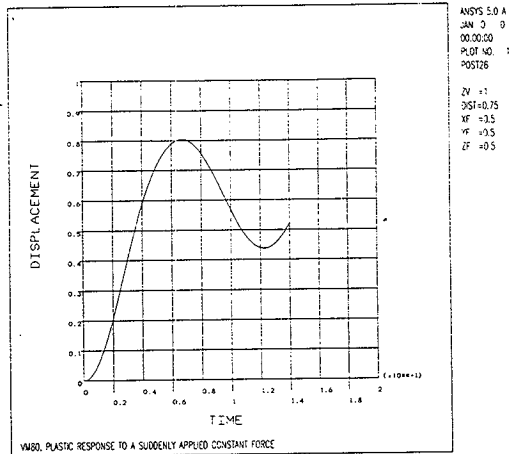


Figure 21
Problem VM80 - Plot 1

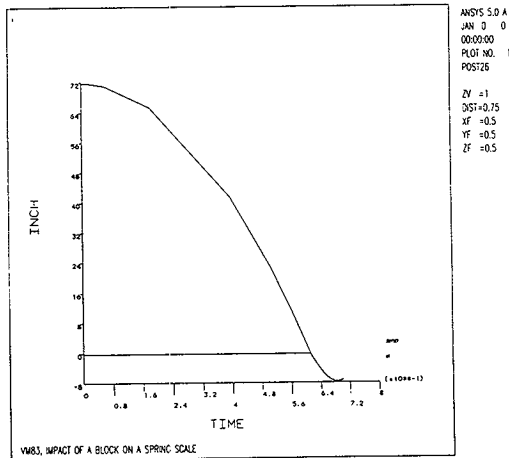


Figure 22
Problem VM83 - Plot 1

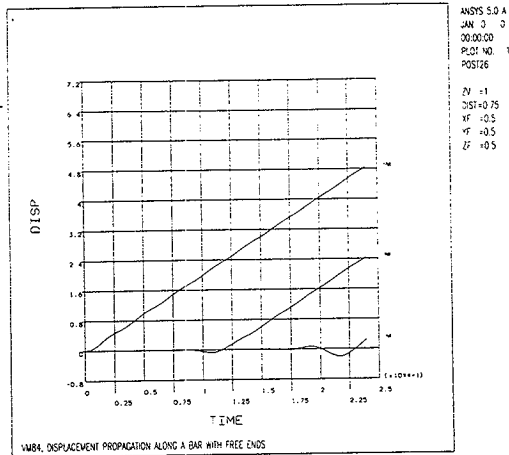


Figure 23
Problem VM84 - Plot 1

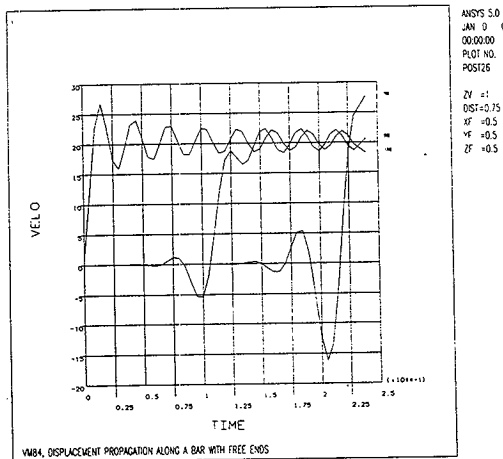


Figure 24
Problem VM84 - Plot 2

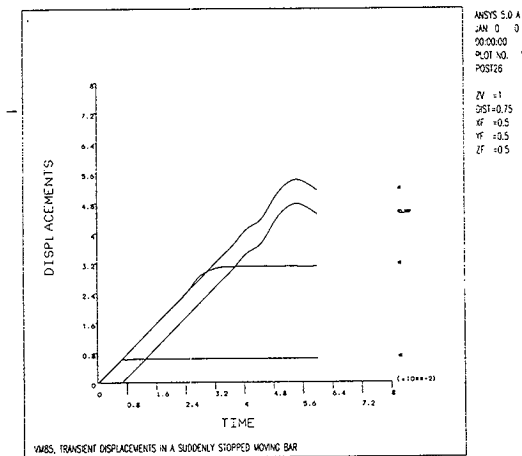


Figure 25
Problem VM85 - Plot 1

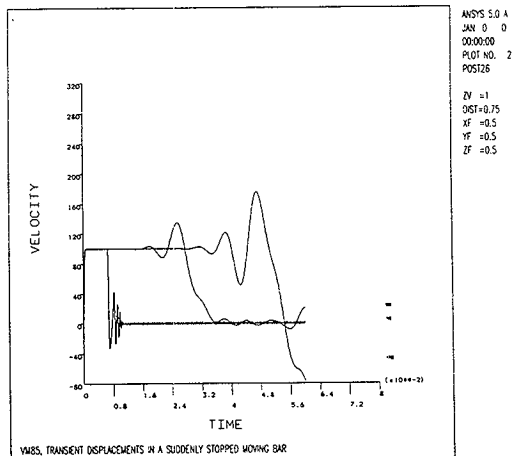


Figure 26
Problem VM85 - Plot 2

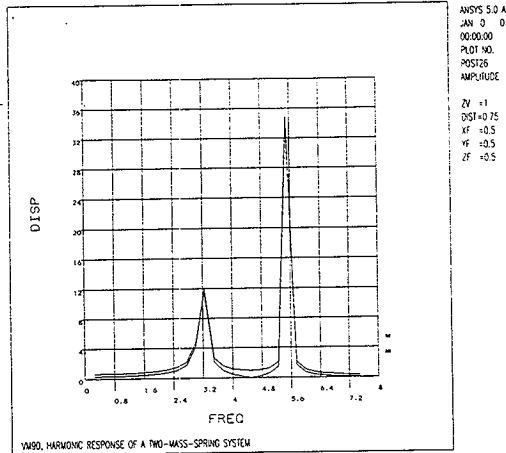


Figure 27
Problem VM90 - Plot 1

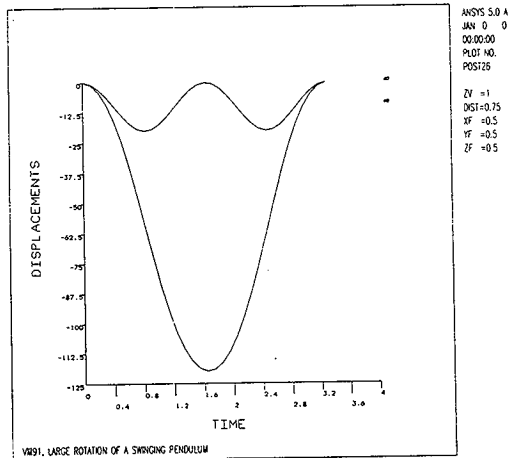


