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CSER-98-002: CRITICALITY ANALYSIS FOR THE STORAGE OF SPECIAL NUCLEAR MATERIAL SOURCES AND STANDARDS IN THE WRAP FACILITY

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Abstract: The storage of test and calibration in order to ascertain potential for a criticality and develop criticality prevention limits.

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CSER-98-002: Criticality Analysis for the Storage of Special Nuclear Material
Sources and Standards in the WRAP Facility

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1.0 INTRODUCTION AND SUMMARY

The Waste Receiving and Processing (WRAP) Facility will store uranium and transuranic (TRU) sources and standards for certification that WRAP meets the requirements of the Quality Assurance Program Plan (QAPP) for the Waste Isolation Pilot Plant (WIPP). In addition, WRAP must meet internal requirements for testing and validation of measuring instruments for nondestructive assay (NDA).

In order to be certified for WIPP, WRAP will participate in the NDA Performance Demonstration Program (PDP). This program is a blind test of the NDA capabilities for TRU waste. It is intended to ensure that the NDA capabilities of this facility satisfy the requirements of the quality assurance program plan for the WIPP. The PDP standards have been provided by the Los Alamos National Laboratory (LANL) for this program. These standards will be used in the WRAP facility.

To internally check the accuracy and sensitivity of the NDA instruments, a further set of sources and standards will also be used by the facility. Each sealed source or standard will be referred to herein as a unit. Various combinations of these units will be placed in test drums and/or boxes which will be subject to their own limits until unloaded. There will be two sealed test drums with five grams of weapons grade plutonium loaded in them. These drums will be appropriately marked and will be subject to the unit limits rather than the drum limits.

This analysis shows that the storage and use of special nuclear material sources and standards within the limited control facility of WRAP (Rooms 101 and 104) is safe from a criticality standpoint. With the form, geometry, and masses involved with this evaluation, a criticality is not possible. The limits given in Section 2 below should be imposed on facility operations.

2.0 LIMITS

2.1 Pu Mass Equivalent Limits

- Unit mass limit in storage 250 g
- Limit in test drum/box 450 g
- Limit in storage room 4500 g

2.2 Spacing Limits

- Between a unit mass and any other fissile material 25 cm

Exception: This spacing limit will not apply to the loading or unloading of test drums/boxes or the loading of unit masses into a glovebox. These operations will be limited by the drum/box limit (see below) or the glovebox limits, whichever is appropriate.

- Between any loaded test drum/box and any other loaded test drum/box or between any loaded test drum/box and any fissile mass, including those in gloveboxes 92 cm

Exception: This spacing limit will not apply to loaded test drums to be used in the TRU glovebox. In those cases, all limits applicable to the glovebox will apply to that drum.

Exception: Locked drums containing no more than six grams of weapons grade plutonium and clearly marked on the outside will be subject to the unit mass limits (see above) rather than the drum limits.

2.3 Other Limits

- Only encapsulated (sealed) sources or standards will be allowed to be used in any test of the NDA equipment or stored in the source storage area.
- Stored unit masses on shelves will be constrained from falling by a positive constraint such as, but not limited to a latched bar across the entire shelf or a latched door across the front of a storage unit.

Exception: Stored unit masses on shelves will be unconstrained only during placing in or removal from storage of material.

- Storage containers with a maximum of 250 g of fissile material is allowed to be unconstrained at any time.

Exception: For purposes of loading unit masses into a test drum/box, a unit mass will be considered to be constrained if it is loaded into the test drum/box.

- Stored loaded PDP drums or boxes will be constrained by a chain or strap attached to a stationary upright structure such as a wall, column, or chain link fence.
- Plutonium allowed in the facility will have a concentration of ^{240}Pu of 5 wt% or more. The concentration of other plutonium isotopes will be controlled by the limit on the ^{240}Pu .

3.0 DESCRIPTION OF FACILITY

The WRAP facility will store various sources and standards in the nuclear materials cage at the west end of Room 104. Within this room is the NDA equipment which these standards are intended to check and test.

There will be various sealed sources and standards producing neutrons by (α, n) reactions ($^{239}\text{PuBe}$, $^{241}\text{AmBe}$) or by spontaneous fission (^{239}Pu , ^{235}U , ^{241}Am). These may contain up to 80 g of fissionable material and are sealed in stainless steel. These will be stored in slip-lid cans or similar containers which will themselves be stored, two in a drum, in 25, 30, or 55 gallon drums with the unoccupied space filled with paraffin. The drums will be stored with at least 25 cm between them, outside surface to outside surface. Sources will also be stored on shelving either inside the nuclear materials cage or adjacent to this area.

The PDP sources will be PuO_2 or UO_2 encapsulated in stainless steel. The plutonium will be weapons grade and the uranium will be enriched in the isotope ^{235}U up to 94%. Various numbers of these sources will be placed in steel cylinders, packed with either carbon felt material or diatomaceous earth. The source cylinders will be from 3.8 to 5 cm in diameter and from 5 to 24 cm in length. These cylinders will be welded shut containing from 300 mg to 100 g of plutonium or uranium.

The WRAP facility will have sources similar to the PDP sources (pseudo-PDP sources) but ranging in size from 1 mg to 50 g of fissile material. The difference between these and the PDP sources is purely administrative. The pseudo-PDP sources will be owned and used by the facility while the PDP sources may be used by outside certifiers.

The PDP and pseudo-PDP sources will be stored on shelves or in 55-gallon drums, with proper spacing between unit masses. The PDP and pseudo-PDP storage drums will not be filled with paraffin, and the sources will not be first placed in slip-lid cans.

Test drums and/or boxes will be loaded uniquely each time they are used. The test drums will be 55 gal drums (ID = 57 cm, Inside Height = 84.5 cm, constructed of 16 gauge steel). It is planned that each drum will have no more than 350 g of fissile material in it when loaded. This material will be in the form of PDP or pseudo-PDP sources loaded into the drum for a specific test of the NDA equipment. The radial spacing of the sources within the drum will be maintained by their insertion into from 5 to 8 fixed vertical positioning tubes (OD $\leq$ 7.5 cm, ID $\leq$ 7 cm) that extend the length of the drum. Vertical spacing within these positioning tubes will be maintained by the use of spacers. The positioning tubes will be at least 8.5 cm apart, center-to-center.

There will also be test boxes loaded similarly to the test drums. Two types of boxes are planned, the B-25 box and the SWB box. It is planned that these boxes have no more than 450 g of fissile material loaded into them. The B-25 box will be 115.6 cm wide, 183 cm long, and 117 cm high (inside dimensions). Within the box will be up to 20 vertical or horizontal positioning tubes ($6 < OD < 23$ cm) extending the height or length of the box. The tubes will be distributed across the volume of the box, at least 8.5 cm apart, center-to-center.

The SWB box will consist of two flat sides and two rounded sides. The box will be 91.9 cm tall and 132 cm wide. The flat sides are planned to be 114 cm long with the curved ends giving the box a maximum length of 175 cm. Within the box there will be up to 20 vertical or horizontal positioning tubes ($OD = 23$ cm) extending the height or length of the box. The tubes will be distributed across the volume of the box, at least 8.5 cm apart, center-to-center.

The test drums and/or boxes may be either empty or filled with a variety of matrix materials; plastic, paper, clothing, glass, scrap metal, vermiculite, wood shavings, sand, and/or solidified organic or inorganic material. In rare cases, PDP matrices may consist of combustible materials.

The test containers will be loaded before each test and unloaded afterwards. Thus, they will generally be empty of fissile material. However, there may be more than one test drum and/or box loaded for any specific testing period. There will also be two test drums with five grams of weapons grade plutonium which will be continually loaded. These drums will be locked and clearly marked. For the purposes of this analysis, these drums will be treated as individual sources.

4.0 EVALUATION OF CRITICALITY SAFETY CONTROLS

Each of the TRU sources and standards are sealed in stainless steel. The PDP and pseudo-PDP sources are sealed inside a second stainless steel container. It is not considered credible that a significant amount of plutonium or uranium could be saturated with water. At worst, each source may be fully reflected by being immersed in water.

ARHCO, 1968 presents minimum critical configurations with respect to a variety of parameters. Graph III.A.9(100)-5 illustrates the behavior of a sphere of $^{239}\text{PuO}_2$ ($H/\text{Pu} = 0$) fully reflected by water. At the theoretical density ($\rho = 10.11 \text{ g/cm}^3$), it would take 10.11 kg of plutonium to reach criticality, which is larger than the total amount of plutonium contained in all of the sources and standards combined.

Not only is this amount more plutonium than will be operationally stored, but

- The figure assumes that the plutonium is pure ^{239}Pu , while the plutonium in the test sources is weapons grade plutonium. The material in the non-PDP type sources, however, may be pure ^{239}Pu .
- The figure assumes no neutron absorbers. The sources and standards are encased in steel which will absorb neutrons.
- The figure assumes the theoretical density of $\rho = 10.11 \text{ g/cm}^3$ which is difficult to achieve in practice.
- The figure assumes a perfectly spherical shape for the PuO_2 while a series of cylindrical encapsulated sources would only approximate this shape.

In order to check the k_{eff} of bounding systems, the computer code MCNP-4A (LANL, 1988, WHC, 1996) was run for a spherical plutonium water system at the most reactive plutonium concentration, 30 g/L, surrounded by one foot of water. The cross sections used were those recommended by the MCNP manual, based on the ENDF/B-V library. The plutonium used was enriched to 5wt% of ^{240}Pu . With this concentration of ^{240}Pu , other isotopes of Pu will be increased also. The concentration of ^{241}Pu corresponding to this ^{240}Pu enrichment is 1.7 wt% which was used in the calculations. However, the enrichment in other plutonium isotopes will be controlled by specifying the ^{240}Pu concentration. The calculated k_{eff} was 0.91407 ± 0.00149 , giving a k_{eff} plus two σ of 0.91705. At the 99% confidence level $k_{\text{eff}} = 0.91799$.

This is a rather conservative model since each standard will be encased in steel and welded into a steel cylinder. The steel acts as an absorber of neutrons, thus lowering the k_{eff} . In addition, it is unlikely that both steel enclosures will be breached and the plutonium soaked with water. In addition, the density and spherical shape is unlikely to be reached.

These data apply to ^{239}Pu while some of the sources will be uranium, enriched in ^{235}U . However, the ^{239}Pu is the limiting case even when compared to 100% ^{235}U and thus this critical mass is the smallest critical mass of both elements. MCNP was also run for the same geometry, but at the most reactive concentration for this isotope, i.e. 60 g/L. The calculated k_{eff} was 0.88564 ± 0.00163 , giving a k_{eff} plus two σ of 0.88890. At the 99% confidence level $k_{\text{eff}} = 0.88995$.

MCNP-4B has recently been validated for plutonium systems (HNF, 1998). This code has been tested and found to give essentially the same results as MCNP-4A, which gives confidence in the code. The maximum allowed values of the calculated k_{eff} with code bias accounted for a safety limit of 0.05 (i.e. to assure that actual $k_{\text{eff}} \leq 0.95$) is 0.942. Thus all of the calculated k_{eff} fall below this limit.

5.0 TECHNICAL PEER REVIEW

Document Reviewed: CSEH-98-002: Criticality Analysis for the Storage of Special Nuclear Material Sources and Standards in the WRAP Facility, Revision 1

Author: Harvey Goldberg

Yes No N/A

☒	☐	☐	Problem completely defined.
☒	☐	☐	Necessary assumptions explicitly stated and supported.
☒	☐	☐	Computer codes and data files documented.
☒	☐	☐	Data checked for consistency with original source information as applicable.
☐	☐	☒	Mathematical derivations checked including dimensional consistency of results.
☒	☐	☐	Models appropriate and used within range of validity or use outside range of established validity justified.
☐	☐	☒	Hand calculations checked for errors.
☒	☐	☐	Code run streams correct and consistent with analysis documentation.
☒	☐	☐	Code output consistent with input and with results reported in analysis documentation.
☒	☐	☐	Acceptability limits on analytical results applicable and supported. Limits checked against sources.
☒	☐	☐	Safety margins consistent with good engineering practices.
☒	☐	☐	Conclusions consistent with analytical results and applicable limits.
☒	☐	☐	Results and conclusions address all points required in the problem statement.
☒	☐	☐	Have all reasonable accidents been considered?
☐	☐	☒	Has low density water (steam) been evaluated as a moderator?
☒	☐	☐	Is the fuel and other hardware composition correct?
☒	☐	☐	Are the cases considered appropriately conservative?
☒	☐	☐	Do the computer models adequately reflect the actual geometry? Have cross sectional cuts of the geometry been made and do they show the desired geometry?
☒	☐	☐	Has the reviewer completed the Criticality Safety Course for Managers and Engineers?

Date completed 3 Sep 1998 13 May 1998

Reviewed by: D.G. Erickson Paul B. Erickson Date 9-3-98

NOTE: Any hand calculations, notes, or summaries generated as part of this review should be signed, dated, and attached to this checklist. Materials should be labeled and recorded so that it is intelligible to a technically-qualified third party.

6.0 REFERENCES

- ARHCO, 1968, *Criticality Handbook, ARH-600*, R.D.Carter, G.R.Kiel, K.R.Ridgway, & W.A. Blyckert, Atlantic Richfield Hanford Company, Richland, Washington, 28 August 1968.
- HNH, 1998, CCVR 97-001: *MCNP 4B Plutonium Validation*, HNH-1905, Rev. 0, D. G. Erickson, Fluor Daniel Northwest, Inc., Richland, Washington, 17 February 1998
- LANL, 1988, MCNP - *A General Monte Carlo N-Particle Transport Code, Version 4A*, LA-12625, J. F. Briemeister, ed., Los Alamos National Laboratory, Los Alamos, New Mexico, 1988
- WHC, 1996, *Certification of MCNP Version 4A for WHC Computer Platforms*, SD-MP-SWD-30001, Rev. 7, L. L. Carter, Westinghouse Hanford Company, Richland, Washington, 1996

7.0 COMPUTER OUTPUT DECKS

Imcnph version 4a ld=10/01/93

09/02/98 15:35:27

edt 465711, sd-mp-swd-30001, rev 0, certified

ecn 186718 with prpr upgrade ph.4a00c

Sun platform

inp=iWRAP7 outp=oWRAP7 mctal=mWRAP7

probid = 09/02/98 15:35:27

```

1-  message:
2-
3-  5% plutonium in WRAP 450 g
4-  1 1 -1.03 -1 imp:n=1          $ Source
5-  2 2 -1.00 -2 1 imp:n=1        $ Water Reflector
6-  3 0 2 imp:n=0                  $ End of the World
7-
8-  1 so 15.3                      $ Source
9-  2 so 45.78                     $ Water Reflector
10-
11-  mode n
12-  kcode 3000 1.0 10 100
13-  ksre 0.0 0.0 0.0
14-  m1 94239.55c -0.0252 94240.50c -0.0030 94241.50c -0.001 $ Plutonium
15-  1001.50c -0.1086 8016.50c -0.8622 $ Water Mode
16-  mt1 lwtr.01t
17-  m2 8016.50c -0.8881 1001.50c -0.1119 $ Water Reflecto
18-  mt2 lwtr.01t
19-  totnu
20-  ctme 350.
21-  print

```

wto, stabilizer, present s, 1.000 1.000 3000

1 initial source from ksre card.

print table 90

```

original number of points      1
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               1
points after expansion or contraction 3000
nominal source size           3000

```

initial guess for k(eff) 1.000000

cycles to skip before tallying 10

number of keff cycles that can be stored 201

Imaterial composition

print table 40

material

number component nuclide, atom fraction

```

1 94239, 0.00065 94240, 0.00008 94241, 0.00003 1001, 0.66606
8016, 0.33319
associated thermal s(a,b) data sets: lwtr.01t
2 8016, 0.33337 1001, 0.66663
associated thermal s(a,b) data sets: lwtr.01t

```

HNF-2594, Rev 1

```

material
number  component nuclide, mass fraction

1      94239, 0.02520  94240, 0.00300  94241, 0.00100  1001, 0.10860
      8016, 0.86220
2      8016, 0.88810  1001, 0.11190

```

```

1 cell volumes and masses
print table 50

```

```

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

1 1 1.00350E-01 1.03000E+00 0.00000E+00 1.50025E+04 1.54525E+04 1
2 2 1.00300E-01 1.00000E+00 0.00000E+00 3.86896E+05 3.86896E+05 1
3 3 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 infinite

```

```

1 surface areas
print table 50

```

```

surface input    calculated    reason area
      area area not calculated

1 1 0.00000E+00 2.94166E+03
2 2 0.00000E+00 2.63367E+04

```

```

1 cells
print table 60

```

```

atom    gram    neutron
cell mat density density volume mass pieces importance

1 1 1s 1.00350E-01 1.03000E+00 1.50025E+04 1.54525E+04 1 1.0000E+00
2 2 2s 1.00300E-01 1.00000E+00 3.86896E+05 3.86896E+05 1 1.0000E+00
3 3 0 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0 0.0000E+00

```

```

total
1 surfaces
4.01898E+05 4.02348E+05
print table 70

```

```

surface trans type surface coefficients

1 1 so 1.5300000E+01
2 2 so 4.5780000E+01
1 cell temperatures in mev for the free-gas thermal neutron treatment.
print table 72

```

```

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.
1 physical constants
print table 98

```

```

name      value description

huge      1.0000000000000E+37 infinity
pia       3.1415926535898E+00 pi
avogad    6.0220434469282E+23 avogadro number (molecules/mole)
aneut     1.0086649670000E+00 neutron mass (amu)
avgdn     5.9703109000000E-01 avogadro number/neutron mass (1.e-24*molecules/mole/amu)
slite     2.9979250000000E+02 speed of light (cm/shake)
planck    4.1357320000000E-13 planck constant (mev shake)
fiscn     1.3703930000000E+02 inverse fine structure constant h*c/(2*pi*e**2)
gpt(1)    9.3958000000000E+02 neutron mass (mev)
gpt(3)    5.1100800000000E-01 electron mass (mev)

```

```

fission q-values: nuclide q(mev) nuclide q(mev)
other      3.3967000000000E-17

```

the following compilation options were used:

```

pointer
cheap
unix
sun
plot
mcplot
gkssim
xlib
default datapath: /apps/mcnp
cross-section tables
                                print table 100

table length

        tables from file /apps/mcnp/tmcscs

1001.50c  1153  njoy                ( 1301)  79/07/31.
8016.50c 23669  njoy                ( 1276)  05/14/81
94239.55c 67551  njoy                ( 1399)  02/21/85
94240.50c 42744  njoy                ( 1380)  79/09/13.

        tables from file /apps/mcnp/endf5p

94241.50c 22523  njoy                total nu    ( 1381)  79/08/30.

        tables from file /apps/mcnp/tmcscs

lwtr.01t 10193  hydrogen in light water at 300 degrees kelvin    1001  0  010/22/85

total  167833

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

```

decimal words of dynamically allocated storage

```

general      94400
tallies      0
bank         6403
cross sections 167833

total        268636

```

```

dump no. 1 on file runtpe  nps = 0  coll = 0  clm = 0.00  nm = 0

```

```

source distribution written to file srcdp  cycle = 0

```

```

1 warning message so far.
1 starting mcrun.  field length = 0  cp0 = 0.04  print table 110

```

5% plutonium in WRAP 450 g

```

nps  x    y    z  cell surf  u    v    w  energy weight time

1  0.000E+00  0.000E+00  0.000E+00  1  0  5.085E-01  4.733E-01  7.193E-01  2.209E+00  1.000E+00  0.000E+00
2  0.000E+00  0.000E+00  0.000E+00  1  1  8.952E-01  -4.447E-01  -2.944E-02  4.904E+00  1.000E+00  0.000E+00

```


HNF-2594, Rev 1

```

3 0.000E+00 0.000E+00 0.000E+00 1 0 -6.184E-01 -4.495E-01 6.446E-01 3.809E-01 1.000E+00 0.000E+00
4 0.000E+00 0.000E+00 0.000E+00 1 0 9.710E-01 -5.665E-02 -2.323E-01 1.331E+00 1.000E+00 0.000E+00
5 0.000E+00 0.000E+00 0.000E+00 1 0 5.861E-01 1.496E-01 -7.963E-01 1.902E+00 1.000E+00 0.000E+00
6 0.000E+00 0.000E+00 0.000E+00 1 0 -6.489E-02 -1.626E-01 9.845E-01 4.410E-01 1.000E+00 0.000E+00
7 0.000E+00 0.000E+00 0.000E+00 1 0 -7.068E-02 3.263E-02 -9.970E-01 4.750E-01 1.000E+00 0.000E+00
8 0.000E+00 0.000E+00 0.000E+00 1 0 -3.915E-01 4.664E-01 -7.932E-01 4.136E+00 1.000E+00 0.000E+00
9 0.000E+00 0.000E+00 0.000E+00 1 0 -2.368E-01 9.215E-01 -3.079E-01 7.453E-02 1.000E+00 0.000E+00
10 0.000E+00 0.000E+00 0.000E+00 1 0 1.946E-01 -3.204E-01 9.271E-01 3.128E+00 1.000E+00 0.000E+00
11 0.000E+00 0.000E+00 0.000E+00 1 0 -6.698E-01 -7.177E-01 -1.905E-01 1.014E+00 1.000E+00 0.000E+00
12 0.000E+00 0.000E+00 0.000E+00 1 0 -8.398E-01 -4.129E-01 3.524E-01 1.395E+00 1.000E+00 0.000E+00
13 0.000E+00 0.000E+00 0.000E+00 1 0 -1.714E-01 -8.572E-01 4.857E-01 7.748E-01 1.000E+00 0.000E+00
14 0.000E+00 0.000E+00 0.000E+00 1 0 -2.489E-01 -5.118E-01 -8.222E-01 1.101E+00 1.000E+00 0.000E+00
15 0.000E+00 0.000E+00 0.000E+00 1 0 -2.959E-01 2.119E-01 9.314E-01 1.951E+00 1.000E+00 0.000E+00
16 0.000E+00 0.000E+00 0.000E+00 1 0 1.395E-01 -9.829E-01 1.202E-01 2.186E+00 1.000E+00 0.000E+00
17 0.000E+00 0.000E+00 0.000E+00 1 0 6.909E-01 -7.110E-01 1.307E-01 1.865E+00 1.000E+00 0.000E+00
18 0.000E+00 0.000E+00 0.000E+00 1 0 -6.580E-01 5.320E-01 -5.329E-01 1.229E+00 1.000E+00 0.000E+00
19 0.000E+00 0.000E+00 0.000E+00 1 0 -9.903E-01 -1.380E-01 1.533E-02 1.305E+00 1.000E+00 0.000E+00
20 0.000E+00 0.000E+00 0.000E+00 1 0 7.462E-01 4.859E-01 -4.551E-01 1.000E+00 1.000E+00 0.000E+00
21 0.000E+00 0.000E+00 0.000E+00 1 0 -1.977E-01 9.797E-01 3.360E-02 3.990E+00 1.000E+00 0.000E+00
22 0.000E+00 0.000E+00 0.000E+00 1 0 -9.117E-01 -3.647E-01 -1.891E-01 2.665E-01 1.000E+00 0.000E+00
23 0.000E+00 0.000E+00 0.000E+00 1 0 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
24 0.000E+00 0.000E+00 0.000E+00 1 0 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
25 0.000E+00 0.000E+00 0.000E+00 1 0 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
26 0.000E+00 0.000E+00 0.000E+00 1 0 -2.568E-01 -6.391E-01 -7.249E-01 4.225E+00 1.000E+00 0.000E+00
27 0.000E+00 0.000E+00 0.000E+00 1 0 -2.912E-01 8.086E-01 5.113E-01 1.079E+00 1.000E+00 0.000E+00
28 0.000E+00 0.000E+00 0.000E+00 1 0 1.472E-01 -9.514E-01 2.705E-01 3.461E+00 1.000E+00 0.000E+00
29 0.000E+00 0.000E+00 0.000E+00 1 0 -6.135E-01 -7.645E-01 -1.978E-01 1.836E+00 1.000E+00 0.000E+00
30 0.000E+00 0.000E+00 0.000E+00 1 0 -5.702E-01 5.651E-01 -5.963E-01 4.556E-01 1.000E+00 0.000E+00
31 0.000E+00 0.000E+00 0.000E+00 1 0 -6.607E-01 5.373E-01 -5.242E-01 6.415E-01 1.000E+00 0.000E+00
32 0.000E+00 0.000E+00 0.000E+00 1 0 -9.742E-02 -6.639E-01 -9.263E-01 2.764E+00 1.000E+00 0.000E+00
33 0.000E+00 0.000E+00 0.000E+00 1 0 -1.965E-01 -3.145E-01 -9.287E-01 2.785E-01 1.000E+00 0.000E+00
34 0.000E+00 0.000E+00 0.000E+00 1 0 4.097E-01 8.465E-01 -3.399E-01 9.097E-01 1.000E+00 0.000E+00
35 0.000E+00 0.000E+00 0.000E+00 1 0 -4.048E-02 8.831E-01 4.675E-01 3.360E-01 1.000E+00 0.000E+00
36 0.000E+00 0.000E+00 0.000E+00 1 0 3.371E-01 -9.269E-01 -1.652E-01 6.376E-01 1.000E+00 0.000E+00
37 0.000E+00 0.000E+00 0.000E+00 1 0 -1.867E-01 9.756E-01 -1.155E-01 2.186E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 0 -2.616E-01 2.336E-01 -9.365E-01 7.314E-01 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 0 9.780E-01 -7.641E-02 -1.939E-01 2.997E-01 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 0 2.580E-01 -7.076E-01 6.578E-01 1.444E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 0 -3.212E-01 -7.678E-01 -5.543E-01 1.914E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 0 5.039E-01 -1.460E-01 8.513E-01 1.502E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 0 6.080E-01 5.487E-01 5.738E-01 5.971E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 0 -2.932E-01 9.304E-01 -2.199E-01 1.827E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 0 -8.475E-01 -3.993E-01 -3.497E-01 1.928E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 0 1.200E-01 -9.195E-01 -3.743E-01 1.351E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 0 7.085E-01 5.879E-01 3.904E-01 2.288E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 0 4.261E-01 9.046E-01 9.254E-03 1.230E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 0 5.431E-01 4.270E-01 -7.230E-01 1.433E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 0 -1.053E-01 -9.805E-01 1.658E-01 6.572E-01 1.000E+00 0.000E+00

```

Estimated keff results by cycle

print table 175

cycle 1 k(collision) 1.248653 removal lifetime(abs) 6.3234E+03 source points generated 3666
wto, stabilizer, present s, previous 0.818 0.917 3666 3000

cycle 2 k(collision) 1.042100 removal lifetime(abs) 9.0733E+03 source points generated 2495
wto, stabilizer, present s, previous 1.202 1.093 2495 3666

cycle 3 k(collision) 0.957154 removal lifetime(abs) 9.8542E+03 source points generated 2760
wto, stabilizer, present s, previous 1.087 1.089 2760 2495

cycle 4 k(collision) 0.943441 removal lifetime(abs) 1.0334E+04 source points generated 2996
wto, stabilizer, present s, previous 1.001 1.067 2996 2760

cycle 5 k(collision) 0.924587 removal lifetime(abs) 9.7811E+03 source points generated 2904

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wto, stabilizer, present s, previous 1.033 1.085 2904 2996

cycle 6 k(collision) 0.917205 removal lifetime(abs) 1.0615E+04 source points generated 3029
wto, stabilizer, present s, previous 0.990 1.071 3029 2904

cycle 7 k(collision) 0.905071 removal lifetime(abs) 9.8719E+03 source points generated 2974
wto, stabilizer, present s, previous 1.009 1.079 2974 3029

dump no. 2 on file runtime nps = 20850 coll = 3376995 ctm = 15.20 rnm = 28058610

cycle 8 k(collision) 0.939985 removal lifetime(abs) 1.0312E+04 source points generated 3103
wto, stabilizer, present s, previous 0.967 1.059 3103 2974

cycle 9 k(collision) 0.923775 removal lifetime(abs) 9.8791E+03 source points generated 2919
wto, stabilizer, present s, previous 1.028 1.083 2919 3103

cycle 10 k(collision) 0.955142 removal lifetime(abs) 1.0302E+04 source points generated 3126
wto, stabilizer, present s, previous 0.960 1.055 3126 2919

source distribution written to file srcpt cycle = 10

cycle 11 k(collision) 0.921044 removal lifetime(abs) 1.0398E+04 source points generated 2945
wto, stabilizer, present s, previous 1.019 1.077 2945 3126

source distribution written to file srcpt cycle = 11

estimator	cycle	12	ave of	2 cycles	combination	simple average	combined average	corr
k(collision)	0.943276	0.932160	0.0119	k(col/abs)	0.000000	0.0000	0.0000	0.0000
k(absorption)	0.923331	0.915296	0.0088	k(abs/tk ln)	0.000000	0.0000	0.0000	0.0000
k(trk length)	0.938762	0.927667	0.0120	k(tk ln/col)	0.000000	0.0000	0.0000	0.0000
rem life(col)	1.0072E+04	1.0176E+04	0.0102					
rem life(abs)	1.0007E+04	1.0203E+04	0.0192	life(col/abs)	0.0000E+00	0.0000	0.0000E+00	0.0000
source points generated 3125								
wto, stabilizer, present s, previous	0.960	1.051	3125	2945				

source distribution written to file srcpt cycle = 12

estimator	cycle	13	ave of	3 cycles	combination	simple average	combined average	corr
k(collision)	0.942356	0.935559	0.0078	k(col/abs)	0.929834	0.0089	0.938022	0.0187
k(absorption)	0.941738	0.924110	0.0108	k(abs/tk ln)	0.927898	0.0091	0.933994	0.0162
k(trk length)	0.939724	0.931686	0.0081	k(tk ln/col)	0.933622	0.0079	0.955988	0.0434
rem life(col)	9.9273E+03	1.0093E+04	0.0101					
rem life(abs)	9.9894E+03	1.0132E+04	0.0132	life(col/abs)	1.0112E+04	0.0114	1.0064E+04	0.0148
source points generated 3009								
wto, stabilizer, present s, previous	0.997	1.060	3009	3125				

source distribution written to file srcpt cycle = 13

estimator	cycle	14	ave of	4 cycles	combination	simple average	combined average	corr
k(collision)	0.904911	0.927897	0.0099	k(col/abs)	0.924568	0.0085	0.922257	0.0118
k(absorption)	0.912630	0.921240	0.0083	k(abs/tk ln)	0.923330	0.0082	0.922480	0.0110
k(trk length)	0.906625	0.925421	0.0089	k(tk ln/col)	0.926659	0.0094	0.916707	0.0120
rem life(col)	9.9387E+03	1.0054E+04	0.0082	k(col/abs/tk ln)	0.924853	0.0086	0.914505	0.0182
rem life(abs)	9.8635E+03	1.0065E+04	0.0115	life(col/abs)	1.0060E+04	0.0097	1.0045E+04	0.0083
source points generated 2944								
wto, stabilizer, present s, previous	1.019	1.071	2944	3009				

source distribution written to file srcpt cycle = 14

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dump no. 3 on file runtime nps = 42051 coll = 7082984 ctm = 31.66 nrm = 58383140

estimator cycle 15 ave of 5 cycles combination simple average combined average corr
k(collision) 0.912226 0.924763 0.0084 k(col/abs) 0.922621 0.0069 0.920743 0.0080 0.7227
k(absorption) 0.917442 0.920480 0.0065 k(abs/tk ln) 0.921357 0.0067 0.920695 0.0076 0.7731
k(trk length) 0.909482 0.922233 0.0077 k(tk ln/col) 0.923498 0.0081 0.913686 0.0114 0.9924
rem life(col) 1.0540E+04 1.0152E+04 0.0114 k(col/abs/tk ln) 0.922492 0.0071 0.916685 0.0151
rem life(abs) 1.0548E+04 1.0161E+04 0.0130 life(col/abs) 1.0156E+04 0.0121 1.0143E+04 0.0127 0.9636
source points generated 3015
wto, stabilizer, present s, previous 0.995 1.064 3015 2944

source distribution written to file srcpt cycle = 15

estimator cycle 16 ave of 6 cycles combination simple average combined average corr
k(collision) 0.914272 0.923014 0.0072 k(col/abs) 0.922380 0.0057 0.921968 0.0060 0.6076
k(absorption) 0.928071 0.921745 0.0054 k(abs/tk ln) 0.922319 0.0055 0.921945 0.0061 0.7717
k(trk length) 0.926192 0.922893 0.0064 k(tk ln/col) 0.922954 0.0066 0.922869 0.0071 0.9212
rem life(col) 0.9112E+03 1.0112E+04 0.0102 k(col/abs/tk ln) 0.922551 0.0058 0.921880 0.0069
rem life(abs) 0.9153E+03 1.0120E+04 0.0114 life(col/abs) 1.0116E+04 0.0107 1.0103E+04 0.0110 0.9680
source points generated 3085
wto, stabilizer, present s, previous 0.972 1.051 3085 3015

source distribution written to file srcpt cycle = 16

estimator cycle 17 ave of 7 cycles combination simple average combined average corr
k(collision) 0.930079 0.924023 0.0061 k(col/abs) 0.922024 0.0048 0.921214 0.0053 0.4870
k(absorption) 0.909705 0.920025 0.0050 k(abs/tk ln) 0.921850 0.0047 0.921377 0.0055 0.6476
k(trk length) 0.928365 0.923675 0.0054 k(tk ln/col) 0.923849 0.0057 0.923594 0.0059 0.9231
rem life(col) 1.0351E+04 1.0146E+04 0.0092 k(col/abs/tk ln) 0.922574 0.0049 0.921283 0.0061
rem life(abs) 1.0323E+04 1.0149E+04 0.0100 life(col/abs) 1.0148E+04 0.0095 1.0144E+04 0.0099 0.9678
source points generated 3100
wto, stabilizer, present s, previous 0.968 1.041 3100 3085

source distribution written to file srcpt cycle = 17

estimator cycle 18 ave of 8 cycles combination simple average combined average corr
k(collision) 0.905804 0.921746 0.0059 k(col/abs) 0.920532 0.0045 0.919847 0.0046 0.5090
k(absorption) 0.914363 0.919318 0.0044 k(abs/tk ln) 0.920503 0.0043 0.919938 0.0047 0.6529
k(trk length) 0.907783 0.921688 0.0052 k(tk ln/col) 0.921717 0.0054 0.921666 0.0055 0.9366
rem life(col) 0.9108E+03 1.0116E+04 0.0085 k(col/abs/tk ln) 0.920917 0.0046 0.919840 0.0052
rem life(abs) 0.9984E+03 1.0130E+04 0.0089 life(col/abs) 1.0123E+04 0.0086 1.0116E+04 0.0094 0.9610
source points generated 2847
wto, stabilizer, present s, previous 1.054 1.079 2847 3100

source distribution written to file srcpt cycle = 18

estimator cycle 19 ave of 9 cycles combination simple average combined average corr
k(collision) 0.892830 0.918533 0.0063 k(col/abs) 0.917101 0.0054 0.916536 0.0059 0.6946
k(absorption) 0.886472 0.915668 0.0056 k(abs/tk ln) 0.916920 0.0055 0.916435 0.0060 0.8089
k(trk length) 0.890048 0.918172 0.0060 k(tk ln/col) 0.918353 0.0061 0.918168 0.0064 0.9543
rem life(col) 1.0278E+04 1.0134E+04 0.0077 k(col/abs/tk ln) 0.917458 0.0056 0.916333 0.0064
rem life(abs) 1.0287E+04 1.0148E+04 0.0080 life(col/abs) 1.0141E+04 0.0078 1.0134E+04 0.0084 0.9628
source points generated 2918
wto, stabilizer, present s, previous 1.028 1.080 2918 2847

source distribution written to file srcpt cycle = 19

estimator cycle 20 ave of 10 cycles combination simple average combined average corr
k(collision) 0.887805 0.915460 0.0065 k(col/abs) 0.914548 0.0056 0.913906 0.0058 0.7536

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k(absorption) 0.895348 0.913636 0.0055 k(abs/tk ln) 0.914267 0.0057 0.913652 0.0058 0.8407
k(trk length) 0.883429 0.914898 0.0064 k(tk ln/col) 0.915179 0.0064 0.915045 0.0069 0.9661
rem life(col) 1.0103E+04 1.0131E+04 0.0069 k(col/abs/tk ln) 0.914665 0.0059 0.914022 0.0060
rem life(abs) 1.0127E+04 1.0146E+04 0.0072 life(col/abs) 1.0139E+04 0.0070 1.0131E+04 0.0075 0.9627
source points generated 3057
wto, stabilizer, present s, previous 0.981 1.063 3057 2918

```

source distribution written to file srcpt cycle = 20

```

estimator cycle 21 ave of 11 cycles combination simple average combined average corr
k(collission) 0.879625 0.912203 0.0069 k(col/abs) 0.912265 0.0057 0.912332 0.0054 0.7639
k(absorption) 0.899244 0.912328 0.0051 k(abs/tk ln) 0.911925 0.0058 0.912494 0.0054 0.8313
k(trk length) 0.877759 0.911522 0.0069 k(tk ln/col) 0.911862 0.0069 0.911836 0.0073 0.9751
rem life(col) 1.0626E+04 1.0176E+04 0.0076 k(col/abs/tk ln) 0.912017 0.0061 0.913345 0.0054
rem life(abs) 1.0539E+04 1.0182E+04 0.0074 life(col/abs) 1.0179E+04 0.0074 1.0182E+04 0.0078 0.9661
source points generated 3096
wto, stabilizer, present s, previous 0.969 1.051 3096 3057

```

source distribution written to file srcpt cycle = 21

dump no. 4 on file runtime nps = 63017 coll = 10810468 ctm = 48.16 nm = 88775423

```

estimator cycle 22 ave of 12 cycles combination simple average combined average corr
k(collission) 0.929000 0.913602 0.0065 k(col/abs) 0.912967 0.0052 0.912287 0.0049 0.7426
k(absorption) 0.912366 0.912331 0.0047 k(abs/tk ln) 0.912859 0.0054 0.912167 0.0049 0.7911
k(trk length) 0.933897 0.913386 0.0066 k(tk ln/col) 0.913494 0.0065 0.913574 0.0068 0.9742
rem life(col) 1.0185E+04 1.0177E+04 0.0070 k(col/abs/tk ln) 0.913107 0.0056 0.912355 0.0050
rem life(abs) 1.0117E+04 1.0176E+04 0.0067 life(col/abs) 1.0177E+04 0.0068 1.0176E+04 0.0071 0.9623
source points generated 3246
wto, stabilizer, present s, previous 0.924 1.020 3246 3096

```

source distribution written to file srcpt cycle = 22

```

estimator cycle 23 ave of 13 cycles combination simple average combined average corr
k(collission) 0.909426 0.913281 0.0060 k(col/abs) 0.912824 0.0048 0.912336 0.0045 0.7407
k(absorption) 0.912792 0.912366 0.0043 k(abs/tk ln) 0.912833 0.0049 0.912222 0.0045 0.7909
k(trk length) 0.912252 0.913299 0.0061 k(tk ln/col) 0.913290 0.0060 0.913284 0.0063 0.9733
rem life(col) 1.0232E+04 1.0181E+04 0.0064 k(col/abs/tk ln) 0.912982 0.0052 0.912205 0.0045
rem life(abs) 1.0356E+04 1.0190E+04 0.0063 life(col/abs) 1.0186E+04 0.0063 1.0187E+04 0.0066 0.9519
source points generated 2919
wto, stabilizer, present s, previous 1.028 1.057 2919 3246

```

source distribution written to file srcpt cycle = 23

```

estimator cycle 24 ave of 14 cycles combination simple average combined average corr
k(collission) 0.884503 0.911226 0.0060 k(col/abs) 0.911627 0.0047 0.912081 0.0042 0.7182
k(absorption) 0.907627 0.912028 0.0040 k(abs/tk ln) 0.911492 0.0048 0.912198 0.0041 0.7552
k(trk length) 0.880510 0.910957 0.0062 k(tk ln/col) 0.911091 0.0061 0.911289 0.0063 0.9767
rem life(col) 1.0669E+04 1.0216E+04 0.0068 k(col/abs/tk ln) 0.911403 0.0051 0.912384 0.0042
rem life(abs) 1.0664E+04 1.0224E+04 0.0067 life(col/abs) 1.0220E+04 0.0067 1.0222E+04 0.0070 0.9637
source points generated 2913
wto, stabilizer, present s, previous 1.030 1.065 2913 2919

```

source distribution written to file srcpt cycle = 24

```

estimator cycle 25 ave of 15 cycles combination simple average combined average corr
k(collission) 0.903981 0.910743 0.0056 k(col/abs) 0.911907 0.0043 0.912953 0.0041 0.6562
k(absorption) 0.927667 0.913070 0.0039 k(abs/tk ln) 0.911705 0.0045 0.913110 0.0041 0.6834
k(trk length) 0.901685 0.910339 0.0058 k(tk ln/col) 0.910541 0.0057 0.910856 0.0058 0.9767

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```
rem life(col) 1.0259E+04 1.0219E+04 0.0064 k(col/abs/tk ln) 0.911384 0.0048 0.913319 0.0042
rem life(abs) 1.0298E+04 1.0229E+04 0.0063 life(col/abs) 1.0224E+04 0.0063 1.0226E+04 0.0066 0.9633
source points generated 3023
wto, stabilizer, present s, previous 0.992 1.054 3023 2913
```

source distribution written to file srcfp cycle = 25

```
estimator cycle 26 ave of 16 cycles combination simple average combined average corr
k(collision) 0.889938 0.909442 0.0055 k(col/abs) 0.910938 0.0042 0.912382 0.0039 0.6711
k(absorption) 0.902891 0.912434 0.0037 k(abs/tk ln) 0.910926 0.0043 0.912519 0.0039 0.6942
k(trk length) 0.895606 0.909418 0.0056 k(tk ln/col) 0.909430 0.0055 0.909439 0.0056 0.9745
rem life(col) 1.0035E+04 1.0207E+04 0.0061 k(col/abs/tk ln) 0.910432 0.0046 0.912476 0.0040
rem life(abs) 1.0042E+04 1.0217E+04 0.0060 life(col/abs) 1.0212E+04 0.0060 1.0214E+04 0.0062 0.9646
source points generated 2995
wto, stabilizer, present s, previous 1.002 1.056 2995 3023
```

source distribution written to file srcfp cycle = 26

