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CACA-2: Revised Version of CACA—A Heavy Isotope and Fission-Product Concentration Calculational Code for Experimental Irradiation Capsules

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CACA-2: REVISED VERSION OF CACA — A HEAVY ISOTOPE AND FISSION-PRODUCT CONCENTRATION CALCULATIONAL CODE FOR EXPERIMENTAL IRRADIATION CAPSULES

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FEBRUARY 1976

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ABSTRACT

This report describes a computer program which calculates nuclide concentration histories, power or neutron flux histories, burnups, and fission-product birthrates for fueled experimental capsules subjected to neutron irradiations. Seventeen heavy nuclides in the chain from ^{232}Th to ^{242}Pu and a user-specified number of fission products are treated. A fourth-order Runge-Kutta calculational method solves the differential equations for nuclide concentrations as a function of time. For a particular problem, a user-specified number of fuel regions may be treated. A fuel region is described by volume, length, and specific irradiation history. A number of initial fuel compositions may be specified for each fuel region. The irradiation history for each fuel region can be divided into time intervals, and a constant power density or a time-dependent neutron flux is specified for each time interval. Also, an independent cross-section set may be selected for each time interval in each irradiation history. The fission-product birthrates for the first composition of each fuel region are summed to give the total fission-product birthrates for the problem.

Key words: computer codes, calculations, in-pile tests, irradiation, burnup, fission products, thermal power, neutron flux.

INTRODUCTION

The CACA program[1] was originally written to alleviate problems in computer turn-around time, cross-section inaccessibility, large output in an undesired form, time-step limitations, power treatment limitations, and fission-product limitations of previous depletion-burnup analysis computer programs such as ORIGEN[2] or FABGEN.[3] However, the original CACA code lacked the flexibility to handle the wide variety of problems that were encountered, and the input instructions were difficult to follow. CACA-2 was written to provide greater flexibility and the input instructions were clarified.

Some of the options in CACA-2 are better understood by considering a typical fueled irradiation test. The HRB capsules are designed to test candidate fuels for the High-Temperature Gas-Cooled Reactor Program. The capsules are irradiated for several cycles in a permanent beryllium facility of the High Flux Isotope Reactor (HFIR) to obtain partial fuel burnup after which they are placed in a HFIR removable beryllium facility (with higher flux levels) for the remaining irradiation. Each HRB capsule contains several fuel sticks with each having a unique composition. The magnitude and the time dependence of the neutron flux is different for each fuel stick. When the capsule is moved from the permanent beryllium facility to the removable beryllium facility, the neutron flux magnitude and spectrum changes. As the capsule is operating, fission-product gases escape from the fuel sticks and are measured to provide an indication of the extent of fuel particle failure in the capsule. Upon completion of the irradiation test, the fuel sticks are removed from the capsule and are inspected to evaluate their performance.

Accurate information about the irradiation history is required to determine the fuel particle failure and to evaluate the performance of the fuel. This includes nuclide concentrations, power histories, fission-product birthrates, and burnups. CACA-2 can be used to model the exact irradiation history and to calculate these various parameters for each fuel stick throughout the irradiation. CACA-2 can also be used in the design of the capsule by calculating power histories for proposed initial fuel loadings.

CALCULATIONAL MODEL

The set of differential equations which describe the nuclide concentrations as a function of time can be put into the form:

$$\frac{dN_i}{dt} = F_i(t,N_1,N_2 \ldots N_m) ,$$

where

N_i = concentration of ith nuclide,

t = time,

M = total number of nuclides.

Several calculational methods were investigated that would solve the differential equations for the nuclide concentrations as a function of time. It was desired that the method be fast and accurate but yet flexible enough to solve the equations given either the neutron flux history or the power history. The method had to allow for neutron flux time variations in flux calculations and the dependence of power on nuclide concentrations in power calculations. A fourth-order Runge-Kutta method was selected based on this method's flexibility to solve the two types of problems. The length of the time step in the Runge-Kutta method was adjusted to make the calculations as fast as possible without impairing the accuracy. A time step of 6 hr was thus selected as optimal.

The following formulas are used in the Runge-Kutta fourth-order method to evaluate the nuclide concentrations with time:

$$N_i^{n+1} = N_i^n + (K_{1_i} + 2K_{2_i} + 2K_{3_i} + K_{4_i})/6 \ ,$$

where

$$K_{1_i} = h \cdot F_i(nh,\ N_1^n,\ \ldots.,\ N_M^n),$$

$$K_{2_i} = h \cdot F_i\left(nh + \frac{h}{2},\ N_1^n + \frac{K_{11}}{2},\ \ldots.\ N_M^n + \frac{K_{1_M}}{2}\right),$$

$$K_{3_i} = h \cdot F_i\left(nh + \frac{h}{2},\ N_1^n + \frac{K_{21}}{2},\ \ldots\ N_M^n + \frac{K_{2_M}}{2}\right),$$

$$K_{4_i} = h \cdot F_i(nh + h,\ N_1^n + K_{31},\ \ldots\ N_M^n + K_{3_M}),$$

and

h = length of time step,

n = nth time step.

Seventeen heavy nuclides from ^{232}Th to ^{242}Pu were selected so that all the significant neutron fission and capture reactions in conventional fuels would be treated. The heavy nuclide chain modeled by CACA-2 is presented in Fig. 1.

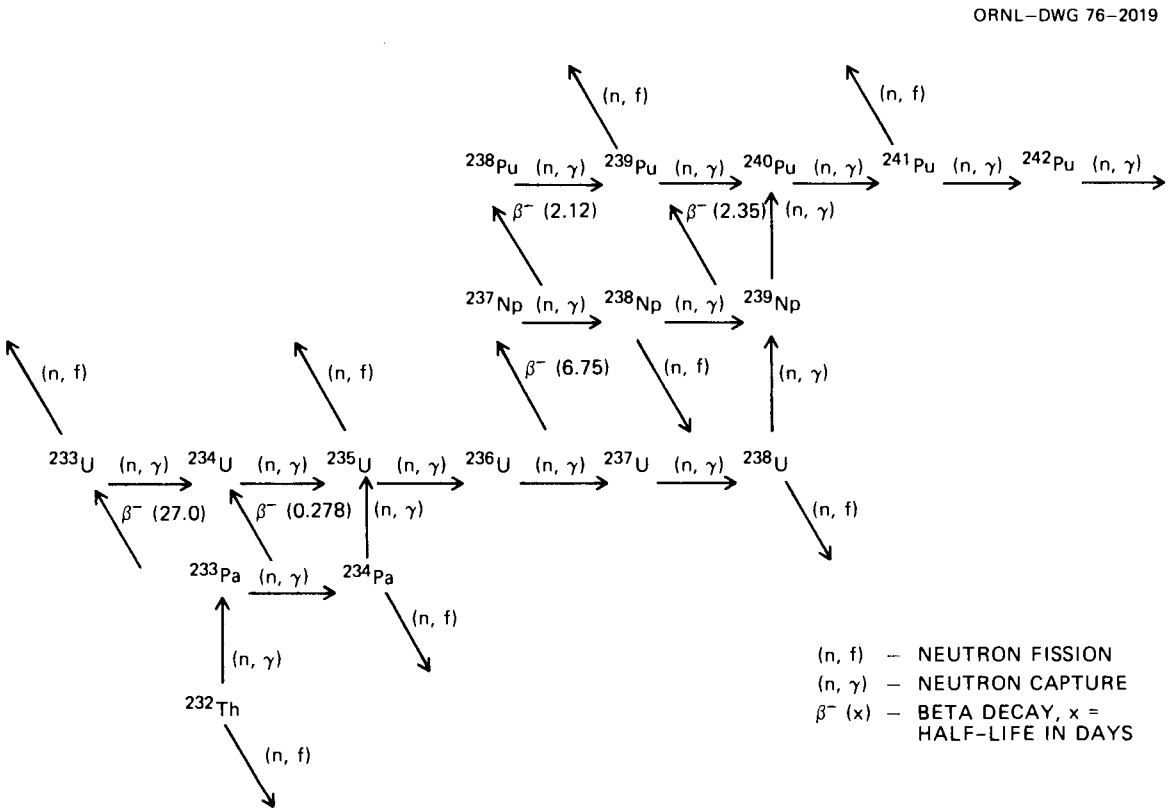

Fig. 1. The heavy nuclide chain modeled by CACA-2.

The number of fission products is user specified, and the concentration of each fission product can be described by the equation:

$$\frac{dN_p}{dt} = \sum_{j=1}^{NG} \sum_{i=1}^{8} Y_i N_i \sigma_{ij} \phi_j - \lambda_p N_p - N_p \sum_{j=1}^{NG} \sigma_{pj} \phi_j \ ,$$

where

N_p = fission product concentration,
Y_i = yield from ith fissionable nuclide,
N_i = concentration of ith fissionable nuclide,
σ_{ij} = fission cross section of ith fissionable nuclide for jth group,
ϕ_j = neutron flux for jth group,
λ_p = decay constant for fission product,
σ_{pj} = absorption cross section of fission product for jth group,
NG = total number of neutron energy groups.

Eight of the seventeen heavy nuclides are assumed fissionable which accounts for the sum from 1 to 8 in the above equation. If the half life for a particular fission product is less than the time step (6 hr), the equilibrium concentration of the fission product is calculated (to avoid numerical instabilities) or

$$N_{p_{equil}} = \sum_{j=1}^{NG} \sum_{i=1}^{8} Y_i N_i \sigma_{ij} \phi_j \Bigg/ \left(\lambda_p + \sum_{j=1}^{NG} \sigma_{pj} \phi_j \right) .$$

In time varying flux calculations, the flux dependence on time for each time interval throughout the irradiation history is of the following form:

$$\phi_j = \phi_j^* (F1_j + F2_j T + F3_j T^2 + F4_j T^3 + F5_j T^4 + F6_j T^5) \ ,$$

where

j = neutron energy group,
ϕ_j = flux in the time interval,
ϕ_j^* = flux input for the time interval,
T = time into the time interval,
$F1_j \rightarrow F6_j$ = constants (input for each fuel region).

This method of treating fluxes is especially useful in calculating depletions and burnups of capsules which undergo cyclic irradiation histories.

In power calculations, the power is constant for the duration of each time interval. However, as the power is dependent on the nuclide concentrations, the neutron flux is adjusted after each time step (6 hr) to keep the power constant.

OUTPUT

For each initial composition, the nuclide concentrations, flux, power, and burnup are output with a user-specified output frequency as well as after each time interval in the irradiation history. At the end of the problem, the total fission-product birthrates (which are the sum of the birthrates for the first composition of each fuel region) are output with the same frequency as were the concentrations, fluxes, etc.

PROGRAM LISTING AND SAMPLE PROBLEM

The input instructions, a listing of the program, and the input and output for a sample problem are presented on the following pages. The sample problem models a fuel stick which is irradiated in a permanent beryllium facility in the HFIR for three cycles after which it is irradiated in a removal beryllium facility for nine cycles. Four compositions of the fuel stick are treated.

Input Instructions

CARDS

A Title of problem. Format(20A4)

B NCS, NG, ITYPE, NFP, NTIME, NC, NCM. Format(24I3)

NCS(Max 10) = Number of cross section sets

NG(Max 2) = Number of neutron energy groups

ITYPE=0 = Power is specified for each time interval

=1 = Flux is specified for each time interval

NFP(Max 10) = Number of fission products

NTIME(Max 50) = Number of time intervals

NC(Max 50) = Number of fuel regions

NCM(Max 100) = Number of concentration sets

C Read the following cards NCS times (for each cross section set):

1) Title of cross section set. Format(20A4)

2) Read NG times (for each group):

25+NFP cross sections in barns and in the order shown in Table 1. Format(6E12.5)

D NFP fission-product names, eight characters allowed for each name. Format(9(2A4))

E Read NFP times (for each fission product):

The decay constant in sec^{-1} and the eight fission-product yields. Format(6E12.5)

(The fission-product yields in decimal form are specified for each of the eight fissionable isotopes in the order shown in Table 1.)

F NTIME time intervals in days. Format(6E12.5)

G Read NCM times (for each concentration set):

The 17 heavy nuclide concentrations in atoms/barn cm and in the order shown in Table 2. Format(6E12.5)

(These concentration sets must include all initial compositions to be calculated.)

