CLIENT NO.: WEP 0107-001.7

SNC NO.: _____

DESIGN CALCULATIONS

VSC-24 CRITICALITY SAFETY ANALYSIS
(PALISADES FUEL WITH BORATED WATER)

Prepared by

SIERRA NUCLEAR, INC.

CLIENT NO.: WEP 0109-001.7

SNC NO.: _____

REVISION CONTROL SHEET

Revision	Reason	Affected Pages	Preparer	Checker	Project Eng.
0	Initial Issue		HHT	MDC	
1	Convert Boron Conc to Weight PPM	1, 3, 5-10, 14, 21, 22, 24, 25, 29, 30-38, 40, 41, 45, 48, 50-52, 54, 59-62, 64, 66, 68, 69, 71-72, Attachment 1	MDC		

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WEP 114.003.5

SIGNATURES

Title	Initials	Date
Henry Hung Tran (Nuclear Engineer)	HHT	2/15/90
Mike Cann	MDC	1/15/90

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Rev 1

1. INTRODUCTION

This calculation is an extension of the calculation package entitled VSC-24 Criticality Safety Analysis for Palisades ISFSI (Ref. 12). Criticality analysis in this calculation package will consider natural boron dissolved in pool water as a means to control criticality rather than burnup credit of spent fuel. All loading fuel assemblies in this calculation are unirradiated (fresh fuel). Otherwise specified, all assumptions and input parameter from the previous calculation remain unchanged in this calculation.

The stainless steel in the previous KENO models of Ref. 12 is replaced with carbon steel. The atomic densities of various materials used in this calculation are given in Table 1.

TABLE (1)

Atomic Densities of Various Materials

MATERIAL	Elements	Atom Densities [atoms/barn-cm]
WATER (70F)	H	6.67E-2
	O	3.34E-2
WATER (212F)	H	6.41E-2
	O	3.20E-2
CARBON STEEL	Fe	8.28E-2
	C	2.61E-4
	Si	1.90E-4
	Mn	1.09E-3
LEAD	Pb	3.30E-2
ZIRCONIUM	Zr	4.29E-2
RX-277	H	2.77E-2
	B-11*	1.46E-3
	O	3.71E-2
	Na	2.60E-4
	Mg	2.08E-4
	Al	8.97E-3
	Si	7.67E-4
	Fe	4.89E-5
ORDINARY CONCRETE	H	1.49E-2
	C	3.81E-3
	O	4.15E-2
	Ca	1.16E-2
	Si	6.04E-3
	Mg	5.87E-4
	Fe	1.97E-4
	Al	7.35E-4
	Na	3.04E-4

* Natural Boron

2. RESULTS & ANALYSIS

2.1 Summary of Calculated Results:

Table(2-1) is the summary of the results obtained from the k-effective calculations of the VSC cask system. From these results, many other parameters pertinent to the criticality safety of the VSC cask system can be estimated or derived. Figura(2-1) indicates the acceptable combinations of U-235 initial enrichment and boron concentration in pool water to have the system k-eff less than 0.95 and 0.98. The following subsections will give a detail description of the approach to construct this curve.

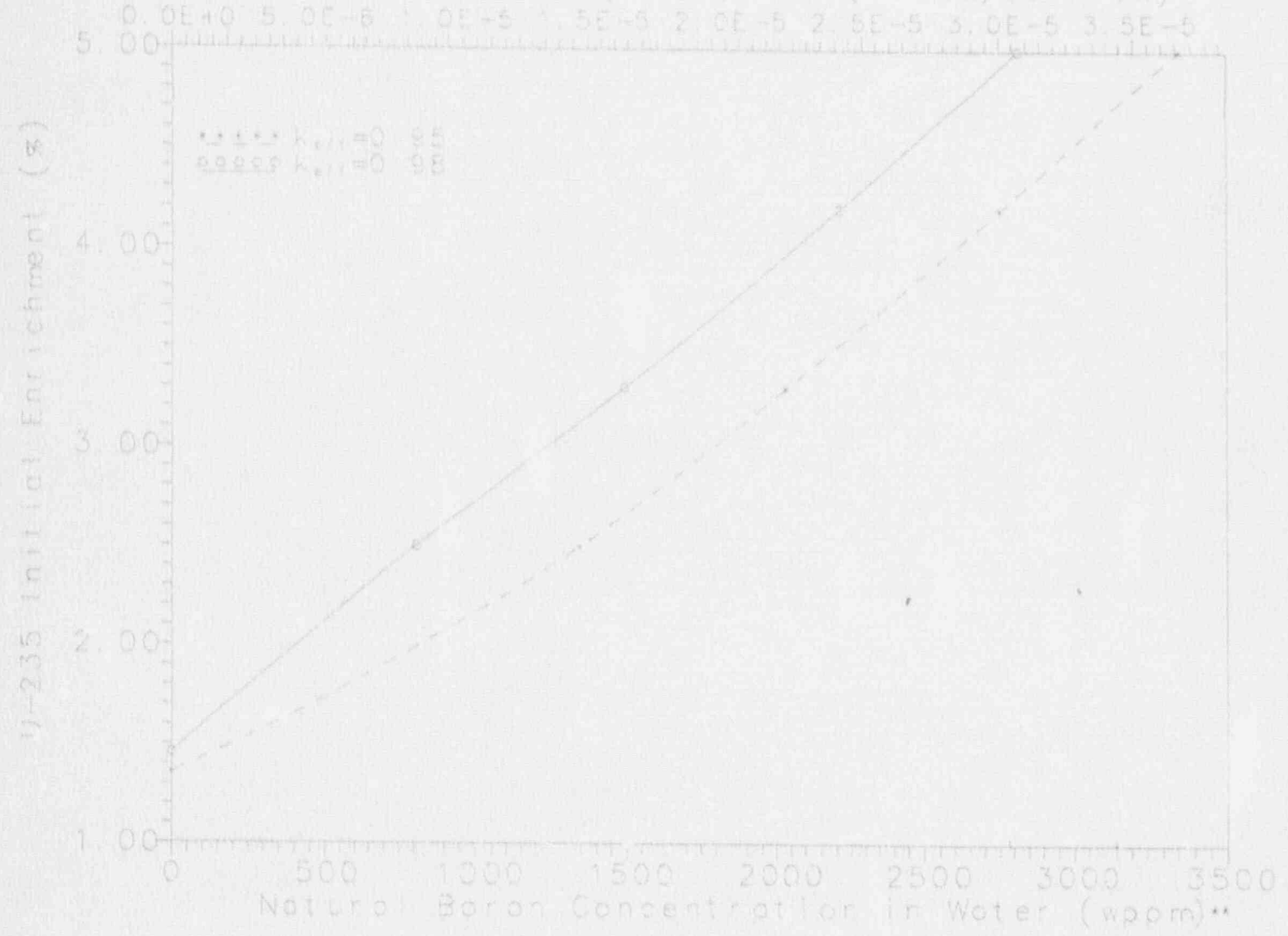
Figure (2-2) includes the k_∞ results from the NULIF computer analyses. The k_∞ as a function of Boron concentration for different fuel enrichments is presented in Figure (2-3).

TABLE 2-1

SECTION	ENRICHMENT	NAT. BORON [WPPM]	AVERAGE K-EFF	1-SIGMA	FINAL* K-EFF
4.1	3.30%	1800	0.9376	0.004	0.9586
4.2	3.30%	2040	0.9243	0.003	0.9433
4.3	2.50%	1080	0.9398	0.003	0.9588
4.4	4.20%	2760	0.9228	0.004	0.9438
4.5	5.00%	3360	Not Computed →		0.9500**

* Includes All Uncertainties

** Estimate from Figure 2-1.



* boron -10 atoms per 10^{-24} cm^3 in the pool water

* grams of boron per million grams of water

~~FIGURE 3.1.2-6~~
FIGURE 2-1

ACCIDENT LOADING k EFFECTIVE CURVE

FIGURE (2-2)

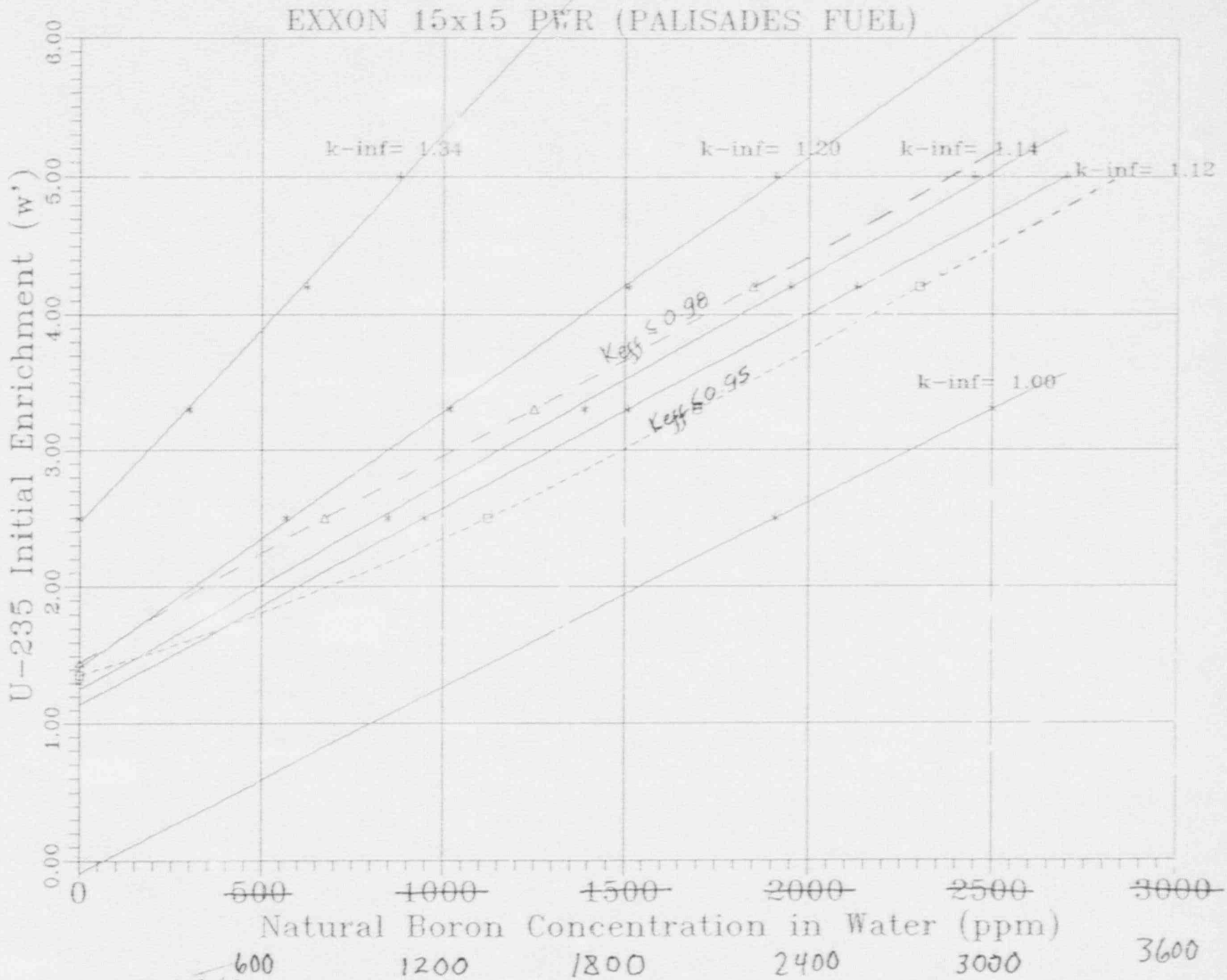
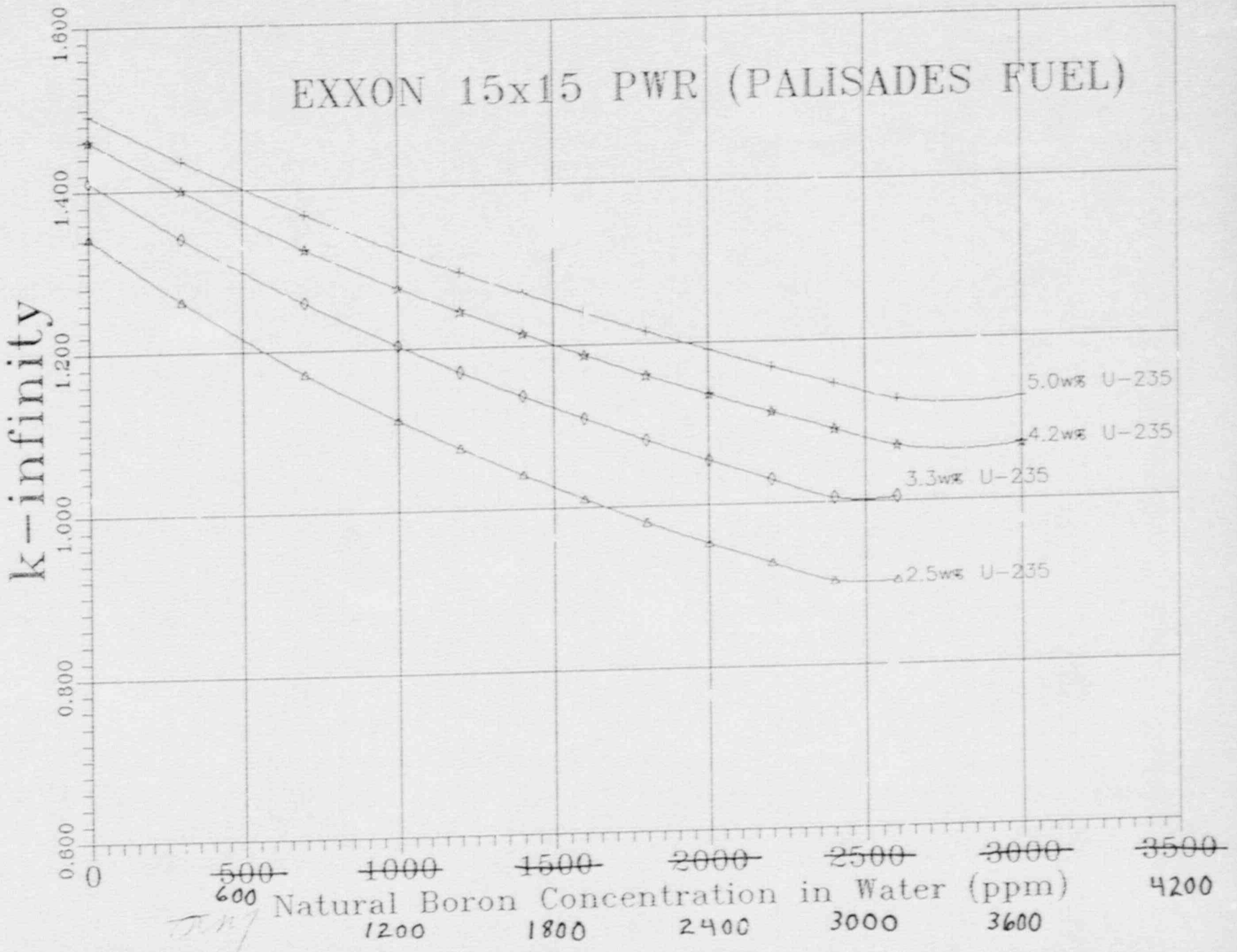

EXXON 15x15 PWR (PALISADES FUEL)
k-inf= 1.34
k-inf= 1.20
k-inf= 1.14
k-inf= 1.12
k-inf= 1.00
Keff ≤ 0.98
Keff ≤ 0.95
U-235 Initial Enrichment (w')
0.00
1.00
2.00
3.00
4.00
5.00
6.00
0
500
1000
1500
2000
2500
3000
Natural Boron Concentration in Water (ppm)
600
1200
1800
2400
3000
3600

Figure (2-3)


EXXON 15x15 PWR (PALISADES FUEL)
k-infinity
1.600
1.400
1.200
1.000
0.800
0.600
5.0w% U-235
4.2w% U-235
3.3w% U-235
2.5w% U-235
0
~~500~~ 600
~~1000~~ 1200
~~1500~~ 1800
~~2000~~ 2400
~~2500~~ 3000
~~3000~~ 3600
~~3500~~ 4200
Natural Boron Concentration in Water (ppm)

2.2 Analysis

(a) From Ref (12), the overall uncertainty due to variation in assembly locations, water density, fuel homogenization, and KENO-IV bias is

$$\Delta K_{total} = 0.013$$

Thus, the "Final k-eff" in Table (2-1) are calculated from:

$$\text{Final } K_{eff} = \text{Average } K_{eff} + 2\sigma + \Delta K_{total}$$

Ex.)

Section 4.1: $0.9376 + 2*0.004 + 0.013 = 0.9586$

(b) From Ref (12), the reactivity gained per 1% of U-235 initial enrichment is:

$$\delta K_{enrichment} = 0.329$$

(c) From Table (2-1), the reactivity reduced per 100 PPM of natural Boron in water is:

$$\delta K_{Boron} = \left(\frac{0.9243 - 0.9376}{2040 - 1800}\right)(100)$$

$$\delta K_{Boron} = -0.0055417$$

(d) Boron Conc. to have $K_{eff} \approx 0.945$ (≤ 0.95)

Enrichment (%)	Natural Boron Concentration (WPPM)
1.36	ϕ (From Ref (12))
2.5	$1076 + \left[\frac{(0.945 - 0.9588) * 100}{-0.0055417}\right] = 1325$
3.3	2040
4.2	2760
5.0	3360

(e) Boron Concentration to have $K_{eff} \leq 0.98$

Enrichment (%)	Natural Boron Concentration (WPPM)
$1.36 + \frac{0.98 - 0.95}{0.329} = 1.45$	ϕ
2.5	$1325 + \left[\frac{(0.98 - 0.95)}{-0.0055417}\right](100) = 784$
3.3	$2040 + \left[\frac{(0.98 - 0.95)}{-0.0055417}\right](100) = 1499$
4.2	$2760 + \left[\frac{(0.98 - 0.95)}{-0.0055417}\right](100) = 2219$
5.0	$3360 + \left[\frac{(0.98 - 0.95)}{-0.0055417}\right](100) = 2819$

3.0 REFERENCES

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11. L. J. Templin, Editor, " Reactor Physics Constants," Argonne National Laboratory, Argonne, Illinois, ANL-5800 (1963).

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CALCULATION SHEET

4. K-eff CALCULATIONS

Refer to Reference (12) for the calculations of basic parameters, generalized KENO geometry, and fuel characteristics applied to this calculation package. Derivations of input parameters for NITAWL, NULIF, XSDRNP, and KENO will be presented here.

Table (4-1) gives the boron (nature) atom density in terms of [atoms / barn-cm]. The homogenized atomic density used in KENO code is also included.

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Table (4-1)

NAT. BORON CONCENTRATION [wppm]	NULIF & XSDRNPM B-10 ATOM [atoms/barn*cm]	KENO-IV B-10 ATOM [atoms/barn*cm]
0	0.000E+00	0.000E+00
120*	1.308E-06	7.462E-07
239	2.615E-06	1.492E-06
359	3.923E-06	2.238E-06
479	5.230E-06	2.984E-06
599	6.538E-06	3.730E-06
718	7.845E-06	4.475E-06
838	9.153E-06	5.222E-06
958	1.046E-05	5.967E-06
1078	1.177E-05	6.715E-06
1198	1.308E-05	7.462E-06
1317	1.438E-05	8.204E-06
1437	1.569E-05	8.951E-06
1557	1.700E-05	9.698E-06
1677	1.831E-05	1.045E-05
1796	1.961E-05	1.119E-05
1916	2.092E-05	1.193E-05
2036	2.223E-05	1.268E-05
2156	2.354E-05	1.343E-05
2275	2.484E-05	1.417E-05
2395	2.615E-05	1.492E-05
2515	2.746E-05	1.567E-05
2635	2.877E-05	1.641E-05
2754	3.007E-05	1.715E-05
2874	3.138E-05	1.790E-05
2994	3.269E-05	1.865E-05
3114	3.400E-05	1.940E-05
3233	3.530E-05	2.014E-05
3353	3.661E-05	2.089E-05
3473	3.792E-05	2.163E-05
3593	3.923E-05	2.238E-05
3712	4.053E-05	2.312E-05
3832	4.184E-05	2.387E-05

$* (1.308\times10^{-6}\ \frac{B^{10}}{barn\cdot cm})(10^{24}\ \frac{barn}{cm^2})(\frac{10.81\ g\ B^{NAT}}{6.02\times10^{23}\ B^{NAT}})(\frac{B^{NAT}}{0.196\ B^{10}})(10^{6}\ \frac{g\ B^{NAT}}{\frac{g\ water}{cm^3}}) = 120\ ppm$

SUMMARY OF FUEL AND REACTOR PARAMETERS

(Exxon 15x15 PWR)

REACTOR PARAMETERS:

Power Thermal Output.....	Reactor_Power := 2650·MW
Number of Assemblies.....	Number_Assem := 204

ASSEMBLY DESCRIPTIONS:

Assembly Width	Assem_Width := 8.25·in Assem_Width = 20.955·cm
Array Size.....	Array := 15·15 (Rods)
Fueled Rods/Assembly.....	Number_FuelRod := 216
Rod Pitch.....	Pitch := 0.550·in Pitch = 1.397·cm
Heavy Metal (Uranium).....	MTHM := 0.40724·MTU
Initial Enrichment.....	Enrichment := 3.0·%
Fuel (UO2) Density.....	Percent_Theo := 94.0·%

FUEL ROD DESCRIPTIONS:

Fuel Rod Diameter.....	Rod_Dia := 0.415·in Rod_Dia = 1.0541·cm
Active Length.....	Act_Length := 131.80·in Act_Length = 334.772·cm
Clad Thickness.....	Clad_Thick := 0.0285·in Clad_Thick = 0.0724·cm
Fuel-Clad Gap.....	Gap := 0.004·in Gap = 0.0102·cm

BASIC FUEL GEOMETRY CALCULATIONS:

The following geometry parameters are calculated or obtained directly from the fuel parameters given in the previous summary table.

o Fuel Pellet (pin) Radius and Diameter:

$$Pellet\_Dia := Rod\_Dia - 2 \cdot (Clad\_Thick + Gap)$$

$$Pellet\_Dia = 0.889 \cdot cm$$

$$Pellet\_Rad := \frac{Pellet\_Dia}{2}$$

$$Pellet\_Rad = 0.4445 \cdot cm$$

o Inner Cladding Radius and Diameter:

$$InClad\_Dia := Rod\_Dia - 2 \cdot Clad\_Thick$$

$$InClad\_Dia = 0.9093 \cdot cm$$

$$InClad\_Rad := \frac{InClad\_Dia}{2}$$

$$InClad\_Rad = 0.4547 \cdot cm$$

o Fuel Rod Radius and Diameter:

$$Rod\_Dia = 1.0541 \cdot cm$$

$$Rod\_Rad := \frac{Rod\_Dia}{2}$$

$$Rod\_Rad = 0.5271 \cdot cm$$

o Equivalent Radius of Fuel Cell (Cylindrical Model):

$$Cell\_Rad := \frac{Pitch}{\sqrt{\pi}}$$

$$Cell\_Rad = 0.7882 \cdot cm$$

Since all non-fuel rods in the fuel assembly are assumed to be water rods, the fuel cell pitch and the equivalent fuel cell radius must be modified to take these water rods into account. It is assumed that the water rods will be smeared out (homogenized) throughout the assembly volume.

$$Total\_Rod := Array$$

$$Total\_Rod = 225$$

$$Mod\_Pitch := Pitch \cdot \sqrt{\frac{Total\_Rod}{Number\_FuelRod}}$$

$$Mod\_Pitch = 1.4258 \cdot cm$$

$$Mod\_Cell\_Rad := \frac{Mod\_Pitch}{\sqrt{\pi}}$$

$$Mod\_Cell\_Rad = 0.8044 \cdot cm$$

BASIC VOLUME CALCULATIONS:

o Pellet (UO2) Volume:

$$Pellet\_Vol := Pellet\_Rad^2 \cdot \pi \cdot Act\_Length$$

$$Pellet\_Vol = 207.7986 \cdot cm^3$$

o Air Gap Volume:

$$Gap\_Vol := \left[InClad\_Rad^2 - Pellet\_Rad^2 \right] \cdot \pi \cdot Act\_Length$$

$$Gap\_Vol = 9.6079 \cdot cm^3$$

o Cladding Volume:

$$Clad\_Vol := \left[Rod\_Rad^2 - InClad\_Rad^2 \right] \cdot \pi \cdot Act\_Length$$

$$Clad\_Vol = 74.7413 \cdot cm^3$$

o Fuel Rod Total Volume:

$$Rod\_Vol := Rod\_Rad^2 \cdot \pi \cdot Act\_Length$$

$$Rod\_Vol = 292.1478 \cdot cm^3$$

o Water Moderator Volume (based on the designed pitch):

$$H2O\_Vol := Pitch^2 \cdot Act\_Length - Rod\_Vol$$

$$H2O\_Vol = 361.1962 \cdot cm^3$$

o Water Moderator Volume (based on the modified pitch):

$$Mod\_H2O\_Vol := Mod\_Pitch^2 \cdot Act\_Length - Rod\_Vol$$

$$Mod\_H2O\_Vol = 388.4189 \cdot cm^3$$

o Unit Cell Volume (based on the designed pitch):

$$Cell\_Vol := Rod\_Vol + H2O\_Vol$$

$$Cell\_Vol = 653.344 \cdot cm^3$$

o Unit Cell Volume (based on the modified pitch):

$$ModCell\_Vol := Rod\_Vol + Mod\_H2O\_Vol$$

$$ModCell\_Vol = 680.5667 \cdot cm^3$$

BASIC MASS CALCULATIONS:

o Molecular weight of commom material [Reference(10):

MW_U235 := 235.0·gm

MW_U238 := 238.0·gm

MW_UO2 := 270.3·gm

o Density of heavy metal (uranium) in the fuel rod:

$$UO2\_Theo\_Density := 10.96 \cdot \frac{gm}{cm^3}$$

Fuel_Density := Percent_Theo·UO2_Theo_Density

$$Fuel\_Density = 10.3024 \cdot \frac{gm}{cm^3}$$

$$Uranium\_Density := Fuel\_Density \cdot \frac{MW\_U238}{MW\_UO2}$$

$$Uranium\_Density = 9.0713 \cdot \frac{gm}{cm^3}$$

o Amount of heavy metal per assembly (calculated):

MHTU := Uranium_Density·Pellet_Vol·Number_FuelRod

MHTU = 0.4072·MTU

CALCULATION SHEET

4.1) Fuel at (3.3% U235, ~~1500~~ 1797 ppm B)

Refer to Reference (12) for generalized geometry cards in the KENO input.

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NULIF INPUT PARMETERS

NULIF requires the following parameters as input: dimensions of the fuel unit cell, reactor power history, power density based on the fuel cell volume, atomic densities of the materials in the fuel cell (fuel pellet, cladding, and moderator).

The basic dimensions of the fuel unit cell are given in previous sections. The fuel cell with the designed pitch will be used for all the NULIF calculations in this criticality analysis. The reactor operating cycle is taken as 16 months at full power and 2 months of outage. Other required parameters are calculated below:

** Atomic Density Calculations:

The following fuel parameter will be considered in this section:

$$Enrichment := 3.3 \cdot \%$$

$$Burnup := 0.0 \cdot \frac{GWd}{MTU}$$

$$Nat\_Boron\_Con := 1198 \cdot ppm$$

o U-235 atomic densities based on pellet volume:

$$N\_U235 := Uranium\_Density \cdot \frac{Avogadro}{MW\_U235} \cdot Enrichment$$

$$N\_U235 = 7.6711\ 10^{-4} \cdot \frac{atoms}{barn \cdot cm}$$

o U238 atomic densities based on pellet volume:

$$N\_U238 := Uranium\_Density \cdot \frac{Avogadro}{MW\_U238} \cdot (1.0 - Enrichment)$$

$$N\_U238 = 2.2195 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

o O16 atomic density based on pellet volume:

$$N\_O16 := 2 \cdot (N\_U238 + N\_U235)$$

$$N\_O16 = 4.5925 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

o Zirconium cladding atomic density is taken as:

$$N\_Zr40 := 4.291 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$ ....Reference(10)

o H1 atomic density in water:

$$N\_H1\_70F := 6.671 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 70F)

$$N\_H1\_212F := 6.406 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 212F)

o O16 atomic density in water:

$$N\_O16\_70F := 3.336 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 70F)

$$N\_O16\_212F := 3.203 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 212F)

o Natural boron concentration in water:

N_NatBoron_70f := Nat_Boron_Con·N_H1_70f

$$N\_NatBoron\_70f = 6.671 \cdot 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

N_NatBoron_212f := Nat_Boron_Con·N_H1_212f

$$N\_NatBoron\_212f = 6.406 \cdot 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

o Operating time required to attain the desired burnup level:

$$Operating\_Time := Burnup \cdot Number\_Assem \cdot \frac{MTHM}{Reactor\_Power}$$

Operating_Time = 0·day

NITAWL INPUT PARAMETERS

The first NITAWL computer run (see Figure[ ]) is used to format the cross sections from the 123 group cross section set contained in the AMPX master library. This NITAWL computer run also performs resonance self-shielding corrections for the following nuclides: U-236, U238, Pu-240, and Pu-242. If the loaded fuel is unirrediated (i.e., fresh fuel) then only U-238 is corrected for resonance self-shielding.