Figure 28
Problem VM91 - Plot 1

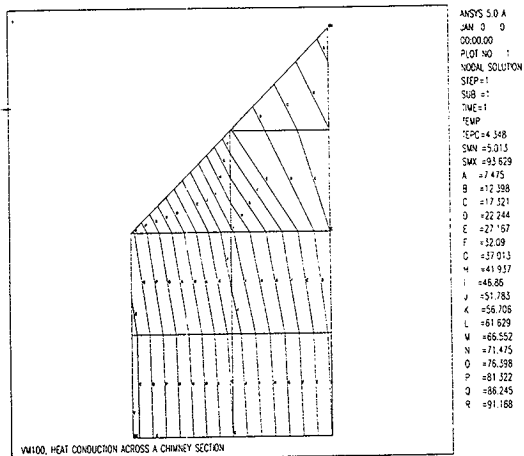


Figure 29
Problem VM100 - Plot 1

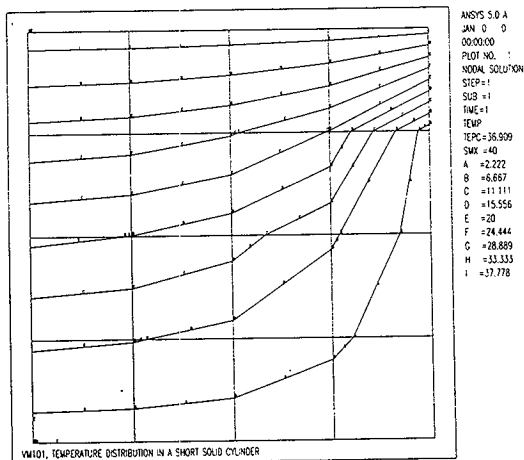


Figure 30
Problem VM101 - Plot 1

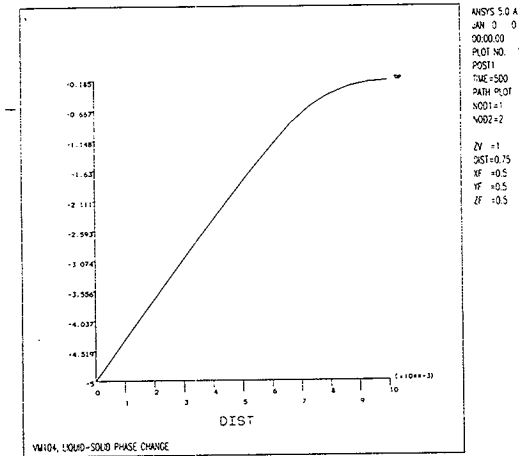


Figure 31
Problem VM104 - Plot 1

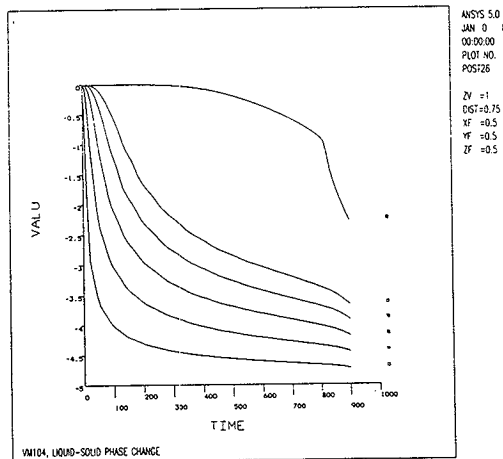


Figure 32
Problem VM104 - Plot 2

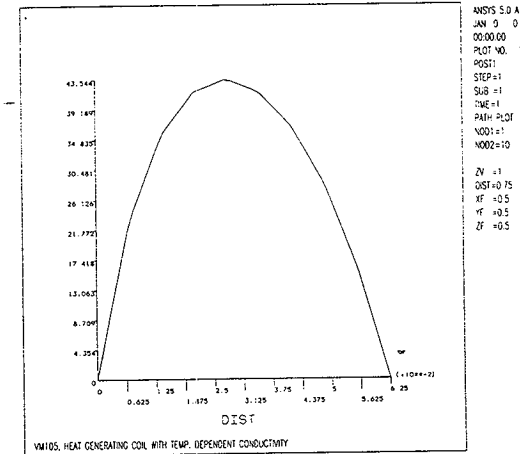


Figure 33
Problem VM105 - Plot 1

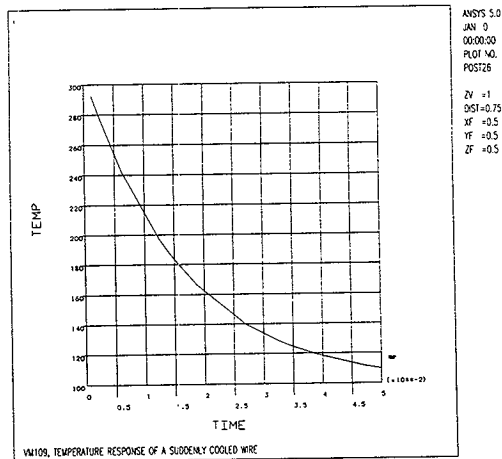


Figure 34
Problem VM109 - Plot 1

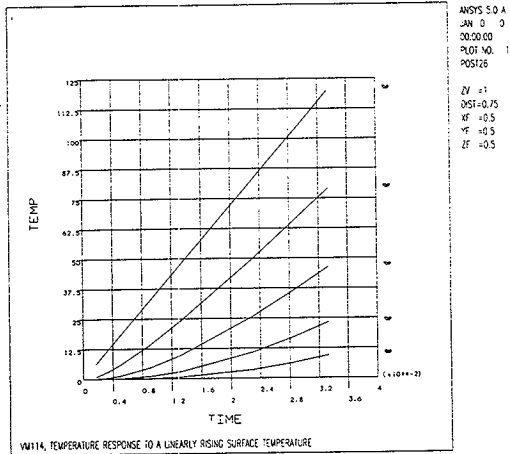


Figure 35