Table 1. CACA-2 input order for cross sections

Cross section	Nuclide	Reaction
1	^{232}Th	(n,f)
2	^{234}Pa	↓
3	^{233}U	↓
4	^{235}U	↓
5	^{238}U	↓
6	^{238}Np	↓
7	^{239}Pu	↓
8	^{241}Pu	↓
9	^{232}Th	(n,γ)
10	^{233}Pa	↓
11	^{234}Pa	↓
12	^{233}U	↓
13	^{234}U	↓
14	^{235}U	↓
15	^{236}U	↓
16	^{237}U	↓
17	^{238}U	↓
18	^{237}Np	↓
19	^{238}Np	↓
20	^{239}Np	↓
21	^{238}Pu	↓
22	^{239}Pu	↓
23	^{240}Pu	↓
24	^{241}Pu	↓
25	^{242}Pu	↓
26	Fission product 1	(n,abs)
↓		↓
25+NFP	Fission product NFP	↓

Table 2. CACA-2 input order for nuclide concentrations

Number	Nuclide
1	^{232}Th
2	^{233}Pa
3	^{234}Pa
4	^{233}U
5	^{234}U
6	^{235}U
7	^{236}U
8	^{237}U
9	^{238}U
10	^{237}Np
11	^{238}Np
12	^{239}Np
13	^{238}Pu
14	^{239}Pu
15	^{240}Pu
16	^{241}Pu
17	^{242}Pu

CARDS

H Read the remaining cards NC times (for each fuel region):

1) Volume (cc) and length (cm) of fuel region. Format(2E12.5)

2) For each of the NTIME time intervals specify a cross-section set. (Specify cross-section sets by the order in which the cross-section sets were read in. For example, if the second cross-section set is desired for a particular time interval, specify a 2 for that time interval.) Format(24I3)

3) If ITYPE is zero, specify the power in watts/cc for each of the NTIME time intervals. Note: NG must equal one if ITYPE equals zero. Format(6E12.5)

   If ITYPE is one, read NTIME fluxes for each of the NG groups: The fluxes are in neutrons/cm^2 sec. First flux entry in each group must start on a new card. Format(6E12.5)

5) If ITYPE is one, read NG times (for each group):

   F1, F2, F3, F4, F5, F6. Format(6E12.5)

   Note: Flux during each time intervals is:

   $$\phi_j = \phi_j^*(F1_j + F2_jT + F3_jT^2 + F4_jT^3 + F5_jT^4 + F6_jT^5) ,$$

   where

   j = neutron energy group,

   ϕ_j = flux at time T in the time interval

   ϕ_j^* = flux read in for the time interval jth group,

   T = time into the time interval (days).

6) NCN. Format(I3)

   NCN = Number of different compositions for the fuel region.

7) For each of the NCN compositions, specify a concentration set. (Specify concentration sets by the order in which the concentration sets were read in. For example, if the third and fourth concentration sets are desired, specify a 3 and a 4.) Format(24I3)

   Note: Only the fission-product birthrates for the first composition of each fuel region will be summed to give the total birthrates for all the fuel regions.

8) Specify the frequency of output in days for each of the NCN compositions. Format(6E12.5)
(Nuclide concentrations, power, and burnup will be output with this frequency as well as after each time interval.)
Note: For meaningful total birthrates, the frequency of output must be the same for the first composition in each fuel region.

Listing of Program and Sample Problem Input

```
      REAL*8 YD(10,8),DECAY(10),CON(30),POWER,FLUX(50,2),S(38,2,10),
     1YP(30),Y(30), FTC(6,2),SR(38,2),FLM(2),FL(2),TTI,EA
      REAL*4 ISOT(30,2),ITAT(8,4)
      DIMENSION VOL(50),POW(50),DELT(50),FR(8),TITLE(20),BR(600,10),
     1TIM(600),CST(30,10),FRST(8,10),AL(50),
     1CONC(17,100),ICM(100),ICS(50),DAYS(100),TITR(35,2),TITCS(20,10)
      REAL*4 AS(34)   /'TH232   PA233   PA234   U233    U234    U235    U
     1236    U237    U238    NP237   NP238   NP239   PU238   PU239   PU2
     140   PU241   PU242   '/
      REAL*4 BS(32)        /'TIME(DAYS)       FLUX(N/CM2SEC)  POWER(W/CC)
     1     FISSIONS/CCSEC  FISSIONS/CC      FIMA              MWD/MT
     1  POWER(KW/FT)     '/
      REAL*4 CS(44)         /'TH232FISPA234FISU233FIS U235FIS U238FIS NP2
     138FISPU239FISPU241FISTH232CAPPA233CAPPA234CAPU233CAP U234CAP U235C
     1AP U236CAP U237CAP U238CAP NP237CAPNP238CAPNP239CAPPU238CAPPU239CA
     1P'/
      REAL*4 DS(26)/'PU240CAPPU241CAPPU242CAPFISPROD1FISPROD2FISPROD3FIS
     1PROD4FISPROD5FISPROD6FISPROD7FISPROD8FISPROD9FISPRO10'/
      COMMON YD,DECAY,POWER,FLM,SR,FTC,FL,TTI,TSTEP,ITYPE,NG,IFP
      EQUIVALENCE (Y(1),CON(1))
      TSTEP = 21600.
142   FORMAT(9(2A4))
      K=0
      DO 60 I=1,17
      DO 60 J=1,2
      K=K+1
60    ISOT(I,J)=AS(K)
      K=0
      DO 61 I=1,8
      DO 61 J=1,4
      K=K+1
61    ITAT(I,J) = BS(K)
      K=0
      DO 62 I=1,22
      DO 62 J=1,2
      K=K+1
62    TITR(I,J)=CS(K)
      K=0
      DO 63 I=23,35
      DO 63 J=1,2
      K=K+1
63    TITR(I,J)=DS(K)
      READ(5,95) (TITLE(I),I=1,20)
95    FORMAT(20A4)
      WRITE(6,96) (TITLE(I),I=1,20)
96    FORMAT(2CX,20A4,//)
      READ(5,100) NCS,NG,ITYPE,NFP,NTIME,NC,NCM
100   FORMAT(24I3)
      IFP=17+NFP
      MFP=25+NFP
      NTP = 1+IFP
      DO 301 K=1,NCS
      READ(5,95) (TITCS(L,K),L=1,20)
      DO 301 J=1,NG
301   READ(5,101) (S(I,J,K),I=1,MFP)
101   FORMAT(6E12.5)
      DO 307 ING=1,NG
      WRITE(6,302)ING
302   FORMAT(20X,'CROSS SECTICN LIBRARY   GROUP',I3,//)
      WRITE(6,303)
303   FORMAT(35X,'CROSS SECTION SET NUMBER')
      WRITE(6,304) (I,I=1,NCS)
304   FORMAT(5X,'CROSS SECTION',7X,10(I2,8X),/)
      DO 305 I=1,MFP
305   WRITE(6,306) I,(TITR(I,J),J=1,2),(S(I,ING,K),K=1,NCS)
```

```
306 FORMAT(2X,I3,2X,2A4,6X,10(2X,F8.3))
    WRITE(6,134)
    DO 35 I=1,NCS
35  WRITE(6,37) I,(TITCS(J,I),J=1,20)
37  FORMAT(5X,'CROSS SECTION SET NUMBER',I3,' IS ',20A4)
    WRITE(6,308)
308 FORMAT(1H1)
307 CONTINUE
    IF(NFP.EQ.0) GO TO 350
    READ(5,142) ((ISOT(I,J),J=1,2),I=18,IFP)
    DO 1 I=1,NFP
  1 READ(5,101) DECAY(I),(YD(I,J),J=1,8)
    WRITE(6,310)
310 FORMAT(20X,'FISSION PRODUCT DECAY CONSTANTS AND YIELDS',//)
    WRITE(6,311)
311 FORMAT(3X,'ISOTOPE',5X,'DECAY CONSTANT',10X,'FISSION PRODUCT YIELD
   1S',/)
    WRITE(6,220) ((TITR(I,J),J=1,2),I=1,8)
220 FORMAT(33X,8(2X,2A4))
    DO 350 I=1,NFP
    K=I+17
    WRITE(6,313) (ISOT(K,J),J=1,2),DECAY(I),(YD(I,L),I=1,8)
313 FORMAT(3X,2A4,6X,E10.4,6X,8(2X,F8.5))
350 CONTINUE
    DO 53 I=1,600
    DO 53 J=1,NFP
 53 BR(I,J)=0.0
    NTIME=NTIME+1
    READ(5,101)(DELT(I),I=2,NTIME)
    DELT(1)=0.0
    WRITE(6,314)
314 FORMAT(//,30X,'TIME INTERVALS (DAYS)',/)
    WRITE(6,315) (DELT(I),I=1,NTIME)
315 FORMAT(2X,10(2X,E10.4))
    DO 330 I=1,NCM
330 READ(5,101) (CONC(J,I),J=1,17)
    WRITE(6,201)
201 FORMAT(///,30X,'CONCENTRATIONS(ATOMS/BARN CM)',/)
    LNCM=NCM/10
    MNCM=LNCM*10
    IF(MNCM.NE.NCM) LNCM=LNCM+1
    DO 202 I=1,LNCM
    JNCM=I*10
    NNCM=JNCM-9
    IF(JNCM.GT.NCM) JNCM=NCM
    WRITE(6,204)
204 FORMAT(30X,'CONCENTRATION SET NUMBER')
    WRITE(6,205) (LMN,LMN=NNCM,JNCM)
205 FORMAT(2X,'NUCLIDE',10X,10(I3,8X),/)
    DO 203 J=1,17
203 WRITE(6,206) (ISOT(J,K),K=1,2),(CONC(J,L),I=NNCM,JNCM)
206 FORMAT(2X,2A4,5X,10(1X,E10.4))
202 WRITE(6,134)
    DO 9 N2=1,NC
    READ(5,101) VOL(N2),AL(N2)
    ICT=0
    IBR=0
    READ(5,100) (ICS(I),I=2,NTIME)
    ICS(1)=ICS(2)
    IF(ITYPE.NE.0) GO TO 6
    READ(5,101) (POW(I),I=2,NTIME)
    POW(1) = POW(2)
    DO 7 I=1,NTIME
    DO 7 J=1,NG
7   FLUX(I,J)=0.0
    DO 8 I=1,6
    DO 8 J=1,NG
8   FTC(I,J)=0.0
    FTC(1,1)=1.0
    GO TO 10
```

```
 6   DO 406 J=1,NG
406  READ(5,101) (FLUX(I,J),I=2,NTIME)
     DO 372 I=1,NG
372  FLUX(1,I)=FLUX(2,I)
     DO 28 I=1,NTIME
28   POW(I)=0.0
     READ(5,101) ((FTC(I,J),I=1,6),J=1,NG)
10   CONTINUE
     READ(5,100) NCN
     READ(5,100) (ICM(I),I=1,NCN)
     READ(5,101) (DAYS(I),I=1,NCN)
     DO 9 N3=1,NCN
     WRITE(6,331) N2,N3
331  FORMAT(1H1,20X,'CASE',I3,10X,'COMPOSITION',I3,//)
     WRITE(6,332) VOL(N2),AL(N2),ICM(N3)
332  FORMAT(10X,'VOLUME= ',F10.4,5X,'LENGTH= ',F10.4,5X,'CONCENTRATION
    1SET NUMBER',I3,/)
     WRITE(6,333)
333  FORMAT(20X,'CROSS SECTION SET FOR EACH TIME INTERVAL')
     WRITE(6,334) (ICS(I),I=1,NTIME)
334  FORMAT(5X,25(I3,1X))
     IF(ITYPE) 81,81,82
81   WRITE(6,380)
380  FORMAT(/,20X,'POWER FOR EACH TIME INTERVAL(WATTS/CC)')
     WRITE(6,315) (POW(I),I=1,NTIME)
     GO TO 83
82   WRITE(6,381)
381  FORMAT(/,20X,'FLUXES FOR EACH TIME INTERVAL(N/CM2SEC)')
     DO 382 ING=1,NG
     WRITE(6,383) ING
383  FORMAT(20X,'GROUP',I3)
382  WRITE(6,315) (FLUX(I,ING),I=1,NTIME)
     WRITE(6,384)
384  FORMAT(/,20X,'POLYNOMIAL TIME CONSTANTS FOR FLUXES')
     DO 385 ING=1,NG
     WRITE(6,383) ING
385  WRITE(6,315) (FTC(I,ING),I=1,6)
83   CONTINUE
     WRITE(6,134)
     N4=ICM(N3)
     ADAY=DAYS(N3)
     SUMC=0.0
     DO 21 I=1,17
     CON(I)=CONC(I,N4)
21   SUMC=SUMC+CONC(I,N4)
     DO 22 I=18,NTP
22   CON(I)=0.0
     T1=0.0
     NS=0
     DO 9 K=1,NTIME
     POWER=POW(K)
     TTI=0.0
     N4=ICS(K)
     DO 45 I=1,MFP
     DO 45 J=1,NG
45   SR(I,J)=S(I,J,N4)
     K1=DELT(K)/ADAY+1.0
     A1=K1-1
     DO 32 J1=1,K1
     IF(J1.EQ.K1) GO TO 33
     T2=T1+ADAY*86400.
     GO TO 34
33   A2=DELT(K)-ADAY*A1
     IF(J1.EQ.1) GO TO 38
     IF(A2.EQ.0.0) GO TO 400
38   T2 = T1+A2*86400.
34   CONTINUE
     NS = NS+1
     L=(T2-T1)/TSTEP+1.0
     DO 335 J=1,NG
```

```
335 FLM(J)=FLUX(K,J)/10.**24
    CALL DIFEQ(T1,T2,CON,L)
    FR(1) = T2/86400.
    IF(IFP.EQ.17) GO TO 169
    DO 164 I=18,IFP
    J=I-17
    YP(I)=0.0
    DO 164 M=1,NG
164 YP(I)=FL(M)*(YD(J,1)*SR(1,M)*Y(1)+YD(J,2)*SR(2,M)*Y(3)+YD(J,3)*
   1SR(3,M)*Y(4)+YD(J,4)*SR(4,M)*Y(6)+YD(J,5)*SR(5,M)*Y(9)+YD(J,6)*
   1SR(6,M)*Y(11)+YD(J,7)*SR(7,M)*Y(14)+YD(J,8)*SR(8,M)*Y(16))
   1+YP(I)
    DO 169 I=18,IFP
    J=I-17
    IJ=I+8
    TOH=.69315/DECAY(J)
    IF(TOH.GT.TSTEP) GO TO 169
    BA=0.0
    DO 170 M=1,NG
170 BA=FL(M)*SR(IJ,M)+BA
    CON(I)=YP(I)/(BA+DECAY(J))
169 CONTINUE
    IF(N3.NE.1) GO TO 165
    IF(IFP.EQ.17) GO TO 165
    IBR=IBR+1
    TIM(IBR) = FR(1)
    DO 146 J=18,IFP
    I=J-17
    BM=YP(J)*VCL(N2)*10.**24
146 BR(IBR,I)=BM+BR(IBR,I)
165 CONTINUE
    FR(2) = 0.0
    DO 167 I=1,NG
167 FR(2)=FR(2)+FL(I)*10.**24
    FR(4) = 0.0
    DO 168 I=1,NG
168 FR(4)=FL(I)*10.**24*(SR(1,I)*Y(1)+SR(2,I)*Y(3)+SR(3,I)*Y(4)+Y(6)
   1*SR(4,I)+Y(9)*SR(5,I)+Y(11)*SR(6,I)+Y(14)*SR(7,I)+Y(16)*SR(8,I))
   1+FR(4)
    FR(3)=FR(4)/(3.468*10.**10)
    FR(5) = CON(NTP)*10.**24
    FR(6)=FR(5)/(SUMC*10.**24)
    FR(7) = FR(6)*.8519*10.**6
    FR(8) = FR(3)*VOL(N2)*.03048/AL(N2)
    DO 173 I=1,IFP
173 CST(I,NS) = CON(I)
    DO 174 I=1,8
174 FRST(I,NS) = FR(I)
400 IF(NS.EQ.10) GO TO 171
    IF(K.NE.NTIME) GO TO 32
    IF(J1.EQ.K1) GO TO 171
    GO TO 32
171 CONTINUE
    WRITE(6,130) (ITAT(1,J),J=1,4)
130 FORMAT(2X,'CONC(ATOMS/BARN CM)',50X,4A4)
    WRITE(6,131) (FRST(1,J),J=1,NS)
131 FORMAT(22X,10(1X,F10.4))
    WRITE(6,134)
    DO 132 I=1,IFP
132 WRITE(6,133) (ISOT(I,J),J=1,2),(CST(I,L),L=1,NS)
133 FORMAT(10X,2A4,4X,10(1X,E10.4))
    WRITE(6,134)
134 FORMAT(/)
    DO 135 I=2,8
135 WRITE(6,136) (ITAT(I,J),J=1,4),(FRST(I,L),L=1,NS)
136 FORMAT(4X,4A4,2X,10(1X,E10.4))
    WRITE(6,393)
393 FORMAT(///)
    NS = 0
32  T1 = T2
```

```
9     CONTINUE
      IF(IFP.EQ.17)  GO TO 370
      WRITE(6,137)
137   FORMAT(1H1)
      WRITE(6,138)
138   FORMAT(1H1,30X,'TOTAL BIRTH RATES(ATOMS/SEC)',//)
      WRITE(6,139)  ((ISOT(I,J),J=1,2),I=18,IFP)
139   FORMAT(2X,'TIME(DAYS)',10(3X,2A4),/)
      DO 370 K=1,IBR
      WRITE(6,144)  TIM(K),(BR(K,I),I=1,NFP)
144   FORMAT(2X,F9.3,2X,10(2X,E9.3))
370   CONTINUE
      STOP
      END
      SUBROUTINE DIFEQ(X,XE,Y,L)
      REAL*8  Y(30),YI(30),YF(30),AM1(30),AM2(30),AM3(30),AM4(30),H,XF,XS
     1,FI,YD(10,8),DECAY(10),SR(38,2),POWER,FLM(2),FTC(6,2),B(40),TTI,FL
     1(2)
      COMMON YD,DECAY,POWER,FLM,SR,FTC,FL,TTI,TSTEP,ITYPE,NG,IFP
      XF=X
      XS=XE
      FI=L
      NFP=IFP+8
      N=IFP+1
      H= (XS-XF)/FI
      DO 10 J=1,N
10    YF(J)=Y(J)
      DO 50 J=1,L
      IF(ITYPE.NE.0)  GO TO 5
      FLM(1)=POWER*3.468*10.**10/(SR(1,1)*YF(1)+SR(2,1)*YF(3)+SR(3,1)*
     1YF(4)+SR(4,1)*YF(6)+SR(5,1)*YF(9)+SR(6,1)*YF(11)+SR(7,1)*YF(14)+
     1SR(8,1)*YF(16))
      FLM(1)=FLM(1)/10.**24
5     TTI=TTI+H/86400.
      DO 3 I=1,NFP
 3    B(I)=0.0
      DO 1 I=1,NG
      FL(I)=FLM(I)*(FTC(1,I)+FTC(2,I)*TTI+FTC(3,I)*TTI**2+FTC(4,I)*TTI**
     13+FTC(5,I)*TTI**4+FTC(6,I)*TTI**5)
      DO 1 M=1,NFP
 1    B(M)=B(M)+SR(M,I)*FL(I)
      CALL EQUA(XF,YF,B,AM1)
      XF=XF+H/2.0
      DO 20 K=1,N
20    YI(K)  =YF(K)+AM1(K)*H/2.0
      CALL EQUA(XF,YI,B,AM2)
      DO 30 K=1,N
30    YI(K)=YF(K)+AM2(K)*H/2.0
      CALL EQUA(XF,YI,B,AM3)
      XF=XF+H/2.0
      DO 40 K=1,N
40    YI(K)=YF(K)+AM3(K)*H
      CALL EQUA(XF,YI,B,AM4)
      DO 50 K=1,N
50    YF(K)= H/6.0*(AM1(K)+AM4(K)+2.0*(AM2(K)+AM3(K)))+YF(K)
      DO 60 K=1,N
60    Y(K)=YF(K)
      RETURN
      END
      SUBROUTINE EQUA(X,Y,B,YP)
      REAL*8  X,Y(30),YP(30),YD(10,8),DECAY(10),POWER,FLM(2),FL(2),TTI,
     1SR(38,2),FTC(6,2),B(40)
      COMMON YD,DECAY,POWER,FLM,SR,FTC,FL,TTI,TSTEP,ITYPE,NG,IFP
      YP(1)=-Y(1)*(B(1)+B(9))
      YP(2)= B(9)*Y(1)-B(10)*Y(2)-2.971*Y(2)/10.**7
      YP(3)= B(10)*Y(2)-Y(3)*(B(2)+B(11))-2.887*Y(3)/10.**5
      YP(4)= 2.971*Y(2)/10.**7-Y(4)*(B(3)+ B(12))
      YP(5)= 2.887*Y(3)/10.**5+Y(4)*B(12)-Y(5)*B(13)
      YP(6)= Y(5)*B(13)-Y(6)*(B(14)+B(4))+Y(3)*B(11)
      YP(7)= Y(6)*B(14)-Y(7)*B(15)
```

```
      YP(8) =  Y(7)*B(15)-Y(8)*B(16)-1.189*Y(8)/10.**6
      YP(9) =  Y(8)*B(16)-Y(9)*(B(17)+B(5))
      YP(10) =  1.189*Y(8)/10.**6-Y(10)*B(18)
      YP(11) =  Y(10)*B(18)-Y(11)*(B(6)+B(19))-3.784*Y(11)/10.**6
      YP(12) =  Y(9)*B(17)+Y(11)*B(19)-Y(12)*B(20)-3.414*Y(12)/10.**6
      YP(13) =  3.784*Y(11)/10.**6-Y(13)*B(21)
      YP(14)=3.414*Y(12)/10.**6-Y(14)*(B(7)+B(22))+Y(13)*B(21)
      YP(15)=Y(14)*B(22)+Y(12)*B(20)-Y(15)*B(23)
      YP(16)=Y(15)*B(23)-Y(16)*(B(8)+B(24))
      YP(17)=Y(16)*B(24)-Y(17)*B(25)
      NTP=IFP+1
      IF(IFP.EQ.17)GO TO 10
      DO 2 I=18,IFP
      J=I-17
      IJ=I+8
      TOH=.69315/DECAY(J)
      YP(I) =  B(1)*Y(1)*YD(J,1)+B(2)*Y(3)*YD(J,2)+B(3)*Y(4)*YD(J,3)+B(4)*
     1Y(6)*YD(J,4)+B(5)*Y(9)*YD(J,5)+B(6)*Y(11)*YD(J,6)+B(7)*Y(14)*
     1YD(J,7)+B(8)*Y(16)*YD(J,8)-B(IJ)*Y(I)-DECAY(J)*Y(I)
    2 IF(TSTEP.GT.TOH)  YP(I)=0.0
   10 YP(NTP)=B(1)*Y(1)+B(2)*Y(3)+B(3)*Y(4)+B(4)*Y(6)+B(5)*Y(9)+B(6)*
     1Y(11)+B(7)*Y(14)+B(8)*Y(16)
      RETURN
      END
```

```
 SAMPLE PROBLEM   HRB CAPSULE AT MIDPLANE IN PB AND RB OF HFIR
 2  1  1  5 24  1  4
CROSS SECTIONS FOR PB FACILITY OF HFIR
  .00208      2200.       243.        241.        .00859      930.
   432.        532.        5.21        37.1        0.0         24.3
  52.6        44.0        8.97        180.        6.72        93.8
  0.0         22.         221.        206.        342.        175.
  35.5        0.0         0.0         0.0         0.0         0.0
CROSS SECTIONS FOR RB FACILITY OF HFIR
  .0081       1300.       151.        144.        .0334       550.
   281.        329.        3.96        32.2        0.C         16.1
   40.1        27.9        10.2        114.        8.44        65.6
  0.0         13.0        131.        141.        287.        109.
   34.5        0.0         0.0         0.0         0.0         0.0
 KR85M   KR87    KR88    XE133   XE135
.000043     .038        0.0         .022        .013        .012
 0.0        .005        .004
.000152     .065        0.0         .040        .025        .017
 0.0        .009        .007
.0000688    .068        0.0         .053        .036        .019
 0.0        .012        .010
.00000152    .037        0.0         .060        .068        .062
 0.0        .070        .067
.0000210     .048        0.0         .061        .066        .059
 0.0        .075        .071
 23.        1.0         23.         1.0         23.         1.0
 23.        1.0         23.         1.0         23.         1.0
 23.        1.0         23.         1.0         23.         1.0
 23.        1.0         23.         1.0         23.         1.0
 .000587    0.0         0.0         0.0         0.0         .0000353
.000000567  0.0         .00000206   0.0         0.0         C.0
 0.0        0.0         0.0         0.0         0.0         0.0
 .002597    0.0         0.0         0.0         0.0         0.0
 0.0        0.0         0.0         0.0         0.0         0.0
 0.0        0.0         0.0         0.0         0.0         0.0
  0.0       0.0         0.C         0.0         0.0         .002563
 0.0        0.0         0.0         0.0         0.0         0.0
 0.0        0.0         0.0         0.0         0.0         0.0
 0.0        0.0         0.0         0.0         0.0         0.0
 0.0        0.0         .002531     0.0         0.0         0.0
```

```
0.0          0.0          0.0          0.0          0.0          0.0
1.5451       1.27
1  1  1  1  1  1  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
.84   E+15  0.0          .84   E+15  0.0          .84   E+15  0.0
2.59  E+15  0.0          2.59  E+15  0.0          2.59  E+15  0.0
2.59  E+15  0.0          2.59  E+15  0.0          2.59  E+15  0.0
2.59  E+15  0.0          2.59  E+15  0.0          2.59  E+15  0.0
1.0         0.0          0.0          0.0          0.0          0.0
4
1  3  4  2
 12.0         24.0         24.0         24.0
```