** Dancoff factor:

The Dancoff factor calculated by the NULIF code is given as:

Dancoff_NULIF := ~~0.7832~~ 0.7992 HHT

However the Dancoff factor from the NULIF output is not defined in the same way as the one requested by the NITAWL computer code. The NITAWL's Dancoff factor is defined as:

Dancoff_NITAWL := 1.0 - Dancoff_NULIF

Thus, for this case:

Dancoff_NITAWL = ~~0.2168~~ 0.2008 HHT

** Scattering Cross Sections Parameters

The following potential scattering cross sections are obtained from Reference(11).

$\sigma_{O16} := 3.8 \cdot barn$ $\sigma_{U235} := 10 \cdot barn$

$\sigma_{U236} := 10 \cdot barn$ $\sigma_{U238} := 9 \cdot barn$

$\sigma_{Pu240} := 11 \cdot barn$ $\sigma_{Pu242} := 11 \cdot barn$

1). U-238 Resonance Parameter:

For fresh fuel, the atomic density of U-238 (N_U238) previously calculated is used. For irradiated fuel, the N_U238 must be replaced with the value obtained from the NULIF burnup calculation results.

- First moderator (U-235) scattering cross section per absorber atom (U-238):

$$\sigma_{s1} := \frac{N_{U235}}{N_{U238}} \cdot \sigma_{U235}$$

$$\sigma_{s1} = 0.3456 \cdot barn$$

- Secund moderator (O-16) scattering cross section per absorber atom (U-238):

$$\sigma_{s2} := \frac{N_{016}}{N_{U238}} \cdot \sigma_{016}$$

$$\sigma_{s2} = 7.8627 \cdot barn$$

- Effective moderator cross section per absorber atom (U-238):

$$\sigma m_{eff} := \sigma_{U238} + (\sigma_{s1} + \sigma_{s2}) + \frac{1}{Pellet\_Dia \cdot N_{U238}}$$

$$\sigma m_{eff} = 67.8885 \cdot barn$$

XSDRNPM INPUT PARAMETERS

The geometric model for the XSDRNPM code is a cylindrical fuel unit cell with radius based on the modified pitch of the square unit cell. The dimensions of the fuel unit cells are calculated in section entitled "Basic Fuel Geometry Calculations". The atomic densities used in the XSDRNPM mixing table are the same as the values calculated in the "NULIF INPUT PARAMETERS" section. The fuel-clad air gap and the cladding region is combined together to form a single Zirconium region with the atomic density calculated below:

$$N\_Zr40\_XSD := \frac{Clad\_Vol}{Clad\_Vol + Gap\_Vol} \cdot N\_Zr40$$

$$N\_Zr40\_XSD = 3.8022\ 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

KENO INPUT PARAMETERS

The geometric models of the KENO-IV computer code are discussed in Section 5.0. Unless specifically noted, all the geometry cards of the KENO input remain the same as the reference geometric model discussed in Section 5.0. This section will calculated other input parameters applied to this particular KENO run.

Since the loaded fuel assemblies in the cask are homogenized, the atomic densities in the KENO mixing table must be based on the volume of the fuel cell (with modified pitch). The homogenized atom densities of all the nuclides in the fuel cell are calculated below:

$$N\_U235\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_U235$$

$$N\_U235\_Homo = 2.3422 \cdot 10^{-4} \cdot \frac{atoms}{barn \cdot cm}$$

$$N\_U238\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_U238$$

$$N\_U238\_Homo = 6.7769 \cdot 10^{-3} \cdot \frac{atoms}{barn \cdot cm}$$

$$N\_Zr40\_Homo := \frac{Clad\_Vol}{ModCell\_Vol} \cdot N\_Zr40$$

$$N\_Zr40\_Homo = 4.7125 \cdot 10^{-3} \cdot \frac{atoms}{barn \cdot cm}$$

$$N\_O16\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_O16 + \frac{Mod\_H2O\_Vol}{ModCell\_Vol} \cdot N\_O16\_70F$$

$$N\_O16\_Homo = 3.3062 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

$$N\_H1\_Homo := \frac{Mod\_H2O\_Vol}{ModCell\_Vol} \cdot N\_H1\_70F$$

$$N\_H1\_Homo = 3.8073 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

~~N_NatBoron_Homo := N_H1_Homo·Nat_Boron_Con~~

$$N\_NatBoron\_Homo = 3.8073 \cdot 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

```
!20B
/NOSEP
NULIF,PD,1600.  HENRY CHAN
USER,WKPPSN,CABX,NC.
CHARGE,N973301,V2C.
TITLE(ESSNUBI) EXXON PWR 15x15, 3.3% U235, BORATED WATER)
ATTACHP(LEB1,1,0)
ATTACHP(LEB2,1,0)
ATTACHP(LEB3,1,0)
REWIND,TAPE1,TAPE2,TAPE3.
ATTACHP,NULIF,9,1.
NULIF(PW=7777777)
/EOR
      =(ESSNUBI) EXXON PWR 15x15, 3.3% U235, BORATED WATER
      =General parameters!
      000001, 1, 0., 1.E-5, 1.E-20
      000002, 500
      000003, 1
      100001,   0.0,  1,  1.0,  1
      100002,   0.0,  1,  1.0,  1
      100003,   0.0,  1,  1.0,  1
      100004,   0.0,  1,  1.0,  1
      100005,   0.0,  1,  1.0,  1
      100006,   0.0,  1,  1.0,  1
      100007,   0.0,  1,  1.0,  1
      100008,   0.0,  1,  1.0,  1
      100009,   0.0,  1,  1.0,  1
      100010,   0.0,  1,  1.0,  1
      100011,   0.0,  1,  1.0,  1
      100012,   0.0,  1,  1.0,  0,  3
      =Composition data!
      300100, 2, 1
      =Cell geometry
      310100, 1, 0.8990, 0.9484, 1.0501, 1.4350, 0
      310101, 70.0, 70.0, 70.0, 0.0
      =Composition of fuel  at 12.3% U235 I.E.!
      320101, U235, 7.6211-4
      320102, U238, 2.2795-2
      320103, O16, 4.5935-2
      320501, Zr4, 4.29I-2
      =Compositions of water coolant(T= 70 F, P=14.7 psi)
      = EXXON PWR 15x15, 3.3% U235,    0ppm NAT. BORON
      340101, H1, 6.671-2
      340102, O16, 3.336-2
      340103, B10, 1.000-20
      /
      = EXXON PWR 15x15, 3.3% U235, 359ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,  B10, 3.933-6
      /
      = EXXON PWR 15x15, 3.3% U235, 838ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,  B10, 9.153-6
      /
      = EXXON PWR 15x15, 3.3% U235, 1197ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,  B10, 1.308-5
      /
      = EXXON PWR 15x15, 3.3% U235, 1436ppm NAT. BORON
      440101,  H1, 6.671-2
```

Note: All title card "PPM" values should be multiplied by a factor of 1.198 to convert value to WPPM Boron.

Ex = General Parameters:
:
:
300 PPM 1002, 0.0, 1, 1.0, 1

Should be
= General Parameters:
:
:
359 PPM 1002, 0.0, 1, 1.0, 1
(300x1.198)

```
440102, 016, 3.336-2
440103,  B10, 1.569-5
/                                   1676 ppm Cr
* EXXON PWR 15x15, 3.31 U235, 1600 ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.336-2
440103,  B10, 1.631-5
/                                   1915 ppm Cr
* EXXON PWR 15x15, 3.31 U235, 1800 ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.336-2
440103,  B10, 2.092-5
/                                   2155 ppm Cr
* EXXON PWR 15x15, 3.31 U235, 2000 ppm NAT. BORON
440101,  H1, 6.671-2
440103, 016, 3.336-2
440103,  B10, 2.354-5
/                                   2394 ppm Cr
* EXXON PWR 15x15, 3.31 U235, 2200 ppm NAT. BORON
440101,  H1, 6.671-2
440103  016, 3.336-2
440103,  B10, 2.615-5
/                                   2633 ppm Cr
* EXXON PWR 15x15, 3.31 U235, 2400 ppm NAT. BORON
440101,  H1, 6.671-2
440103, 016, 3.336-2
440103,  B10, 2.877-5
/                                   2872 ppm Cr
* EXXON PWR 15x15, 3.31 U235, 2600 ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.336-2
440103,  B10, 3.138-5
/                                   3112 ppm Cr
* EXXON PWR 15x15, 3.31 U235, 2800 ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.336-2
440103,  B10, 3.400-5
```

```
108
NOSEQ
ESSNXB,PO,T200  HENRY TRAN
USER,W19PBN,CASE,MC.
CHARGE,N9222D1,69C.
TITLE([ESSNXB1] EXXON 15X15 PWR, 3.3% U235, 1500 ppm NAT.BORON)
ATTACHP(NITAWL,1,2)
ATTACHP(AIM227,1,0A)
REWIND,TAPE1.
NITAWL,PL=777777.
REWIND,TAPE4.
REWIND,TAPE2.
COPYBF,TAPE4,TAPE2.
REWIND,TAPE4.
ATTACHP,XSDRNPM,1,0A.
(SHNPN,PL=777777)
REWIND,TAPE2,TAPE3.
RETURN,TAPE4.
ATTACHP,NITAW1,1,2.
NITAW,PL=777777.
REWIND,TAPE4.
RETURN,TAPE2,TAPE1.
(ABEL,TAPE4,W,D=96,L=ELSECT,VSN=000741.
COPYBF,TAPE4.
EOR
1##  6  91 0  0  0  3  4  5  12  0 -1  0  1
2##
    10000  +3002  410000 1200054  130300
   1400055 2100002 2300055 2500021 2900031  3200094
   922351  -25922351 -2392235?  -42922351 -5092235?
   922381  -25922381 +03922381  +42922381 -5092238?
   80004   -2560004  +2360004   +4280004  -5040004
   400040  -25400040 +2340040   -42400040 -5040040
   10001   +2510001  -2310001   +4210001  +5010001
   30100   -2350100  -2350100   +4250100  -5050100
3##
   922351 294.27  2  0.4445  0.2006  67.2219 2.2179?E+02
   235.0  2.3970E-1  1  15.99  7.79740  1  1.0
 2 922351 294.27  2  0.4445  6.2006  67.2014 2.2179?E 02
   235.0  6.597E-1  1  15.99  7.79740  1  1.0
 3 922381 294.27  2  0.4445  0.2006  67.8985 2.2395?E-02
   235.0  3.456E-1  1  15.99  7.86270  1  1.0
 4 92922381 294.27  2  0.4445  0.2006  68.6378 2.2990?E-02
   235.0  4.440E-1  1  15.99  7.93740  1  1.0
 5 92922381 294.27  2  0.4445  0.2006  69.1252 2.3035?E-02
   235.0  5.370E-1  1  15.99  8.00510  1  1.0
4
EOR
[ESSNXB1] EXXON 15X15 PWR, 3.3% U235, 1500 ppm NAT.BORON
1## 2  3  1  0  3  3.10  0  2  1  10  12  0  0  0
2## -2 -1 -1  E
3## 1  0  0  0  4.0  0  0  0  0  0  0  1  0
4## -1  123  0  -2  2  4  126  -1  0
5## 1.-4 2.-4 1.0 0.0 0.0  1.420892  E
 7
1### 1
     1 -1
     1
     2
     2
     3
     3  3
     3
```

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Generalized geometry cards

CALCULATION SHEET

4.2) Fuel at (3.3%, ~~1700~~ 2035 ppm B) HM

Same as Section (4.2) ; Except

ICENO input

CLIENT:	JOB NO.	REVISION:
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CHECKER:	DATE:	PAGE: 351

```
/JOB
/NOSEQ
[33K1B1,P6,T7000.  HENRY TRAN
USER,VK9PEN,CARK,NC.
CHARGE,N97330:,VSC.
TITLE([E3JK1B1] EIXON 15x15 PWR, 3.380235;1700 ppm NAT.BORON)
LABEL,TAPE4,D=DE,L=EYSECT,VSN=007421.
COPYBF,TAPE4,TAPE4.
REWIND,TAPE4.
RETURN,TAPE4.
PFL(CC=10)
ATTACHP,XENO4,1,ZA.
(ENO4,P1=777777.
/EOR
[E3JK1B1] EIXON 15x15 PWR, 3.380235,1700 ppm NAT.BORON
99.0  72   200  3    122  75   16   5    22   1
1     1    1    1    -18  1    0    2000 00   1
0     0    0    0    0    00   9    0
   0.0  -1.0    0.0  -1.0   -1.0  -1.0
1 -73922351     2.3422-4
1  37922581     6.7769-3
1  2660004      5.2062-2
1  3340000      6.7125-3
1  2210001      3.8973-2
1  3350100      1.2690-5
2  10001   6.671-4     2  80506   7.356-2     2  50100   2.222-5
2  60002   2.6100-3    3  250005  1.0900-3
2  260001  8.2000-2    2  140005  1.9400-4
2  820000  3.2960-2
5  10001   2.7700-2    5  50000   1.4600-3    5  80006   5.7100-2
5  110500  2.6000-4    5  120005  2.0300-4    5  130000  6.9700-3
5  140005  7.6700-4    5  260001  6.8700-5
```

generalized geometry cards

CALCULATION SHEET

4.3) Fuel at (2.5% U235, ~~400~~ 1077 ppm B)

See section (4.2) for NITAWL input

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CHECKER:	DATE:	PAGE: 37

NULIF INPUT PARMETERS

NULIF requires the following parameters as input: dimensions of the fuel unit cell, reactor power history, power density based on the fuel cell volume, atomic densities of the materials in the fuel cell (fuel pellet, cladding, and moderator).

The basic dimensions of the fuel unit cell are given in previous sections. The fuel cell with the designed pitch will be used for all the NULIF calculations in this criticality analysis. The reactor operating cycle is taken as 16 months at full power and 2 months of outage. Other required parameters are calculated below:

** Atomic Density Calculations:

The following fuel parameter will be considered in this section:

$$Enrichment := 2.5 \cdot \%$$

$$Burnup := 0.0 \cdot \frac{GWd}{MTU}$$

$$Nat\_Boron\_Con := 1000 \cdot ppm$$

o U-235 atomic densities based on pellet volume:

$$N\_U235 := Uranium\_Density \cdot \frac{Avogadro}{MW\_U235} \cdot Enrichment$$

$$N\_U235 = 5.8114 \cdot 10^{-4} \cdot \frac{atoms}{barn \cdot cm}$$

o U238 atomic densities based on pellet volume:

$$N\_U238 := Uranium\_Density \cdot \frac{Avogadro}{MW\_U238} \cdot (1.0 - Enrichment)$$

$$N\_U238 = 2.2379 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$

o O16 atomic density based on pellet volume:

$$N\_O16 := 2 \cdot (N\_U238 + N\_U235)$$

$$N\_O16 = 4.592 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$

o Zirconium cladding atomic density is taken as:

$$N\_Zr40 := 4.291 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm} \quad \text{....Reference(10)}$$

o H1 atomic density in water:

$$N\_H1\_70F := 6.671 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm} \quad (at\ T = 70F)$$

$$N\_H1\_212F := 6.406 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm} \quad (at\ T = 212F)$$

o O16 atomic density in water:

$$N\_O16\_70F := 3.336 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm} \quad (at\ T = 70F)$$

$$N\_O16\_212F := 3.203 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm} \quad (at\ T = 212F)$$

o Natural boron concentration in water:

N_NatBoron_70f := Nat_Boron_Con·N_H1_70f

$$N\_NatBoron\_70f = 6.671 \cdot 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

N_NatBoron_212f := Nat_Boron_Con·N_H1_212f

$$N\_NatBoron\_212f = 6.406 \cdot 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

o Operating time required to attain the desired burnup level:

$$Operating\_Time := Burnup \cdot Number\_Assem \cdot \frac{MTHM}{Reactor\_Power}$$

Operating_Time = 0·day

The NITAWL computer run (see figure[ ]) is used to [illegible] the cross sections from the 123 group cross section set contained in the AMPX master library. This NITAWL computer run also performs resonance self-shielding corrections for the following nuclides: U-236, U238, Pu-240, and Pu-242. If the loaded fuel is unirradiated (i.e., fresh fuel) then only U-238 is corrected for resonance self-shielding.

** Dancoff factor:

The Dancoff factor calculated by the NULIF code is given as:

Dancoff_NULIF := ~~0.7892~~ 0.7992 HH

However the Dancoff factor from the NULIF output is not defined in the same way as the one requested by the NITAWL computer code. The NITAWL's Dancoff factor is defined as:

Dancoff_NITAWL := 1.0 - Dancoff_NULIF

Thus, for this case:

Dancoff_NITAWL = ~~0.2168~~ 0.2008 HH

** Scattering Cross Sections Parameters

The following potential scattering cross sections are obtained from Reference(11).

σ_O16 := 3.8·barn σ_U235 := 10·barn

σ_U236 := 10·barn σ_U238 := 9·barn

σ_Pu240 := 11·barn σ_Pu242 := 11·barn

1). U-238 Resonance Parameter:

For fresh fuel, the atomic density of U-238 (N_U238) previously calculated is used. For irradiated fuel, the N_U238 must be replaced with the value obtained from the NULIF burnup calculation results.

- First moderator (U-235) scattering cross section per absorber atom (U-238):

$$\sigma_{s1} := \frac{N_{U235}}{N_{U238}} \cdot \sigma_{U235}$$

$$\sigma_{s1} = 0.2597 \cdot barn$$

- Second moderator (O-16) scattering cross section per absorber atom (U-238):

$$\sigma_{s2} := \frac{N_{O16}}{N_{U238}} \cdot \sigma_{O16}$$

$$\sigma_{s2} = 7.7974 \cdot barn$$

- Effective moderator cross section per absorber atom (U-238):

$$\sigma m_{eff} := \sigma_{U238} + (\sigma_{s1} + \sigma_{s2}) + \frac{1}{Pellet_{Dia} \cdot N_{U238}}$$

$$\sigma m_{eff} = 67.3214 \cdot barn$$

XSDRNPM INPUT PARAMETERS

The geometric model for the XSDRNPM code is a cylindrical fuel unit cell with radius based on the modified pitch of the square unit cell. The dimensions of the fuel unit cells are calculated in section entitled "Basic Fuel Geometry Calculations". The atomic densities used in the XSDRNPM mixing table are the same as the values calculated in the "NULIF INPUT PARAMETERS" section. The fuel-clad air gap and the cladding region is combined together to form a single Zirconium region with the atomic density calculated below:

$$N\_Zr40\_XSD := \frac{Clad\_Vol}{Clad\_Vol + Gap\_Vol} \cdot N\_Zr40$$

$$N\_Zr40\_XSD = 3.8022 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

KENO INPUT PARAMETERS

The geometric models of the KENO-IV computer code are discussed in Section 5.0. Unless specifically noted, all the geometry cards of the KENO input remain the same as the reference geometric model discussed in Section 5.0. This section will calculated other input parameters applied to this particular KENO run.

Since the loaded fuel assemblies in the cask are homogenized, the atomic densities in the KENO mixing table must be based on the volume of the fuel cell (with modified pitch). The homogenized atom densities of all the nuclides in the fuel cell are calculated below:

$$N\_U235\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_U235$$

$$N\_U235\_Homo = 1.7744 \cdot 10^{-4} \ \frac{atoms}{barn \cdot cm}$$

$$N\_U238\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_U238$$

$$N\_U238\_Homo = 6.833 \cdot 10^{-3} \ \frac{atoms}{barn \cdot cm}$$

$$N\_Zr40\_Homo := \frac{Clad\_Vol}{ModCell\_Vol} \cdot N\_Zr40$$

$$N\_Zr40\_Homo = 4.7125 \cdot 10^{-3} \ \frac{atoms}{barn \cdot cm}$$

$$N\_O16\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_O16 + \frac{Mod\_H2O\_Vol}{ModCell\_Vol} \cdot N\_O16\_70F$$

$$N\_O16\_Homo = 3.306 \cdot 10^{-2} \ \frac{atoms}{barn \cdot cm}$$

$$N\_H1\_Homo := \frac{Mod\_H2O\_Vol}{ModCell\_Vol} \cdot N\_H1\_70F$$

$$N\_H1\_Homo = 3.8073\ 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

~~$N\_NatBoron\_Homo := N\_H1\_Homo \cdot Nat\_Boron\_Con$~~

$$N\_NatBoron\_Homo = 3.8073\ 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

```
/JOB
'NOSIO
NULIF,P0,T600.  HENRY TEAS
USER,VK9PBN,CASK,NC.
LHARPOI,N973304,VSC.
TITLE([E25NUB1] EXXON PWR 15x15, 2.5% U235, BORATED WATER)
ATTACHP(LEB1,1,0)
ATTACHP(LEB2,1,0)
ATTACHP(LEB3,1,0)
REWIND,TAPE1,TAPE2,TAPE3.
ATTACHP,NULIF,9,1.
NULIF(P,s727777)
/EOR
      =[E25NUB1] EXXON PWR 15x15, 2.5% U235, BORATED WATER
      =General parameters
      000001, 1, 0,  1.0-5, 1.0-20
      000002, 500
      000007, 1
      100001,   0.0,  1, 1.0, 1, 3
      100002,   0.0,  1, 1.0, 1
      100003,   0.0,  1, 1.0, 1
      100004,   0.0,  1, 1.0, 1
      100005,   0.0,  1, 1.0, 1
      100006,   0.0,  1, 1.0, 1
      100007,   0.0,  1, 1.0, 1
      100008,   0.0,  1, 1.0, 1
      100009,   0.0,  1, 1.0, 1
      100010,   0.0,  1, 1.0, 1
      100011,   0.0,  1, 1.0, 1
      100012,   0.0,  1, 1.0, 0, 3
      =Composition data
      200100, 2, 1
      =Cell geometry
      310109, 1, 0.8890, 0.9094, 1.0541, 1.4238, 0
      310101, 20.0, 20.0, 10.0, 0.0
      =Compositions of fuel rod (2.5% U235 1.0/)
      320101, U235, 5.9118-4
      320102, U238, 2.3379-2
      320103, O16, 4.592e-2
      320104, ZR4, 4.291-2
      =Composition of water coolant(Ta 70 F, Pa14.7 psi)
      = EXXON PWR 15x15, 2.5% U235,   0ppm NAT. BORON
      340101,  H1, 6.671-2
      340102, O16, 3.33e-2
      340103,  B10, 1.009-20
      /                                  359 w.c.
      = EXXON PWR 15x15, 2.5% U235,  0ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.33e-2
      440103,  B10, 3.923-6
      /                                  838 w.c.
      = EXXON PWR 15x15, 2.5% U235,  700ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.33e-2
      440103,  B10, 9.152-6
      /                                  1147 w.c.
      = EXXON PWR 15x15, 2.5% U235,  1000ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.33e-2
      440103,  B10, 1.308-5
      /                                  1436 w.c.
      = EXXON PWR 15x15, 2.5% U235,  1200ppm NAT. BORON
      440101,  H1, 6.671-2
```

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```
440102, 016, 3.33e-2
440102,   B10, 1.569-5
/                                   1676 ppm
* EXXON PWR 15x15, 2.55 U235, ~~1000~~ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.33e-2
440103,   B10, 1.821-5
/                                   1915 ppm
* EXXON PWR 15x15, 2.55 U235, ~~1000~~ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.33e-2
440103,   B10, 2.092-5
/                                   2154 ppm
* EXXON PWR 15x15, 2.55 U235, ~~1000~~ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.33e-2
440103,   B10, 2.354-5
/                                   2394 ppm
* EXXON PWR 15x15, 2.55 U235, ~~1000~~ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.33e-2
440103,   B10, 2.615-5
/                                   2637 ppm
* EXXON PWR 15x15, 2.55 U235, ~~2000~~ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.33e-2
440103,   B10, 2.877-5
/                                   2878 ppm
* EXXON PWR 15x15, 2.55 U235, ~~1000~~ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.33e-2
440103,   B10, 3.138-5
/                                   3117 ppm
* EXXON PWR 15x15, 2.55 U235, ~~2000~~ppm NAT. BORON
440101,  H1, 6.671-2
440102, 016, 3.33e-2
440103,   B10, 3.400-5
/
END
```

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```
/JOB
/MODEV
E25N1B1,P0,T200. HENRY TRAN
USER,VH9PBN,CASH,NC.
CHARGE,N973301,V8L.                                    477 pp.
TITLE([E25N1B1] EXXON (5x15 PWR, 2.5% U235, 900 ppm NAT.BORON)
ATTACHF(NITAW,,,2)
ATTACHF(AIM123,1,0A)
REWIND,TAPE1.
LABEL,TAPE1,D=GE,L=FYSECT,VSN=007421.
COPYBF,TAPE1,TAPE2.
REWIND,TAPE2.
RETURN,TAPE1.
NITAW1,PL=777777.
RETURN,TAPE2.
REWIND,TAPE4.
COPYBF,TAPE4,TAPE2.
REWIND,TAPE4.
ATTACHP,XSDRNPM,1,0A.
(SDRNPM(PL=777777)
REWIND,TAPE2,TAPE3.
RETURN,TAPE4.
ATTACHP,NITAW1,1,2.
NITAW1(PL=777777)
REWIND,TAPE4.
RETURN,TAPE2,TAPE2.
 ABEL,TAPE1,W,D=GE,L=FYSECT,VSN=007421.
COPYBF,TAPE4,TAPE1.
/EOR
(49  5  2 36  0  0  5  4  0  12t  0 -1  0  1
2##  1001  80004
    50000  46002  110000 120005  130000
   140005 240002 250004 260001 280003  820040
    50100
     2592235  42922351 50922351
     2592381  42922381 50922381
     2580004  4.80004  5080004
     25400000  42200000 50400000
     2510001  4210001  5010001
     2500100  4250100  5050100
     32922351
     32922381
     3380004
     32400000
     3210001
     3250100
1
/EOR                                                   10 477 pp
[E25N1B1] EXXON (5x15 PWR, 2.5% U235, 900 ppm NAT.BORON
(49  2  3  11  0  3  3 10  8  3  1  10  12  0  0  0
2## -2 -1 -1  1
3##  1  0  0  0 4.0  0  0  0  0  0  1  0
4## -1  123  0  -2  5  4  12t  -1  0
5##  1.-4 2.-4 1.0 0.0 0.0  1.420892  1
 1
1##  1
     1  1
     1
     2
     2
     3
     3  3
     3
```

48 JM

```
1011
     0
     25922351      25922351
     2580004
     0
     23000000
     0
     2510001       2580004
     2550100
1544
     0.0
     5.811d-4      2.2279-2
     4.5920-2
     0.0
     5.8022-2
     0.0
     6.671-2       1.35e-1
     1.177+
 1
3344  5P1.0 F0.0
 1
2544  810.0  110.4445 310.5271   0.0044
3444  581    281      483
3544  1      2        3
1044  12
5144  12111.0  117.0
 1
7140
344  0 0 32 s  0   3 4 5 12x   0 +1  0
211
     10001  80004
     50000  60002  110000 120005  130000
     140005 240002 250005 260001 280003  820000
     50100
     42922351 50922351
     42922381 50922381
     4280004  5080304
     42400000 50400000
     4210001  5013001
     4250100  5050100
     32922751
     32922381
     3280004
     32400003
     3210001
     3250100
     25922351
     25922381
     2580004
     25800000
     2510001
     2550100
 1
7E0R
```

```
/JOB
/NOUSE
E25KIBI,Fo,T2000.  HENRY TEAM
USER,VK9PBN,CASK,NC.
CHARGE,N973501,VSC.                                    1077 m.t.
TITLE([E25KIBI] EXXON 15x15 PWR, 2.55U235, ~~400~~ ppm NAT.BORON)
LABEL,T4PEA,D=GE,L=EXPECT.VBN=007421.
COPYBF,TAPEA,TAPE4.
REWIND,TAPE4.
RETURN,TAPEA.
RFL(EC=10)
ATTACHP,KENO6,1,0=.
KENO6,PL=777777.
/ICM                                                   1077 m.t.
([E25KIBI] EXXON 15x15 PWR, 2.55U23%, ~~400~~ ppm NAT.BORON
99.0  72   300  3    121  75   19   5    22   0
1     1    1    1    -16  1    0    2000 60   1
0     0    0    0    6    00   0    0
      0.0  -1.0  0.0  -1.0  -1.0  -1.0
1 -2592235     1.7744-6
1  8922761     6.8330-5
1  258000      3.7060-2
1  2540000     4.7125-3
1  2910001     3.6073-2
   2850100     6.71E-4
2  10501  6.471-2     2  81004  3.328-2     2  50100  1.171-5
2  60002  2.6100-4    2  250005 1.0900-3
3  260001 8.1800-2    3  140003 1.9000-4
4  820000 2.2960-2
5  10001  2.1T0E-2    5  50000  1.4e00-2    5  80014  3.7100-2
5  110000 2.6600-4    5  120005 2.0800-4    5  130030 2.4700-3
5  140005 7.4700-4    5  260001 4.0900-5
```

Generalized geometry cards

50 JM

CALCULATION SHEET

4.4) Fuel at (4.2% U^{235}, ~~2340~~ 2754 ppm B)

See section (4.1) for NITAWL input

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NULIF INPUT PARAMETERS

NULIF requires the following parameters as input: dimensions of the fuel unit cell, reactor power history, power density based on the fuel cell volume, atomic densities of the materials in the fuel cell (fuel pellet, cladding, and moderator).