Problem VM114 - Plot 1

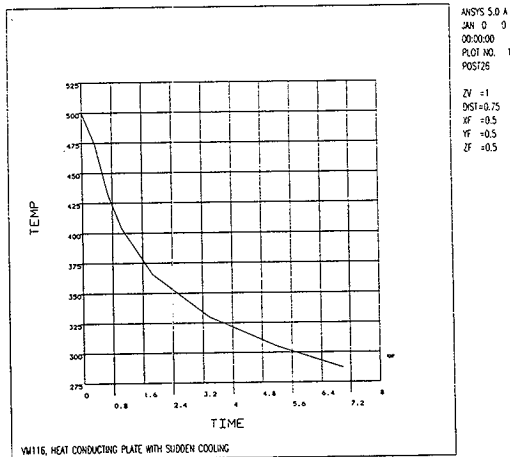


Figure 36
Problem VM116 - Plot 1

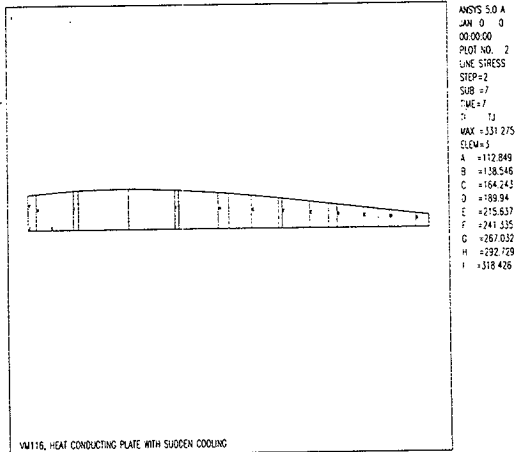


Figure 37
Problem VM116 - Plot 2

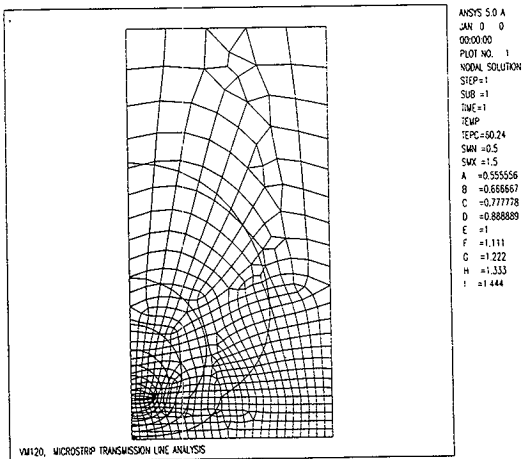


Figure 38
Problem VM120 - Plot 1

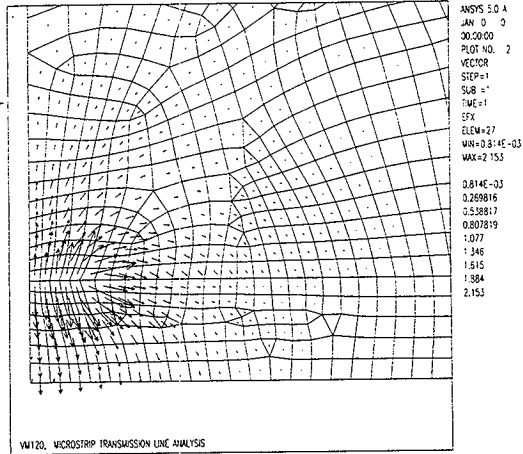


Figure 39
Problem VM120 - Plot 2

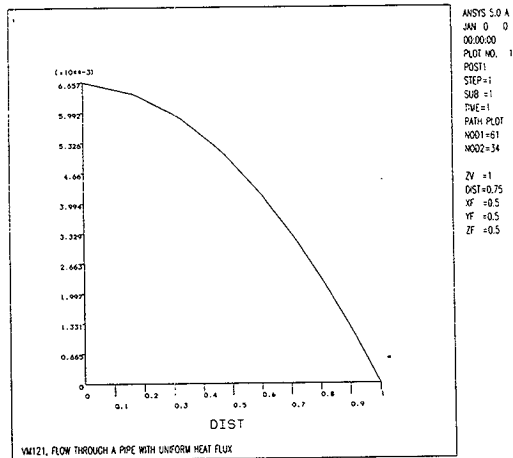


Figure 40
Problem VM121 - Plot 1

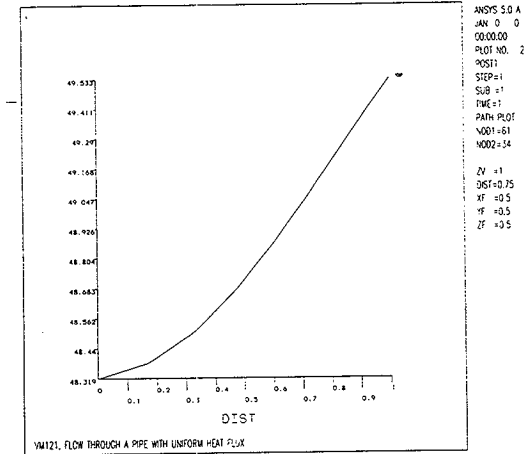


Figure 41
Problem VM121 - Plot 2

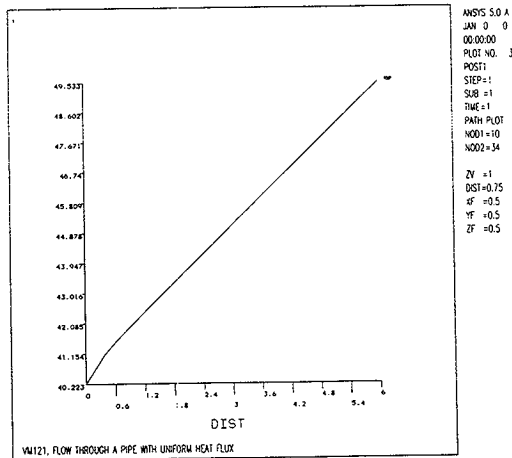


Figure 42
Problem VM121 - Plot 3