Sample Problem Output

SAMPLE PROBLEM HRB CAPSULE AT MIDPLANE IN PB AND BB OF HFIR

CROSS SECTION LIBRARY GROUP 1

	CROSS SECTION	CROSS SECTION SET NUMBER 1	2
1	TH232FIS	0.002	0.008
2	PA234FIS	2200.000	1300.000
3	U233FIS	243.000	151.000
4	U235FIS	241.000	144.000
5	U238FIS	0.009	0.033
6	NP238FIS	930.000	550.000
7	PU239FIS	432.000	281.000
8	PU241FIS	532.000	329.000
9	TH232CAP	5.210	3.960
10	PA233CAP	37.100	32.200
11	PA234CAP	0.0	0.0
12	U233CAP	24.300	16.100
13	U234CAP	52.600	40.100
14	U235CAP	44.000	27.900
15	U236CAP	8.970	10.200
16	U237CAP	180.000	114.000
17	U238CAP	6.720	8.440
18	NP237CAP	93.800	65.600
19	NP238CAP	0.0	0.0
20	NP239CAP	22.000	13.000
21	PU238CAP	221.000	131.000
22	PU239CAP	206.000	141.000
23	PU240CAP	342.000	287.000
24	PU241CAP	175.000	109.000
25	PU242CAP	35.500	34.500
26	FISPROD1	0.0	0.0
27	FISPROD2	0.0	0.0
28	FISPROD3	0.0	0.0
29	FISPROD4	0.0	0.0
30	FISPROD5	0.0	0.0

CROSS SECTION SET NUMBER 1 IS CROSS SECTIONS FOR PB FACILITY OF HFIR
CROSS SECTION SET NUMBER 2 IS CROSS SECTIONS FOR BB FACILITY OF HFIR