The basic dimensions of the fuel unit cell are given in previous sections. The fuel cell with the designed pitch will be used for all the NULIF calculations in this criticality analysis. The reactor operating cycle is taken as 16 months at full power and 2 months of outage. Other required parameters are calculated below:

** Atomic Density Calculations:

The following fuel parameter will be considered in this section:

$$Enrichment := 4.2 \cdot \%$$

$$Burnup := 0.0 \cdot \frac{GWd}{MTU}$$

$$Nat\_Boron\_Con := 1198 \cdot ppm$$

o U-235 atomic densities based on pellet volume:

$$N\_U235 := Uranium\_Density \cdot \frac{Avogadro}{MW\_U235} \cdot Enrichment$$

$$N\_U235 = 9.7632\ 10^{-4} \cdot \frac{atoms}{barn \cdot cm}$$

o U238 atomic densities based on pellet volume:

$$N\_U238 := Uranium\_Density \cdot \frac{Avogadro}{MW\_U238} \cdot (1.0 - Enrichment)$$

$$N\_U238 = 2.1989 \cdot 10^{2} \cdot \frac{atoms}{barn \cdot cm}$$

o O16 atomic density based on pellet volume:

$$N\_O16 := 2 \cdot (N\_U238 + N\_U235)$$

$$N\_O16 = 4.593 \cdot 10^{2} \cdot \frac{atoms}{barn \cdot cm}$$

o Zirconium cladding atomic density is taken a

$$N\_Zr40 := 4.291 \cdot 10^{2} \cdot \frac{atoms}{barn \cdot cm}$$ ....Reference(10)

o H1 atomic density in water:

$$N\_H1\_70F := 6.671 \cdot 10^{2} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 70f)

$$N\_H1\_212F := 6.406 \cdot 10^{2} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 212f)

o O16 atomic density in water:

$$N\_O16\_70F := 3.336 \cdot 10^{2} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 70f)

$$N\_O16\_212F := 3.203 \cdot 10^{2} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 212f)

o Natural boron concentration in water:

N_NatBoron_70F := Nat_Boron_Con·N_H1_70F

$$N\_NatBoron\_70F = 6.671\ 10^{-5}\ \cdot \frac{atoms}{barn \cdot cm}$$

N_NatBoron_212F := Nat_Boron_Con·N_H1_212F

$$N\_NatBoron\_212F = 6.406\ 10^{-5}\ \cdot \frac{atoms}{barn \cdot cm}$$

o Operating time required to attain the desired burnup level:

$$Operating\_Time := Burnup \cdot Number\_Assem \cdot \frac{MTHM}{Reactor\_Power}$$

Operating_Time = 0·day

NITAWL INPUT PARAMETERS

The first NITAWL computer run (see Figure[ ]) is used to format the cross sections from the 123 group cross section set contained in the AMPX master library. This NITAWL computer run also performs resonance self-shielding corrections for the following nuclides: U-236, U238, Pu-240, and Pu-242. If the loaded fuel is unirradiated (i.e., fresh fuel) then only U-238 is corrected for resonance self-shielding.

** Dancoff factor:

The Dancoff factor calculated by the NULIF code is given as:

Dancoff_NULIF := ~~0.1000~~ 0.7902 HHT

However the Dancoff factor from the NULIF output is not defined in the same way as the one requested by the NITAWL computer code. The NITAWL's Dancoff factor is defined as:

Dancoff_NITAWL := 1.0 - Dancoff_NULIF

Thus, for this case:

Dancoff_NITAWL = ~~0.8100~~ 0.2098 HHJ

** Scattering Cross Sections Parameters

The following potential scattering cross sections are obtained from Reference(11).

σ_O16 := 3.8·barn σ_U235 := 10·barn

σ_U236 := 10·barn σ_U238 := 9·barn

σ_Pu240 := 11·barn σ_Pu242 := 11·barn

1). U-238 Resonance Parameter:

For fresh fuel, the atomic density of U-238 (N_U238) previously calculated is used. For irradiated fuel, the N_U238 must be replaced with the value obtained from the NULIF burnup calculation results.

- First moderator (U-235) scattering cross section per absorber atom (U-238):

$$\sigma_{s1} := \frac{N\_U235}{N\_U238} \cdot \sigma\_U235$$

$\sigma_{s1} = 0.444 \cdot barn$

- Second moderator (O-16) scattering cross section per absorber atom (U-238):

$$\sigma_{s2} := \frac{N\_O16}{N\_U238} \cdot \sigma\_O16$$

$\sigma_{s2} = 7.9374 \cdot barn$

- Effective moderator cross section per absorber atom (U-238):

$$\sigma m\_eff := \sigma\_U238 + (\sigma_{s1} + \sigma_{s2}) + \frac{1}{Pellet\_Dia \cdot N\_U238}$$

$\sigma m\_eff = 68.5378 \cdot barn$

XSDRNPM INPUT PARAMETERS

The geometric model for the XSDRNPM code is a cylindrical fuel unit cell with radius based on the modified pitch of the square unit cell. The dimensions of the fuel unit cells are calculated in section entitled "Basic Fuel Geometry Calculations". The atomic densities used in the XSDRNPM mixing table are the same as the values calculated in the "NULIF INPUT PARAMETERS" section. The fuel-clad air gap and the cladding region is combined together to form a single Zirconium region with the atomic density calculated below:

$$N\_Zr40\_XSD := \frac{Clad\_Vol}{Clad\_Vol + Gap\_Vol} \cdot N\_Zr40$$

$$N\_Zr40\_XSD = 3.8022 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

KENO INPUT PARAMETERS

The geometric models of the KENO-IV computer code are discussed in Section 5.0. Unless specifically noted, all the geometry cards of the KENO input remain the same as the reference geometric model discussed in Section 5.0. This section will calculated other input parameters applied to this particular KENO run.

Since the loaded fuel assemblies in the cask are homogenized, the atomic densities in the KENO mixing table must be based on the volume of the fuel cell (with modified pitch). The homogenized atom densities of all the nuclides in the fuel cell are calculated below:

$$N\_U235\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_U235$$

$$N\_U235\_Homo = 2.981 \cdot 10^{-4} \cdot \frac{atoms}{barn \cdot cm}$$

$$N\_U238\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_U238$$

$$N\_U238\_Homo = 6.7138 \cdot 10^{-3} \cdot \frac{atoms}{barn \cdot cm}$$

$$N\_Zr40\_Homo := \frac{Clad\_Vol}{ModCell\_Vol} \cdot N\_Zr40$$

$$N\_Zr40\_Homo = 4.7125 \cdot 10^{-3} \cdot \frac{atoms}{barn \cdot cm}$$

$$N\_O16\_Homo := \frac{Pellet\_Vol}{ModCell\_Vol} \cdot N\_O16 + \frac{Mod\_H2O\_Vol}{ModCell\_Vol} \cdot N\_O16\_70F$$

$$N\_O16\_Homo = 3.3063 \cdot 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

$$N\_H1\_Homo := \frac{Mod\_H2O\_Vol}{ModCell\_Vol} \cdot N\_H1\_70f$$

$$N\_H1\_Homo = 3.8073\ 10^{-2} \cdot \frac{atoms}{barn \cdot cm}$$

~~$N\_NatBoron\_Homo := N\_H1\_Homo \cdot Nat\_Boron\_Con$~~

$$N\_NatBoron\_Homo = 3.8073\ 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

```
$JOB
/NOBEG
MULTI,F0,T600.  HENRY TRAN
USER,VK9PSN,CASK,NC.
CHARGE,N973301,VSC.
TITLE(IE42NUBI) EXXON PWR 15x15, 4.2% U235, BORATED WATER.
ATTACHP(LEB1,1,0)
ATTACHP(LEB2,1,0)
ATTACHP(LEB3,1,0)
PE(KIND,TAPE1,TAPE2,TAPE3.
ATTACHP,NULIF,9,1.
NULIF(PL=777777)
$EOF
      =(E42NUBI) EXXON PWR 15x15, 4.2% U235, BORATED WATER
      =General parameters=
      000001, 5, 0,  1.0-5, 1.0+20
      000002, 500
      000003, 1
 4ppm 100001,   0.0,  1, 1.0, 1, 2
500ppm 100002,   0.0,  1, 1.0, 1
1000ppm 100003,   0.0,  1, 1.0, 1
1500ppm 100004,   0.0,  1, 1.0, 1
2000ppm 100005,   0.0,  1, 1.0, 1
2500ppm 100006,   0.0,  1, 1.0, 1
3000ppm 100007,   0.0,  1, 1.0, 1
3500ppm 100008,   0.0,  1, 1.0, 1
4000ppm 100009,   0.0,  1, 1.0, 1
4500ppm 100010,   0.0,  1, 1.0, 1
5000ppm 100011,   0.0,  1, 1.0, 1
5600ppm 100012,   0.0,  1, 1.0, 1
6200ppm 100013,   0.0,  1, 1.0, 0, 3
      =Composition data=
      300100, 2, 1
      =Cell geometry=
      310100, 1, 0.8890, 0.9094, 1.0561, 1.0258, 0
      310101, 70.0, 70.0, 7000, 0.0
      =Compositions of fuel rod (4.2% U235 1.0)=
      320101, U235, 9.7622-4
      320102, U238, 2.1989-2
      320103, O16, 4.5930-2
      330101, ZR4, 4.291-2
      =Compositions of water (density(@ 70.F, Pw14.7 psi)
      = EXXON PWR 15x15, 4.2% U235,    0ppm NAT. BORON
      340101,  H1, 6.671-2
      340102, O16, 3.336-2
      340102, B10, 1.000-20
      /                                  500 ppm
      = EXXON PWR 15x15, 4.2% U235, 500ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,  B10, 3.923-6
      /                                  838 ppm
      = EXXON PWR 15x15, 4.2% U235, 838ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,  B10, 9.153-6
      /                                  1197 ppm
      = EXXON PWR 15x15, 4.2% U235, 1197ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,  B10, 1.308-5
      /                                  1436 ppm
      = EXXON PWR 15x15, 4.2% U235, 1436ppm NAT. BORON
```

60 BP

```
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 1.8e9-5
/                                  1476 ppm B
* EXXON PWR 15x15, 4.2% U235, 1400ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 1.851-5
/                                  1195 ppm B
* EXXON PWR 15x15, 4.2% U235, 1000ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 2.092-5
/                                  2155 ppm B
* EXXON PWR 15x15, 4.2% U235, 1800ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 2.756-5
/                                  2394 ppm B
* EXXON PWR 15x15, 4.2% U235, 2000ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 2.615-5
/                                  3234 ppm B
* EXXON PWR 15x15, 4.2% U235, 2700ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 3.877-5
/                                  3473 ppm B
* EXXON PWR 15x15, 4.2% U235, 2900ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 3.739-5
/                                  3712 ppm B
* EXXON PWR 15x15, 4.2% U235, 3100ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 3.600-5
/                                  3951 ppm B
* EXXON PWR 15x15, 4.2% U235, 3300ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 3.462-5
/
/EOF
```

19 SM

```
/JOB
/NOSEQ
E42NXBI,P0,T200. HENRY TRAN
USER,VK9PBN,CASK,NC.
CHARGE,N973301,VSC.                                    2753 cm c —
TITLE/[E42NXBI] EXXON 15x15 PWR, 4.2% U235, 2300 ppm NAT.BORON)
LABEL,TAPEA,D=0F,L=EXSECT,VSN=007421.
COPYBF,TAPEA,TAPE4.
RETURN,TAPEA.
REWIND,TAPE4.
COPYBF,TAPE4,TAPE2.
REWIND,TAPE4.
ATTACHP,XSDRNPM,I,DA.
XSDRNPM(PL=777777)
REWIND,TAPE2,TAPE3.
RETURN,TAPE4.
ATTACHP,NITAWL,1,2.
NITAWL(PL=777777)
REWIND,TAPE4.
RETURN,TAPE2,TAPE3.
LABEL,TAPEA,M,D=GE,L=EXSECT,VSN=007421.
COPYBF,TAPE4,TAPEA.
*EOR                                                   2753 cm c
[E42NXBI] EXXON 15x15 PWR, 4.2% U235, 2300 ppm NAT.BORON
100  7  2  11  0  2  1.26  5  2  3  10 12  0  0  0
200 -2 -1 -1  1
300  1    0  1.0  0.0   0  0  0  0  0  0  1.0
400 -1  122  0     2  3  126  -1  0
500  1.-6 2.-6 1.0 0.0 0.0     1.420893 1
 1
1200  1
      1  1
      1
      2
      2
      3
      3  3
      4
      4
1400
      0
      42922351      42922361
      4220004
      0
      42400000
      0
      4210001       4280004
      4230100
1500
      0.0
      4.7632-4      2.1989-2
      4.5930-2
      0.0
      3.8022-2
      0.0
      6.671-2       3.336-2
      3.067-5
 1
2300   5R1.0 F0.0
 1
3500  410.0  110.4485 310.5271   0.8044
3600  5R1    2R2      4R3
3900  1      2        3
4000  F3
```

62 8M

```
5144  12111-0  121-0
  1
/EOF
144  0 0 32 6  0   5 0 6 12e   0 -1  0  1
241
      10001  80004
      50000  60002  110000 120005  130000
      140005 240003 250005 260001 280003  020000
      50100
      50922351
      50922391
      5060004
      50600000
      5010001
      5050100
      35922351
      35922381
      3580004
      35400000
      3510001
      3550100
      2592351
      2592381
      2580004
      25400000
      2510001
      2550100
      42952351
      42952381
      4280004
      42400000
      4210001
       4250100
  1
/EOF
```

```
/JOB
/NOSEQ
E42KEB1,PC,T2000.  HENRY TRAN
USER,VM/PSN,CASE,MC.
CHARGE,N97J301,VSC.                          2753 m. c.
TITLE([E42KEB1] EXXON 15x15 PWR, 4.2%U235, 2300 ppm NAT.BORON)
ABEL,TAPEA,D=GE,L=EXEC7,VSN=007421.
COPYBF,TAPEA,TAPE4.
REWIND,TAPE4.
PE ,A,,TAPEA.
RFL(EC=10)
ATTACHP,XEN04,,,3A.
XEN04,PL=777777.
/EOR                                         2753 m. c.
[E42KEB1] EXXON 15x15 PWR, 4.2%U235, 2300 ppm NAT.BORON
99.0  72  700  3    123  75   18   5    22   6
1     1   1    1    -1P  1    0    2900 00   0
0     0   0    0    6    00   0    0
   0.0  -1.0    0.0  -1.0    -1.0  -1.0
1-4292351     2.9810-4
1  4292381     6.7178-3
   4280004     2.3063-2
1  4240000     4.7125-7
   4210001     2.6073-2
1  4250100     1.7160-5
2  10001  6.671-2     2  80004  3.336-2     2  50100  3.002-5
2  60002  2.4180-4    3  250305 1.1350-3
2  260001 6.2000-2    3  140005 1.9030-4
4  420000 3.2960-2
5  10001  1.7780-2    5  30000  1.4600-3    5  80004  3.7100-2
5  110000 2.6000-4    5  120005 2.0800-4    5  130000 8.9700-2
5  140005 7.6763-4    5  260001 6.6900-5
```

Generalized geometry cards

CALCULATION SHEET

4.5) Fuel at (5.0% U235, ~~2500~~ 3354 ppm B)

Only NULIF run is performed.
Keff for this case is extrapolated
from Figure (2-1).

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N. IF INPUT PARMETERS

NULIF requires the following parameters as input: dimensions of the fuel unit cell, reactor power history, power density based on the fuel cell volume, atomic densities of the materials in the fuel cell (fuel pellet, cladding, and moderator).

The basic dimensions of the fuel unit cell are given in previous sections. The fuel cell with the designed pitch will be used for all the NULIF calculations in this criticality analysis. The reactor operating cycle is taken as 16 months at full power and 2 months of outage. Other required parameters are calculated below:

** Atomic Density Calculations:

The following fuel parameter will be considered in this section:

$$Enrichment := 5.0 \cdot \%$$

$$Burnup := 0.0 \cdot \frac{GWd}{MTU}$$

$$Nat\_Boron\_Con := 1198 \cdot ppm$$

o U-235 atomic densities based on pellet volume:

$$N\_U235 := Uranium\_Density \cdot \frac{Avogadro}{MW\_U235} \cdot Enrichment$$

$$N\_U235 = 1.1623 \cdot 10^{-3} \cdot \frac{atoms}{barn \cdot cm}$$

o U238 atomic densities based on pellet volume:

$$N\_U238 := Uranium\_Density \cdot \frac{Avogadro}{MW\_U238} \cdot (1.0 - Enrichment)$$

$$N\_U23B = 2.1805 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$

o O16 atomic density based on pellet volume:

$$N\_O16 := 2 \cdot (N\_U23B + N\_U235)$$

$$N\_O16 = 4.5935 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$

o Zirconium cladding atomic density is taken as:

$$N\_Zr40 := 4.291 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$ ....Reference(10)

o H1 atomic density in water:

$$N\_H1\_70F := 6.671 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 70F)

$$N\_H1\_212F := 6.406 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 212F)

o O16 atomic density in water:

$$N\_O16\_70F := 3.336 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 70F)

$$N\_O16\_212F := 3.203 \cdot 10^{22} \cdot \frac{atoms}{barn \cdot cm}$$ (at T = 212F)

o Natural boron concentration in water:

N_NatBoron_70F := Nat_Boron_Con·N_H1_70F

$$N\_NatBoron\_70F = 6.671\ 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

N_NatBoron_212F := Nat_Boron_Con·N_H1_212F

$$N\_NatBoron\_212F = 6.406\ 10^{-5} \cdot \frac{atoms}{barn \cdot cm}$$

o Operating time required to attain the desired burnup level:

$$Operating\_Time := Burnup \cdot Number\_Assem \cdot \frac{MTHM}{Reactor\_Power}$$

$$Operating\_Time = 0 \cdot day$$

NITAWL INPUT PARAMETERS

The first NITAWL computer run (see Figure[ ]) is used to format the cross sections from the 123 group cross section set contained in the AMPX master library. This NITAWL computer run also performs resonance self-shielding corrections for the following nuclides: U-236, U238, Pu-240, and Pu-242. If the loaded fuel is unirradiated (i.e., fresh fuel) then only U-238 is corrected for resonance self-shielding.

** Dancoff factor:

The Dancoff factor calculated by the NULIF code is given as:

Dancoff_NULIF := ~~0.7832~~ 0.7992 HH

However the Dancoff factor from the NULIF output is not defined in the same way as the one requested by the NITAWL computer code. The NITAWL's Dancoff factor is defined as:

Dancoff_NITAWL := 1.0 - Dancoff_NULIF

Thus, for this case:

Dancoff_NITAWL = ~~0.21682~~ 0.2008 HH

** Scattering Cross Sections Parameters

The following potential scattering cross sections are obtained from Reference(11).

σ_O16 := 3.8·barn

σ_U235 := 10·barn

σ_U236 := 10·barn

σ_U238 := 9·barn

σ_Pu240 := 11·barn

σ_Pu242 := 11·barn

1). U-238 Resonance Parameter:

For fresh fuel, the atomic density of U-238 (N_U238) previously calculated is used. For irradiated fuel, the N_U238 must be replaced with the value obtained from the NULIF burnup calculation results.

- First moderator (U-235) scattering cross section per absorber atom (U-238):

$$\sigma_{s1} := \frac{N_{U235}}{N_{U238}} \cdot \sigma_{U235}$$

$$\sigma_{s1} = 0.533 \cdot barn$$

- Second moderator (O-16) scattering cross section per absorber atom (U-238):

$$\sigma_{s2} := \frac{N_{O16}}{N_{U238}} \cdot \sigma_{O16}$$

$$\sigma_{s2} = 8.0051 \cdot barn$$

- Effective moderator cross section per absorber atom (U-238):

$$\sigma m_{eff} := \sigma_{U238} + (\sigma_{s1} + \sigma_{s2}) + \frac{1}{Pellet\_Dia \cdot N_{U238}}$$

$$\sigma m_{eff} = 69.1253 \cdot barn$$

```
/JOB
/NOSEQ
NULIF,PD,T600.  HENRY TRAN
USER,VK9PBN,CASK,NC.
CHARGE,N973301,VSC.
TITLE(E5ONUBI) EXXON PWR 15x15, 5.0% U235, BORATED WATER)
ATTACHP(LEB1,1,0)
ATTACHP(LEB2,1,0)
ATTACHP(LEB3,1,0)
REWIND,TAPE1,TAPE2,TAPE3.
ATTACHP,NULIF,9,1.
NULIF(PL=777777)
/EOF
      =[E5ONUBI] EXXON PWR 15x15, 5.0% U235, BORATED WATER
      =General parameters!
      000001, 3, 0,  1.0-5, 1.0-20
      000002, 500
      000003, 1
  0ppm 100001,   0.0,  1, 1.0, 1, 3
300ppm 100002,   0.0,  1, 1.0, 1
700ppm 100003,   0.0,  1, 1.0, 1
1000ppm 100004,  0.0,  1, 1.0, 1
1200ppm 100005,  0.0,  1, 1.0, 1
1400ppm 100006,  0.0,  1, 1.0, 1
1600ppm 100007,  0.0,  1, 1.0, 1
1800ppm 100008,  0.0,  1, 1.0, 1
2000ppm 100009,  0.0,  1, 1.0, 1
2200ppm 100010,  0.0,  1, 1.0, 1
2400ppm 100011,  0.0,  1, 1.0, 1
2600ppm 100012,  0.0,  1, 1.0, 1
2800ppm 100013,  0.0,  1, 1.0, 0, 1
      =Composition data!
      300100, 2, 1
      =Cell geometry
      310100, 1, 0.8890, 0.9094, 1.0541, 1.4255, 0
      310101, 70.0, 70.0, 70.0, 0.0
      =Compositions of fuel rod (5.0% U235 1.2
      320101, U235, 1.3623-3
      320102, U238, 2.1905-2
      320103, O16, 4.5935-2
      330101, ZY4, 4.291-2
      =Compositions of water coolant(T= 70 F, P=14.7 psi)
      = EXXON PWR 15x15, 5.0% U235,   0ppm NAT. BORON
      340101,  H1, 6.671-2
      340102, O16, 3.336-2
      340103,  B10, 1.000-20
      /
                                  350 ppm
      = EXXON PWR 15x15, 5.0% U235, 300ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,   B10, 3.923-6
      /
                                  838 ppm
      = EXXON PWR 15x15, 5.0% U235, 700ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,   B10, 9.153-6
      /
                                  1197 ppm
      = EXXON PWR 15x15, 5.0% U235, 1000ppm NAT. BORON
      440101,  H1, 6.671-2
      440102, O16, 3.336-2
      440103,   B10, 1.308-5
      /
                                  1436 ppm
      = EXXON PWR 15x15, 5.0% U235, 1200ppm NAT. BORON
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71 BM

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440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 1.569-5
/                                  1676 ppm. boron
* EXXON PWR 15x15, 5.0% U235, 1600ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 1.831-5
/                                  1915 ppm. boron
* EXXON PWR 15x15, 5.0% U235, 1800ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 2.092-5
/                                  2155 ppm. boron
* EXXON PWR 15x15, 5.0% U235, 2000ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 2.354-5
/                                  2394 ppm. boron
* EXXON PWR 15x15, 5.0% U235, 2200ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 2.615-5
/                                  2633 ppm. boron
* EXXON PWR 15x15, 5.0% U235, 2400ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 2.877-5
/                                  2873 ppm. boron
* EXXON PWR 15x15, 5.0% U235, 2600ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 3.138-5
/                                  3112 ppm. boron
* EXXON PWR 15x15, 5.0% U235, 2800ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 3.400-5
/                                  3351 ppm. boron
* EXXON PWR 15x15, 5.0% U235, 3000ppm NAT. BORON
440101,  H1, 6.671-2
440102, O16, 3.336-2
440103,  B10, 3.923-5
/
```
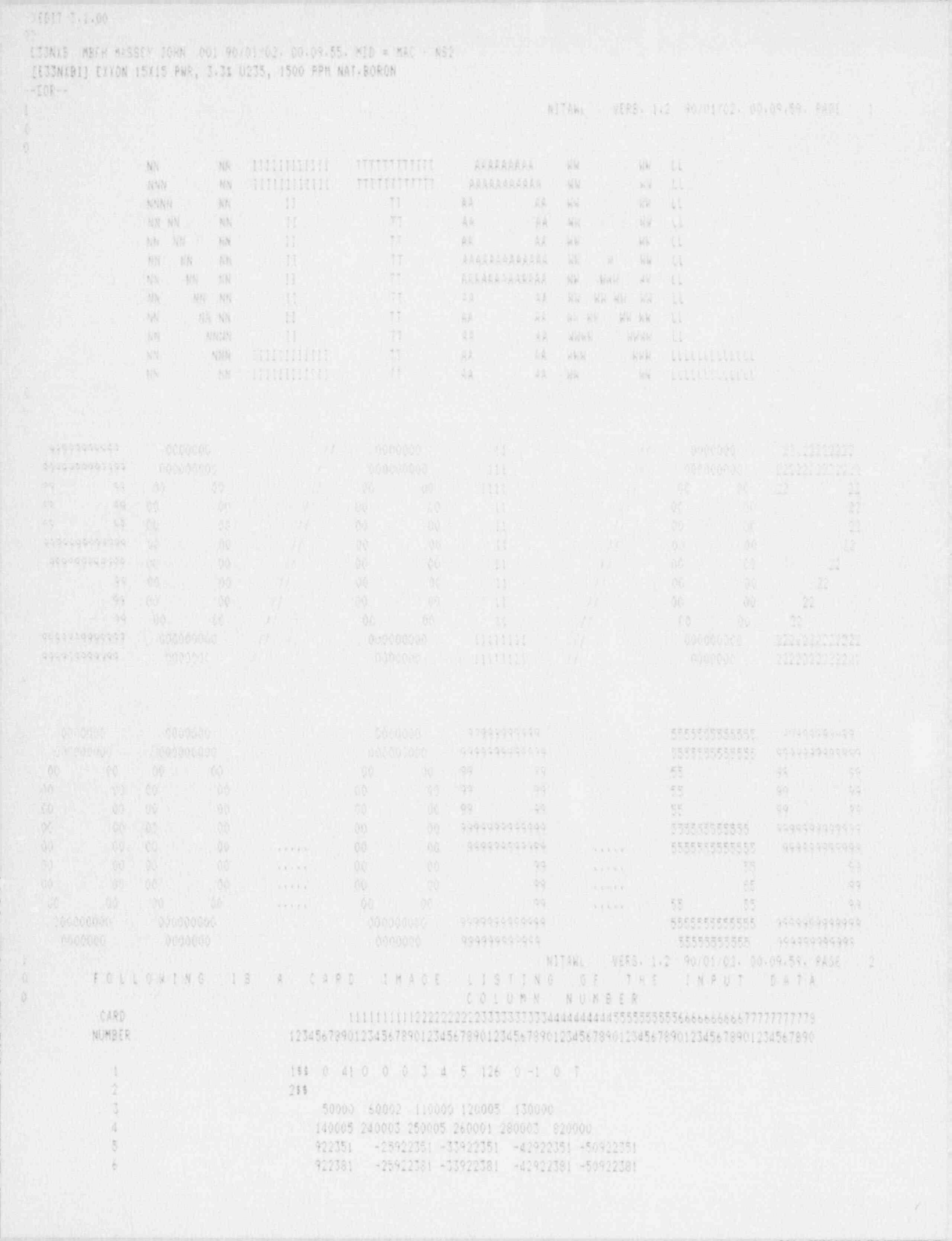

(SOR

```
01.44.22.USER,VAPSN,,NC.
03.44.23.ABSC, 0.
03.44.22. YOUR PASSWORD EXPIRES AT 00.00.00 ON 90/02/08.
03.44.22.CHARGE,6973301,VSC.
03.44.24. CHARGE = 6973301, PROJECT = VSC.
03.44.24.1111201.
03.44.24.PROC1. SYSTEM PROLOGUE
03.44.24.COMMENT. SYSTEM PROLOG
05.44.24.NEW$(A).
03.44.25.EMEXIF.
03.44.26. INQUIRY COMPLETE.
03.44.26.REVERT.
03.44.26.TITLE(ESSNUBI) EXXON PWR 15X15, 3.3% U235, BURATED WATER)
03.44.26.ATTACHPUBF(1,6)
05.44.26.    STOP
07.44.26.    025200 MAXIMUM EXECUTION FL.
01.44.28.        0.148 CP SECONDS EXECUTION TIME
03.44.29.ATTACHPUBF(2,6)
03.45.00.    STOP
07.45.00.    025200 MAXIMUM EXECUTION FL.
01.45.01.        0.242 CP SECONDS EXECUTION TIME
03.44.31.ATTACHPUBF(3,6)
03.44.31.    STOP
07.44.31.    025200 MAXIMUM EXECUTION FL.
01.44.32.        0.245 CP SECONDS EXECUTION TIME
03.44.3.REWIND,TAPE1,TAPE2,TAPE3.
03.44.31.ATTACHP,MULTF,9,T.
03.44.32.    STOP
07.44.33.    025200 MAXIMUM EXECUTION FL.
01.44.33.        0.289 CP SECONDS EXECUTION TIME
03.44.33.MULTF(A,T77777)
03.44.44.TIME =    1000, KEFF = 1.01147
03.44.46.TIME =     800, KEFF = 1.04092
03.44.51.TIME =     700, KEFF = 1.05342
03.44.55.TIME =     600, KEFF = 1.06357
03.44.59.TIME =     500, KEFF = 1.07494
03.45.04.TIME =     400, KEFF = 1.08515
03.45.09.TIME =     300, KEFF = 1.09849
03.45.12.TIME =     250, KEFF = 1.09864
03.45.16.TIME =     200, KEFF = 1.09826
03.45.22.TIME =     150, KEFF = 1.09759
03.45.26.TIME =     100, KEFF = 1.09853
03.45.30.TIME =    1000, KEFF = 1.09557
03.45.30.    STOP 222
03.45.30.    030100 MAXIMUM EXECUTION FL.
03.45.31.        61.326 CP SECONDS EXECUTION TIME.
03.45.31.VERF,     0.11A7UNS.
03.45.31.VEMS,    102.660K0W3.
03.45.31.DECP,     62.522SECS.
03.45.31. BPU,    133.480UNTS.
03.45.31.$OUT(*/DP=E)
03.45.31. NO FILES PROCESSED.
03.45.31.$DAYFILE(OUTPUT,JT=D)
03.45.31.IABO,    472B BDBS FN=OUTPUT.
03.45.31.POWER COMPUTING/990 - NOS 2.7.1.10
03.45.31.DATE:          89/12/29.
03.45.31.JSN:           MHIH
END OF FILE
```

```
EDIT 7.1.00

[I3NIB  MECH MASSEY JOHN  001 90/01/02. 00.09.55. MID = MAC - NS2
[EI3NIBI] EXION 15X15 PWR, 3.3% U235, 1500 PPM NAT.BORON
-EOR--
```