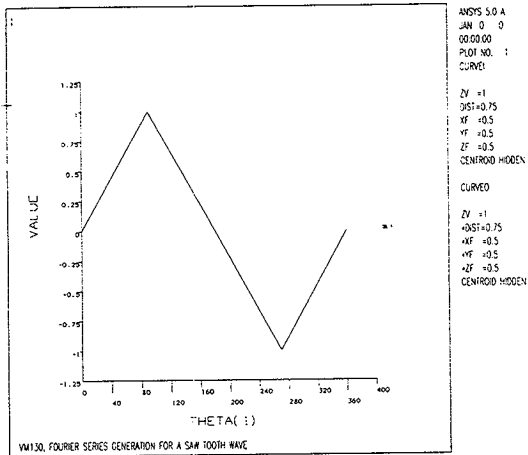


Figure 43
Problem VM130 - Plot 1

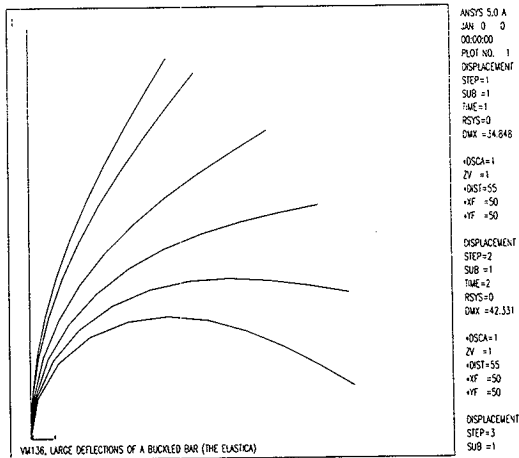


Figure 44
Problem VM136 - Plot 1

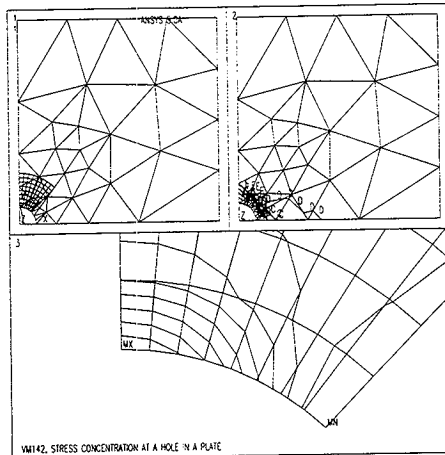


Figure 45
Problem VM142 - Plot 1

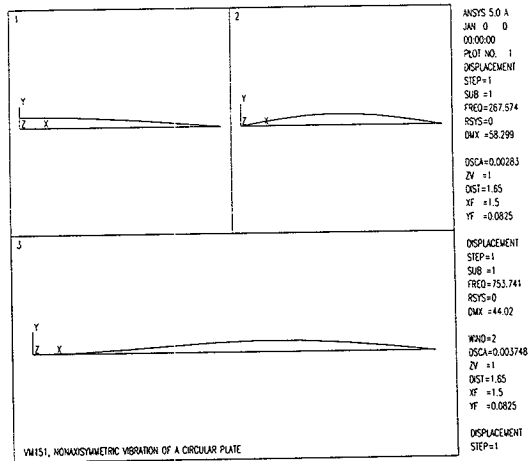


Figure 46
Problem VM151 - Plot 1

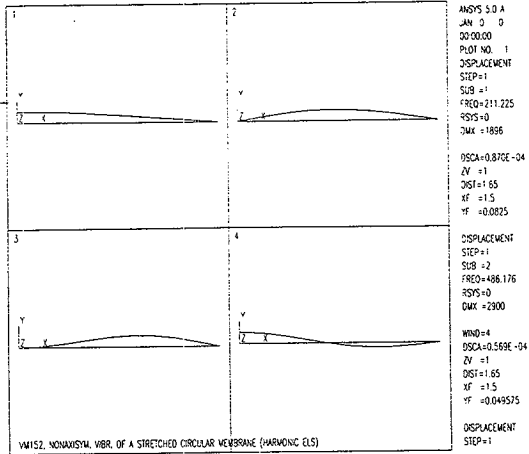


Figure 47
Problem VM152 - Plot 1

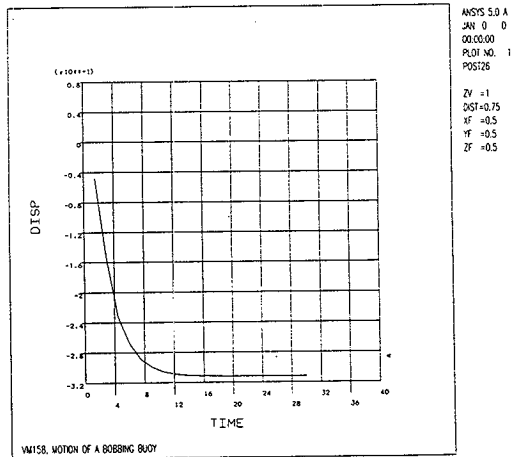


Figure 48
Problem VM158 - Plot 1

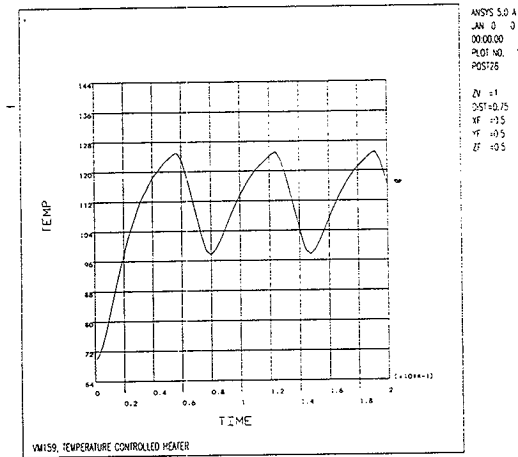


Figure 49
Problem VM159 - Plot 1

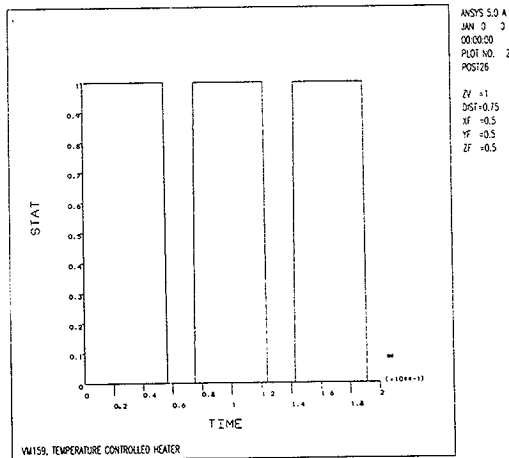