FISSION PRODUCT DECAY CONSTANTS AND YIELDS

ISOTOPE	DECAY CONSTANT	FISSION PRODUCT YIELDS TH232FIS	PA234FIS	U233FIS	U235FIS	U238FIS	NP238FIS	PU239FIS	PU241FIS
KR85M	0.4300D-04	0.03800	0.0	0.02200	0.01300	0.01200	0.0	0.00500	0.00400
KR87	0.1520D-03	0.06500	0.0	0.04000	0.02500	0.01700	0.0	0.00900	0.00700
KR88	0.6880D-04	0.06800	0.0	0.05300	0.03600	0.01900	0.0	0.01200	0.01000
XE133	0.1520D-05	0.03700	0.0	0.06000	0.06800	0.06200	0.0	0.07000	0.06700
XE135	0.2100D-04	0.04800	0.0	0.06100	0.06600	0.05900	0.0	0.07500	0.07100

TIME INTERVALS (DAYS)

0.0 0.2300E 02 0.1000E 01 0.2300E 02 0.1000E 01 0.2300E 02 0.1000E 01 0.2300E 02 0.1000E 01 0.2300E 02
0.1000E 01 0.2300E 02 0.1000E 01 0.2300E 02 0.1000E 01 0.2300E 02 0.1000E 01 0.2300E 02 0.1000E 01 0.2300E 02
0.1000E 01 0.2300E 02 0.1000E 01 0.2300E 02 0.1000E 01

CONCENTRATIONS (ATOMS/BARN CM)

NUCLIDE	CONCENTRATION SET NUMBER 1	2	3	4
TH232	0.5870E-03	0.2597E-02	0.0	0.0
PA233	0.0	0.0	0.0	0.0
PA234	0.0	0.0	0.0	0.0
U233	0.0	0.0	0.0	0.0
U234	0.0	0.0	0.0	0.0
U235	0.3530E-04	0.0	0.2563E-02	0.0
U236	0.5670E-06	0.0	0.0	0.0
U237	0.0	0.0	0.0	0.0
U238	0.2060E-05	0.0	0.0	0.2531E-02
NP237	0.0	0.0	0.0	0.0
NP238	0.0	0.0	0.0	0.0
NP239	0.0	0.0	0.0	0.0
PU238	0.0	0.0	0.0	0.0
PU239	0.0	0.0	0.0	0.0
PU240	0.0	0.0	0.0	0.0
PU241	0.0	0.0	0.0	0.0
PU242	0.0	0.0	0.0	0.0

CASE 1 COMPOSITICN 1

VOLUME= 1.5451 LENGTH= 1.2700 CONCENTRATION SET NUMBER 1

CROSS SECTION SET FOR EACH TIME INTERVAL

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

FLUXES FOR EACH TIME INTERVAL(N/CM2SEC)
GROUP 1

0.8400D 15 0.8400D 15 0.0 0.8400D 15 0.0 0.8400D 15 0.0 0.2590D 16 0.0 0.2590D 16
0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16
0.0 0.2590D 16 0.0 0.2590D 16 0.0

POLYNOMIAL TIME CCNSTANTS FOR FLUXES
GROUP 1

0.1000D 01 0.0 0.0 0.0 0.0 0.0

CONC(ATOMS/BARN CM) TIME(DAYS)

	0.0	12.0000	23.0000	24.0000	36.0000	47.0000	48.0000	60.0000	71.0000	72.0000
TH232	0.5870E-03	0.5843E-03	0.5819E-03	0.5819E-03	0.5793E-03	0.5769E-03	0.5769E-03	0.5743E-03	0.5719E-03	0.5719E-03
PA233	0.0	0.2252E-05	0.3732E-05	C.3637E-05	0.4821E-05	0.5594E-05	C.5452E-05	0.6093E-05	0.6507E-05	0.6342E-05
PA234	0.0	0.2224E-08	0.3742E-08	0.3095E-09	0.4859E-08	0.5652E-08	0.4675E-09	0.6164E-08	0.6589E-08	0.5450E-C9
U233	0.0	0.3392E-06	0.1051E-05	0.1146E-05	0.2086E-05	0.3018E-05	0.3160E-05	0.4098E-05	0.4918E-05	0.5082E-05
U234	0.0	0.3604E-07	0.1288E-06	C.1322E-06	0.2821E-06	0.4609E-06	0.4661E-06	0.6872E-06	0.9165E-06	0.9225E-06
U235	0.3530E-04	0.2754E-04	0.2194E-04	C.2194E-04	0.1713E-04	0.1365E-04	0.1365E-04	0.1068E-04	0.8534E-05	0.8534E-05
U236	0.5670E-06	0.1756E-05	0.2605E-05	0.2605E-C5	0.3327E-05	0.3839E-05	0.3839E-05	0.4271E-05	0.4575E-05	0.4575E-05
U237	0.0	0.5569E-08	0.1081E-07	C.9754E-08	0.1536E-07	0.1906E-07	0.1720E-07	0.2165E-07	0.2412E-07	0.2177E-07
U238	0.2060E-05	0.2048E-05	0.2039E-05	C.2039E-05	0.2029E-05	0.2020E-05	0.2012E-05	0.2012E-05	0.2004E-05	0.2004E-C5
NP237	0.0	0.3200E-08	0.1198E-07	0.1303E-C7	0.2712E-07	0.4402E-07	0.4588E-07	0.6558E-07	0.8587E-07	0.8822E-07
NP238	0.0	0.3639E-10	0.1662E-09	0.1199E-09	0.4104E-09	0.6896E-09	0.4973E-09	0.1054E-08	0.1400E-08	0.1010E-08
NP239	0.0	0.3277E-08	0.3354E-08	0.2497E-C8	0.3316E-08	0.3326E-08	0.2476E-08	0.3288E-08	0.3259E-08	0.2456E-C8
PU238	0.0	0.3876E-10	0.3469E-09	0.3933E-09	0.1328E-08	0.2925E-08	0.3118E-08	0.5594E-08	0.8746E-08	0.9136E-08
PU239	0.0	0.7007E-08	0.1272E-07	0.1358E-C7	0.1645E-07	0.1864E-07	0.1949E-07	0.2029E-07	0.2158E-07	0.2242E-07
PU240	0.0	0.5436E-09	0.1935E-08	0.1935E-08	0.3818E-08	0.5499E-08	0.5499E-08	0.7193E-08	0.8543E-08	0.8543E-08
PU241	0.0	0.4350E-10	0.2874E-09	0.2874E-C9	0.8165E-09	0.1455E-08	0.1455E-08	0.2222E-08	0.2921E-08	0.2921E-08
PU242	0.0	0.1567E-11	0.2158E-10	0.2158E-10	0.1010E-09	0.2537E-09	0.2537E-09	0.5218E-09	0.8620E-09	0.8620E-09
KR85M	0.2161E-08	0.1722E-08	0.1454E-08	0.0	0.1268E-08	0.1153E-08	0.0	0.1083E-08	0.1038E-C8	0.0
KR87	0.1176E-08	0.9358E-09	0.7877E-09	0.0	0.6831E-09	0.6176E-09	0.0	0.5766E-09	0.5493E-09	0.0
KR88	0.3740E-08	0.2572E-08	0.2491E-08	0.0	0.2144E-08	0.1923E-08	0.0	0.1778E-08	0.1680E-C8	0.0
XE133	0.0	0.2187E-06	0.2224E-06	0.1950E-C6	0.1868E-06	0.1640E-06	0.1438E-06	0.1383E-06	0.1258E-C6	C.1103E-06
XE135	0.0	0.1792E-07	0.1474E-07	0.2402E-C8	0.1226E-07	0.1058E-07	0.1724E-08	0.9307E-08	0.8418E-08	0.1372E-08
FLUX(N/CM2SEC)	0.8400E 15	0.8400E 15	0.8400E 15	0.0	0.8400E 15	0.8400E 15	0.0	0.840CE 15	0.8400E 15	0.0
POWER(W/CC)	0.2061E 03	0.1630E 03	0.1346E 03	0.0	0.1127E 03	0.9803E 02	0.0	0.8707E 02	0.7944E 02	0.0
FISSIONS/CCSEC	0.7147E 13	0.5652E 13	0.4669E 13	0.0	0.3909E 13	0.3400E 13	0.0	0.3020E 13	0.2755E 13	0.0
FISSIONS/CC	0.0	0.6591E 19	0.1147E 20	0.1147E 20	0.1590E 20	0.1936E 20	0.1936E 20	0.2269E 20	0.2543E 20	0.2543E 20
FIMA	0.0	0.1055E-01	0.1836E-01	0.1836E-01	0.2545E-01	0.3099E-01	0.3099E-01	0.3631E-01	0.4069E-01	0.4069E-01
MWD/MT	0.0	0.8984E 04	0.1564E 05	0.1564E 05	0.2168E 05	0.2640E 05	0.2640E 05	0.3094E 05	0.3467E 05	0.3467E 05
POWER(KW/FT)	0.7642E 01	0.6044E 01	0.4992E 01	0.0	0.4180E 01	0.3635E 01	0.0	0.3229E 01	0.2946E 01	0.0

CONC(ATOMS/BARN CM) TIME(DAYS)

	84.0000	95.0000	96.0000	108.0000	119.0000	120.0000	132.0000	143.0000	144.0000	156.0000
TH232	0.5658E-03	0.5603E-03	0.5603E-03	0.5544E-03	0.5490E-03	0.5490E-03	0.5432E-03	0.5379E-03	0.5379E-03	0.5322E-03
PA233	0.9271E-05	0.1106E-04	0.1078E-04	0.1216E-C4	0.1298E-04	0.1265E-04	0.1333E-04	0.137CE-04	0.1335E-04	0.137CE-C4
PA234	0.2380E-07	0.2849E-07	0.2357E-08	0.3138E-C7	0.3353E-07	0.2773E-08	0.3443E-07	0.3542E-07	0.2930E-08	0.3542E-07
U233	0.5235E-05	0.5851E-05	0.6131E-05	0.6787E-05	0.7422E-05	0.7751E-05	0.8186E-05	0.8560E-05	0.8907E-05	0.9052E-C5
U234	0.1600E-05	0.2347E-05	0.2373E-05	C.3218E-C5	0.4035E-05	0.4066E-05	0.4908E-05	0.5676E-05	0.5709E-05	0.6462E-05
U235	0.5488E-05	0.3755E-05	0.3755E-05	0.2610E-05	0.2003E-05	0.2003E-05	0.1652E-05	0.1510E-05	0.151CE-C5	0.1478E-05
U236	0.4960E-05	0.5146E-05	0.5146E-05	0.5238E-05	0.5263E-05	0.5263E-05	C.5254E-05	0.5230E-05	0.5230E-05	0.5199E-05
U237	0.7225E-07	0.8604E-07	0.7764E-07	C.8950E-C7	0.9257E-07	0.8353E-07	0.9145E-07	0.9282E-07	0.8376E-07	0.9081E-07
U238	0.1975E-05	0.1956E-05	0.1956E-05	0.1938E-05	0.1923E-05	0.1923E-05	0.1907E-05	0.1893E-05	0.1893E-C5	0.1877E-05
NP237	0.1340E-06	0.1981E-06	0.2065E-06	0.2692E-06	0.3244E-06	0.3334E-06	0.3797E-06	0.4195E-06	0.4285E-06	0.4592E-06
NP238	0.4000E-08	0.6032E-08	0.4350E-08	0.8390E-C8	0.1023E-07	0.7377E-08	0.1209E-07	0.1343E-07	0.9686E-C8	0.1477E-07
NP239	0.1228E-07	0.1243E-07	0.9253E-08	0.1223E-07	0.1222E-07	0.9098E-08	0.1203E-07	0.1203E-07	0.8955E-08	0.1184E-07
PU238	0.1635E-07	0.2736E-07	0.2905E-07	0.4392E-07	0.6063E-07	0.6349E-07	C.8059E-07	0.9777E-07	0.1015E-06	0.1165E-06
PU239	0.3231E-07	0.4102E-07	0.4419E-07	0.4690E-07	0.5205E-07	0.5518E-07	0.5755E-07	0.6287E-07	0.6594E-07	0.6836E-07
PU24C	0.1123E-07	0.1518E-07	0.1518E-07	0.1916E-07	0.2212E-07	0.2212E-07	0.2519E-07	0.2777E-07	0.2777E-07	0.3067E-07
PU241	0.5396E-08	0.7689E-08	0.7689E-08	0.1038E-07	0.1258E-07	0.1258E-07	0.1477E-07	0.1657E-07	0.1657E-07	0.1851E-C7
PU242	0.1972E-08	0.3492E-08	0.3492E-08	0.5719E-C8	0.8216E-08	0.8216E-08	0.1132E-07	0.1444E-07	0.1444E-07	0.18C7E-07
KR85M	0.1680E-08	0.1609E-08	0.0	0.1667E-08	0.1727E-08	0.0	0.1840E-08	0.1900E-08	0.0	0.1995E-08
KR87	0.8821E-09	0.8396E-09	0.0	0.8660E-09	0.8944E-09	0.0	0.9517E-09	0.9818E-09	0.0	0.1031E-08
KR88	0.2665E-08	0.2513E-08	0.0	0.2573E-08	0.2647E-08	0.0	0.2809E-08	0.2895E-08	0.0	0.303EE-08
XE133	0.1727E-06	0.1637E-06	0.1435E-06	0.1509E-06	0.1503E-06	0.1318E-06	0.1510E-06	0.1570E-06	0.1377E-06	0.1608E-06
XE135	0.1261E-07	0.1124E-07	0.1833E-08	0.1096E-07	0.1097E-07	0.1788E-08	0.1144E-07	0.1172E-07	0.1910E-08	0.1226E-07
FLUX(N/CM2SEC)	0.2590E 16	0.2590E 16	0.0	0.2590E 16	0.2590E 16	0.0	0.2590E 16	0.2590E 16	0.0	0.2590E 16
POWER(W/CC)	0.1217E 03	0.1108E 03	0.0	0.1096E 03	0.1107E 03	0.0	0.1158E 03	0.1188E 03	0.0	0.1242E 03
FISSIONS/CCSEC	0.4220E 13	0.3841E 13	0.0	0.3800E 13	0.3838E 13	0.0	0.4016E 13	0.4121E 13	0.0	0.4309E 13
FISSIONS/CC	0.3027E 20	0.3407E 20	0.3407E 20	0.3806E 20	0.4168E 20	0.4168E 20	0.4580E 20	0.4967E 20	0.4967E 20	0.5410E 20
FIMA	0.4843E-01	0.5451E-01	0.5451E-01	0.6090E-01	0.6669E-01	0.6669E-01	0.7330E-01	0.7948E-01	0.7948E-01	0.8657E-01
MWD/MT	0.4126E 05	0.4644E 05	0.4644E 05	0.5188E 05	0.5682E 05	0.5682E 05	0.6244E 05	0.6771E 05	0.6771E 05	0.7375E C5
POWER(KW/FT)	0.4512E 01	0.4108E 01	0.0	0.4063E 01	0.4103E 01	0.0	0.4295E 01	0.4406E 01	0.0	0.46C7E 01