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                                                                    NITAWL   VERS. 1.2  90/01/02. 00.09.59. PAGE    1
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                                                                    NITAWL   VERS. 1.2  90/01/03. 00.09.59. PAGE    2
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0        F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
                                                  C O L U M N   N U M B E R
      CARD                        1111111111222222222233333333334444444444555555555566666666677777777779
      NUMBER                 12345678901234567890123456789012345678901234567890123456789012345678901234567890

        1                    1$$  0  41 0  0  0  3  4  5  126  0 -1  0  7
        2                    2$$
        3                         50000  60002  110000 120005  130000
        4                         140005 240003 250005 260001 280003  820000
        5                         922351   -28922351 -33922351  -42922351 -50922351
        6                         922381   -25922381 -33922381  -42922381 -50922381
```

```
                                  4000+0  -2540000  -3300000  -4216000  -5040000
                                  10301   -2510001  -2310001  -4210001  -5010001
                                  50100   -2350100  -3350100  -4250100  -5050100
                              3**
                                 922381  294.27  2  0.4445  0.2000  67.0214 2.237901E-02
                               1  235.0  2.597E-1  1  15.99  7.79740  1  1.0
                                2922381  294.27  2  0.4445  0.2000  67.0214 2.237901E-02
                               1  235.0  2.597E-1  1  15.99  7.79740  1  1.0
                                3922381  294.27  2  0.4445  0.2000  67.6685 2.219501E-02
                               1  235.0  3.456E-1  1  15.99  7.84270  1  1.0
                                4922381  294.27  2  0.4445  0.2000  68.8378 2.189940E-02
                               1  235.0  4.440E-1  1  15.99  7.93740  1  1.0
                                5922381  294.27  2  0.4445  0.2000  69.1253 2.180650E-02
                               1  235.0  5.320E-1  1  15.99  8.00810  1  1.0
                              7*
0       ********************************** E N D   O F   I N P U T   L I S T I N G **********************************
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                                                                    NITAWL   VERS. 5.0  04/01/02. 08:26:59. PAGE    2
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```
 =0 ARRAY     10 ENTRIES READ
  0T
 NSCR =    NUMBER OF EXTRA CROSS SECTIONS                                0
 NNT  =    NUMBER OF NUCLIDES FROM MASTER LIBRARY                       41
 NNT  =    NUMBER OF NUCLIDES FROM 1-BASIC LIBRARY (LOD 1)
 NNT  =    NUMBER OF NUCLIDES FROM 1-BASIC LIBRARY (LOD 5)
 NOR  =    ANISN/DOT-HORSE OUTPUT TRIGGER
 MAX  =    TOTAL CROSS SECTION POSITION                                  7
 NS   =    WITHIN-GROUP SCATTERING CROSS SECTION POSITION                4
 IRES =    NUMBER OF RESONANCE CALCULATIONS                              5
 IDM  =    TABLE LENGTH FOR CROSS SECTIONS                             120
 IPR  =    IS AN OLD ANISN LIBRARY MOUNTED ? (0=1 NO/YES)                0
 IPO  =    OUTPUT OPTION TRIGGER                                        -1
 IPC  =    PRINT CONTROL - ANISN OUTPUT                                  0
DYNE STORAGE ALLOCATED FOR THIS CASE IS  32000 WORDS
 =9 ARRAY     41 ENTRIES READ
 =0 ARRAY     75 ENTRIES READ
  0T
0 GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
  TAPE IDENTIFICATION NUMBER                    0
  NUMBER OF NUCLIDES ON TAPE                  205
  NUMBER OF NEUTRON ENERGY GROUPS             123
  FIRST THERMAL NEUTRON ENERGY GROUP           92
  NUMBER OF GAMMA ENERGY GROUPS                 0
0 XSDRN TAPE     0
                    SUPER-XSDRN LIBRARY--LAST DIGITS OF ID #'S ARE CODED AS FOLLOWS--      0-300K,1
                    -600K,7-850K,8-750K,9-1000K,ANYTHING ELSE IS PRECISELY THAT--IF THESE THERMAL TE
                    MPERATURES ARE DESIRED, CALL C.W. CRAVEN, JR. OR       N. M. GREENE----ALL THER
                    MAL DATA IS PO (1FTQ#94).  ALSO J. WILSON DATA  AND 3 1/9 NUCLIDES       JULY, 1
                    969                                  -THIS IS A CONVERTED TAPE
0 NUCLIDES FROM XSDRN TAPE
    1     URANIUM-235                 THERMAL TEMPERATURE = 294.6 K            922351
    2     URANIUM-235                 THERMAL TEMPERATURE = 294.6 K          2922351
    3     URANIUM-235                 THERMAL TEMPERATURE = 294.6 K          3922351
    4     URANIUM-235                 THERMAL TEMPERATURE = 294.6 K          4922351
    5     URANIUM-235                 THERMAL TEMPERATURE = 294.6 K          5922351
    6     URANIUM-238R                THERMAL TEMPERATURE = 294.6 K           922381
    7     URANIUM-238R                THERMAL TEMPERATURE = 294.6 K          2922381
    8     URANIUM-238R                THERMAL TEMPERATURE = 294.6 K          3922381
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 10    URAN UM-238                    THERMAL TEMPERATURE = 294.6 K          5092238
 11    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K           10001
 12    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K         2010001
 13    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K         3010001
 14    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K         4010001
 15    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K         5010001
 16    BORON     NATURAL                                                      50000
 17    BORON-10                                                               50100
1                                                                  NITAWL   VERS. 1.2  90/01/02. 00.09.34. PAGE   4
 18    BORON-10                                                             2050100
 19    BORON-10                                                             3050100
 20    BORON-10                                                             4050100
 21    BORON-10                                                             5050100
 22    CARBON    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 589.26 K         60002
 23    OXYGEN                          THERMAL TEMPERATURE= 294.6 K         80004
 24    OXYGEN                          THERMAL TEMPERATURE= 294.6 K       2080004
 25    OXYGEN                          THERMAL TEMPERATURE= 294.6 K       3080004
 26    OXYGEN                          THERMAL TEMPERATURE= 294.6 K       4080004
 27    OXYGEN                          THERMAL TEMPERATURE= 294.6 K       5080004
 28    SODIUM    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 297.6 K         110000
 29    MAGNESIUM                         THERMAL TEMP = 900.0 K              120000
 30    ALUMINUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K        130000
 31    SILICON                           THERMAL TEMP = 900.0 K              140000
 32    PHOSPHOR      THERMAL TEMP=294.6                                      150000
 33    MANGANESE                         THERMAL TEMP = 900.0 K              250000
 34    IRON          THERMAL TEMP=294.6                                      260000
 35    NICKEL        THERMAL TEMP=294.6                                      280000
 36    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K        400000
 37    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K      2400000
 38    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K      3400000
 39    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K      4400000
 40    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K      5400000
 41    LEAD      NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K         820000
 URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          922351
 URANIUM-238                    THERMAL TEMPERATURE = 294.6 K         2922381
 URANIUM-235                    THERMAL TEMPERATURE = 294.6 K         3922351
 URANIUM-238                    THERMAL TEMPERATURE = 294.6 K         4922381
 URANIUM-235                    THERMAL TEMPERATURE = 294.6 K         5922351
 URANIUM-238                    THERMAL TEMPERATURE = 294.6 K         6922381
0RESONANCE DATA FOR THIS NUCLIDE
 (MASS NUMBER (A)       =   238.020            TEMPERATURE(KELVIN)     =   294.270
 (POTENTIAL SCATTER (SIGMA=     9.500          LUMPED NUCLEAR DENSITY  =  .2237900E-01
 (SPIN FACTOR (G)       =     1.000            LUMP DIMENSION (A-BAR)  =  .4445000E+00
 (SIGMA-A(EFFECTIVE)    =  .6722160E+01        DANCOFF CORRECTION (C)  =  .2008900E+00
 (THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
 (MASS OF MODERATOR-1   =   235.000            SIGMA-P ER ABSORBER ATOM)=  .2597000E+00
 (MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
 (MASS OF MODERATOR-2   =    15.990            SIGMA-P ER ABSORBER ATOM)=  .7797400E+01
 (MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
 (THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-DIMENSIONAL OBJECT.
1                                                                  NITAWL   VERS. 1.2  90/01/02. 00.09.59. PAGE   5
 (VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000
 (GROUP       RES ABS         RES FIES
   50      4.493928E-02    0.
   51      5.637421E-02    0.
   52      7.049155E-02    0.
   53      8.793741E-02    0.
   54      1.093332E-01    0.
   55      1.353371E-01    0.
   56      1.667740E-01    0.
   57      2.044446E-01    0.
   58      2.490296E-01    0.
```

```
 60      3.415630E+01    0.
 61      4.302347E+01    0.
 62      5.072706E+01    0.
 63      5.920943E+01    0.
 64      6.837687E+01    0.
 65      7.242652E+01    0.
 66      7.647928E+01    0.
 67      7.874354E+01    0.
 68      8.639461E+01    0.
 69      1.115767E+00    0.
 70      1.157441E+00    0.
 71      1.136069E+00    0.
 72      1.074379E+00    0.
 73      1.049119E+00    0.
 74      1.283479E+00    0.
 75      1.036836E+00    0.
 76      1.387221E+00    0.
 77      4.206455E+00    0.
 78      1.789403E+00    0.
 79      3.432066E+00    0.
 80      7.42+794E+02
 81      2.016423E+01    0.
 82      8.649873E+00    0.
 83      5.044753E-01    0.
 84      1.076731E+01    0.
 85      2.915+02E+02    0.
 86      0.              0.
 87      4.+74+7E-01     0.
 88      2.494306E+01    0.
 89      9.674+12E+00    0.
 90      4.767598E-01    0.
 91      5.084440E-01    0.
 92      1.507757E-01    0.
DEXCESS RESONANCE INTEGRALS
0               RESOLVED        UNRESOLVED          TOTAL
0ABSORPTION     .177041E+02     .134655E+01     .10850E+02
0FISSION        0.              0.              0.
0TIME OF DAY 10:40:15.
0 URANIUM-2[2#                  THERMAL TEMPERATURE = 2[0.0 K           [59227[0
0RESONANCE DATA FOR THIS NUCLIDE
                                                                        NITAWL    VERS. 1.2  86/01/02. 00.05.59. PAGE   5
0AREA NUMBER (A)        =   238.030             TEMPERATURE(KELVIN)     =   294.270
0POTENTIAL SCATTER SIGMA=     9.800             LUMPED NUCLEAR DENSITY  =  .0237400E+01
0SPIN FACTOR (G)        =     1.000             LUMP DIMENSION (A-BAR)  =  .4445000E+00
0SIGMA-ZEROEFFECTIVE    =  .6732140E+02         DANCOFF CORRECTION (C)  =  .2003600E+00
0THIS ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
0MASS OF MODERATOR-1    =   235.000             SIGMA(PER ABSORBER ATOM)=  .2841000E+00
0MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
0MASS OF MODERATOR-2    =    15.990             SIGMA(PER ABSORBER ATOM)=  .7797400E+01
0MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
0THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-DIMENSIONAL OBJECT.
0VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF SHIELDING=1.00000
0GROUP       RES ABS         RES FISS
  50      4.493924E-02    0.
  51      5.637921E-02    0.
  52      7.049153E-02    0.
  53      8.793741E-02    0.
  54      1.093332E-01    0.
  55      1.353371E-01    0.
  56      1.667740E-01    0.
  57      2.044446E-01    0.
  58      2.490296E-01    0.
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```
 60      3.615638E-01    0.
 61      4.302547E-01    0.
 62      5.072706E-01    0.
 63      5.920943E-01    0.
 64      6.837887E-01    0.
 65      7.802652E-01    0.
 66      7.663928E-01    0.
 67      7.574354E-01    0.
 68      4.609601E-01    0.
 69      1.156767E+00    0.
 70      1.157441E+00    0.
 71      1.136099E+00    0.
 72      1.074379E+00    0.
 73      1.098113E+00    0.
 74      1.282479E+00    0.
 75      2.036836E+00    0.
 76      1.187221E+00    0.
 77      4.305459E+00    0.
 78      1.724468E+00    0.
 79      3.933064E+00    0.
 80      7.458764E-03    0.
 81      2.016922E+00    0.
 82      8.940813E+00    0.
 83      4.464358E-01    0.
 84      1.009711E+01    0.
                                                                    VITAM   VERS. 1.2  99/01/02. 00:03:49. RISE
 85      1.932882E-01    0.
 86      0.              0.
 87      6.167627E-02    0.
 88      2.494008E+01    0.
 89      9.639412E+00    0.
 90      8.763503E-01    0.
 91      3.084440E-01    0.
 92      1.507357E+01    0.
RESONANCE INTEGRALS
                 RESOLVED      UNRESOLVED          TOTAL
ABSORPTION      .1770HE+02     .1664E+01     .1843E+02
FISSION          0.             0.            0.
TIME OF DAY 00:10:22
0 URANIUM-238                  THERMAL TEMPERATURE = 294.6 K                 2292251
0RESONANCE DATA FOR THIS NUCLIDE
0MASS NUMBER (A)       =  238.000            TEMPERATURE(KELVIN)     =  294.270
0POTENTIAL SCATTER SIGMA=    9.500           LUMPED NUCLEAR DENSITY  =  .2219300E-01
0SPIN FACTOR (G)       =    1.000           LUMP DIMENSION (A-BAR)  =  .4445000E+00
0SIGMA-M(EFFECTIVE)    =  .6788350E+02      DANCOFF CORRECTION (C)  =  .2008000E+00
0THIS ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
0MASS OF MODERATOR-1   =  235.000           SIGMA(PER ABSORBER ATOM =  .3436000E+00
0MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
0MASS OF MODERATOR-2   =   15.990           SIGMA(PER ABSORBER ATOM)=  .7862700E+01
0MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
0THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-DIMENSIONAL OBJECT.
0VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000
0GROUP       RES ABS        RES FISS
  50      4.494562E-02    0.
  51      5.638464E-02    0.
  52      7.050504E-02    0.
  53      8.797205E-02    0.
  54      1.093805E-01    0.
  55      1.353999E-01    0.
  56      1.668834E-01    0.
  57      2.046031E-01    0.
  58      2.492503E-01    0.
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 60      3.620577E-01    0.
 61      4.309103E-01    0.
 62      5.081764E-01    0.
 63      5.932135E-01    0.
1                                                    NITAWL    VERS. 1.2  90/01/02. 00.09.59. PAGE    3
 64      6.858.55E-01    0.
 65      7.260491E-01    0.
 66      7.666518E-01    0.
 67      7.596865E-01    0.
 68      9.639741E-01    0.
 69      1.182796E+00    0.
 70      1.163923E+00    0.
 71      1.140620E+00    0.
 72      1.078264E+00    0.
 73      1.192718E+00    0.
 74      1.288859E+00    0.
 75      2.012282E+00    0.
 76      1.191679E+00    0.
 77      4.220559E+00    0.
 78      1.794821E+00    0.
 79      3.447470E+00    0.
 80      7.918770E-02    0.
 81      2.019635E+00    0.
 82      8.876177E+00    0.
 83      6.466320E-01    0.
 84      1.014148E+01    0.
 85      4.429641E-01    0.
 86      0.              0.
 87      6.187783E-01    0.
 88      2.109451E+01    0.
 89      8.651468E+02    0.
 90      9.762757E-01    0.
 91      8.084447E-01    0.
 92      1.507978E-01    0.
0RESS RESONANCE INTEGRALS
                RESOLVED      UNRESOLVED          TOTAL
 ABSORPTION     .177761E+02   .193485E+01    .1952.1E+02
 FISSION        0.            0.
 TIME OF DAY 09.50.20.
 0URANIUM-238                  THERMAL TEMPERATURE = 294.6 K          4291731
 CRESONANCE DATA FOR THIS NUCLIDE
 OMASS NUMBER (A)      =   238.000            TEMPERATURE(KELVIN)    =   294.270
 OPOTENTIAL SCATTER SIGMA=     9.500          LUMPED NUCLEAR DENSITY =  .2498908E+01
 OSPIN FACTOR (G)      =     1.000            LUMP DIMENSION (A-BAR) =  .4445000E+00
  OMA+M(EFFECTIVE)     =  .6853780E+02        DANCOFF CORRECTION (C) =  .2008000E+00
 0U    SORBER WIL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
 OMASS OF MODERATOR=   =   235.000            SIGMA(PER ABSORBER ATOM)=  .4440000E+00
 OMODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
 OMASS OF MODERATOR-2  =    15.990            SIGMA(PER ABSORBER ATOM)=  .2977A00E+01
1                                                    NITAWL    VERS. 1.2  90/01/02. 00.09.59. PAGE    4
 OMODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.
 OTHIS RESONANCE MATERIAL WILL BE TREATED AS A 2-DIMENSIONAL OBJECT.
 OVOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000
 OGROUP       RES ABS         RES FISS
  50      4.495322E-02    0.
  51      5.639126E-02    0.
  52      7.052310E-02    0.
  53      8.801444E-02    0.
  54      1.094363E-01    0.
  55      1.354721E-01    0.
  56      1.670039E-01    0.
  57      2.047765E-01    0.
```

59	3.019540E+01	0.
60	3.628953E+01	0.
61	4.216501E+01	0.
62	5.092012E+01	0.
63	5.946840E+01	0.
64	6.871632E+01	0.
65	7.280644E+01	0.
66	7.692079E+01	0.
67	7.622371E+01	0.
68	9.673082E+01	0.
69	1.167363E+00	0.
70	1.167007E+00	0.
71	1.185757E+00	0.
72	1.082661E+00	0.
73	1.107945E+00	0.
74	1.296153E+00	0.
75	2.050610E+00	0.
76	1.467222E+00	0.
77	4.237810E+00	0.
78	1.805167E+00	0.
79	3.963849E+00	0.
80	7.930765E+00	0.
81	2.022250E+00	0.
82	8.918579E+00	0.
83	8.466287E+01	0.
84	1.420701E+01	0.
85	2.933014E+01	0.
86	0.	0.
87	6.187460E+01	0.
88	2.519527E+01	0.
89	8.665054E+00	0.
90	9.763935E+01	0.
91	5.084456E+01	0.
92	1.507782E+01	0.

0REGION RESONANCE INTEGRALS

	RESOLVED	UNRESOLVED	TOTAL
ABSORPTION	4.279585E+02	3.159645E+01	4.595549E+02
FISSION	0.	0.	0.

0TIME OF DAY 00.10.30.

NITAWL VERS. 3.2 90/01/02. 00.07.59. PROC ID

0 URANIUM-238 THERMAL TEMPERATURE = 294.0 K 90002381

0RESONANCE DATA FOR THIS NUCLIDE

0MASS NUMBER (A) = 238.000 TEMPERATURE (KELVIN) = 294.270

0POTENTIAL SCATTER SIGMA= 9.300 LUMPED NUCLEAR DENSITY = .3180E03E-01

0SPIN FACTOR (G) = 1.000 LUMP DIMENSION (A-BAR) = .4445000E+00

0SIGMA-M(EFFECTIVE) = .6912570E+02 DANCOFF CORRECTION (C) = .1000000E+00

0THE ABSORBER WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

0MASS OF MODERATOR-1 = 235.000 SIGMA(PER ABSORBER ATOM)= .5330000E+00

0MODERATOR-1 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

0MASS OF MODERATOR-2 = 15.990 SIGMA(PER ABSORBER ATOM)= .9005100E+01

0MODERATOR-2 WILL BE TREATED BY THE NORDHEIM INTEGRAL METHOD.

0THIS RESONANCE MATERIAL WILL BE TREATED AS A 2-DIMENSIONAL OBJECT.

0VOLUME FRACTION OF LUMP IN CELL USED TO ACCOUNT FOR SPATIAL SELF-SHIELDING=1.00000

0GROUP	REG ABS	REG FISS
50	4.496177E-02	0.
51	5.639975E-02	0.
52	7.053930E-02	0.
53	8.604887E-02	0.
54	1.094819E-01	0.
55	1.355345E-01	0.
56	1.671102E-01	0.
57	2.049350E-01	0.

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 OGP 110 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
 OGP 111 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
 OGP 112 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
 OGP 113 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
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 OGP 122 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
 OGP 123 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
0 BORON-10
 OGP  94 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
 OGP  95 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
 OGP  96 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
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 OGP 106 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
 OGP 107 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
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OGP 109 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
OGP 110 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
OGP 111 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
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OGP 122 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
OGP 123 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
0 BORON-10                                                3351.06
OGP  94 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
OGP  95 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
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OGP 100 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
1                                   NITAWL   VERS. 1.2  90/01/02. 00.09.59. PAGE  15
OGP 101 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
OGP 102 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
OGP 103 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
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OGP 123 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
0 BORON-10                                                4250100
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OGP  98 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
1                                   NITAWL   VERS. 1.2  90/01/02. 00.09.59. PAGE  16
OGP  99 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
OGP 100 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
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OGP 105 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
OGP 106 ELASTIC SUM OF  0.          VERSUS AVERAGE VALUE  0.
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0GP 108 ELASTIC SUM OF 0. VERSUS AVERAGE VALUE 0.
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1 MITAN-10 5050104
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0GP 95 ELASTIC SUM OF 0. VERSUS AVERAGE VALUE 0.
0GP 96 ELASTIC SUM OF 0. VERSUS AVERAGE VALUE 0.
1 MITAN1 VERS. 1.2 90/01/02. 00.04.59. PAGE 17
0GP 97 ELASTIC SUM OF 0. VERSUS AVERAGE VALUE 0.
0GP 98 ELASTIC SUM OF 0. VERSUS AVERAGE VALUE 0.
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0GP 123 ELASTIC SUM OF 0. VERSUS AVERAGE VALUE 0.
0 CARBON NATURAL BROWN - ST. JOHN KERNE TEMP. = 589.26 K 60002
0 OXYGEN THERMAL TEMPERATURE= 294.6 K 80004
1 MITAN1 VERS. 1.2 90/01/02. 00.09.59. PAGE 18
0 OXYGEN THERMAL TEMPERATURE= 294.6 K 2580004
0 OXYGEN THERMAL TEMPERATURE= 294.6 K 3380004
0 OXYGEN THERMAL TEMPERATURE= 294.6 K 4280004
0 OXYGEN THERMAL TEMPERATURE= 294.6 K 5080004
0 SODIUM NATURAL BROWN - ST. JOHN KERNEL TEMP. = 293.6 K 110000
0 MAGNESIUM THERMAL TEMP = 900.0 K 120003
0 ALUMINUM NATURAL BROWN - ST. JOHN KERNEL TEMP. = 627.13 K 130000
0 SILICON THERMAL TEMP = 900.0 K 140005
0CHROMIUM THERMAL TEMP=294.6 240003
0 MANGANESE THERMAL TEMP = 900.0 K 250005
0IRON THERMAL TEMP=294.6 260001

0 ZIRCONIUM NATURAL BROWN - ST. JOHN KERNEL TEMP. = 627.13 K 400000
0 ZIRCONIUM NATURAL BROWN - ST. JOHN KERNEL TEMP. = 627.13 K 25400000
0 ZIRCONIUM NATURAL BROWN - ST. JOHN KERNEL TEMP. = 627.13 K 33400000
0 ZIRCONIUM NATURAL BROWN - ST. JOHN KERNEL TEMP. = 627.13 K 42400000
0 ZIRCONIUM NATURAL BROWN - ST. JOHN KERNEL TEMP. = 627.13 K 50400000
0 LEAD NATURAL BROWN - ST. JOHN KERNEL TEMP. = 297.6 K 820000
TIME OF DAY 00.11.14.

THIS XSDRN WORKING TAPE WAS CREATED 90/01/02.
THE TITLE OF THE PARENT CASE IS AS FOLLOWS
SUPER-XSDRN LIBRARY--LAST DIGITS OF ID #'S ARE CODED AS FOLLOWS-- 5=900K,6
=800K,7=650K,8=750K,9=1000K,ANYTHING ELSE IS PRECISELY THAT--IF THESE THERMAL TE
MPERATURES ARE DESIRED, CALL C.W. CRAVEN, JR. OR N. M. GREENE----ALL THER

TAPE ID 0 NUMBER OF NUCLIDES 41
NUMBER OF NEUTRON GROUPS 123 NUMBER OF GAMMA GROUPS 0
FIRST THERMAL GROUP 42

TABLE OF CONTENTS

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-*EOR--
1                                                                                XSDRNPM  VERS. 1.08 90/01/02. 00.11.22. PAGE    1
0      F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
2                                                  C O L U M N   N U M B E R
        CARD                        11111111112222222223333333334444444445555555556666666667777777770
       NUMBER               12345678901234567890123456789012345678901234567890123456789012345678901234567890

         1                  =JDN181J EXXON 15X15 PWR, 3.2% U235, 1796 PPM NAT.BORON
         2                  1## 2  3  11  0  3   3 10  6  3  1   10 12  2  0  0
         3                  2## -2 -1 -1  .5
         4                  3## 1  0  0   0  4.0   0  0  0  0  0   1  0
         5                  4## -1  123  0  -2  3   4  126  -1  0
         6                  5++  1.-4 2.-4 1.0 0.0 0.0   1.420992  E
         7                    7
         8                  1### 1
         9                       1  1
        10                       1
        11                       2
        12                       2
        13                       1
        14                       3  3
        15                       3
        16                 1###
        17                       6
        18                       37922251      3191250
        19                       3220004
        20                       6
        21                       33400090
        22                       0
        23                       3D10001       3D10004
        24                       3380100
        25                 2###
        26                       0.0
        27                       7.671+4       1.2195-2
        28                       4.5925-2
        29                       0.0
        30                       3.8022-2
        31                       0.0
        32                       4.67J-2       2.33+-2
        33                       1.961-5
        34                    7
        35                 3D++   5R1.0 F0.0
        36                    7
        37                 3S++  a10.0  110.4445 310.5271   0.9044
        38                 3###  5R1    2R2      4R2
        39                 3###  1      2        7
        40                 4###  F3
        41                 5###  121I1.0  123.0
        42                    7
0      ********************************** E N D   O F   I N P U T   L I S T I N G **********************************



1                                                                                XSDRNPM  VERS. 1.08 90/01/02. 00.11.22. PAGE    2
0
0
  XX        XX    SSSSSSSSSS    DDDDDDDDDDD    RRRRRRRRRRR    NN         NN   PPPPPPPPPPP    MM         MM
   XX      XX   SSSSSSSSSSSS   DDDDDDDDDDDD   RRRRRRRRRRRR   NNN        NN   PPPPPPPPPPPP   MMM       MMM
    XX    XX    SS        SS   DD        DD   RR        RR   NNNN       NN   PP        PP   MMMM     MMMM
     XX  XX     SS             DD        DD   RR        RR   NN NN      NN   PP        PP   MM MM   MM MM
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XSDRNPM

90/01/02

00.11.22
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1 XSDRNPM VERS. 1.0A 90/01/02. 00.11.22. PAGE

[E12NXB1] EXXON 15X15 PWR, 3.7% U235, ~~[illegible]~~ PPM NAT.BORON

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0    1$ ARRAY    15 ENTRIES READ
0    2$ ARRAY    10 ENTRIES READ
0    3$ ARRAY    12 ENTRIES READ
0    4$ ARRAY     9 ENTRIES READ
0    5* ARRAY    12 ENTRIES READ
0    0T
0          THE FOLLOWING DIRECT ACCESS SPACE IS REQUIRED
     LOGICAL UNIT  8 HAS    153 BLOCKS OF LENGTH 1497 WORDS
     LOGICAL UNIT  9 HAS     12 BLOCKS OF LENGTH 0047 WORDS
     LOGICAL UNIT 10 HAS    492 BLOCKS OF LENGTH   55 WORDS
0GENERAL PROBLEM DESCRIPTION DATA BLOCK
0                         GENERAL PROBLEM DATA

 IGE  1/2/3 = PLANE/CYLINDER/SPHERE       2       ISN  QUADRATURE ORDER                  8
 IZM  NUMBER OF ZONES                     3       ISCT ORDER OF SCATTERING               3
 IM   NUMBER OF SPACIAL INTERVALS        11       IEVT 0/1/2/3/4/5/6=Q/K/ALPHA/C/Z/R/H   1
 IBL  0/1/2/3 = VACUUM/REFL/PER/WHITE     0       IIM  INNER ITERATION MAXIMUM          10
 IBR  RIGHT BOUNDARY CONDITION            3       ICM  OUTER ITERATION MAXIMUM          12
 MXX  NUMBER OF MIXTURES                  3       ICLC -1/0/N--FLAT RES/SN/OPT           0
 MS   MIXING TABLE LENGTH                10       ITH  0/1 = FORWARD/ADJOINT             0
 IGM  NUMBER OF ENERGY GROUPS           123       IFLU 0/1/2/3/4=L-S/L/S/W/L-W           0
 NNG  NUMBER OF NEUTRON GROUPS          123       IPRT -2/-1/0/N=MIXTURE XSEC PRINT     -2
 NGG  NUMBER OF GAMMA GROUPS              0       ID1  0/1/2/3=NO/PRT ND/PCH N/BOTH     -1
```