```
estimator cycle 27 ave of 17 cycles combination simple average combined average corr
k(collision) 0.911987 0.909592 0.0051 k(col/abs) 0.911128 0.0040 0.912605 0.0037 0.6714
k(absorption) 0.916335 0.912664 0.0035 k(abs/tk ln) 0.910815 0.0040 0.912716 0.0037 0.6825
k(trk length) 0.901739 0.908966 0.0052 k(tk ln/col) 0.909279 0.0051 0.909491 0.0053 0.9666
rem life(col) 1.0203E+04 1.0207E+04 0.0057 k(col/abs/tk ln) 0.910407 0.0043 0.912815 0.0039
rem life(abs) 1.0164E+04 1.0214E+04 0.0056 life(col/abs) 1.0211E+04 0.0056 1.0212E+04 0.0058 0.9634
source points generated 3144
wto, stabilizer, present s, previous 0.954 1.032 3144 2995
```

source distribution written to file srcfp cycle = 27

```
estimator cycle 28 ave of 18 cycles combination simple average combined average corr
k(collision) 0.922602 0.910315 0.0049 k(col/abs) 0.911508 0.0038 0.912664 0.0035 0.6645
k(absorption) 0.913355 0.912702 0.0033 k(abs/tk ln) 0.911379 0.0038 0.912745 0.0035 0.6662
k(trk length) 0.928591 0.910057 0.0051 k(tk ln/col) 0.910186 0.0049 0.910324 0.0050 0.9651
rem life(col) 1.0363E+04 1.0216E+04 0.0054 k(col/abs/tk ln) 0.911024 0.0041 0.912746 0.0036
rem life(abs) 1.0295E+04 1.0219E+04 0.0053 life(col/abs) 1.0217E+04 0.0053 1.0218E+04 0.0055 0.9613
source points generated 3031
wto, stabilizer, present s, previous 0.990 1.039 3031 3144
```

source distribution written to file srcfp cycle = 28

dump no. 5 on file runtpe nps = 84353 coll = 14596629 ctm = 64.94 nm = 119647737

```
estimator cycle 29 ave of 19 cycles combination simple average combined average corr
k(collision) 0.897739 0.909653 0.0047 k(col/abs) 0.911731 0.0036 0.913134 0.0035 0.5559
k(absorption) 0.933730 0.913809 0.0034 k(abs/tk ln) 0.911667 0.0036 0.913282 0.0035 0.5730
k(trk length) 0.899964 0.909525 0.0048 k(tk ln/col) 0.909589 0.0047 0.909649 0.0048 0.9652
rem life(col) 9.9901E+03 1.0204E+04 0.0053 k(col/abs/tk ln) 0.910996 0.0039 0.913222 0.0036
rem life(abs) 1.0120E+04 1.0213E+04 0.0051 life(col/abs) 1.0209E+04 0.0051 1.0213E+04 0.0053 0.9550
source points generated 2891
wto, stabilizer, present s, previous 1.038 1.062 2891 3031
```

source distribution written to file srcfp cycle = 29

```
estimator cycle 30 ave of 20 cycles combination simple average combined average corr
k(collision) 0.924984 0.910419 0.0045 k(col/abs) 0.912334 0.0034 0.913680 0.0034 0.5679
k(absorption) 0.922613 0.914249 0.0032 k(abs/tk ln) 0.912191 0.0035 0.913769 0.0034 0.5822
k(trk length) 0.921658 0.910132 0.0046 k(tk ln/col) 0.910276 0.0045 0.910382 0.0047 0.9652
rem life(col) 1.0462E+04 1.0217E+04 0.0052 k(col/abs/tk ln) 0.911600 0.0038 0.913786 0.0035
rem life(abs) 1.0503E+04 1.0228E+04 0.0050 life(col/abs) 1.0222E+04 0.0050 1.0226E+04 0.0052 0.9574
```

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source points generated 3007

wto, stabilizer, present s, previous 0.998 1.051 3007 2891

source distribution written to file srcfp cycle = 30

estimator	cycle	31	ave of	21 cycles	combination	simple average	combined average	corr
k(collision)	0.911656	0.910478	0.0043	k(col/abs)	0.912781	0.0033	0.914172	0.0033 0.5484
k(absorption)	0.931787	0.915084	0.0032	k(abs/tk ln)	0.912594	0.0034	0.914232	0.0034 0.5558
k(trk length)	0.909533	0.910104	0.0044	k(tk ln/col)	0.910291	0.0043	0.910428	0.0044 0.9650
rem life(col)	1.0351E+04	1.0223E+04	0.0049	k(col/abs/tk ln)	0.911889	0.0036	0.914256	0.0034
rem life(abs)	1.0408E+04	1.0236E+04	0.0048	life(col/abs)	1.0230E+04	0.0048	1.0233E+04	0.0050 0.9572

source points generated 3007

wto, stabilizer, present s, previous 0.998 1.051 3007 3007

source distribution written to file srcfp cycle = 31

estimator	cycle	32	ave of	22 cycles	combination	simple average	combined average	corr
k(collision)	0.935305	0.911607	0.0043	k(col/abs)	0.913680	0.0033	0.915070	0.0033 0.5781
k(absorption)	0.929809	0.915754	0.0031	k(abs/tk ln)	0.913634	0.0034	0.915253	0.0033 0.5879
k(trk length)	0.941157	0.911515	0.0045	k(tk ln/col)	0.911561	0.0043	0.911622	0.0044 0.9668
rem life(col)	1.0066E+04	1.0216E+04	0.0048	k(col/abs/tk ln)	0.912958	0.0036	0.915134	0.0033
rem life(abs)	1.0149E+04	1.0232E+04	0.0046	life(col/abs)	1.0224E+04	0.0046	1.0230E+04	0.0049 0.9558

source points generated 3089

wto, stabilizer, present s, previous 0.971 1.036 3089 3007

source distribution written to file srcfp cycle = 32

estimator	cycle	33	ave of	23 cycles	combination	simple average	combined average	corr
k(collision)	0.895135	0.910734	0.0042	k(col/abs)	0.913425	0.0032	0.915134	0.0032 0.5281
k(absorption)	0.924070	0.916115	0.0030	k(abs/tk ln)	0.913416	0.0033	0.915356	0.0032 0.5447
k(trk length)	0.893135	0.910716	0.0044	k(tk ln/col)	0.910725	0.0043	0.910736	0.0043 0.9679
rem life(col)	1.0089E+04	1.0211E+04	0.0046	k(col/abs/tk ln)	0.912522	0.0035	0.915192	0.0032
rem life(abs)	1.0091E+04	1.0226E+04	0.0045	life(col/abs)	1.0218E+04	0.0045	1.0223E+04	0.0047 0.9564

source points generated 2914

wto, stabilizer, present s, previous 1.030 1.060 2914 3089

source distribution written to file srcfp cycle = 33

estimator	cycle	34	ave of	24 cycles	combination	simple average	combined average	corr
k(collision)	0.920370	0.911136	0.0040	k(col/abs)	0.913184	0.0030	0.914197	0.0030 0.4633
k(absorption)	0.894923	0.915232	0.0030	k(abs/tk ln)	0.913136	0.0031	0.914342	0.0031 0.4879
k(trk length)	0.918474	0.911039	0.0042	k(tk ln/col)	0.911087	0.0041	0.911142	0.0041 0.9679
rem life(col)	1.0436E+04	1.0220E+04	0.0045	k(col/abs/tk ln)	0.912469	0.0033	0.914283	0.0031
rem life(abs)	1.0333E+04	1.0231E+04	0.0043	life(col/abs)	1.0225E+04	0.0043	1.0230E+04	0.0044 0.9521

source points generated 3073

wto, stabilizer, present s, previous 0.976 1.040 3073 2914

source distribution written to file srcfp cycle = 34

estimator	cycle	35	ave of	25 cycles	combination	simple average	combined average	corr
k(collision)	0.942151	0.912376	0.0041	k(col/abs)	0.914292	0.0032	0.915335	0.0031 0.5242
k(absorption)	0.939606	0.916207	0.0031	k(abs/tk ln)	0.914230	0.0032	0.915454	0.0032 0.5428
k(trk length)	0.941376	0.912253	0.0042	k(tk ln/col)	0.912314	0.0041	0.912380	0.0042 0.9711
rem life(col)	1.0389E+04	1.0227E+04	0.0043	k(col/abs/tk ln)	0.913612	0.0034	0.915424	0.0032
rem life(abs)	1.0368E+04	1.0236E+04	0.0041	life(col/abs)	1.0231E+04	0.0042	1.0236E+04	0.0043 0.9528

source points generated 3121

wto, stabilizer, present s, previous 0.961 1.026 3121 3073

source distribution written to file srcfp cycle = 35

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dump no. 6 on file runtime nps = 105365 coll = 18303611 ctm = 81.38 nm = 149925933

```

estimator cycle 36 ave of 26 cycles combination simple average combined average corr
k(collision) 0.937235 0.913332 0.0041 k(col/abs) 0.914594 0.0030 0.915266 0.0030 0.4696
k(absorption) 0.907051 0.915855 0.0030 k(abs/tk ln) 0.914620 0.0031 0.915364 0.0030 0.4776
k(trk length) 0.941709 0.913386 0.0043 k(tk ln/col) 0.913359 0.0041 0.913320 0.0042 0.9726
rem life(col) 1.0259E+04 1.0228E+04 0.0042 k(col/abs/tk ln) 0.914191 0.0034 0.915255 0.0030
rem life(abs) 1.0232E+04 1.0236E+04 0.0040 life(col/abs) 1.0232E+04 0.0040 1.0236E+04 0.0041 0.9522
source points generated 3035
wto, stabilizer, present s, previous 0.988 1.031 3035 3121

```

source distribution written to file srcfp cycle = 36

```

estimator cycle 37 ave of 27 cycles combination simple average combined average corr
k(collision) 0.887277 0.912367 0.0041 k(col/abs) 0.914540 0.0029 0.915458 0.0029 0.3514
k(absorption) 0.939004 0.916712 0.0030 k(abs/tk ln) 0.914440 0.0030 0.915544 0.0030 0.3365
k(trk length) 0.880481 0.912167 0.0043 k(tk ln/col) 0.912267 0.0042 0.912470 0.0041 0.9735
rem life(col) 1.0065E+04 1.0222E+04 0.0041 k(col/abs/tk ln) 0.913749 0.0033 0.915475 0.0030
rem life(abs) 1.0176E+04 1.0234E+04 0.0038 life(col/abs) 1.0228E+04 0.0039 1.0234E+04 0.0040 0.9489
source points generated 2890
wto, stabilizer, present s, previous 1.038 1.054 2890 3035

```

source distribution written to file srcfp cycle = 37

```

estimator cycle 38 ave of 28 cycles combination simple average combined average corr
k(collision) 0.925880 0.912850 0.0040 k(col/abs) 0.914793 0.0028 0.915635 0.0028 0.3495
k(absorption) 0.917401 0.916737 0.0029 k(abs/tk ln) 0.914755 0.0029 0.915745 0.0028 0.3338
k(trk length) 0.929114 0.912772 0.0042 k(tk ln/col) 0.912811 0.0041 0.912895 0.0040 0.9738
rem life(col) 1.0751E+04 1.0241E+04 0.0043 k(col/abs/tk ln) 0.914120 0.0032 0.915627 0.0029
rem life(abs) 1.0730E+04 1.0252E+04 0.0041 life(col/abs) 1.0246E+04 0.0042 1.0253E+04 0.0042 0.9581
source points generated 3194
wto, stabilizer, present s, previous 0.939 1.014 3194 2890

```

source distribution written to file srcfp cycle = 38

```

estimator cycle 39 ave of 29 cycles combination simple average combined average corr
k(collision) 0.938240 0.913725 0.0039 k(col/abs) 0.915564 0.0029 0.916405 0.0028 0.3890
k(absorption) 0.936051 0.917403 0.0029 k(abs/tk ln) 0.915500 0.0029 0.916481 0.0028 0.3697
k(trk length) 0.936685 0.913597 0.0042 k(tk ln/col) 0.913661 0.0040 0.913792 0.0040 0.9748
rem life(col) 9.7501E+03 1.0224E+04 0.0045 k(col/abs/tk ln) 0.914908 0.0032 0.916409 0.0029
rem life(abs) 9.7370E+03 1.0234E+04 0.0043 life(col/abs) 1.0229E+04 0.0044 1.0234E+04 0.0044 0.9637
source points generated 3069
wto, stabilizer, present s, previous 0.978 1.019 3069 3194

```

source distribution written to file srcfp cycle = 39

```

estimator cycle 40 ave of 30 cycles combination simple average combined average corr
k(collision) 0.913799 0.913728 0.0038 k(col/abs) 0.915187 0.0028 0.915756 0.0028 0.3731
k(absorption) 0.894727 0.916647 0.0029 k(abs/tk ln) 0.915107 0.0029 0.915806 0.0028 0.3570
k(trk length) 0.912713 0.913567 0.0040 k(tk ln/col) 0.913648 0.0039 0.913811 0.0038 0.9748
rem life(col) 1.0210E+04 1.0223E+04 0.0043 k(col/abs/tk ln) 0.914647 0.0031 0.915773 0.0028
rem life(abs) 1.0112E+04 1.0230E+04 0.0042 life(col/abs) 1.0227E+04 0.0042 1.0230E+04 0.0043 0.9603
source points generated 2850
wto, stabilizer, present s, previous 1.053 1.053 2850 3069

```

source distribution written to file srcfp cycle = 40

```

estimator cycle 41 ave of 31 cycles combination simple average combined average corr
k(collision) 0.954537 0.915044 0.0039 k(col/abs) 0.915663 0.0028 0.915926 0.0027 0.2933
k(absorption) 0.905346 0.916282 0.0029 k(abs/tk ln) 0.915589 0.0028 0.915918 0.0027 0.2824
k(trk length) 0.954757 0.914896 0.0041 k(tk ln/col) 0.914970 0.0040 0.915125 0.0040 0.9779
rem life(col) 1.0272E+04 1.0225E+04 0.0042 k(col/abs/tk ln) 0.915408 0.0031 0.915949 0.0027

```

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```
rem life(abs) 1.0168E+04 1.0228E+04 0.0041 life(col/abs) 1.0226E+04 0.0041 1.0228E+04 0.0041 0.9568
source points generated 3135
wto, stabilizer, present s, previous 0.957 1.018 3135 2850
```

source distribution written to file srctp cycle = 41

```
estimator cycle 42 ave of 32 cycles combination simple average combined average corr
k(collission) 0.939394 0.915805 0.0039 k(col/abs) 0.916481 0.0028 0.916758 0.0027 0.3402
k(absorption) 0.944240 0.917156 0.0029 k(abs/tk ln) 0.916503 0.0029 0.916819 0.0028 0.3402
k(trk length) 0.945396 0.915849 0.0041 k(tk ln/col) 0.915827 0.0040 0.915773 0.0039 0.9783
rem life(col) 1.0099E+04 1.0221E+04 0.0041 k(col/abs/tk ln) 0.916270 0.0031 0.916726 0.0028
rem life(abs) 1.0124E+04 1.0225E+04 0.0039 life(col/abs) 1.0223E+04 0.0040 1.0224E+04 0.0040 0.9570
source points generated 2969
wto, stabilizer, present s, previous 1.010 1.036 2969 3135
```

source distribution written to file srctp cycle = 42

```
dump no. 7 on file runtp nps = 126659 coll = 22037596 ctm = 97.97 nm = 180461936
```

```
estimator cycle 43 ave of 33 cycles combination simple average combined average corr
k(collission) 0.888593 0.914981 0.0039 k(col/abs) 0.915959 0.0028 0.916397 0.0027 0.3492
k(absorption) 0.909950 0.916938 0.0029 k(abs/tk ln) 0.915859 0.0029 0.916437 0.0027 0.3488
k(trk length) 0.880604 0.914781 0.0042 k(tk ln/col) 0.914881 0.0040 0.915176 0.0039 0.9783
rem life(col) 1.0521E+04 1.0230E+04 0.0041 k(col/abs/tk ln) 0.915566 0.0031 0.916472 0.0027
rem life(abs) 1.0511E+04 1.0233E+04 0.0039 life(col/abs) 1.0232E+04 0.0039 1.0233E+04 0.0040 0.9591
source points generated 2847
wto, stabilizer, present s, previous 1.054 1.061 2847 2969
```

source distribution written to file srctp cycle = 43

```
estimator cycle 44 ave of 34 cycles combination simple average combined average corr
k(collission) 0.931223 0.915458 0.0038 k(col/abs) 0.915967 0.0027 0.916180 0.0026 0.3158
k(absorption) 0.901250 0.916476 0.0028 k(abs/tk ln) 0.915878 0.0028 0.916180 0.0027 0.3163
k(trk length) 0.931743 0.915280 0.0041 k(tk ln/col) 0.915369 0.0039 0.915636 0.0038 0.9789
rem life(col) 1.0178E+04 1.0229E+04 0.0039 k(col/abs/tk ln) 0.915738 0.0030 0.916261 0.0026
rem life(abs) 1.0156E+04 1.0231E+04 0.0038 life(col/abs) 1.0230E+04 0.0038 1.0231E+04 0.0039 0.9589
source points generated 3202
wto, stabilizer, present s, previous 0.937 1.017 3202 2847
```

source distribution written to file srctp cycle = 44

```
estimator cycle 45 ave of 35 cycles combination simple average combined average corr
k(collission) 0.896190 0.914908 0.0037 k(col/abs) 0.915509 0.0027 0.915768 0.0026 0.3317
k(absorption) 0.903633 0.916109 0.0028 k(abs/tk ln) 0.915485 0.0028 0.915802 0.0026 0.3275
k(trk length) 0.900577 0.914860 0.0040 k(tk ln/col) 0.914884 0.0039 0.914949 0.0037 0.9782
rem life(col) 1.0044E+04 1.0223E+04 0.0039 k(col/abs/tk ln) 0.915292 0.0030 0.915773 0.0026
rem life(abs) 1.0094E+04 1.0227E+04 0.0037 life(col/abs) 1.0225E+04 0.0037 1.0227E+04 0.0038 0.9591
source points generated 2922
wto, stabilizer, present s, previous 1.027 1.049 2922 3202
```

source distribution written to file srctp cycle = 45

```
estimator cycle 46 ave of 36 cycles combination simple average combined average corr
k(collission) 0.943133 0.915692 0.0037 k(col/abs) 0.915844 0.0026 0.915912 0.0025 0.3118
k(absorption) 0.911985 0.915995 0.0027 k(abs/tk ln) 0.915748 0.0027 0.915875 0.0025 0.3137
k(trk length) 0.937936 0.915501 0.0039 k(tk ln/col) 0.915597 0.0038 0.915812 0.0038 0.9778
rem life(col) 1.0612E+04 1.0234E+04 0.0039 k(col/abs/tk ln) 0.915729 0.0030 0.915982 0.0025
rem life(abs) 1.0496E+04 1.0235E+04 0.0037 life(col/abs) 1.0234E+04 0.0037 1.0235E+04 0.0037 0.9586
source points generated 3144
```


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wto, stabilizer, present s, previous 0.954 1.019 3144 2922

source distribution written to file srcfp cycle = 46

estimator	cycle	47	ave of 37 cycles	combination	simple average	combined average	corr
k(collision)	0.913919	0.915644	0.0036	k(col/abs)	0.915696	0.0026	0.915719 0.0024 0.3116
k(absorption)	0.906871	0.915748	0.0026	k(abs/tk ln)	0.915600	0.0026	0.915676 0.0025 0.3135
k(trk length)	0.913710	0.915452	0.0038	k(tk ln/col)	0.915548	0.0037	0.915765 0.0037 0.9778
rem life(col)	9.8895E+03	1.0225E+04	0.0039	k(col/abs/tk ln)	0.915615	0.0029	0.915791 0.0025
rem life(abs)	9.9727E+03	1.0227E+04	0.0036	life(col/abs)	1.0226E+04	0.0037	1.0228E+04 0.0037 0.9595
source points generated 2853							
wto, stabilizer, present s, previous 1.052 1.059 2853 3144							

source distribution written to file srcfp cycle = 47

estimator	cycle	48	ave of 38 cycles	combination	simple average	combined average	corr
k(collision)	0.893811	0.915070	0.0036	k(col/abs)	0.915041	0.0026	0.915028 0.0025 0.3451
k(absorption)	0.887745	0.915011	0.0027	k(abs/tk ln)	0.914947	0.0027	0.914979 0.0025 0.3443
k(trk length)	0.893806	0.914883	0.0038	k(tk ln/col)	0.914976	0.0037	0.915186 0.0036 0.9784
rem life(col)	1.0470E+04	1.0231E+04	0.0038	k(col/abs/tk ln)	0.914988	0.0029	0.915098 0.0025
rem life(abs)	1.0450E+04	1.0233E+04	0.0036	life(col/abs)	1.0232E+04	0.0037	1.0234E+04 0.0036 0.9605
source points generated 2864							
wto, stabilizer, present s, previous 1.047 1.071 2864 2853							

source distribution written to file srcfp cycle = 48

estimator	cycle	49	ave of 39 cycles	combination	simple average	combined average	corr
k(collision)	0.875777	0.914062	0.0037	k(col/abs)	0.914441	0.0026	0.914625 0.0025 0.3521
k(absorption)	0.907530	0.914820	0.0026	k(abs/tk ln)	0.914354	0.0027	0.914606 0.0025 0.3518
k(trk length)	0.876113	0.913889	0.0039	k(tk ln/col)	0.913976	0.0037	0.914165 0.0037 0.9800
rem life(col)	1.0676E+04	1.0243E+04	0.0039	k(col/abs/tk ln)	0.914257	0.0029	0.914682 0.0025
rem life(abs)	1.0727E+04	1.0246E+04	0.0037	life(col/abs)	1.0244E+04	0.0038	1.0247E+04 0.0038 0.9630
source points generated 2853							
wto, stabilizer, present s, previous 1.052 1.086 2853 2864							

source distribution written to file srcfp cycle = 49

dump no. 8 on file runtime nps = 147460 coll = 25772708 ctm = 114.50 nrm = 210865536

estimator	cycle	50	ave of 40 cycles	combination	simple average	combined average	corr
k(collision)	0.920473	0.914223	0.0036	k(col/abs)	0.914720	0.0026	0.914955 0.0024 0.3549
k(absorption)	0.930755	0.915218	0.0026	k(abs/tk ln)	0.914628	0.0026	0.914939 0.0025 0.3538
k(trk length)	0.919893	0.914039	0.0038	k(tk ln/col)	0.914131	0.0037	0.914331 0.0036 0.9801
rem life(col)	9.9312E+03	1.0235E+04	0.0039	k(col/abs/tk ln)	0.914493	0.0029	0.915013 0.0025
rem life(abs)	9.9445E+03	1.0238E+04	0.0037	life(col/abs)	1.0237E+04	0.0038	1.0239E+04 0.0037 0.9645
source points generated 3026							
wto, stabilizer, present s, previous 0.991 1.068 3026 2853							

source distribution written to file srcfp cycle = 50

estimator	cycle	51	ave of 41 cycles	combination	simple average	combined average	corr
k(collision)	0.911435	0.914155	0.0035	k(col/abs)	0.914370	0.0025	0.914461 0.0024 0.3479
k(absorption)	0.889313	0.914586	0.0026	k(abs/tk ln)	0.914282	0.0026	0.914427 0.0025 0.3460
k(trk length)	0.911563	0.913978	0.0037	k(tk ln/col)	0.914067	0.0036	0.914258 0.0035 0.9801
rem life(col)	1.0118E+04	1.0232E+04	0.0038	k(col/abs/tk ln)	0.914240	0.0028	0.914520 0.0025
rem life(abs)	1.0154E+04	1.0236E+04	0.0036	life(col/abs)	1.0234E+04	0.0037	1.0237E+04 0.0036 0.9645
source points generated 2966							
wto, stabilizer, present s, previous 1.011 1.077 2966 3026							

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source distribution written to file srcpt cycle = 51

```

estimator cycle 52 ave of 42 cycles combination simple average combined average corr
k(collison) 0.891961 0.913626 0.0035 k(col/abs) 0.914092 0.0025 0.914296 0.0024 0.3450
k(absorption) 0.913399 0.914558 0.0026 k(abs/tk ln) 0.914016 0.0026 0.914282 0.0024 0.3438
k(trk length) 0.892794 0.913474 0.0036 k(tk ln/col) 0.913550 0.0035 0.913711 0.0035 0.9805
rem life(col) 9.9132E+03 1.0224E+04 0.0038 k(col/abs/tk ln) 0.913886 0.0028 0.914342 0.0024
rem life(abs) 1.0019E+04 1.0231E+04 0.0036 life(col/abs) 1.0228E+04 0.0036 1.0233E+04 0.0036 0.9640
source points generated 2807
wto, stabilizer, present s, previous 1.069 1.111 2807 2966

```

source distribution written to file srcpt cycle = 52

```

estimator cycle 53 ave of 43 cycles combination simple average combined average corr
k(collison) 0.931407 0.914040 0.0034 k(col/abs) 0.914400 0.0024 0.914562 0.0024 0.3523
k(absorption) 0.923271 0.914760 0.0025 k(abs/tk ln) 0.914278 0.0025 0.914518 0.0024 0.3495
k(trk length) 0.927318 0.913796 0.0036 k(tk ln/col) 0.913918 0.0035 0.914151 0.0034 0.9802
rem life(col) 1.0370E+04 1.0228E+04 0.0037 k(col/abs/tk ln) 0.914199 0.0027 0.914624 0.0024
rem life(abs) 1.0309E+04 1.0233E+04 0.0035 life(col/abs) 1.0230E+04 0.0036 1.0235E+04 0.0035 0.9635
source points generated 3088
wto, stabilizer, present s, previous 0.972 1.079 3088 2807

```

source distribution written to file srcpt cycle = 53

```

estimator cycle 54 ave of 44 cycles combination simple average combined average corr
k(collison) 0.920506 0.914187 0.0033 k(col/abs) 0.914526 0.0024 0.914678 0.0023 0.3538
k(absorption) 0.919352 0.914865 0.0025 k(abs/tk ln) 0.914369 0.0025 0.914615 0.0023 0.3501
k(trk length) 0.917160 0.913872 0.0035 k(tk ln/col) 0.914030 0.0034 0.914320 0.0034 0.9799
rem life(col) 9.9881E+03 1.0222E+04 0.0037 k(col/abs/tk ln) 0.914308 0.0027 0.914752 0.0023
rem life(abs) 1.0000E+04 1.0228E+04 0.0034 life(col/abs) 1.0225E+04 0.0035 1.0230E+04 0.0035 0.9643
source points generated 2915
wto, stabilizer, present s, previous 1.029 1.103 2915 3088

```

source distribution written to file srcpt cycle = 54

```

estimator cycle 55 ave of 45 cycles combination simple average combined average corr
k(collison) 0.931295 0.914567 0.0033 k(col/abs) 0.914688 0.0023 0.914743 0.0022 0.3476
k(absorption) 0.912365 0.914809 0.0024 k(abs/tk ln) 0.914536 0.0024 0.914673 0.0023 0.3441
k(trk length) 0.931400 0.914262 0.0034 k(tk ln/col) 0.914414 0.0033 0.914699 0.0033 0.9802
rem life(col) 1.0746E+04 1.0234E+04 0.0038 k(col/abs/tk ln) 0.914546 0.0026 0.914817 0.0023
rem life(abs) 1.0707E+04 1.0238E+04 0.0035 life(col/abs) 1.0236E+04 0.0036 1.0240E+04 0.0035 0.9674
source points generated 3149
wto, stabilizer, present s, previous 0.953 1.071 3149 2915

```

source distribution written to file srcpt cycle = 55

```

estimator cycle 56 ave of 46 cycles combination simple average combined average corr
k(collison) 0.921682 0.914722 0.0032 k(col/abs) 0.914721 0.0023 0.914720 0.0022 0.3447
k(absorption) 0.910700 0.914720 0.0024 k(abs/tk ln) 0.914555 0.0023 0.914637 0.0022 0.3418
k(trk length) 0.920162 0.914390 0.0033 k(tk ln/col) 0.914556 0.0033 0.914861 0.0033 0.9802
rem life(col) 1.0278E+04 1.0235E+04 0.0037 k(col/abs/tk ln) 0.914611 0.0026 0.914801 0.0022
rem life(abs) 1.0316E+04 1.0240E+04 0.0034 life(col/abs) 1.0238E+04 0.0035 1.0242E+04 0.0035 0.9672
source points generated 2999
wto, stabilizer, present s, previous 1.000 1.084 2999 3149

```

source distribution written to file srcpt cycle = 56

dump no. 9 on file runpt nps = 168264 coll = 29459361 ctm = 130.85 nm = 240957558

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```

estimator cycle 57 ave of 47 cycles combination simple average combined average corr
k(collission) 0.901230 0.914435 0.0032 k(col/abs) 0.914305 0.0023 0.914249 0.0022 0.3569
k(absorption) 0.889094 0.914175 0.0024 k(abs/tk ln) 0.914131 0.0023 0.914152 0.0022 0.3545
k(trk length) 0.900134 0.914087 0.0033 k(tk ln/col) 0.914261 0.0032 0.914586 0.0032 0.9804
rem life(col) 1.0624E+04 1.0243E+04 0.0037 k(col/abs/tk ln) 0.914232 0.0025 0.914344 0.0022
rem life(abs) 1.0545E+04 1.0247E+04 0.0034 life(col/abs) 1.0245E+04 0.0035 1.0248E+04 0.0034 0.9680
source points generated 2951

```

wt0, stabilizer, present s, previous 1.017 1.093 2951 2999

source distribution written to file srcpt cycle = 57

```

estimator cycle 58 ave of 48 cycles combination simple average combined average corr
k(collission) 0.915781 0.914463 0.0031 k(col/abs) 0.914236 0.0022 0.914140 0.0022 0.3550
k(absorption) 0.906202 0.914009 0.0023 k(abs/tk ln) 0.913988 0.0023 0.913997 0.0022 0.3563
k(trk length) 0.908307 0.913966 0.0032 k(tk ln/col) 0.914215 0.0031 0.914659 0.0031 0.9791
rem life(col) 1.0274E+04 1.0244E+04 0.0036 k(col/abs/tk ln) 0.914146 0.0025 0.914289 0.0022
rem life(abs) 1.0196E+04 1.0245E+04 0.0033 life(col/abs) 1.0245E+04 0.0034 1.0246E+04 0.0034 0.9668
source points generated 3064

```

wt0, stabilizer, present s, previous 0.979 1.078 3064 2951

source distribution written to file srcpt cycle = 58

```

estimator cycle 59 ave of 49 cycles combination simple average combined average corr
k(collission) 0.913835 0.914450 0.0030 k(col/abs) 0.913972 0.0022 0.913793 0.0022 0.3458
k(absorption) 0.888794 0.913494 0.0024 k(abs/tk ln) 0.913774 0.0023 0.913656 0.0022 0.3385
k(trk length) 0.918263 0.914054 0.0032 k(tk ln/col) 0.914252 0.0031 0.914601 0.0031 0.9785
rem life(col) 1.0598E+04 1.0251E+04 0.0036 k(col/abs/tk ln) 0.913999 0.0024 0.913871 0.0022
rem life(abs) 1.0586E+04 1.0252E+04 0.0033 life(col/abs) 1.0252E+04 0.0034 1.0253E+04 0.0033 0.9681
source points generated 2935

```

wt0, stabilizer, present s, previous 1.022 1.096 2935 3064

source distribution written to file srcpt cycle = 59

```

estimator cycle 60 ave of 50 cycles combination simple average combined average corr
k(collission) 0.881313 0.913787 0.0031 k(col/abs) 0.913436 0.0023 0.913293 0.0022 0.3750
k(absorption) 0.892994 0.913084 0.0024 k(abs/tk ln) 0.913292 0.0023 0.913201 0.0022 0.3628
k(trk length) 0.886307 0.913499 0.0032 k(tk ln/col) 0.913643 0.0031 0.913835 0.0031 0.9785
rem life(col) 1.0871E+04 1.0264E+04 0.0037 k(col/abs/tk ln) 0.913457 0.0025 0.913303 0.0022
rem life(abs) 1.0814E+04 1.0264E+04 0.0035 life(col/abs) 1.0264E+04 0.0036 1.0264E+04 0.0034 0.9714
source points generated 2955

```

wt0, stabilizer, present s, previous 1.015 1.098 2955 2935

source distribution written to file srcpt cycle = 60

```

estimator cycle 61 ave of 51 cycles combination simple average combined average corr
k(collission) 0.884260 0.913208 0.0031 k(col/abs) 0.912838 0.0023 0.912690 0.0023 0.4101
k(absorption) 0.881665 0.912468 0.0024 k(abs/tk ln) 0.912709 0.0023 0.912606 0.0023 0.3954
k(trk length) 0.885512 0.912950 0.0032 k(tk ln/col) 0.913079 0.0031 0.913238 0.0031 0.9792
rem life(col) 1.0283E+04 1.0264E+04 0.0036 k(col/abs/tk ln) 0.912875 0.0025 0.912685 0.0023
rem life(abs) 1.0119E+04 1.0261E+04 0.0034 life(col/abs) 1.0262E+04 0.0035 1.0259E+04 0.0034 0.9673
source points generated 3070

```

wt0, stabilizer, present s, previous 0.977 1.082 3070 2955

source distribution written to file srcpt cycle = 61

```

estimator cycle 62 ave of 52 cycles combination simple average combined average corr
k(collission) 0.899745 0.912949 0.0030 k(col/abs) 0.912494 0.0023 0.912320 0.0022 0.4187
k(absorption) 0.890166 0.912039 0.0024 k(abs/tk ln) 0.912415 0.0023 0.912263 0.0022 0.3981
k(trk length) 0.904694 0.912792 0.0031 k(tk ln/col) 0.912870 0.0030 0.912955 0.0031 0.9786
rem life(col) 1.0787E+04 1.0274E+04 0.0037 k(col/abs/tk ln) 0.912593 0.0025 0.912298 0.0023
rem life(abs) 1.0778E+04 1.0271E+04 0.0035 life(col/abs) 1.0272E+04 0.0036 1.0269E+04 0.0035 0.9696
source points generated 3022

```

wt0, stabilizer, present s, previous 0.993 1.084 3022 3070

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source distribution written to file srcpt cycle = 62

```

estimator cycle 63 ave of 53 cycles combination simple average combined average corr
k(collission) 0.908677 0.912869 0.0030 k(col/abs) 0.912629 0.0023 0.912543 0.0022 0.4083
k(absorption) 0.930603 0.912389 0.0024 k(abs/tk ln) 0.912468 0.0023 0.912438 0.0022 0.3773
k(trk length) 0.899829 0.912547 0.0031 k(tk ln/col) 0.912708 0.0030 0.912891 0.0030 0.9770
rem life(col) 9.6582E+03 1.0262E+04 0.0038 k(col/abs/tk ln) 0.912602 0.0024 0.912472 0.0022
rem life(abs) 9.7305E+03 1.0261E+04 0.0035 life(col/abs) 1.0261E+04 0.0037 1.0259E+04 0.0035 0.9720
source points generated 2953
wto, stabilizer, present s, previous 1.016 1.095 2953 3022

```

source distribution written to file srcpt cycle = 63

dump no. 10 on file runtpe nps = 189260 coll = 33241907 ctm = 147.57 nm = 271739150

```

estimator cycle 64 ave of 54 cycles combination simple average combined average corr
k(collission) 0.919657 0.912994 0.0029 k(col/abs) 0.913057 0.0023 0.913074 0.0022 0.4012
k(absorption) 0.951857 0.913120 0.0025 k(abs/tk ln) 0.912832 0.0023 0.912915 0.0022 0.3566
k(trk length) 0.912361 0.912544 0.0030 k(tk ln/col) 0.912769 0.0029 0.913004 0.0030 0.9759
rem life(col) 9.6252E+03 1.0251E+04 0.0039 k(col/abs/tk ln) 0.912886 0.0024 0.912905 0.0023
rem life(abs) 9.5691E+03 1.0248E+04 0.0037 life(col/abs) 1.0249E+04 0.0038 1.0246E+04 0.0037 0.9737
source points generated 3053
wto, stabilizer, present s, previous 0.983 1.081 3053 2953

```

source distribution written to file srcpt cycle = 64

```

estimator cycle 65 ave of 55 cycles combination simple average combined average corr
k(collission) 0.910304 0.912945 0.0029 k(col/abs) 0.913133 0.0022 0.913182 0.0022 0.3979
k(absorption) 0.924099 0.913320 0.0024 k(abs/tk ln) 0.912914 0.0022 0.913028 0.0022 0.3539
k(trk length) 0.910543 0.912507 0.0029 k(tk ln/col) 0.912726 0.0029 0.912954 0.0029 0.9759
rem life(col) 1.0216E+04 1.0250E+04 0.0038 k(col/abs/tk ln) 0.912924 0.0024 0.913022 0.0022
rem life(abs) 1.0252E+04 1.0248E+04 0.0036 life(col/abs) 1.0249E+04 0.0037 1.0247E+04 0.0036 0.9736
source points generated 2897
wto, stabilizer, present s, previous 1.036 1.106 2897 3053

```

source distribution written to file srcpt cycle = 65

```

estimator cycle 66 ave of 56 cycles combination simple average combined average corr
k(collission) 0.888686 0.912512 0.0029 k(col/abs) 0.912863 0.0022 0.912962 0.0022 0.3999
k(absorption) 0.907378 0.913214 0.0024 k(abs/tk ln) 0.912668 0.0022 0.912829 0.0022 0.3568
k(trk length) 0.890901 0.912121 0.0029 k(tk ln/col) 0.912317 0.0029 0.912496 0.0029 0.9762
rem life(col) 1.0511E+04 1.0255E+04 0.0038 k(col/abs/tk ln) 0.912616 0.0023 0.912810 0.0022
rem life(abs) 1.0632E+04 1.0255E+04 0.0036 life(col/abs) 1.0255E+04 0.0037 1.0255E+04 0.0037 0.9721
source points generated 2938
wto, stabilizer, present s, previous 1.021 1.108 2938 2897

```

source distribution written to file srcpt cycle = 66

```

estimator cycle 67 ave of 57 cycles combination simple average combined average corr
k(collission) 0.893546 0.912179 0.0028 k(col/abs) 0.912791 0.0022 0.912963 0.0021 0.3838
k(absorption) 0.923939 0.913402 0.0024 k(abs/tk ln) 0.912620 0.0022 0.912849 0.0021 0.3440
k(trk length) 0.895955 0.911838 0.0029 k(tk ln/col) 0.912009 0.0028 0.912148 0.0029 0.9763
rem life(col) 1.0153E+04 1.0253E+04 0.0037 k(col/abs/tk ln) 0.912473 0.0023 0.912837 0.0022
rem life(abs) 1.0158E+04 1.0253E+04 0.0036 life(col/abs) 1.0253E+04 0.0036 1.0253E+04 0.0036 0.9721
source points generated 2989
wto, stabilizer, present s, previous 1.004 1.104 2989 2938

```

source distribution written to file srcpt cycle = 67

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```

estimator cycle 68 ave of 58 cycles combination simple average combined average corr
k(collission) 0.901271 0.911991 0.0028 k(col/abs) 0.912689 0.0021 0.912888 0.0021 0.3833
k(absorption) 0.912466 0.913386 0.0023 k(abs/tk ln) 0.912488 0.0021 0.912757 0.0021 0.3431
k(trk length) 0.897496 0.911591 0.0028 k(tk ln/col) 0.911791 0.0028 0.911969 0.0028 0.9763
rem life(col) 9.8480E+03 1.0246E+04 0.0037 k(col/abs/tk ln) 0.912323 0.0023 0.912746 0.0021
rem life(abs) 9.8779E+03 1.0247E+04 0.0036 life(col/abs) 1.0246E+04 0.0036 1.0247E+04 0.0036 0.9730
source points generated 2933
vto, stabilizer, present s, previous 1.023 1.116 2933 2989

```

source distribution written to file srcpt cycle = 68

```

estimator cycle 69 ave of 59 cycles combination simple average combined average corr
k(collission) 0.914266 0.912030 0.0027 k(col/abs) 0.912775 0.0021 0.912987 0.0021 0.3835
k(absorption) 0.921355 0.913521 0.0023 k(abs/tk ln) 0.912614 0.0021 0.912885 0.0021 0.3450
k(trk length) 0.918467 0.911707 0.0028 k(tk ln/col) 0.911869 0.0028 0.912015 0.0028 0.9759
rem life(col) 1.0141E+04 1.0244E+04 0.0037 k(col/abs/tk ln) 0.912419 0.0022 0.912885 0.0021
rem life(abs) 1.0097E+04 1.0244E+04 0.0035 life(col/abs) 1.0244E+04 0.0036 1.0244E+04 0.0035 0.9728
source points generated 3077
vto, stabilizer, present s, previous 0.975 1.096 3077 2933

```

source distribution written to file srcpt cycle = 69

```

estimator cycle 70 ave of 60 cycles combination simple average combined average corr
k(collission) 0.857833 0.911127 0.0029 k(col/abs) 0.912257 0.0021 0.912680 0.0021 0.3814
k(absorption) 0.905553 0.913388 0.0023 k(abs/tk ln) 0.912093 0.0021 0.912588 0.0021 0.3457
k(trk length) 0.837121 0.910797 0.0029 k(tk ln/col) 0.910962 0.0029 0.911118 0.0029 0.9787
rem life(col) 1.0264E+04 1.0244E+04 0.0036 k(col/abs/tk ln) 0.911771 0.0023 0.912577 0.0021
rem life(abs) 1.0392E+04 1.0246E+04 0.0035 life(col/abs) 1.0245E+04 0.0035 1.0247E+04 0.0035 0.9711
source points generated 2789
vto, stabilizer, present s, previous 1.076 1.147 2789 3077

```

source distribution written to file srcpt cycle = 70

dump no. 11 on file runtime nps = 210100 coll = 36935075 ctm = 163.92 nrm = 301842189

```

estimator cycle 71 ave of 61 cycles combination simple average combined average corr
k(collission) 0.896270 0.910883 0.0028 k(col/abs) 0.912352 0.0021 0.912840 0.0021 0.3517
k(absorption) 0.939772 0.913821 0.0023 k(abs/tk ln) 0.912165 0.0021 0.912733 0.0021 0.3132
k(trk length) 0.893181 0.910509 0.0029 k(tk ln/col) 0.910696 0.0029 0.910888 0.0029 0.9788
rem life(col) 9.6335E+03 1.0234E+04 0.0037 k(col/abs/tk ln) 0.911737 0.0023 0.912723 0.0021
rem life(abs) 9.7586E+03 1.0238E+04 0.0035 life(col/abs) 1.0236E+04 0.0036 1.0240E+04 0.0035 0.9719
source points generated 3207
vto, stabilizer, present s, previous 0.935 1.094 3207 2789