CONC(ATOMS/BARN CM) TIME(DAYS)

	167.0000	168.0000	180.0000	191.0000	192.0000	204.0000	215.0000	216.0000	228.0000	239.0000

TH232	0.5270E-03	0.5270E-03	0.5214E-03	0.5164E-03	0.5164E-03	0.5109E-03	0.5059E-03	0.5059E-03	0.5006E-03	0.4957E-03
PA233	0.1387E-04	0.1352E-04	0.1372E-04	0.1380E-04	0.1345E-04	0.1358E-04	0.1361E-04	0.1327E-04	0.1336E-04	0.1338E-04
PA234	0.3588E-07	0.2968E-08	0.3548E-07	0.3569E-07	0.2952E-08	0.3512E-07	0.3522E-07	0.2913E-08	0.3457E-07	0.3462E-07
U233	0.9195E-05	0.9546E-05	0.9480E-05	0.9470E-05	0.9820E-05	0.9627E-05	0.9529E-05	0.9874E-05	0.9612E-05	0.9468E-05
U234	0.7132E-05	0.7165E-05	0.7797E-05	0.8352E-05	0.8385E-05	0.8894E-05	0.9338E-05	0.9371E-05	0.9766E-05	0.1011E-04
U235	0.1518E-05	0.1518E-05	0.1603E-05	0.1702E-05	0.1702E-05	0.1819E-05	0.1927E-05	0.1927E-05	0.2040E-05	0.2137E-05
U236	0.5171E-05	0.5171E-05	0.5146E-05	0.5131E-05	0.5131E-05	0.5122E-05	0.5122E-05	0.5122E-05	0.5131E-05	0.5145E-05
U237	0.9188E-07	0.8291E-07	0.8986E-07	0.9104E-07	0.8215E-07	0.8927E-07	0.9070E-07	0.8184E-07	0.8923E-07	0.9092E-07
U238	0.1864E-05	0.1864E-05	0.1849E-05	0.1836E-05	0.1836E-05	0.1820E-05	0.1808E-05	0.1808E-05	0.1793E-05	0.1781E-05
NP237	0.4862E-06	0.4952E-06	0.5140E-06	0.5319E-06	0.5408E-06	0.5515E-06	0.5633E-06	0.5722E-06	0.5776E-06	0.5856E-06
NP238	0.1569E-07	0.1131E-07	0.1662E-07	0.1724E-07	0.1243E-07	0.1789E-07	0.1830E-07	0.1320E-07	0.1877E-07	0.1905E-07
NP239	0.1184E-07	0.8816E-08	0.1166E-07	0.1166E-07	0.8681E-08	0.1148E-07	0.1148E-07	0.8550E-08	0.1131E-07	0.1131E-07
PU238	0.1313E-06	0.1357E-06	0.1470E-06	0.1586E-06	0.1634E-06	0.1708E-06	0.1794E-06	0.1845E-06	0.1887E-06	0.1949E-06
PU239	0.7326E-07	0.7629E-07	0.7803E-07	0.8205E-07	0.8503E-07	0.8581E-07	0.8887E-07	0.9181E-07	0.9167E-07	0.9390E-07
PU240	0.3311E-07	0.3311E-07	0.3578E-07	0.3791E-07	0.3791E-07	0.4017E-07	0.4188E-07	0.4188E-07	0.4365E-07	0.4493E-07
PU241	0.2018E-07	0.2018E-07	0.2198E-07	0.2349E-07	0.2349E-07	0.2507E-07	0.2633E-07	0.2633E-07	0.2762E-07	0.2860E-07
PU242	0.2158E-07	0.2158E-07	0.2557E-07	0.2934E-07	0.2934E-07	0.3354E-07	0.3743E-07	0.3743E-07	0.4167E-07	0.4551E-07
KR85M	0.2029E-08	0.0	0.2096E-08	0.2105E-08	0.0	0.2150E-08	0.2143E-08	0.0	0.2173E-08	0.2155E-08
KR87	0.1069E-08	0.0	0.1083E-08	0.1088E-08	0.0	0.1112E-08	0.1108E-08	0.0	0.1124E-08	0.1115E-08
KR88	0.3089E-08	0.0	0.3192E-08	0.3209E-08	0.0	0.3280E-08	0.3272E-08	0.0	0.3320E-08	0.3295E-08
XE133	0.1675E-06	0.1468E-06	0.1703E-06	0.1760E-06	0.1544E-06	0.1773E-06	0.1818E-06	0.1595E-06	0.1816E-06	0.1853E-06
XE135	0.1249E-07	0.2035E-08	0.1294E-07	0.1305E-07	0.2128E-08	0.1339E-07	0.1341E-07	0.2186E-08	0.1366E-07	0.1361E-07

FLUX(N/CM2SEC)	0.2590E 16	0.0	0.2550E 16	0.2590E 16	0.0	0.2590E 16	0.2590E 16	0.0	0.2590E 16	0.2590E 16
POWER(W/CC)	0.1265E 03	0.0	0.1308E 03	0.1319E 03	0.0	0.1350E 03	0.1352E 03	0.0	0.1374E 03	0.1369E 03
FISSIONS/CCSEC	0.4387E 13	0.0	0.4535E 13	0.4574E 13	0.0	0.4682E 13	0.4688E 13	0.0	0.4764E 13	0.4747E 13
FISSIONS/CC	0.5823E 20	0.5823E 20	0.6292E 20	0.6724E 20	0.6724E 20	0.7210E 20	0.7656E 20	0.7656E 20	0.8151E 20	0.8603E 20
FIMA	0.9318E-01	0.9318E-01	0.1007E 00	0.1076E 00	0.1076E 00	0.1154E 00	0.1225E 00	0.1225E 00	0.1304E 00	0.1377E 00
MWD/MT	0.7938E 05	0.7938E 05	0.8577E 05	0.9167E 05	0.9167E 05	0.9829E 05	0.1044E 06	0.1044E 06	0.1111E 06	0.1173E 06
POWER(KW/FT)	0.4691E 01	0.0	0.4849E 01	0.4891E 01	0.0	0.5006E 01	0.5013E 01	0.0	0.5094E 01	0.5076E 01

CONC(ATOMS/BARN CM) TIME(DAYS)

	240.0000	252.0000	263.0000	264.0000	276.0000	287.0000	288.0000
TH232	0.4957E-03	0.4904E-03	0.4857E-03	0.4857E-03	0.4805E-03	0.4759E-03	0.4759E-03
PA233	0.1304E-04	0.1312E-04	0.1313E-04	0.1280E-04	0.1287E-04	0.1287E-04	0.1255E-04
PA234	0.2863E-08	0.3394E-07	0.3397E-07	0.2810E-08	0.3329E-07	0.3331E-07	0.2755E-08
U233	0.9807E-05	0.9511E-05	0.9343E-05	0.9676E-05	0.9365E-05	0.9188E-05	0.9514E-05
U234	0.1014E-04	0.1044E-04	0.1070E-04	0.1073E-04	0.1094E-04	0.1114E-04	0.1117E-04
U235	0.2137E-05	0.2235E-05	0.2315E-05	0.2315E-05	0.2394E-05	0.2457E-05	0.2457E-05
U236	0.5145E-05	0.5168E-05	0.5194E-05	0.5194E-05	0.5228E-05	0.5263E-05	0.5263E-05
U237	0.8205E-07	0.8972E-07	0.9164E-07	0.8269E-07	0.9064E-07	0.9275E-07	0.8369E-07
U238	0.1781E-05	0.1768E-05	0.1756E-05	0.1756E-05	0.1743E-05	0.1733E-05	0.1733E-05
NP237	0.5945E-06	0.5967E-06	0.6025E-06	0.6115E-06	0.6118E-06	0.6165E-06	0.6255E-06
NP238	0.1374E-07	0.1941E-07	0.1961E-07	0.1414E-07	0.1991E-07	0.2008E-07	0.1448E-07
NP239	0.8425E-08	0.1115E-07	0.1115E-07	0.8305E-08	0.1100E-07	0.1100E-07	0.8193E-08
PU238	0.2002E-06	0.2019E-06	0.2063E-06	0.2117E-06	0.2117E-06	0.2148E-06	0.2204E-06
PU239	0.9679E-07	0.9591E-07	0.9750E-07	0.1003E-06	0.9894E-07	0.1001E-06	0.1029E-06
PU240	0.4493E-07	0.4627E-07	0.4718E-07	0.4718E-07	0.4817E-07	0.4881E-07	0.4881E-07
PU241	0.2860E-07	0.2958E-07	0.3030E-07	0.3030E-07	0.3103E-07	0.3155E-07	0.3155E-07
PU242	0.4551E-07	0.4962E-07	0.5328E-07	0.5328E-07	0.5715E-07	0.6055E-07	0.6055E-07
KR85M	0.0	0.2175E-08	0.2150E-08	0.0	0.2164E-08	0.2135E-08	0.0
KR87	0.0	0.1126E-08	0.1113E-08	0.0	0.1121E-08	0.1106E-08	0.0
KR88	0.0	0.3328E-08	0.3293E-08	0.0	0.3315E-08	0.3274E-08	0.0
XE133	0.1625E-06	0.1840E-06	0.1870E-06	0.1640E-06	0.1849E-06	0.1874E-06	0.1643E-06
XE135	0.2219E-08	0.1379E-07	0.1370E-07	0.2232E-08	0.1382E-07	0.1370E-07	0.2233E-08

FLUX(N/CM2SEC)	0.0	0.2590E 16	0.2590E 15	0.0	0.2590E 16	0.2590E 16	0.0
POWER(W/CC)	0.0	0.1384E 03	0.1375E 03	0.0	0.1385E 03	0.1373E 03	0.0
FISSIONS/CCSEC	0.0	0.4800E 13	0.4767E 13	0.0	0.4805E 13	0.4760E 13	0.0
FISSIONS/CC	0.8603E 20	0.9104E 20	0.9559E 20	0.9559E 20	0.1006E 21	0.1051E 21	0.1051E 21
FIMA	0.1377E 00	0.1457E 00	0.1530E 00	0.1530E 00	0.1610E 00	0.1683E 00	0.1683E 00
MWD/MT	0.1173E 06	0.1241E 06	0.1303E 06	0.1303E 06	0.1371E 06	0.1433E 06	0.1433E 06
POWER(KW/FT)	0.0	0.5133E 01	0.5097E 01	0.0	0.5138E 01	0.5090E 01	0.0

CASE 1 COMPOSITION 2

VOLUME= 1.5451 LENGTH= 1.2700 CONCENTRATION SET NUMBER 3

CROSS SECTION SET FOR EACH TIME INTERVAL
1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

FLUXES FOR EACH TIME INTERVAL(N/CM2SEC)
GROUP 1
0.8400D 15 0.8400D 15 0.0 0.8400D 15 0.0 0.8400D 15 0.0 0.2590D 16 0.0 0.2590D 16
0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16
0.0 0.2590D 16 0.0 0.2590D 16 0.0

POLYNOMIAL TIME CONSTANTS FOR FLUXES
GROUP 1
0.1000D 01 0.0 0.0 0.0 0.0 0.0

CONC(ATOMS/BARN CM) TIME(DAYS)

	0.0	23.0000	24.0000	47.0000	48.0000	71.0000	72.0000	95.0000	96.0000	119.0000
TH232	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PA233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PA234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