0 SPECIAL OPTIONS

IFO 0/1 = NONE/WEIGHTING CALCULATION -1 IFN DUMMY PARAMETER 0
IBM VOLUMETRIC SOURCES (0/N=NO/YES) 0 IDEM 0/1 = NONE/DENSITY ..CTORS ID+ 0
IPM BOUNDARY SOURCES (0/N=NO/YES) 0 IAZ 0/N = NONE/N ACTIVITIES BY ZONE 0
IFN 0/1/2 = INPUT ID+/3A+/4B+ LAST 0 IAI 0/1=NONE/ACTIVITIES BY INTERVAL 0
IIMX MAXIMUM TIME (MINUTES) 4 IFCT 0/1=NO/YES UPSCATTER SCALING 1
IDTI 0/1/2/3=NO/XSECT/SRCE/FLUX--OUT 0 IPUT 0/1/2=NO/K/ALPHA PARAMETRIC SRCH 0
0 WEIGHTING DATA (IFO=1)

IFON -1/0/1=CELL/ZONE/REGION WEIGHT -1 IHTF TOTAL XSECT PRN IN BRD GP TABLES 0
IGNT NUMBER OF BROAD GROUPS 123 NDBF PRN 0-0 OR FILE NUMBER 4
ITP 0/10/20/30/40 0/C/E/ACTA 0 NUSF TABLE LENGTH OR MAX ORDER 126
IPF -2/-1/0/N=NOTED XSECT PRINT -2 MSCM EXTRA 1+D X-SECT POSITIONS 0
IAP -1/N ANISN XSECT PRINT -1

FLOATING POINT PARAMETERS

EV EIGENVALUE GUESS 0. PW IPST=1/0--K/ALPHA 0.
EVM EIGENVALUE MODIFIER 0. EPS OVERALL CONVERGENCE 1.00000E-04
BK BUCKLING FACTOR=1.42009E+00 1.42009E+00 PTC POINT CONVERGENCE 2.00-00E-04
DX CM/PARAMT FOR BUCK.IND 0. ZNF NORMALIZATION FACTOR 1.00000E+00
(SCRAM VERS. 1.04 90/01/02. 02.11.22. PAGE 4
DBZ ..E DEPTH FOR BUCKLIAD 0. EGL EV CHANGE EPS FOR SEARCH 1.00000E-02
USC VOID DISCARTNT CORRC ON 0. XNPM NEW PARAM MOD FOR SEARCH 7.50000E+0
(DATA BLOCK 2 (MIXING TABLE, ETC.)
THIS CASE WILL REQUIRE 17613 LOCATIO FOR MIXING
THIS CASE HAD BEEN ALLOCATED 32000 LOCATIONS
123 ARRAY -- 10 ENTRIES READ
146 ARRAY 10 ENTRIES READ
154 ARRAY 10 ENTRIES READ
0 OT

1796 w/ c
(SCRAM VERS. 1.04 9 /02. 00.11.22. PAGE 5
0 [REDACTED] EXXON IDAHO PWR, 7.2% U235, [redacted] PPM NAT.BORON

NUCLIDES REQUESTED	CITATION IDENTIFICATION	MIXTURE	MIXING TABLE COMPONENT	ATOM DENSITY	EXTRA ISECT ID'S
1	0	0	1	0	0
2	0	0	1	92023[illegible]	7.47110E-04
3	0	0	1	92023[illegible]	2.21950E-05
4	0	0	1	13A0004	2.59250E-02
5	0	0	2	0	0
6	0	0	2	22400000	3.80220E-05
7	0	0	3	0	0
8	0	0	3	8016001	6.67100E-02
9	0	0	3	8180004	3.33600E-02
10	0	0	3	8350100	1.96100E-05
11	0				
12	0				
13	0				
14	0				
15	0				
16	0				
17	0				
18	0				
19	0				
20	0				
21	0				
22	0				
23	0				
24	0				
25	0				
26	0				
27	0				

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   29       0
   30       0
   31       0
   32       0
   33       0
   34       0
   35       0
   36       0
   37       0
   38       0
   39       0
   40       0
   41       0
 TIME OF DAY 00.11.29.
0(DAT)+0 REQUIRES   74ed4 LOCATIONS. THIS VERSION OF XEDRN ALLOWS A MAXIMUM OF   32000
0 CROSS SECTIONS WILL BE STORED EXTERNALLY
0   32254 LOCATIONS WILL BE USED
 0 EXECUTING FIRST TIME
0   32+ ARRAY    1251 ENTRIES READ
1    0T
0   35+ ARRAY      12 ENTRIES READ
1                                                                    XSDRNPM   VERS. 1.0A 90/01/02. 00.11.32. PAGE    6
0   144 ARRAY      11 ENTRIES READ
0   345 ARRAY       5 ENTRIES READ
0   494 ARRAY       5 ENTRIES READ
0   516 ARRAY     135 ENTRIES READ
1    0T
1                                                                    XSDRNPM   VERS. 1.0A 90/01/02. 00.11.32. PAGE    7
0                    [EXPERIMENTAL EXXON ITALS PWR, 3.23 WT% U235, 1500 PPM NaT-BORON
                     NEUTRON 66GROUP PARAMETERS
0  GP    ENERGY      LETHARGY      MID-PT    BROAD GP        CALC                    RIGHT        LEFT
       BOUNDARIES   BOUNDARIES   VELOCITIES   NUMBERS        TYPE                    ALBEDO       ALBEDO
     1  1.49180E+07 -2.99997E-01  5.21033E+09        1           0                 1.00000E+00
     2  1.34990E+07 -3.00031E-01  4.95624E+09        2           0                 1.00000E+00
     3  1.22140E+07 -3.99998E-01  4.71452E+09        3           0                 1.00000E+00
     4  1.10520E+07 -4.00026E-01  4.48459E+09        4           0                 1.00000E+00
     5  1.00000E+07                4.26535E+09        5           0                 1.00000E+00
     6  9.04820E+06  9.99971E-02  4.05708E+09        6           0                 1.00000E+00
     7  8.18730E+06  2.00001E+01  3.85803E+09        7           0                 1.00000E+00
     8  7.40820E+06  2.99998E-01  3.67165E+09        8           0                 1.00000E+00
     9  6.70320E+06  4.00000E+01  3.49258E+09        9           0                 1.00000E+00
    10  6.06530E+06  5.00001E-01  3.32224E+09       10           0                 1.00000E+00
    11  5.48810E+06  6.00003E-01  3.16020E+09       11           0                 1.00000E+00
    12  4.96580E+06  7.00021E-01  3.00609E+09       12           0                 1.00000E+00
    13  4.49330E+06  7.99998E-01  2.85948E+09       13           0                 1.00000E+00
    14  4.06570E+06  8.99999E-01  2.72002E+09       14           0                 1.00000E+00
    15  3.67880E+06  9.99998E-01  2.58736E+09       15           0                 1.00000E+00
    16  3.32870E+06  1.10000E+00  2.46117E+09       16           0                 1.00000E+00
    17  3.01190E+06  1.20001E+00  2.34113E+09       17           0                 1.00000E+00
    18  2.72530E+06  1.30001E+00  2.22697E+09       18           0                 1.00000E+00
    19  2.46600E+06  1.39999E+00  2.11836E+09       19           0                 1.00000E+00
    20  2.23130E+06  1.50000E+00  2.01505E+09       20           0                 1.00000E+00
    21  2.01900E+06  1.59998E+00  1.91677E+09       21           0                 1.00000E+00
    22  1.82680E+06  1.70002E+00  1.82328E+09       22           0                 1.00000E+00
    23  1.65300E+06  1.79999E+00  1.73437E+09       23           0                 1.00000E+00
    24  1.49570E+06  1.89999E+00  1.64976E+09       24           0                 1.00000E+00
    25  1.35330E+06  2.00004E+00  1.56931E+09       25           0                 1.00000E+00
    26  1.22460E+06  2.09997E+00  1.49278E+09       26           0                 1.00000E+00
    27  1.10800E+06  2.20003E+00  1.41997E+09       27           0                 1.00000E+00
    28  1.00260E+06  2.29999E+00  1.35073E+09       28           0                 1.00000E+00
    29  9.07180E+05  2.40000E+00  1.28485E+09       29           0                 1.00000E+00
    30  8.20850E+05  2.50000E+00  1.22219E+09       30           0                 1.00000E+00
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32	6.32050E+05	2.70001E+00	1.10588E+09	32	0	1.00000E+00
33	6.08104E+05	2.80000E+00	1.05194E+09	33	0	1.00000E+00
34	5.50230E+05	2.90000E+00	1.00064E+09	34	0	1.00000E+00
35	4.97870E+05	3.00000E+00	9.51877E+08	35	0	1.00000E+00
36	4.50490E+05	3.10000E+00	9.05415E+08	36	0	1.00000E+00
37	4.07620E+05	3.20001E+00	8.61287E+08	37	0	1.00000E+00
38	3.68830E+05	3.30000E+00	8.19252E+08	38	0	1.00000E+00
39	3.33730E+05	3.40001E+00	7.79295E+08	39	0	1.00000E+00
40	3.01970E+05	3.50001E+00	7.41292E+08	40	0	1.00000E+00
41	2.73240E+05	3.59999E+00	7.05137E+08	41	0	1.00000E+00
42	2.47230E+05	3.70002E+00	6.70747E+08	42	0	1.00000E+00
43	2.23710E+05	3.79999E+00	6.38079E+08	43	0	1.00000E+00
44	2.02420E+05	3.90000E+00	6.06923E+08	44	0	1.00000E+00
45	1.83160E+05	3.99998E+00	5.77325E+08	45	0	1.00000E+00
46	1.65730E+05	4.09998E+00	5.49170E+08	46	0	1.00000E+00
47	1.49960E+05	4.19997E+00	5.22386E+08	47	0	1.00000E+00
48	1.35690E+05	4.29997E+00	4.96900E+08	48	0	1.00000E+00
49	1.22770E+05	4.40003E+00	4.72666E+08	49	0	1.00000E+00
50	1.11090E+05	4.50000E+00	4.49368E+08	50	0	1.00000E+00
51	1.00510E+05	4.75000E+00	3.82161E+08	51	0	1.00000E+00
52	6.73790E+04	5.00001E+00	3.37473E+08	52	0	1.00000E+00
53	5.24750E+04	5.25000E+00	2.97643E+08	57	0	1.00000E+00

54	4.01650E+04	5.49999E+00	2.62670E+08	54	0	1.00000E+00
55	3.16230E+04	5.74999E+00	2.31904E+08	55	0	1.00000E+00
56	2.47870E+04	6.00002E+00	2.04564E+08	56	0	1.00000E+00
57	1.93040E+04	6.25003E+00	1.80527E+08	57	0	1.00000E+00
58	1.49340E+04	6.50003E+00	1.59172E+08	58	0	1.00000E+00
59	1.17090E+04	6.74998E+00	1.40573E+08	59	0	1.00000E+00
60	9.11380E+03	7.00000E+00	1.24076E+08	60	0	1.00000E+00
61	7.10170E+03	7.25001E+00	1.09496E+08	61	0	1.00000E+00
62	5.53080E+03	7.50001E+00	9.66303E+07	62	0	1.00000E+00
63	4.30740E+03	7.75001E+00	8.52759E+07	63	0	1.00000E+00
64	3.35460E+03	8.00001E+00	7.52559E+07	64	0	1.00000E+00
65	3.61260E+03	8.24999E+00	8.64124E+07	65	0	1.00000E+00
66	2.97470E+03	8.49999E+00	8.06094E+07	66	0	1.00000E+00
67	1.59460E+03	8.75001E+00	5.17225E+07	67	0	1.00000E+00
68	1.23610E+03	9.00000E+00	4.56451E+07	68	0	1.00000E+00
69	9.62120E+02	9.25000E+00	4.02317E+07	69	0	1.00000E+00
70	7.48520E+02	9.50000E+00	3.55485E+07	70	0	1.00000E+00
71	5.82950E+02	9.74999E+00	3.13714E+07	71	0	1.00000E+00
72	8.54000E+02	1.00000E+01	2.76859E+07	72	0	1.00000E+00
73	3.53370E+02	1.02500E+01	2.44319E+07	73	0	1.00000E+00
74	2.75260E+02	1.05000E+01	2.15610E+07	74	0	1.00000E+00
75	2.14450E+02	1.07500E+01	1.90277E+07	75	0	1.00000E+00
76	1.67020E+02	1.10000E+01	1.67919E+07	76	0	1.00000E+00
77	1.30070E+02	1.12500E+01	1.48187E+07	77	0	1.00000E+00
78	1.01300E+02	1.15000E+01	1.30775E+07	78	0	1.00000E+00
79	7.88930E+01	1.17500E+01	1.15403E+07	79	0	1.00000E+00
80	6.14420E+01	1.20000E+01	1.01848E+07	80	0	1.00000E+00
81	4.78510E+01	1.22500E+01	8.98801E+06	81	0	1.00000E+00
82	3.72660E+01	1.25000E+01	7.92188E+06	82	0	1.00000E+00
83	2.90230E+01	1.27500E+01	6.99986E+06	83	0	1.00000E+00
84	2.26030E+01	1.30000E+01	6.17733E+06	84	0	1.00000E+00
85	1.76030E+01	1.32500E+01	5.45153E+06	85	0	1.00000E+00
86	1.37100E+01	1.35000E+01	4.81099E+06	86	0	1.00000E+00
87	1.06770E+01	1.37500E+01	4.24565E+06	87	0	1.00000E+00
88	8.31530E+00	1.40000E+01	3.74677E+06	88	0	1.00000E+00
89	6.47590E+00	1.42500E+01	3.30651E+06	89	0	1.00000E+00
90	5.04350E+00	1.45000E+01	2.91800E+06	90	0	1.00000E+00
91	3.92790E+00	1.47500E+01	2.57512E+06	91	0	1.00000E+00
92	3.05900E+00	1.30000E+01	2.27254E+06	92	0	1.00000E+00

96	1.65910E+00	1.54980E+01	1.84660E+06	96	0	1.00000E+00	
95	1.70900E+00	1.55822E+01	1.76924E+06	95	0	1.00000E+00	
94	1.56660E+00	1.56692E+01	1.69258E+06	94	0	1.00000E+00	
93	1.43150E+00	1.57594E+01	1.61075E+06	93	0	1.00000E+00	
92	1.28490E+00	1.58674E+01	1.51951E+06	92	0	1.00000E+00	
91	1.13370E+00	1.59926E+01	1.42692E+06	91	0	1.00000E+00	
90	9.99190E-01	1.61189E+01	1.33974E+06	90	0	1.00000E+00	
89	8.81030E-01	1.62449E+01	1.25458E+06	89	0	1.00000E+00	
88	7.83530E-01	1.63816E+01	1.16506E+06	88	0	1.00000E+00	
87	6.85220E-01	1.65409E+01	1.07106E+06	87	0	1.00000E+00	
86	5.48800E-01	1.67181E+01	9.74241E+05	86	0	1.00000E+00	
85	4.48540E-01	1.69199E+01	8.77651E+05	85	0	1.00000E+00	
84	3.61440E-01	1.71359E+01	7.93327E+05	84	0	1.00000E+00	
83	2.99450E-01	1.73239E+01	7.23012E+05	83	0	1.00000E+00	
82	2.49350E-01	1.75070E+01	6.59317E+05	82	0	1.00000E+00	
81	2.01070E-01	1.76928E+01	6.07594E+05	81	0	1.00000E+00	
80	1.74240E-01	1.78339E+01	5.69506E+05	80	0	1.00000E+00	
79	1.39830E-01	1.79517E+01	5.34703E+05	79	0	1.00000E+00	

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78	1.39810E-01	1.80956E+01	4.67557E+05	78	0	1.00000E+00	
77	1.15780E-01	1.82402E+01	4.47271E+05	77	0	1.00000E+00	
76	9.97580E-02	1.84023E+01	4.11434E+05	76	0	1.00000E+00	
75	8.02110E-02	1.86153E+01	3.80936E+05	75	0	1.00000E+00	
74	6.99350E-02	1.87787E+01	3.51826E+05	74	0	1.00000E+00	
73	5.99910E-02	1.89233E+01	3.27341E+05	73	0	1.00000E+00	
72	4.98690E-02	1.91165E+01	2.92906E+05	72	0	1.00000E+00	
71	3.98010E-02	1.93811E+01	2.56694E+05	71	0	1.00000E+00	
70	2.97800E-02	1.96330E+01	2.18923E+05	70	0	1.00000E+00	
69	2.10780E-02	1.99177E+01	1.84094E+05	69	0	1.00000E+00	
68	1.48910E-02	2.03251E+01	1.52133E+05	68	0	1.00000E+00	
67	9.82920E-03	2.07405E+01	1.14293E+05	67	0	1.00000E+00	
66	4.74190E-03	2.14694E+01					

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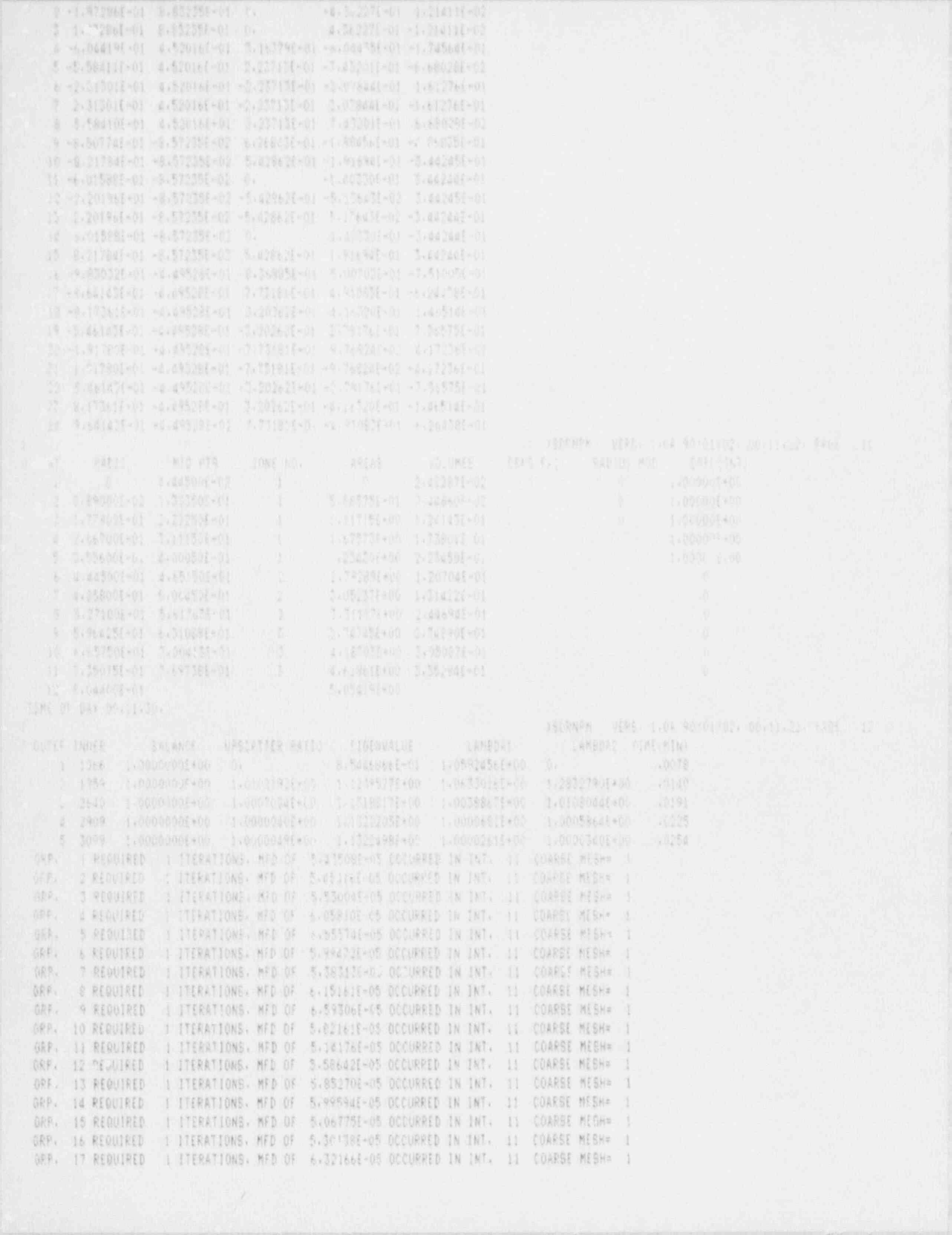
[EDITABLE EXTRA ISOTROPIC P3 SCATTERING, ~~+300~~ PPM NAT.BORON

MIXTURE BY ZONE	ORDER P(L) BY ZONE	ACTIVITY TABLE MATL NO.	REACTION	DISADVANTAGE CONSTANTS WEIGHTS	DIRECTIONS	REFL DIREC	WT x COS
1	1			0	-2.79064E-01	25	0
2	2			5.06143E-02	-1.49728E-01	3	-9.96548E-03
3	3			5.06143E-02	1.49728E-01	2	9.98548E-03
4				0	-4.04419E-01	5	0
5				5.65985E-02	-5.68410E-01	8	-3.16450E-02
6				5.65985E-02	-2.31201E-01	7	-1.28592E-02
7				5.65985E-02	2.31201E-01	6	1.28592E-02
8				5.65985E-02	5.68410E-01	5	3.16450E-02
9				0	-8.50774E-01	15	0
10				5.22844E-02	-8.21784E-01	13	-4.29665E-02
11				5.22844E-02	-6.01888E-01	14	-3.14577E-02
12				5.22844E-02	-2.20196E-01	17	-1.15123E-02
13				5.22844E-02	2.20196E-01	12	1.15123E-02
14				5.22844E-02	6.01888E-01	11	3.14577E-02
15				5.22844E-02	8.21784E-01	10	4.29665E-02
16				0	-9.83032E-01	24	0
17				4.53355E-02	-9.64143E-01	24	-4.37099E-02
18				4.53355E-02	-8.17361E-01	20	-3.70555E-02
19				4.53355E-02	-5.46143E-01	22	-2.47597E-02
20				4.53355E-02	-1.91780E-01	21	-8.69444E-03
21				4.53355E-02	1.91780E-01	20	8.69444E-03
22				4.53355E-02	5.46143E-01	19	2.47597E-02
23				4.53355E-02	8.17361E-01	18	3.70555E-02
24				4.53355E-02	9.64143E-01	17	4.37099E-02

0CONSTANTS FOR P(3) SCATTERING

0 ANGL SET 1 SET 2 SET 3 SET 4 SET 5



GRP. 1 REQUIRED 1 ITERATIONS. MFD OF 5.21508E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 2 REQUIRED 1 ITERATIONS. MFD OF 5.05126E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 3 REQUIRED 1 ITERATIONS. MFD OF 5.53004E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 4 REQUIRED 1 ITERATIONS. MFD OF 6.05810E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 5 REQUIRED 1 ITERATIONS. MFD OF 6.05574E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 6 REQUIRED 1 ITERATIONS. MFD OF 5.99472E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 7 REQUIRED 1 ITERATIONS. MFD OF 5.38315E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 8 REQUIRED 1 ITERATIONS. MFD OF 6.15161E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 9 REQUIRED 1 ITERATIONS. MFD OF 6.59306E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 10 REQUIRED 1 ITERATIONS. MFD OF 5.02161E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 11 REQUIRED 1 ITERATIONS. MFD OF 5.16176E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 12 REQUIRED 1 ITERATIONS. MFD OF 5.58642E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 13 REQUIRED 1 ITERATIONS. MFD OF 5.85270E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 14 REQUIRED 1 ITERATIONS. MFD OF 5.99594E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 15 REQUIRED 1 ITERATIONS. MFD OF 5.06775E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 16 REQUIRED 1 ITERATIONS. MFD OF 5.30138E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 17 REQUIRED 1 ITERATIONS. MFD OF 6.32166E-05 OCCURRED IN INT. 11 COARSE MESH= 1

GRP. 19 REQUIRED 1 ITERATIONS. MFD OF 5.67977E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 20 REQUIRED 1 ITERATIONS. MFD OF 5.19763E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 21 REQUIRED 1 ITERATIONS. MFD OF 5.35153E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 22 REQUIRED 1 ITERATIONS. MFD OF 5.53627E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 23 REQUIRED 1 ITERATIONS. MFD OF 4.76621E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 24 REQUIRED 1 ITERATIONS. MFD OF 5.57514E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 25 REQUIRED 1 ITERATIONS. MFD OF 5.02618E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 26 REQUIRED 1 ITERATIONS. MFD OF 5.02064E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 27 REQUIRED 1 ITERATIONS. MFD OF 4.65336E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 28 REQUIRED 1 ITERATIONS. MFD OF 4.51457E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 29 REQUIRED 1 ITERATIONS. MFD OF 5.16443E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 30 REQUIRED 1 ITERATIONS. MFD OF 5.25619E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 31 REQUIRED 1 ITERATIONS. MFD OF 5.23629E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 32 REQUIRED 1 ITERATIONS. MFD OF 5.11713E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 33 REQUIRED 1 ITERATIONS. MFD OF 4.95005E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 34 REQUIRED 1 ITERATIONS. MFD OF 4.41573E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 35 REQUIRED 1 ITERATIONS. MFD OF 2.49005E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 36 REQUIRED 1 ITERATIONS. MFD OF 4.26443E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 37 REQUIRED 1 ITERATIONS. MFD OF 4.96205E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 38 REQUIRED 1 ITERATIONS. MFD OF 4.85729E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 39 REQUIRED 1 ITERATIONS. MFD OF 5.13484E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 40 REQUIRED 1 ITERATIONS. MFD OF 5.18918E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 41 REQUIRED 1 ITERATIONS. MFD OF 5.37040E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 42 REQUIRED 1 ITERATIONS. MFD OF 5.26829E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 43 REQUIRED 1 ITERATIONS. MFD OF 4.24807E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 44 REQUIRED 1 ITERATIONS. MFD OF 5.21107E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 45 REQUIRED 1 ITERATIONS. MFD OF 5.17975E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 46 REQUIRED 1 ITERATIONS. MFD OF 5.15470E-05 OCCURRED IN INT. 10 COARSE MESH= 1
GRP. 47 REQUIRED 1 ITERATIONS. MFD OF 5.10136E-05 OCCURRED IN INT. 10 COARSE MESH= 1
GRP. 48 REQUIRED 1 ITERATIONS. MFD OF 5.05159E-05 OCCURRED IN INT. 10 COARSE MESH= 1
GRP. 49 REQUIRED 1 ITERATIONS. MFD OF 5.00612E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 50 REQUIRED 1 ITERATIONS. MFD OF 4.32037E-05 OCCURRED IN INT. 10 COARSE MESH= 1
GRP. 51 REQUIRED 1 ITERATIONS. MFD OF 4.27436E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 52 REQUIRED 1 ITERATIONS. MFD OF 4.26467E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 53 REQUIRED 1 ITERATIONS. MFD OF 4.25724E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 54 REQUIRED 1 ITERATIONS. MFD OF 4.02026E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 55 REQUIRED 1 ITERATIONS. MFD OF 3.92147E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 56 REQUIRED 1 ITERATIONS. MFD OF 3.78170E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 57 REQUIRED 1 ITERATIONS. MFD OF 3.64345E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 58 REQUIRED 1 ITERATIONS. MFD OF 3.55387E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 59 REQUIRED 1 ITERATIONS. MFD OF 3.40369E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 60 REQUIRED 1 ITERATIONS. MFD OF 3.26501E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 61 REQUIRED 1 ITERATIONS. MFD OF 3.10648E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 62 REQUIRED 1 ITERATIONS. MFD OF 2.95172E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 63 REQUIRED 1 ITERATIONS. MFD OF 2.83070E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 64 REQUIRED 1 ITERATIONS. MFD OF 2.72078E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 65 REQUIRED 1 ITERATIONS. MFD OF 2.56659E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 66 REQUIRED 1 ITERATIONS. MFD OF 2.39167E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 67 REQUIRED 1 ITERATIONS. MFD OF 2.31944E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 68 REQUIRED 1 ITERATIONS. MFD OF 2.17965E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 69 REQUIRED 1 ITERATIONS. MFD OF 2.08209E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 70 REQUIRED 1 ITERATIONS. MFD OF 1.98443E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 71 REQUIRED 1 ITERATIONS. MFD OF 1.94822E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 72 REQUIRED 1 ITERATIONS. MFD OF 1.89922E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 73 REQUIRED 1 ITERATIONS. MFD OF 1.73057E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 74 REQUIRED 1 ITERATIONS. MFD OF 1.67993E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 75 REQUIRED 1 ITERATIONS. MFD OF 1.49139E-05 OCCURRED IN INT. 9 COARSE MESH= 2
GRP. 76 REQUIRED 1 ITERATIONS. MFD OF 1.63008E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 77 REQUIRED 1 ITERATIONS. MFD OF 1.36631E-05 OCCURRED IN INT. 9 COARSE MESH= 2
GRP. 78 REQUIRED 1 ITERATIONS. MFD OF 1.55401E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 79 REQUIRED 1 ITERATIONS. MFD OF 1.28257E-05 OCCURRED IN INT. 11 COARSE MESH= 2