Figure 50
Problem VM159 - Plot 2

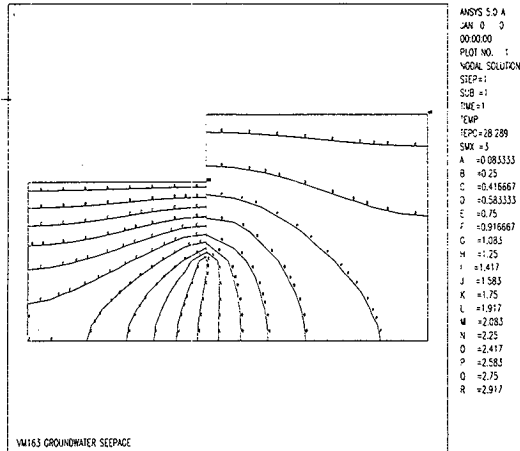


Figure 51
Problem VM163 - Plot 1

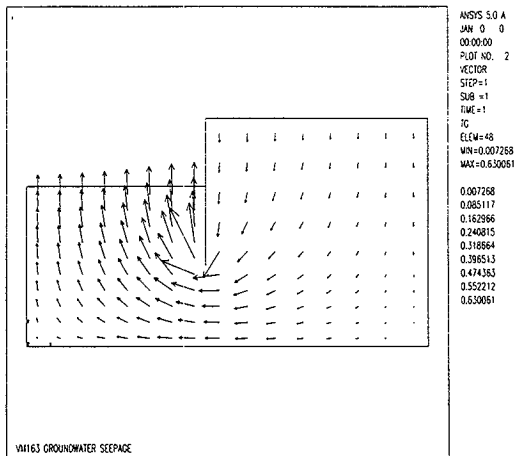


Figure 52
Problem VM163 - Plot 2

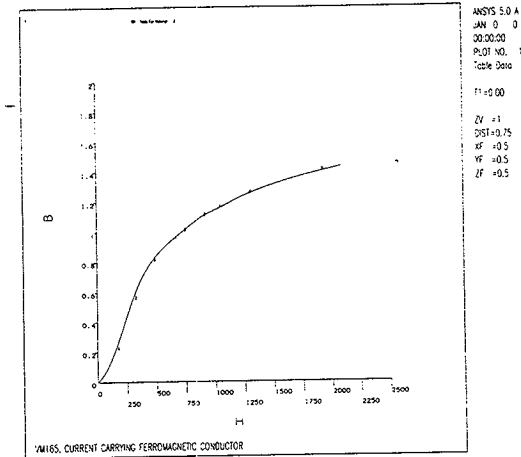


Figure 53
Problem VM165 - Plot 1

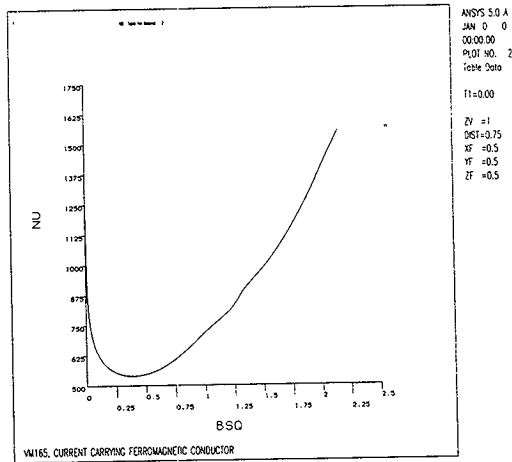


Figure 54
Problem VM165 - Plot 2

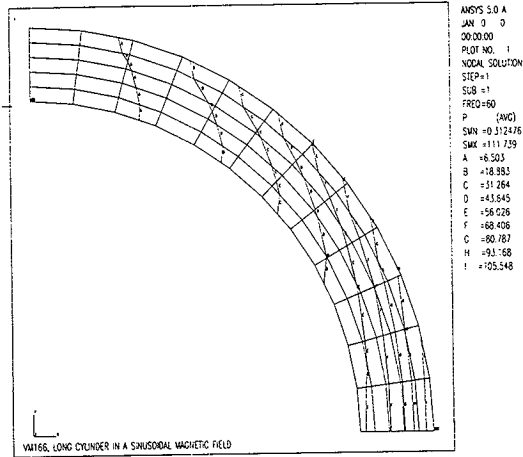


Figure 55
Problem VM166 - Plot 1

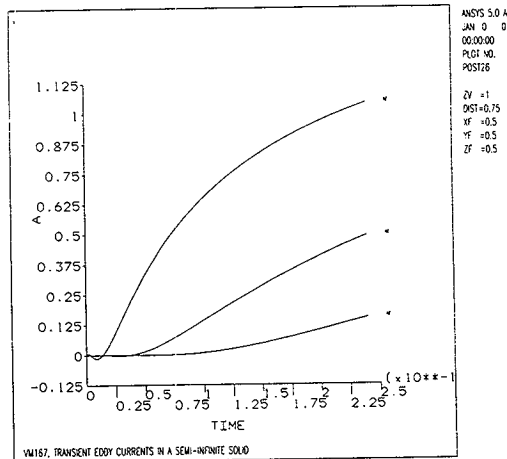


Figure 56
Problem VM167 - Plot 1

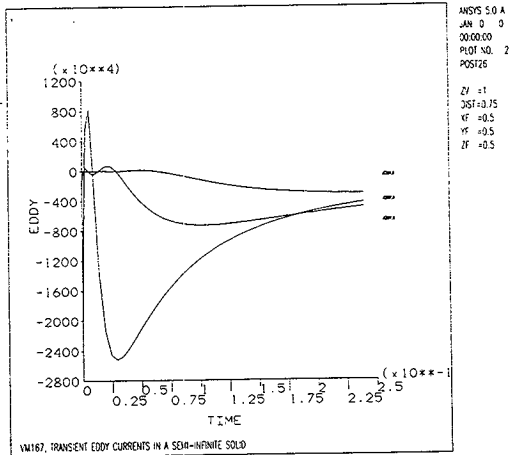


Figure 57
Problem VM167 - Plot 2