U234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U235	0.2563E-02	0.1593E-02	0.1593E-02	0.9898E-03	0.9898E-03	0.6151E-03	0.6151E-03	0.2539E-03	0.2539E-03	0.1048E-03
U236	0.0	0.1486E-03	0.1486E-03	0.2387E-03	0.2387E-03	0.2926E-03	0.2926E-03	0.3345E-03	0.3345E-03	0.3409E-03
U237	0.0	0.5717E-06	0.5159E-06	0.1160E-05	0.1047E-05	0.1529E-05	0.1380E-05	0.5577E-05	0.5032E-05	0.6008E-05
U238	0.0	0.7109E-07	0.7109E-07	0.3298E-06	0.3298E-06	0.7224E-06	0.7224E-06	0.3132E-05	0.3132E-05	0.6279E-05
NP237	0.0	0.5366E-06	0.5924E-06	0.2423E-05	0.2537E-05	0.5082E-05	0.5231E-05	0.1244E-04	0.1298E-04	0.2077E-04
NP238	0.0	0.7168E-08	0.5169E-08	0.3751E-07	0.2705E-07	0.8242E-07	0.5943E-07	0.3776E-06	0.2723E-06	0.6542E-06
NP239	0.0	0.8313E-10	0.6190E-10	0.4647E-09	0.3460E-09	0.1082E-08	0.8060E-09	0.1706E-07	0.1270E-07	0.3680E-07
PU238	0.0	0.1309E-07	0.1509E-07	0.1466E-06	0.1571E-06	0.4868E-06	0.5097E-06	0.1655E-05	0.1760E-05	0.3810E-05
PU239	0.0	0.9533E-09	0.9745E-09	0.1901E-07	0.1913E-07	0.8500E-07	0.8528E-07	0.3658E-06	0.3702E-06	0.9675E-06
PU240	0.0	0.5358E-10	0.5358E-10	0.2168E-08	0.2168E-08	0.1443E-07	0.1443E-07	0.9287E-07	0.9287E-07	0.2945E-06
PU241	0.0	0.3956E-11	0.3956E-11	0.3034E-09	0.3034E-09	0.2836E-08	0.2836E-08	0.3562E-07	0.3562E-07	0.1316E-06
PU242	0.0	0.1502E-12	0.1502E-12	0.2498E-10	0.2498E-10	0.3780E-09	0.3780E-09	0.8672E-08	0.8672E-08	0.4745E-07
KR85M	0.1569E-06	0.9748E-07	0.0	0.6058E-07	0.0	0.3765E-07	0.0	0.2866E-07	0.0	0.1191E-07
KR87	0.8534E-07	0.5303E-07	0.0	0.3296E-07	0.0	0.2048E-07	0.0	0.1559E-07	0.0	0.6477E-08
KR88	0.2715E-06	0.1687E-06	0.0	0.1048E-06	0.0	0.6516E-07	0.0	0.4960E-07	0.0	0.2060E-07
XE133	0.0	0.1578E-04	0.1384E-04	0.1048E-04	0.9190E-05	0.6542E-05	0.5737E-05	0.5573E-05	0.4887E-05	0.2448E-05
XE135	0.0	0.1025E-05	0.1671E-06	0.6370E-06	0.1038E-06	0.3960E-06	0.6454E-07	0.3051E-06	0.4973E-07	0.1284E-06
FLUX(N/CM2SEC)	0.8400E 15	0.8400E 15	0.0	0.8400E 15	0.0	0.8400E 15	0.0	0.2590E 16	0.0	0.2590E 16
POWER(W/CC)	0.1496E 05	0.9297E 04	0.0	0.5779E 04	0.0	0.3593E 04	0.0	0.2755E 04	0.0	0.1178E 04
FISSIONS/CCSEC	0.5189E 15	0.3224E 15	0.0	0.2004E 15	0.0	0.1246E 15	0.0	0.9553E 14	0.0	0.4084E 14
FISSIONS/CC	0.0	0.8205E 21	0.8205E 21	0.1330E 22	0.1330E 22	0.1647E 22	0.1647E 22	0.1951E 22	0.1951E 22	0.2078E 22
FIMA	0.0	0.3201E 00	0.3201E 00	0.5191E 00	0.5191E 00	0.6428E 00	0.6428E 00	0.7612E 00	0.7612E 00	0.8109E 00
MWD/MT	0.0	0.2727E 06	0.2727E 06	0.4422E 06	0.4422E 06	0.5476E 06	0.5476E 06	0.6484E 06	0.6484E 06	0.6908E 06
POWER(KW/FT)	0.5548E 03	0.3448E 03	0.0	0.2143E 03	0.0	0.1332E 03	0.0	0.1022E 03	0.0	0.4367E 02

CONC(ATOMS/BARN CM) TIME(DAYS)

	120.0000	143.0000	144.0000	167.0000	168.0000	191.0000	192.0000	215.0000	216.0000	239.0000
TH232	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PA233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PA234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U235	0.1048E-03	0.4327E-04	0.4327E-04	0.1786E-04	0.1786E-04	0.7374E-05	0.7374E-05	0.3044E-05	0.3044E-05	0.1257E-05
U236	0.3409E-03	0.3331E-03	0.3331E-03	0.3201E-03	0.3201E-03	0.3054E-03	0.3054E-03	0.2904E-03	0.2904E-03	0.2759E-03
U237	0.5421E-05	0.5949E-05	0.5369E-05	0.5746E-05	0.5185E-05	0.5493E-05	0.4957E-05	0.5230E-05	0.4719E-05	0.4969E-05
U238	0.6279E-05	0.9360E-05	0.9360E-05	0.1223E-04	0.1223E-04	0.1484E-04	0.1484E-04	0.1720E-04	0.1720E-04	0.1931E-04
NP237	0.2135E-04	0.2695E-04	0.2753E-04	0.3107E-04	0.3163E-04	0.3353E-04	0.3407E-04	0.3477E-04	0.3528E-04	0.3511E-04
NP238	0.4717E-06	0.8630E-06	0.6223E-06	0.1003E-05	0.7236E-06	0.1088E-05	0.7849E-06	0.1132E-05	0.8163E-06	0.1146E-05
NP239	0.2740E-07	0.5647E-07	0.4204E-07	0.7486E-07	0.5574E-07	0.9168E-07	0.6826E-07	0.1069E-06	0.7957E-07	0.1205E-06
PU238	0.3992E-05	0.6234E-05	0.6474E-05	0.8404E-05	0.8684E-05	0.1011E-04	0.1041E-04	0.1131E-04	0.1162E-04	0.1206E-04
PU239	0.9769E-06	0.1749E-05	0.1764E-05	0.2519E-05	0.2538E-05	0.3169E-05	0.3192E-05	0.3662E-05	0.3689E-05	0.4004E-05
PU240	0.2945E-06	0.6189E-06	0.6189E-06	0.9923E-06	0.9923E-06	0.1344E-05	0.1344E-05	0.1635E-05	0.1635E-05	0.1853E-05
PU241	0.1316E-06	0.3111E-06	0.3111E-06	0.5433E-06	0.5433E-06	0.7806E-06	0.7806E-06	0.9889E-06	0.9889E-06	0.1153E-05
PU242	0.4745E-07	0.1517E-06	0.1517E-06	0.3472E-06	0.3472E-06	0.6335E-06	0.6335E-06	0.9886E-06	0.9886E-06	0.1382E-05
KR85M	0.0	0.5052E-08	0.0	0.2271E-08	0.0	0.1162E-08	0.0	0.7320E-09	0.0	0.5724E-09
KR87	0.0	0.2742E-08	0.0	0.1226E-08	0.0	0.6197E-09	0.0	0.3835E-09	0.0	0.2951E-09
KR88	0.0	0.8705E-08	0.0	0.3873E-08	0.0	0.1938E-08	0.0	0.1182E-08	0.0	0.8968E-09
XE133	0.2147E-05	0.1063E-05	0.9322E-06	0.5080E-06	0.4455E-06	0.2965E-06	0.2600E-06	0.2223E-06	0.1950E-06	0.2005E-06
XE135	0.2092E-07	0.5720E-07	0.9324E-08	0.2945E-07	0.4800E-08	0.1927E-07	0.3141E-08	0.1598E-07	0.2605E-08	0.1521E-07
FLUX(N/CM2SEC)	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16
POWER(W/CC)	0.0	0.5452E 03	0.0	0.2996E 03	0.0	0.2097E 03	0.0	0.1804E 03	0.0	0.1730E 03
FISSIONS/CCSEC	0.0	0.1891E 14	0.0	0.1039E 14	0.0	0.7273E 13	0.0	0.6257E 13	0.0	0.5999E 13
FISSIONS/CC	0.2078E 22	0.2134E 22	0.2134E 22	0.2162E 22	0.2162E 22	0.2179E 22	0.2179E 22	0.2192E 22	0.2192E 22	0.2204E 22
FIMA	0.8109E 00	0.8327E 00	0.8327E 00	0.8436E 00	0.8436E 00	0.8502E 00	0.8502E 00	0.8553E 00	0.8553E 00	0.8600E 00
MWD/MT	0.6908E 06	0.7094E 06	0.7094E 06	0.7186E 06	0.7186E 06	0.7243E 06	0.7243E 06	0.7287E 06	0.7287E 06	0.7327E 06
POWER(KW/FT)	0.0	0.2022E 02	0.0	0.1111E 02	0.0	0.7777E 01	0.0	0.6691E 01	0.0	0.6415E 01

CONC(ATOMS/BARN CM) TIME(DAYS)

	240.0000	263.0000	264.0000	287.0000	288.0000
TH232	0.0	0.0	0.0	0.0	0.0
PA233	0.0	0.0	0.0	0.0	0.0
PA234	0.0	0.0	0.0	0.0	0.0
U233	0.0	0.0	0.0	0.0	0.0
U234	0.0	0.0	0.0	0.0	0.0
U235	0.1257E-05	0.5188E-06	0.5188E-06	0.2142E-06	0.2142E-06
U236	0.2759E-03	0.2619E-03	0.2619E-03	0.2485E-03	0.2485E-03
U237	0.4484E-05	0.4718E-05	0.4257E-05	0.4478E-05	0.4041E-05
U238	0.1931E-04	0.2119E-04	0.2119E-04	0.2285E-04	0.2285E-04
NP237	0.3560E-04	0.3484E-04	0.3530E-04	0.3415E-04	0.3459E-04
NP238	0.8262E-06	0.1138E-05	0.8210E-06	0.1117E-05	0.8055E-06
NP239	0.8970E-07	0.1326E-06	0.9872E-07	0.1433E-06	0.1067E-06
PU238	0.1238E-04	0.1246E-04	0.1277E-04	0.1257E-04	0.1288E-04
PU239	0.4035E-05	0.4217E-05	0.4251E-05	0.4327E-05	0.4364E-05
PU240	0.1853E-05	0.2002E-05	0.2002E-05	0.2092E-05	0.2092E-05
PU241	0.1153E-05	0.1270E-05	0.1270E-05	0.1346E-05	0.1346E-05
PU242	0.1382E-05	0.1782E-05	0.1782E-05	0.2167E-05	0.2167E-05
KR85M	0.0	0.5166E-09	0.0	0.4976E-09	0.0
KR87	0.0	0.2636E-09	0.0	0.2527E-09	0.0
KR88	0.0	0.7944E-09	0.0	0.7584E-09	0.0
XE133	0.1758E-06	0.1968E-06	0.1725E-06	0.1977E-06	0.1734E-06
XE135	0.2480E-08	0.1523E-07	0.2483E-08	0.1538E-07	0.2507E-08
FLUX(N/CM2SEC)	0.0	0.2590E 16	0.0	0.2590E 16	0.0
POWER(W/CC)	0.0	0.1721E 03	0.0	0.1721E 03	0.0
FISSIONS/CCSEC	0.0	0.5969E 13	0.0	0.5969E 13	0.0
FISSIONS/CC	0.2204E 22	0.2216E 22	0.2216E 22	0.2228E 22	0.2228E 22

FIMA	0.8600E 00	0.8646E 00	0.8646E 00	0.8692E 00	0.8692E 00
MWD/MT	0.7327E 06	0.7366E 06	0.7366E 06	0.7405E 06	0.7405E 06
POWER(KW/FT)	0.0	0.6382E 01	0.0	0.6383E 01	0.0

CASE 1 COMPOSITION 3

VOLUME= 1.5451 LENGTH= 1.2700 CONCENTRATION SET NUMBER 4

CROSS SECTION SET FOR EACH TIME INTERVAL

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

FLUXES FOR EACH TIME INTERVAL(N/CM2SEC)
GROUP 1

0.8400D 15 0.8400D 15 0.0 0.8400D 15 0.0 0.8400D 15 0.0 0.2590D 16 0.0 0.2590D 16
0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.2590D 16
0.0 0.2590D 16 0.0 0.2590D 16 0.0

POLYNOMIAL TIME CONSTANTS FOR FLUXES
GROUP 1

0.1000D 01 0.0 0.0 0.0 0.0 0.0

CONC(ATOMS/BARN CM) TIME(DAYS)