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GRP.  91 REQUIRED   1 ITERATIONS. MFD OF  1.37203E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP.  92 REQUIRED   1 ITERATIONS. MFD OF  1.12529E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP.  93 REQUIRED   1 ITERATIONS. MFD OF  1.03690E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP.  94 REQUIRED   1 ITERATIONS. MFD OF  1.22969E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP.  95 REQUIRED   1 ITERATIONS. MFD OF  1.51111E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP.  96 REQUIRED   1 ITERATIONS. MFD OF  1.30378E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP.  97 REQUIRED   1 ITERATIONS. MFD OF  1.24576E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP.  98 REQUIRED   1 ITERATIONS. MFD OF  1.22785E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP.  99 REQUIRED   1 ITERATIONS. MFD OF  1.28606E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP. 100 REQUIRED   1 ITERATIONS. MFD OF  1.24875E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP. 101 REQUIRED   1 ITERATIONS. MFD OF  1.26618E-05 OCCURRED IN INT.   9  COARSE MESH=
GRP. 102 REQUIRED   1 ITERATIONS. MFD OF  1.24698E-05 OCCURRED IN INT.   2  COARSE MESH=
GRP. 103 REQUIRED   1 ITERATIONS. MFD OF  1.25086E-05 OCCURRED IN INT.   2  COARSE MESH=
         104 REQUIRED   2 ITERATIONS. MFD OF  4.87489E-05 OCCURRED IN INT.  11  COARSE MESH=
         105 REQUIRED   3 ITERATIONS. MFD OF  2.57450E-05 OCCURRED IN INT.  11  COARSE MESH=
         106 REQUIRED   3 ITERATIONS. MFD OF  4.35334-05 OCCURRED IN INT.  11  COARSE MESH=
         107 REQUIRED   1 ITERATIONS. MFD OF  1.27484E-05 OCCURRED IN INT.   6  COARSE MESH=
         108 REQUIRED   3 ITERATIONS. MFD OF  5.49403E-05 OCCURRED IN INT.  11  COARSE MESH=
         109 REQUIRED   2 ITERATIONS. MFD OF  3.46165E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP. 110 REQUIRED   3 ITERATIONS. MFD OF  4.27456E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP. 111 REQUIRED   1 ITERATIONS. MFD OF  1.65534E-05 OCCURRED IN INT.   1  COARSE MESH=
GRP. 112 REQUIRED   1 ITERATIONS. MFD OF  1.72825E-05 OCCURRED IN INT.   1  COARSE MESH=
GRP. 113 REQUIRED   2 ITERATIONS. MFD OF  3.14150E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP. 114 REQUIRED   2 ITERATIONS. MFD OF  3.34710E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP. 115 REQUIRED   2 ITERATIONS. MFD OF  3.49506E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP. 116 REQUIRED   1 ITERATIONS. MFD OF  1.27560E-05 OCCURRED IN INT.   6  COARSE MESH=
GRP. 117 REQUIRED   2 ITERATIONS. MFD OF  3.04533E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP. 118 REQUIRED   2 ITERATIONS. MFD OF  4.45437E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP. 119 REQUIRED   2 ITERATIONS. MFD OF  5.01171E-05 OCCURRED IN INT.  11  COARSE MESH=
GRP. 120 REQUIRED   2 ITERATIONS. MFD OF  5.46456E-05 OCCURRED IN INT.  11  COARSE MESH=
                                                                                 XSDRNPM  (REV. 1.06 NOV/01/02. DEC/11/2. EPSE  14
 0 GRP. 121 REQUIRED   3 ITERATIONS. MFD OF  6.25388E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 122 REQUIRED   2 ITERATIONS. MFD OF  9.72327E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 123 REQUIRED   2 ITERATIONS. MFD OF  3.45725E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 124 REQUIRED   2 ITERATIONS. MFD OF  2.85305E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 125 REQUIRED   2 ITERATIONS. MFD OF  3.91242E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 126 REQUIRED   2 ITERATIONS. MFD OF  3.84982E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 127 REQUIRED   2 ITERATIONS. MFD OF  3.95962E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 128 REQUIRED   2 ITERATIONS. MFD OF  3.74044E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 129 REQUIRED   3 ITERATIONS. MFD OF  9.40201E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 130 REQUIRED  10 ITERATIONS. MFD OF  1.94037E-02 OCCURRED IN INT.   1  COARSE MESH=
 GRP. 131 REQUIRED   4 ITERATIONS. MFD OF  4.20772E-05 OCCURRED IN INT.   1  COARSE MESH=
 GRP. 132 REQUIRED   3 ITERATIONS. MFD OF  5.77833E-05 OCCURRED IN INT.  11  COARSE MESH=
 GRP. 133 REQUIRED   4 ITERATIONS. MFD OF  1.47271E-05 OCCURRED IN INT.  11  COARSE MESH=
    * 3209  1.00000000E+00  1.00000484E+00  1.17227601E+00  1.00002091E+00  1.00003631E+00  0100
       FINAL MINITOR          LAMBDA  1.13059075E+00          ANGULAR FLUX IN  16
 TIME OF DAY 00.12.37.
                                                                                 XSDRNPM  (REV. 1.06 NOV/01/02. DEC/11/2. EPSE  14
 0[033N(DI] EXXON 15X15 PWR, 3.3% U235, ~~600~~ PPM NAT.BORON
 0 INT. ZONE NUMBER     RADIUS     INT. MIDPOINT     AREA          VOLUME     FROD DENSITY
     1       1          0          4.44500E-02       0          2.48287E-02  3.48755E-02
     2       1       8.89000E-02   1.33350E-01   5.52575E-01   7.44860E-02  1.34265E-01
     3       1       1.77800E-01   2.22250E-01   1.11715E+00   1.24143E-01  2.17650E-01
     4       1       2.66700E-01   3.11150E-01   1.67573E+00   1.73801E-01  3.18703E-01
     5       1       3.55600E-01   4.00050E-01   2.23430E+00   2.23458E-01  4.25214E-01
     6       2       4.44500E-01   4.65150E-01   2.79288E+00   1.20704E-01        0
     7       2       4.85800E-01   5.06450E-01   3.05237E+00   1.31422E-01        0
     8       3       5.27100E-01   5.61763E-01   3.31187E+00   2.44694E-01        0
     9       3       5.96425E-01   6.31088E-01   3.74745E+00   2.74890E-01        0
    10       3       6.65750E-01   7.00413E-01   4.18303E+00   3.05087E-01        0
    11       3       7.33075E-01   7.69738E-01   4.61861E+00   3.35284E-01        0
    12               8.04400E-01                 5.05419E+00
```

TIME OF DAY 00:12:39.

0TRANSPORT GROUP-BIETTON WEIGHTING FUNCTION

0 ZONE	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	4.525177E-04	1.027508E-05	4.526405E-05	1.018441E-04	2.037481E-04	3.827431E-04	6.644031E-04	1.077921E-03
2	7.278479E-04	2.034966E-05	5.042564E-05	1.129702E-04	2.305220E-04	4.297112E-04	7.462687E-04	1.205111E-03
3	2.690505E-04	7.273846E-06	1.803465E-05	4.052659E-05	8.223965E-05	1.543784E-04	2.686556E-04	4.329411E-04
4	8.379151E-04	1.125451E-05	2.025932E-05	6.602941E-05	1.390133E-04	2.582102E-04	4.471181E-04	7.254047E-04

0 ZONE	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	1.623317E-03	3.240491E-03	5.022071E-03	7.961232E-03	9.716071E-03	5.313945E-03	6.289131E-03	7.692241E-03
2	1.928765E-03	3.880161E-03	7.504452E-03	8.875871E-03	5.880101E-03	6.661791E-03	7.612641E-03	9.112051E-03
3	6.595631E-04	4.208191E-04	1.279441E-03	1.873151E-03	2.055161E-03	2.411661E-03	2.846151E-03	3.291661E-03
4	1.040815E-03	1.859421E-03	2.087531E-03	2.726071E-03	3.307181E-03	3.800131E-03	4.487361E-03	5.414231E-03

0 ZONE	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24
1	8.714741E-03	9.232971E-03	9.721161E-03	9.111191E-03	8.411931E-03	9.467181E-03	9.116131E-03	9.689791E-03
2	1.028431E-02	1.030661E-02	1.016771E-02	1.032641E-02	1.018021E-02	1.175751E-02	1.140091E-02	1.201131E-02
3	3.944031E-03	4.141741E-03	4.285491E-03	4.324901E-03	4.149221E-03	4.871141E-03	4.677161E-03	4.721171E-03
4	6.150091E-03	6.596761E-03	6.940811E-03	6.457641E-03	6.342881E-03	6.986161E-03	6.782281E-03	7.102691E-03

ZONE	GRP.	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32
1	8.664503E-03	9.[illegible]E-03	7.995361E-03	5.610604E-03	9.426891E-03	1.059471E-02	9.215221E-03	8.814471E-03
2	1.008655E-02	1.1[illegible]E-02	9.348201E-03	5.681491E-03	1.226501E-02	1.315531E-02	1.189171E-02	1.085971E-02
3	4.227611E-03	4.[illegible]E-03	3.775641E-03	3.[illegible]E-03	4.[illegible]E-03	5.241901E-03	4.626161E-03	4.264481E-03
4	6.[illegible]E-03	6.[illegible]E-03	5.562701E-03	5.742301E-03	9.221661E-03	7.[illegible]E-03	6.[illegible]E-03	6.[illegible]E-03

1ZONE	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40
1	7.[illegible]E-03	6.[illegible]E-03	5.[illegible]E-03	5.[illegible]E-03	6.[illegible]E-03	6.[illegible]E-03	5.[illegible]E-03	4.[illegible]E-03
2	9.[illegible]E-03	8.[illegible]E-03	6.[illegible]E-03	8.[illegible]E-03	7.[illegible]E-03	8.[illegible]E-03	6.[illegible]E-03	5.[illegible]E-03
3	3.[illegible]E-03	3.[illegible]E-03	2.[illegible]E-03	2.[illegible]E-03	2.[illegible]E-03	2.[illegible]E-03	2.[illegible]E-03	1.[illegible]E-03
4	5.[illegible]E-03	4.[illegible]E-03	3.[illegible]E-03	3.[illegible]E-03	3.[illegible]E-03	3.[illegible]E-03	3.[illegible]E-03	2.[illegible]E-03

0 ZONE	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45	GRP. 46	GRP. 47	GRP. 48
1	3.758479E-03	3.284201E-03	2.891091E-03	2.556531E-03	2.280221E-03	2.029197E-03	1.812291E-03	1.627181E-03
2	4.379301E-03	3.732791E-03	3.203671E-03	2.767361E-03	2.397751E-03	2.072561E-03	1.798531E-03	1.620131E-03
3	1.716521E-03	1.517481E-03	1.347041E-03	1.202031E-03	1.077451E-03	9.677721E-04	8.727201E-04	7.866761E-04
4	2.649201E-03	2.372671E-03	2.128471E-03	1.916471E-03	1.731211E-03	1.568161E-03	1.427161E-03	1.299201E-03

0 ZONE	GRP. 49	GRP. 50	GRP. 51	GRP. 52	GRP. 53	GRP. 54	GRP. 55	GRP. 56
1	1.470741E-03	3.077981E-03	2.470161E-03	1.917491E-03	1.526911E-03	1.197781E-03	9.716691E-04	5.865141E-04
2	1.375411E-03	2.671121E-03	1.959491E-03	1.041011E-03	7.866901E-04	4.705871E-04	1.695601E-04	1.603521E-05
3	5.479191E-04	1.104501E-03	8.217251E-04	5.495611E-04	3.588411E-04	2.048121E-04	9.914681E-05	1.109791E-05
4	8.987991E-04	1.900361E-03	1.446021E-03	1.012101E-03	7.057491E-04	5.108931E-04	3.761141E-04	2.852211E-04

0 ZONE	GRP. 57	GRP. 58	GRP. 59	GRP. 60	GRP. 61	GRP. 62	GRP. 63	GRP. 64
1	9.649121E-04	1.072561E-03	1.095621E-03	1.155011E-03	1.163191E-03	1.211351E-03	1.162721E-03	1.180381E-03
2	2.038501E-04	2.467721E-04	4.336011E-04	8.564031E-04	6.741871E-04	1.029761E-04	8.970271E-04	1.207671E-04
3	6.538081E-05	1.089251E-04	1.555411E-04	2.102391E-04	2.166701E-04	1.657331E-04	2.786621E-04	3.618451E-04
4	3.571491E-04	4.329201E-04	4.770331E-04	5.428961E-04	5.516161E-04	5.802151E-04	5.640361E-04	5.764751E-04

0 ZONE	GRP. 65	GRP. 66	GRP. 67	GRP. 68	GRP. 69	GRP. 70	GRP. 71	GRP. 72
1	1.260391E-03	1.296071E-03	1.165001E-03	1.425261E-03	1.402211E-03	1.432761E-03	1.442811E-03	1.473001E-03
2	1.534631E-04	7.035121E-04	1.716781E-04	9.453461E-04	8.729251E-04	1.251981E-03	1.033521E-03	1.089011E-03
3	2.819421E-04	5.026271E-04	1.563291E-04	3.159841E-04	3.790211E-04	5.145391E-04	4.036981E-04	4.229051E-04
4	1.217771E-04	6.662481E-04	5.802471E-04	7.742821E-04	7.654271E-04	9.182161E-04	7.991551E-04	8.233721E-04

0 ZONE	GRP. 73	GRP. 74	GRP. 75	GRP. 76	GRP. 77	GRP. 78	GRP. 79	GRP. 80
1	1.547711E-03	1.779361E-03	2.665171E-03	9.066211E-04	5.565991E-03	9.812281E-04	2.980091E-03	1.710921E-03

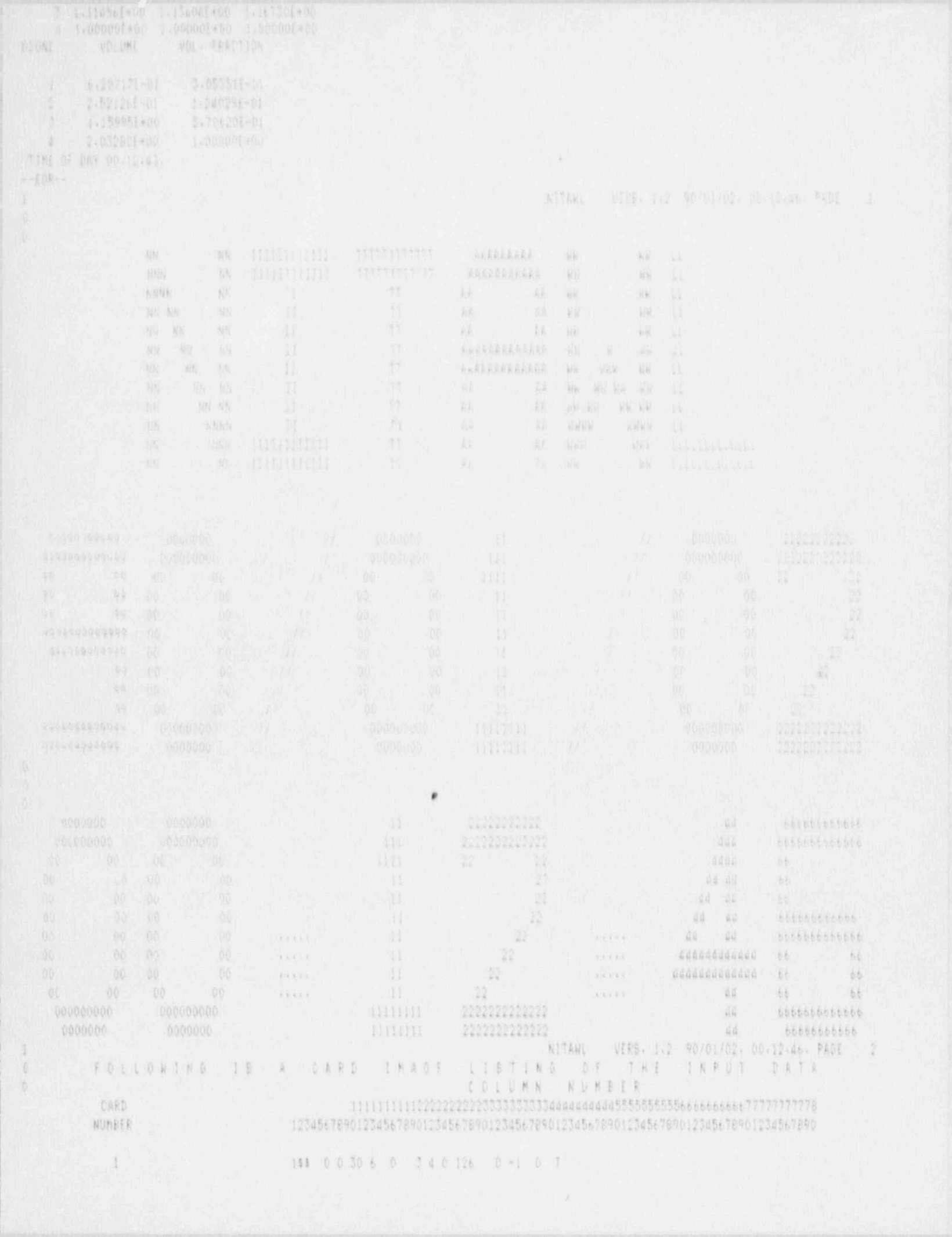
0 ZONE	GRP. 81	GRP. 82	GRP. 83	GRP. 84	GRP. 85	GRP. 86	GRP. 87	GRP. 88
2	1.980221E-03	1.495771E-03	2.985951E-03	2.707631E-04	4.367391E-03	3.079521E-04	3.442851E-03	8.037041E-04
3	9.527041E-04	5.696491E-04	1.172081E-03	1.384211E-04	1.674811E-03	1.592251E-04	1.318371E-03	3.708781E-04
4	1.265321E-03	1.052401E-03	1.852971E-03	3.893411E-04	2.586251E-03	4.159171E-04	2.086791E-03	7.285711E-04

0 ZONE	GRP. 89	GRP. 90	GRP. 91	GRP. 92	GRP. 93	GRP. 94	GRP. 95	GRP. 96
1	2.169641E-03	5.116001E-03	8.216741E-04	5.707021E-03	1.047771E-03	2.031431E-03	2.408681E-03	6.565781E-03
2	2.193301E-03	7.199311E-03	4.736291E-04	7.838361E-03	5.214771E-04	2.052921E-03	2.619011E-03	9.162641E-03
3	8.542461E-04	2.756311E-03	1.132361E-04	2.992931E-03	2.663671E-04	8.161521E-04	1.026701E-03	3.495721E-03
4	1.421981E-03	4.027901E-03	3.742571E-04	4.422661E-03	5.366061E-04	1.740631E-03	1.646061E-03	5.136031E-03

0 ZONE	GRP. 89	GRP. 90	GRP. 91	GRP. 92	GRP. 93	GRP. 94	GRP. 95	GRP. 96
1	3.766591E-03	1.356481E-03	1.274011E-03	9.638631E-04	1.025121E-03	2.150091E-04	2.633091E-04	4.065521E-04
2	4.648401E-03	1.136521E-03	1.037021E-03	1.221131E-04	2.050221E-04	4.107741E-05	8.121561E-05	2.971141E-04

4	2.7e862E-02	3.e4e74E-04	7.7534eE-04	5.396e7E-04	8.77523E-04	7.66355E-04	1.15e79E-04	2.01715E-04	
0 ZONE	GRP. 97	GRP. 98	GRP. 99	GRP.100	GRP.101	GRP.102	GRP.103	GRP.104	
1	4.17072E-04	7.9e542E-04	4.3e259E-04	7.93703E-04	8.30392E-04	1.04738E-03	1.15674E-03	1.56845E-03	
2	3.79218E-04	7.09813E-04	1.01252E-03	6.99424E-04	7.53614E-04	9.17e90E-04	1.12607E-03	1.54100E-03	
3	1.91e1eE-04	2.76827E-04	5.95e22E-04	2.74793E-04	2.98806E-04	3.47255E-04	4.40091E-04	5.46182E-04	
4	2.36256E-04	4.89122E-04	6.89433E-04	4.85909E-04	5.15025E-04	6.28972E-04	7.85369E-04	1.00951E-03	
0 ZONE	GRP.105	GRP.106	GRP.107	GRP.108	GRP.109	GRP.110	GRP.111	GRP.112	
1	2.79175E-03	2.07206E-03	2.66231E-03	3.16881E-03	1.65979E-03	2.05e96E-03	2.34252E-03	2.78124E-03	
2	2.46075E-03	2.46726E-03	3.21547E-03	2.76690E-03	1.97207E-03	2.45286E-03	3.30603E-03	4.60860E-03	
3	1.00907E-03	9.50e46E-04	1.2195eE-03	1.45530E-03	7.64753E-04	9.59417E-04	1.30081E-03	1.83e4eE-03	
4	1.62953E-03	1.48086E-03	1.91710E-03	2.26523E-03	1.18752E-03	1.47473E-03	1.98174E-03	2.76907E-03	
0 ZONE	GRP.113	GRP.114	GRP.115	GRP.116	GRP.117	GRP.118	GRP.119	GRP.120	
1	5.62760E-03	8.65e0eE-03	6.19921E-03	7.84184E-03	9.07721E-03	1.14e25E-02	1.39751E-02	1.54734E-02	
2	6.96667E-03	1.08e67E-02	7.65455E-03	1.01752E-02	1.29934E-02	1.59402E-02	1.88965E-02	2.12998E-02	
3	2.77777E-03	4.38e04E-03	3.02230E-03	4.06703E-03	5.18752E-03	6.25e56E-03	7.44918E-03	8.58120E-03	
4	4.16745E-03	6.49e62E-03	4.70e87E-03	5.98e67E-03	7.55110E-03	9.25736E-03	1.08405E-02	1.21e2eE-02	
0 ZONE	GRP.121	GRP.122	GRP.123	GRP.124					
1	7.74192E-02	7.15861E-02	5.70e65E-02	8.60697E-01					
2	1.08951E-02	1.02827E-02	9.50275E-03	1.07044E-01					
3	4.23589E-02	3.93e67E-02	3.14120E-02	2.12756E-01					
4	4.12185E-02	5.e0926E-02	4.62e85E-02	2.29987E-01					

0 ZONE	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8	
1	2.32943E-04	4.55e4eE-04	1.61401E-03	7.01135E-03	7.45246E-03	1.72813E-02	3.23607E-02	3.77167E-02	
2	2.45421E-04	4.72149E-04	1.56e15E-03	2.44507E-03	4.21110E-03	4.28502E-03	4.23595E-03	5.44026E-03	
3	1.27499E-04	2.20811E-04	1.52e47E-03	3.41475E-03	7.05945E-03	1.35462E-02	2.26922E-02	3.56e42E-02	
4	1.60887E-04	3.37116E-04	1.55906E-03	7.48762E-03	9.19814E-03	1.28e94E-02	2.25107E-02	3.62754E-02	
0 ZONE	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16	
1	5.54c59E-02	7.16795E-02	9.40e67E-02	1.22279E-01	1.39214E-01	1.42456E-01	1.71e82E-01	2.27130E-01	
2	5.38223E-02	1.07405E-02	1.03771E-02	1.17430E-01	1.22234E-02	1.25e8eE-01	1.63148E-01	2.18165E-01	
3	5.27048E-02	6.69705E-02	8.74e78E-02	1.14274E-01	1.26140E-01	1.29e62E-01	1.57482E-01	2.11e0eE-01	
4	5.24149E-02	6.85809E-02	9.01126E-02	1.17107E-01	1.31e79E-01	1.34491E-01	1.62544E-01	2.17410E-01	
0 ZONE	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24	
1	2.66050E-01	2.84743E-01	2.97109E-01	2.63877E-01	2.37118E-01	2.71523E-01	3.09627E-01	2.82732E-01	
2	2.55329E-01	2.73312E-01	2.85602E-01	2.52744E-01	2.28454E-01	2.59866E-01	2.95297E-01	2.71983E-01	
3	2.47425E-01	2.65221E-01	2.76749E-01	2.44070E-01	2.20348E-01	2.50e87E-01	2.39164E-01	2.62711E-01	
4	2.54279E-01	2.72179E-01	2.84061E-01	2.51192E-01	2.27447E-01	2.58e19E-01	2.46813E-01	2.70064E-01	
0 ZONE	GRP. 25	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32	
1	2.51129E-01	2.76691E-01	2.13374E-01	2.17159E-01	2.07957E-01	3.02850E-01	2.70652E-01	2.54678E-01	
2	2.40443E-01	2.67724E-01	2.04271E-01	2.07576E-01	2.71567E-01	2.40721E-01	2.59558E-01	2.44462E-01	
3	2.31846E-01	2.58027E-01	1.96202E-01	1.99300E-01	2.61140E-01	2.79d48E-01	2.49620E-01	2.35523E-01	
4	2.39572E-01	2.66515E-01	2.02463E-01	2.05781E-01	2.69400E-01	2.86298E-01	2.57280E-01	2.42769E-01	
0 ZONE	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40	
1	2.23632E-01	2.16911E-01	1.60673E-01	1.46977E-01	1.47963E-01	2.22497E-01	1.90151E-01	1.68056E-01	
2	2.28709E-01	2.08280E-01	1.56143E-01	1.43218E-01	1.90741E-01	2.12515E-01	1.83779E-01	1.63324E-01	
3	2.20492E-01	2.01131E-01	1.51550E-01	1.39650E-01	1.84733E-01	2.05796E-01	1.77779E-01	1.58817E-01	
4	2.26806E-01	2.06586E-01	1.54845E-01	1.42302E-01	1.89519E-01	2.11853E-01	1.82301E-01	1.62199E-01	
0 ZONE	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45	GRP. 46	GRP. 47	GRP. 48	
1	1.56085E-01	1.46665E-01	1.38539E-01	1.31981E-01	1.26523E-01	1.22026E-01	1.14755E-01	1.09477E-01	
2	1.52221E-01	1.43431E-01	1.3584eE-01	1.29746E-01	1.24666E-01	1.20461E-01	1.13299E-01	1.08374E-01	
3	1.48485E-01	1.40242E-01	1.33118E-01	1.27412E-01	1.22657E-01	1.18830E-01	1.11809E-01	1.07023E-01	
4	1.51271E-01	1.42599E-01	1.35112E-01	1.29096E-01	1.24086E-01	1.20008E-01	1.12906E-01	1.07940E-01	
0 ZONE	GRP. 49	GRP. 50	GRP. 51	GRP. 52	GRP. 53	GRP. 54	GRP. 55	GRP. 56	
1	1.04653E-01	2.43398E-01	2.24065E-01	2.07141E-01	1.93095E-01	1.82719E-01	1.73750E-01	1.67243E-01	
2	1.03810E-01	2.42055E-01	2.23443E-01	2.07119E-01	1.93565E-01	1.83659E-01	1.74919E-01	1.68571E-01	
3	1.02671E-01	2.39874E-01	2.21841E-01	2.06044E-01	1.93002E-01	1.83294E-01	1.74775E-01	1.68674E-01	
4	1.03418E-01	2.41221E-01	2.22719E-01	2.06512E-01	1.93100E-01	1.83163E-01	1.74460E-01	1.68224E-01	
0 ZONE	GRP. 57	GRP. 58	GRP. 59	GRP. 60	GRP. 61	GRP. 62	GRP. 63	GRP. 64	



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                 5                          50000  60002  210000 120005  130000
                 6                         140005 240002 250008 260001 280005  820000
                 7                          50100
                 8                          2592351  42922351 5032351
                 9                          2942381  42422381 5092381
                10                          2580004  4258004  5080004
                11                          25800000 42600000 50400000
                12                          2510001  4210001  5010001
                13                          2850100  4250100  5050100
                14                          32922351
                15                          32922381
                16                          3280004
                17                          32800000
                18                          32210001
                19                          32850100
0       ********************************** E N D   O F   I N P U T   D E C K **********************************
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                                                                    NITAWL    USER: 142  90/01/02. 06:12.46.  PAGE    3
0
0    IA ARRAY     12 ENTRIES READ
0
0 NEDR =    NUMBER OF EXTRA CROSS SECTIONS                          1
  NRT  =    NUMBER OF NUCLIDES FROM MASTER LIBRARY                  0
  NNT  =    NUMBER OF NUCLIDES FROM T-SECT LIBRARY (UNIT 2)        10
  NIR  =    NUMBER OF NUCLIDES FROM T-SECT LIBRARY (UNIT 7)         4
  NER  =    ANISN/DOT/MORSE OUTPUT TRIGGER                          0
  NXS  =    TOTAL CROSS SECTION POSITION                            3
  NIJ  =    WITHIN-GROUP SCATTERING CROSS SECTION POSITION          4
  LFIB =    NUMBER OF RESONANCE CALCULATIONS                        0
  IDF  =    TABLE LENGTH FOR CROSS SECTIONS                      1226
  IPT  =    IS AN OLD ANISN LIBRARY MOUNTED ? (0/1 NO/YES)          0
  LPF  =    OUTPUT OPTION TRIGGER                                   2
  IPR  =    PRINT CONTROL + ANISN OUTPUT                            0
0THE STORAGE ALLOCATED FOR THIS CASE IS  33000 WORDS
0    JA ARRAY     34 ENTRIES READ
0
0 GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
   TAPE IDENTIFICATION NUMBER                  165
   NUMBER OF NUCLIDES ON TAPE                    6
   NUMBER OF NEUTRON ENERGY GROUPS             123
   FIRST THERMAL NEUTRON ENERGY GROUP           98
   NUMBER OF GAMMA ENERGY GROUPS                 0
+  WORK TAPE     0
0 THIS XSDRN WORKING TAPE WAS CREATED 90/01/02
 THE TITLE OF THE PARENT CASE IS AS FOLLOWS
 SUPER-XSDRN LIBRARY--LAST DIGITS OF ID #'S ARE CODED AS FOLLOWS--      5-900K,6
 -800K,7-850K,8-750K,9-1000K,ANYTHING ELSE IS PRECISELY THAT--IF THESE THERMAL TE
 MPERATURES ARE DESIRED, CALL C.W. CRAVEN, JR. OR       N. M. GREENE----ALL THER
-  WTD. TAPE    165
0 XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED-- [E3]NXB1] EXXON 15X15 PWR, 3.3% U235
 , 1500 PPM NAT.BORON
  1Mb mil

0 NUCLIDES FROM  WORK TAPE
     1     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          25922351
     2     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          42922351
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    4    URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          2592351
    5    URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          4292351
    6    URANIUM-238R                   THERMAL TEMPERATURE = 294.6 K          5092381
    7    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          251000
    8    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          421000
    9    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          501000
   10    BORON     NATURAL                                                      50000
   11    BORON-10                                                               50100
1                                                                  NITAWL    VERS. 1.2  90/01/02. 00.12.46. PAGE    4
   12    BORON-10                                                             2550100
   13    BORON-10                                                             4250100
   14    BORON-10                                                             5050100
   15    CARBON    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 589.2K K         60002
   16    OXYGEN                          THERMAL TEMPERATURE= 294.6 K         2560004
   17    OXYGEN                          THERMAL TEMPERATURE= 294.6 K         4260004
   18    OXYGEN                          THERMAL TEMPERATURE= 294.6 K         5060004
   19    SODIUM    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K         110000
   20    MAGNESIUM                             THERMAL TEMP = 900.0 K         120005
   21    ALUMINUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.15 K        130000
   22    SILICON                               THERMAL TEMP = 900.0 K         140005
   23    CHROMIUM      THERMAL TEMP=294.6                                     240007
   24    MANGANESE                             THERMAL TEMP = 900.0 K         250005
   25    IRON          THERMAL TEMP=294.6                                     260001
   26    NICKEL        THERMAL TEMP=294.6                                     280002
   27    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K       2540003
   28    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K       4240003
   29    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K       5040003
   30    LEAD      NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K         820600
 NUCLIDES FROM  WIMS TAPE
   31    URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          2592351
   32    URANIU--238R                   THERMAL TEMPERATURE = 294.6 K          5092381
   33    HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          251001
   34    BORON-10                                                               250100
   35    OXYGEN                          THERMAL TEMPERATURE= 294.6 K          2560004
   36    ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K       5040003
TIME OF DAY 00.12.47.
1                                                                  NITAWL    VERS. 1.2  90/01/02. 00.12.46. PAGE    5
0    THIS ISOTXS WORKING TAPE WAS CREATED 90/01/02
     THE TITLE OF THE PARENT CASE IS AS FOLLOWS
     BORN WEIGHTED TAPE--PARENT CASE ENTITLED-- (ESSENTIAL) EXXON 15X15 PWR, 3.3% 1.2G
     W 1500 PPM NAT.BORON


     TAPE ID                          165         NUMBER OF NUCLIDES                 36
     NUMBER OF NEUTRON GROUPS         187         NUMBER OF GAMMA GROUPS              0
     FIRST THERMAL GROUP               90


                                TABLE OF CONTENTS

     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          ID  2592351
     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          ID  4292351
     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K          ID  5092351
     URANIUM-238R                   THERMAL TEMPERATURE = 294.6 K          ID  2592381
     URANIUM-238R                   THERMAL TEMPERATURE = 294.6 K          ID  4292381
     URANIUM-238R                   THERMAL TEMPERATURE = 294.6 K          ID  5092381
     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          ID   251001
     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          ID   421001
     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          ID   501001
     BORON     NATURAL                                                      ID    50000
     BORON-10                                                               ID    50100
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      BORON-10                                                                  1D  4250100
      BORON-10                                                                  1D  5050100
      CARBON    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 589.26 K            1D    60002
      OXYGEN                          THERMAL TEMPERATURE= 294.6 K              1D  2580004
      OXYGEN                          THERMAL TEMPERATURE= 294.6 K              1D  4280004
      OXYGEN                          THERMAL TEMPERATURE= 294.6 K              1D  5080004
      SODIUM    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 297.6 K             1D   110000
      MAGNESIUM                              THERMAL TEMP = 900.0 K             1D   120005
      ALUMINUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K            1D   130000
      SILICON                                THERMAL TEMP = 900.0 K             1D   140005
     CHROMIUM       THERMAL TEMP=294.6                                          1D   240007
      MANGANESE                              THERMAL TEMP = 900.0 K             1D   250005
     IRON           THERMAL TEMP=294.6                                          1D   260007
     NICKEL         THERMAL TEMP=294.6                                          1D   280007
      ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K            1D  2540000
      ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K            1D  4240000
      ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K            1D  5040000
      LEAD      NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K             1D   820000
      URANIUM-235                    THERMAL TEMPERATURE = 294.6 K              1D  9228751
      URANIUM-238M                   THERMAL TEMPERATURE = 294.6 K              1D  9238751
      HYDROGEN--THERMOS ID=1001(X-6401) THERMAL TEMPERATURE= 294.6 K            1H   1019601
      BORON-10                                                                  1D  5050100
      OXYGEN                          THERMAL TEMPERATURE= 294.6 K              1D  8280004
      ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K            1D  9040000
-EOR-
 MBRA   POWER COMPUTING(490) - MAC 2.7.1(10)     MOS 2.7.1 ST=MAC.(1) 90/02/02. 00.15.00.



00.09.50.LOGIN,B,PO,T200. HENRY TRAN
00.09.50.USER,WAPPEN,,MC.
00.09.51.ABBC, 0.
00.09.51. YOUR PASSWORD EXPIRES AT 01.00.00 ON 90/02/05.
00.09.51.CHARGE,N9722G1,WBC.
00.09.52. CHARGE = N9722G1, PROJECT = WBC.
00.09.52.EDITOR.
00.09.52.PROC. SYSTEM CATALOGUE
00.09.52.COMMENT. SYSTEM PROCED
00.09.52.NEWS(A).
00.09.54.CHECKER.
00.09.54. INQUIRY COMPLETE.
00.09.55.RIVERT.
00.09.55.TITLE,IESSNXB1 EXXON 1845 PWR, 3.25 U235, ~~1500~~ PPM NAT.BORON)
00.09.55.ATTACHP(NITAWL,1,0)
00.09.57.    STOP
00.09.57.    025200 MAXIMUM EXECUTION FL.
00.09.57.      0.279 CP SECONDS EXECUTION TIME.
00.09.57.ATTACHP(AIM120,1,0A)
00.09.58.    STOP
00.09.58.    025200 MAXIMUM EXECUTION FL.
00.09.58.      0.042 CP SECONDS EXECUTION TIME.
00.09.58.REWIND,TAPE1.
00.09.58.NITAWL,PL=777777.
00.11.17.      END  MNITAWL
00.11.17.    225200 MAXIMUM EXECUTION FL.
00.11.17.     71.182 CP SECONDS EXECUTION TIME.
00.11.17.REWIND,TAPE4.
00.11.17.REWIND,TAPE2.
00.11.17.COPYBF,TAPE4,TAPE2.
00.11.18. EOI    1 FILES        1 RECD     359336 WORDS
00.11.18.REWIND,TAPE4.
00.11.18.ATTACHP,XSDRNPM,1,0A.
00.11.22.    STOP
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00.11.22.     0.843 CP SECONDS EXECUTION TIME.
00.11.22.$SDRNPM(PL=777777)
00.12.43.     END  XSDRNPM
00.12.43.    245000 MAXIMUM EXECUTION FL.
00.12.43.   109.265 CP SECONDS EXECUTION TIME.
00.12.43. RETRIEVED NORMAL TERMINATION.
00.12.43. JOB RETRIEVED.
00.12.43. RPV - PREVIOUS ERROR CONDITIONS RESET.
00.12.43.REWIND,TAPE2,TAPE3.
00.12.44.RETURN,TAPE6.
00.12.44.ATTACHP,NITAWL,1,2.
00.12.46.    STOP
00.12.46.    035200 MAXIMUM EXECUTION FL.
00.12.46.     0.280 CP SECONDS EXECUTION TIME.
00.12.46.NITAWL(PL=777777)
00.12.51.     END  NNITAWL
00.12.51.    220600 MAXIMUM EXECUTION FL.
00.12.51.     2.831 CP SECONDS EXECUTION TIME.
00.12.51.REWIND,TAPE4.
00.12.51.RETURN,TAPE3,TAPE5.
00.13.51.LABEL,TAPE8,W,D=DE,L=FASECT,VSN=007421.
00.13.51.N1104, ASSIGNED TO TAPE8, VSN=007421.
00.14.54.COPYBF,TAPE4,TAPE8.
00.14.58. EOI    1 FILES        1 RECS     309499 WORDS
00.14.59.OFF,      0.166SUNS.
00.14.59.UEMT,     2.478SUNS.
00.14.59.UTKE,    194.777SUNS.
00.14.59.HEOP,    185.942SECS.
00.14.59. SRU,    204.183UNITS.
00.14.59.$OUT(+,0)=C.
00.15.00. NO FILES PROCESSED.
00.15.00.$DAYFILE(OUTPUT,IT=0).
00.15.00 TAPE,     1LCE SDBS FN=OUTPUT.
00.15.00.POWER COMPUTING/990 - NOS 2.7.1-2D
00.15.00.DATE:          90/01/02.
00.15.00.JSN:           MBF.
END OF FILE
```

```
XEDIT 3.1.00
*
[E33KEBI MRHM MASSEY JOHN  001 90/01/02. 02:00:55. MID = MAC - ME2
[E33KEBI] EXXON 15X15 PWR, 3.3%U235,~~1500~~ PPM NAT.BORON
--EOR--
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/02. 02:11:14. PAGE    1
0
0
                                KK          KK   EEEEEEEEEEEEE   NN          NN    DDDDDDDDDD
                                KK        KK     EEEEEEEEEEEEE   NNN         NN   DDDDDDDDDDDD
                                KK      KK       EE              NNNN        NN   DD        DD
                                KK    KK         EE              NN NN       NN   DD        DD
                                KK  KK           EE              NN  NN      NN   DD        DD
                                KKKKKK           EEEEEEEEE       NN   NN     NN   DD        DD
                                KKKKKK           EEEEEEEEE       NN    NN    NN   DD        DD
                                KK  KK           EE              NN     NN   NN   DD        DD
                                KK    KK         EE              NN      NN  NN   DD        DD
                                KK      KK       EE              NN       NNNN   DD        DD
                                KK        KK     EEEEEEEEEEEEE   NN        NNN   DDDDDDDDDDDD
                                KK          KK   EEEEEEEEEEEEE   NN         NN   DDDDDDDDDD
0
0
0
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0
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0
0
0
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/02. 02:11:14. PAGE    2
0
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/02. 02:11:14. PAGE    3
0       F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                  C O L U M N   N U M B E R
        CARD                        11111111112222222222333333333344444444445555555555666666666677777777778
        NUMBER                  12345678901234567890123456789012345678901234567890123456789012345678901234567890

          1                     [E33KEBI] EXXON 15X15 PWR, 3.3%U235,~~1500~~ PPM NAT.BORON
          2                     99.0  70   300  3    123  75   10   5    22   6
          3                     1     1    1    1    -10  1    0    2000 00   1
          4                     0     0    0    0    0    00   0    0
```

```
                1 -33922551     2.3422+4
                1  33922381     6.7769+3
                1  3350004      5.3062-2
                1  33400000     4.7125-3
                1  3210001      3.8073-1
                1  3350100      1.1190+5
                2  10001  6.671-2     2  80004  3.336-2     2  50100  1.961-5
                2  60002  2.6100-4    3  250005 1.0900-3
                3  260001 8.2800-2    3  140005 1.9000-4
                4  920000 3.2960-2
                5  30001  2.7700-2    5  50000  1.4600-3    5  90004  3.7100-1
                5  110000 2.6000+4    5  120005 2.0890+4    5  170000 8.9710-5
                5  140005 7.6700+4    5  260001 4.8900-5
                BOX TYPE  1
                GENERAL          1 6+0.0    123+0.5
                GENERAL          2 6+0.0    123+0.5
                GENERAL          3 6+0.0    123+0.5
                GENERAL          4 6+0.0    123+0.5
                GENERAL          5 6+0.0    123+0.5
                CUBOID  0  106.0451 -0.0001 106.0451 -0.0001  10.0001 -0.0001 123+0.5
                  2 GENERALIZED GEOMETRIES OF THE 1/4 TRANSFER CASK.
                X ZONE BDRY   0.0000,  106.0450
                Y ZONE BDRY   0.0000,  106.0450
                Z ZONE BDRY   0.0000,   50.0000
                ZONE     1    1    1
                X BLOK BDRY   0.0000,   23.360,   46.720,  106.0450
                Y BLOK BDRY   0.0000,  106.045
                Z BLOK BDRY   0.0000,   50.000
                BLOCK    1    1    1
                MEDIA          3,   5,   3,   4,   3,   1,   3,   1,   3,   2,
                   2,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
                   3,   2,   2,   2,   1,   2,   2, 1000
                SURFACES       1,   2,   3,   4,   5,   6,   7,   8,   9,  10,
                  11,  12,  13,  14,  15,  16,  17,  18,  19,  20,  21,  22,
                  23,  24,  25
                SECTOR -1  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
                SECTOR  0 -1  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
                SECTOR  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                  0  0  0
                SECTOR  0  0  0 -1 -1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                  0  0  0
                SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                  0  0  0
                SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                  0  0  0
1                                                  KENO IV - VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE   4
0      F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                  C O L U M N   N U M B E R
 CARD                          11111111112222222222333333333344444444445555555556666666666777777777
NUMBER                 1234567890123456789012345678901234567890123456789012345678901234567890123456789

                  0  0  0
                SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                  0  0  0
                SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                  0  0  0
                SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  1
                  0  0 -1
                SECTOR  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  0  0  0  1
                 -1  0  0
                SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
```

```
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0-1 0 0 1 0 0 0 0 0 0 0 0 0
                      0  1 -1
                    SECTOR  0 0 0 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0-1
                      0  0  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0-1 1 0 0 0 0 0 0 0 0 0 0 0
                      1 -1  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0
                      0  0  1
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0-1 1 0 0 0 0 0 0 0 0 0 0
                      1 -1  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0-1 1 0 0 0 0 0 0 0 0 1
                      0  0 -1
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0 0 1 0 0 0 0 0 1
                     -1  0  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 1 0 0 0 0 0 0 0
                      1 -1  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0 0 1 0 0 0 0 0
                      0  1 -1
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 1 0 0 0 0 0 0
                      1 -1  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 1 0 0 0 0 0
                      0  0 -1
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 1 0 0 0 0
                     -1  0  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 1 0 0 0
                      1 -1  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 1 0 0
                      0  1 -1
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 1 0
                      1 -1  0
                    SECTOR  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 1
                      0  0 -1
                    SECTOR  1 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
                    BLOCK     2     1     1
                    MEDIA         2,    5,    3,    4,    1,    6,    7,    8,    9,    2,
                                                KENDIV    MCR 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE    3
F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
                                                C O L U M N   N U M B E R
 CARD                    11111111112222222222333333333344444444445555555556666666666777777777
NUMBER          12345678901234567890123456789012345678901234567890123456789012345678901234567890

                    2,    2,    2,    1,    3,    2,    2,    2,    2,    2,    1,    2,
                    3, 1000
                    SURFACES      1,    2,    3,    4,    5,    6,    7,    8,   14,   15,
                      16,   17,   18,   19,   20,   21,   26,   27,   28,   29,   35
                    SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  1
                    SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  1
                    SECTOR  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  1  0  0 -1 -1
                    SECTOR  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  1 -1  0  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  1 -1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  1 -1  0
```

```
SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0 -1  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0 -1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0 -1  1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0 -1  1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0 -1  1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0 -1  1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0 -1  1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1 -1  1
SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1 -1  1
BLOCK    3    1    1
MEDIA          3,   5,   3,   4,   1,   2,   3,   2,   2,   1,
   2,   1,   2,   5,   2,   3,   5,   2, 1000
SURFACES       1,   2,   3,   4,   5,   6,   7,   8,  18,  19,
  20,  21,  30,  31,  32,  33,  34,  36
SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  1
SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  1 -1
SECTOR  0  0  0  0  0  0  0  0  0  1  0  0  0  1  0  0 -1  0 -1
SECTOR  0  0  0  1  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0  0
SECTOR  0  0  0  0  0  1  0  0  0  0 -1  1  0  0  1 -1  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0 -1  0  1  0  0  1 -1  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0 -1  1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1 -1  1
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0  0  0
```



```
0    F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
                                        C O L U M N   N U M B E R
CARD                    1111111111222222222233333333334444444445555555556666666667777777778
NUMBER         12345678901234567890123456789012345678901234567890123456789012345678901234567890

SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  36 QUADRIC SURFACES IN THE SYSTEM
     1.0YS0          1.0XS0   -11245.542     $
     1.0YS0          1.0XS0   -10713.285     $
     1.0YS0          1.0XS0   -8713.2090     $
     1.0YS0          1.0XS0   -8595.1441     $
     1.0YS0          1.0XS0   -6814.5025     $
     1.0YS0          1.0XS0   -6401.6301     $
     1.0YS0          1.0XS0   -6199.9876     $
     1.0YS0          1.0XS0   -5903.6172     $
     1.0Y       -70.1040     $
     1.0Y       -69.5960     $
     1.0Y       -68.8975     $
     1.0Y       -47.9425     $
     1.0Y       -47.2440     $
     1.0Y       -46.2280     $
     1.0Y       -45.5295     $
     1.0Y       -24.5745     $
     1.0Y       -23.6760     $
     1.0Y       -22.8600     $
     1.0Y       -22.1615     $
     1.0Y        -1.2065     $
```

```
          177                                1.01Y       -0.5080     $
          178                                1.01X       +1.2065     $
          179                                1.01X      -22.1615     $
          180                                1.01X      -22.8600     $
          181                                1.01X      -23.8760     $
          182                                1.01X      -24.5745     $
          183                                1.01X      -45.5295     $
          184                                1.01X      -46.2280     $
          185                                1.01Y       -4.2440     $
          186                                1.01Y      -67.9425     $
          187                                1.01X      -68.8975     $
          188                                1.01X      -69.5960     $
          189                                1.01Y      -70.1040     $
          190                                1.01Y      -46.7360     $
          191                                1.01Y      -23.3680     $
          192                          END CASE
          193                          END KENO
0         ************************************ E N D    O F    I N P U T    L I S T I N G ************************************
```

```
                                                                                                                                  KENO IV    VER 1.2A (21/09/87) 90/01/02. 02.11.13. PAGE    7
0(E32FEB1) EXXON 15X15 PWR, 3.3%U235,1500 PPM NAT.BORON
 NUMBER OF GENERATIONS                    55                          START TYPE                                 1
 NUMBER PER GENERATION                   300                          GENERATIONS BETWEEN CHECKPOINTS            0
 NUMBER OF GENERATIONS TO BE SKIPPED       7                          LIST INPUT X-SECTIONS READ FROM TAPE     NO
 NUMBER OF ENERGY GROUPS                 123                          LIST 1-D MIXTURE X-SECTIONS              NO
 MAX. NUMBER OF ENERGY TRANSFERS          75                          LIST 2-D MIXTURE X-SECTIONS              NO
 NUMBER OF INPUT NUCLIDES                 19                          LIST FISS. AND ABS. BY REGION            NO
 NUMBER OF MIXTURES                        5                          USE X-SECTIONS FROM PREVIOUS CASE        NO
 NUMBER OF MIXING TABLE ENTRIES           22                          USE GEOMETRY FROM PREVIOUS CASE          NO
 NUMBER OF GEOMETRY CARDS                  6                          USE VELOCITIES FROM PREVIOUS CASE        NO
 NUMBER OF BOX TYPES                       1                          COMPUTE MATRIX K-EFFECTIVE BY UNIT       NO
 NUMBER OF UNITS IN X DIRECTION            1                          COMPUTE MATRIX K-EFFECTIVE BY BOX TYPE   NO
 NUMBER OF UNITS IN Y DIRECTION            1                          LIST FIDO PROB MATRIX BY UNIT            NO
 NUMBER OF UNITS IN Z DIRECTION            1                          ADJOINT CALCULATION                      NO
 NUMBER OF NUCLIDES READ FROM TAPE        -1                          USE EXPONENTIAL TRANSFORM                NO
 ALBEDO TYPE                               1                          CALCULATE FLUX                          YES
 SEARCH TYPE                               0                          CALCULATE FISSION DENSITIES             YES
 OTHER PROBLEM WILL BE RUN WITH SPECULARLY REFLECTING BOUNDARY CONDITION
 THE ALBEDOS ARE +X = 0.          -X = 1.00000E+00 +Y = 0.          -Y = 1.00000E+00 +Z = 1.00000E+00 -Z = 1.00000E+00
 MAXIMUM TIME =  99.0000 MINUTES
 STORAGE LOCATIONS REQUIRED FOR THIS JOB =     54705
  REMAINING AVAILABLE LOCATIONS=     48594
 REQUIRED LCM STORAGE LOCATIONS  =  23580 (00101454B)
  REMAINING LCM AVAILABLE        =  56420 (00225644B)
```