```

source distribution written to file srcpt cycle = 71

```

estimator cycle 72 ave of 62 cycles combination simple average combined average corr
k(collission) 0.964120 0.911742 0.0029 k(col/abs) 0.912704 0.0021 0.913068 0.0020 0.3081
k(absorption) 0.904248 0.913666 0.0022 k(abs/tk ln) 0.912534 0.0021 0.912975 0.0020 0.2708
k(trk length) 0.963893 0.911402 0.0030 k(tk ln/col) 0.911572 0.0030 0.911781 0.0030 0.9810
rem life(col) 1.0161E+04 1.0233E+04 0.0036 k(col/abs/tk ln) 0.912270 0.0023 0.912958 0.0021
rem life(abs) 1.0024E+04 1.0235E+04 0.0035 life(col/abs) 1.0234E+04 0.0035 1.0236E+04 0.0035 0.9698
source points generated 3180
vto, stabilizer, present s, previous 0.943 1.080 3180 3207

```

source distribution written to file srcpt cycle = 72

```

estimator cycle 73 ave of 63 cycles combination simple average combined average corr
k(collission) 0.906828 0.911664 0.0029 k(col/abs) 0.912891 0.0021 0.913309 0.0020 0.2940

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```

k(absorption) 0.942157 0.914118 0.0023 k(abs/tk ln) 0.912764 0.0021 0.913247 0.0020 0.2649
k(trk length) 0.911935 0.911410 0.0030 k(tk ln/col) 0.911537 0.0029 0.911686 0.0029 0.9805
rem life(col) 9.6892E+03 1.0225E+04 0.0037 k(col/abs/tk ln) 0.912397 0.0023 0.913254 0.0021
rem life(abs) 9.7431E+03 1.0227E+04 0.0035 life(col/abs) 1.0226E+04 0.0036 1.0228E+04 0.0035 0.9713
source points generated 2805
wto, stabilizer, present s, previous 1.070 1.138 2805 3180

```

source distribution written to file srcpt cycle = 73

```

estimator cycle 74 ave of 64 cycles combination simple average combined average corr
k(collision) 0.910511 0.911646 0.0029 k(col/abs) 0.912917 0.0020 0.913350 0.0020 0.2936
k(absorption) 0.918636 0.914189 0.0022 k(abs/tk ln) 0.912826 0.0021 0.913312 0.0020 0.2654
k(trk length) 0.914838 0.911464 0.0029 k(tk ln/col) 0.911555 0.0029 0.911661 0.0029 0.9801
rem life(col) 1.0044E+04 1.0222E+04 0.0036 k(col/abs/tk ln) 0.912433 0.0022 0.913315 0.0020
rem life(abs) 1.0076E+04 1.0225E+04 0.0034 life(col/abs) 1.0223E+04 0.0035 1.0226E+04 0.0035 0.9714
source points generated 3011
wto, stabilizer, present s, previous 0.996 1.117 3011 2805

```

source distribution written to file srcpt cycle = 74

```

estimator cycle 75 ave of 65 cycles combination simple average combined average corr
k(collision) 0.909168 0.911608 0.0028 k(col/abs) 0.912965 0.0020 0.913422 0.0020 0.2919
k(absorption) 0.922915 0.914323 0.0022 k(abs/tk ln) 0.912879 0.0020 0.913389 0.0020 0.2640
k(trk length) 0.909566 0.911435 0.0029 k(tk ln/col) 0.911521 0.0028 0.911622 0.0028 0.9801
rem life(col) 1.0189E+04 1.0221E+04 0.0036 k(col/abs/tk ln) 0.912455 0.0022 0.913391 0.0020
rem life(abs) 1.0154E+04 1.0224E+04 0.0034 life(col/abs) 1.0222E+04 0.0035 1.0225E+04 0.0034 0.9713
source points generated 3004
wto, stabilizer, present s, previous 0.999 1.118 3004 3011

```

source distribution written to file srcpt cycle = 75

```

estimator cycle 76 ave of 66 cycles combination simple average combined average corr
k(collision) 0.899767 0.911428 0.0028 k(col/abs) 0.912984 0.0020 0.913493 0.0020 0.2817
k(absorption) 0.928553 0.914539 0.0022 k(abs/tk ln) 0.912888 0.0020 0.913457 0.0020 0.2535
k(trk length) 0.898439 0.911238 0.0028 k(tk ln/col) 0.911333 0.0028 0.911446 0.0028 0.9802
rem life(col) 1.0113E+04 1.0220E+04 0.0035 k(col/abs/tk ln) 0.912402 0.0022 0.913459 0.0020
rem life(abs) 1.0210E+04 1.0224E+04 0.0033 life(col/abs) 1.0222E+04 0.0034 1.0225E+04 0.0034 0.9705
source points generated 3007
wto, stabilizer, present s, previous 0.998 1.117 3007 3004

```

source distribution written to file srcpt cycle = 76

```

estimator cycle 77 ave of 67 cycles combination simple average combined average corr
k(collision) 0.891150 0.911126 0.0028 k(col/abs) 0.912756 0.0020 0.913304 0.0019 0.2882
k(absorption) 0.904362 0.914387 0.0021 k(abs/tk ln) 0.912664 0.0020 0.913271 0.0019 0.2600
k(trk length) 0.891392 0.910942 0.0028 k(tk ln/col) 0.911034 0.0028 0.911141 0.0028 0.9805
rem life(col) 1.0845E+04 1.0229E+04 0.0036 k(col/abs/tk ln) 0.912151 0.0022 0.913271 0.0020
rem life(abs) 1.0853E+04 1.0233E+04 0.0034 life(col/abs) 1.0231E+04 0.0035 1.0234E+04 0.0034 0.9724
source points generated 3028
wto, stabilizer, present s, previous 0.991 1.112 3028 3007

```

source distribution written to file srcpt cycle = 77

```

*****
***
dump no. 12 on file runtime nps = 231103 coll = 40628225 ctm = 180.31 nrm = 332022295

```

```

estimator cycle 78 ave of 68 cycles combination simple average combined average corr
k(collision) 0.909814 0.911106 0.0027 k(col/abs) 0.912764 0.0019 0.913321 0.0019 0.2880
k(absorption) 0.916784 0.914422 0.0021 k(abs/tk ln) 0.912727 0.0020 0.913325 0.0019 0.2604
k(trk length) 0.917072 0.911032 0.0028 k(tk ln/col) 0.911069 0.0027 0.911112 0.0027 0.9795

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```
rem life(col) 9.8952E+03 1.0224E+04 0.0036 k(col/abs/tk ln) 0.912187 0.0021 0.913316 0.0019
rem life(abs) 9.9714E+03 1.0229E+04 0.0034 life(col/abs) 1.0227E+04 0.0035 1.0231E+04 0.0034 0.9726
source points generated 2933
wto, stabilizer, present s, previous 1.023 1.128 2933 3028
```

source distribution written to file srcpt cycle = 78

```
estimator cycle 79 ave of 69 cycles combination simple average combined average corr
k(collission) 0.899345 0.910936 0.0027 k(col/abs) 0.912853 0.0019 0.913448 0.0019 0.2700
k(absorption) 0.938467 0.914771 0.0021 k(abs/tk ln) 0.912785 0.0019 0.913438 0.0019 0.2384
k(trk length) 0.895037 0.910800 0.0028 k(tk ln/col) 0.910868 0.0027 0.910951 0.0027 0.9794
rem life(col) 1.0422E+04 1.0227E+04 0.0035 k(col/abs/tk ln) 0.912169 0.0021 0.913433 0.0019
rem life(abs) 1.0399E+04 1.0232E+04 0.0033 life(col/abs) 1.0229E+04 0.0034 1.0234E+04 0.0034 0.9727
source points generated 2977
wto, stabilizer, present s, previous 1.008 1.126 2977 2933
```

source distribution written to file srcpt cycle = 79

```
estimator cycle 80 ave of 70 cycles combination simple average combined average corr
k(collission) 0.910084 0.910924 0.0026 k(col/abs) 0.913089 0.0019 0.913667 0.0019 0.2604
k(absorption) 0.948637 0.915254 0.0021 k(abs/tk ln) 0.913002 0.0019 0.913648 0.0019 0.2259
k(trk length) 0.907239 0.910749 0.0027 k(tk ln/col) 0.910836 0.0027 0.910944 0.0027 0.9793
rem life(col) 1.0152E+04 1.0226E+04 0.0035 k(col/abs/tk ln) 0.912309 0.0021 0.913644 0.0019
rem life(abs) 1.0111E+04 1.0230E+04 0.0033 life(col/abs) 1.0228E+04 0.0034 1.0232E+04 0.0033 0.9725
source points generated 3099
wto, stabilizer, present s, previous 0.968 1.106 3099 2977
```

source distribution written to file srcpt cycle = 80

```
estimator cycle 81 ave of 71 cycles combination simple average combined average corr
k(collission) 0.902454 0.910804 0.0026 k(col/abs) 0.913007 0.0019 0.913598 0.0019 0.2612
k(absorption) 0.912022 0.915209 0.0021 k(abs/tk ln) 0.912923 0.0019 0.913581 0.0019 0.2267
k(trk length) 0.902806 0.910637 0.0027 k(tk ln/col) 0.910721 0.0026 0.910823 0.0026 0.9793
rem life(col) 1.0614E+04 1.0231E+04 0.0035 k(col/abs/tk ln) 0.912217 0.0020 0.913577 0.0019
rem life(abs) 1.0588E+04 1.0235E+04 0.0033 life(col/abs) 1.0233E+04 0.0034 1.0236E+04 0.0033 0.9731
source points generated 3002
wto, stabilizer, present s, previous 0.999 1.115 3002 3099
```

source distribution written to file srcpt cycle = 81

```
estimator cycle 82 ave of 72 cycles combination simple average combined average corr
k(collission) 0.901986 0.910682 0.0026 k(col/abs) 0.913004 0.0019 0.913623 0.0019 0.2572
k(absorption) 0.923678 0.915327 0.0021 k(abs/tk ln) 0.912935 0.0019 0.913618 0.0019 0.2237
k(trk length) 0.903895 0.910544 0.0026 k(tk ln/col) 0.910613 0.0026 0.910695 0.0026 0.9793
rem life(col) 1.0102E+04 1.0229E+04 0.0034 k(col/abs/tk ln) 0.912184 0.0020 0.913611 0.0019
rem life(abs) 1.0143E+04 1.0234E+04 0.0032 life(col/abs) 1.0232E+04 0.0033 1.0235E+04 0.0033 0.9731
source points generated 3031
wto, stabilizer, present s, previous 0.990 1.109 3031 3002
```

source distribution written to file srcpt cycle = 82

```
estimator cycle 83 ave of 73 cycles combination simple average combined average corr
k(collission) 0.900168 0.910538 0.0025 k(col/abs) 0.912820 0.0018 0.913417 0.0019 0.2622
k(absorption) 0.898895 0.915101 0.0021 k(abs/tk ln) 0.912716 0.0018 0.913395 0.0019 0.2319
k(trk length) 0.894934 0.910330 0.0026 k(tk ln/col) 0.910434 0.0026 0.910566 0.0026 0.9790
rem life(col) 1.0010E+04 1.0226E+04 0.0034 k(col/abs/tk ln) 0.911990 0.0020 0.913390 0.0019
rem life(abs) 1.0048E+04 1.0231E+04 0.0032 life(col/abs) 1.0229E+04 0.0033 1.0233E+04 0.0032 0.9733
source points generated 3024
wto, stabilizer, present s, previous 0.992 1.108 3024 3031
```

source distribution written to file srcpt cycle = 83

```
estimator cycle 84 ave of 74 cycles combination simple average combined average corr
```

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```

k(collision) 0.909523 0.910524 0.0025 k(col/abs) 0.912862 0.0018 0.913469 0.0018 0.2616
k(absorption) 0.922350 0.915199 0.0021 k(abs/tk ln) 0.912760 0.0018 0.913450 0.0018 0.2314
k(trk length) 0.909703 0.910321 0.0026 k(tk ln/col) 0.910423 0.0025 0.910552 0.0025 0.9790
rem life(col) 1.0013E+04 1.0224E+04 0.0034 k(col/abs/tk ln) 0.912015 0.0020 0.913444 0.0018
rem life(abs) 1.0023E+04 1.0228E+04 0.0032 life(col/abs) 1.0226E+04 0.0032 1.0230E+04 0.0032 0.9734
source points generated 2988
vto, stabilizer, present s, previous 1.004 1.112 2988 3024

```

source distribution written to file srcfp cycle = 84

dump no. 13 on file runtime nps = 252197 coll = 44347215 ctm = 196.79 nm = 362378838

```

estimator cycle 85 ave of 75 cycles combination simple average combined average corr
k(collision) 0.923011 0.910691 0.0025 k(col/abs) 0.912915 0.0018 0.913497 0.0018 0.2583
k(absorption) 0.910719 0.915140 0.0020 k(abs/tk ln) 0.912862 0.0018 0.913518 0.0018 0.2262
k(trk length) 0.929995 0.910584 0.0026 k(tk ln/col) 0.910637 0.0025 0.910712 0.0025 0.9784
rem life(col) 9.9902E+03 1.0220E+04 0.0033 k(col/abs/tk ln) 0.912138 0.0019 0.913496 0.0018
rem life(abs) 1.0080E+04 1.0226E+04 0.0031 life(col/abs) 1.0223E+04 0.0032 1.0229E+04 0.0032 0.9732
source points generated 3108
vto, stabilizer, present s, previous 0.965 1.092 3108 2988

```

source distribution written to file srcfp cycle = 85

```

estimator cycle 86 ave of 76 cycles combination simple average combined average corr
k(collision) 0.942692 0.911112 0.0025 k(col/abs) 0.913188 0.0018 0.913777 0.0018 0.2659
k(absorption) 0.924670 0.915265 0.0020 k(abs/tk ln) 0.913138 0.0018 0.913794 0.0018 0.2343
k(trk length) 0.943017 0.911010 0.0026 k(tk ln/col) 0.911061 0.0025 0.911133 0.0025 0.9792
rem life(col) 9.9645E+03 1.0217E+04 0.0033 k(col/abs/tk ln) 0.912462 0.0020 0.913776 0.0018
rem life(abs) 9.9202E+03 1.0222E+04 0.0031 life(col/abs) 1.0220E+04 0.0032 1.0225E+04 0.0031 0.9732
source points generated 3003
vto, stabilizer, present s, previous 0.999 1.101 3003 3108

```

source distribution written to file srcfp cycle = 86

```

estimator cycle 87 ave of 77 cycles combination simple average combined average corr
k(collision) 0.932800 0.911393 0.0025 k(col/abs) 0.913498 0.0018 0.914082 0.0018 0.2823
k(absorption) 0.941297 0.915603 0.0020 k(abs/tk ln) 0.913443 0.0018 0.914096 0.0018 0.2503
k(trk length) 0.932019 0.911283 0.0026 k(tk ln/col) 0.911338 0.0025 0.911415 0.0025 0.9794
rem life(col) 9.9278E+03 1.0213E+04 0.0033 k(col/abs/tk ln) 0.912760 0.0020 0.914080 0.0018
rem life(abs) 1.0045E+04 1.0220E+04 0.0031 life(col/abs) 1.0217E+04 0.0032 1.0223E+04 0.0031 0.9726
source points generated 3012
vto, stabilizer, present s, previous 0.996 1.099 3012 3003

```

source distribution written to file srcfp cycle = 87

```

estimator cycle 88 ave of 78 cycles combination simple average combined average corr
k(collision) 0.916907 0.911464 0.0024 k(col/abs) 0.913415 0.0018 0.913932 0.0018 0.2756
k(absorption) 0.897101 0.915366 0.0020 k(abs/tk ln) 0.913334 0.0018 0.913925 0.0018 0.2471
k(trk length) 0.912797 0.911303 0.0025 k(tk ln/col) 0.911383 0.0025 0.911493 0.0025 0.9792
rem life(col) 1.0235E+04 1.0214E+04 0.0032 k(col/abs/tk ln) 0.912711 0.0019 0.913916 0.0018
rem life(abs) 1.0237E+04 1.0220E+04 0.0031 life(col/abs) 1.0217E+04 0.0031 1.0223E+04 0.0031 0.9726
source points generated 2946
vto, stabilizer, present s, previous 1.018 1.111 2946 3012

```

source distribution written to file srcfp cycle = 88

```

estimator cycle 89 ave of 79 cycles combination simple average combined average corr
k(collision) 0.910723 0.911455 0.0024 k(col/abs) 0.913589 0.0018 0.914097 0.0018 0.2696
k(absorption) 0.943660 0.915724 0.0020 k(abs/tk ln) 0.913537 0.0018 0.914121 0.0018 0.2464

```


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k(trk length) 0.915053 0.911350 0.0025 k(tk ln/col) 0.911402 0.0024 0.911473 0.0024 0.9789
rem life(col) 9.7319E+03 1.0208E+04 0.0033 k(col/abs/tk ln) 0.912843 0.0019 0.914093 0.0018
rem life(abs) 9.6537E+03 1.0213E+04 0.0031 life(col/abs) 1.0210E+04 0.0032 1.0215E+04 0.0031 0.9728
source points generated 3024
wto, stabilizer, present s, previous 0.992 1.101 3024 2946

```

source distribution written to file srcfp cycle = 89

```

estimator cycle 90 ave of 80 cycles combination simple average combined average corr
k(collission) 0.915822 0.911509 0.0024 k(col/abs) 0.913575 0.0017 0.914063 0.0018 0.2681
k(absorption) 0.909008 0.915640 0.0020 k(abs/tk ln) 0.913543 0.0018 0.914101 0.0018 0.2439
k(trk length) 0.919071 0.911447 0.0025 k(tk ln/col) 0.911478 0.0024 0.911521 0.0024 0.9787
rem life(col) 1.0439E+04 1.0210E+04 0.0032 k(col/abs/tk ln) 0.912865 0.0019 0.914064 0.0018
rem life(abs) 1.0406E+04 1.0215E+04 0.0031 life(col/abs) 1.0213E+04 0.0031 1.0217E+04 0.0031 0.9729
source points generated 3106
wto, stabilizer, present s, previous 0.966 1.085 3106 3024

```

source distribution written to file srcfp cycle = 90

```

estimator cycle 91 ave of 81 cycles combination simple average combined average corr
k(collission) 0.870225 0.911000 0.0024 k(col/abs) 0.913299 0.0018 0.913922 0.0018 0.2660
k(absorption) 0.912330 0.915599 0.0020 k(abs/tk ln) 0.913282 0.0018 0.913964 0.0018 0.2431
k(trk length) 0.872490 0.910966 0.0025 k(tk ln/col) 0.910983 0.0024 0.911003 0.0024 0.9796
rem life(col) 1.0181E+04 1.0210E+04 0.0032 k(col/abs/tk ln) 0.912521 0.0019 0.913928 0.0018
rem life(abs) 1.0174E+04 1.0215E+04 0.0030 life(col/abs) 1.0212E+04 0.0031 1.0217E+04 0.0030 0.9729
source points generated 2944
wto, stabilizer, present s, previous 1.019 1.105 2944 3106

```

source distribution written to file srcfp cycle = 91

dump no. 14 on file runtime nps = 273384 coll = 48053034 ctm = 213.24 nm = 392669349

```

estimator cycle 92 ave of 82 cycles combination simple average combined average corr
k(collission) 0.912163 0.911014 0.0024 k(col/abs) 0.913194 0.0017 0.913759 0.0017 0.2630
k(absorption) 0.897081 0.915373 0.0020 k(abs/tk ln) 0.913179 0.0017 0.913800 0.0017 0.2401
k(trk length) 0.912528 0.910985 0.0025 k(tk ln/col) 0.910999 0.0024 0.911017 0.0024 0.9796
rem life(col) 1.0179E+04 1.0210E+04 0.0031 k(col/abs/tk ln) 0.912457 0.0019 0.913765 0.0018
rem life(abs) 1.0092E+04 1.0213E+04 0.0030 life(col/abs) 1.0212E+04 0.0031 1.0215E+04 0.0030 0.9723
source points generated 3115
wto, stabilizer, present s, previous 0.963 1.081 3115 2944

```

source distribution written to file srcfp cycle = 92

```

estimator cycle 93 ave of 83 cycles combination simple average combined average corr
k(collission) 0.943919 0.911410 0.0024 k(col/abs) 0.913406 0.0017 0.913964 0.0017 0.2615
k(absorption) 0.917695 0.915401 0.0019 k(abs/tk ln) 0.913382 0.0017 0.913989 0.0017 0.2393
k(trk length) 0.942410 0.911363 0.0025 k(tk ln/col) 0.911387 0.0024 0.911414 0.0024 0.9802
rem life(col) 1.0554E+04 1.0214E+04 0.0031 k(col/abs/tk ln) 0.912725 0.0019 0.913966 0.0017
rem life(abs) 1.0569E+04 1.0218E+04 0.0030 life(col/abs) 1.0216E+04 0.0030 1.0219E+04 0.0030 0.9727
source points generated 3058
wto, stabilizer, present s, previous 0.981 1.080 3058 3115

```

source distribution written to file srcfp cycle = 93

```

estimator cycle 94 ave of 84 cycles combination simple average combined average corr
k(collission) 0.915820 0.911463 0.0024 k(col/abs) 0.913503 0.0017 0.914067 0.0017 0.2626
k(absorption) 0.927299 0.915543 0.0019 k(abs/tk ln) 0.913465 0.0017 0.914081 0.0017 0.2393
k(trk length) 0.913327 0.911387 0.0024 k(tk ln/col) 0.911425 0.0024 0.911468 0.0024 0.9801
rem life(col) 1.0006E+04 1.0211E+04 0.0031 k(col/abs/tk ln) 0.912797 0.0019 0.914063 0.0017

```

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```
rem life(abs) 1.0005E+04 1.0215E+04 0.0030 life(col/abs) 1.0213E+04 0.0030 1.0216E+04 0.0030 0.9729
source points generated 2922
wto, stabilizer, present s, previous 1.027 1.101 2922 3058
```

```
source distribution written to file srctp cycle = 94
```

```
estimator cycle 95 ave of 85 cycles combination simple average combined average corr
k(collission) 0.916206 0.911519 0.0023 k(col/abs) 0.913651 0.0017 0.914217 0.0017 0.2636
k(absorption) 0.935955 0.915783 0.0019 k(abs/tk ln) 0.913618 0.0017 0.914237 0.0017 0.2411
k(trk length) 0.916936 0.911452 0.0024 k(tk ln/col) 0.911485 0.0024 0.911523 0.0024 0.9801
rem life(col) 1.0212E+04 1.0211E+04 0.0031 k(col/abs/tk ln) 0.912918 0.0018 0.914215 0.0017
rem life(abs) 1.0196E+04 1.0215E+04 0.0029 life(col/abs) 1.0213E+04 0.0030 1.0216E+04 0.0029 0.9729
source points generated 2958
wto, stabilizer, present s, previous 1.014 1.101 2958 2922
```

```
source distribution written to file srctp cycle = 95
```

```
estimator cycle 96 ave of 86 cycles combination simple average combined average corr
k(collission) 0.937439 0.911820 0.0023 k(col/abs) 0.913581 0.0017 0.913976 0.0017 0.2180
k(absorption) 0.9278727 0.915342 0.0020 k(abs/tk ln) 0.913538 0.0017 0.913979 0.0017 0.1997
k(trk length) 0.935721 0.911734 0.0024 k(tk ln/col) 0.911777 0.0024 0.911823 0.0024 0.9804
rem life(col) 1.0815E+04 1.0218E+04 0.0031 k(col/abs/tk ln) 0.912965 0.0018 0.913968 0.0017
rem life(abs) 1.0698E+04 1.0221E+04 0.0029 life(col/abs) 1.0219E+04 0.0030 1.0222E+04 0.0029 0.9734
source points generated 3110
wto, stabilizer, present s, previous 0.965 1.078 3110 2958
```

```
source distribution written to file srctp cycle = 96
```

```
estimator cycle 97 ave of 87 cycles combination simple average combined average corr
k(collission) 0.937385 0.912114 0.0023 k(col/abs) 0.913805 0.0017 0.914200 0.0017 0.2271
k(absorption) 0.928727 0.915496 0.0019 k(abs/tk ln) 0.913734 0.0017 0.914174 0.0017 0.2073
k(trk length) 0.932375 0.911971 0.0024 k(tk ln/col) 0.912043 0.0023 0.912107 0.0024 0.9803
rem life(col) 1.0382E+04 1.0220E+04 0.0031 k(col/abs/tk ln) 0.913194 0.0018 0.914175 0.0017
rem life(abs) 1.0373E+04 1.0222E+04 0.0029 life(col/abs) 1.0221E+04 0.0030 1.0223E+04 0.0029 0.9735
source points generated 3022
wto, stabilizer, present s, previous 0.993 1.084 3022 3110
```

```
source distribution written to file srctp cycle = 97
```

```
estimator cycle 98 ave of 88 cycles combination simple average combined average corr
k(collission) 0.906098 0.912045 0.0023 k(col/abs) 0.913721 0.0017 0.914112 0.0017 0.2284
k(absorption) 0.906781 0.915397 0.0019 k(abs/tk ln) 0.913674 0.0017 0.914101 0.0017 0.2074
k(trk length) 0.910240 0.911952 0.0024 k(tk ln/col) 0.911999 0.0023 0.912039 0.0023 0.9800
rem life(col) 9.8583E+03 1.0216E+04 0.0031 k(col/abs/tk ln) 0.913131 0.0018 0.914096 0.0017
rem life(abs) 9.9428E+03 1.0219E+04 0.0029 life(col/abs) 1.0218E+04 0.0030 1.0221E+04 0.0029 0.9736
source points generated 2844
wto, stabilizer, present s, previous 1.055 1.117 2844 3022
```

```
source distribution written to file srctp cycle = 98
```

```
*****
```

```
***
```

```
dump no. 15 on file runtime nps = 294513 coll = 51806807 ctm = 229.88 nm = 423297358
```