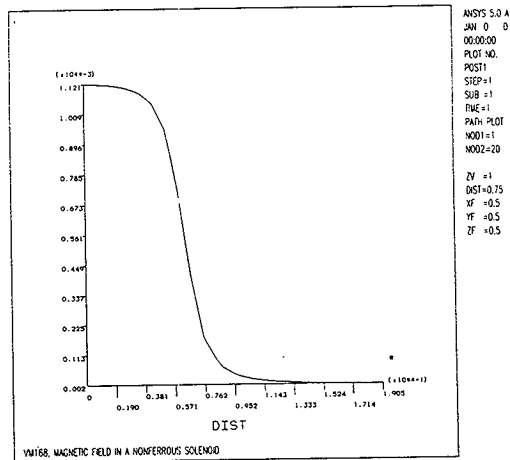


Figure 58
Problem VM168 - Plot 1

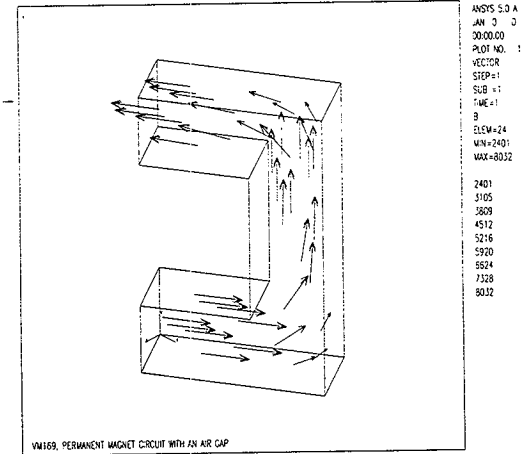


Figure 59
Problem VM169 - Plot 1

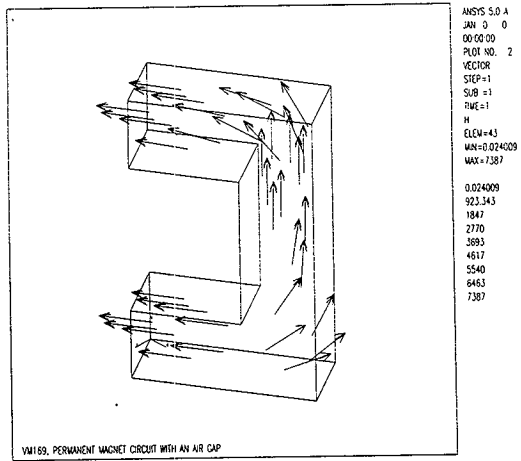


Figure 60
Problem VM169 - Plot 2

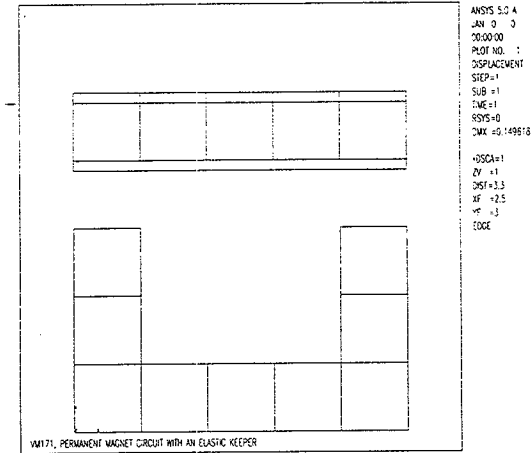


Figure 61
Problem VM171 - Plot 1

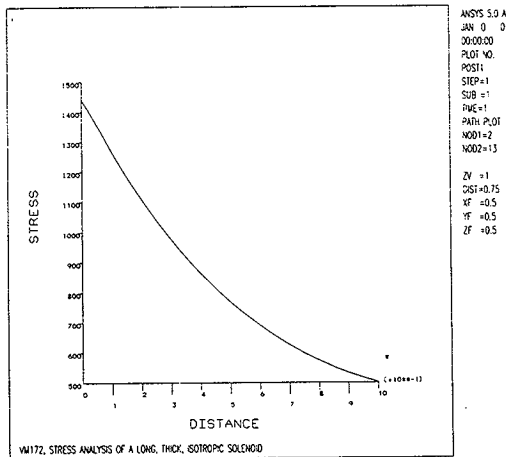


Figure 62
Problem VM172 - Plot 1

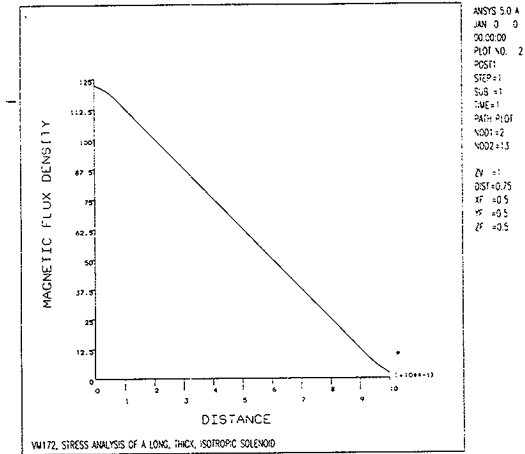


Figure 63
Problem VM172 - Plot 2

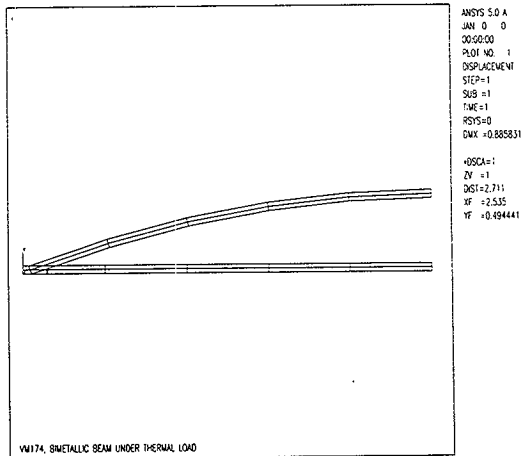


Figure 64
Problem VM174 - Plot 1