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                                                                                                                                  KENO IV    VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE    8
0(E33KEB1) EXXON 15X15 PWR, 3.3%U235,1500 PPM NAT.BORON
0     MIXTURE  NUCLIDE   DENSITY
          1 -32922351   2.34220E-04
          1  32922381   6.77690E-03
          1   2380004   3.30620E-02
          1  32400000   4.71250E-02
          1   3310001   3.80730E-02
          1   3350100   1.11900E-05
          2     10001   6.67100E-02
          2     80004   3.33600E-02
          2     50100   1.96100E-05
          3     60002   2.61000E-04
          3    250005   1.09000E-03
```

```
        4   820000   3.29600E-02
        5    10001   2.77000E-02
        5    50000   1.46000E-03
        5    80004   3.71000E-02
        5   110000   2.60060E-04
        5   120005   2.08000E-04
        5   130000   8.97000E-03
        5   140005   7.67000E-04
        5   260001   6.89000E-05
0


0CROSS SECTIONS READ FROM TAPE

 NUCLIDE =     10001   HYDROGEN--THERMOS ID=1001(1-640) THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =     80004   OXYGEN                          THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =     50000   BORON      NATURAL
 NUCLIDE =     50100   BORON-10
 NUCLIDE =     60002   CARBON     NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 594.26 K
 NUCLIDE =    110060   SODIUM     NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 297.5 K
 NUCLIDE =    120005   MAGNESIUM                              THERMAL TEMP = 400.0 K
 NUCLIDE =    130000   ALUMINUM   NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.15 K
 NUCLIDE =    140005   SILICON                                THERMAL TEMP = 900.0 K
 NUCLIDE =    250005   MANGANESE                              THERMAL TEMP = 900.0 K
 NUCLIDE =    260001   IRON           THERMAL TEMP=294.6
 NUCLIDE =    820003   LEAD       NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 297.5 K
 NUCLIDE =  92432251   URANIUM-235                        THERMAL TEMPERATURE = 294.6 K
 NUCLIDE =  92432381   URANIUM-238                        THERMAL TEMPERATURE = 294.6 K
 NUCLIDE =   1210001   HYDROGEN--THERMOS ID=1003(1-640) THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =   5250100   BORON-10
 NUCLIDE =   8250004   OXYGEN                          THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =  40400000   ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.15 K
1                                                        KENO IV     VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE    9

0(EXCHERIS EXXON 15X15 PWR, 3.3%U235, 1500 PPM NAT.BORON
0GEOMETRY DESCRIPTION
ORIGION
0
0BOX TYPE
ORIGION
0  1  GENERAL    1     +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  2  GENERAL    2     +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  3  GENERAL    3     +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  4  GENERAL    4     +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  5  GENERAL    5     +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  6  CUBOID     0     +X = 1.0605E+02  -X =-1.0000E-04  +Y = 1.0605E+02  -Y =+1.0000E-04  +Z = 5.0000E+01  -Z =+1.0000E-04
1                                                        KENO IV     VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE   10

0(EXCHERIS EXXON 15X15 PWR, 3.3%U235, 1500 PPM NAT.BORON
0WEIGHTING FUNCTION
0BOX TYPE                                  GROUP   WTLOW    WT AVG    WT HI
0       REGION   1 DEFINED BY GEOMETRY CARD   1
                                             1     .167      .500     1.500
                                           GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   2 DEFINED BY GEOMETRY CARD   2
                                             1     .167      .500     1.500
                                           GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   3 DEFINED BY GEOMETRY CARD   3
                                             1     .167      .500     1.500
                                           GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   4 DEFINED BY GEOMETRY CARD   4
                                             1     .167      .500     1.500
                                           GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   5 DEFINED BY GEOMETRY CARD   5
```

```
                                        GROUPS 2 TO 122 SAME AS ABOVE
0       REGION  6 DEFINED BY GEOMETRY CARD  6
                                          1      .167      .500     1.500
                                        GROUPS 2 TO 122 SAME AS ABOVE
1                                                                KENO1V     VER 1.2F (21/09/87) 90/01/02. 02.11.10. PAGE   11
0   2    PALIZE  GEOMET
0    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .
 DEAR IT
   WITH THE DEEPEST REGRET I MUST INFORM YOU THAT A DREADFUL MIS/FORTUNE HAS OCCURRED.
 YOU HAVE FAILED TO MENTION YOUR SEX AND MARITAL STATUS.
                                                    RESPECTFULLY YOURS,
                                                    GEOM

 X ZONE BDRY  0.          ,   .10605E+02
 Y ZONE BDRY  0.          ,   .10605E+02
 Z ZONE BDRY  0.          ,   .50000E+02
0ZONE     1    1    1
 X BLCK BDRY  0.          ,   .22360E+02,   .44736E+02,   .10605E+02
 Y BLCK BDRY  0.          ,   .10605E+02
 Z BLCK BDRY  0.          ,   .50000E+02
0BLOCK    1    1    1
 MEDIA          3,   9,   7,   4,   3,   2,   7,   2,   3,   4,
     2,   4,   3,   1,   3,   2,   7,   2,   2,   1,   1,   2,
     1,   3,   4,   2,   1,   2,   2, 1000
 SURFACES       1,   2,   3,   4,   5,   6,   7,   8,   9,  10,
    11,  12,  13,  14,  15,  16,  17,  18,  19,  20,  21,  22,
    23,  24,  25
 SECTOR -1  1  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
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0
 SECTOR  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 -1  1
 SECTOR  1  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
0BLOCK    2    1    1
 MEDIA          3,   5,   3,   4,   3,   2,   3,   2,   3,   2,
     2,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
1                                                                KENO1V     VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE   12
0    3, 1000
 SURFACES       1,   2,   3,   4,   5,   6,   7,   8,  14,  15,
```