```
estimator cycle 99 ave of 89 cycles combination simple average combined average corr
k(collission) 0.928945 0.912235 0.0023 k(col/abs) 0.913761 0.0016 0.914117 0.0016 0.2213
k(absorption) 0.905575 0.915286 0.0019 k(abs/tk ln) 0.913704 0.0016 0.914095 0.0016 0.2013
k(trk length) 0.927030 0.912121 0.0023 k(tk ln/col) 0.912178 0.0023 0.912225 0.0023 0.9801
rem life(col) 1.0471E+04 1.0219E+04 0.0030 k(col/abs/tk ln) 0.913214 0.0018 0.914095 0.0016
rem life(abs) 1.0574E+04 1.0223E+04 0.0029 life(col/abs) 1.0221E+04 0.0029 1.0225E+04 0.0029 0.9730
source points generated 3012
```

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wt0, stabilizer, present s, previous 0.996 1.100 3012 2844

source distribution written to file srcp cycle = 99

estimator	cycle	100	ave of	90 cycles	combination	simple average	combined average	corr
k(collision)	0.904203	0.912146	0.0023	k(col/abs)	0.913717	0.0016	0.914086	0.0016 0.2210
k(absorption)	0.915462	0.915288	0.0019	k(abs/tk ln)	0.913665	0.0016	0.914068	0.0016 0.2011
k(trk length)	0.904885	0.912041	0.0023	k(tk ln/col)	0.912093	0.0023	0.912136	0.0023 0.9801
rem life(col)	1.0177E+04	1.0219E+04	0.0030	k(col/abs/tk ln)	0.913158	0.0018	0.914066	0.0016
rem life(abs)	1.0306E+04	1.0224E+04	0.0029	life(col/abs)	1.0221E+04	0.0029	1.0226E+04	0.0029 0.9719
source points generated	2908							
wt0, stabilizer, present s, previous	1.032	1.119	2908	3012				

source distribution written to file srcp cycle = 100

1 problem summary

run terminated when 100 kcode cycles were done.

09/02/98 19:31:11

+ 5% plutonium in WRAP 450 g

probid = 09/02/98 15:35:27

0

neutron creation	tracks	weight	energy	neutron loss	tracks	weight	energy
(per source particle)				(per source particle)			
source	300369	9.9877E-01	2.1065E+00	escape	3302	8.2589E-03	1.4616E-02
			energy cutoff	0 0.			0.
			time cutoff	0 0.			0.
weight window	0 0.	0.	weight window	0 0.	0.		0.
cell importance	0 0.	0.	cell importance	0 0.	0.		0.
weight cutoff	0 9.3939E-02	4.0483E-08	weight cutoff	297069	9.3979E-02	4.0286E-08	
energy importance	0 0.	0.	energy importance	0 0.	0.		0.
dxtan	0 0.	0.	dxtan	0 0.	0.		0.
forced collisions	0 0.	0.	forced collisions	0 0.	0.		0.
exp. transform	0 0.	0.	exp. transform	0 0.	0.		0.
upscattering	0 0.	5.8188E-07	downscattering	0 0.	2.0708E+00		
			capture	0 6.7268E-01	1.9150E-02		
(n,xn)	4 8.9613E-06	3.6331E-06	loss to (n,xn)	2 4.4806E-06	3.6275E-05		
fission	0 0.	0.	loss to fission	0 3.1779E-01	1.8908E-03		
total	300373	1.0927E+00	2.1065E+00	total	300373	1.0927E+00	2.1065E+00

number of neutrons banked	2	average lifetime, shakes	cutoffs
neutron tracks per source particle	1.0000E+00	escape	6.3628E+03 tco 1.0000E+34
neutron collisions per source particle	1.7601E+02	capture	1.0197E+04 eco 0.0000E+00
total neutron collisions	52866920	capture or escape	1.0165E+04 we1 -5.0000E-01
net multiplication	1.0000E+00 0.0001	any termination	1.2589E+04 we2 -2.5000E-01

computer time so far in this run	234.61 minutes	maximum number ever in bank	1
computer time in merun	234.57 minutes	bank overflows to backup file	0
source particles per minute	1.2805E+03	field length	0
random numbers generated	431921261	most random numbers used was	14055 in history 46583

range of sampled source weights = 8.1833E-01 to 1.2024E+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	497895	300371	11578325	3.0978E+01	2.9506E-04	7.0919E-01	8.9324E-01	1.6052E+00
2	2	303774	170576	41288595	7.1561E+01	4.5435E-05	2.6400E-01	5.7850E-01	8.0394E-01
total		801669	470947	52866920	1.0254E+02				

1 neutron weight balance in each cell -- external events

print table 130

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	cell	entering	source	energy	time	exiting	total		
		cutoff		cutoff					
1	1	4.5835E-01	9.9877E-01	0.0000E+00	0.0000E+00	-8.4987E-01	6.0725E-01		
2	2	8.4987E-01	0.0000E+00	0.0000E+00	0.0000E+00	-4.6661E-01	3.8327E-01		
total 1.3082E+00 9.9877E-01 0.0000E+00 0.0000E+00 -1.3165E+00 9.9051E-01									
1neutron 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	1	0.0000E+00	0.0000E+00	2.7806E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.7806E-04
2	2	0.0000E+00	0.0000E+00	-3.1792E-04	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	-3.1792E-04
total 0.0000E+00 0.0000E+00 -3.9852E-05 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00 -3.9852E-05									
1neutron weight balance in each cell -- physical events print table 130									
	cell	(n,xn)	fission	capture	loss to	loss to	total		
			(n,xn)	fission					
1	1	8.9613E-06	0.0000E+00	-2.8974E-01	-4.4806E-06	-3.1779E-01	-6.0753E-01		
2	2	0.0000E+00	0.0000E+00	-3.8295E-01	0.0000E+00	0.0000E+00	-3.8295E-01		
total 8.9613E-06 0.0000E+00 -6.7268E-01 -4.4806E-06 -3.1779E-01 -9.9047E-01									
1neutron 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)		
1	1	94239.55c	6.5159E-04	176905	4.4729E-01	1.3375E-01	3.0259E-01	4.4806E-06	
		94240.50c	7.7246E-05	12471	3.6166E-02	3.3462E-02	6.6588E-05	0.0000E+00	
		94241.50c	2.5642E-05	8503	2.1019E-02	5.3920E-03	1.5134E-02	0.0000E+00	
		1001.50c	6.6606E-01	10615682	2.8226E+01	1.1500E-01	0.0000E+00	0.0000E+00	
		8016.50c	3.3319E-01	764764	2.2474E+00	2.1335E-03	0.0000E+00	0.0000E+00	
2	2	8016.50c	3.3337E-01	1793388	3.3945E+00	1.3662E-03	0.0000E+00	0.0000E+00	
		1001.50c	6.6663E-01	39495207	6.8166E+01	3.8158E-01	0.0000E+00	0.0000E+00	
total 52866920 1.0254E+02 6.7268E-01 3.1779E-01 4.4806E-06									
total over all cells for each nuclide total collisions weight lost weight loss weight gain									
		collisions	* weight	to capture	to fission	by (n,xn)			
	1001.50c	50110889	9.6392E+01	4.9658E-01	0.0000E+00	0.0000E+00			
	8016.50c	2558152	5.6419E+00	3.4997E-03	0.0000E+00	0.0000E+00			
	94239.55c	176905	4.4729E-01	1.3375E-01	3.0259E-01	4.4806E-06			
	94240.50c	12471	3.6166E-02	3.3462E-02	6.6588E-05	0.0000E+00			
	94241.50c	8503	2.1019E-02	5.3920E-03	1.5134E-02	0.0000E+00			
1keff results for: 5% plutonium in WRAP 450 g probid = 09/02/98 15:35:27									

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 10 cycles and run a total of 100 cycles with nominally 3000 neutrons per cycle.
this problem has run 10 inactive cycles with 29846 neutron histories and 90 active cycles with 270523 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 300369 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

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the k(collision) cycle values appear normally distributed at the 95 percent confidence level
the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

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|-----|
| the final estimated combined collision/absorption/track-length keff = 0.91407 with an estimated standard deviation of 0.00149 |
|-----|
| the estimated 68, 95, & 99 percent keff confidence intervals are 0.91258 to 0.91555, 0.91110 to 0.91703, and 0.91014 to 0.91799 |
|-----|
| the estimated collision/absorption neutron removal lifetime = 1.02E-04 seconds with an estimated standard deviation of 2.94E-07 |
|-----|

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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	0.91215	0.00207	0.91007 to 0.91422	0.90802 to 0.91627	0.90667 to 0.91762	
absorption	0.91529	0.00172	0.91357 to 0.91701	0.91186 to 0.91872	0.91074 to 0.91984	
track length	0.91204	0.00211	0.90993 to 0.91415	0.90785 to 0.91624	0.90648 to 0.91761	
col/absorp	0.91409	0.00148	0.91260 to 0.91557	0.91113 to 0.91704	0.91017 to 0.91800	0.2210
abs/trk len	0.91407	0.00148	0.91259 to 0.91555	0.91112 to 0.91702	0.91016 to 0.91798	0.2011
col/trk len	0.91214	0.00208	0.91005 to 0.91422	0.90798 to 0.91629	0.90663 to 0.91764	0.9801
col/abs/trk len	0.91407	0.00149	0.91258 to 0.91555	0.91110 to 0.91703	0.91014 to 0.91799	

if the largest of each keff occurred on the next cycle, the keff results and 68, 95, and 99 percent confidence intervals would be:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence
collision	0.91272	0.00213	0.91059 to 0.91485	0.90848 to 0.91696	0.90710 to 0.91834
absorption	0.91569	0.00175	0.91394 to 0.91744	0.91221 to 0.91917	0.91107 to 0.92031
track length	0.91263	0.00217	0.91046 to 0.91480	0.90832 to 0.91695	0.90691 to 0.91835
col/abs/trk len	0.91458	0.00155	0.91304 to 0.91613	0.91150 to 0.91766	0.91050 to 0.91867

the estimated collision/absorption neutron lifetimes, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

type	lifetime(sec)	standard deviation	68% confidence	95% confidence	99% confidence
removal	1.0226E-04	2.9394E-07	1.0197E-04 to 1.0256E-04	1.0168E-04 to 1.0285E-04	1.0148E-04 to 1.0304E-04
capture	1.0263E-04	2.6257E-07	1.0236E-04 to 1.0289E-04	1.0210E-04 to 1.0315E-04	1.0193E-04 to 1.0332E-04
fission	5.1616E-05	1.2137E-07	5.1495E-05 to 5.1738E-05	5.1375E-05 to 5.1858E-05	5.1296E-05 to 5.1937E-05
escape	6.4613E-05	2.2273E-06	6.2384E-05 to 6.6843E-05	6.0177E-05 to 6.9050E-05	5.8729E-05 to 7.0498E-05

average keff results summed over 2 cycles each to form 45 batch values of keff print table 178

batch number	start cycle	end cycle	keff estimators by batch k(coll) k(abs) k(track)	average keff estimators and deviations k(coll) st dev k(abs) st dev k(track) st dev	col/abs/tl keff k(c/a/t) st dev
1	11	12	0.93216 0.91530 0.92767		
2	13	14	0.92563 0.92718 0.92317	0.92790 0.00426	0.92542 0.00225
3	15	16	0.91325 0.92276 0.91784	0.92301 0.00547	0.92289 0.00284
4	17	18	0.91794 0.91203 0.91807	0.92175 0.00407	0.91932 0.00345
5	19	20	0.89032 0.89091 0.88774	0.91546 0.00703	0.91364 0.00628
6	21	22	0.90431 0.90581 0.90583	0.91360 0.00603	0.91233 0.00529
7	23	24	0.89696 0.91021 0.89638	0.91123 0.00563	0.91203 0.00448
8	25	26	0.89696 0.91528 0.89865	0.90944 0.00519	0.91243 0.00390
9	27	28	0.91729 0.91485 0.91517	0.91031 0.00466	0.91270 0.00345
10	29	30	0.91136 0.92817 0.91081	0.91042 0.00417	0.91425 0.00345

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11	31	32	0.92348	0.93080	0.92534	0.91161	0.00395	0.91575	0.00347	0.91152	0.00390	0.91535	0.00411
12	33	34	0.90595	0.90950	0.90580	0.91114	0.00364	0.91523	0.00321	0.91104	0.00360	0.91483	0.00379
13	35	36	0.93696	0.92233	0.94154	0.91333	0.00400	0.91585	0.00302	0.91339	0.00406	0.91579	0.00314
14	37	38	0.90658	0.92820	0.90480	0.91285	0.00374	0.91674	0.00293	0.91277	0.00380	0.91616	0.00318
15	39	40	0.92602	0.91539	0.92470	0.91373	0.00359	0.91665	0.00273	0.91357	0.00363	0.91638	0.00288
16	41	42	0.94697	0.92479	0.95008	0.91581	0.00395	0.91716	0.00260	0.91585	0.00409	0.91698	0.00263
17	43	44	0.90991	0.90560	0.90617	0.91546	0.00372	0.91648	0.00254	0.91528	0.00388	0.91670	0.00248
18	45	46	0.91967	0.90781	0.91926	0.91569	0.00352	0.91599	0.00244	0.91550	0.00367	0.91629	0.00236
19	47	48	0.90386	0.89731	0.90376	0.91507	0.00339	0.91501	0.00251	0.91488	0.00353	0.91534	0.00243
20	49	50	0.89812	0.91914	0.89800	0.91422	0.00332	0.91522	0.00239	0.91404	0.00345	0.91536	0.00231
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21	51	52	0.90170	0.90136	0.90218	0.91363	0.00322	0.91456	0.00237	0.91347	0.00333	0.91464	0.00231
22	53	54	0.92596	0.92131	0.92224	0.91419	0.00312	0.91486	0.00228	0.91387	0.00320	0.91512	0.00229
23	55	56	0.92649	0.91153	0.92578	0.91472	0.00303	0.91472	0.00218	0.91439	0.00310	0.91510	0.00219
24	57	58	0.90851	0.89765	0.90422	0.91446	0.00291	0.91401	0.00221	0.91397	0.00300	0.91482	0.00216
25	59	60	0.89757	0.89089	0.90229	0.91379	0.00287	0.91308	0.00231	0.91350	0.00291	0.91338	0.00232
26	61	62	0.89200	0.88592	0.89510	0.91295	0.00288	0.91204	0.00245	0.91279	0.00289	0.91229	0.00246
27	63	64	0.91417	0.94123	0.90609	0.91299	0.00277	0.91312	0.00260	0.91254	0.00279	0.91272	0.00245
28	65	66	0.89950	0.91574	0.90072	0.91251	0.00272	0.91321	0.00250	0.91212	0.00272	0.91263	0.00236
29	67	68	0.89174	0.91820	0.89673	0.91199	0.00267	0.91339	0.00242	0.91159	0.00268	0.91254	0.00228
30	69	70	0.88605	0.91345	0.88779	0.91113	0.00272	0.91339	0.00234	0.91080	0.00271	0.91233	0.00223
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31	71	72	0.93020	0.92201	0.92954	0.91174	0.00270	0.91367	0.00228	0.91140	0.00269	0.91274	0.00218
32	73	74	0.90867	0.93040	0.91339	0.91165	0.00262	0.91419	0.00227	0.91146	0.00260	0.91315	0.00216
33	75	76	0.90447	0.92573	0.90400	0.91143	0.00255	0.91454	0.00223	0.91124	0.00253	0.91324	0.00212
34	77	78	0.90048	0.91057	0.90423	0.91111	0.00249	0.91442	0.00216	0.91103	0.00247	0.91313	0.00206
35	79	80	0.90471	0.94355	0.90114	0.91092	0.00243	0.91525	0.00226	0.91075	0.00241	0.91324	0.00206
36	81	82	0.90222	0.91785	0.90335	0.91068	0.00237	0.91533	0.00220	0.91054	0.00235	0.91321	0.00201
37	83	84	0.90485	0.91062	0.90232	0.91052	0.00231	0.91520	0.00214	0.91032	0.00230	0.91303	0.00197
38	85	86	0.93285	0.91769	0.93651	0.91111	0.00233	0.91527	0.00208	0.91101	0.00234	0.91354	0.00193
39	87	88	0.92485	0.91920	0.92241	0.91146	0.00229	0.91537	0.00203	0.91130	0.00230	0.91373	0.00188
40	89	90	0.91327	0.92633	0.91706	0.91151	0.00224	0.91564	0.00200	0.91145	0.00224	0.91394	0.00186
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41	91	92	0.89119	0.90471	0.89251	0.91101	0.00224	0.91537	0.00197	0.91098	0.00224	0.91366	0.00185
42	93	94	0.92987	0.92250	0.92787	0.91146	0.00223	0.91554	0.00193	0.91139	0.00222	0.91396	0.00182
43	95	96	0.92682	0.90689	0.92633	0.91182	0.00220	0.91534	0.00189	0.91173	0.00220	0.91397	0.00176
44	97	98	0.92174	0.91775	0.92131	0.91205	0.00217	0.91540	0.00185	0.91195	0.00216	0.91409	0.00171
45	99	100	0.91657	0.91052	0.91596	0.91215	0.00212	0.91529	0.00181	0.91204	0.00211	0.91405	0.00167

average keff results summed over 3 cycles each to form 30 batch values of keff

batch			keff estimators by batch			average keff estimators and deviations				col/abs/tl keff						
number	start	end	cycle	cycle	cycle	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	11	13	0.93556	0.92411	0.93169											
2	14	16	0.91047	0.91938	0.91410	0.92301	0.01254	0.92175	0.00236	0.92289	0.000879					
3	17	19	0.90957	0.90351	0.90873	0.91853	0.00852	0.91567	0.00623	0.91817	0.00693					
4	20	22	0.89881	0.90232	0.89903	0.91360	0.00778	0.91233	0.00553	0.91339	0.00685	0.91187	0.00978			
5	23	25	0.89930	0.91603	0.89815	0.91074	0.00667	0.91307	0.00434	0.91034	0.00612	0.91246	0.00653			
6	26	28	0.90818	0.91086	0.90865	0.91031	0.00547	0.91270	0.00357	0.91006	0.00500	0.91219	0.00485			
7	29	31	0.91146	0.92938	0.91039	0.91048	0.00462	0.91508	0.00384	0.91010	0.00423	0.91229	0.00473			
8	32	34	0.91574	0.91627	0.91759	0.91114	0.00406	0.91523	0.00333	0.91104	0.00378	0.91352	0.00390			
9	35	37	0.92222	0.92855	0.92119	0.91237	0.00378	0.91671	0.00329	0.91217	0.00352	0.91447	0.00381			
10	38	40	0.92597	0.91606	0.92617	0.91373	0.00365	0.91665	0.00294	0.91357	0.00345	0.91540	0.00318			
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11	41	43	0.92751	0.91985	0.92692	0.91498	0.00353	0.91694	0.00268	0.91478	0.00334	0.91608	0.00284			
12	44	46	0.92352	0.90562	0.92342	0.91569	0.00330	0.91599	0.00262	0.91550	0.00314	0.91558	0.00254			
13	47	49	0.89450	0.90072	0.89454	0.91406	0.00344	0.91482	0.00268	0.91389	0.00331	0.91431	0.00272			
14	50	52	0.90796	0.91116	0.90808	0.91363	0.00322	0.91456	0.00250	0.91347	0.00309	0.91404	0.00252			
15	53	55	0.92774	0.91833	0.92529	0.91457	0.00314	0.91481	0.00234	0.91426	0.00298	0.91420	0.00236			
16	56	58	0.91290	0.90200	0.90953	0.91446	0.00294	0.91401	0.00233	0.91397	0.00280	0.91365	0.00244			

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17	59	61	0.89314	0.88782	0.89669	0.91321	0.00303	0.91247	0.00268	0.91295	0.00282	0.91219	0.00247
18	62	64	0.90936	0.92421	0.90563	0.91299	0.00287	0.91312	0.00261	0.91254	0.00269	0.91207	0.00235
19	65	67	0.89751	0.91847	0.89913	0.91218	0.00283	0.91340	0.00248	0.91184	0.00264	0.91213	0.00222
20	68	70	0.89112	0.91312	0.89103	0.91113	0.00289	0.91339	0.00235	0.91080	0.00271	0.91185	0.00217
21	71	73	0.92241	0.92873	0.92367	0.91166	0.00280	0.91412	0.00235	0.91141	0.00265	0.91272	0.00224
22	74	76	0.90648	0.92337	0.90761	0.91143	0.00268	0.91454	0.00228	0.91124	0.00254	0.91293	0.00217
23	77	79	0.90010	0.91987	0.90117	0.91094	0.00261	0.91477	0.00219	0.91080	0.00246	0.91295	0.00210
24	80	82	0.90484	0.92811	0.90465	0.91068	0.00251	0.91533	0.00217	0.91054	0.00237	0.91303	0.00206
25	83	85	0.91090	0.91065	0.91154	0.91069	0.00240	0.91514	0.00209	0.91058	0.00228	0.91297	0.00196
26	86	88	0.93080	0.92102	0.92928	0.91146	0.00244	0.91537	0.00202	0.91130	0.00230	0.91345	0.00190
27	89	91	0.89892	0.92167	0.90220	0.91100	0.00239	0.91560	0.00196	0.91097	0.00224	0.91357	0.00186
28	92	94	0.92397	0.91402	0.92276	0.91146	0.00235	0.91554	0.00189	0.91139	0.00220	0.91369	0.00177
29	95	97	0.93034	0.91417	0.92834	0.91211	0.00236	0.91550	0.00182	0.91197	0.00220	0.91386	0.00169
30	98	100	0.91308	0.90927	0.91405	0.91215	0.00228	0.91529	0.00178	0.91204	0.00213	0.91381	0.00162

average keff results summed over 5 cycles each to form 18 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff	
			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	11	15	0.92476	0.92048	0.92223						
2	16	20	0.90616	0.90679	0.90756	0.91546	0.00930	0.91364	0.00684	0.91490	0.00733
3	21	25	0.90131	0.91194	0.90122	0.91074	0.00715	0.91307	0.00399	0.91034	0.00622
4	26	30	0.90945	0.91778	0.90951	0.91042	0.00507	0.91425	0.00306	0.91013	0.00440
5	31	35	0.92020	0.92404	0.92073	0.91238	0.00438	0.91621	0.00307	0.91225	0.00402
6	36	40	0.92049	0.91865	0.92014	0.91373	0.00383	0.91665	0.00255	0.91357	0.00353
7	41	45	0.92199	0.91288	0.92262	0.91491	0.00344	0.91611	0.00222	0.91486	0.00325
8	46	50	0.90943	0.90898	0.90829	0.91422	0.00306	0.91522	0.00212	0.91404	0.00294
9	51	55	0.91732	0.91154	0.91605	0.91457	0.00272	0.91481	0.00191	0.91426	0.00260
10	56	60	0.90677	0.89756	0.90663	0.91379	0.00255	0.91308	0.00243	0.91350	0.00245
11	61	65	0.90453	0.91568	0.90259	0.91295	0.00246	0.91332	0.00221	0.91251	0.00242
12	66	70	0.89112	0.91414	0.89199	0.91113	0.00289	0.91339	0.00202	0.91080	0.00280
13	71	75	0.91738	0.92555	0.91908	0.91161	0.00270	0.91432	0.00208	0.91143	0.00265
14	76	80	0.90203	0.92736	0.90184	0.91092	0.00259	0.91525	0.00214	0.91075	0.00255
15	81	85	0.90743	0.91353	0.90827	0.91069	0.00242	0.91514	0.00199	0.91058	0.00238
16	86	90	0.92379	0.92315	0.92439	0.91151	0.00241	0.91564	0.00193	0.91145	0.00239
17	91	95	0.91167	0.91807	0.91154	0.91152	0.00226	0.91578	0.00182	0.91145	0.00224
18	96	100	0.92281	0.90688	0.92205	0.91215	0.00223	0.91529	0.00179	0.91204	0.00219

average keff results summed over 6 cycles each to form 15 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff	
			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	11	16	0.92301	0.92175	0.92289						
2	17	22	0.90419	0.90292	0.90388	0.91360	0.00941	0.91233	0.00941	0.91339	0.00951
3	23	28	0.90374	0.91344	0.90340	0.91031	0.00635	0.91270	0.00545	0.91006	0.00642
4	29	34	0.91360	0.92282	0.91399	0.91114	0.00457	0.91523	0.00461	0.91104	0.00464
5	35	40	0.92410	0.92231	0.92368	0.91373	0.00438	0.91665	0.00384	0.91357	0.00440
6	41	46	0.92552	0.91273	0.92517	0.91569	0.00408	0.91599	0.00320	0.91550	0.00408
7	47	52	0.90123	0.90594	0.90131	0.91363	0.00402	0.91456	0.00306	0.91347	0.00400
8	53	58	0.92032	0.91016	0.91741	0.91446	0.00358	0.91401	0.00271	0.91397	0.00350
9	59	64	0.90125	0.90601	0.90116	0.91299	0.00348	0.91312	0.00255	0.91254	0.00340
10	65	70	0.89432	0.91580	0.89508	0.91113	0.00363	0.91339	0.00230	0.91080	0.00350
11	71	76	0.91444	0.92605	0.91564	0.91143	0.00330	0.91454	0.00237	0.91124	0.00320
12	77	82	0.90247	0.92399	0.90291	0.91068	0.00310	0.91533	0.00231	0.91054	0.00300

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13	83	88	0.92085	0.91584	0.92041	0.91146	0.00296	0.91537	0.00212	0.91130	0.00286	0.91532	0.00258
14	89	94	0.91145	0.91785	0.91248	0.91146	0.00274	0.91554	0.00197	0.91139	0.00265	0.91525	0.00228
15	95	100	0.92171	0.91172	0.92120	0.91215	0.00264	0.91529	0.00185	0.91204	0.00256	0.91512	0.00202

average keff results summed over 9 cycles each to form 10 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff	
			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	11	19	0.91853	0.91567	0.91817						
2	20	28	0.90210	0.90974	0.90194	0.91031	0.00822	0.91270	0.00297	0.91006	0.00812
3	29	37	0.91647	0.92473	0.91639	0.91237	0.00517	0.91671	0.00436	0.91217	0.00514
4	38	46	0.92567	0.91384	0.92550	0.91569	0.00494	0.91599	0.00317	0.91550	0.00493
5	47	55	0.91006	0.91007	0.90931	0.91457	0.00399	0.91481	0.00272	0.91426	0.00402
6	56	64	0.90513	0.90467	0.90395	0.91299	0.00362	0.91312	0.00279	0.91254	0.00370
7	65	73	0.90368	0.92011	0.90461	0.91166	0.00333	0.91412	0.00256	0.91141	0.00333
8	74	82	0.90381	0.92378	0.90448	0.91068	0.00305	0.91333	0.00253	0.91054	0.00301
9	83	91	0.91354	0.91778	0.91434	0.91100	0.00271	0.91560	0.00225	0.91097	0.00269
10	92	100	0.92246	0.91249	0.92172	0.91215	0.00268	0.91529	0.00203	0.91204	0.00263

average keff results summed over 10 cycles each to form 9 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff	
			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	11	20	0.91546	0.91364	0.91490						
2	21	30	0.90538	0.91486	0.90537	0.91042	0.00504	0.91425	0.00061	0.91013	0.00477
3	31	40	0.92034	0.92144	0.92044	0.91373	0.00441	0.91665	0.00242	0.91357	0.00440
4	41	50	0.91571	0.91093	0.91545	0.91422	0.00315	0.91522	0.00223	0.91204	0.00315
5	51	60	0.91204	0.90455	0.91134	0.91379	0.00248	0.91308	0.00275	0.91350	0.00250
6	61	70	0.89782	0.91491	0.89729	0.91113	0.00334	0.91339	0.00226	0.91080	0.00338
7	71	80	0.90971	0.92645	0.91046	0.91092	0.00283	0.91525	0.00267	0.91075	0.00286
8	81	90	0.91561	0.91834	0.91633	0.91151	0.00252	0.91564	0.00235	0.91145	0.00257
9	91	100	0.91724	0.91247	0.91679	0.91215	0.00231	0.91529	0.00210	0.91204	0.00235

average keff results summed over 15 cycles each to form 6 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff	
			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	11	25	0.91074	0.91307	0.91034						
2	26	40	0.91671	0.92022	0.91680	0.91373	0.00299	0.91665	0.00358	0.91357	0.00323
3	41	55	0.91625	0.91113	0.91565	0.91457	0.00192	0.91481	0.00276	0.91426	0.00199
4	56	70	0.90081	0.90912	0.90040	0.91113	0.00370	0.91339	0.00242	0.91080	0.00374
5	71	85	0.90895	0.92215	0.90973	0.91069	0.00290	0.91514	0.00256	0.91058	0.00290
6	86	100	0.91942	0.91603	0.91933	0.91215	0.00278	0.91529	0.00210	0.91204	0.00278

average keff results summed over 18 cycles each to form 5 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff	
			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	11	28	0.91031	0.91270	0.91006						
2	29	46	0.92107	0.91929	0.92095	0.91569	0.00538	0.91599	0.00329	0.91550	0.00544
3	47	64	0.90760	0.90737	0.90663	0.91299	0.00411	0.91312	0.00345	0.91254	0.00432

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4	65	82	0.90374	0.92195	0.90454	0.91068	0.00372	0.91533	0.00329	0.91054	0.00365	0.91918	0.00213
5	83	100	0.91800	0.91514	0.91803	0.91215	0.00323	0.91529	0.00255	0.91204	0.00320	0.91677	0.00177

average keff results summed over 30 cycles each to form 3 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations			
			k(coll)	k(abs)	k(track)	k(coll) st dev	k(abs) st dev	k(track) st dev	
1	11	40	0.91373	0.91665	0.91357				
2	41	70	0.90853	0.91013	0.90803	0.91113	0.00260	0.91339	0.00326
3	71	100	0.91418	0.91909	0.91453	0.91215	0.00182	0.91529	0.00267

average keff results summed over 45 cycles each to form 2 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations			
			k(coll)	k(abs)	k(track)	k(coll) st dev	k(abs) st dev	k(track) st dev	
1	11	55	0.91457	0.91481	0.91426				
2	56	100	0.90973	0.91577	0.90982	0.91215	0.00242	0.91529	0.00048

average individual and combined collision/absorption/track-length keff results for 9 different batch sizes

cycles per keff batch	number of batches	average keff estimators and deviations	normality	average k(c/a/t)	k(c/a/t) confidence intervals
		k(coll) st dev k(abs) st dev k(trk) st dev	co/ab/trk	k(c/a/t) st dev	95% confidence 99% confidence
1	90	0.9121 0.0021 0.9153 0.0017 0.9120 0.0021	95/95/95	0.91407	0.00149 0.91110-0.91703 0.91014-0.91799
2	45	0.9121 0.0021 0.9153 0.0018 0.9120 0.0021	95/95/95	0.91405	0.00167 0.91067-0.91742 0.90954-0.91856
3	30	0.9121 0.0023 0.9153 0.0018 0.9120 0.0021	95/95/95	0.91381	0.00162 0.91049-0.91712 0.90933-0.91828
5	18	0.9121 0.0022 0.9153 0.0018 0.9120 0.0022	95/95/95	0.91413	0.00173 0.91044-0.91783 0.90902-0.91924
6	15	0.9121 0.0026 0.9153 0.0019 0.9120 0.0026	95/95/95	0.91512	0.00202 0.91072-0.91952 0.90895-0.92130
9	10	0.9121 0.0027 0.9153 0.0020 0.9120 0.0026	95/95/95	0.91567	0.00175 0.91152-0.91981 0.90954-0.92180
10	9	0.9121 0.0023 0.9153 0.0021 0.9120 0.0023	95/95/95	0.91528	0.00132 0.91206-0.91850 0.91040-0.92016
15	6	0.9121 0.0028 0.9153 0.0021 0.9120 0.0028	95/95/95	0.91750	0.00116 0.91382-0.92119 0.91075-0.92426
18	5	0.9121 0.0032 0.9153 0.0025 0.9120 0.0032	95/95/95	0.91677	0.00177 0.90915-0.92438 0.89920-0.93433

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	3000	1.24865 1.28946 1.24882		
2	3666	1.04210 1.02611 1.03734		
3	2495	0.95715 0.94653 0.96146		
4	2760	0.94344 0.94671 0.94551		
5	2996	0.92459 0.92937 0.91538		
6	2904	0.91721 0.93092 0.92211		
7	3029	0.90507 0.88926 0.90567		
8	2974	0.93398 0.91620 0.93925		
9	3103	0.92378 0.93824 0.92185		
10	2919	0.95514 0.90831 0.95140		
----- begin active keff cycles -----				
11	3126	0.92104 0.90726 0.91657		
12	2945	0.94328 0.92333 0.93876	0.93216 0.01112 0.91530 0.00804 0.92767 0.01109	
13	3125	0.94236 0.94174 0.93972	0.93556 0.00726 0.92411 0.00996 0.93169 0.00756	
14	3009	0.90491 0.91263 0.90663	0.92790 0.00922 0.92124 0.00761 0.92542 0.00824	0.91450 0.01662 321
15	2944	0.91223 0.91744 0.90948	0.92476 0.00780 0.92048 0.00594 0.92223 0.00713	0.91669 0.01385 372
16	3015	0.91427 0.92807 0.92619	0.92301 0.00661 0.92175 0.00501 0.92289 0.00586	0.92188 0.00640 1474
17	3085	0.93008 0.90970 0.92836	0.92402 0.00567 0.92003 0.00457 0.92367 0.00501	0.92128 0.00562 1629
18	3100	0.90580 0.91436 0.90778	0.92175 0.00542 0.91932 0.00402 0.92169 0.00478	0.91984 0.00474 1992
19	2847	0.89283 0.88647 0.89005	0.91853 0.00576 0.91567 0.00509 0.91817 0.00549	0.91633 0.00585 1157
20	2918	0.88781 0.89535 0.88543	0.91546 0.00600 0.91364 0.00499 0.91490 0.00590	0.91402 0.00546 1191

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21	3057	0.87963	0.89924	0.87776	0.91220	0.00633	0.91233	0.00470	0.91152	0.00631	0.91335	0.00496	1306
22	3096	0.92900	0.91237	0.93390	0.91360	0.00594	0.91233	0.00429	0.91339	0.00606	0.91235	0.00453	1433
23	3246	0.90943	0.91279	0.91225	0.91328	0.00548	0.91237	0.00394	0.91330	0.00557	0.91220	0.00412	1587
24	2919	0.88450	0.90763	0.88051	0.91123	0.00547	0.91203	0.00367	0.91096	0.00567	0.91238	0.00380	1737
25	2913	0.90398	0.92767	0.90168	0.91074	0.00512	0.91307	0.00357	0.91034	0.00531	0.91332	0.00382	1617
26	3023	0.88994	0.90289	0.89561	0.90944	0.00496	0.91243	0.00340	0.90942	0.00505	0.91248	0.00369	1617
27	2995	0.91199	0.91634	0.90171	0.90959	0.00466	0.91266	0.00320	0.90897	0.00477	0.91281	0.00353	1660
28	3144	0.92260	0.91335	0.92859	0.91031	0.00445	0.91270	0.00302	0.91006	0.00463	0.91275	0.00325	1846
29	3031	0.89774	0.93373	0.89996	0.90965	0.00426	0.91381	0.00306	0.90953	0.00441	0.91322	0.00329	1714
30	2891	0.92498	0.92261	0.92166	0.91042	0.00412	0.91425	0.00294	0.91013	0.00423	0.91379	0.00316	1769
31	3007	0.91166	0.93179	0.90953	0.91048	0.00392	0.91508	0.00292	0.91010	0.00402	0.91426	0.00314	1701
32	3007	0.93530	0.92981	0.94116	0.91161	0.00390	0.91575	0.00286	0.91152	0.00408	0.91513	0.00304	1737
33	3089	0.89153	0.92407	0.89313	0.91073	0.00383	0.91612	0.00276	0.91072	0.00398	0.91519	0.00296	1758
34	2914	0.92037	0.89492	0.91847	0.91114	0.00369	0.91523	0.00278	0.91104	0.00383	0.91428	0.00283	1842
35	3073	0.94215	0.93961	0.94138	0.91238	0.00375	0.91621	0.00284	0.91225	0.00387	0.91542	0.00292	1657
36	3121	0.93723	0.90705	0.91471	0.91333	0.00373	0.91585	0.00275	0.91339	0.00388	0.91526	0.00276	1789
37	3035	0.88728	0.93900	0.88048	0.91237	0.00371	0.91671	0.00278	0.91217	0.00393	0.91547	0.00273	1762
38	2890	0.92588	0.91740	0.92911	0.91285	0.00361	0.91674	0.00268	0.91277	0.00384	0.91563	0.00262	1848
39	3194	0.93824	0.93605	0.93668	0.91373	0.00359	0.91740	0.00267	0.91360	0.00379	0.91641	0.00263	1763
40	3069	0.91380	0.89473	0.91271	0.91373	0.00347	0.91665	0.00269	0.91357	0.00366	0.91577	0.00258	1768
41	2850	0.95454	0.90535	0.95476	0.91504	0.00360	0.91628	0.00263	0.91490	0.00378	0.91595	0.00248	1866
42	3135	0.93939	0.94424	0.94540	0.91581	0.00357	0.91716	0.00269	0.91585	0.00379	0.91673	0.00253	1737
43	2969	0.88859	0.90995	0.88060	0.91498	0.00356	0.91694	0.00262	0.91478	0.00382	0.91647	0.00247	1762
44	2847	0.93122	0.90125	0.93174	0.91546	0.00349	0.91648	0.00258	0.91528	0.00374	0.91626	0.00239	1821
45	3202	0.89619	0.90363	0.90058	0.91491	0.00343	0.91611	0.00253	0.91486	0.00363	0.91577	0.00238	1792
46	2922	0.94315	0.91199	0.93794	0.91569	0.00342	0.91599	0.00246	0.91550	0.00361	0.91598	0.00232	1837
47	3144	0.91392	0.90687	0.91371	0.91564	0.00333	0.91575	0.00241	0.91545	0.00351	0.91579	0.00226	1877
48	2853	0.89381	0.88775	0.89381	0.91507	0.00329	0.91501	0.00246	0.91488	0.00347	0.91510	0.00231	1747
49	2864	0.87578	0.90753	0.87611	0.91406	0.00336	0.91482	0.00240	0.91389	0.00352	0.91468	0.00229	1729
50	2853	0.92047	0.93075	0.91989	0.91422	0.00328	0.91522	0.00237	0.91404	0.00343	0.91501	0.00226	1736
51	3026	0.91144	0.88931	0.91156	0.91415	0.00320	0.91459	0.00240	0.91398	0.00335	0.91452	0.00225	1700
52	2966	0.89196	0.91340	0.89279	0.91363	0.00317	0.91456	0.00234	0.91347	0.00331	0.91434	0.00221	1731
53	2807	0.93141	0.92327	0.92732	0.91404	0.00312	0.91476	0.00230	0.91380	0.00325	0.91462	0.00217	1743
54	3088	0.92051	0.91935	0.91716	0.91419	0.00305	0.91486	0.00225	0.91387	0.00317	0.91475	0.00213	1775
55	2915	0.93129	0.91236	0.93140	0.91457	0.00301	0.91481	0.00220	0.91426	0.00312	0.91482	0.00208	1819
56	3149	0.92168	0.91070	0.92016	0.91472	0.00295	0.91472	0.00215	0.91439	0.00306	0.91480	0.00204	1859
57	2999	0.90123	0.88909	0.90013	0.91443	0.00290	0.91417	0.00217	0.91409	0.00301	0.91434	0.00205	1793
58	2951	0.91578	0.90620	0.90831	0.91446	0.00284	0.91401	0.00213	0.91397	0.00295	0.91429	0.00201	1818
59	3064	0.91383	0.88879	0.91826	0.91445	0.00278	0.91349	0.00215	0.91405	0.00289	0.91387	0.00201	1788
60	2935	0.88131	0.89299	0.88631	0.91379	0.00280	0.91308	0.00215	0.91350	0.00288	0.91330	0.00203	1718
61	2955	0.88426	0.88167	0.88551	0.91321	0.00281	0.91247	0.00219	0.91295	0.00288	0.91268	0.00208	1598
62	3070	0.89975	0.89017	0.90469	0.91295	0.00276	0.91204	0.00219	0.91279	0.00283	0.91230	0.00207	1577
63	3022	0.90868	0.93060	0.89983	0.91287	0.00271	0.91239	0.00218	0.91255	0.00278	0.91247	0.00204	1592
64	2953	0.91966	0.95186	0.91236	0.91299	0.00266	0.91312	0.00226	0.91254	0.00273	0.91290	0.00207	1525
65	3053	0.91030	0.92410	0.91054	0.91295	0.00262	0.91332	0.00223	0.91251	0.00268	0.91302	0.00203	1551
66	2897	0.88869	0.90738	0.89090	0.91251	0.00260	0.91321	0.00219	0.91212	0.00266	0.91281	0.00201	1565
67	2938	0.89355	0.92394	0.89596	0.91218	0.00258	0.91340	0.00216	0.91184	0.00263	0.91284	0.00197	1595
68	2989	0.90127	0.91247	0.89750	0.91199	0.00254	0.91339	0.00212	0.91159	0.00260	0.91275	0.00194	1615
69	2933	0.91427	0.92135	0.91847	0.91203	0.00250	0.91352	0.00209	0.91171	0.00255	0.91289	0.00191	1641
70	3077	0.85783	0.90555	0.85712	0.91113	0.00262	0.91339	0.00206	0.91080	0.00267	0.91258	0.00192	1587
71	2789	0.89627	0.93977	0.89318	0.91088	0.00259	0.91382	0.00207	0.91051	0.00264	0.91272	0.00191	1585
72	3207	0.96412	0.90425	0.96589	0.91174	0.00268	0.91367	0.00204	0.91140	0.00275	0.91296	0.00188	1617
73	3180	0.90683	0.94216	0.91194	0.91166	0.00264	0.91412	0.00206	0.91141	0.00271	0.91325	0.00188	1594
74	2805	0.91051	0.91864	0.91484	0.91165	0.00260	0.91419	0.00203	0.91146	0.00266	0.91332	0.00185	1621
75	3011	0.90917	0.92291	0.90957	0.91161	0.00256	0.91432	0.00200	0.91143	0.00262	0.91339	0.00182	1641
76	3004	0.89977	0.92855	0.89844	0.91143	0.00253	0.91454	0.00198	0.91124	0.00259	0.91346	0.00180	1657
77	3007	0.89115	0.90436	0.89139	0.91113	0.00251	0.91439	0.00196	0.91094	0.00257	0.91327	0.00178	1656

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78	3028	0.90981	0.91678	0.91707	0.91111	0.00247	0.91442	0.00193	0.91103	0.00253	0.91332	0.00176	1681
79	2933	0.89934	0.93847	0.89504	0.91094	0.00244	0.91477	0.00193	0.91080	0.00251	0.91343	0.00175	1680
80	2977	0.91008	0.94864	0.90724	0.91092	0.00241	0.91525	0.00197	0.91075	0.00247	0.91364	0.00176	1642
81	3099	0.90245	0.91202	0.90281	0.91080	0.00238	0.91521	0.00194	0.91064	0.00244	0.91358	0.00173	1660
82	3002	0.90199	0.92368	0.90389	0.91068	0.00235	0.91533	0.00192	0.91054	0.00241	0.91361	0.00171	1676
83	3031	0.90017	0.89890	0.89493	0.91054	0.00232	0.91510	0.00190	0.91033	0.00238	0.91339	0.00170	1671
84	3024	0.90952	0.92235	0.90970	0.91052	0.00229	0.91520	0.00188	0.91032	0.00235	0.91344	0.00168	1689
85	2988	0.92301	0.91072	0.93000	0.91069	0.00226	0.91514	0.00186	0.91058	0.00233	0.91350	0.00166	1719
86	3108	0.94269	0.92467	0.94302	0.91111	0.00227	0.91527	0.00184	0.91101	0.00234	0.91378	0.00165	1716
87	3003	0.93280	0.94130	0.93202	0.91139	0.00226	0.91560	0.00184	0.91128	0.00233	0.91408	0.00166	1671
88	3012	0.91691	0.89710	0.91280	0.91146	0.00223	0.91537	0.00183	0.91130	0.00230	0.91392	0.00164	1689
89	2946	0.91072	0.94366	0.91505	0.91145	0.00220	0.91572	0.00185	0.91135	0.00227	0.91409	0.00164	1668
90	3024	0.91582	0.90901	0.91907	0.91151	0.00218	0.91564	0.00182	0.91145	0.00224	0.91406	0.00162	1692
91	3106	0.87023	0.91233	0.87249	0.91100	0.00221	0.91560	0.00180	0.91097	0.00226	0.91393	0.00162	1670
92	2944	0.91216	0.89708	0.91253	0.91101	0.00218	0.91537	0.00179	0.91098	0.00224	0.91377	0.00160	1685
93	3115	0.94392	0.91770	0.94241	0.91141	0.00219	0.91540	0.00177	0.91136	0.00224	0.91397	0.00158	1699
94	3058	0.91582	0.92730	0.91333	0.91146	0.00217	0.91554	0.00176	0.91139	0.00222	0.91406	0.00157	1709
95	2922	0.91621	0.93596	0.91694	0.91152	0.00214	0.91578	0.00175	0.91145	0.00219	0.91421	0.00156	1703
96	2958	0.93744	0.87783	0.93572	0.91182	0.00214	0.91534	0.00179	0.91173	0.00218	0.91397	0.00154	1725
97	3110	0.93739	0.92873	0.93238	0.91211	0.00213	0.91550	0.00177	0.91197	0.00217	0.91418	0.00154	1718
98	3022	0.90610	0.90678	0.91024	0.91205	0.00211	0.91540	0.00176	0.91195	0.00215	0.91410	0.00152	1735
99	2844	0.92895	0.90557	0.92703	0.91224	0.00209	0.91529	0.00174	0.91212	0.00213	0.91409	0.00150	1762
100	3012	0.90420	0.91546	0.90488	0.91215	0.00207	0.91529	0.00172	0.91204	0.00211	0.91407	0.00149	1779

the largest active cycle keffs by estimator are:

collision 0.96412 on cycle 72
absorption 0.95186 on cycle 64
track length 0.96589 on cycle 72

the smallest active cycle keffs by estimator are:

collision 0.85783 on cycle 70
absorption 0.87783 on cycle 96
track length 0.85712 on cycle 70

Plot of the estimated col/abs/track-length keff one standard deviation interval versus cycle number (l = final keff = 0.91407)

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skip cycles	active cycles	active neutrons	average keff k(col)	estimators at dev	and deviations k(abe) st dev	normality k(trk) st dev	average k(c/a/t) co/ab/tl k(c/a/t) st dev	confidence intervals 95% confidence 99% confidence
0	100	300369[0.9185	0.0041	0.9210	0.0042	0.9183	0.0041	[no/no/nc] 0.91942 0.00406 0.91133-0.92752 0.90869-0.93016
1	99	297369[0.9152	0.0024	0.9172	0.0020	0.9150	0.0024	[no/no/nc] 0.91647 0.00189 0.91271-0.92023 0.91149-0.92146
2	98	293703[0.9139	0.0021	0.9161	0.0017	0.9137	0.0021	[p5/p5/p5] 0.91528 0.00149 0.91231-0.91825 0.91134-0.91922
3	97	291208[0.9134	0.0020	0.9158	0.0017	0.9132	0.0020	[p5/p5/p5] 0.91486 0.00146 0.91196-0.91777 0.91101-0.91872
4	96	288448[0.9131	0.0020	0.9155	0.0017	0.9129	0.0020	[p5/p5/p5] 0.91453 0.00144 0.91167-0.91739 0.91074-0.91832
5	95	285452[0.9130	0.0020	0.9154	0.0017	0.9129	0.0021	[p5/p5/p5] 0.91443 0.00145 0.91155-0.91731 0.91061-0.91825
6	94	282548[0.9129	0.0021	0.9152	0.0017	0.9128	0.0021	[p5/p5/p5] 0.91430 0.00145 0.91140-0.91720 0.91046-0.91814
7	93	279519[0.9130	0.0021	0.9155	0.0017	0.9129	0.0021	[p5/p5/p5] 0.91452 0.00146 0.91162-0.91742 0.91067-0.91837
8	92	276545[0.9127	0.0021	0.9155	0.0017	0.9126	0.0021	[p5/p5/p5] 0.91440 0.00147 0.91147-0.91732 0.91051-0.91828
9	91	273442[0.9126	0.0021	0.9152	0.0017	0.9125	0.0021	[p5/p5/p5] 0.91421 0.00147 0.91128-0.91714 0.91033-0.91810
10	90*	270523[0.9121	0.0021	0.9153	0.0017	0.9120	0.0021	[p5/p5/p5] 0.91407 0.00149 0.91110-0.91703 0.91014-0.91799
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11	89	267397[0.9120	0.0021	0.9154	0.0017	0.9120	0.0021	[p5/p5/p5] 0.91410 0.00151 0.91110-0.91710 0.91012-0.91808
12	88	264452[0.9117	0.0021	0.9153	0.0018	0.9117	0.0021	[p5/p5/p5] 0.91389 0.00151 0.91087-0.91690 0.90989-0.91789
13	87	261327[0.9113	0.0021	0.9150	0.0017	0.9114	0.0021	[p5/p5/p5] 0.91356 0.00150 0.91058-0.91654 0.90961-0.91751
14	86	258318[0.9114	0.0021	0.9150	0.0018	0.9114	0.0022	[p5/p5/p5] 0.91360 0.00151 0.91059-0.91661 0.90960-0.91760
15	85	255374[0.9114	0.0021	0.9150	0.0018	0.9114	0.0022	[p5/p5/p5] 0.91358 0.00153 0.91054-0.91663 0.90954-0.91763
16	84	252359[0.9114	0.0022	0.9148	0.0018	0.9113	0.0022	[p5/p5/p5] 0.91346 0.00154 0.91039-0.91653 0.90939-0.91753
17	83	249274[0.9111	0.0022	0.9149	0.0018	0.9111	0.0022	[p5/p5/p5] 0.91341 0.00156 0.91030-0.91652 0.90928-0.91753
18	82	246174[0.9112	0.0022	0.9149	0.0018	0.9111	0.0022	[p5/p5/p5] 0.91343 0.00158 0.91028-0.91658 0.90925-0.91761
19	81	243527[0.9114	0.0022	0.9152	0.0018	0.9114	0.0023	[p5/p5/p5] 0.91376 0.00157 0.91064-0.91689 0.90962-0.91790
20	80	240409[0.9117	0.0022	0.9155	0.0018	0.9117	0.0023	[p5/p5/p5] 0.91403 0.00156 0.91092-0.91714 0.90990-0.91816
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21	79	237352[0.9121	0.0022	0.9157	0.0019	0.9121	0.0022	[p5/p5/p5] 0.91429 0.00155 0.91120-0.91738 0.91019-0.91839
22	78	234256[0.9119	0.0022	0.9157	0.0019	0.9118	0.0023	[p5/p5/p5] 0.91420 0.00157 0.91107-0.91733 0.91005-0.91835
23	77	231010[0.9120	0.0023	0.9158	0.0019	0.9118	0.0023	[p5/p5/p5] 0.91422 0.00159 0.91105-0.91739 0.91001-0.91842
24	76	228091[0.9123	0.0023	0.9159	0.0019	0.9122	0.0023	[p5/p5/p5] 0.91442 0.00159 0.91124-0.91759 0.91020-0.91863
25	75	225178[0.9124	0.0023	0.9157	0.0019	0.9124	0.0023	[p5/p5/p5] 0.91438 0.00161 0.91117-0.91760 0.91012-0.91865
26	74	222153[0.9127	0.0023	0.9159	0.0020	0.9126	0.0023	[p5/p5/p5] 0.91457 0.00162 0.91134-0.91780 0.91029-0.91886
27	73	219160[0.9127	0.0023	0.9159	0.0020	0.9128	0.0024	[p5/p5/p5] 0.91463 0.00164 0.91135-0.91790 0.91028-0.91897
28	72	216016[0.9126	0.0024	0.9159	0.0020	0.9125	0.0024	[p5/p5/p5] 0.91455 0.00166 0.91123-0.91787 0.91014-0.91896
29	71	212985[0.9128	0.0024	0.9157	0.0020	0.9127	0.0024	[p5/p5/p5] 0.91448 0.00168 0.91113-0.91784 0.91003-0.91894
30	70	210094[0.9126	0.0024	0.9156	0.0021	0.9126	0.0024	[p5/p5/p5] 0.91437 0.00170 0.91097-0.91777 0.90986-0.91889
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31	69	207087[0.9127	0.0024	0.9154	0.0021	0.9126	0.0025	[p5/p5/p5] 0.91426 0.00172 0.91083-0.91770 0.90970-0.91883
32	68	204080[0.9123	0.0025	0.9151	0.0021	0.9122	0.0025	[p5/p5/p5] 0.91394 0.00172 0.91051-0.91738 0.90938-0.91851
33	67	200991[0.9126	0.0025	0.9150	0.0021	0.9125	0.0025	[p5/p5/p5] 0.91397 0.00174 0.91049-0.91745 0.90935-0.91860
34	66	198077[0.9125	0.0025	0.9153	0.0021	0.9124	0.0025	[p5/p5/p5] 0.91414 0.00177 0.91061-0.91767 0.90945-0.91883
35	65	195004[0.9121	0.0025	0.9149	0.0021	0.9120	0.0025	[p5/p5/p5] 0.91373 0.00175 0.91024-0.91722 0.90909-0.91837
36	64	191883[0.9117	0.0025	0.9151	0.0022	0.9115	0.0025	[p5/p5/p5] 0.91358 0.00177 0.91003-0.91713 0.90886-0.91829
37	63	188348[0.9121	0.0025	0.9147	0.0022	0.9120	0.0025	[p5/p5/p5] 0.91357 0.00180 0.90998-0.91717 0.90879-0.91835
38	62	185958[0.9118	0.0025	0.9146	0.0022	0.9117	0.0025	[p5/p5/p5] 0.91341 0.00182 0.90977-0.91706 0.90857-0.91826
39	61	182764[0.9114	0.0026	0.9143	0.0022	0.9113	0.0025	[p5/p5/p5] 0.91304 0.00181 0.90941-0.91666 0.90821-0.91786
40	60	179695[0.9114	0.0026	0.9146	0.0022	0.9113	0.0026	[p5/p5/p5] 0.91324 0.00183 0.90957-0.91692 0.90835-0.91813
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41	59	176854[0.9106	0.0025	0.9148	0.0022	0.9105	0.0025	[p5/p5/p5] 0.91295 0.00187 0.90921-0.91669 0.90798-0.91793
42	58	173710[0.9101	0.0025	0.9143	0.0022	0.9099	0.0025	[p5/p5/p5] 0.91234 0.00180 0.90873-0.91595 0.90754-0.91714
43	57	170741[0.9105	0.0025	0.9143	0.0023	0.9105	0.0025	[p5/p5/p5] 0.91261 0.00179 0.90902-0.91620 0.90783-0.91739
44	56	167894[0.9101	0.0026	0.9146	0.0023	0.9101	0.0025	[p5/p5/p5] 0.91256 0.00183 0.90888-0.91624 0.90766-0.91746
45	55	164692[0.9104	0.0026	0.9148	0.0023	0.9102	0.0025	[p5/p5/p5] 0.91270 0.00186 0.90897-0.91644 0.90773-0.91768
46	54	161770[0.9098	0.0026	0.9148	0.0024	0.9097	0.0025	[p5/p5/p5] 0.91251 0.00190 0.90870-0.91633 0.90743-0.91760
47	53	158626[0.9097	0.0026	0.9150	0.0024	0.9097	0.0026	[p5/p5/p5] 0.91257 0.00194 0.90867-0.91647 0.90738-0.91767
48	52	155773[0.9100	0.0026	0.9155	0.0024	0.9100	0.0026	[p5/p5/p5] 0.91304 0.00193 0.90917-0.91692 0.90788-0.91821
49	51	152909[0.9107	0.0026	0.9156	0.0024	0.9106	0.0026	[p5/p5/p5] 0.91333 0.00192 0.90948-0.91718 0.90819-0.91847
50	50	150056[0.9105	0.0027	0.9153	0.0025	0.9104	0.0026	[p5/p5/p5] 0.91310 0.00194 0.90920-0.91699 0.90790-0.91829
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51	49	147030[0.9105	0.0027	0.9159	0.0025	0.9104	0.0027	[p5/p5/p5] 0.91345 0.00196 0.90950-0.91740 0.90817-0.91873
52	48	144063[0.9109	0.0027	0.9159	0.0025	0.9108	0.0027	[p5/p5/p5] 0.91360 0.00199 0.90960-0.91761 0.90825-0.91896
53	47	141257[0.9104	0.0028	0.9158	0.0026	0.9104	0.0027	[p5/p5/p5] 0.91337 0.00203 0.90929-0.91746 0.90792-0.91883
54	46	138169[0.9102	0.0028	0.9157	0.0026	0.9103	0.0028	[p5/p5/p5] 0.91328 0.00207 0.90911-0.91746 0.90770-0.91887

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55	45	135254	0.9097	0.0028	0.9158	0.0027	0.9098	0.0028	[95/95/95]	0.91307	0.00212	0.90878-0.91735	0.90734-0.91880
56	44	132105	0.9095	0.0029	0.9159	0.0027	0.9096	0.0029	[95/95/95]	0.91303	0.00218	0.90862-0.91743	0.90714-0.91892
57	43	129106	0.9096	0.0030	0.9165	0.0027	0.9098	0.0029	[95/95/95]	0.91358	0.00219	0.90916-0.91801	0.90766-0.91950
58	42	126155	0.9095	0.0030	0.9168	0.0028	0.9098	0.0030	[95/95/95]	0.91392	0.00225	0.90937-0.91847	0.90783-0.92001
59	41	12309	0.9094	0.0031	0.9174	0.0028	0.9096	0.0031	[95/95/95]	0.91424	0.00230	0.90958-0.91891	0.90799-0.92049
60	40	120156	0.9101	0.0031	0.9180	0.0028	0.9102	0.0031	[95/95/95]	0.91471	0.00227	0.91010-0.91932	0.90854-0.92089
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61	39	117201	0.9108	0.0031	0.9190	0.0027	0.9109	0.0031	[95/95/95]	0.91561	0.00216	0.91122-0.92000	0.90973-0.92149
62	38	114131	0.9110	0.0032	0.9197	0.0026	0.9110	0.0032	[95/95/95]	0.91620	0.00216	0.91181-0.92060	0.91031-0.92210
63	37	111109	0.9111	0.0032	0.9194	0.0027	0.9113	0.0033	[95/95/95]	0.91617	0.00222	0.91167-0.92068	0.91012-0.92222
64	36	108156	0.9109	0.0033	0.9185	0.0026	0.9113	0.0033	[95/95/95]	0.91565	0.00218	0.91121-0.92008	0.90969-0.92160
65	35	105103	0.9109	0.0034	0.9184	0.0027	0.9113	0.0034	[95/95/95]	0.91556	0.00223	0.91101-0.92011	0.90944-0.92168
66	34	102206	0.9115	0.0035	0.9187	0.0027	0.9119	0.0035	[95/95/95]	0.91593	0.00224	0.91136-0.92049	0.90979-0.92207
67	33	99268	0.9121	0.0035	0.9185	0.0028	0.9124	0.0036	[95/95/95]	0.91601	0.00229	0.91134-0.92068	0.90972-0.92229
68	32	96279	0.9124	0.0036	0.9187	0.0029	0.9129	0.0036	[95/95/95]	0.91628	0.00235	0.91148-0.92109	0.90981-0.92276
69	31	93346	0.9124	0.0037	0.9187	0.0030	0.9127	0.0038	[95/95/95]	0.91621	0.00242	0.91126-0.92116	0.90953-0.92288
70	30	90269	0.9142	0.0034	0.9191	0.0030	0.9145	0.0034	[95/95/95]	0.91693	0.00221	0.91240-0.92146	0.91081-0.92305
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71	29	87480	0.9148	0.0034	0.9184	0.0031	0.9153	0.0034	[95/95/95]	0.91685	0.00228	0.91217-0.92153	0.91052-0.92318
72	28	84273	0.9130	0.0041	0.9189	0.0031	0.9135	0.0030	[95/95/95]	0.91599	0.00231	0.91123-0.92075	0.90955-0.92243
73	27	81093	0.9133	0.0032	0.9180	0.0031	0.9135	0.0031	[95/95/95]	0.91576	0.00234	0.91094-0.92058	0.90922-0.92230
74	26	78288	0.9134	0.0033	0.9180	0.0032	0.9135	0.0032	[95/95/95]	0.91573	0.00242	0.91071-0.92075	0.90892-0.92254
75	25	75277	0.9135	0.0034	0.9178	0.0034	0.9136	0.0034	[95/95/95]	0.91571	0.00252	0.91048-0.92093	0.90861-0.92281
76	24	72273	0.9141	0.0035	0.9173	0.0035	0.9142	0.0035	[95/95/95]	0.91579	0.00261	0.91035-0.92122	0.90839-0.92319
77	23	69266	0.9151	0.0035	0.9179	0.0036	0.9152	0.0035	[95/95/95]	0.91653	0.00259	0.91113-0.92193	0.90916-0.92389
78	22	66238	0.9154	0.0037	0.9180	0.0038	0.9152	0.0036	[95/95/95]	0.91651	0.00272	0.91082-0.92221	0.90873-0.92429
79	21	63305	0.9161	0.0038	0.9170	0.0038	0.9161	0.0037	[95/95/95]	0.91654	0.00284	0.91058-0.92250	0.90837-0.92470
80	20	60328	0.9164	0.0040	0.9154	0.0036	0.9166	0.0038	[95/95/95]	0.91591	0.00292	0.90974-0.92208	0.90744-0.92439
<hr/>													
81	19	57229	0.9172	0.0041	0.9156	0.0038	0.9173	0.0040	[95/95/95]	0.91636	0.00306	0.90988-0.92284	0.90743-0.92529
82	18	54227	0.9180	0.0042	0.9151	0.0040	0.9180	0.0041	[95/95/95]	0.91652	0.00325	0.90958-0.92346	0.90693-0.92611
83	17	51196	0.9191	0.0044	0.9161	0.0041	0.9194	0.0041	[95/95/95]	0.91796	0.00323	0.91103-0.92488	0.90834-0.92757
84	16	48172	0.9196	0.0046	0.9157	0.0044	0.9200	0.0043	[95/95/95]	0.91811	0.00348	0.91059-0.92563	0.90763-0.92859
85	15	45184	0.9194	0.0049	0.9160	0.0047	0.9193	0.0046	[95/95/95]	0.91778	0.00362	0.90989-0.92566	0.90672-0.92883
86	14	42076	0.9178	0.0050	0.9154	0.0050	0.9176	0.0046	[95/95/95]	0.91660	0.00359	0.90870-0.92451	0.90545-0.92776
87	13	39073	0.9166	0.0052	0.9134	0.0049	0.9165	0.0048	[95/95/95]	0.91510	0.00354	0.90721-0.92299	0.90388-0.92632
88	12	36061	0.9166	0.0057	0.9148	0.0052	0.9168	0.0052	[95/95/95]	0.91637	0.00362	0.90817-0.92457	0.90459-0.92814
89	11	33115	0.9171	0.0062	0.9122	0.0049	0.9170	0.0057	[95/95/95]	0.91435	0.00330	0.90673-0.92197	0.90326-0.92544
90	10	30091	0.9172	0.0068	0.9125	0.0054	0.9168	0.0063	[95/95/95]	0.91342	0.00354	0.90505-0.92179	0.90104-0.92580
<hr/>													
91	9	26985	0.9225	0.0049	0.9125	0.0060	0.9217	0.0043	[95/95/95]	0.91699	0.00311	0.90937-0.92460	0.90544-0.92853
92	8	24041	0.9238	0.0054	0.9144	0.0064	0.9229	0.0048	[95/95/95]	0.91809	0.00323	0.90979-0.92639	0.90507-0.93111
93	7	20926	0.9209	0.0052	0.9139	0.0074	0.9201	0.0044	[95/95/95]	0.91666	0.00243	0.90992-0.92339	0.90549-0.92782
94	6	17868	0.9217	0.0061	0.9117	0.0084	0.9212	0.0051	[95/95/95]	0.91770	0.00266	0.90922-0.92617	0.90215-0.93325
95	5	14946	0.9228	0.0074	0.9069	0.0084	0.9221	0.0061	[95/95/95]	0.91556	0.00297	0.90279-0.92834	0.88610-0.94503
96	4	11988	0.9192	0.0083	0.9141	0.0053	0.9186	0.0066	[95/95/95]	0.91525	0.00361	0.86939-0.96110	0.68558-1.14492
97	3	8878	0.9131	0.0080	0.9093	0.0031	0.9141	0.0067					
98	2	5856	0.9166	0.0124	0.9105	0.0049	0.9160	0.0111					

the minimum estimated standard deviation for the col/abs/tl keff estimator occurs with 4 inactive cycles and 96 active cycles.

the first active half of the problem skips 10 cycles and uses 45 active cycles; the second half skips 55 and uses 45 cycles.
the col/abs/trk-len keff, one standard deviation, and 68, 95, and 99 percent intervals for each active half of the problem are:

problem	keff	standard deviation	68% confidence	95% confidence	99% confidence
first half	0.91482	0.00208	0.91272 to 0.91691	0.91061 to 0.91902	0.90920 to 0.92043
second half	0.91307	0.00212	0.91093 to 0.91521	0.90878 to 0.91735	0.90734 to 0.91880
final result	0.91407	0.00149	0.91258 to 0.91555	0.91110 to 0.91703	0.91014 to 0.91799

the first and second half values of k(collisions/absorption/track length) appear to be the same at the 68 percent confidence level.

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Plot of the estimated col/abs/track-length keff one standard deviation interval by active cycle number (ℓ = final keff = 0.91407)

dump no. 16 on file runtpe nps = 300369 coll = 52866920 ctm = 234.57 nrm = 431921261

1 warning message so far.

run terminated when 100 kcode cycles were done.

computer time = 234.63 minutes

mcnph version 4a 10/01/93

09/02/98 19:31:12

probid = 09/02/98 15:35:27

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lmcnph version 4a Id=10/01/93

09/02/98 16:04:58

probid = 09/02/98 16:04:58

edt 465711, sd-mp-swd-30001, rev 0, certified

ecn 186718 with prpr upgrade ph-4a00c

Sun platform

inp=iWRAP6 outp=oWRAP6 mctal=inWRAP6