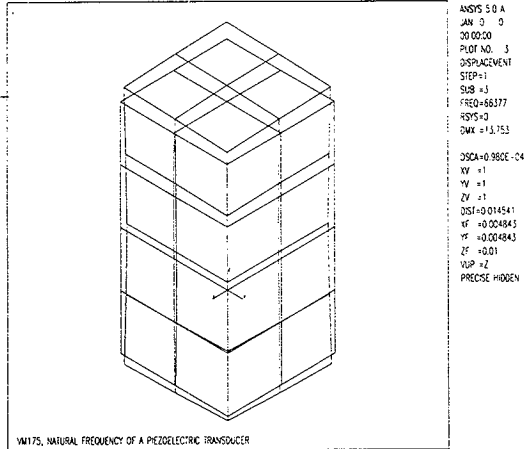


Figure 65
Problem VM175 - Plot 3

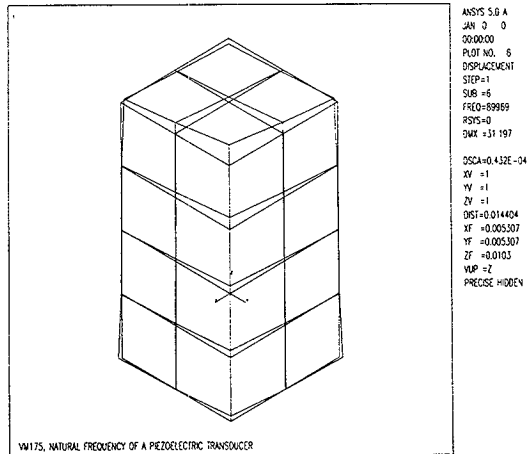


Figure 66
Problem VM175 - Plot 6

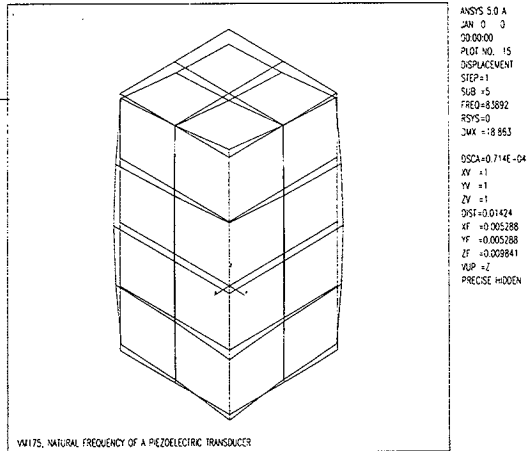


Figure 67
Problem VM175 - Plot 15

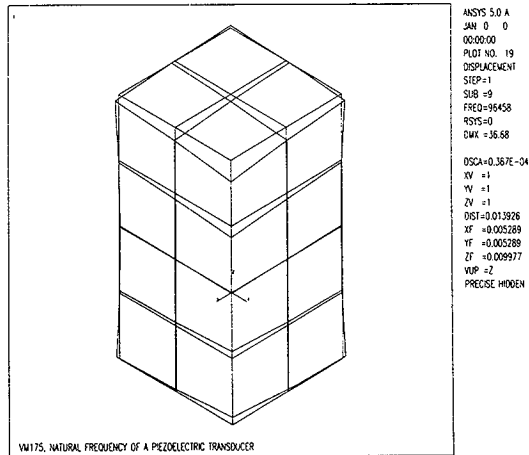


Figure 68
Problem VM175 - Plot 19

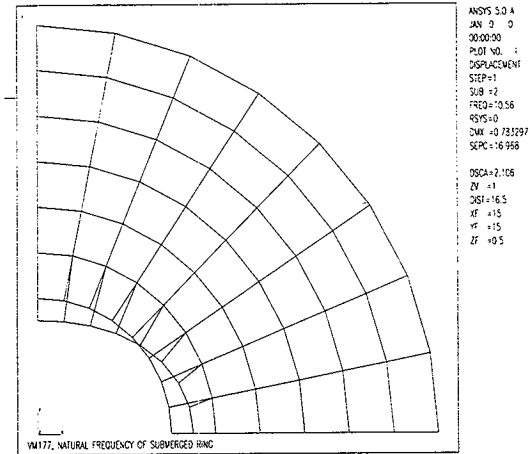


Figure 69
Problem VM177 - Plot 1

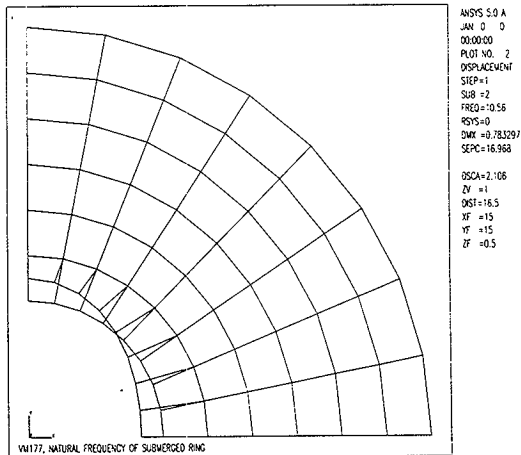


Figure 70
Problem VM177 - Plot 2

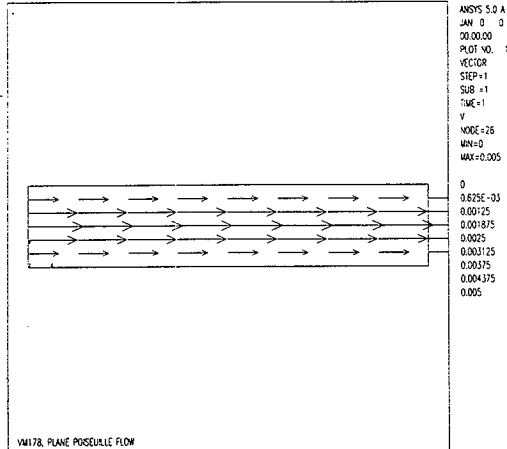


Figure 71
Problem VM178 - Plot 1

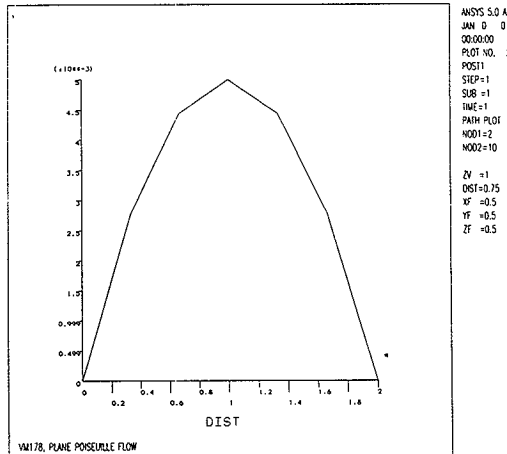