	0.0	23.0000	24.0000	47.0000	48.0000	71.0000	72.0000	95.0000	96.0000	119.0000
TH232	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PA233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PA234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U235	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U236	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U237	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U238	0.2531E-02	0.2503E-02	0.2503E-02	0.2475E-02	0.2475E-02	0.2447E-02	0.2447E-02	0.2343E-02	0.2343E-02	0.2243E-02
NP237	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NP238	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NP239	0.0	0.4118E-05	0.3066E-05	0.4075E-05	0.3034E-05	0.4030E-05	0.3000E-05	0.1494E-04	0.1112E-04	0.1431E-04
PU238	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU239	0.0	0.1560E-04	0.1665E-04	0.2241E-04	0.2345E-04	0.2457E-04	0.2560E-04	0.4283E-04	0.4665E-04	0.4488E-04
PU240	0.0	0.2376E-05	0.2376E-05	0.6696E-05	0.6696E-05	0.1015E-04	0.1015E-04	0.1667E-04	0.1667E-04	0.2128E-04
PU241	0.0	0.3529E-06	0.3529E-06	0.1778E-05	0.1778E-05	0.3518E-05	0.3518E-05	0.8670E-05	0.8670E-05	0.1278E-04
PU242	0.0	0.2651E-07	0.2651E-07	0.3109E-06	0.3109E-06	0.1049E-05	0.1049E-05	0.4093E-05	0.4093E-05	0.9093E-05
KR85M	0.5097E-11	0.6780E-09	0.0	0.1024E-08	0.0	0.1188E-08	0.0	0.4368E-08	0.0	0.4865E-08
KR87	0.2043E-11	0.3445E-09	0.0	0.5201E-09	0.0	0.6022E-09	0.0	0.2209E-08	0.0	0.2457E-08
KR88	0.5043E-11	0.1015E-08	0.0	0.1539E-08	0.0	0.1788E-08	0.0	0.6567E-08	0.0	0.7333E-08
XE133	0.0	0.1878E-06	0.1647E-06	0.3678E-06	0.3226E-06	0.4573E-06	0.4010E-06	0.1518E-05	0.1331E-05	0.1924E-05
XE135	0.0	0.2041E-07	0.3326E-08	0.3160E-07	0.5150E-08	0.3711E-07	0.6048E-08	0.1360E-06	0.2216E-07	0.1538E-06
FLUX(N/CM2SEC)	0.8400E 15	0.8400E 15	0.0	0.8400E 15	0.0	0.8400E 15	0.0	0.2590E 16	0.0	0.2590E 16
POWER(W/CC)	0.5266E 00	0.1683E 03	0.0	0.2579E 03	0.0	0.3029E 03	0.0	0.1118E 04	0.0	0.1261E 04
FISSIONS/CCSEC	0.1826E 11	0.5837E 13	0.0	0.8944E 13	0.0	0.1050E 14	0.0	0.3876E 14	0.0	0.4374E 14
FISSIONS/CC	0.0	0.5795E 19	0.5795E 19	0.2094E 20	0.2094E 20	0.4050E 20	0.4050E 20	0.1006E 21	0.1006E 21	0.1843E 21
FIMA	0.0	0.2289E-02	0.2289E-02	0.8275E-02	0.8275E-02	0.1600E-01	0.1600E-01	0.3975E-01	0.3975E-01	0.7282E-01
MWD/MT	0.0	0.1950E 04	0.1950E 04	0.7049E 04	0.7049E 04	0.1363E 05	0.1363E 05	0.3387E 05	0.3387E 05	0.6204E 05
POWER(KW/FT)	0.1953E-01	0.6241E 01	0.0	0.9564E 01	0.0	0.1123E 02	0.0	0.4145E 02	0.0	0.4677E 02

CONC(ATOMS/BARN CM) TIME(DAYS)

	120.0000	143.0000	144.0000	167.0000	168.0000	191.0000	192.0000	215.0000	216.0000	239.0000
TH232	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PA233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PA234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U235	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U236	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U237	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U238	0.2243E-02	0.2147E-02	0.2147E-02	0.2055E-02	0.2055E-02	0.1968E-02	0.1968E-02	0.1884E-02	0.1884E-02	0.1803E-02
NP237	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NP238	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NP239	0.1065E-04	0.1370E-04	0.1020E-04	0.1311E-04	0.9763E-05	0.1255E-04	0.9346E-05	0.1202E-04	0.8947E-05	0.1150E-04
PU238	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PU239	0.4853E-04	0.4340E-04	0.4690E-04	0.4160E-04	0.4495E-04	0.3983E-04	0.4304E-04	0.3813E-04	0.4120E-04	0.3651E-04
PU240	0.2128E-04	0.2205E-04	0.2205E-04	0.2154E-04	0.2154E-04	0.2073E-04	0.2073E-04	0.1987E-04	0.1987E-04	0.1903E-04
PU241	0.1278E-04	0.1424E-04	0.1424E-04	0.1427E-04	0.1427E-04	0.1384E-04	0.1384E-04	0.1329E-04	0.1329E-04	0.1273E-04
PU242	0.9093E-05	0.1467E-04	0.1467E-04	0.1966E-04	0.1966E-04	0.2370E-04	0.2370E-04	0.2682E-04	0.2682E-04	0.2915E-04
KR85M	0.0	0.4854E-08	0.0	0.4702E-08	0.0	0.4515E-08	0.0	0.4326E-08	0.0	0.4142E-08
KR87	0.0	0.2450E-08	0.0	0.2373E-08	0.0	0.2279E-08	0.0	0.2183E-08	0.0	0.2090E-08
KR88	0.0	0.7325E-08	0.0	0.7098E-08	0.0	0.6817E-08	0.0	0.6532E-08	0.0	0.6254E-08
XE133	0.1687E-05	0.1987E-05	0.1743E-05	0.1946E-05	0.1706E-05	0.1874E-05	0.1644E-05	0.1797E-05	0.1576E-05	0.1721E-05
XE135	0.2507E-07	0.1544E-06	0.2517E-07	0.1499E-06	0.2443E-07	0.1440E-06	0.2347E-07	0.1380E-06	0.2249E-07	0.1321E-06
FLUX(N/CM2SEC)	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16
POWER(W/CC)	0.0	0.1266E 04	0.0	0.1229E 04	0.0	0.1181E 04	0.0	0.1132E 04	0.0	0.1084E 04
FISSIONS/CCSEC	0.0	0.4391E 14	0.0	0.4262E 14	0.0	0.4095E 14	0.0	0.3924E 14	0.0	0.3758E 14
FISSIONS/CC	0.1843E 21	0.2722E 21	0.2722E 21	0.3586E 21	0.3586E 21	0.4420E 21	0.4420E 21	0.5220E 21	0.5220E 21	0.5986E 21
FIMA	0.7282E-01	0.1075E 00	0.1075E 00	0.1417E 00	0.1417E 00	0.1746E 00	0.1746E 00	0.2062E 00	0.2062E 00	0.2365E 00
MWD/MT	0.6204E 05	0.9161E 05	0.9161E 05	0.1207E 06	0.1207E 06	0.1488E 06	0.1488E 06	0.1757E 06	0.1757E 06	0.2015E 06
POWER(KW/FT)	0.0	0.4695E 02	0.0	0.4557E 02	0.0	0.4379E 02	0.0	0.4196E 02	0.0	0.4018E 02

CONC(ATOMS/BARN CM)	TIME(DAYS) 240.0000	263.0000	264.0000	287.0000	288.0000
TH232	0.0	0.0	0.0	0.0	0.0
PA233	0.0	0.0	0.0	0.0	0.0
PA234	0.0	0.0	0.0	0.0	0.0
U233	0.0	0.0	0.0	0.0	0.0
U234	0.0	0.0	0.0	0.0	0.0
U235	0.0	0.0	0.0	0.0	0.0
U236	0.0	0.0	0.0	0.0	0.0
U237	0.0	0.0	0.0	0.0	0.0
U238	0.1803E-02	0.1726E-02	0.1726E-02	0.1653E-02	0.1653E-02
NP237	0.0	0.0	0.0	0.0	0.0
NP238	0.0	0.0	0.0	0.0	0.0
NP239	0.8565E-05	0.1101E-04	0.8200E-05	0.1054E-04	0.7850E-05
PU238	0.0	0.0	0.0	0.0	0.0
PU239	0.3944E-04	0.3495E-04	0.3776E-04	0.3346E-04	0.3615E-04
PU240	0.1903E-04	0.1822E-04	0.1822E-04	0.1744E-04	0.1744E-04
PU241	0.1273E-04	0.1219E-04	0.1219E-04	0.1167E-04	0.1167E-04
PU242	0.2915E-04	0.3082E-04	0.3082E-04	0.3194E-04	0.3194E-04
KR85M	0.0	0.3966E-08	0.0	0.3797E-08	0.0
KR87	0.0	0.2001E-08	0.0	0.1916E-08	0.0
KR88	0.0	0.5988E-08	0.0	0.5732E-08	0.0
XE133	0.1509E-05	0.1648E-05	0.1445E-05	0.1578E-05	0.1384E-05
XE135	0.2154E-07	0.1265E-06	0.2062E-07	0.1211E-06	0.1974E-07
FLUX(N/CM2SEC)	0.0	0.2590E 16	0.0	0.2590E 16	0.0
POWER(W/CC)	0.0	0.1037E 04	0.0	0.9931E 03	0.0
FISSIONS/CCSEC	0.0	0.3597E 14	0.0	0.3444E 14	0.0
FISSIONS/CC	0.5986E 21	0.6720E 21	0.6720E 21	0.7422E 21	0.7422E 21
FIMA	0.2365E 00	0.2655E 00	0.2655E 00	0.2932E 00	0.2932E 00
MWD/MT	0.2015E 06	0.2262E 06	0.2262E 06	0.2498E 06	0.2498E 06
POWER(KW/FT)	0.0	0.3847E 02	0.0	0.3683E 02	0.0

CASE 1 COMPOSITION 4

VOLUME= 1.5451 LENGTH= 1.2700 CONCENTRATION SET NUMBER 2

CROSS SECTION SET FOR EACH TIME INTERVAL

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

FLUXES FOR EACH TIME INTERVAL(N/CM2SEC)

GROUP 1

0.84000 15 0.8400D 15 0.0 0.8400D 15 0.0 0.8400D 15 0.0 0.2590D 16 0.0 0.2590D 16
0.0 0.2590D 16 0.0 0.2590D 16 0.0 0.25900 16 0.0 0.2590D 16 0.0 0.2590D 16
0.0 0.2590D 16 0.0 0.2590D 16 0.0

POLYNOMIAL TIME CONSTANTS FOR FLUXES

GROUP 1

0.10000 01 0.0 0.0 0.0 0.0 0.0

CONC(ATOMS/BARN CM)	TIME(DAYS) 0.0	23.0000	24.0000	47.0000	48.0000	71.0000	72.0000	95.0000	96.0000	119.0000
TH232	0.2597E-02	0.2575E-02	0.2575E-02	0.2552E-02	0.2552E-02	0.2530E-02	0.2530E-02	0.2479E-02	0.2479E-02	0.2429E-02
PA233	0.0	0.1651E-04	0.1609E-04	0.2475E-04	0.2412E-04	0.2879E-04	0.2806E-04	0.4894E-04	0.4770E-04	0.5744E-04
PA234	0.0	0.1655E-07	0.1369E-08	0.2501E-07	0.2068E-08	0.2915E-07	0.2411E-08	0.1261E-06	0.1043E-07	0.1484E-06
U233	0.0	0.4652E-05	0.5070E-05	0.1335E-04	0.1398E-04	0.2176E-04	0.2249E-04	0.2588E-04	0.2712E-04	0.3284E-04
U234	0.0	0.5697E-06	0.5849E-06	0.2039E-05	0.2062E-05	0.4055E-05	0.4081E-05	0.1038E-04	0.1050E-04	0.1785E-04
U235	0.0	0.1507E-07	0.1507E-07	0.1005E-06	0.1005E-06	0.2786E-06	0.2786E-06	0.1142E-05	0.1142E-05	0.2476E-05
U236	0.0	0.2830E-09	0.2830E-09	0.3959E-08	0.3959E-08	0.1717E-07	0.1717E-07	0.1097E-06	0.1097E-06	0.3538E-06
U237	0.0	0.5837E-12	0.5267E-12	0.1243E-10	0.1122E-10	0.6467E-10	0.5836E-10	0.1259E-08	0.1136E-08	0.4634E-08
U238	0.0	0.3086E-13	0.3086E-13	0.1394E-11	0.1394E-11	0.1134E-10	0.1134E-10	0.3263E-09	0.3263E-09	0.1854E-08
NP237	0.0	0.2375E-12	0.2945E-12	0.1053E-10	0.1175E-10	0.8437E-10	0.9068E-10	0.1224E-08	0.1347E-08	0.6516E-08
NP238	0.0	0.2451E-14	0.1768E-14	0.1394E-12	0.1005E-12	0.1225E-11	0.8831E-12	0.3295E-10	0.2376E-10	0.1875E-09
NP239	0.0	0.2658E-16	0.1979E-16	0.1618E-14	0.1205E-14	0.1478E-13	0.1100E-13	0.1534E-11	0.1142E-11	0.9653E-11
PU238	0.0	0.2450E-14	0.3134E-14	0.2889E-12	0.3277E-12	0.3843E-11	0.4185E-11	0.7637E-10	0.8555E-10	0.6099E-09
PU239	0.0	0.1202E-15	0.1270E-15	0.2497E-13	0.2538E-13	0.4547E-12	0.4585E-12	0.1246E-10	0.1286E-10	0.1204E-09
PU240	0.0	0.4455E-17	0.4455E-17	0.1844E-14	0.1844E-14	0.4956E-13	0.4956E-13	0.2025E-11	0.2025E-11	0.2521E-10
PU241	0.0	0.2300E-18	0.2300E-18	0.1834E-15	0.1834E-15	0.6968E-14	0.6968E-14	0.5442E-12	0.5442E-12	0.8343E-11
PU242	0.0	0.6112E-20	0.6112E-20	0.1035E-16	0.1035E-16	0.6123E-15	0.6123E-15	0.8102E-13	0.8102E-13	0.1718E-11
KR85M	0.4010E-11	0.8907E-09	0.0	0.1404E-08	0.0	0.2293E-08	0.0	0.5354E-08	0.0	0.6895E-08
KR87	0.1940E-11	0.2523E-09	0.0	0.7225E-09	0.0	0.1180E-08	0.0	0.2756E-08	0.0	0.3553E-08
KR88	0.4485E-11	0.7375E-09	0.0	0.2115E-08	0.0	0.3455E-08	0.0	0.8072E-08	0.0	0.1043E-07
XE133	0.0	0.2189E-07	0.1920E-07	0.8557E-07	0.7504E-07	0.1562E-06	0.1370E-06	0.3789E-06	0.3322E-06	0.5086E-06
XE135	0.0	0.2670E-08	0.4351E-09	0.7866E-08	0.1282E-08	0.1298E-07	0.2116E-08	0.3065E-07	0.4996E-08	0.4013E-07
FLUX(N/CM2SEC)	0.8400E 15	0.8400E 15	0.0	0.8400E 15	0.0	0.8400E 15	0.0	0.2590E 16	0.0	0.2590E 16
POWER(W/CC)	0.1308E 00	0.2848E 02	0.0	0.8064E 02	0.0	0.1314E 03	0.0	0.3179E 03	0.0	0.4128E 03
FISSIONS/CCSEC	0.4537E 10	0.9877E 12	0.0	0.2796E 13	0.0	0.4556E 13	0.0	0.1103E 14	0.0	0.1432E 14
FISSIONS/CC	0.0	0.7326E 18	0.7326E 18	0.4529E 19	0.4529E 19	0.1198E 20	0.1198E 20	0.3147E 20	0.3147E 20	0.5705E 20
FIMA	0.0	0.2821E-03	0.2821E-03	0.1744E-02	0.1744E-02	0.4614E-02	0.4614E-02	0.1212E-01	0.1212E-01	0.2197E-01
MWD/MT	0.0	0.2403E 03	0.2403E 03	0.1486E 04	0.1486E 04	0.3930E 04	0.3930E 04	0.1032E 05	0.1032E 05	0.1871E 05
POWER(KW/FT)	0.4852E-02	0.1056E 01	0.0	0.2990E 01	0.0	0.4871E 01	0.0	0.1179E 02	0.0	0.1531E 02