```

1-  message:
2-
3-  uranium 235 in WRAP
4-    1 1 -1.06 -1 imp:n=1      $ Source
5-    2 2 -1.00 -2 1 imp:n=1    $ Water Reflector
6-    3 0      2 imp:n=0        $ End of the World
7-
8-    1 so 12.14                $ Source
9-    2 so 45.78                $ Water Reflector
10-
11-  mode n
12-    kcode 3000 1.0 10 100
13-    ksrc 0.0 0.0 0.0
14-    ml 92235.50c -0.060      $ Uranium
15-    1001.50c -0.1052 8016.50c -0.8348      $ Water Mode
16-    mt1 lwtr.01t
17-    m2 8016.50c -0.8881 1001.50c -0.1119    $ Water Reflecto
18-    mt2 lwtr.01t
19-    totnu
20-    ctme 350.
21-    print
wto, stablizer, present s,      1.000 1.000 3000
1  initial source from ksrc card.

```

print table 90

```

original number of points      1
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              1
points after expansion or contraction    3000
nominal source size          3000

```

initial guess for k(eff.) 1.000000

cycles to skip before tallying 10

number of keff cycles that can be stored 201

1 material composition

print table 40

material

number component nuclide, atom fraction

1 92235, 0.00163 1001, 0.66558 8016, 0.33279

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

2 8016, 0.33337 1001, 0.66663

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

material

number component nuclide, mass fraction

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```

1      92235, 0.06000      1001, 0.10520      8016, 0.83480
2      8016, 0.88810      1001, 0.11190
1cell volumes and masses
                                print table 50

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

1  1  1.00110E-01  1.06000E+00  0.00000E+00  7.49453E+03  7.94421E+03  1
2  2  1.00300E-01  1.00000E+00  0.00000E+00  3.94404E+05  3.94404E+05  1
3  3  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0  infinite
1surface areas
                                print table 50

      surface  input      calculated      reason area
              area      area      not calculated

1  1  0.00000E+00  1.85203E+03
2  2  0.00000E+00  2.63367E+04
1cells
                                print table 60

      atom      gram      neutron
      cell mat  density  density  volume  mass  pieces importance

1  1  1s  1.00110E-01  1.06000E+00  7.49453E+03  7.94421E+03  1  1.0000E+00
2  2  2s  1.00300E-01  1.00000E+00  3.94404E+05  3.94404E+05  1  1.0000E+00
3  3  0  0.00000E+00  0.00000E+00  0.00000E+00  0.00000E+00  0  0.0000E+00

total      4.01898E+05  4.02348E+05
1surfaces
                                print table 70

      surface  trans type  surface coefficients

1  1      so  1.2140000E+01
2  2      so  4.5780000E+01
1 cell temperatures in mev for the free-gas thermal neutron treatment.
                                print table 72

all non-zero importance cells with materials have a temperature for thermal neutrons of 2.5300E-08 mev.
1physical constants
                                print table 98

name      value  description

huge  1.0000000000000E+37  infinity
pie   3.1415926535898E+00  pi
avogad  6.0220434469282E+23  avogadro number (molecules/mole)
anout  1.0086649670000E+00  neutron mass (amu)
avgdn  5.9703109000000E-01  avogadro number/neutron mass (1.e-24*molecules/mole/amu)
slite  2.9979250000000E+02  speed of light (cm/shake)
planck  4.1357320000000E-13  planck constant (mev shake)
fscon  1.3703930000000E+02  inverse fine structure constant h*c/(2*pi*e**2)
gpt(1)  9.3958000000000E+02  neutron mass (mev)
gpt(3)  5.1109800000000E-01  electron mass (mev)

fission q-values: nuclide q(mev) nuclide q(mev)
                  other 3.3967000000000E-17

the following compilation options were used:

pointer
cheap
unix
sun

```

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```

plot
mcplot
gkssim
xlib
default datapath: /apps/mcnp
1 cross-section tables
print table 100

table length

tables from file /apps/mcnp/tmccs

1001.50c 1153 njoy ( 1301) 79/07/31.
8016.50c 23669 njoy ( 1276) 05/14/81
92235.50c 44188 njoy total nu ( 1395) 79/09/12.

tables from file /apps/mcnp/tmccs

lwtr.01t 10193 hydrogen in light water at 300 degrees kelvin 1001 0 010/22/85

total 79203

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

```

decimal words of dynamically allocated storage

```

general 93980
tallies 0
bank 6403
cross sections 79203

total 179586

```

```

*****
***

```

```

dump no. 1 on file runtpe nps = 0 coll = 0 ctm = 0.00 nm = 0

```

```

source distribution written to file srcpt cycle = 0

```

```

1 warning message so far.
1 starting mcrun. field length = 0 cp0 = 0.04 print table 110

```

uranium 235 in WRAP

```

nps x y z cell surf u v w energy weight time
1 0.000E+00 0.000E+00 0.000E+00 1 0 5.085E-01 4.733E-01 7.193E-01 2.209E+00 1.000E+00 0.000E+00
2 0.000E+00 0.000E+00 0.000E+00 1 0 8.952E-01 -4.447E-01 -2.944E-02 4.904E+00 1.000E+00 0.000E+00
3 0.000E+00 0.000E+00 0.000E+00 1 0 -6.184E-01 -4.495E-01 6.446E-01 3.809E-01 1.000E+00 0.000E+00
4 0.000E+00 0.000E+00 0.000E+00 1 0 9.710E-01 -5.665E-02 -2.323E-01 1.331E+00 1.000E+00 0.000E+00
5 0.000E+00 0.000E+00 0.000E+00 1 0 5.861E-01 1.496E-01 -7.963E-01 1.902E+00 1.000E+00 0.000E+00
6 0.000E+00 0.000E+00 0.000E+00 1 0 -6.489E-02 -1.626E-01 9.845E-01 4.410E-01 1.000E+00 0.000E+00
7 0.000E+00 0.000E+00 0.000E+00 1 0 -7.068E-02 3.263E-02 -9.970E-01 4.750E-01 1.000E+00 0.000E+00
8 0.000E+00 0.000E+00 0.000E+00 1 0 -3.915E-01 4.664E-01 -7.932E-01 4.136E+00 1.000E+00 0.000E+00
9 0.000E+00 0.000E+00 0.000E+00 1 0 -2.368E-01 9.215E-01 -3.079E-01 7.453E-02 1.000E+00 0.000E+00
10 0.000E+00 0.000E+00 0.000E+00 1 0 1.946E-01 -3.204E-01 9.271E-01 3.128E+00 1.000E+00 0.000E+00
11 0.000E+00 0.000E+00 0.000E+00 1 0 -6.698E-01 -7.177E-01 -1.905E-01 1.014E+00 1.000E+00 0.000E+00

```

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```

12 0.000E+00 0.000E+00 0.000E+00 1 0 -8.398E-01 -4.129E-01 3.524E-01 1.395E+00 1.000E+00 0.000E+00
13 0.000E+00 0.000E+00 0.000E+00 1 0 -1.714E-01 -8.572E-01 4.857E-01 7.748E-01 1.000E+00 0.000E+00
14 0.000E+00 0.000E+00 0.000E+00 1 0 -2.489E-01 -5.118E-01 -8.222E-01 1.101E+00 1.000E+00 0.000E+00
15 0.000E+00 0.000E+00 0.000E+00 1 0 -2.959E-01 2.119E-01 9.314E-01 1.951E+00 1.000E+00 0.000E+00
16 0.000E+00 0.000E+00 0.000E+00 1 0 1.395E-01 -9.829E-01 1.202E-01 2.186E+00 1.000E+00 0.000E+00
17 0.000E+00 0.000E+00 0.000E+00 1 0 6.909E-01 -7.110E-01 1.307E-01 1.865E+00 1.000E+00 0.000E+00
18 0.000E+00 0.000E+00 0.000E+00 1 0 -6.580E-01 5.320E-01 -5.329E-01 1.229E+00 1.000E+00 0.000E+00
19 0.000E+00 0.000E+00 0.000E+00 1 0 -9.903E-01 -1.380E-01 1.353E-02 1.305E+00 1.000E+00 0.000E+00
20 0.000E+00 0.000E+00 0.000E+00 1 0 7.462E-01 4.859E-01 -4.551E-01 1.000E+00 1.000E+00 0.000E+00
21 0.000E+00 0.000E+00 0.000E+00 1 0 -1.977E-01 9.797E-01 3.360E-02 3.990E+00 1.000E+00 0.000E+00
22 0.000E+00 0.000E+00 0.000E+00 1 0 -9.117E-01 -3.647E-01 -1.891E-01 2.665E-01 1.000E+00 0.000E+00
23 0.000E+00 0.000E+00 0.000E+00 1 0 -4.287E-01 8.361E-01 -3.423E-01 1.156E+00 1.000E+00 0.000E+00
24 0.000E+00 0.000E+00 0.000E+00 1 0 1.080E-01 3.412E-01 -9.338E-01 2.669E+00 1.000E+00 0.000E+00
25 0.000E+00 0.000E+00 0.000E+00 1 0 -9.111E-01 -9.012E-03 -4.122E-01 2.185E+00 1.000E+00 0.000E+00
26 0.000E+00 0.000E+00 0.000E+00 1 0 -2.568E-01 -6.391E-01 -7.249E-01 4.225E+00 1.000E+00 0.000E+00
27 0.000E+00 0.000E+00 0.000E+00 1 0 -2.912E-01 8.086E-01 5.113E-01 1.079E+00 1.000E+00 0.000E+00
28 0.000E+00 0.000E+00 0.000E+00 1 0 1.472E-01 -9.514E-01 2.705E-01 3.461E+00 1.000E+00 0.000E+00
29 0.000E+00 0.000E+00 0.000E+00 1 0 -6.135E-01 -7.645E-01 -1.978E-01 1.836E+00 1.000E+00 0.000E+00
30 0.000E+00 0.000E+00 0.000E+00 1 0 -5.702E-01 5.651E-01 -5.963E-01 4.556E+00 1.000E+00 0.000E+00
31 0.000E+00 0.000E+00 0.000E+00 1 0 -6.607E-01 5.373E-01 -5.242E-01 6.415E-01 1.000E+00 0.000E+00
32 0.000E+00 0.000E+00 0.000E+00 1 0 -9.742E-02 -3.639E-01 -9.263E-01 2.764E+00 1.000E+00 0.000E+00
33 0.000E+00 0.000E+00 0.000E+00 1 0 -1.965E-01 -3.145E-01 -9.287E-01 2.785E-01 1.000E+00 0.000E+00
34 0.000E+00 0.000E+00 0.000E+00 1 0 4.097E-01 8.465E-01 -3.399E-01 9.097E-01 1.000E+00 0.000E+00
35 0.000E+00 0.000E+00 0.000E+00 1 0 -4.048E-02 8.831E-01 4.675E-01 3.360E-01 1.000E+00 0.000E+00
36 0.000E+00 0.000E+00 0.000E+00 1 0 3.371E-01 -9.269E-01 -1.652E-01 6.376E-01 1.000E+00 0.000E+00
37 0.000E+00 0.000E+00 0.000E+00 1 0 -1.867E-01 9.756E-01 -1.155E-01 2.186E+00 1.000E+00 0.000E+00
38 0.000E+00 0.000E+00 0.000E+00 1 0 -2.616E-01 2.336E-01 -9.365E-01 7.314E-01 1.000E+00 0.000E+00
39 0.000E+00 0.000E+00 0.000E+00 1 0 9.780E-01 -7.641E-02 -1.939E-01 2.997E-01 1.000E+00 0.000E+00
40 0.000E+00 0.000E+00 0.000E+00 1 0 2.580E-01 -7.076E-01 6.578E-01 1.444E+00 1.000E+00 0.000E+00
41 0.000E+00 0.000E+00 0.000E+00 1 0 -3.212E-01 -7.678E-01 -5.543E-01 1.914E+00 1.000E+00 0.000E+00
42 0.000E+00 0.000E+00 0.000E+00 1 0 5.039E-01 -1.460E-01 8.513E-01 1.502E+00 1.000E+00 0.000E+00
43 0.000E+00 0.000E+00 0.000E+00 1 0 6.080E-01 5.487E-01 5.738E-01 5.971E+00 1.000E+00 0.000E+00
44 0.000E+00 0.000E+00 0.000E+00 1 0 -2.932E-01 9.304E-01 -2.199E-01 1.827E+00 1.000E+00 0.000E+00
45 0.000E+00 0.000E+00 0.000E+00 1 0 -8.475E-01 -3.993E-01 -3.497E-01 1.928E+00 1.000E+00 0.000E+00
46 0.000E+00 0.000E+00 0.000E+00 1 0 1.200E-01 -9.195E-01 -3.743E-01 1.351E+00 1.000E+00 0.000E+00
47 0.000E+00 0.000E+00 0.000E+00 1 0 7.085E-01 5.879E-01 3.904E-01 2.288E+00 1.000E+00 0.000E+00
48 0.000E+00 0.000E+00 0.000E+00 1 0 4.261E-01 9.046E-01 9.254E-03 1.230E+00 1.000E+00 0.000E+00
49 0.000E+00 0.000E+00 0.000E+00 1 0 5.431E-01 4.270E-01 -7.230E-01 1.433E+00 1.000E+00 0.000E+00
50 0.000E+00 0.000E+00 0.000E+00 1 0 -1.053E-01 -9.805E-01 1.658E-01 6.572E-01 1.000E+00 0.000E+00

```

Estimated keff results by cycle

print table 175

cycle 1 k(collision) 1.237348 removal lifetime(abs) 7.8639E+03 source points generated 3696
wto, stabilizer, present s, previous 0.812 0.915 3696 3000

cycle 2 k(collision) 0.992195 removal lifetime(abs) 1.0755E+04 source points generated 2404
wto, stabilizer, present s, previous 1.248 1.125 2404 3696

cycle 3 k(collision) 0.885114 removal lifetime(abs) 1.1332E+04 source points generated 2655
wto, stabilizer, present s, previous 1.130 1.131 2655 2404

cycle 4 k(collision) 0.906025 removal lifetime(abs) 1.1309E+04 source points generated 3046
wto, stabilizer, present s, previous 0.985 1.091 3046 2655

cycle 5 k(collision) 0.882202 removal lifetime(abs) 1.1537E+04 source points generated 2937
wto, stabilizer, present s, previous 1.021 1.107 2937 3046

cycle 6 k(collision) 0.881396 removal lifetime(abs) 1.1512E+04 source points generated 2934
wto, stabilizer, present s, previous 1.022 1.114 2934 2937

cycle 7 k(collision) 0.869471 removal lifetime(abs) 1.1987E+04 source points generated 2935
wto, stabilizer, present s, previous 1.022 1.120 2935 2934

cycle 8 k(collision) 0.898001 removal lifetime(abs) 1.1536E+04 source points generated 3117

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wto, stabilizer, present s, previous 0.962 1.094 3117 2935

dump no. 2 on file runtime nps = 23607 coll = 4480293 ctm = 15.22 nm = 35943308

cycle 9 k(collision) 0.870582 removal lifetime(abs) 1.2014E+04 source points generated 2868
wto, stabilizer, present s, previous 1.046 1.131 2868 3117

cycle 10 k(collision) 0.874943 removal lifetime(abs) 1.1450E+04 source points generated 2996
wto, stabilizer, present s, previous 1.001 1.119 2996 2868

source distribution written to file srctp cycle = 10

cycle 11 k(collision) 0.891128 removal lifetime(abs) 1.1113E+04 source points generated 3015
wto, stabilizer, present s, previous 0.995 1.116 3015 2996

source distribution written to file srctp cycle = 11

estimator	cycle	12	ave of	2 cycles	combination	simple average	combined average	corr
k(collision)		0.873450		0.882289	0.0100	k(col/abs)	0.000000	0.000000
k(absorption)		0.869847		0.882174	0.0140	k(abs/tk ln)	0.000000	0.000000
k(trk length)		0.879460		0.882472	0.0034	k(tk ln/col)	0.000000	0.000000
rem life(col)		1.1529E+04		1.1298E+04	0.0205			
rem life(abs)		1.1480E+04		1.1297E+04	0.0163	life(col/abs)	0.0000E+00	0.0000E+00
source points generated		2893						
wto, stabilizer, present s, previous		1.006		1.121	2983	3015		

source distribution written to file srctp cycle = 12

estimator	cycle	13	ave of	3 cycles	combination	simple average	combined average	corr
k(collision)		0.903536		0.889371	0.0098	k(col/abs)	0.882668	0.0069
k(absorption)		0.863543		0.875964	0.0108	k(abs/tk ln)	0.882963	0.0051
k(trk length)		0.904943		0.889962	0.0086	k(tk ln/col)	0.889667	0.0090
rem life(col)		1.1668E+04		1.1421E+04	0.0159			
rem life(abs)		1.1624E+04		1.1406E+04	0.0133	life(col/abs)	1.1413E+04	0.0146
source points generated		3012						
wto, stabilizer, present s, previous		0.996		1.117	3012	2983		

source distribution written to file srctp cycle = 13

estimator	cycle	14	ave of	4 cycles	combination	simple average	combined average	corr
k(collision)		0.879164		0.886819	0.0075	k(col/abs)	0.882152	0.0049
k(absorption)		0.882048		0.877485	0.0078	k(abs/tk ln)	0.882103	0.0037
k(trk length)		0.877001		0.886722	0.0071	k(tk ln/col)	0.886771	0.0072
rem life(col)		1.0811E+04		1.1268E+04	0.0177	k(col/abs/tk ln)	0.883675	0.0046
rem life(abs)		1.0921E+04		1.1285E+04	0.0144	life(col/abs)	1.1277E+04	0.0160
source points generated		2978						
wto, stabilizer, present s, previous		1.007		1.122	2978	3012		

source distribution written to file srctp cycle = 14

estimator	cycle	15	ave of	5 cycles	combination	simple average	combined average	corr
k(collision)		0.887992		0.887054	0.0058	k(col/abs)	0.884830	0.0049
k(absorption)		0.903093		0.882607	0.0084	k(abs/tk ln)	0.884877	0.0042
k(trk length)		0.888852		0.887148	0.0055	k(tk ln/col)	0.887101	0.0056
rem life(col)		1.1654E+04		1.1345E+04	0.0152	k(col/abs/tk ln)	0.885603	0.0042
rem life(abs)		1.1655E+04		1.1359E+04	0.0128	life(col/abs)	1.1352E+04	0.0140
source points generated		3040						
wto, stabilizer, present s, previous		0.987		1.113	3040	2978		

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source distribution written to file srcpt cycle = 15

estimator	cycle	16	ave of	6 cycles	combination	simple average	combined average	corr
k(collission)	0.861345	0.882769	0.0068	k(col/abs)	0.882596	0.0047	0.882596	0.0053 -0.0413
k(absorption)	0.881505	0.882423	0.0068	k(abs/tk ln)	0.882961	0.0041	0.883007	0.0046 -0.2041
k(trk length)	0.865252	0.883499	0.0061	k(tk ln/col)	0.883134	0.0064	0.883982	0.0068 0.9608
rem life(col)	1.1609E+04	1.1389E+04	0.0130	k(col/abs/tk ln)	0.882897	0.0046	0.883848	0.0044
rem life(abs)	1.1668E+04	1.1410E+04	0.0114	life(col/abs)	1.1400E+04	0.0121	1.1480E+04	0.0101 0.9915

source points generated 2887
wto, stabilizer, present s, previous 1.039 1.139 2887 3040

source distribution written to file srcpt cycle = 16

dump no. 3 on file runtime nps = 47616 coll = 9300456 ctm = 31.48 nm = 74220629

estimator	cycle	17	ave of	7 cycles	combination	simple average	combined average	corr
k(collission)	0.866421	0.880434	0.0064	k(col/abs)	0.881231	0.0043	0.881304	0.0047 -0.0052
k(absorption)	0.879665	0.882029	0.0058	k(abs/tk ln)	0.881505	0.0038	0.881517	0.0042 -0.1413
k(trk length)	0.865880	0.880982	0.0059	k(tk ln/col)	0.880708	0.0061	0.881221	0.0065 0.9662
rem life(col)	1.1771E+04	1.1444E+04	0.0119	k(col/abs/tk ln)	0.881148	0.0044	0.882203	0.0042
rem life(abs)	1.1875E+04	1.1477E+04	0.0112	life(col/abs)	1.1460E+04	0.0115	1.1518E+04	0.0134 0.9846

source points generated 2992
wto, stabilizer, present s, previous 1.003 1.130 2992 2887

source distribution written to file srcpt cycle = 17

estimator	cycle	18	ave of	8 cycles	combination	simple average	combined average	corr
k(collission)	0.871819	0.879357	0.0056	k(col/abs)	0.879745	0.0041	0.879758	0.0044 0.0808
k(absorption)	0.866856	0.880132	0.0055	k(abs/tk ln)	0.880290	0.0036	0.880297	0.0039 -0.0828
k(trk length)	0.876706	0.880447	0.0052	k(tk ln/col)	0.879902	0.0054	0.881017	0.0058 0.9621
rem life(col)	1.1701E+04	1.1476E+04	0.0107	k(col/abs/tk ln)	0.879979	0.0040	0.881730	0.0037
rem life(abs)	1.1671E+04	1.1501E+04	0.0099	life(col/abs)	1.1488E+04	0.0102	1.1538E+04	0.0110 0.9842

source points generated 2988
wto, stabilizer, present s, previous 1.004 1.132 2988 2992

source distribution written to file srcpt cycle = 18

estimator	cycle	19	ave of	9 cycles	combination	simple average	combined average	corr
k(collission)	0.874960	0.878868	0.0050	k(col/abs)	0.878493	0.0039	0.878521	0.0041 0.1200
k(absorption)	0.862009	0.878119	0.0053	k(abs/tk ln)	0.878733	0.0036	0.878808	0.0039 0.0409
k(trk length)	0.870541	0.879347	0.0047	k(tk ln/col)	0.879107	0.0048	0.879370	0.0051 0.9515
rem life(col)	1.1947E+04	1.1528E+04	0.0104	k(col/abs/tk ln)	0.878778	0.0038	0.878998	0.0041
rem life(abs)	1.1899E+04	1.1545E+04	0.0095	life(col/abs)	1.1537E+04	0.0099	1.1580E+04	0.0096 0.9864

source points generated 2943
wto, stabilizer, present s, previous 1.019 1.141 2943 2988

source distribution written to file srcpt cycle = 19

estimator	cycle	20	ave of	10 cycles	combination	simple average	combined average	corr
k(collission)	0.908984	0.881880	0.0056	k(col/abs)	0.880053	0.0039	0.879716	0.0042 0.1109
k(absorption)	0.879193	0.878226	0.0048	k(abs/tk ln)	0.880196	0.0037	0.879976	0.0039 0.0481
k(trk length)	0.907541	0.882166	0.0053	k(tk ln/col)	0.882023	0.0054	0.882282	0.0056 0.9693
rem life(col)	1.2104E+04	1.1586E+04	0.0105	k(col/abs/tk ln)	0.880757	0.0041	0.880119	0.0041
rem life(abs)	1.2110E+04	1.1602E+04	0.0097	life(col/abs)	1.1594E+04	0.0101	1.1636E+04	0.0099 0.9892

source points generated 3130
wto, stabilizer, present s, previous 0.958 1.113 3130 2943

source distribution written to file srcpt cycle = 20

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```

estimator cycle 21 ave of 11 cycles combination simple average combined average corr
k(collison) 0.867237 0.880549 0.0053 k(col/abs) 0.879045 0.0037 0.878708 0.0039 0.1551
k(absorption) 0.870686 0.877541 0.0044 k(abs/tk ln) 0.879509 0.0034 0.879288 0.0037 0.0752
k(trk length) 0.874587 0.881477 0.0049 k(tk ln/col) 0.881013 0.0050 0.882010 0.0052 0.9629
rem life(col) 1.1356E+04 1.1565E+04 0.0097 k(col/abs/tk ln) 0.879855 0.0038 0.879957 0.0037
rem life(abs) 1.1293E+04 1.1574E+04 0.0092 life(col/abs) 1.1569E+04 0.0094 1.1585E+04 0.0095 0.9865
source points generated 2863
wto, stabilizer, present s, previous 1.048 1.154 2863 3130

```

source distribution written to file srcpt cycle = 21

```

estimator cycle 22 ave of 12 cycles combination simple average combined average corr
k(collison) 0.921624 0.883972 0.0062 k(col/abs) 0.882142 0.0049 0.881460 0.0051 0.4815
k(absorption) 0.910802 0.880312 0.0051 k(abs/tk ln) 0.882675 0.0047 0.881968 0.0051 0.4697
k(trk length) 0.924204 0.885038 0.0060 k(tk ln/col) 0.884505 0.0060 0.885265 0.0065 0.9766
rem life(col) 1.1313E+04 1.1544E+04 0.0090 k(col/abs/tk ln) 0.883107 0.0051 0.882453 0.0054
rem life(abs) 1.1200E+04 1.1542E+04 0.0088 life(col/abs) 1.1543E+04 0.0089 1.1542E+04 0.0092 0.9815
source points generated 3222
wto, stabilizer, present s, previous 0.931 1.104 3222 2863

```

source distribution written to file srcpt cycle = 22

```

estimator cycle 23 ave of 13 cycles combination simple average combined average corr
k(collison) 0.888996 0.884358 0.0057 k(col/abs) 0.882545 0.0045 0.881871 0.0047 0.4854
k(absorption) 0.885765 0.880732 0.0047 k(abs/tk ln) 0.883114 0.0044 0.882397 0.0047 0.4648
k(trk length) 0.891004 0.885496 0.0055 k(tk ln/col) 0.884927 0.0056 0.885707 0.0060 0.9766
rem life(col) 1.1951E+04 1.1575E+04 0.0087 k(col/abs/tk ln) 0.883529 0.0047 0.882890 0.0050
rem life(abs) 1.1933E+04 1.1573E+04 0.0085 life(col/abs) 1.1574E+04 0.0086 1.1572E+04 0.0089 0.9833
source points generated 2887
wto, stabilizer, present s, previous 1.039 1.148 2887 3222

```

source distribution written to file srcpt cycle = 23

```

estimator cycle 24 ave of 14 cycles combination simple average combined average corr
k(collison) 0.860211 0.882633 0.0056 k(col/abs) 0.881013 0.0045 0.880316 0.0047 0.5440
k(absorption) 0.861971 0.879392 0.0046 k(abs/tk ln) 0.881619 0.0044 0.880844 0.0047 0.5252
k(trk length) 0.862386 0.883846 0.0055 k(tk ln/col) 0.883240 0.0055 0.884214 0.0060 0.9794
rem life(col) 1.0966E+04 1.1532E+04 0.0089 k(col/abs/tk ln) 0.881957 0.0047 0.881504 0.0050
rem life(abs) 1.0939E+04 1.1527E+04 0.0088 life(col/abs) 1.1530E+04 0.0088 1.1527E+04 0.0092 0.9861
source points generated 2852
wto, stabilizer, present s, previous 1.052 1.167 2852 2887

```

source distribution written to file srcpt cycle = 24

```

***
dump no. 4 on file runtime nps = 71528 coll = 14152105 ctrn = 47.82 nrm = 112710179

```

```

estimator cycle 25 ave of 15 cycles combination simple average combined average corr
k(collison) 0.862999 0.881324 0.0055 k(col/abs) 0.880908 0.0042 0.880766 0.0043 0.4270
k(absorption) 0.895890 0.880492 0.0045 k(abs/tk ln) 0.881673 0.0041 0.881361 0.0042 0.4322
k(trk length) 0.868978 0.882855 0.0052 k(tk ln/col) 0.882089 0.0053 0.883762 0.0058 0.9790
rem life(col) 1.0846E+04 1.1486E+04 0.0093 k(col/abs/tk ln) 0.881557 0.0044 0.881996 0.0047
rem life(abs) 1.0996E+04 1.1492E+04 0.0088 life(col/abs) 1.1489E+04 0.0090 1.1498E+04 0.0090 0.9845
source points generated 3026
wto, stabilizer, present s, previous 0.991 1.147 3026 2852

```

source distribution written to file srcpt cycle = 25

```

estimator cycle 26 ave of 16 cycles combination simple average combined average corr
k(collison) 0.867467 0.880458 0.0052 k(col/abs) 0.879749 0.0042 0.879559 0.0043 0.4593

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```
k(absorption) 0.857259 0.879040 0.0045 k(abs/tk ln) 0.880323 0.0041 0.880023 0.0043 0.4884
k(trk length) 0.862889 0.881607 0.0051 k(tk ln/col) 0.881033 0.0051 0.881645 0.0055 0.9759
rem life(col) 1.1717E+04 1.1501E+04 0.0087 k(col/abs/tk ln) 0.880368 0.0043 0.879817 0.0047
rem life(abs) 1.1673E+04 1.1503E+04 0.0083 life(col/abs) 1.1502E+04 0.0085 1.1506E+04 0.0084 0.9845
source points generated 3017
wto, stabilizer, present s, previous 0.994 1.147 3017 3026
```

source distribution written to file srcpt cycle = 26

```
estimator cycle 27 ave of 17 cycles combination simple average combined average corr
k(collission) 0.922245 0.882916 0.0056 k(col/abs) 0.881001 0.0042 0.880123 0.0042 0.4050
k(absorption) 0.879808 0.879085 0.0042 k(abs/tk ln) 0.881462 0.0041 0.880469 0.0042 0.4370
k(trk length) 0.919550 0.883839 0.0054 k(tk ln/col) 0.883378 0.0055 0.884364 0.0057 0.9810
rem life(col) 1.1240E+04 1.1485E+04 0.0083 k(col/abs/tk ln) 0.881947 0.0044 0.880439 0.0045
rem life(abs) 1.1149E+04 1.1482E+04 0.0080 life(col/abs) 1.1484E+04 0.0081 1.1480E+04 0.0082 0.9828
source points generated 3174
wto, stabilizer, present s, previous 0.945 1.118 3174 3017
```

source distribution written to file srcpt cycle = 27

```
estimator cycle 28 ave of 18 cycles combination simple average combined average corr
k(collission) 0.879008 0.882699 0.0053 k(col/abs) 0.880468 0.0040 0.879535 0.0040 0.4042
k(absorption) 0.863810 0.878236 0.0041 k(abs/tk ln) 0.880954 0.0039 0.879945 0.0041 0.4332
k(trk length) 0.880838 0.883672 0.0051 k(tk ln/col) 0.883186 0.0052 0.884234 0.0054 0.9810
rem life(col) 1.1615E+04 1.1492E+04 0.0079 k(col/abs/tk ln) 0.881536 0.0042 0.879982 0.0044
rem life(abs) 1.1502E+04 1.1483E+04 0.0075 life(col/abs) 1.1488E+04 0.0077 1.1478E+04 0.0078 0.9805
source points generated 2878
wto, stabilizer, present s, previous 1.042 1.159 2878 3174
```

source distribution written to file srcpt cycle = 28

```
estimator cycle 29 ave of 19 cycles combination simple average combined average corr
k(collission) 0.874071 0.882245 0.0051 k(col/abs) 0.880706 0.0038 0.880169 0.0038 0.3612
k(absorption) 0.895912 0.879166 0.0040 k(abs/tk ln) 0.881126 0.0037 0.880537 0.0038 0.3781
k(trk length) 0.872528 0.883085 0.0049 k(tk ln/col) 0.882665 0.0049 0.883474 0.0051 0.9807
rem life(col) 1.1217E+04 1.1478E+04 0.0076 k(col/abs/tk ln) 0.881499 0.0040 0.880655 0.0040
rem life(abs) 1.1207E+04 1.1469E+04 0.0072 life(col/abs) 1.1473E+04 0.0074 1.1463E+04 0.0075 0.9811
source points generated 3054
wto, stabilizer, present s, previous 0.982 1.138 3054 2878
```

source distribution written to file srcpt cycle = 29

```
estimator cycle 30 ave of 20 cycles combination simple average combined average corr
k(collission) 0.904835 0.883375 0.0050 k(col/abs) 0.881333 0.0036 0.880528 0.0037 0.3583
k(absorption) 0.881668 0.879292 0.0038 k(abs/tk ln) 0.881776 0.0036 0.880891 0.0037 0.3733
k(trk length) 0.906598 0.884261 0.0048 k(tk ln/col) 0.883818 0.0048 0.884601 0.0050 0.9819
rem life(col) 1.1086E+04 1.1458E+04 0.0074 k(col/abs/tk ln) 0.882309 0.0039 0.880971 0.0039
rem life(abs) 1.1063E+04 1.1449E+04 0.0071 life(col/abs) 1.1453E+04 0.0072 1.1443E+04 0.0073 0.9820
source points generated 3091
wto, stabilizer, present s, previous 0.971 1.126 3091 3054
```

source distribution written to file srcpt cycle = 30

```
estimator cycle 31 ave of 21 cycles combination simple average combined average corr
k(collission) 0.871351 0.882802 0.0048 k(col/abs) 0.881261 0.0035 0.880674 0.0035 0.3337
k(absorption) 0.888289 0.879720 0.0037 k(abs/tk ln) 0.881655 0.0034 0.880983 0.0035 0.3431
k(trk length) 0.870170 0.883590 0.0046 k(tk ln/col) 0.883196 0.0047 0.883805 0.0048 0.9819
rem life(col) 1.1240E+04 1.1448E+04 0.0071 k(col/abs/tk ln) 0.882037 0.0037 0.881060 0.0036
rem life(abs) 1.1221E+04 1.1438E+04 0.0068 life(col/abs) 1.1443E+04 0.0069 1.1432E+04 0.0071 0.9823
source points generated 2905
wto, stabilizer, present s, previous 1.033 1.154 2905 3091
```

source distribution written to file srcpt cycle = 31

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```

estimator cycle 32 ave of 22 cycles combination simple average combined average corr
k(collison) 0.831014 0.880448 0.0053 k(col/abs) 0.880086 0.0036 0.879893 0.0033 0.2871
k(absorption) 0.879799 0.879724 0.0035 k(abs/tk ln) 0.880372 0.0036 0.880026 0.0033 0.2857
k(trk length) 0.827053 0.881020 0.0053 k(tk ln/col) 0.880734 0.0053 0.880657 0.0055 0.9856
rem life(col) 1.1392E+04 1.1445E+04 0.0068 k(col/abs/tk ln) 0.880397 0.0040 0.879946 0.0035
rem life(abs) 1.1492E+04 1.1440E+04 0.0065 life(col/abs) 1.1443E+04 0.0066 1.1438E+04 0.0067 0.9801
source points generated 2899
wto, stabilizer, present s, previous 1.035 1.165 2899 2905

```

source distribution written to file srcpt cycle = 32

dump no. 5 on file runtpe nps = 95525 coll = 18944563 ctm = 63.96 nrm = 150791796

```

estimator cycle 33 ave of 23 cycles combination simple average combined average corr
k(collison) 0.877411 0.880316 0.0050 k(col/abs) 0.879922 0.0034 0.879714 0.0032 0.2883
k(absorption) 0.875235 0.879528 0.0033 k(abs/tk ln) 0.880198 0.0034 0.879841 0.0032 0.2871
k(trk length) 0.877531 0.880869 0.0051 k(tk ln/col) 0.880592 0.0050 0.880515 0.0052 0.9856
rem life(col) 1.1399E+04 1.1443E+04 0.0065 k(col/abs/tk ln) 0.880238 0.0038 0.879761 0.0033
rem life(abs) 1.1346E+04 1.1436E+04 0.0062 life(col/abs) 1.1440E+04 0.0063 1.1433E+04 0.0064 0.9797
source points generated 3180
wto, stabilizer, present s, previous 0.943 1.124 3180 2899

```

source distribution written to file srcpt cycle = 33

```

estimator cycle 34 ave of 24 cycles combination simple average combined average corr
k(collison) 0.949803 0.883211 0.0058 k(col/abs) 0.881840 0.0039 0.880785 0.0034 0.4040
k(absorption) 0.902073 0.880468 0.0034 k(abs/tk ln) 0.882105 0.0039 0.880849 0.0034 0.4025
k(trk length) 0.949829 0.883742 0.0058 k(tk ln/col) 0.883477 0.0058 0.883466 0.0060 0.9901
rem life(col) 1.1162E+04 1.1432E+04 0.0063 k(col/abs/tk ln) 0.882474 0.0045 0.880836 0.0035
rem life(abs) 1.1115E+04 1.1423E+04 0.0061 life(col/abs) 1.1427E+04 0.0062 1.1420E+04 0.0063 0.9799
source points generated 3262
wto, stabilizer, present s, previous 0.920 1.095 3262 3180