Figure 72
Problem VM178 - Plot 2

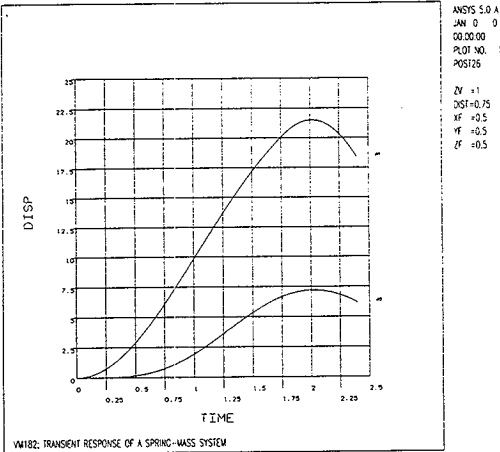


Figure 73
Problem VM182 - Plot 1

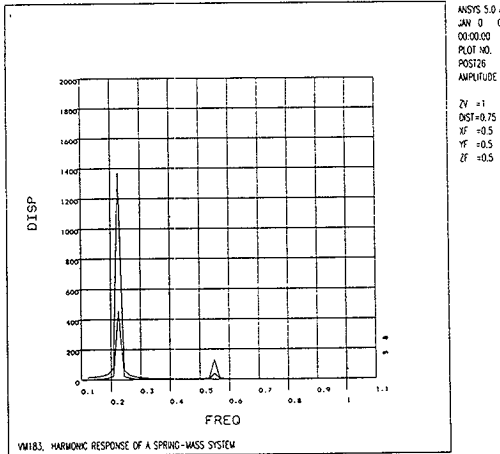


Figure 74
Problem VM183 - Plot 1

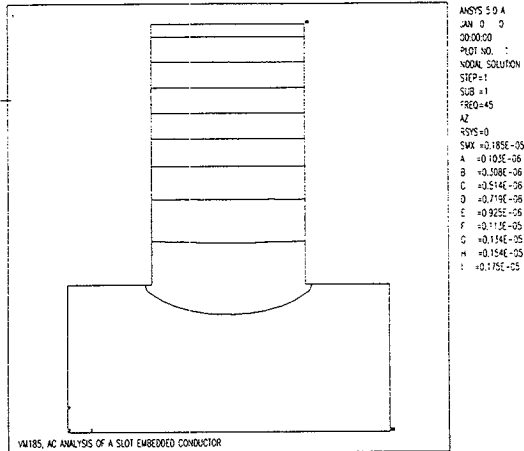


Figure 75
Problem VM185 - Plot 1

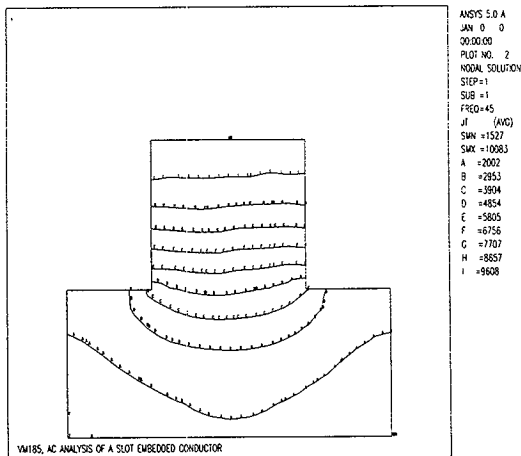


Figure 76
Problem VM185 - Plot 2

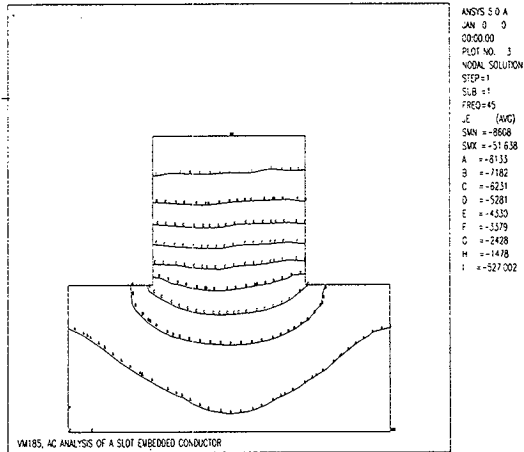


Figure 77
Problem VM185 - Plot 3

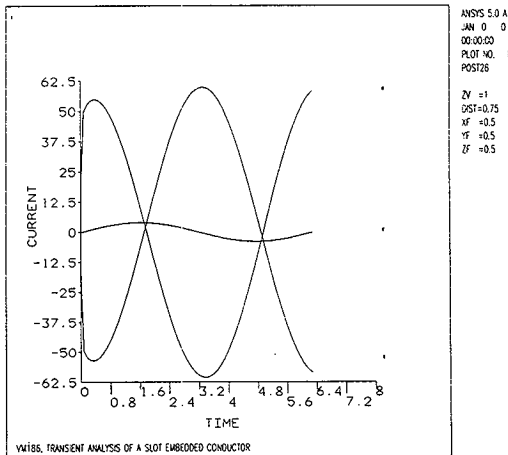


Figure 78
Problem VM186 - Plot 1

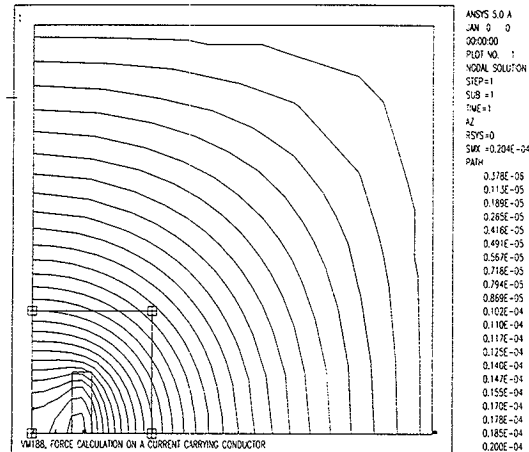


Figure 79
Problem VM188 - Plot 1