CONC(ATOMS/BARN CM)	TIME(DAYS) 120.0000	143.0000	144.0000	167.0000	168.0000	191.0000	192.0000	215.0000	216.0000	239.0000
TH232	0.2429E-02	0.2380E-02	0.2380E-02	0.2332E-02	0.2332E-02	0.2284E-02	0.2284E-02	0.2236E-02	0.2238E-02	0.2193E-02

PA233	0.5598E-04	0.6062E-04	0.5908E-04	0.6138E-04	0.5983E-04	0.6105E-04	0.5950E-04	0.6023E-04	0.5870E-04	0.5920E-04
PA234	0.1227E-07	0.1567E-06	0.1296E-07	0.1587E-06	0.1313E-07	0.1579E-06	0.1306E-07	0.1558E-06	0.1289E-07	0.1532E-06
U233	0.3429E-04	0.3787E-04	0.3941E-04	0.4068E-04	0.4223E-04	0.4190E-04	0.4345E-04	0.4216E-04	0.4369E-04	0.4189E-04
U234	0.1799E-04	0.2511E-04	0.2526E-04	0.3155E-04	0.3170E-04	0.3695E-04	0.3710E-04	0.4131E-04	0.4146E-04	0.4474E-04
U235	0.2476E-05	0.4044E-05	0.4044E-05	0.5626E-05	0.5626E-05	0.7080E-05	0.7080E-05	0.8338E-05	0.8338E-05	0.9379E-05
U236	0.3538E-06	0.7915E-06	0.7915E-06	0.1429E-05	0.1429E-05	0.2248E-05	0.2248E-05	0.3215E-05	0.3215E-05	0.4293E-05
U237	0.4182E-08	0.1122E-07	0.1013E-07	0.2135E-07	0.1926E-07	0.3480E-07	0.3140E-07	0.5108E-07	0.4609E-07	0.6954E-07
U238	0.1854E-08	0.6098E-08	0.6098E-08	0.1486E-07	0.1486E-07	0.2988E-07	0.2988E-07	0.5261E-07	0.5261E-07	0.8413E-07
NP237	0.6968E-08	0.2041E-07	0.2151E-07	0.4740E-07	0.4948E-07	0.9073E-07	0.9412E-07	0.1520E-06	0.1569E-06	0.2310E-06
NP238	0.1352E-09	0.6080E-09	0.4385E-09	0.1443E-08	0.1040E-08	0.2803E-08	0.2021E-08	0.4744E-08	0.3421E-08	0.7269E-08
NP239	0.7187E-11	0.3341E-10	0.2488E-10	0.8407E-10	0.6260E-10	0.1728E-09	0.1287E-09	0.3092E-09	0.2302E-09	0.5004E-09
PU238	0.6621E-09	0.2485E-08	0.2655E-08	0.6982E-08	0.7384E-08	0.1547E-07	0.1625E-07	0.2909E-07	0.3041E-07	0.4856E-07
PU239	0.1228E-09	0.5532E-09	0.5617E-09	0.1689E-08	0.1710E-08	0.3977E-08	0.4021E-08	0.7840E-08	0.7919E-08	0.1359E-07
PU240	0.2521E-10	0.1392E-09	0.1392E-09	0.4836E-09	0.4836E-09	0.1254E-08	0.1254E-08	0.2664E-08	0.2664E-08	0.4896E-08
PU241	0.8343E-11	0.5395E-10	0.5395E-10	0.2089E-09	0.2089E-09	0.5865E-09	0.5865E-09	0.1322E-08	0.1322E-08	0.2545E-08
PU242	0.1718E-11	0.1501E-10	0.1501E-10	0.7452E-10	0.7452E-10	0.2574E-09	0.2574E-09	0.6935E-09	0.6935E-09	0.1561E-08
KR85M	0.0	0.8078E-08	0.0	0.8817E-08	0.0	0.9225E-08	0.0	0.9418E-08	0.0	0.9481E-08
KR87	0.0	0.4167E-08	0.0	0.4553E-08	0.0	0.4767E-08	0.0	0.4871E-08	0.0	0.4907E-08
KR88	0.0	0.1225E-07	0.0	0.1340E-07	0.0	0.1405E-07	0.0	0.1438E-07	0.0	0.1450E-07
XE133	0.4460E-06	0.6220E-06	0.5455E-06	0.7021E-06	0.6157E-06	0.7531E-06	0.6604E-06	0.7834E-06	0.6870E-06	0.8002E-06
XE135	0.6540E-08	0.4775E-07	0.7782E-08	0.5285E-07	0.8613E-08	0.5598E-07	0.9124E-08	0.5779E-07	0.9419E-08	0.5873E-07
FLUX(N/CM2SEC)	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16	0.0	0.2590E 16
POWER(W/CC)	0.0	0.4873E 03	0.0	0.5362E 03	0.0	0.5656E 03	0.0	0.5820E 03	0.0	0.5901E 03
FISSIONS/CCSEC	0.0	0.1690E 14	0.0	0.1859E 14	0.0	0.1961E 14	0.0	0.2018E 14	0.0	0.2046E 14
FISSIONS/CC	0.5705E 20	0.8863E 20	0.8863E 20	0.1245E 21	0.1245E 21	0.1629E 21	0.1629E 21	0.2030E 21	0.2030E 21	0.2438E 21
FIMA	0.2197E-01	0.3413E-01	0.3413E-01	0.4792E-01	0.4792E-01	0.6275E-01	0.6275E-01	0.7816E-01	0.7816E-01	0.9389E-01
MWD/MT	0.1871E 05	0.2907E 05	0.2907E 05	0.4083E 05	0.4083E 05	0.5345E 05	0.5345E 05	0.6658E 05	0.6658E 05	0.7999E 05
POWER(KW/FT)	0.0	0.1807E 02	0.0	0.1988E 02	0.0	0.2097E 02	0.0	0.2158E 02	0.0	0.2188E 02

CONC(ATOMS/BARN CM) TIME(DAYS)

	240.0000	263.0000	264.0000	287.0000	288.0000
TH232	0.2193E-02	0.2149E-02	0.2149E-02	0.2105E-02	0.2105E-02
PA233	0.5770E-04	0.5809E-04	0.5662E-04	0.5696E-04	0.5552E-04
PA234	0.1267E-07	0.1503E-06	0.1243E-07	0.1474E-06	0.1219E-07
U233	0.4339E-04	0.4134E-04	0.4281E-04	0.4065E-04	0.4209E-04
U234	0.4488E-04	0.4734E-04	0.4748E-04	0.4927E-04	0.4940E-04
U235	0.9379E-05	0.1021E-04	0.1021E-04	0.1086E-04	0.1086E-04
U236	0.4293E-05	0.5446E-05	0.5446E-05	0.6644E-05	0.6644E-05
U237	0.6275E-07	0.8956E-07	0.8081E-07	0.1105E-06	0.9974E-07
U238	0.8413E-07	0.1251E-06	0.1251E-06	0.1758E-06	0.1758E-06
NP237	0.2378E-06	0.3265E-06	0.3353E-06	0.4363E-06	0.4471E-06
NP238	0.5242E-08	0.1034E-07	0.7455E-08	0.1388E-07	0.1001E-07
NP239	0.3726E-09	0.7509E-09	0.5591E-09	0.1063E-08	0.7914E-09
PU238	0.5059E-07	0.7413E-07	0.7702E-07	0.1056E-06	0.1095E-06
PU239	0.1371E-07	0.2138E-07	0.2157E-07	0.3122E-07	0.3149E-07
PU240	0.4896E-08	0.8076E-08	0.8076E-08	0.1226E-07	0.1226E-07
PU241	0.2545E-08	0.4354E-08	0.4354E-08	0.6806E-08	0.6806E-08
PU242	0.1561E-08	0.3068E-08	0.3068E-08	0.5428E-08	0.5428E-08
KR85M	0.0	0.9465E-08	0.0	0.9400E-08	0.0
KR87	0.0	0.4901E-08	0.0	0.4870E-08	0.0
KR88	0.0	0.1449E-07	0.0	0.1441E-07	0.0
XE133	0.7017E-06	0.8081E-06	0.7087E-06	0.8101E-06	0.7104E-06
XE135	0.9572E-08	0.5911E-07	0.9635E-08	0.5913E-07	0.9638E-08
FLUX(N/CM2SEC)	0.0	0.2590E 16	0.0	0.2590E 16	0.0
POWER(W/CC)	0.0	0.5929E 03	0.0	0.5922E 03	0.0
FISSIONS/CCSEC	0.0	0.2056E 14	0.0	0.2054E 14	0.0
FISSIONS/CC	0.2438E 21	0.2850E 21	0.2850E 21	0.3263E 21	0.3263E 21
FIMA	0.9389E-01	0.1098E 00	0.1098E 00	0.1256E 00	0.1256E 00
MWD/MT	0.7999E 05	0.9350E 05	0.9350E 05	0.1070E 06	0.1070E 06
POWER(KW/FT)	0.0	0.2198E 02	0.0	0.2196E 02	0.0

TOTAL BIRTH RATES(ATOMS/SEC)

TIME(DAYS)	KR85M	KR87	KR88	XE133	XE135
0.0	0.144E 12	0.276E 12	0.398E 12	0.751E 12	0.729E 12
12.000	0.114E 12	0.220E 12	0.316E 12	0.593E 12	0.575E 12
23.000	0.966E 11	0.185E 12	0.265E 12	0.487E 12	0.474E 12
24.000	0.0	0.0	0.0	0.0	0.0
36.000	0.842E 11	0.160E 12	0.228E 12	0.404E 12	0.394E 12
47.000	0.766E 11	0.145E 12	0.204E 12	0.348E 12	0.341E 12
48.000	0.0	0.0	0.0	0.0	0.0
60.000	0.720E 11	0.135E 12	0.189E 12	0.306E 12	0.300E 12
71.000	0.690E 11	0.129E 12	0.179E 12	0.276E 12	0.272E 12
72.000	0.0	0.0	0.0	0.0	0.0
84.000	0.112E 12	0.207E 12	0.283E 12	0.409E 12	0.406E 12
95.000	0.107E 12	0.197E 12	0.267E 12	0.364E 12	0.364E 12
96.000	0.0	0.0	0.0	0.0	0.0
108.000	0.111E 12	0.203E 12	0.273E 12	0.354E 12	0.355E 12
119.000	0.115E 12	0.210E 12	0.281E 12	0.353E 12	0.356E 12
120.000	0.0	0.0	0.0	0.0	0.0
132.000	0.122E 12	0.224E 12	0.299E 12	0.368E 12	0.372E 12
143.000	0.126E 12	0.231E 12	0.308E 12	0.377E 12	0.381E 12
144.000	0.0	0.0	0.0	0.0	0.0
156.000	0.133E 12	0.242E 12	0.323E 12	0.394E 12	0.398E 12
167.000	0.135E 12	0.246E 12	0.328E 12	0.401E 12	0.406E 12
168.000	0.0	0.0	0.0	0.0	0.0
180.000	0.139E 12	0.254E 12	0.339E 12	0.415E 12	0.420E 12
191.000	0.140E 12	0.256E 12	0.341E 12	0.419E 12	0.424E 12

192.000	0.0	0.0	0.0	0.0	0.0
204.000	0.143E 12	0.261E 12	0.349E 12	0.430E 12	0.434E 12
215.000	0.142E 12	0.260E 12	0.348E 12	0.431E 12	0.435E 12
216.000	0.0	0.0	0.0	0.0	0.0
228.000	0.144E 12	0.264E 12	0.353E 12	0.439E 12	0.443E 12
239.000	0.143E 12	0.262E 12	0.350E 12	0.438E 12	0.442E 12
240.000	0.0	0.0	0.0	0.0	0.0
252.000	0.144E 12	0.264E 12	0.354E 12	0.443E 12	0.447E 12
263.000	0.143E 12	0.261E 12	0.350E 12	0.440E 12	0.444E 12
264.000	0.0	0.0	0.0	0.0	0.0
276.000	0.144E 12	0.263E 12	0.352E 12	0.444E 12	0.448E 12
287.000	0.142E 12	0.260E 12	0.348E 12	0.441E 12	0.444E 12
288.000	0.0	0.0	0.0	0.0	0.0

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