```

source distribution written to file srcpt cycle = 34

```

estimator cycle 35 ave of 25 cycles combination simple average combined average corr
k(collison) 0.895371 0.883698 0.0056 k(col/abs) 0.881875 0.0038 0.880521 0.0033 0.3837
k(absorption) 0.870079 0.880052 0.0033 k(abs/tk ln) 0.882259 0.0038 0.880629 0.0033 0.3731
k(trk length) 0.901834 0.884466 0.0056 k(tk ln/col) 0.884082 0.0056 0.883864 0.0059 0.9891
rem life(col) 1.2020E+04 1.1455E+04 0.0064 k(col/abs/tk ln) 0.882738 0.0043 0.880688 0.0035
rem life(abs) 1.2055E+04 1.1448E+04 0.0062 life(col/abs) 1.1452E+04 0.0063 1.1448E+04 0.0064 0.9817
source points generated 2850
wto, stabilizer, present s, previous 1.053 1.151 2850 3262

```

source distribution written to file srcpt cycle = 35

```

estimator cycle 36 ave of 26 cycles combination simple average combined average corr
k(collison) 0.860528 0.882807 0.0055 k(col/abs) 0.881355 0.0037 0.880251 0.0032 0.3865
k(absorption) 0.876173 0.879903 0.0032 k(abs/tk ln) 0.881699 0.0037 0.880337 0.0032 0.3759
k(trk length) 0.859241 0.883495 0.0055 k(tk ln/col) 0.883151 0.0055 0.882857 0.0057 0.9894
rem life(col) 1.1484E+04 1.1456E+04 0.0061 k(col/abs/tk ln) 0.882068 0.0042 0.880372 0.0033
rem life(abs) 1.1570E+04 1.1453E+04 0.0060 life(col/abs) 1.1455E+04 0.0060 1.1453E+04 0.0061 0.9804
source points generated 2895
wto, stabilizer, present s, previous 1.036 1.157 2895 2850

```

source distribution written to file srcpt cycle = 36

```

estimator cycle 37 ave of 27 cycles combination simple average combined average corr
k(collison) 0.890600 0.883095 0.0053 k(col/abs) 0.881589 0.0035 0.880440 0.0031 0.3890

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k(absorption) 0.884733 0.880082 0.0030 k(abs/tk ln) 0.881941 0.0035 0.880527 0.0031 0.3786
k(trk length) 0.891742 0.883801 0.0053 k(tk ln/col) 0.883448 0.0053 0.883140 0.0055 0.9895
rem life(col) 1.1569E+04 1.1461E+04 0.0059 k(col/abs/tk ln) 0.882326 0.0040 0.880559 0.0032
rem life(abs) 1.1512E+04 1.1455E+04 0.0058 life(col/abs) 1.1458E+04 0.0058 1.1455E+04 0.0059 0.9800
source points generated 3135
wto, stabilizer, present s, previous 0.957 1.123 3135 2895

```

source distribution written to file srcpt cycle = 37

```

estimator cycle 38 ave of 28 cycles combination simple average combined average corr
k(collision) 0.851133 0.881954 0.0053 k(col/abs) 0.880958 0.0035 0.880173 0.0029 0.3881
k(absorption) 0.876725 0.879962 0.0029 k(abs/tk ln) 0.881391 0.0035 0.880275 0.0030 0.3795
k(trk length) 0.856319 0.882819 0.0053 k(tk ln/col) 0.882387 0.0053 0.882350 0.0055 0.9894
rem life(col) 1.1796E+04 1.1473E+04 0.0058 k(col/abs/tk ln) 0.881578 0.0040 0.880386 0.0031
rem life(abs) 1.1838E+04 1.1469E+04 0.0057 life(col/abs) 1.1471E+04 0.0057 1.1469E+04 0.0058 0.9804
source points generated 2915
wto, stabilizer, present s, previous 1.029 1.153 2915 3135

```

source distribution written to file srcpt cycle = 38

```

estimator cycle 39 ave of 29 cycles combination simple average combined average corr
k(collision) 0.900283 0.882586 0.0051 k(col/abs) 0.881400 0.0034 0.880450 0.0029 0.3964
k(absorption) 0.887255 0.880213 0.0028 k(abs/tk ln) 0.881864 0.0034 0.880551 0.0029 0.3885
k(trk length) 0.902953 0.883514 0.0051 k(tk ln/col) 0.883050 0.0051 0.882922 0.0054 0.9895
rem life(col) 1.1646E+04 1.1478E+04 0.0056 k(col/abs/tk ln) 0.882104 0.0039 0.880635 0.0030
rem life(abs) 1.1478E+04 1.1469E+04 0.0055 life(col/abs) 1.1474E+04 0.0055 1.1470E+04 0.0056 0.9766
source points generated 3220
wto, stabilizer, present s, previous 0.932 1.108 3220 2915

```

source distribution written to file srcpt cycle = 39

```

estimator cycle 40 ave of 30 cycles combination simple average combined average corr
k(collision) 0.875367 0.882345 0.0050 k(col/abs) 0.881098 0.0033 0.880106 0.0028 0.3996
k(absorption) 0.869338 0.879851 0.0028 k(abs/tk ln) 0.881502 0.0033 0.880189 0.0028 0.3950
k(trk length) 0.872693 0.883153 0.0050 k(tk ln/col) 0.882749 0.0050 0.882572 0.0052 0.9892
rem life(col) 1.1293E+04 1.1472E+04 0.0054 k(col/abs/tk ln) 0.881783 0.0038 0.880179 0.0029
rem life(abs) 1.1209E+04 1.1460E+04 0.0054 life(col/abs) 1.1466E+04 0.0054 1.1463E+04 0.0055 0.9760
source points generated 2951
wto, stabilizer, present s, previous 1.017 1.138 2951 3220

```

source distribution written to file srcpt cycle = 40

```

*****
***
dump no. 6 on file runtpe nps = 119881 coll = 23821597 ctm = 80.41 nm = 189552888

```

```

estimator cycle 41 ave of 31 cycles combination simple average combined average corr
k(collision) 0.867710 0.881873 0.0048 k(col/abs) 0.881048 0.0032 0.880416 0.0027 0.3750
k(absorption) 0.891393 0.880223 0.0027 k(abs/tk ln) 0.881356 0.0032 0.880492 0.0027 0.3615
k(trk length) 0.862557 0.882489 0.0049 k(tk ln/col) 0.882181 0.0048 0.881900 0.0050 0.9884
rem life(col) 1.1065E+04 1.1459E+04 0.0054 k(col/abs/tk ln) 0.881528 0.0037 0.880543 0.0028
rem life(abs) 1.1078E+04 1.1448E+04 0.0053 life(col/abs) 1.1454E+04 0.0053 1.1450E+04 0.0055 0.9770
source points generated 2964
wto, stabilizer, present s, previous 1.012 1.140 2964 2951

```

source distribution written to file srcpt cycle = 41

```

estimator cycle 42 ave of 32 cycles combination simple average combined average corr
k(collision) 0.873412 0.881609 0.0047 k(col/abs) 0.881195 0.0031 0.880898 0.0027 0.3489
k(absorption) 0.898083 0.880781 0.0027 k(abs/tk ln) 0.881544 0.0031 0.880995 0.0027 0.3409
k(trk length) 0.876664 0.882306 0.0047 k(tk ln/col) 0.881958 0.0047 0.881676 0.0049 0.9883

```

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```
rem life(col) 1.1398E+04 1.1457E+04 0.0052 k(col/abs/tk ln) 0.881566 0.0035 0.880975 0.0028
rem life(abs) 1.1432E+04 1.1447E+04 0.0051 life(col/abs) 1.1452E+04 0.0051 1.1449E+04 0.0053 0.9768
source points generated 2971
wto, stabilizer, present s, previous 1.010 1.143 2971 2964
```

source distribution written to file srcpt cycle = 42

```
estimator cycle 43 ave of 33 cycles combination simple average combined average corr
k(collission) 0.897049 0.882077 0.0046 k(col/abs) 0.881637 0.0030 0.881321 0.0026 0.3616
k(absorption) 0.894543 0.881198 0.0027 k(abs/tk ln) 0.881995 0.0030 0.881419 0.0026 0.3543
k(trk length) 0.898329 0.882792 0.0046 k(tk ln/col) 0.882434 0.0046 0.882130 0.0047 0.9884
rem life(col) 1.1416E+04 1.1456E+04 0.0050 k(col/abs/tk ln) 0.882022 0.0035 0.881386 0.0027
rem life(abs) 1.1462E+04 1.1448E+04 0.0050 life(col/abs) 1.1452E+04 0.0050 1.1449E+04 0.0051 0.9763
source points generated 3159
wto, stabilizer, present s, previous 0.950 1.112 3159 2971
```

source distribution written to file srcpt cycle = 43

```
estimator cycle 44 ave of 34 cycles combination simple average combined average corr
k(collission) 0.898238 0.882552 0.0045 k(col/abs) 0.881906 0.0030 0.881436 0.0026 0.3621
k(absorption) 0.883293 0.881260 0.0026 k(abs/tk ln) 0.882181 0.0030 0.881512 0.0026 0.3552
k(trk length) 0.893358 0.883103 0.0045 k(tk ln/col) 0.882827 0.0045 0.882701 0.0046 0.9876
rem life(col) 1.0975E+04 1.1442E+04 0.0051 k(col/abs/tk ln) 0.882305 0.0034 0.881511 0.0026
rem life(abs) 1.0984E+04 1.1434E+04 0.0050 life(col/abs) 1.1438E+04 0.0050 1.1435E+04 0.0051 0.9777
source points generated 3031
wto, stabilizer, present s, previous 0.990 1.121 3031 3159
```

source distribution written to file srcpt cycle = 44

```
estimator cycle 45 ave of 35 cycles combination simple average combined average corr
k(collission) 0.880584 0.882496 0.0043 k(col/abs) 0.881746 0.0029 0.881205 0.0025 0.3612
k(absorption) 0.872003 0.880996 0.0025 k(abs/tk ln) 0.881997 0.0029 0.881274 0.0025 0.3558
k(trk length) 0.879418 0.882998 0.0044 k(tk ln/col) 0.882747 0.0043 0.882627 0.0044 0.9876
rem life(col) 1.1426E+04 1.1441E+04 0.0049 k(col/abs/tk ln) 0.882163 0.0033 0.881258 0.0026
rem life(abs) 1.1481E+04 1.1436E+04 0.0048 life(col/abs) 1.1438E+04 0.0048 1.1436E+04 0.0049 0.9772
source points generated 2942
wto, stabilizer, present s, previous 1.020 1.135 2942 3031
```

source distribution written to file srcpt cycle = 45

```
estimator cycle 46 ave of 36 cycles combination simple average combined average corr
k(collission) 0.906171 0.883153 0.0043 k(col/abs) 0.882199 0.0028 0.881493 0.0025 0.3733
k(absorption) 0.889997 0.881246 0.0025 k(abs/tk ln) 0.882455 0.0029 0.881559 0.0025 0.3681
k(trk length) 0.907014 0.883665 0.0043 k(tk ln/col) 0.883409 0.0043 0.883278 0.0044 0.9880
rem life(col) 1.1027E+04 1.1430E+04 0.0049 k(col/abs/tk ln) 0.882688 0.0033 0.881542 0.0025
rem life(abs) 1.1026E+04 1.1424E+04 0.0048 life(col/abs) 1.1427E+04 0.0048 1.1425E+04 0.0049 0.9782
source points generated 3164
wto, stabilizer, present s, previous 0.948 1.101 3164 2942
```

source distribution written to file srcpt cycle = 46

```
estimator cycle 47 ave of 37 cycles combination simple average combined average corr
k(collission) 0.904029 0.883718 0.0042 k(col/abs) 0.882785 0.0028 0.882098 0.0025 0.3965
k(absorption) 0.903687 0.881852 0.0025 k(abs/tk ln) 0.883049 0.0029 0.882165 0.0025 0.3924
k(trk length) 0.905197 0.884247 0.0042 k(tk ln/col) 0.883982 0.0042 0.883830 0.0043 0.9882
rem life(col) 1.0968E+04 1.1417E+04 0.0049 k(col/abs/tk ln) 0.883272 0.0032 0.882131 0.0026
rem life(abs) 1.1073E+04 1.1415E+04 0.0048 life(col/abs) 1.1416E+04 0.0048 1.1414E+04 0.0048 0.9778
source points generated 2914
wto, stabilizer, present s, previous 1.030 1.134 2914 3164
```

source distribution written to file srcpt cycle = 47

```
estimator cycle 48 ave of 38 cycles combination simple average combined average corr
```

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```

k(collison) 0.894632 0.884005 0.0041 k(col/abs) 0.882967 0.0028 0.882199 0.0024 0.3979
k(absorption) 0.884783 0.881929 0.0024 k(abs/tk ln) 0.883218 0.0028 0.882262 0.0024 0.3937
k(trk length) 0.894113 0.884506 0.0041 k(tk ln/col) 0.884255 0.0041 0.884124 0.0042 0.9883
rem life(col) 1.1153E+04 1.1410E+04 0.0048 k(col/abs/tk ln) 0.883480 0.0032 0.882235 0.0025
rem life(abs) 1.1112E+04 1.1407E+04 0.0047 life(col/abs) 1.1409E+04 0.0047 1.1407E+04 0.0048 0.9780
source points generated 2979
wto, stabilizer, present s, previous 1.007 1.130 2979 2914

```

source distribution written to file srcpt cycle = 48

dump no. 7 on file runtime nps = 143977 coll = 28592521 ctm = 96.49 nrm = 227524634

```

estimator cycle 49 ave of 39 cycles combination simple average combined average corr
k(collison) 0.893041 0.884236 0.0040 k(col/abs) 0.883108 0.0027 0.882270 0.0024 0.3985
k(absorption) 0.883862 0.881979 0.0024 k(abs/tk ln) 0.883431 0.0027 0.882346 0.0024 0.3939
k(trk length) 0.899208 0.884883 0.0040 k(tk ln/col) 0.884560 0.0040 0.884312 0.0041 0.9876
rem life(col) 1.1411E+04 1.1410E+04 0.0047 k(col/abs/tk ln) 0.883699 0.0031 0.882290 0.0024
rem life(abs) 1.1402E+04 1.1407E+04 0.0046 life(col/abs) 1.1408E+04 0.0046 1.1406E+04 0.0046 0.9780
source points generated 2989
wto, stabilizer, present s, previous 1.004 1.130 2989 2979

```

source distribution written to file srcpt cycle = 49

```

estimator cycle 50 ave of 40 cycles combination simple average combined average corr
k(collison) 0.898937 0.884604 0.0039 k(col/abs) 0.883653 0.0027 0.882990 0.0024 0.4088
k(absorption) 0.910896 0.882702 0.0025 k(abs/tk ln) 0.883950 0.0027 0.883080 0.0024 0.3998
k(trk length) 0.897474 0.885198 0.0040 k(tk ln/col) 0.884901 0.0039 0.884710 0.0040 0.9875
rem life(col) 1.1234E+04 1.1406E+04 0.0046 k(col/abs/tk ln) 0.884168 0.0030 0.883079 0.0025
rem life(abs) 1.1208E+04 1.1402E+04 0.0045 life(col/abs) 1.1404E+04 0.0045 1.1402E+04 0.0045 0.9781
source points generated 2972
wto, stabilizer, present s, previous 1.009 1.134 2972 2989

```

source distribution written to file srcpt cycle = 50

```

estimator cycle 51 ave of 41 cycles combination simple average combined average corr
k(collison) 0.908672 0.885191 0.0039 k(col/abs) 0.884011 0.0027 0.883168 0.0024 0.4125
k(absorption) 0.888032 0.882832 0.0024 k(abs/tk ln) 0.884304 0.0027 0.883253 0.0024 0.4037
k(trk length) 0.908902 0.885776 0.0039 k(tk ln/col) 0.885484 0.0039 0.885306 0.0040 0.9879
rem life(col) 1.1332E+04 1.1404E+04 0.0045 k(col/abs/tk ln) 0.884600 0.0030 0.883260 0.0024
rem life(abs) 1.1403E+04 1.1402E+04 0.0044 life(col/abs) 1.1403E+04 0.0044 1.1402E+04 0.0044 0.9774
source points generated 3056
wto, stabilizer, present s, previous 0.982 1.121 3056 2972

```

source distribution written to file srcpt cycle = 51

```

estimator cycle 52 ave of 42 cycles combination simple average combined average corr
k(collison) 0.902881 0.885612 0.0038 k(col/abs) 0.884477 0.0027 0.883675 0.0024 0.4272
k(absorption) 0.904231 0.883341 0.0024 k(abs/tk ln) 0.884705 0.0026 0.883760 0.0024 0.4111
k(trk length) 0.898094 0.886069 0.0038 k(tk ln/col) 0.885841 0.0038 0.885782 0.0039 0.9873
rem life(col) 1.1404E+04 1.1417E+04 0.0045 k(col/abs/tk ln) 0.885008 0.0030 0.883842 0.0024
rem life(abs) 1.1875E+04 1.1413E+04 0.0044 life(col/abs) 1.1415E+04 0.0044 1.1412E+04 0.0044 0.9785
source points generated 3037
wto, stabilizer, present s, previous 0.988 1.119 3037 3056

```

source distribution written to file srcpt cycle = 52

```

estimator cycle 53 ave of 43 cycles combination simple average combined average corr
k(collison) 0.896031 0.885854 0.0037 k(col/abs) 0.884724 0.0026 0.883927 0.0024 0.4318
k(absorption) 0.894174 0.883593 0.0024 k(abs/tk ln) 0.884889 0.0026 0.883999 0.0023 0.4121

```

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k(trk length) 0.890997 0.886184 0.0037 k(tk ln/col) 0.886019 0.0037 0.886004 0.0038 0.9866
 rem life(col) 1.1262E+04 1.1413E+04 0.0044 k(col/abs/tn ln) 0.885211 0.0029 0.884076 0.0024
 rem life(abs) 1.1379E+04 1.1412E+04 0.0043 life(col/abs) 1.1413E+04 0.0043 1.1412E+04 0.0043 0.9770
 source points generated 3016
 wto, stabilizer, present s, previous 0.995 1.120 3016 3037

source distribution written to file srcpt cycle = 53

estimator cycle 54 ave of 44 cycles combination simple average combined average corr
 k(collission) 0.851058 0.885064 0.0038 k(col/abs) 0.884380 0.0026 0.883894 0.0023 0.4070
 k(absorption) 0.888120 0.883696 0.0023 k(abs/tn ln) 0.884591 0.0026 0.883973 0.0023 0.3917
 k(trk length) 0.855464 0.885486 0.0037 k(tk ln/col) 0.885275 0.0037 0.885357 0.0038 0.9869
 rem life(col) 1.1400E+04 1.1413E+04 0.0043 k(col/abs/tn ln) 0.884749 0.0029 0.884089 0.0023
 rem life(abs) 1.1481E+04 1.1414E+04 0.0042 life(col/abs) 1.1413E+04 0.0042 1.1414E+04 0.0042 0.9762
 source points generated 2819
 wto, stabilizer, present s, previous 1.064 1.159 2819 3016

source distribution written to file srcpt cycle = 54

estimator cycle 55 ave of 45 cycles combination simple average combined average corr
 k(collission) 0.879589 0.884942 0.0037 k(col/abs) 0.884144 0.0025 0.883589 0.0023 0.4070
 k(absorption) 0.867933 0.883346 0.0023 k(abs/tn ln) 0.884266 0.0025 0.883634 0.0023 0.4001
 k(trk length) 0.871984 0.885186 0.0037 k(tk ln/col) 0.885064 0.0037 0.885077 0.0037 0.9854
 rem life(col) 1.1895E+04 1.1424E+04 0.0043 k(col/abs/tn ln) 0.884491 0.0028 0.883648 0.0023
 rem life(abs) 1.2037E+04 1.1428E+04 0.0042 life(col/abs) 1.1426E+04 0.0042 1.1427E+04 0.0043 0.9753
 source points generated 3058
 wto, stabilizer, present s, previous 0.981 1.131 3058 2819

source distribution written to file srcpt cycle = 55

estimator cycle 56 ave of 46 cycles combination simple average combined average corr
 k(collission) 0.857528 0.884346 0.0037 k(col/abs) 0.883608 0.0026 0.883086 0.0023 0.4319
 k(absorption) 0.861483 0.882870 0.0023 k(abs/tn ln) 0.883728 0.0025 0.883128 0.0023 0.4255
 k(trk length) 0.857598 0.884586 0.0037 k(tk ln/col) 0.884466 0.0036 0.884477 0.0037 0.9859
 rem life(col) 1.2387E+04 1.1445E+04 0.0046 k(col/abs/tn ln) 0.883934 0.0029 0.883141 0.0023
 rem life(abs) 1.2359E+04 1.1448E+04 0.0045 life(col/abs) 1.1446E+04 0.0045 1.1447E+04 0.0046 0.9792
 source points generated 2935
 wto, stabilizer, present s, previous 1.022 1.149 2935 3058

source distribution written to file srcpt cycle = 56

dump no. 8 on file runtime nps = 167903 coll = 33409893 ctm = 112.71 nm = 265783733

estimator cycle 57 ave of 47 cycles combination simple average combined average corr
 k(collission) 0.930432 0.885327 0.0037 k(col/abs) 0.884008 0.0025 0.883078 0.0022 0.3842
 k(absorption) 0.874348 0.882689 0.0023 k(abs/tn ln) 0.884160 0.0025 0.883129 0.0022 0.3741
 k(trk length) 0.933725 0.885632 0.0038 k(tk ln/col) 0.885479 0.0037 0.885423 0.0038 0.9871
 rem life(col) 1.1884E+04 1.1454E+04 0.0045 k(col/abs/tn ln) 0.884549 0.0029 0.883144 0.0023
 rem life(abs) 1.1646E+04 1.1452E+04 0.0044 life(col/abs) 1.1453E+04 0.0045 1.1452E+04 0.0045 0.9749
 source points generated 3169
 wto, stabilizer, present s, previous 0.947 1.114 3169 2935

source distribution written to file srcpt cycle = 57

estimator cycle 58 ave of 48 cycles combination simple average combined average corr
 k(collission) 0.894502 0.885518 0.0037 k(col/abs) 0.883938 0.0025 0.882867 0.0022 0.3685
 k(absorption) 0.866839 0.882359 0.0023 k(abs/tn ln) 0.884078 0.0025 0.882917 0.0022 0.3601
 k(trk length) 0.893534 0.885796 0.0037 k(tk ln/col) 0.885657 0.0037 0.885610 0.0037 0.9871
 rem life(col) 1.1703E+04 1.1459E+04 0.0045 k(col/abs/tn ln) 0.884558 0.0028 0.882923 0.0023

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```
rem life(abs) 1.1618E+04 1.1455E+04 0.0043 life(col/abs) 1.1457E+04 0.0044 1.1455E+04 0.0044 0.9745
source points generated 2883
wto, stabilizer, present s, previous 1.041 1.154 2883 3169
```

```
source distribution written to file srcpt cycle = 58
```

```
estimator cycle 59 ave of 49 cycles combination simple average combined average corr
k(collison) 0.864363 0.885086 0.0036 k(col/abs) 0.883874 0.0024 0.883085 0.0022 0.3402
k(absorption) 0.897230 0.882662 0.0022 k(abs/tk ln) 0.884030 0.0024 0.883143 0.0022 0.3340
k(trk length) 0.866237 0.885397 0.0036 k(tk ln/col) 0.885242 0.0036 0.885205 0.0037 0.9872
rem life(col) 1.1328E+04 1.1457E+04 0.0044 k(col/abs/tk ln) 0.884382 0.0028 0.883141 0.0022
rem life(abs) 1.1452E+04 1.1455E+04 0.0042 life(col/abs) 1.1456E+04 0.0043 1.1455E+04 0.0043 0.9732
source points generated 2919
wto, stabilizer, present s, previous 1.028 1.158 2919 2883
```

```
source distribution written to file srcpt cycle = 59
```

```
estimator cycle 60 ave of 50 cycles combination simple average combined average corr
k(collison) 0.871596 0.884816 0.0036 k(col/abs) 0.883672 0.0024 0.882922 0.0021 0.3440
k(absorption) 0.875952 0.882528 0.0022 k(abs/tk ln) 0.883851 0.0024 0.882989 0.0021 0.3373
k(trk length) 0.874247 0.885174 0.0036 k(tk ln/col) 0.884995 0.0036 0.884970 0.0036 0.9872
rem life(col) 1.1537E+04 1.1458E+04 0.0043 k(col/abs/tk ln) 0.884173 0.0027 0.882996 0.0022
rem life(abs) 1.1475E+04 1.1456E+04 0.0042 life(col/abs) 1.1457E+04 0.0042 1.1456E+04 0.0042 0.9730
source points generated 3076
wto, stabilizer, present s, previous 0.975 1.137 3076 2919
```

```
source distribution written to file srcpt cycle = 60
```

```
estimator cycle 61 ave of 51 cycles combination simple average combined average corr
k(collison) 0.889398 0.884906 0.0035 k(col/abs) 0.883863 0.0024 0.883190 0.0021 0.3443
k(absorption) 0.897364 0.882819 0.0022 k(abs/tk ln) 0.884004 0.0024 0.883249 0.0021 0.3341
k(trk length) 0.885938 0.885189 0.0035 k(tk ln/col) 0.885048 0.0035 0.885033 0.0035 0.9869
rem life(col) 1.1186E+04 1.1453E+04 0.0042 k(col/abs/tk ln) 0.884305 0.0027 0.883270 0.0021
rem life(abs) 1.1286E+04 1.1452E+04 0.0041 life(col/abs) 1.1453E+04 0.0041 1.1452E+04 0.0041 0.9724
source points generated 3049
wto, stabilizer, present s, previous 0.984 1.135 3049 3076
```

```
source distribution written to file srcpt cycle = 61
```

```
estimator cycle 62 ave of 52 cycles combination simple average combined average corr
k(collison) 0.858190 0.884392 0.0035 k(col/abs) 0.883678 0.0023 0.883221 0.0021 0.3258
k(absorption) 0.890340 0.882964 0.0021 k(abs/tk ln) 0.883885 0.0023 0.883303 0.0021 0.3210
k(trk length) 0.865311 0.884807 0.0035 k(tk ln/col) 0.884600 0.0035 0.884673 0.0035 0.9863
rem life(col) 1.1044E+04 1.1445E+04 0.0042 k(col/abs/tk ln) 0.884054 0.0026 0.883325 0.0021
rem life(abs) 1.1165E+04 1.1447E+04 0.0040 life(col/abs) 1.1446E+04 0.0041 1.1447E+04 0.0041 0.9720
source points generated 2802
wto, stabilizer, present s, previous 1.071 1.181 2802 3049
```

```
source distribution written to file srcpt cycle = 62
```

```
estimator cycle 63 ave of 53 cycles combination simple average combined average corr
k(collison) 0.928938 0.885233 0.0035 k(col/abs) 0.884234 0.0024 0.883549 0.0021 0.3494
k(absorption) 0.897372 0.883236 0.0021 k(abs/tk ln) 0.884412 0.0023 0.883621 0.0021 0.3439
k(trk length) 0.926259 0.885589 0.0035 k(tk ln/col) 0.885411 0.0035 0.885540 0.0036 0.9871
rem life(col) 1.1447E+04 1.1445E+04 0.0041 k(col/abs/tk ln) 0.884686 0.0027 0.883670 0.0021
rem life(abs) 1.1354E+04 1.1445E+04 0.0040 life(col/abs) 1.1445E+04 0.0040 1.1445E+04 0.0040 0.9713
source points generated 3209
wto, stabilizer, present s, previous 0.935 1.127 3209 2802
```

```
source distribution written to file srcpt cycle = 63
```

```
estimator cycle 64 ave of 54 cycles combination simple average combined average corr
k(collison) 0.875448 0.885052 0.0035 k(col/abs) 0.884269 0.0023 0.883745 0.0020 0.3377
```

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```
k(absorption) 0.896744 0.883486 0.0021 k(abs/tk ln) 0.884408 0.0023 0.883805 0.0020 0.3281
k(trk length) 0.871569 0.885329 0.0035 k(tk ln/col) 0.885190 0.0035 0.885269 0.0035 0.9868
rem life(col) 1.1187E+04 1.1440E+04 0.0041 k(col/abs/tk ln) 0.884622 0.0026 0.883854 0.0021
rem life(abs) 1.1273E+04 1.1442E+04 0.0039 life(col/abs) 1.1441E+04 0.0040 1.1442E+04 0.0039 0.9710
source points generated 2831
wto, stabalizer, present s, previous 1.060 1.184 2831 3209
```

source distribution written to file srcpt cycle = 64

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

dump no. 9 on file runtime nps = 191945 coll = 38206043 ctm = 128.87 nrm = 303916282

```
estimator cycle 65 ave of 55 cycles combination simple average combined average corr
k(collision) 0.879874 0.884957 0.0034 k(col/abs) 0.884292 0.0023 0.883851 0.0020 0.3341
k(absorption) 0.891283 0.883628 0.0021 k(abs/tk ln) 0.884434 0.0023 0.883911 0.0020 0.3246
k(trk length) 0.880392 0.885239 0.0034 k(tk ln/col) 0.885098 0.0034 0.885179 0.0034 0.9868
rem life(col) 1.1786E+04 1.1447E+04 0.0040 k(col/abs/tk ln) 0.884608 0.0026 0.883960 0.0020
rem life(abs) 1.1791E+04 1.1448E+04 0.0039 life(col/abs) 1.1447E+04 0.0039 1.1449E+04 0.0039 0.9716
source points generated 2959
wto, stabalizer, present s, previous 1.014 1.175 2959 2831
```

source distribution written to file srcpt cycle = 65

```
estimator cycle 66 ave of 56 cycles combination simple average combined average corr
k(collision) 0.882757 0.884918 0.0034 k(col/abs) 0.884488 0.0022 0.884219 0.0020 0.3218
k(absorption) 0.907754 0.884058 0.0021 k(abs/tk ln) 0.884661 0.0022 0.884291 0.0020 0.3175
k(trk length) 0.886564 0.885263 0.0033 k(tk ln/col) 0.885091 0.0033 0.885188 0.0034 0.9866
rem life(col) 1.1111E+04 1.1441E+04 0.0040 k(col/abs/tk ln) 0.884747 0.0025 0.884318 0.0020
rem life(abs) 1.1158E+04 1.1443E+04 0.0038 life(col/abs) 1.1442E+04 0.0039 1.1444E+04 0.0039 0.9719
source points generated 2864
wto, stabalizer, present s, previous 1.047 1.199 2864 2959
```

source distribution written to file srcpt cycle = 66

```
estimator cycle 67 ave of 57 cycles combination simple average combined average corr
k(collision) 0.890306 0.885013 0.0033 k(col/abs) 0.884566 0.0022 0.884286 0.0020 0.3225
k(absorption) 0.887531 0.884119 0.0021 k(abs/tk ln) 0.884724 0.0022 0.884352 0.0020 0.3180
k(trk length) 0.889056 0.885330 0.0033 k(tk ln/col) 0.885171 0.0033 0.885264 0.0033 0.9866
rem life(col) 1.1262E+04 1.1437E+04 0.0039 k(col/abs/tk ln) 0.884821 0.0025 0.884380 0.0020
rem life(abs) 1.1227E+04 1.1439E+04 0.0038 life(col/abs) 1.1438E+04 0.0038 1.1440E+04 0.0038 0.9719
source points generated 2972
wto, stabalizer, present s, previous 1.009 1.191 2972 2864
```

source distribution written to file srcpt cycle = 67

```
estimator cycle 68 ave of 58 cycles combination simple average combined average corr
k(collision) 0.880456 0.884934 0.0033 k(col/abs) 0.884461 0.0022 0.884165 0.0019 0.3235
k(absorption) 0.876447 0.883987 0.0020 k(abs/tk ln) 0.884575 0.0022 0.884213 0.0019 0.3209
k(trk length) 0.875664 0.885163 0.0032 k(tk ln/col) 0.885049 0.0032 0.885102 0.0033 0.9861
rem life(col) 1.1519E+04 1.1439E+04 0.0039 k(col/abs/tk ln) 0.884695 0.0025 0.884220 0.0020
rem life(abs) 1.1505E+04 1.1440E+04 0.0037 life(col/abs) 1.1440E+04 0.0038 1.1441E+04 0.0037 0.9720
source points generated 2926
wto, stabalizer, present s, previous 1.025 1.203 2926 2972
```

source distribution written to file srcpt cycle = 68

```
estimator cycle 69 ave of 59 cycles combination simple average combined average corr
k(collision) 0.869454 0.884672 0.0032 k(col/abs) 0.884179 0.0022 0.883873 0.0019 0.3331
k(absorption) 0.866286 0.883687 0.0020 k(abs/tk ln) 0.884259 0.0022 0.883905 0.0019 0.3339
k(trk length) 0.865607 0.884832 0.0032 k(tk ln/col) 0.884752 0.0032 0.884774 0.0032 0.9859
```

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```
rem life(col) 1.1657E+04 1.1442E+04 0.0038 k(col/abs/tk ln) 0.884397 0.0024 0.883897 0.0020
rem life(abs) 1.1709E+04 1.1445E+04 0.0037 life(col/abs) 1.1444E+04 0.0037 1.1446E+04 0.0037 0.9719
source points generated 2960
wto, stabilizer, present s, previous 1.014 1.204 2960 2926
```

source distribution written to file srcpt cycle = 69

```
estimator cycle 70 ave of 60 cycles combination simple average combined average corr
k(collission) 0.880830 0.884608 0.0032 k(col/abs) 0.884356 0.0021 0.884210 0.0019 0.3186
k(absorption) 0.908764 0.884105 0.0020 k(abs/tk ln) 0.884460 0.0021 0.884254 0.0019 0.3235
k(trk length) 0.883881 0.884816 0.0031 k(tk ln/col) 0.884712 0.0031 0.884742 0.0032 0.9858
rem life(col) 1.0999E+04 1.1435E+04 0.0038 k(col/abs/tk ln) 0.884509 0.0024 0.884226 0.0020
rem life(abs) 1.0923E+04 1.1436E+04 0.0037 life(col/abs) 1.1436E+04 0.0037 1.1436E+04 0.0037 0.9722
source points generated 3107
wto, stabilizer, present s, previous 0.966 1.180 3107 2960
```

source distribution written to file srcpt cycle = 70

```
estimator cycle 71 ave of 61 cycles combination simple average combined average corr
k(collission) 0.843478 0.883933 0.0032 k(col/abs) 0.883935 0.0022 0.883937 0.0019 0.3305
k(absorption) 0.873877 0.883937 0.0020 k(abs/tk ln) 0.883995 0.0022 0.883959 0.0019 0.3355
k(trk length) 0.838289 0.884053 0.0032 k(tk ln/col) 0.883993 0.0032 0.883976 0.0032 0.9862
rem life(col) 1.1584E+04 1.1438E+04 0.0038 k(col/abs/tk ln) 0.883975 0.0024 0.883931 0.0020
rem life(abs) 1.1671E+04 1.1440E+04 0.0036 life(col/abs) 1.1439E+04 0.0037 1.1440E+04 0.0037 0.9717
source points generated 2942
wto, stabilizer, present s, previous 1.020 1.202 2942 3107
```

source distribution written to file srcpt cycle = 71

```
estimator cycle 72 ave of 62 cycles combination simple average combined average corr
k(collission) 0.923878 0.884578 0.0032 k(col/abs) 0.884408 0.0022 0.884298 0.0019 0.3556
k(absorption) 0.902600 0.884238 0.0020 k(abs/tk ln) 0.884438 0.0022 0.884308 0.0019 0.3583
k(trk length) 0.920283 0.884637 0.0032 k(tk ln/col) 0.884608 0.0032 0.884609 0.0032 0.9866
rem life(col) 1.1227E+04 1.1434E+04 0.0037 k(col/abs/tk ln) 0.884484 0.0025 0.884301 0.0020
rem life(abs) 1.1107E+04 1.1435E+04 0.0036 life(col/abs) 1.1434E+04 0.0036 1.1435E+04 0.0036 0.9708
source points generated 3341
wto, stabilizer, present s, previous 0.898 1.140 3341 2942
```

source distribution written to file srcpt cycle = 72

dump no. 10 on file runtpe nps = 215506 coll = 42949410 ctm = 144.84 nm = 341584866

```
estimator cycle 73 ave of 63 cycles combination simple average combined average corr
k(collission) 0.898879 0.884805 0.0032 k(col/abs) 0.884583 0.0022 0.884439 0.0019 0.3592
k(absorption) 0.892027 0.884362 0.0020 k(abs/tk ln) 0.884630 0.0022 0.884454 0.0019 0.3625
k(trk length) 0.901115 0.884899 0.0032 k(tk ln/col) 0.884852 0.0032 0.884850 0.0032 0.9867
rem life(col) 1.1140E+04 1.1429E+04 0.0037 k(col/abs/tk ln) 0.884689 0.0024 0.884441 0.0019
rem life(abs) 1.1151E+04 1.1430E+04 0.0036 life(col/abs) 1.1430E+04 0.0036 1.1430E+04 0.0036 0.9712
source points generated 2850
wto, stabilizer, present s, previous 1.053 1.206 2850 3341
```

source distribution written to file srcpt cycle = 73

```
estimator cycle 74 ave of 64 cycles combination simple average combined average corr
k(collission) 0.850112 0.884263 0.0032 k(col/abs) 0.884161 0.0022 0.884093 0.0019 0.3803
k(absorption) 0.865032 0.884060 0.0020 k(abs/tk ln) 0.884223 0.0022 0.884113 0.0019 0.3824
k(trk length) 0.852127 0.884387 0.0032 k(tk ln/col) 0.884325 0.0032 0.884332 0.0032 0.9871
rem life(col) 1.1491E+04 1.1430E+04 0.0036 k(col/abs/tk ln) 0.884236 0.0025 0.884101 0.0019
rem life(abs) 1.1516E+04 1.1432E+04 0.0035 life(col/abs) 1.1431E+04 0.0035 1.1432E+04 0.0036 0.9711
```


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source points generated 2891
wto, stabilizer, present s, previous 1.038 1.213 2891 2850

source distribution written to file srcpt cycle = 74

estimator	cycle	75	ave of	65 cycles	combination	simple average	combined average	corr
k(collision)	0.837964	0.884320	0.0031	k(col/abs)	0.884366	0.0022	0.884397	0.0019 0.3766
k(absorption)	0.907009	0.884413	0.0020	k(abs/tk ln)	0.884407	0.0022	0.884411	0.0019 0.3756
k(trk length)	0.885288	0.884401	0.0031	k(tk ln/col)	0.884360	0.0031	0.884366	0.0032 0.9870
rem life(col)	1.1272E+04	1.1428E+04	0.0036	k(col/abs/tk ln)	0.884378	0.0024	0.884407	0.0019
rem life(abs)	1.1331E+04	1.1430E+04	0.0035	life(col/abs)	1.1429E+04	0.0035	1.1430E+04	0.0035 0.9710

source points generated 3163
wto, stabilizer, present s, previous 0.948 1.173 3163 2891

source distribution written to file srcpt cycle = 75

estimator	cycle	76	ave of	66 cycles	combination	simple average	combined average	corr
k(collision)	0.869824	0.884100	0.0031	k(col/abs)	0.884306	0.0021	0.884439	0.0019 0.3702
k(absorption)	0.890953	0.884512	0.0020	k(abs/tk ln)	0.884335	0.0021	0.884449	0.0019 0.3685
k(trk length)	0.868370	0.884158	0.0031	k(tk ln/col)	0.884129	0.0031	0.884131	0.0031 0.9870
rem life(col)	1.1219E+04	1.1425E+04	0.0035	k(col/abs/tk ln)	0.884257	0.0024	0.884447	0.0019
rem life(abs)	1.1272E+04	1.1428E+04	0.0034	life(col/abs)	1.1426E+04	0.0035	1.1428E+04	0.0035 0.9710

source points generated 2879
wto, stabilizer, present s, previous 1.042 1.215 2879 3163

source distribution written to file srcpt cycle = 76

estimator	cycle	77	ave of	67 cycles	combination	simple average	combined average	corr
k(collision)	0.890351	0.884193	0.0031	k(col/abs)	0.884475	0.0021	0.884655	0.0019 0.3712
k(absorption)	0.900934	0.884757	0.0020	k(abs/tk ln)	0.884495	0.0021	0.884661	0.0019 0.3686
k(trk length)	0.889225	0.884233	0.0031	k(tk ln/col)	0.884213	0.0031	0.884215	0.0031 0.9870
rem life(col)	1.1311E+04	1.1423E+04	0.0035	k(col/abs/tk ln)	0.884395	0.0024	0.884660	0.0019
rem life(abs)	1.1296E+04	1.1426E+04	0.0034	life(col/abs)	1.1424E+04	0.0034	1.1426E+04	0.0034 0.9710

source points generated 3045
wto, stabilizer, present s, previous 0.985 1.194 3045 2879

source distribution written to file srcpt cycle = 77

estimator	cycle	78	ave of	68 cycles	combination	simple average	combined average	corr
k(collision)	0.870794	0.883996	0.0030	k(col/abs)	0.884569	0.0021	0.884907	0.0019 0.3449
k(absorption)	0.910867	0.885141	0.0020	k(abs/tk ln)	0.884587	0.0021	0.884913	0.0019 0.3420
k(trk length)	0.870584	0.884033	0.0030	k(tk ln/col)	0.884014	0.0030	0.884016	0.0030 0.9871
rem life(col)	1.0989E+04	1.1417E+04	0.0035	k(col/abs/tk ln)	0.884390	0.0023	0.884911	0.0019
rem life(abs)	1.1120E+04	1.1421E+04	0.0034	life(col/abs)	1.1419E+04	0.0034	1.1422E+04	0.0034 0.9706

source points generated 2849
wto, stabilizer, present s, previous 1.053 1.232 2849 3045

source distribution written to file srcpt cycle = 78

estimator	cycle	79	ave of	69 cycles	combination	simple average	combined average	corr
k(collision)	0.877695	0.883905	0.0030	k(col/abs)	0.884375	0.0021	0.884646	0.0019 0.3455
k(absorption)	0.864721	0.884845	0.0020	k(abs/tk ln)	0.884371	0.0021	0.884644	0.0019 0.3453
k(trk length)	0.874684	0.883897	0.0030	k(tk ln/col)	0.883901	0.0030	0.883901	0.0030 0.9870
rem life(col)	1.1466E+04	1.1417E+04	0.0034	k(col/abs/tk ln)	0.884216	0.0023	0.884643	0.0019
rem life(abs)	1.1477E+04	1.1422E+04	0.0033	life(col/abs)	1.1420E+04	0.0033	1.1422E+04	0.0033 0.9706

source points generated 3000
wto, stabilizer, present s, previous 1.000 1.216 3000 2849

source distribution written to file srcpt cycle = 79

estimator	cycle	80	ave of	70 cycles	combination	simple average	combined average	corr
k(collision)	0.938316	0.884682	0.0031	k(col/abs)	0.884886	0.0021	0.885015	0.0019 0.3682
k(absorption)	0.902037	0.885091	0.0020	k(abs/tk ln)	0.884898	0.0021	0.885020	0.0019 0.3684

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```
k(trk length) 0.940521 0.884706 0.0031 k(tk ln/col) 0.884694 0.0031 0.884691 0.0031 0.9880
rem life(col) 1.1409E+04 1.1417E+04 0.0034 k(col/abs/tk ln) 0.884826 0.0024 0.885016 0.0019
rem life(abs) 1.1356E+04 1.1421E+04 0.0033 life(col/abs) 1.1419E+04 0.0033 1.1421E+04 0.0033 0.9704
source points generated 3144
wto, stabilizer, present s, previous 0.954 1.189 3144 3000
```

source distribution written to file srcpt cycle = 80

```
***
dump no. 11 on file runtime nps = 239524 coll = 47708947 ctm = 160.88 nm = 379444502
```

```
estimator cycle 81 ave of 71 cycles combination simple average combined average corr
k(collision) 0.860469 0.884341 0.0031 k(col/abs) 0.884576 0.0021 0.884725 0.0019 0.3809
k(absorption) 0.865158 0.884810 0.0020 k(abs/tk ln) 0.884591 0.0021 0.884731 0.0019 0.3808
k(trk length) 0.860989 0.884372 0.0031 k(tk ln/col) 0.884357 0.0030 0.884353 0.0031 0.9882
rem life(col) 1.1593E+04 1.1420E+04 0.0033 k(col/abs/tk ln) 0.884508 0.0024 0.884726 0.0019
rem life(abs) 1.1579E+04 1.1423E+04 0.0032 life(col/abs) 1.1422E+04 0.0033 1.1424E+04 0.0032 0.9705
source points generated 2711
wto, stabilizer, present s, previous 1.107 1.273 2711 3144
```

source distribution written to file srcpt cycle = 81

```
estimator cycle 82 ave of 72 cycles combination simple average combined average corr
k(collision) 0.885371 0.884355 0.0030 k(col/abs) 0.884652 0.0021 0.884839 0.0019 0.3801
k(absorption) 0.894719 0.884948 0.0019 k(abs/tk ln) 0.884671 0.0021 0.884847 0.0019 0.3802
k(trk length) 0.885926 0.884394 0.0030 k(tk ln/col) 0.884375 0.0030 0.884370 0.0030 0.9882
rem life(col) 1.1454E+04 1.1420E+04 0.0033 k(col/abs/tk ln) 0.884566 0.0023 0.884840 0.0019
rem life(abs) 1.1445E+04 1.1424E+04 0.0032 life(col/abs) 1.1422E+04 0.0032 1.1424E+04 0.0032 0.9705
source points generated 3079
wto, stabilizer, present s, previous 0.974 1.228 3079 2711
```

source distribution written to file srcpt cycle = 82

```
estimator cycle 83 ave of 73 cycles combination simple average combined average corr
k(collision) 0.882879 0.884335 0.0030 k(col/abs) 0.884493 0.0021 0.884589 0.0019 0.3757
k(absorption) 0.863268 0.884651 0.0019 k(abs/tk ln) 0.884508 0.0021 0.884596 0.0019 0.3762
k(trk length) 0.882733 0.884366 0.0030 k(tk ln/col) 0.884351 0.0030 0.884347 0.0030 0.9882
rem life(col) 1.1915E+04 1.1427E+04 0.0033 k(col/abs/tk ln) 0.884451 0.0023 0.884590 0.0019
rem life(abs) 1.1868E+04 1.1430E+04 0.0032 life(col/abs) 1.1428E+04 0.0032 1.1430E+04 0.0032 0.9713
source points generated 2947
wto, stabilizer, present s, previous 1.018 1.248 2947 3079
```

source distribution written to file srcpt cycle = 83

```
estimator cycle 84 ave of 74 cycles combination simple average combined average corr
k(collision) 0.865827 0.884085 0.0029 k(col/abs) 0.884213 0.0021 0.884290 0.0019 0.3852
k(absorption) 0.861672 0.884340 0.0019 k(abs/tk ln) 0.884231 0.0021 0.884297 0.0019 0.3854
k(trk length) 0.866224 0.884121 0.0029 k(tk ln/col) 0.884103 0.0029 0.884099 0.0030 0.9883
rem life(col) 1.2462E+04 1.1441E+04 0.0035 k(col/abs/tk ln) 0.884182 0.0023 0.884292 0.0019
rem life(abs) 1.2424E+04 1.1443E+04 0.0033 life(col/abs) 1.1442E+04 0.0034 1.1444E+04 0.0034 0.9749
source points generated 2929
wto, stabilizer, present s, previous 1.024 1.257 2929 2947
```

source distribution written to file srcpt cycle = 84

```
estimator cycle 85 ave of 75 cycles combination simple average combined average corr
k(collision) 0.899098 0.884285 0.0029 k(col/abs) 0.884435 0.0020 0.884525 0.0019 0.3912
k(absorption) 0.902721 0.884585 0.0019 k(abs/tk ln) 0.884486 0.0020 0.884546 0.0019 0.3941
k(trk length) 0.904052 0.884387 0.0029 k(tk ln/col) 0.884336 0.0029 0.884316 0.0029 0.9881
rem life(col) 1.0875E+04 1.1433E+04 0.0035 k(col/abs/tk ln) 0.884419 0.0023 0.884521 0.0019
```

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```
rem life(abs) 1.0980E+04 1.1437E+04 0.0033 life(col/abs) 1.1435E+04 0.0034 1.1438E+04 0.0034 0.9752
source points generated 3129
wto, stabilizer, present s, previous 0.959 1.225 3129 2929
```

source distribution written to file srcpt cycle = 85

```
estimator cycle 86 ave of 76 cycles combination simple average combined average corr
k(collison) 0.873889 0.884149 0.0029 k(col/abs) 0.884253 0.0020 0.884315 0.0019 0.3943
k(absorption) 0.867237 0.884357 0.0019 k(abs/tk ln) 0.884304 0.0020 0.884336 0.0019 0.3971
k(trk length) 0.874088 0.884251 0.0029 k(tk ln/col) 0.884200 0.0029 0.884180 0.0029 0.9881
rem life(col) 1.1631E+04 1.1436E+04 0.0034 k(col/abs/tk ln) 0.884252 0.0023 0.884310 0.0019
rem life(abs) 1.1635E+04 1.1440E+04 0.0033 life(col/abs) 1.1438E+04 0.0034 1.1441E+04 0.0033 0.9754
source points generated 2878
wto, stabilizer, present s, previous 1.042 1.266 2878 3129
```

source distribution written to file srcpt cycle = 86

```
estimator cycle 87 ave of 77 cycles combination simple average combined average corr
k(collison) 0.850066 0.883706 0.0029 k(col/abs) 0.883920 0.0020 0.884051 0.0019 0.4077
k(absorption) 0.867158 0.884134 0.0019 k(abs/tk ln) 0.883979 0.0020 0.884075 0.0019 0.4100
k(trk length) 0.851454 0.883825 0.0029 k(tk ln/col) 0.883766 0.0029 0.883748 0.0029 0.9884
rem life(col) 1.1410E+04 1.1436E+04 0.0034 k(col/abs/tk ln) 0.883888 0.0023 0.884049 0.0019
rem life(abs) 1.1475E+04 1.1440E+04 0.0033 life(col/abs) 1.1438E+04 0.0033 1.1441E+04 0.0033 0.9751
source points generated 2864
wto, stabilizer, present s, previous 1.047 1.282 2864 2878
```

source distribution written to file srcpt cycle = 87

```
estimator cycle 88 ave of 78 cycles combination simple average combined average corr
k(collison) 0.924979 0.884235 0.0029 k(col/abs) 0.884375 0.0021 0.884463 0.0019 0.4346
k(absorption) 0.913809 0.884514 0.0019 k(abs/tk ln) 0.884437 0.0021 0.884487 0.0019 0.4370
k(trk length) 0.925544 0.884360 0.0029 k(tk ln/col) 0.884298 0.0029 0.884276 0.0029 0.9889
rem life(col) 1.1606E+04 1.1438E+04 0.0034 k(col/abs/tk ln) 0.884370 0.0023 0.884459 0.0019
rem life(abs) 1.1535E+04 1.1441E+04 0.0032 life(col/abs) 1.1440E+04 0.0033 1.1442E+04 0.0032 0.9749
source points generated 3232
wto, stabilizer, present s, previous 0.928 1.226 3232 2864
```

source distribution written to file srcpt cycle = 88

```
dump no. 12 on file runtpe nps = 263205 coll = 52520965 ctm = 177.06 nm = 417615376
```

```
estimator cycle 89 ave of 79 cycles combination simple average combined average corr
k(collison) 0.901005 0.884447 0.0029 k(col/abs) 0.884540 0.0021 0.884599 0.0019 0.4378
k(absorption) 0.893836 0.884632 0.0019 k(abs/tk ln) 0.884596 0.0021 0.884619 0.0019 0.4400
k(trk length) 0.900193 0.884560 0.0029 k(tk ln/col) 0.884504 0.0029 0.884487 0.0029 0.9890
rem life(col) 1.1722E+04 1.1442E+04 0.0033 k(col/abs/tk ln) 0.884547 0.0023 0.884596 0.0019
rem life(abs) 1.1608E+04 1.1443E+04 0.0032 life(col/abs) 1.1442E+04 0.0032 1.1444E+04 0.0032 0.9744
source points generated 2947
wto, stabilizer, present s, previous 1.018 1.261 2947 3232
```

source distribution written to file srcpt cycle = 89

```
estimator cycle 90 ave of 80 cycles combination simple average combined average corr
k(collison) 0.844078 0.883943 0.0029 k(col/abs) 0.884348 0.0020 0.884608 0.0019 0.4139
k(absorption) 0.894405 0.884754 0.0019 k(abs/tk ln) 0.884405 0.0020 0.884630 0.0019 0.4161
k(trk length) 0.844161 0.884055 0.0029 k(tk ln/col) 0.883999 0.0029 0.883982 0.0029 0.9894
rem life(col) 1.1070E+04 1.1437E+04 0.0033 k(col/abs/tk ln) 0.884251 0.0023 0.884605 0.0019
rem life(abs) 1.1161E+04 1.1440E+04 0.0032 life(col/abs) 1.1438E+04 0.0032 1.1441E+04 0.0032 0.9744
source points generated 2855
```

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wto, stabilizer, present s, previous 1.051 1.288 2855 2947

source distribution written to file srcpt cycle = 90

```

estimator cycle 91 ave of 81 cycles combination simple average combined average corr
k(collision) 0.904106 0.884192 0.0029 k(col/abs) 0.884515 0.0020 0.884724 0.0018 0.4164
k(absorption) 0.891611 0.884839 0.0019 k(abs/tk ln) 0.884535 0.0020 0.884732 0.0018 0.4181
k(trk length) 0.898292 0.884231 0.0029 k(tk ln/col) 0.884211 0.0029 0.884210 0.0029 0.9891
rem life(col) 1.1136E+04 1.1433E+04 0.0033 k(col/abs/tk ln) 0.884421 0.0023 0.884725 0.0018
rem life(abs) 1.1079E+04 1.1435E+04 0.0031 life(col/abs) 1.1434E+04 0.0032 1.1436E+04 0.0032 0.9744
source points generated 3233
wto, stabilizer, present s, previous 0.928 1.230 3233 2855

```

source distribution written to file srcpt cycle = 91

```

estimator cycle 92 ave of 82 cycles combination simple average combined average corr
k(collision) 0.870126 0.884020 0.0029 k(col/abs) 0.884395 0.0020 0.884638 0.0018 0.4179
k(absorption) 0.879192 0.884770 0.0019 k(abs/tk ln) 0.884400 0.0020 0.884642 0.0018 0.4197
k(trk length) 0.867813 0.884031 0.0029 k(tk ln/col) 0.884026 0.0028 0.884025 0.0029 0.9891
rem life(col) 1.1184E+04 1.1430E+04 0.0033 k(col/abs/tk ln) 0.884274 0.0022 0.884638 0.0018
rem life(abs) 1.1209E+04 1.1433E+04 0.0031 life(col/abs) 1.1431E+04 0.0032 1.1434E+04 0.0031 0.9746
source points generated 2857
wto, stabilizer, present s, previous 1.050 1.288 2857 3233

```

source distribution written to file srcpt cycle = 92

```

estimator cycle 93 ave of 83 cycles combination simple average combined average corr
k(collision) 0.855180 0.883673 0.0028 k(col/abs) 0.884274 0.0020 0.884661 0.0018 0.4041
k(absorption) 0.893489 0.884875 0.0018 k(abs/tk ln) 0.884281 0.0020 0.884666 0.0018 0.4062
k(trk length) 0.855528 0.883688 0.0028 k(tk ln/col) 0.883680 0.0028 0.883679 0.0029 0.9893
rem life(col) 1.1342E+04 1.1429E+04 0.0032 k(col/abs/tk ln) 0.884078 0.0022 0.884661 0.0018
rem life(abs) 1.1380E+04 1.1432E+04 0.0031 life(col/abs) 1.1431E+04 0.0031 1.1433E+04 0.0031 0.9745
source points generated 2894
wto, stabilizer, present s, previous 1.037 1.295 2894 2857

```

source distribution written to file srcpt cycle = 93

```

estimator cycle 94 ave of 84 cycles combination simple average combined average corr
k(collision) 0.909854 0.883984 0.0028 k(col/abs) 0.884519 0.0020 0.884869 0.0018 0.4123
k(absorption) 0.899951 0.885055 0.0018 k(abs/tk ln) 0.884533 0.0020 0.884877 0.0018 0.4146
k(trk length) 0.910898 0.884011 0.0028 k(tk ln/col) 0.883998 0.0028 0.883995 0.0028 0.9894
rem life(col) 1.0809E+04 1.1422E+04 0.0033 k(col/abs/tk ln) 0.884350 0.0022 0.884869 0.0018
rem life(abs) 1.0852E+04 1.1425E+04 0.0031 life(col/abs) 1.1423E+04 0.0032 1.1427E+04 0.0031 0.9755
source points generated 3177
wto, stabilizer, present s, previous 0.944 1.250 3177 2894

```

source distribution written to file srcpt cycle = 94

```

estimator cycle 95 ave of 85 cycles combination simple average combined average corr
k(collision) 0.879158 0.883928 0.0028 k(col/abs) 0.884451 0.0020 0.884792 0.0018 0.4128
k(absorption) 0.878186 0.884974 0.0018 k(abs/tk ln) 0.884467 0.0020 0.884800 0.0018 0.4150
k(trk length) 0.879639 0.883960 0.0028 k(tk ln/col) 0.883944 0.0028 0.883941 0.0028 0.9894
rem life(col) 1.1633E+04 1.1424E+04 0.0032 k(col/abs/tk ln) 0.884287 0.0022 0.884792 0.0018
rem life(abs) 1.1638E+04 1.1428E+04 0.0031 life(col/abs) 1.1426E+04 0.0031 1.1429E+04 0.0031 0.9756
source points generated 2980
wto, stabilizer, present s, previous 1.007 1.273 2980 3177

```

source distribution written to file srcpt cycle = 95

```

estimator cycle 96 ave of 86 cycles combination simple average combined average corr
k(collision) 0.949684 0.884692 0.0029 k(col/abs) 0.885017 0.0020 0.885250 0.0018 0.4513
k(absorption) 0.916669 0.885342 0.0018 k(abs/tk ln) 0.885004 0.0020 0.885244 0.0018 0.4510
k(trk length) 0.944584 0.884665 0.0029 k(tk ln/col) 0.884679 0.0029 0.884672 0.0029 0.9900

```

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```
rem life(col) 1.1325E+04 1.1423E+04 0.0032 k(col/abs/tk ln) 0.884900 0.0023 0.885244 0.0018
rem life(abs) 1.1237E+04 1.1425E+04 0.0030 life(col/abs) 1.1424E+04 0.0031 1.1426E+04 0.0031 0.9751
source points generated 3279
wto, stabilizer, present s, previous 0.915 1.219 3279 2980
```

source distribution written to file srctp cycle = 96

```
***
dump no. 13 on file runtime nps = 287380 coll = 57297744 ctm = 193.21 nrm = 455641760
```

```
estimator cycle 97 ave of 87 cycles combination simple average combined average corr
k(collision) 0.908804 0.884969 0.0029 k(col/abs) 0.885169 0.0020 0.885314 0.0018 0.4504
k(absorption) 0.887687 0.885369 0.0018 k(abs/tk ln) 0.885149 0.0020 0.885307 0.0018 0.4503
k(trk length) 0.907529 0.884928 0.0029 k(tk ln/col) 0.884949 0.0029 0.884937 0.0029 0.9901
rem life(col) 1.1588E+04 1.1425E+04 0.0032 k(col/abs/tk ln) 0.885089 0.0022 0.885305 0.0018
rem life(abs) 1.1548E+04 1.1427E+04 0.0030 life(col/abs) 1.1426E+04 0.0031 1.1428E+04 0.0030 0.9751
source points generated 2801
wto, stabilizer, present s, previous 1.071 1.297 2801 3279
```

source distribution written to file srctp cycle = 97

```
estimator cycle 98 ave of 88 cycles combination simple average combined average corr
k(collision) 0.916479 0.885327 0.0029 k(col/abs) 0.885610 0.0021 0.885805 0.0019 0.4675
k(absorption) 0.931369 0.885892 0.0019 k(abs/tk ln) 0.885574 0.0020 0.885790 0.0019 0.4647
k(trk length) 0.913795 0.885256 0.0029 k(tk ln/col) 0.885292 0.0029 0.885266 0.0029 0.9903
rem life(col) 1.0572E+04 1.1415E+04 0.0032 k(col/abs/tk ln) 0.885492 0.0023 0.885780 0.0019
rem life(abs) 1.0590E+04 1.1417E+04 0.0031 life(col/abs) 1.1416E+04 0.0031 1.1418E+04 0.0031 0.9769
source points generated 3054
wto, stabilizer, present s, previous 0.982 1.264 3054 2801
```

source distribution written to file srctp cycle = 98

```
estimator cycle 99 ave of 89 cycles combination simple average combined average corr
k(collision) 0.894087 0.885426 0.0028 k(col/abs) 0.885692 0.0020 0.885877 0.0018 0.4684
k(absorption) 0.891830 0.885959 0.0019 k(abs/tk ln) 0.885637 0.0020 0.885855 0.0018 0.4651
k(trk length) 0.890471 0.885314 0.0028 k(tk ln/col) 0.885370 0.0028 0.885328 0.0028 0.9901
rem life(col) 1.1407E+04 1.1415E+04 0.0032 k(col/abs/tk ln) 0.885566 0.0022 0.885837 0.0018
rem life(abs) 1.1448E+04 1.1418E+04 0.0031 life(col/abs) 1.1416E+04 0.0031 1.1419E+04 0.0031 0.9768
source points generated 2930
wto, stabilizer, present s, previous 1.024 1.286 2930 3054
```

source distribution written to file srctp cycle = 99

```
estimator cycle 100 ave of 90 cycles combination simple average combined average corr
k(collision) 0.892943 0.885509 0.0028 k(col/abs) 0.885611 0.0020 0.885678 0.0018 0.4579
k(absorption) 0.863747 0.885712 0.0019 k(abs/tk ln) 0.885544 0.0020 0.885654 0.0018 0.4561
k(trk length) 0.890867 0.885376 0.0028 k(tk ln/col) 0.885443 0.0028 0.885391 0.0028 0.9901
rem life(col) 1.1672E+04 1.1418E+04 0.0032 k(col/abs/tk ln) 0.885532 0.0022 0.885637 0.0018
rem life(abs) 1.1693E+04 1.1421E+04 0.0030 life(col/abs) 1.1419E+04 0.0031 1.1422E+04 0.0030 0.9769
source points generated 3005
wto, stabilizer, present s, previous 0.998 1.277 3005 2930
```

source distribution written to file srctp cycle = 100

1 problem summary

run terminated when 100 kcode cycles were done.

09/02/98 19:28:17

+ uranium 235 in WRAP

probid = 09/02/98 16:04:58

0

neutron creation tracks weight energy neutron loss tracks weight energy

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(per source particle)				(per source particle)			
source	299444	1.0019E+00	2.0292E+00	escape	2478	6.1726E-03	1.0779E-02
			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.	
weight cutoff	0	1.1975E-01	3.7683E-08	weight cutoff	296970	1.2003E-01	3.5857E-08
energy importance	0	0.	0.	energy importance	0	0.	
dxtan	0	0.	0.	dxtan	0	0.	
forced collisions	0	0.	0.	forced collisions	0	0.	
exp. transform	0	0.	0.	exp. transform	0	0.	
upscattering	0	0.	6.5300E-07	downscattering	0	0.	1.9984E+00
			capture	0	6.2918E-01	1.7554E-02	
(n,xn)	7	1.4332E-05	7.9010E-06	loss to (n,xn)	3	6.1759E-06	6.5485E-05
fission	0	0.	0.	loss to fission	0	3.6624E-01	2.3820E-03
total	299451	1.1216E+00	2.0292E+00	total	299451	1.1216E+00	2.0292E+00
number of neutrons banked				4	average lifetime, shakes		
neutron tracks per source particle				1.0000E+00	escape	6.7417E+03	too
neutron collisions per source particle				1.9932E+02	capture	1.1423E+04	eco
total neutron collisions				59685788	capture or escape	1.1395E+04	wc1
net multiplication				1.0000E+00	any termination	1.4126E+04	wc2
computer time so far in this run				201.30 minutes	maximum number ever in bank		
computer time in mcrun				201.26 minutes	bank overflows to backup file		
source particles per minute				1.4878E+03	field length		
random numbers generated				474650976	most random numbers used was		
range of sampled source weights = 8.1169E-01 to 1.2479E+00				print table 126			
1 neutron activity in each cell							
cell	tracks entering	population	collisions	collisions	number	flux	average
			* weight	weighted	weighted	track weight	average
			(per history)	energy	energy	(relative)	track mfp
1	1	511283	299448	9031335	2.4891E+01	3.3070E-04	7.1277E-01
2	2	340768	202406	50654453	8.8218E+01	4.3257E-05	2.4778E-01
total	852051	501854	59685788	1.1311E+02			
1 neutron weight balance in each cell -- external events				print table 130			
cell	entering	source	energy	time	exiting	total	
			cutoff	cutoff			
1	1	5.0499E-01	1.0019E+00	0.0000E+00	0.0000E+00	-9.8345E-01	5.2340E-01
2	2	9.8345E-01	0.0000E+00	0.0000E+00	0.0000E+00	-5.1116E-01	4.7229E-01
total	1.4884E+00	1.0019E+00	0.0000E+00	0.0000E+00	-1.4946E+00	9.9568E-01	
1 neutron weight balance in each cell -- variance reduction events				print table 130			
cell	weight	cell	weight	energy	dxtan	forced	exponential
	window	importance	cutoff	importance		collision	transform
1	1	0.0000E+00	0.0000E+00	-8.2488E-05	0.0000E+00	0.0000E+00	0.0000E+00
2	2	0.0000E+00	0.0000E+00	-1.9418E-04	0.0000E+00	0.0000E+00	0.0000E+00
total	0.0000E+00	0.0000E+00	-2.7666E-04	0.0000E+00	0.0000E+00	0.0000E+00	-2.7666E-04
1 neutron weight balance in each cell -- physical events				print table 130			
cell	(n,xn)	fission	capture	loss to	loss to	total	
			(n,xn)	fission			

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```

1 1 1.4332E-05 0.0000E+00 -1.5708E-01 -6.1759E-06 -3.6624E-01 -5.2331E-01
2 2 0.0000E+00 0.0000E+00 -4.7210E-01 0.0000E+00 0.0000E+00 -4.7210E-01

```

total 1.4332E-05 0.0000E+00 -6.2918E-01 -6.1759E-06 -3.6624E-01 -9.9541E-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,n)
1 1	92235.50c	1.6277E-03	182716	4.6172E-01	6.7581E-02	3.6624E-01	8.1559E-06
	1001.50c	6.6558E-01	8224903	2.2554E+01	8.7756E-02	0.0000E+00	0.0000E+00
	8016.50c	3.3279E-01	623716	1.8749E+00	1.7457E-03	0.0000E+00	0.0000E+00
2 2	8016.50c	3.3337E-01	2198640	4.1772E+00	1.5138E-03	0.0000E+00	0.0000E+00
	1001.50c	6.6663E-01	48455813	8.4041E+01	4.7058E-01	0.0000E+00	0.0000E+00
total			59685788	1.1311E+02	6.2918E-01	3.6624E-01	8.1559E-06

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

1001.50c	56680716	1.0659E+02	5.5834E-01	0.0000E+00	0.0000E+00
8016.50c	2822356	6.0521E+00	3.2596E-03	0.0000E+00	0.0000E+00
92235.50c	182716	4.6172E-01	6.7581E-02	3.6624E-01	8.1559E-06

1keff results for: uranium 235 in WRAP probid = 09/02/98 16:04:58

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 10 cycles and run a total of 100 cycles with nominally 3000 neutrons per cycle.
this problem has run 10 inactive cycles with 29592 neutron histories and 90 active cycles with 269852 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 299444 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

the k (collision) cycle values appear normally distributed at the 95 percent confidence level
the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

```

| the final estimated combined collision/absorption/track-length keff = 0.88564 with an estimated standard deviation of 0.00163 |
| the estimated 68, 95, & 99 percent keff confidence intervals are 0.88400 to 0.88727, 0.88239 to 0.88889, and 0.88133 to 0.88995 |
| the estimated collision/absorption neutron removal lifetime = 1.14E-04 seconds with an estimated standard deviation of 3.48E-07 |

```

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	0.88551	0.00249	0.88302 to 0.88800	0.88055 to 0.89047	0.87893 to 0.89209	
absorption	0.88571	0.00166	0.88405 to 0.88737	0.88241 to 0.88902	0.88133 to 0.89009	
track length	0.88538	0.00247	0.88290 to 0.88785	0.88045 to 0.89030	0.87885 to 0.89191	
col/abso	0.88568	0.00162	0.88405 to 0.88730	0.88244 to 0.88891	0.88139 to 0.88997	0.4579

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abs/trk len	0.88565	0.00162	0.88403 to 0.88728	0.88242 to 0.88888	0.88137 to 0.88994	0.4561
col/trk len	0.88539	0.00249	0.88290 to 0.88788	0.88044 to 0.89034	0.87882 to 0.89196	0.9901
col/abs/trk len	0.88564	0.00163	0.88400 to 0.88727	0.88239 to 0.88889	0.88133 to 0.88995	

if the largest of each keff occurred on the next cycle, the keff results and 68, 95, and 99 percent confidence intervals would be:

keff estimator	keff	standard deviation	68% confidence	95% confidence	99% confidence
collision	0.88622	0.00256	0.88365 to 0.88878	0.88111 to 0.89132	0.87945 to 0.89298
absorption	0.88621	0.00172	0.88450 to 0.88793	0.88280 to 0.88963	0.88168 to 0.89075
track length	0.88608	0.00254	0.88354 to 0.88863	0.88102 to 0.89115	0.87936 to 0.89281
col/abs/trk len	0.88618	0.00170	0.88447 to 0.88788	0.88279 to 0.88957	0.88168 to 0.89067

the estimated collision/absorption neutron lifetimes, one standard deviations, and 68, 95, and 99 percent confidence intervals are:

type	lifetime(sec)	standard deviation	68% confidence	95% confidence	99% confidence
removal	1.1422E-04	3.4796E-07	1.1387E-04 to 1.1457E-04	1.1352E-04 to 1.1491E-04	1.1330E-04 to 1.1514E-04
capture	1.1455E-04	3.0187E-07	1.1425E-04 to 1.1485E-04	1.1395E-04 to 1.1515E-04	1.1375E-04 to 1.1535E-04
fission	5.1105E-05	1.3501E-07	5.0970E-05 to 5.1240E-05	5.0836E-05 to 5.1374E-05	5.0748E-05 to 5.1461E-05
escape	6.7572E-05	2.8613E-06	6.4708E-05 to 7.0437E-05	6.1873E-05 to 7.3272E-05	6.0013E-05 to 7.5132E-05

1 average keff results summed over 2 cycles each to form 45 batch values of keff print table 178

batch start	end	keff estimators by batch			average keff estimators and deviations			col/abs/lr keff
number	cycle	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	11	12	0.88229	0.88217	0.88247			
2	13	14	0.89135	0.87280	0.89097	0.88682 0.00453	0.87748 0.00469	0.88672 0.00425
3	15	16	0.87467	0.89230	0.87705	0.88277 0.00482	0.88242 0.00563	0.88350 0.00405
4	17	18	0.86912	0.87326	0.87129	0.87936 0.00482	0.88013 0.00459	0.88045 0.00419
5	19	20	0.89197	0.87060	0.88904	0.88188 0.00451	0.87823 0.00404	0.88217 0.00367
6	21	22	0.89443	0.89074	0.89940	0.88397 0.00423	0.88031 0.00390	0.88504 0.00415
7	23	24	0.87460	0.87387	0.87670	0.88263 0.00382	0.87939 0.00342	0.88385 0.00370
8	25	26	0.86523	0.87657	0.86593	0.88046 0.00396	0.87904 0.00299	0.88161 0.00391
9	27	28	0.90063	0.87181	0.90019	0.88270 0.00415	0.87824 0.00275	0.88367 0.00402
10	29	30	0.88945	0.88879	0.88956	0.88337 0.00377	0.87929 0.00268	0.88426 0.00364
11	31	32	0.85118	0.88404	0.84861	0.88045 0.00450	0.87972 0.00246	0.88102 0.00462
12	33	34	0.91361	0.88865	0.91368	0.88321 0.00495	0.88047 0.00237	0.88374 0.00502
13	35	36	0.87795	0.87313	0.88054	0.88281 0.00457	0.87990 0.00225	0.88350 0.00463
14	37	38	0.87087	0.88073	0.87403	0.88195 0.00431	0.87996 0.00208	0.88282 0.00434
15	39	40	0.88783	0.87830	0.88782	0.88235 0.00404	0.87985 0.00194	0.88315 0.00405
16	41	42	0.87056	0.89474	0.86961	0.88161 0.00385	0.88078 0.00204	0.88231 0.00388
17	43	44	0.89764	0.88892	0.89584	0.88255 0.00373	0.88126 0.00198	0.88310 0.00373
18	45	46	0.89338	0.88100	0.89322	0.88315 0.00357	0.88125 0.00186	0.88366 0.00356
19	47	48	0.89933	0.89424	0.89966	0.88400 0.00348	0.88193 0.00189	0.88451 0.00347
20	49	50	0.89599	0.89738	0.89834	0.88460 0.00336	0.88270 0.00195	0.88520 0.00337
21	51	52	0.90578	0.89613	0.90350	0.88561 0.00335	0.88334 0.00196	0.88607 0.00332
22	53	54	0.87354	0.89115	0.87323	0.88506 0.00324	0.88370 0.00191	0.88549 0.00322
23	55	56	0.86856	0.86471	0.86479	0.88435 0.00318	0.88287 0.00200	0.88459 0.00320
24	57	58	0.91247	0.87059	0.91363	0.88552 0.00326	0.88236 0.00198	0.88580 0.00330
25	59	60	0.86798	0.88659	0.87024	0.88482 0.00321	0.88253 0.00191	0.88517 0.00322
26	61	62	0.87379	0.89385	0.87562	0.88439 0.00311	0.88296 0.00188	0.88481 0.00312
27	63	64	0.90219	0.89706	0.89891	0.88505 0.00306	0.88349 0.00189	0.88533 0.00305
28	65	66	0.88132	0.89952	0.88348	0.88492 0.00296	0.88406 0.00191	0.88526 0.00294
29	67	68	0.88538	0.88199	0.88236	0.88493 0.00285	0.88399 0.00184	0.88516 0.00284
30	69	70	0.87514	0.88753	0.87474	0.88461 0.00277	0.88410 0.00178	0.88482 0.00276
31	71	72	0.88368	0.88824	0.87929	0.88458 0.00268	0.88424 0.00173	0.88464 0.00268
32	73	74	0.87450	0.87853	0.87662	0.88426 0.00262	0.88406 0.00168	0.88439 0.00260
33	75	76						0.88432 0.00159
34	77	78						0.88411 0.00156

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33	75	76	0.87889	0.89898	0.87683	0.88410	0.00254	0.88451	0.00169	0.88416	0.00253	0.88440	0.00153
34	77	78	0.88057	0.90590	0.87990	0.88400	0.00247	0.88514	0.00176	0.88403	0.00246	0.88478	0.00155
35	79	80	0.90801	0.88338	0.90760	0.88468	0.00249	0.88509	0.00171	0.88471	0.00248	0.88497	0.00151
36	81	82	0.87292	0.87994	0.87346	0.88436	0.00244	0.88495	0.00167	0.88439	0.00243	0.88478	0.00148
37	83	84	0.87435	0.86247	0.87430	0.88409	0.00239	0.88434	0.00173	0.88412	0.00238	0.88427	0.00153
38	85	86	0.88649	0.88498	0.88907	0.88415	0.00233	0.88436	0.00169	0.88425	0.00232	0.88431	0.00149
39	87	88	0.88752	0.89048	0.88850	0.88424	0.00227	0.88451	0.00165	0.88436	0.00226	0.88445	0.00146
40	89	90	0.87254	0.89412	0.87218	0.88394	0.00223	0.88475	0.00163	0.88406	0.00223	0.88451	0.00142
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41	91	92	0.88712	0.88540	0.88305	0.88402	0.00218	0.88477	0.00159	0.88403	0.00217	0.88452	0.00138
42	93	94	0.88252	0.89672	0.88321	0.88398	0.00213	0.88505	0.00157	0.88401	0.00212	0.88470	0.00136
43	95	96	0.91442	0.89743	0.91211	0.88469	0.00219	0.88534	0.00156	0.88466	0.00217	0.88513	0.00139
44	97	98	0.91264	0.90953	0.91066	0.88533	0.00224	0.88589	0.00162	0.88526	0.00220	0.88567	0.00147
45	99	100	0.89352	0.87779	0.89067	0.88551	0.00219	0.88571	0.00160	0.88538	0.00216	0.88558	0.00145

average keff results summed over 3 cycles each to form 30 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations						col/abs/tl keff	
			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	11	13	0.88937	0.87596	0.88996	0.88277	0.00660	0.88242	0.00646	0.88350	0.00646		
2	14	16	0.87617	0.88888	0.87704	0.87887	0.00545	0.87812	0.00570	0.87935	0.00558		
3	17	19	0.87107	0.86951	0.87104	0.88397	0.00640	0.88031	0.00459	0.88504	0.00693	0.87469	0.00433
4	20	22	0.89928	0.88689	0.90211	0.88132	0.00562	0.88049	0.00356	0.88285	0.00579	0.87647	0.00632
5	23	25	0.87074	0.88121	0.87412	0.88270	0.00479	0.87824	0.00368	0.88367	0.00480	0.87615	0.00419
6	26	28	0.88957	0.86696	0.88776	0.88280	0.00405	0.87972	0.00344	0.88359	0.00406	0.87940	0.00375
7	29	31	0.88342	0.88862	0.88310	0.88321	0.00353	0.88047	0.00307	0.88374	0.00352	0.88105	0.00314
8	32	34	0.88608	0.88570	0.88480	0.88310	0.00312	0.88008	0.00274	0.88380	0.00310	0.88086	0.00289
9	35	37	0.88217	0.87699	0.88427	0.88235	0.00289	0.87985	0.00246	0.88315	0.00285	0.88044	0.00268
10	38	40	0.87560	0.87777	0.87732	<hr/>							
11	41	43	0.87939	0.89467	0.87918	0.88208	0.00262	0.88120	0.00260	0.88279	0.00260	0.88162	0.00237
12	44	46	0.89500	0.88176	0.89326	0.88315	0.00263	0.88125	0.00238	0.88366	0.00253	0.88232	0.00217
13	47	49	0.89723	0.89078	0.89951	0.88424	0.00265	0.88198	0.00230	0.88488	0.00263	0.88271	0.00232
14	50	52	0.90350	0.90105	0.90149	0.88561	0.00281	0.88334	0.00253	0.88607	0.00271	0.88480	0.00254
15	53	55	0.87556	0.88341	0.87282	0.88494	0.00270	0.88335	0.00236	0.88519	0.00267	0.88410	0.00229
16	56	58	0.89415	0.86756	0.89495	0.88552	0.00259	0.88236	0.00242	0.88580	0.00257	0.88396	0.00221
17	59	61	0.87512	0.89018	0.87547	0.88491	0.00251	0.88282	0.00232	0.88519	0.00249	0.88392	0.00203
18	62	64	0.88753	0.89482	0.88771	0.88505	0.00237	0.88349	0.00228	0.88533	0.00235	0.88440	0.00195
19	65	67	0.88431	0.89552	0.88534	0.88501	0.00224	0.88412	0.00225	0.88533	0.00222	0.88473	0.00187
20	68	70	0.87691	0.88383	0.87505	0.88461	0.00217	0.88410	0.00213	0.88482	0.00217	0.88442	0.00176
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21	71	73	0.88875	0.88950	0.88656	0.88480	0.00207	0.88436	0.00205	0.88490	0.00207	0.88462	0.00167
22	74	76	0.86930	0.88766	0.86859	0.88410	0.00210	0.88451	0.00196	0.88416	0.00211	0.88435	0.00161
23	77	79	0.87961	0.89217	0.87816	0.88390	0.00201	0.88485	0.00190	0.88390	0.00203	0.88441	0.00154
24	80	82	0.89472	0.88730	0.89581	0.88436	0.00198	0.88495	0.00182	0.88439	0.00201	0.88469	0.00150
25	83	85	0.88260	0.87589	0.88422	0.88429	0.00190	0.88459	0.00178	0.88439	0.00192	0.88449	0.00145
26	86	88	0.88298	0.88274	0.88370	0.88424	0.00182	0.88451	0.00172	0.88436	0.00185	0.88444	0.00140
27	89	91	0.88306	0.89328	0.88088	0.88419	0.00176	0.88484	0.00168	0.88423	0.00178	0.88456	0.00135
28	92	94	0.87839	0.89088	0.87808	0.88398	0.00171	0.88505	0.00164	0.88401	0.00173	0.88457	0.00130
29	95	97	0.91255	0.89418	0.91058	0.88497	0.00192	0.88537	0.00161	0.88493	0.00191	0.88518	0.00137
30	98	100	0.90117	0.89565	0.89838	0.88551	0.00193	0.88571	0.00159	0.88538	0.00190	0.88547	0.00136

average keff results summed over 5 cycles each to form 18 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations						col/abs/tl keff	
			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	11	15	0.88705	0.88261	0.88715								

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2	16	20	0.87671	0.87385	0.87718	0.88188	0.00517	0.87823	0.00438	0.88217	0.00498	
3	21	25	0.88021	0.88502	0.88423	0.88132	0.00304	0.88049	0.00340	0.88285	0.00296	
4	26	30	0.88953	0.87569	0.88848	0.88337	0.00297	0.87929	0.00268	0.88426	0.00252	0.87744
5	31	35	0.88499	0.88309	0.88528	0.88370	0.00232	0.88005	0.00221	0.88447	0.00196	0.88111
6	36	40	0.87558	0.87884	0.87659	0.88235	0.00233	0.87985	0.00182	0.88315	0.00207	0.87907
7	41	45	0.88340	0.88786	0.88207	0.88250	0.00197	0.88100	0.00192	0.88300	0.00176	0.88214
8	46	50	0.89936	0.89465	0.90060	0.88460	0.00271	0.88270	0.00238	0.88520	0.00268	0.88298
9	51	55	0.88765	0.88850	0.88509	0.88494	0.00242	0.88335	0.00220	0.88519	0.00236	0.88406
10	56	60	0.88368	0.87517	0.88507	0.88482	0.00217	0.88253	0.00213	0.88517	0.00211	0.88390
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11	61	65	0.88637	0.89462	0.88589	0.88496	0.00196	0.88363	0.00222	0.88524	0.00191	0.88472
12	66	70	0.88076	0.88936	0.88015	0.88461	0.00183	0.88410	0.00208	0.88482	0.00179	0.88458
13	71	75	0.88086	0.88811	0.87942	0.88432	0.00171	0.88441	0.00194	0.88440	0.00170	0.88441
14	76	80	0.88940	0.89390	0.88868	0.88468	0.00162	0.88509	0.00192	0.88471	0.00161	0.88435
15	81	85	0.87873	0.87751	0.87991	0.88429	0.00156	0.88459	0.00185	0.88439	0.00153	0.88448
16	86	90	0.87880	0.88729	0.87909	0.88394	0.00150	0.88475	0.00174	0.88406	0.00147	0.88436
17	91	95	0.88368	0.88849	0.88243	0.88393	0.00141	0.88497	0.00165	0.88396	0.00138	0.88435
18	96	100	0.91240	0.89826	0.90945	0.88551	0.00206	0.88571	0.00172	0.88538	0.00192	0.88537

average keff results summed over 6 cycles each to form 15 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations			col/abs/tl keff		
			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	11	16	0.88277	0.88242	0.88350						
2	17	22	0.88517	0.87820	0.88658	0.88397	0.00120	0.88031	0.00211	0.88504	0.00154
3	23	28	0.88015	0.87408	0.88094	0.88270	0.00145	0.87824	0.00241	0.88367	0.00163
4	29	34	0.88475	0.88716	0.88395	0.88321	0.00115	0.88047	0.00281	0.88374	0.00115
5	35	40	0.87888	0.87738	0.88080	0.88235	0.00124	0.87985	0.00226	0.88315	0.00107
6	41	46	0.88719	0.88822	0.88622	0.88315	0.00130	0.88125	0.00231	0.88366	0.00101
7	47	52	0.90037	0.89592	0.90050	0.88561	0.00269	0.88334	0.00287	0.88607	0.00255
8	53	58	0.88486	0.87548	0.88388	0.88552	0.00233	0.88236	0.00267	0.88580	0.00223
9	59	64	0.88132	0.89250	0.88159	0.88505	0.00211	0.88349	0.00261	0.88533	0.00202
10	65	70	0.88061	0.88968	0.88019	0.88461	0.00194	0.88410	0.00242	0.88482	0.00188
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11	71	76	0.87902	0.88858	0.87758	0.88410	0.00183	0.88451	0.00222	0.88416	0.00182
12	77	82	0.88717	0.88974	0.88699	0.88436	0.00169	0.88495	0.00207	0.88439	0.00168
13	83	88	0.88279	0.87931	0.88396	0.88424	0.00156	0.88451	0.00196	0.88436	0.00155
14	89	94	0.88072	0.89208	0.87948	0.88398	0.00146	0.88505	0.00189	0.88401	0.00147
15	95	100	0.90686	0.89491	0.90448	0.88551	0.00204	0.88571	0.00188	0.88538	0.00193

average keff results summed over 9 cycles each to form 10 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations			col/abs/tl keff		
			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	11	19	0.87887	0.87812	0.87935						
2	20	28	0.88653	0.87835	0.88800	0.88270	0.00383	0.87824	0.00012	0.88367	0.00433
3	29	37	0.88389	0.88377	0.88406	0.88310	0.00225	0.88008	0.00185	0.88380	0.00250
4	38	46	0.88333	0.88474	0.88326	0.88315	0.00159	0.88125	0.00175	0.88366	0.00177
5	47	55	0.89210	0.89175	0.89127	0.88494	0.00217	0.88335	0.00250	0.88519	0.00205
6	56	64	0.88560	0.88419	0.88605	0.88505	0.00178	0.88349	0.00205	0.88533	0.00168
7	65	73	0.88332	0.88962	0.88232	0.88480	0.00152	0.88436	0.00194	0.88490	0.00148
8	74	82	0.88121	0.88905	0.88086	0.88436	0.00139	0.88495	0.00178	0.88439	0.00138
9	83	91	0.88288	0.88397	0.88293	0.88419	0.00124	0.88484	0.00157	0.88423	0.00123
10	92	100	0.89737	0.89357	0.89568	0.88551	0.00172	0.88571	0.00165	0.88538	0.00159

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average keff results summed over 10 cycles each to form 9 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff
			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	11	20	0.88188	0.87823	0.88217					
2	21	30	0.88487	0.88036	0.88636	0.88337 0.00149	0.87929 0.00107	0.88426 0.00210		
3	31	40	0.88029	0.88097	0.88094	0.88235 0.00134	0.87985 0.00083	0.88315 0.00164		
4	41	50	0.89138	0.89125	0.89133	0.88460 0.00245	0.88270 0.00291	0.88520 0.00235	0.88608 0.00584	
5	51	60	0.88567	0.88183	0.88508	0.88482 0.00191	0.88253 0.00226	0.88517 0.00182	0.88563 0.00385	
6	61	70	0.88357	0.89199	0.88302	0.88461 0.00157	0.88410 0.00243	0.88482 0.00153	0.88487 0.00200	
7	71	80	0.88513	0.89101	0.88405	0.88468 0.00133	0.88509 0.00228	0.88471 0.00130	0.88481 0.00156	
8	81	90	0.87877	0.88240	0.87950	0.88394 0.00137	0.88475 0.00200	0.88406 0.00130	0.88452 0.00146	
9	91	100	0.89804	0.89337	0.89594	0.88551 0.00198	0.88571 0.00201	0.88538 0.00175	0.88509 0.00130	

average keff results summed over 15 cycles each to form 6 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff
			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	11	25	0.88132	0.88049	0.88285					
2	26	40	0.88337	0.87921	0.88345	0.88235 0.00102	0.87985 0.00064	0.88315 0.00030		
3	41	55	0.89014	0.89034	0.88925	0.88494 0.00266	0.88335 0.00351	0.88519 0.00204		
4	56	70	0.88360	0.88638	0.88371	0.88461 0.00191	0.88410 0.00260	0.88482 0.00149	0.88536 0.00158	
5	71	85	0.88300	0.88651	0.88267	0.88429 0.00152	0.88459 0.00207	0.88439 0.00123	0.88466 0.00131	
6	86	100	0.89163	0.89135	0.89032	0.88551 0.00174	0.88571 0.00203	0.88538 0.00141	0.88505 0.00109	

average keff results summed over 18 cycles each to form 5 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations				col/abs/tl keff
			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	11	28	0.88270	0.87824	0.88367					
2	29	46	0.88361	0.88426	0.88366	0.88315 0.00045	0.88125 0.00301	0.88366 0.00001		
3	47	64	0.88885	0.88797	0.88866	0.88505 0.00192	0.88349 0.00284	0.88533 0.00166		
4	65	82	0.88227	0.88933	0.88159	0.88436 0.00152	0.88495 0.00248	0.88439 0.00150	0.88558 0.00035	
5	83	100	0.89012	0.88877	0.88931	0.88551 0.00165	0.88571 0.00207	0.88538 0.00152	0.88490 0.00075	

average keff results summed over 30 cycles each to form 3 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations			
			k(coll)	k(abs)	k(track)	k(coll) st dev	k(abs) st dev	k(track) st dev	
1	11	40	0.88235	0.87985	0.88315				
2	41	70	0.88687	0.88836	0.88648	0.88461 0.00226	0.88410 0.00425	0.88482 0.00166	
3	71	100	0.88731	0.88893	0.88650	0.88551 0.00159	0.88571 0.00294	0.88538 0.00111	

average keff results summed over 45 cycles each to form 2 batch values of keff

batch number	start cycle	end cycle	keff estimators by batch			average keff estimators and deviations			
			k(coll)	k(abs)	k(track)	k(coll) st dev	k(abs) st dev	k(track) st dev	
1	11	55	0.88494	0.88335	0.88519				
2	56	100	0.88608	0.88808	0.88557	0.88551 0.00057	0.88571 0.00237	0.88538 0.00019	

1 average individual and combined collision/absorption/track-length keff results for 9 different batch sizes

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cycles per number of		average keff estimators and deviations				normality		k(c/a/t) confidence intervals			
keff batch	k batches	k(col)	st dev	k(abs) st dev	k(trk) st dev	co/ab/trk	k(c/a/t) st dev	95% confidence	99% confidence		
1	90	0.8855	0.0025	0.8857	0.0017	0.8854	0.0025	[95/95/95]	0.88564 0.00163	0.88239-0.88889	0.88133-0.88995
2	45	0.8855	0.0022	0.8857	0.0016	0.8854	0.0022	[95/95/95]	0.88558 0.00145	0.88266-0.88849	0.88167-0.88948
3	30	0.8855	0.0019	0.8857	0.0016	0.8854	0.0019	[95/95/95]	0.88547 0.00136	0.88267-0.88826	0.88169-0.88924
5	18	0.8855	0.0021	0.8857	0.0017	0.8854	0.0019	[no/95/no]	0.88537 0.00156	0.88204-0.88870	0.88077-0.88997
6	15	0.8855	0.0020	0.8857	0.0019	0.8854	0.0019	[no/95/no]	0.88520 0.00148	0.88198-0.88842	0.88068-0.88971
9	10	0.8855	0.0017	0.8857	0.0017	0.8854	0.0016	[95/95/95]	0.88499 0.00071	0.88330-0.88667	0.88250-0.88747
10	9	0.8855	0.0020	0.8857	0.0020	0.8854	0.0017	[95/95/95]	0.88509 0.00130	0.88190-0.88827	0.88026-0.88991
15	6	0.8855	0.0017	0.8857	0.0020	0.8854	0.0014	[95/95/99]	0.88505 0.00109	0.88159-0.88852	0.87870-0.89141
18	5	0.8855	0.0017	0.8857	0.0021	0.8854	0.0015	[95/95/95]	0.88490 0.00075	0.88169-0.88812	0.87748-0.89232

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	3000	1.23735	1.25193	1.24093									
2	3696	0.99219	0.99668	0.99046									
3	2404	0.88511	0.90778	0.88664									
4	2655	0.90602	0.92460	0.91084									
5	3046	0.88220	0.87590	0.88356									
6	2937	0.88140	0.90108	0.87888									
7	2934	0.86947	0.87708	0.86050									
8	2935	0.89800	0.88022	0.90154									
9	3117	0.87058	0.86641	0.86711									
10	2868	0.87494	0.90610	0.87293									
----- begin active keff cycles -----													
11	2996	0.89113	0.89450	0.88548									
12	3015	0.87345	0.86985	0.87946	0.88229	0.00884	0.88217	0.01233	0.88247	0.00301			
13	2983	0.90354	0.86354	0.90494	0.88937	0.00873	0.87596	0.00945	0.88996	0.00769			
14	3012	0.87916	0.88205	0.87700	0.88682	0.00668	0.87748	0.00685	0.88672	0.00633	0.88070	0.00259	14259
15	2978	0.88799	0.90309	0.88885	0.88705	0.00518	0.88261	0.00737	0.88715	0.00492	0.88536	0.00465	3581
16	3040	0.86135	0.88150	0.86525	0.88277	0.00602	0.88242	0.00602	0.88350	0.00543	0.88385	0.00389	4235
17	2887	0.86642	0.87967	0.86588	0.88043	0.00560	0.88203	0.00511	0.88098	0.00523	0.88220	0.00369	4021
18	2992	0.87182	0.86686	0.87671	0.87936	0.00497	0.88013	0.00481	0.88045	0.00456	0.88173	0.00327	4465
19	2988	0.87496	0.86201	0.87054	0.87887	0.00441	0.87812	0.00470	0.87935	0.00417	0.87900	0.00364	3178
20	2943	0.90898	0.87919	0.90754	0.88188	0.00496	0.87823	0.00420	0.88217	0.00468	0.88012	0.00358	2957

21	3130	0.86724	0.87069	0.87459	0.88055	0.00468	0.87754	0.00386	0.88148	0.00429	0.87996	0.00327	3212
22	2863	0.92162	0.91080	0.92420	0.88397	0.00547	0.88031	0.00449	0.88504	0.00529	0.88245	0.00479	1388
23	3222	0.88900	0.88577	0.89100	0.88436	0.00505	0.88073	0.00415	0.88550	0.00489	0.88289	0.00445	1483
24	2887	0.86021	0.86197	0.86239	0.88263	0.00498	0.87939	0.00407	0.88385	0.00482	0.88150	0.00443	1388
25	2852	0.86300	0.89589	0.86898	0.88132	0.00482	0.88049	0.00394	0.88285	0.00459	0.88200	0.00419	1459
26	3026	0.86747	0.85726	0.86289	0.88046	0.00459	0.87904	0.00396	0.88161	0.00447	0.87982	0.00409	1421
27	3017	0.92224	0.87981	0.91955	0.88292	0.00496	0.87908	0.00372	0.88384	0.00476	0.88044	0.00399	1414
28	3174	0.87901	0.86381	0.88084	0.88270	0.00469	0.87824	0.00361	0.88367	0.00449	0.87998	0.00388	1407
29	2878	0.87407	0.89591	0.87253	0.88225	0.00446	0.87917	0.00354	0.88309	0.00429	0.88066	0.00355	1592
30	3054	0.90483	0.88167	0.90660	0.88337	0.00438	0.87929	0.00336	0.88426	0.00423	0.88097	0.00346	1598

31	3091	0.87135	0.88829	0.87017	0.88280	0.00420	0.87972	0.00323	0.88359	0.00408	0.88106	0.00321	1763
32	2905	0.83101	0.87980	0.82705	0.88045	0.00465	0.87972	0.00308	0.88102	0.00466	0.87795	0.00305	1864
33	2899	0.87741	0.87524	0.87753	0.88032	0.00444	0.87953	0.00295	0.88087	0.00446	0.87976	0.00291	1954
34	3180	0.94980	0.90207	0.94983	0.88321	0.00514	0.88047	0.00297	0.88374	0.00515	0.88084	0.00312	1640
35	3262	0.89537	0.87008	0.90183	0.88370	0.00496	0.88005	0.00288	0.88447	0.00499	0.88069	0.00304	1649
36	2850	0.86053	0.87617	0.85924	0.88281	0.00485	0.87990	0.00277	0.88350	0.00489	0.88037	0.00290	1737
37	2895	0.89060	0.88473	0.89174	0.88310	0.00467	0.88008	0.00267	0.88380	0.00472	0.88056	0.00280	1796
38	3135	0.85113	0.87672	0.85632	0.88195	0.00464	0.87996	0.00258	0.88282	0.00465	0.88039	0.00272	1835
39	2915	0.90028	0.88725	0.90295	0.88259	0.00453	0.88021	0.00250	0.88351	0.00454	0.88063	0.00266	1857
40	3220	0.87537	0.86934	0.87269	0.88235	0.00438	0.87985	0.00244	0.88315	0.00440	0.88018	0.00258	1906

41	2951	0.86771	0.89139	0.86256	0.88187	0.00426	0.88022	0.00239	0.88249	0.00431	0.88054	0.00246	2023
42	2964	0.87341	0.89808	0.87666	0.88161	0.00413	0.88078	0.00238	0.88231	0.00417	0.88098	0.00244	2003

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43	2971	0.89705	0.89454	0.89833	0.88208	0.00403	0.88120	0.00235	0.88279	0.00407	0.88139	0.00241	1996
44	3159	0.89824	0.88329	0.89936	0.88255	0.00394	0.88126	0.00228	0.88310	0.00397	0.88151	0.00232	2089
45	3031	0.88058	0.87200	0.89742	0.88250	0.00383	0.88100	0.00223	0.88300	0.00385	0.88126	0.00226	2132
46	2942	0.90617	0.89000	0.90701	0.88315	0.00378	0.88125	0.00218	0.88366	0.00380	0.88154	0.00222	2146
47	3164	0.90403	0.90369	0.90520	0.88372	0.00372	0.88185	0.00220	0.88425	0.00374	0.88213	0.00225	2037
48	2914	0.89463	0.88478	0.89411	0.88400	0.00363	0.88193	0.00215	0.88451	0.00365	0.88223	0.00219	2094
49	2979	0.89304	0.88386	0.89921	0.88424	0.00354	0.88198	0.00209	0.88488	0.00358	0.88229	0.00215	2120
50	2989	0.89894	0.91090	0.89747	0.88460	0.00347	0.88270	0.00216	0.88520	0.00350	0.88308	0.00220	1981
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51	2972	0.90867	0.88803	0.90890	0.88519	0.00344	0.88283	0.00211	0.88578	0.00346	0.88326	0.00216	2009
52	3056	0.90288	0.90423	0.89809	0.88561	0.00338	0.88334	0.00212	0.88607	0.00339	0.88384	0.00215	1985
53	3037	0.89603	0.89417	0.89100	0.88585	0.00331	0.88359	0.00209	0.88618	0.00332	0.88408	0.00210	2034
54	3016	0.85106	0.88812	0.85546	0.88506	0.00333	0.88370	0.00204	0.88549	0.00331	0.88409	0.00205	2090
55	2819	0.87959	0.86793	0.87198	0.88494	0.00326	0.88335	0.00203	0.88519	0.00325	0.88365	0.00203	2079
56	3058	0.85753	0.86148	0.85760	0.88435	0.00324	0.88287	0.00204	0.88459	0.00324	0.88314	0.00205	1994
57	2935	0.93043	0.87435	0.93372	0.88533	0.00332	0.88269	0.00200	0.88563	0.00334	0.88314	0.00201	2016
58	3169	0.89450	0.86684	0.89353	0.88552	0.00326	0.88236	0.00199	0.88580	0.00327	0.88292	0.00199	2012
59	2883	0.86436	0.89723	0.86624	0.88509	0.00322	0.88266	0.00197	0.88540	0.00323	0.88314	0.00195	2055
60	2919	0.87160	0.87595	0.87425	0.88482	0.00316	0.88253	0.00194	0.88517	0.00317	0.88300	0.00192	2082
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61	3076	0.88940	0.89736	0.88594	0.88491	0.00310	0.88282	0.00192	0.88519	0.00311	0.88327	0.00189	2105
62	3049	0.85819	0.89034	0.86531	0.88439	0.00309	0.88296	0.00189	0.88481	0.00307	0.88333	0.00186	2142
63	2802	0.92894	0.89737	0.92626	0.88523	0.00314	0.88324	0.00187	0.88559	0.00311	0.88367	0.00186	2103
64	3209	0.87545	0.89674	0.87157	0.88505	0.00309	0.88349	0.00186	0.88533	0.00306	0.88385	0.00182	2116
65	2831	0.87987	0.89128	0.88039	0.88496	0.00303	0.88363	0.00183	0.88524	0.00301	0.88396	0.00179	2185
66	2959	0.88276	0.90775	0.88656	0.88492	0.00298	0.88406	0.00184	0.88526	0.00296	0.88432	0.00180	2131
67	2864	0.89031	0.88753	0.88906	0.88501	0.00293	0.88412	0.00181	0.88533	0.00290	0.88438	0.00177	2173
68	2972	0.88046	0.87645	0.87566	0.88493	0.00288	0.88399	0.00179	0.88516	0.00286	0.88422	0.00174	2205
69	2926	0.86945	0.86629	0.86561	0.88467	0.00284	0.88369	0.00178	0.88483	0.00283	0.88390	0.00173	2175
70	2960	0.88083	0.90876	0.88388	0.88461	0.00279	0.88410	0.00180	0.88482	0.00278	0.88423	0.00174	2136
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71	3107	0.84348	0.87388	0.83829	0.88393	0.00283	0.88394	0.00178	0.88405	0.00284	0.88393	0.00173	2123
72	2942	0.92388	0.90260	0.92028	0.88458	0.00286	0.88424	0.00178	0.88464	0.00285	0.88430	0.00174	2065
73	3341	0.89888	0.89203	0.90112	0.88480	0.00282	0.88436	0.00175	0.88490	0.00282	0.88444	0.00172	2082
74	2850	0.85011	0.86503	0.85213	0.88426	0.00283	0.88406	0.00175	0.88439	0.00282	0.88410	0.00172	2030
75	2891	0.88796	0.90701	0.88529	0.88432	0.00278	0.88441	0.00176	0.88440	0.00278	0.88441	0.00172	2004
76	3163	0.86982	0.89095	0.86837	0.88410	0.00275	0.88451	0.00173	0.88416	0.00275	0.88445	0.00170	2034
77	2879	0.89035	0.90093	0.88923	0.88419	0.00271	0.88476	0.00173	0.88423	0.00271	0.88466	0.00168	2034
78	3045	0.87079	0.91087	0.87058	0.88400	0.00268	0.88514	0.00174	0.88403	0.00267	0.88491	0.00168	2008
79	2849	0.87770	0.86472	0.87468	0.88390	0.00264	0.88485	0.00174	0.88390	0.00264	0.88464	0.00168	1990
80	3000	0.93832	0.90204	0.94052	0.88468	0.00272	0.88509	0.00174	0.88471	0.00272	0.88502	0.00169	1934
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81	3144	0.86047	0.86516	0.86099	0.88434	0.00270	0.88481	0.00173	0.88437	0.00271	0.88473	0.00169	1900
82	2711	0.88537	0.89472	0.88593	0.88436	0.00266	0.88495	0.00172	0.88439	0.00267	0.88484	0.00167	1920
83	3079	0.88288	0.86327	0.88237	0.88434	0.00262	0.88465	0.00172	0.88437	0.00263	0.88459	0.00167	1904
84	2947	0.86583	0.86167	0.86622	0.88409	0.00260	0.88434	0.00172	0.88412	0.00261	0.88429	0.00167	1866
85	2929	0.89910	0.90272	0.90405	0.88429	0.00257	0.88459	0.00172	0.88439	0.00259	0.88452	0.00167	1854
86	3129	0.87389	0.86724	0.87409	0.88415	0.00254	0.88436	0.00171	0.88425	0.00256	0.88431	0.00166	1846
87	2878	0.85007	0.86716	0.85145	0.88371	0.00255	0.88413	0.00170	0.88383	0.00256	0.88405	0.00166	1820
88	2864	0.92498	0.91381	0.92554	0.88424	0.00257	0.88451	0.00172	0.88436	0.00258	0.88446	0.00169	1737
89	3232	0.90100	0.89384	0.90019	0.88445	0.00255	0.88463	0.00170	0.88456	0.00256	0.88460	0.00167	1748
90	2947	0.84408	0.89440	0.84416	0.88394	0.00257	0.88475	0.00169	0.88406	0.00257	0.88460	0.00165	1769
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91	2855	0.90411	0.89161	0.89829	0.88419	0.00255	0.88484	0.00167	0.88423	0.00255	0.88473	0.00164	1787
92	3233	0.87013	0.87919	0.86781	0.88402	0.00252	0.88477	0.00165	0.88403	0.00252	0.88464	0.00162	1803
93	2857	0.85518	0.89349	0.85553	0.88367	0.00251	0.88488	0.00163	0.88369	0.00252	0.88466	0.00160	1823
94	2894	0.90985	0.89995	0.91090	0.88398	0.00250	0.88505	0.00162	0.88401	0.00251	0.88487	0.00159	1818
95	3177	0.87916	0.87819	0.87964	0.88393	0.00247	0.88497	0.00161	0.88396	0.00248	0.88479	0.00158	1834
96	2980	0.94968	0.91667	0.94458	0.88469	0.00256	0.88534	0.00163	0.88466	0.00255	0.88524	0.00161	1729
97	3279	0.90880	0.88769	0.90753	0.88497	0.00255	0.88537	0.00161	0.88493	0.00253	0.88531	0.00160	1747
98	2801	0.91648	0.91337	0.91379	0.88533	0.00254	0.88589	0.00168	0.88526	0.00253	0.88578	0.00165	1611
99	3054	0.89409	0.89183	0.89047	0.88543	0.00252	0.88596	0.00166	0.88531	0.00250	0.88584	0.00164	1626
100	2930	0.89294	0.86375	0.89087	0.88551	0.00249	0.88571	0.00166	0.88538	0.00247	0.88564	0.00163	1620

the largest active cycle keffs by estimator are:

collision 0.94980 on cycle 34
 absorption 0.93137 on cycle 98
 track length 0.94983 on cycle 34

the smallest active cycle keffs by estimator are:

collision 0.83101 on cycle 32
 absorption 0.85726 on cycle 26
 track length 0.82705 on cycle 32

plot of the estimated col/abs/track-length keff one standard deviation interval versus cycle number ($\bar{k}$ = final keff = 0.88564)

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Individual and collision/absorption/track-length keffs for different numbers of inactive cycles skipped for fission source settling

skip cycles	active cycles	active neutrons	average k(coll) st dev	average keff estimators and deviations k(abs) st dev	normality k(trk) st dev	average k(c/a/t) co/ab/t/l	k(c/a/t) st dev	95% confidence	99% confidence
0	100	299444	0.8899 0.0043	0.8910 0.0041	0.8898 0.0043	[no/no/no]	0.89083 0.00411	0.88264-0.89902	0.87996-0.90169
1	99	296444	0.8864 0.0025	0.8874 0.0020	0.8862 0.0025	[no/no/no]	0.88713 0.00193	0.88328-0.89097	0.88203-0.89222
2	98	292748	0.8853 0.0023	0.8863 0.0016	0.8852 0.0023	[95/95/95]	0.88606 0.00159	0.88290-0.88922	0.88187-0.89025
3	97	290344	0.8853 0.0023	0.8860 0.0016	0.8851 0.0023	[95/95/95]	0.88589 0.00159	0.88271-0.88906	0.88168-0.89009
4	96	287689	0.8851 0.0024	0.8856 0.0016	0.8849 0.0023	[95/95/95]	0.88549 0.00156	0.88237-0.88860	0.88135-0.88962
5	95	284643	0.8852 0.0024	0.8857 0.0016	0.8849 0.0024	[95/95/95]	0.88558 0.00158	0.88243-0.88872	0.88140-0.88975
6	94	281706	0.8852 0.0024	0.8856 0.0016	0.8850 0.0024	[95/95/95]	0.88546 0.00159	0.88229-0.88863	0.88126-0.88967
7	93	278772	0.8854 0.0024	0.8857 0.0016	0.8852 0.0024	[95/95/95]	0.88557 0.00160	0.88238-0.88876	0.88134-0.88980
8	92	275837	0.8852 0.0024	0.8857 0.0017	0.8850 0.0024	[95/95/95]	0.88558 0.00162	0.88236-0.88881	0.88130-0.88986
9	91	272720	0.8854 0.0025	0.8859 0.0017	0.8852 0.0024	[95/95/95]	0.88579 0.00162	0.88255-0.88902	0.88150-0.89007
10	90*	269852	0.8855 0.0025	0.8857 0.0017	0.8854 0.0025	[95/95/95]	0.88564 0.00163	0.88239-0.88889	0.88133-0.88995
11	89	266856	0.8854 0.0025	0.8856 0.0017	0.8854 0.0025	[95/95/95]	0.88557 0.00165	0.88228-0.88885	0.88121-0.88992
12	88	263841	0.8856 0.0025	0.8858 0.0017	0.8854 0.0025	[95/95/95]	0.88573 0.00166	0.88243-0.88904	0.88135-0.89012
13	87	260858	0.8854 0.0026	0.8860 0.0017	0.8852 0.0025	[95/95/95]	0.88593 0.00167	0.88260-0.88925	0.88131-0.89034
14	86	257846	0.8854 0.0026	0.8861 0.0017	0.8853 0.0026	[95/95/95]	0.88598 0.00169	0.88261-0.88934	0.88152-0.89044
15	85	254868	0.8854 0.0026	0.8859 0.0017	0.8853 0.0026	[95/95/95]	0.88580 0.00170	0.88242-0.88919	0.88131-0.89029
16	84	251828	0.8857 0.0026	0.8859 0.0017	0.8855 0.0026	[95/95/95]	0.88589 0.00172	0.88246-0.88931	0.88135-0.89043
17	83	248941	0.8859 0.0027	0.8860 0.0017	0.8857 0.0026	[95/95/95]	0.88599 0.00174	0.88253-0.88944	0.88140-0.89057
18	82	245949	0.8861 0.0027	0.8863 0.0018	0.8859 0.0027	[95/95/95]	0.88623 0.00175	0.88275-0.88971	0.88162-0.89084
19	81	242961	0.8862 0.0027	0.8866 0.0018	0.8860 0.0027	[95/95/95]	0.88649 0.00174	0.88302-0.88996	0.88188-0.89109
20	80	240018	0.8860 0.0027	0.8866 0.0018	0.8858 0.0027	[95/95/95]	0.88653 0.00176	0.88301-0.89004	0.88187-0.89119

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21	79	236888	0.8862	0.0028	0.8868	0.0018	0.8859	0.0028	0.8867	0.00178	0.88322-0.89031	0.88206-0.89147
22	78	234025	0.8857	0.0028	0.8865	0.0018	0.8854	0.0027	0.8864	0.00177	0.88287-0.88993	0.88171-0.89109
23	77	230803	0.8857	0.0028	0.8866	0.0018	0.8854	0.0028	0.8864	0.00180	0.88282-0.88999	0.88164-0.89116
24	76	227916	0.8860	0.0028	0.8869	0.0018	0.8857	0.0028	0.8875	0.00179	0.88318-0.89033	0.88201-0.89150
25	75	225064	0.8863	0.0028	0.8868	0.0018	0.8859	0.0028	0.8868	0.00182	0.88305-0.89032	0.88186-0.89151
26	74	222038	0.8866	0.0029	0.8872	0.0018	0.8862	0.0028	0.8875	0.00180	0.88341-0.89059	0.88223-0.89176
27	73	219021	0.8861	0.0029	0.8873	0.0018	0.8857	0.0029	0.8873	0.00182	0.88339-0.89067	0.88219-0.89186
28	72	215847	0.8862	0.0029	0.8876	0.0018	0.8858	0.0029	0.8876	0.00183	0.88371-0.89101	0.88251-0.89221
29	71	212969	0.8864	0.0029	0.8875	0.0018	0.8860	0.0029	0.8875	0.00185	0.88370-0.89098	0.88238-0.89220
30	70	209915	0.8861	0.0030	0.8875	0.0019	0.8857	0.0030	0.8873	0.00188	0.88357-0.89109	0.88234-0.89232
31	69	206824	0.8863	0.0030	0.8875	0.0019	0.8859	0.0030	0.8873	0.00191	0.88354-0.89116	0.88229-0.89241
32	68	203919	0.8871	0.0029	0.8876	0.0019	0.8868	0.0029	0.8875	0.00192	0.88367-0.89133	0.88242-0.89259
33	67	201020	0.8873	0.0030	0.8878	0.0019	0.8869	0.0029	0.8876	0.00194	0.88382-0.89156	0.88254-0.89283
34	66	197840	0.8863	0.0029	0.8876	0.0019	0.8860	0.0028	0.8875	0.00194	0.88342-0.89118	0.88214-0.89246
35	65	194578	0.8862	0.0029	0.8879	0.0020	0.8857	0.0029	0.8875	0.00198	0.88361-0.89152	0.88231-0.89283
36	64	191728	0.8866	0.0029	0.8881	0.0020	0.8861	0.0029	0.8876	0.00199	0.88377-0.89175	0.88246-0.89306
37	63	188833	0.8865	0.0030	0.8881	0.0020	0.8861	0.0029	0.8876	0.00203	0.88373-0.89186	0.88240-0.89320
38	62	185698	0.8871	0.0029	0.8883	0.0020	0.8865	0.0029	0.8876	0.00205	0.88399-0.89221	0.88263-0.89357
39	61	182783	0.8869	0.0030	0.8883	0.0021	0.8863	0.0030	0.8880	0.00210	0.88387-0.89227	0.88248-0.89366
40	60	179563	0.8871	0.0030	0.8886	0.0021	0.8865	0.0030	0.8883	0.00211	0.88411-0.89255	0.88271-0.89395
41	59	176612	0.8874	0.0031	0.8886	0.0021	0.8869	0.0030	0.8883	0.00213	0.88407-0.89262	0.88266-0.89403
42	58	173648	0.8877	0.0031	0.8884	0.0021	0.8871	0.0031	0.8883	0.00217	0.88388-0.89259	0.88244-0.89403
43	57	170677	0.8875	0.0032	0.8883	0.0022	0.8869	0.0031	0.8881	0.00221	0.88366-0.89253	0.88219-0.89400
44	56	167518	0.8873	0.0032	0.8884	0.0022	0.8868	0.0032	0.8884	0.00224	0.88363-0.89264	0.88214-0.89413
45	55	164487	0.8874	0.0033	0.8887	0.0022	0.8869	0.0032	0.8884	0.00227	0.88385-0.89296	0.88234-0.89447
46	54	161543	0.8871	0.0033	0.8887	0.0023	0.8865	0.0033	0.8883	0.00232	0.88366-0.89296	0.88211-0.89451
47	53	158381	0.8868	0.0034	0.8884	0.0023	0.8862	0.0033	0.8879	0.00234	0.88326-0.89268	0.88169-0.89425
48	52	155467	0.8866	0.0034	0.8885	0.0023	0.8860	0.0034	0.8880	0.00239	0.88319-0.89282	0.88159-0.89442
49	51	152488	0.8865	0.0035	0.8886	0.0024	0.8858	0.0034	0.8880	0.00248	0.88306-0.89302	0.88140-0.89468
50	50	149499	0.8862	0.0035	0.8881	0.0024	0.8855	0.0035	0.8876	0.00248	0.88370-0.89268	0.88103-0.89435
51	49	146527	0.8858	0.0036	0.8881	0.0024	0.8850	0.0035	0.8879	0.00254	0.88247-0.89271	0.88075-0.89442
52	48	143471	0.8854	0.0036	0.8878	0.0025	0.8848	0.0036	0.8873	0.00256	0.88222-0.89252	0.88050-0.89425
53	47	140434	0.8852	0.0037	0.8877	0.0025	0.8846	0.0037	0.8872	0.00259	0.88204-0.89250	0.88029-0.89425
54	46	137418	0.8859	0.0037	0.8876	0.0026	0.8853	0.0037	0.8874	0.00266	0.88206-0.89277	0.88025-0.89457
55	45	134599	0.8861	0.0038	0.8881	0.0026	0.8856	0.0038	0.8876	0.00266	0.88225-0.89299	0.88044-0.89480
56	44	131541	0.8867	0.0038	0.8887	0.0026	0.8862	0.0038	0.8882	0.00264	0.88291-0.89359	0.88110-0.89540
57	43	128606	0.8857	0.0038	0.8890	0.0026	0.8851	0.0037	0.8879	0.00277	0.88283-0.89404	0.88093-0.89593
58	42	125437	0.8855	0.0039	0.8895	0.0026	0.8849	0.0038	0.8891	0.00282	0.88330-0.89472	0.88137-0.89665
59	41	122554	0.8860	0.0039	0.8894	0.0027	0.8854	0.0039	0.8891	0.00288	0.88308-0.89475	0.88110-0.89673
60	40	119635	0.8864	0.0040	0.8897	0.0027	0.8856	0.0039	0.8893	0.00296	0.88338-0.89537	0.88134-0.89740
61	39	116559	0.8863	0.0041	0.8895	0.0028	0.8856	0.0040	0.8892	0.00300	0.88316-0.89535	0.88108-0.89742
62	38	113510	0.8870	0.0042	0.8895	0.0029	0.8862	0.0041	0.8894	0.00315	0.88302-0.89581	0.88084-0.89799
63	37	110708	0.8859	0.0041	0.8893	0.0029	0.8851	0.0041	0.8895	0.00322	0.88251-0.89558	0.88076-0.89782
64	36	107499	0.8862	0.0042	0.8891	0.0030	0.8854	0.0042	0.8898	0.00326	0.88234-0.89562	0.88060-0.89791
65	35	104668	0.8864	0.0043	0.8890	0.0031	0.8856	0.0043	0.8896	0.00336	0.88211-0.89581	0.87975-0.89817
66	34	101709	0.8865	0.0045	0.8884	0.0032	0.8856	0.0044	0.8893	0.00348	0.88122-0.89540	0.87877-0.89785
67	33	98845	0.8864	0.0046	0.8885	0.0032	0.8855	0.0046	0.8895	0.00358	0.88101-0.89563	0.87848-0.89816
68	32	95873	0.8866	0.0047	0.8886	0.0033	0.8858	0.0047	0.8895	0.00363	0.88103-0.89591	0.87849-0.89849
69	31	92947	0.8871	0.0049	0.8896	0.0034	0.8864	0.0048	0.8896	0.00362	0.88155-0.89638	0.87896-0.89896
70	30	89987	0.8873	0.0050	0.8889	0.0034	0.8865	0.0050	0.8899	0.00371	0.88048-0.89571	0.87781-0.89838
71	29	86880	0.8888	0.0050	0.8894	0.0035	0.8882	0.0048	0.8892	0.00368	0.88073-0.89584	0.87807-0.89850
72	28	83938	0.8876	0.0050	0.8890	0.0036	0.8870	0.0049	0.8895	0.00375	0.88024-0.89569	0.87751-0.89842
73	27	80597	0.8872	0.0051	0.8889	0.0037	0.8865	0.0050	0.8895	0.00394	0.87938-0.89565	0.87649-0.89854
74	26	77747	0.8886	0.0051	0.8898	0.0037	0.8878	0.0050	0.8895	0.00403	0.88033-0.89700	0.87735-0.89998
75	25	74856	0.8886	0.0053	0.8891	0.0038	0.8879	0.0053	0.8893	0.00411	0.87988-0.89689	0.87678-0.89995
76	24	71693	0.8894	0.0055	0.8890	0.0040	0.8887	0.0054	0.8895	0.00426	0.87959-0.89730	0.87639-0.90051
77	23	68814	0.8893	0.0057	0.8885	0.0041	0.8887	0.0057	0.8896	0.00441	0.87886-0.89726	0.87550-0.90061

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78	22	65769	0.8902	0.0060	0.8875	0.0042	0.8895	0.0059	95/95/95	0.88717	0.00454	0.87765-0.89668	0.87417-0.90017
79	21	62920	0.8908	0.0062	0.8886	0.0042	0.8902	0.0061	95/95/95	0.88802	0.00453	0.87849-0.89754	0.87496-0.90107
80	20	59920	0.8884	0.0060	0.8879	0.0044	0.8877	0.0058	95/95/95	0.88655	0.00469	0.87666-0.89644	0.87296-0.90014
81	19	56776	0.8899	0.0062	0.8891	0.0045	0.8891	0.0060	95/95/95	0.88784	0.00481	0.87765-0.89803	0.87379-0.90188
82	18	54065	0.8901	0.0065	0.8888	0.0047	0.8893	0.0063	95/95/95	0.88744	0.00511	0.87654-0.89834	0.87237-0.90251
83	17	50986	0.8906	0.0069	0.8903	0.0047	0.8897	0.0067	95/95/95	0.88891	0.00524	0.87768-0.90014	0.87332-0.90449
84	16	48039	0.8921	0.0072	0.8921	0.0047	0.8912	0.0069	95/95/95	0.89092	0.00528	0.87951-0.90233	0.87501-0.90683
85	15	45110	0.8916	0.0076	0.8913	0.0049	0.8903	0.0074	95/95/95	0.88734	0.00601	0.87425-0.90043	0.86898-0.90569
86	14	41981	0.8929	0.0081	0.8931	0.0050	0.8915	0.0078	95/95/95	0.88957	0.00639	0.87551-0.90363	0.86973-0.90941
87	13	39103	0.8962	0.0080	0.8951	0.0049	0.8946	0.0077	95/95/95	0.89278	0.00679	0.87764-0.90792	0.87125-0.91431
88	12	36239	0.8938	0.0083	0.8935	0.0051	0.8920	0.0079	95/95/95	0.88811	0.00719	0.87184-0.90437	0.86475-0.91146
89	11	33007	0.8931	0.0090	0.8935	0.0055	0.8912	0.0087	95/95/95	0.88735	0.00808	0.86870-0.90599	0.86022-0.91447
90	10	30060	0.8980	0.0084	0.8934	0.0061	0.8959	0.0080	95/95/95	0.88800	0.00889	0.86697-0.90903	0.85688-0.91912
91	9	27205	0.8974	0.0093	0.8936	0.0068	0.8957	0.0090	95/95/95	0.88678	0.00941	0.86376-0.90979	0.85190-0.92165
92	8	23972	0.9008	0.0099	0.8954	0.0075	0.8992	0.0094	95/95/95	0.88845	0.00924	0.86469-0.91221	0.85118-0.92571
93	7	21115	0.9073	0.0085	0.8956	0.0086	0.9054	0.0081	95/95/95	0.89337	0.01182	0.86056-0.92618	0.83896-0.94778
94	6	18221	0.9069	0.0101	0.8949	0.0102	0.9045	0.0095	95/95/95	0.88209	0.01364	0.83866-0.92552	0.80239-0.96179
95	5	15044	0.9124	0.0103	0.8983	0.0118	0.9094	0.0099	95/95/95	0.88012	0.02667	0.76536-0.99488	0.61542-1.14482
96	4	12064	0.9031	0.0057	0.8937	0.0140	0.9007	0.0059	95/95/95	0.93818	0.00136	0.92087-0.95549	0.85147-1.02489
97	3	8785	0.9012	0.0077	0.8956	0.0196	0.8984	0.0077					
98	2	5984	0.8935	0.0006	0.8778	0.0140	0.8907	0.0002					

the minimum estimated standard deviation for the col/abs/|l keff estimator occurs with 96 inactive cycles and 4 active cycles.

the first active half of the problem skips 10 cycles and uses 45 active cycles; the second half skips 55 and uses 45 cycles.
the col/abs/trk-len keff, one standard deviation, and 68, 95, and 99 percent intervals for each active half of the problem are:

problem	keff	standard deviation	68% confidence	95% confidence	99% confidence
first half	0.88365	0.00203	0.88161 to 0.88569	0.87955 to 0.88774	0.87817 to 0.88912
second half	0.88762	0.00266	0.88494 to 0.89030	0.88225 to 0.89299	0.88044 to 0.89480
final result	0.88564	0.00163	0.88400 to 0.88727	0.88239 to 0.88889	0.88133 to 0.88995

the first and second half values of k(collision/absorption/track length) appear to be the same at the 95 percent confidence level.
1plot of the estimated col/abs/track-length keff one standard deviation interval by active cycle number (l = final keff = 0.88564)

21	79		(-+k---)	
22	78		(-+k---)	
23	77		(-+k---)	
24	76		(-+k---)	
25	75		(-+k---)	
26	74		(-+k---)	
27	73		(-+k---)	
28	72		(-+k---)	
29	71	+	(-+k---)	+
30	70		(-+k---)	
31	69		(-+k---)	
32	68		(-+k---)	
33	67		(-+k---)	
34	66		(-+k---)	
35	65		(-+k---)	
36	64		(-+k---)	
37	63		(-+k---)	
38	62		(-+k---)	
39	61	+	(-+k---)	+
40	60		(-+k---)	
41	59		(-+k---)	
42	58		(-+k---)	
43	57		(-+k---)	
44	56		(-+k---)	
45	55		(-+k---)	
46	54		(-+k---)	
47	53		(-+k---)	
48	52		(-+k---)	
49	51	+	(-+k---)	+
50	50		(-+k---)	
51	49		(-+k---)	
52	48		(-+k---)	
53	47		(-+k---)	
54	46		(-+k---)	
55	45		(-+k---)	
56	44		(-+k---)	
57	43		(-+k---)	
58	42		(-+k---)	
59	41	+	(-+k---)	+
60	40		(-+k---)	
61	39		(-+k---)	
62	38		(-+k---)	
63	37		(-+k---)	
64	36		(-+k---)	
65	35		(-+k---)	
66	34		(-+k---)	
67	33		(-+k---)	
68	32		(-+k---)	
69	31	+	(-+k---)	+
70	30		(-+k---)	
71	29		(-+k---)	
72	28		(-+k---)	
73	27		(-+k---)	
74	26		(-+k---)	
75	25		(-+k---)	
76	24		(-+k---)	
77	23		(-+k---)	
78	22		(-+k---)	
79	21	+	(-+k---)	+
80	20		(-+k---)	
81	19		(-+k---)	
82	18		(-+k---)	
83	17		(-+k---)	

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dump no. 14 on file runtime nps = 299444 coll = 59685788 ctm = 201.26 nrm = 474650976

1 warning message so far.

run terminated when 100 kcode cycles were done.

computer time = 201.31 minutes

mcnph version 4a 10/01/93 09/02/98 19:28:18 probid = 09/02/98 16:04:58

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To DISTRIBUTION	From H. J. Goldberg	Page 1 of 1
		Date 09/03/98
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		ECN No. 605737

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	DT/ECN Only
R. J. Bottenus	T4-51	X			
D. G. Erickson	B4-44	X			
J. P. Estrellado	B4-44	X			
<i>J. K. KERSTEN</i>	<i>T4-52</i>	X			
H. J. Goldberg	B4-44	X			
M. F. Hackworth	T4-51	X			
J. A. Locklair	T3-06	X			
<i>J. R. WEIDERT</i>	<i>T4-52</i>	X			
Central Files	B1-07	(X)			
Docket Files	A3-02	(X)			