```
SECTOR +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1
SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1
BLOCK   5   1
MEDIA        2,   5,   2,   4,   7,   2,   7,   2,   2,   2,
   2,   1,   2,   1,   2,   2,   1,   2, 1000
SURFACE      1,   2,   2,   4,   5,   6,   7,   8,  12,  13,
  25,  27,  30,  31,  32,  33,  34,  36
SECTOR +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1  0
SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1  1
SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 +1
0   36 QUADRIC SURFACES IN THE SYSTEM
    .10000E+01YS0      .10000E+01XS0      -.11246E+05    $
    .10000E+01YS0      .10000E+01XS0      -.10713E+05    $
    .10000E+01YS0      .10000E+01XS0      -.87133E+04    $
    .10000E+01YS0      .10000E+01XS0      -.85951E+04    $
1                                                    KENO|V     VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE   13
0   .10000E+01YS0      .10000E+01XS0      -.68145E+04    $
    .10000E+01YS0      .10000E+01XS0      -.64016E+04    $
    .10000E+01YS0      .10000E+01XS0      -.62000E+04    $
    .10000E+01YS0      .10000E+01XS0      -.59036E+04    $
    .10000E+01Y        -.70104E+02    $
    .10000E+01Y        -.69596E+02    $
    .10000E+01Y        -.68898E+02    $
    .10000E+01Y        -.67943E+02    $
```

```
 .10000E+01Y      +.46220E+02    1
 .10000E+01Y      +.48530E+02    1
 .10000E+01Y      +.24578E+02    1
 .10000E+01Y      +.23876E+02    1
 .10000E+01Y      +.22860E+02    1
 .10000E+01Y      +.22162E+02    1
 .10000E+01Y      +.12065E+01    1
 .10000E+01Y      +.50900E+00    1
 .10000E+01X      +.50800E+00    1
 .10000E+01X      +.12065E+01    1
 .10000E+01X      +.22162E+02    1
 .10000E+01X      +.22860E+02    1
 .10000E+01X      +.23876E+02    1
 .10000E+01X      +.24578E+02    1
 .10000E+01X      +.48530E+02    1
 .10000E+01Y      +.46220E+02    1
 .10000E+01X      +.47248E+02    1
 .10000E+01X      +.47943E+02    1
 .10000E+01X      +.48690E+02    1
 .10000E+01X      +.49195E+02    1
 .30000E+01X      +.79100E+02    1
 .10000E+01Y      +.41756E+02    1
 .10000E+01Y      +.23668E+02    1
1                                                    1ENDIV     VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE    14
0
```

```
 ***************************************
 FINAL ALLOCATION OF MEMORY HAS BEEN COMPLETED
 ***************************************
0REQUIRED SCM FIELD LENGTH   111604 (003337048)
 REQUIRED LCM FIELD LENGTH    36900 (000110448)
 REQUIRED RMS FIELD LENGTH        5 (000000008)
0REQUIRED SCM BLANK COMMON    6887A (002064148)
 REQUIRED LCM BLANK COMMON    36900 (000110448)
 REQUIRED RMS BLANK COMMON        0 (000000008)
0REMAINING SCM AVAILABLE      927A (000220748)
 REMAINING LCM AVAILABLE     62100 (000F75708)
0***************************************
```

```
0LOCATION OF RELOCATABLE ARRAYS
0ARRAY        MAT      LOCATION

 FSP/MUBAR      1          SCM
 FSP/MUBAR      2          SCM
 FSP/MUBAR      3          SCM
 FSP/MUBAR      4          LCM
 FSP/MUBAR      5          LCM
 WGT                       SCM
 FMABS                     SCM
 FMFIS                     SCM
1                                                    1ENDIV     VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE    15
0(EB3MERI) EXXON 15X15 PWR, 3.3%U235, 1500 PPM NAT.BORON
0 VOLUMES
0 BOX TYPE    1
          REGION DEFINED BY GEOMETRY CARD      1   VOLUME =    0.          CM..3       CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD      2   VOLUME =    0.          CM..3       CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD      3   VOLUME =    0.          CM..3       CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD      4   VOLUME =    0.          CM..3       CUMULATIVE VOLUME =    0.          CM..3
```

REGION DEFINED BY GEOMETRY CARD 6 VOLUME = 4.37002E+00 CM..3 CUMULATIVE VOLUME = 5.62261E+05 CM..3

0 TOTAL VOLUMES

1	1.00000E+00
2	1.00000E+00
3	1.00000E+00
4	1.00000E+00
5	5.62277E+05
6	4.37002E+00

0VOLUME FRACTION OF THE CORE CONTAINING FISSILE MATERIAL= 4.1775E-05

OSTART TYPE = 1

* THE NEUTRONS WERE STARTED IN THE ARRAY WITH A COSINE DISTRIBUTION.
THE CHOSEN START TYPE MAY NOT BE ADEQUATE. TOO MANY ATTEMPTS MAY BE NEEDED TO START THE NEUTRONS

0 300 NEUTRONS WERE INITIALLY STARTED

.01450 MINUTES WERE REQUIRED FOR STARTING.

1 KENOIV VER 1.2A (21/09/87) 90/01/02. 02.11.10. PAGE 14

0(EXXON) EXXON 1X1X1 PWR, 3.2%U235, 1500 PPM NAT.BORON

0 GENERATION	K-EFFECTIVE	ELAPSED TIME(MIN)	AVG. K-EFF	DEVIATION	MATRIX K-EFF
			WARNING - ONLY 294 INDEPENDENT FISSION POINTS WERE GENERATED.		
1	8.46943E-01	2.79833E-01	1.00000E+00	0.	0.
			WARNING - ONLY 297 INDEPENDENT FISSION POINTS WERE GENERATED.		
2	8.89596E-01	5.40333E-01	1.09000E+00	0.	0.
3	8.68515E-01	7.99667E-01	8.68515E-01	0.	0.
4	9.37876E-01	1.05583E+00	9.04196E-01	3.56607E-02	0.
5	9.05256E-01	1.31467E+00	9.04769E-01	2.04077E-02	0.
6	8.86211E-01	1.58317E+00	9.00139E-01	1.52835E-02	0.
7	9.06247E-01	1.83867E+00	9.01381E-01	1.14935E-02	0.
8	8.79469E-01	2.10167E+00	8.97726E-01	1.03837E-02	0.
9	9.50227E-01	2.34100E+00	9.05226E-01	1.15482E-02	0.
10	9.03411E-01	2.62367E+00	9.05024E-01	9.99965E-03	0.
11	9.08194E-01	2.89100E+00	9.05376E-01	9.82589E-03	0.
12	8.98579E-01	3.15683E+00	9.04796E-01	7.95472E-03	0.
13	8.69691E-01	3.41500E+00	9.01241E-01	7.85665E-03	0.
14	9.13717E-01	3.68017E+00	9.02281E-01	7.24707E-03	0.
15	9.16745E-01	3.93517E+00	9.03287E-01	6.75918E-03	0.
16	9.02395E-01	4.19283E+00	9.04868E-01	6.42842E-03	0.
17	9.97267E-01	4.44633E+00	9.11036E-01	8.59404E-03	0.
18	9.24602E-01	4.71167E+00	9.11884E-01	8.08750E-03	0.
19	9.59536E-01	4.97133E+00	9.18666E-01	8.09344E-03	0.
20	9.05660E-01	5.22733E+00	9.16184E-01	7.64703E-03	0.
21	9.44023E-01	5.50483E+00	9.15755E-01	7.40188E-03	0.
22	9.17502E-01	5.76000E+00	9.15842E-01	7.02254E-03	0.
23	9.42649E-01	6.02417E+00	9.17118E-01	6.89069E-03	0.
24	9.70002E-01	6.27667E+00	9.19502E-01	6.91542E-03	0.
25	9.61284E-01	6.53700E+00	9.21338E-01	6.85290E-03	0.
26	9.28723E-01	6.79567E+00	9.21646E-01	6.56836E-03	0.
27	8.98261E-01	7.06133E+00	9.20710E-01	6.36921E-03	0.
28	9.32326E-01	7.32083E+00	9.21158E-01	6.13566E-03	0.
29	8.97772E-01	7.59450E+00	9.20241E-01	5.96722E-03	0.
30	9.53864E-01	7.85783E+00	9.21491E-01	5.87385E-03	0.
31	9.95522E-01	8.11867E+00	9.24043E-01	6.21607E-03	0.
32	9.55762E-01	8.38217E+00	9.25101E-01	6.09765E-03	0.
33	9.75997E-01	8.64183E+00	9.26742E-01	6.12194E-03	0.
34	9.78066E-01	8.90833E+00	9.28346E-01	6.14069E-03	0.
35	9.13103E-01	9.15850E+00	9.27884E-01	5.96960E-03	0.
36	9.72084E-01	9.42517E+00	9.29104E-01	5.93547E-03	0.
37	9.68064E-01	9.68083E+00	9.30295E-01	5.86947E-03	0.
38	9.52932E-01	9.93883E+00	9.30924E-01	5.73865E-03	0.
39	9.45876E-01	1.02005E+01	9.31328E-01	5.59601E-03	0.
40	9.23977E-01	1.04712E+01	9.31135E-01	5.45019E-03	0.
41	8.68401E-01	1.07443E+01	9.29526E-01	5.54695E-03	0.
42	8.76402E-01	1.10137E+01	9.28198E-01	5.56724E-03	0.
43	9.49785E-01	1.12763E+01	9.28725E-01	5.45522E-03	0.

```
        45      9.63636E-01     1.17695E+01     9.30201E-01     5.31114E-03     0.
        46      9.68414E-01     1.20550E+01     9.31167E-01     5.26091E-03     0.
        47      9.26333E-01     1.23052E+01     9.31085E-01     5.14305E-03     0.
        48      9.88035E-01     1.25565E+01     9.32323E-01     5.18913E-03     0.
        49      9.91640E-01     1.28168E+01     9.33585E-01     5.22547E-03     0.
        50      9.42673E-01     1.30757E+01     9.33778E-01     5.11715E-03     0.
        51      9.60164E-01     1.33363E+01     9.34317E-01     5.04048E-03     0.
        52      9.59346E-01     1.35953E+01     9.34817E-01     4.96395E-03     0.
        53      9.20312E-01     1.38505E+01     9.34533E-01     4.87395E-03     0.
1                                                               KENOIV    VER 1.2A (21/09/87) 90/01/02. 02.11.14. PAGE   17
0       54      9.70189E-01     1.41162E+01     9.35219E-01     4.82824E-03     0.
        55      9.78425E-01     1.43877E+01     9.36034E-01     4.80591E-03     0.
        56      9.37820E-01     1.46422E+01     9.35697E-01     4.72811E-03     0.
        57      9.60020E-01     1.49065E+01     9.36139E-01     4.66277E-03     0.
        58      9.07847E-01     1.51573E+01     9.35674E-01     4.60615E-03     0.
        59      9.50268E-01     1.54182E+01     9.35890E-01     4.55187E-03     0.
        60      9.20580E-01     1.56762E+01     9.35626E-01     4.46089E-03     0.
        61      9.43618E-01     1.59268E+01     9.35765E-01     4.39682E-03     0.
        62      9.29862E-01     1.61960E+01     9.35834E-01     4.31363E-03     0.
        63      9.78560E-01     1.64457E+01     9.36485E-01     4.29208E-03     0.
-EOF-
 MENM    POWER COMPUTING/990 - NOS 2.7.1.10     NOS 2.7.1 ST=MAC     90/01/02. 02.15.42.

02.08.49.EJOB(BT,PD,T1000.    MENM) TRAN
02.08.49.USER,VANPON,,NC.
02.08.49.ABSC.  D.
02.08.49. YOUR PASSWORD EXPIRES AT 00.00.00 ON 90/00/00.
02.08.49.CHARGE,N973301,V8.
02.08.50. CHARGE = N973301, PROJECT = VEP.
02.08.51.ZZZZZQ.
02.08.51.PROCL. SYSTEM PROLOGUE
02.08.51.COMMENT. SYSTEM PROLOG
02.08.51.NEWS(A).
02.08.52.CHEKEIA.
02.08.53. INQUIRY COMPLETE.
02.08.53.REQUEST.
02.08.53.TITLE (LIBRARY) EDION 15X15 PWR, 6.3X0225 ENDF FAM NAT.$DKON)
02.08.53.LABEL,TAPE4,D=GE,L=ELSECT,VSN=00742).
02.11.05.NTIOS, ASSIGNED TO TAPE4, VSN=00742).
02.11.06.COPYBF,TAPE4,TAPE4.
02.11.11. COPY    1 FILES        1 RECS     747+42 WORDS
02.11.11.REWIND,TAPE4.
02.11.11.RETURN,TAPE4.
02.11.11.RFL(EC=10)
02.11.11.ATTACHP,KENOW,1,2A.
02.11.13.    STOP
02.11.13.    035200 MAXIMUM EXECUTION FL.
02.11.43.      0.279 CP SECONDS EXECUTION TIME.
02.11.13.KENOW,PL=777777.
02.18.42. TIME LIMIT.
02.18.42.UEPF,      0.133KUNS.
02.18.42.UEMT,      2.723KUNS.
02.18.42.UEMS,     33.728KUNS.
02.18.42.UECP,   1001.854SECS.
02.18.42. SRU,   1990.957UNTS.
02.18.42.$OUT(*/OP=E)
02.18.42. NO FILES PROCESSED.
02.18.42.$DAYFILE(OUTPUT,JT=D)
02.18.42.IABG,     52B SDBS FN=OUTPUT.
02.18.42.POWER COMPUTING/990 - NOS 2.7.1.10
02.18.42.DATE:          90/01/02.
```

Note

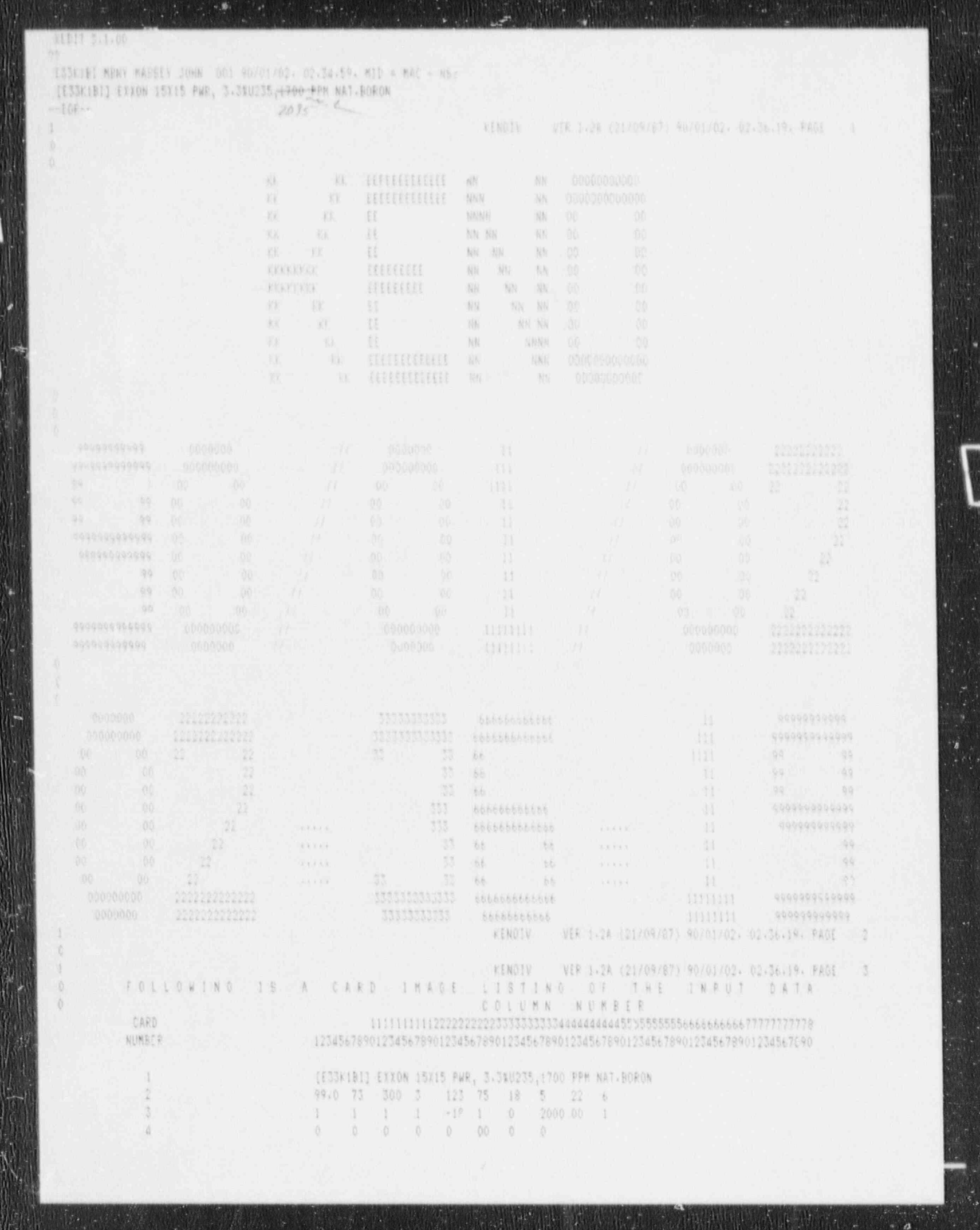
← Average keff with 3 generations skip is calculated to be 0.9576 (see attached spreadsheet

2	0.889596	1	0
3	0.868515	0.868515	0
4	0.939876	0.904196	0.035680
5	0.905856	0.904749	0.020607
6	0.886311	0.900139	0.015283
7	0.906347	0.901381	0.011903
8	0.879449	0.897726	0.010383
9	0.950227	0.905226	0.011504
10	0.903611	0.905024	0.009999
11	0.908194	0.905376	0.008825
12	0.895575	0.904376	0.00 95d
13	0.869691	0.901241	0.007856
14	0.913717	0.902291	0.007247
15	0.916795	0.903397	0.006759
16	0.923995	0.904868	0.006420
17	0.897387	0.901036	0.005950
18	0.924607	0.911884	0.008083
19	0.959506	0.91d636	0.008095
20	0.90566	0.914104	0.007647
21	0.9d4023	0.915755	0.007401
22	0.917502	0.915842	0.007022
23	0.9d2649	0.917118	0.006800
24	0.970002	0.919522	0.006915
25	0.961289	0.921338	0.006852
26	0.928723	0.921646	0.006568
27	0.898261	0.92071	0.006369
28	0.932536	0.921158	0.006125
29	0.897772	0.920291	0.005967
30	0.953864	0.921491	0.005873
31	0.995522	0.924043	0.006216
32	0.955782	0.925101	0.006097
33	0.975997	0.926742	0.006121
34	0.978066	0.928346	0.006120
35	0.913103	0.927584	0.005969
36	0.972084	0.929188	0.005935
37	0.968064	0.930295	0.005869
38	0.952932	0.930924	0.005730
39	0.945876	0.931329	0.005596
40	0.923977	0.931135	0.005450
41	0.868401	0.929526	0.005516
42	0.876402	0.928198	0.005567
43	0.949785	0.928725	0.005458
44	0.960724	0.929486	0.005377
45	0.963636	0.930281	0.005311
46	0.968414	0.931147	0.005260
47	0.928333	0.931085	0.005143
48	0.980038	0.932323	0.005180
49	0.99164	0.933585	0.005223
50	0.9d2873	0.933778	0.005117
51	0.960164	0.934317	0.005040
52	0.959346	0.934817	0.004963
53	0.920312	0.934533	0.004873
54	0.970189	0.935219	0.004828
55	0.978425	0.936034	0.004805
56	0.917824	0.935697	0.004728
57	0.96002	0.936139	0.004662
58	0.907847	0.935634	0.004606
59	0.950268	0.93589	0.004531
60	0.92058	0.935626	0.004460
61	0.943818	0.935765	0.004386
62	0.939863	0.935834	0.004313
63	0.97558	0.936485	0.004292
AVERAGE:	0.937618		0.00429 (SKIP 3)

3.3%, 4500

```
EDIT 3.1.00
$$
[E3K1B] MONY MADSEN JOHN  001 90/01/02. 02.34.59. MID = MAC = N5:
[E3K1B] EXXON 15X15 PWR, 3.3%U235,1700 PPM NAT.BORON
--EOF--
```

2035



```
1                                                    KENO-IV     VER 1.2B (21/09/87) 90/01/02. 02.36.19. PAGE    1
```



```
1                                                    KENO-IV     VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE    2
```



```
1                                                    KENO-IV     VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE    3
0        F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                    C O L U M N   N U M B E R
          CARD                    1111111111222222222233333333334444444444555555555666666666677777777778
         NUMBER          1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

           1             [E3K1B] EXXON 15X15 PWR, 3.3%U235,1700 PPM NAT.BORON
           2             99.0  73   300  3    123  75   18   5    22   6
           3             1     1    1    1    -1P  1    0    2000 00   1
           4             0     0    0    0    0    00   0    0
```

```
                    1 -3324205E1     3.3A2E-4
                    1  3324230E1     6.7769-5
                    1  3380004       5.50E2-2
                    1  33400000      4.7125-3
                    1  3310001       3.8073-2
                    1  3250100       1.2690-5
                    2  10001  4.671-2     2  80004  3.536-2     2  50100  1.223-5
                    2  60002  2.6100-4     3  250005  1.0900-3
                    3  260001  8.2800-2     3  140005  1.9000-4
                    4  820000  3.2960-2
                    5  10001  2.7700-2     5  50000  1.4600-3     5  80004  3.7100-2
                    5  110000  2.8000-4     5  120005  2.0800-4     5  130009  8.4700-2
                    5  140005  7.6700-4     5  260001  8.8950-5
                    BOX TYPE  1
                    GENERAL          1 6*0.0    123*0.5
                    GENERAL          2 6*0.0    123*0.5
                    GENERAL          3 6*0.0    123*0.5
                    GENERAL          4 6*0.0    123*0.5
                    GENERAL          5 6*0.0    123*0.5
                    CUBOID  0   106.0451 -0.0001  106.0451 -0.0001  50.0001 -0.0001 123*0.5
                       2 GENERALIZED GEOMETRIES OF THE 1/4 TRANSFER CASK.
                    X ZONE BDRY    0.0000,  106.0450
                    Y ZONE BDRY    0.0000,  106.0450
                    Z ZONE BDRY    0.0000,   50.0000
                    ZONE     1   1   1
                    X BLCK BDRY    0.0000,   23.368,   46.736,  106.0450
                    Y BLCK BDRY    0.0000,  106.045
                    Z BLCK BDRY    0.0000,   50.000
                    BLOCK    1   1   1
                    MEDIA          3,   5,   3,   4,   3,   2,   3,   2,   3,   2,
                       2,   2,   3,   1,   3,   2,   3,   2,   2,   3,   1,   1,
                       3,   2,   2,   2,   1,   2,   3, 1000
                    SURFACE        1,   2,   3,   4,   5,   6,   7,   8,   9,  10,
                      11,  12,  13,  14,  15,  16,  17,  18,  19,  20,  21,  22,
                      23,  24,  25
                    SECTOR -1  1  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
                    SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0 -1
                    SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  0  0  0  0  0  1
                     -1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
```


0 F O L L O W I N G I S A C A R D I M A G E L I S T I N G O F T H E I N P U T D A T A

0 C O L U M N N U M B E R

```
CARD        1111111111222222222233333333334444444444555555555566666666667777777778
NUMBER      12345678901234567890123456789012345678901234567890123456789012345678901234567890
```

```
                      0  0  0
                    SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  1
                      0  0 -1
                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  0  0  0  1
                     -1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
```

```
 63            SECTOR  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  0  0
 64              0  1 -1
 65            SECTOR  0  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0 -1
 66              0  0  0
 67            SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0
 68              1 -1  0
 69            SECTOR  0  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0
 70              0  0  1
 71            SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0
 72              1 -1  0
 73            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1
 74              0  0 -1
 75            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  1
 76             -1  0  0
 77            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0
 78              1 -1  0
 79            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0
 80              0  1 -1
 81            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0
 82              1 -1  0
 83            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0
 84              1 -1  0
 85            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1
 86              0  0 -1
 87            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0
 88             -1  0  0
 89            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0
 90              1 -1  0
 91            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0
 92              0  1 -1
 93            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0
 94              1 -1  0
 95            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0
 96              1 -1  0
 97            SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1
 98              0  0 -1
 99            SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
100              0  0  0
101            BLOCK    2   1   1
102            MEDIA          3,   5,   3,   4,   3,   2,   3,   2,   3,   2,
1                                        KENOIV    VER 1.2A (21/09/87) 90/01/02. 01.56.19. PAGE    5
0      F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                            C O L U M N   N U M B E R
   CARD                          1111111111222222222233333333334444444444555555555566666666667777777777778
  NUMBER               12345678901234567890123456789012345678901234567890123456789012345678901234567890

 103              2,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
 104              3, 1000
 105           SURFACES       1,   2,   3,   4,   5,   6,   7,   8,  14,  15,
 106              16,  17,  18,  19,  20,  21,  26,  27,  28,  29,  35
 107           SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 108           SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 109           SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 110           SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 111           SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 112           SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 113           SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 114           SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0  1
 115           SECTOR  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  1  0  0 -1 -1
 116           SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  1 -1  0  0  0
 117           SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  1 -1  0  0
 118           SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  1 -1  0
```

```
120                 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0  0
121                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1
122                 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  1 -1  0  0
123                 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1  0  0 -1  0
124                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0
125                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0  0
126                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0
127                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0
128                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0
129                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0
130                 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
131                 BLOCK     3    1    1
132                 MEDIA         3,    5,    3,    4,    3,    2,    3,    2,    2,    3,
133                   2,    1,    2,    3,    2,    3,    3,    2, 1000
134                 SURFACES      1,    2,    3,    4,    5,    6,    7,    8,   10,   19,
135                  20,   21,   30,   31,   32,   33,   34,   36
136                 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
137                 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
138                 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
139                 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
140                 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
141                 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
142                 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0
143                 SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  1
144                 SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  1 -1
145                 SECTOR  0  0  0  0  0  0  0  0  1  0  0  0  1  0  0 -1  0 -1
146                 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0  0
147                 SECTOR  0  0  0  0  1  0  0  0  0 -1  1  0  0  1 -1  0  0  0
148                 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0  0
149                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  0  0 -1
150                 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0  0
151                 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1 -1
152                 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0  0
153                 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0  0  0
1                                                   KENOIV    VER 1.2A (21/09/87) 90/01/01. 02.36.19. PAGE    6
0    F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                 C O L U M N   N U M B E R
 CARD                      11111111112222222222333333333344444444445555555555666666666677777777778
 NUMBER           12345678901234567890123456789012345678901234567890123456789012345678901234567890

154                 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
155                   36 QUADRIC SURFACES IN THE SYSTEM
156                         1.0YSQ          1.0XSQ   -11245.542     $
157                         1.0YSQ          1.0XSQ   -10713.285     $
158                         1.0YSQ          1.0XSQ   -8713.2090     $
159                         1.0YSQ          1.0XSQ   -8595.1441     $
160                         1.0YSQ          1.0XSQ   -6814.5025     $
161                         1.0YSQ          1.0XSQ   -6401.6001     $
162                         1.0YSQ          1.0XSQ   -6199.9276     $
163                         1.0YSQ          1.0XSQ   -5903.6172     $
164                         1.0Y       -70.1040     $
165                         1.0Y       -69.5960     $
166                         1.0Y       -68.8975     $
167                         1.0Y       -47.9425     $
168                         1.0Y       -47.2440     $
169                         1.0Y       -46.2280     $
170                         1.0Y       -45.5295     $
171                         1.0Y       -24.5745     $
172                         1.0Y       -23.8760     $
173                         1.0Y       -22.8600     $
174                         1.0Y       -22.1615     $
175                         1.0Y        -1.2065     $
```

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    177                                 1.0X       -0.5080     $
    178                                 1.0X       -1.2065     $
    179                                 1.0X      -22.1615     $
    180                                 1.0Y
    181
    182                                 1.0X      -24.5745     $
    183                                 1.0Y
    184                                 1.0X      -46.2280     $
    185                                 1.0X      -47.4[illegible]     $
    186                                 1.0X      -48.9425     $
    187                                 1.0X      -68.8975     $
    188                                 1.0Y      -69.5960     $
    189                                 1.0X      -70.1040     $
    190                                 1.0Y      -46.7360     $
    191                                 1.0Y      -22.3680     $
    192                           END CASE
    193                           END KENO
0          ********************************** E N D   O F   I N P U T   L I S T I N G **********************************
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1                                                                  KENOIV    VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE    7
0[E33K1B1] EXXON 15X15 PWR, 3.38U235, 1706 PPM NAT.BORON
0NUMBER OF GENERATIONS                    70          START TYPE                                1
0NUMBER PER GENERATION                   300          GENERATIONS BETWEEN CHECKPOINTS           0
0NUMBER OF GENERATIONS TO BE SKIPPED       3          LIST INPUT X-SECTIONS READ FROM TAPE     NO
0NUMBER OF ENERGY GROUPS                 123          LIST 1-D MIXTURE X SECTIONS              NO
0MAX. NUMBER OF ENERGY TRANSFERS          75          LIST 2-D MIXTURE X-SECTIONS              NO
0NUMBER OF INPUT NUCLIDES                 18          LIST FISS. AND ABS. BY REGION            NO
0NUMBER OF MIXTURES                        5          USE X-SECTIONS FROM PREVIOUS CASE        NO
0NUMBER OF MIXING TABLE ENTRIES           22          USE GEOMETRY FROM PREVIOUS CASE          NO
0NUMBER OF GEOMETRY CARDS                  6          USE VELOCITIES FROM PREVIOUS CASE        NO
0NUMBER OF BOX TYPES                       1          COMPUTE MATRIX K-EFFECTIVE BY UNIT       NO
0NUMBER OF UNITS IN   DIRECTION            1          COMPUTE MATRIX K-EFFECTIVE BY BOX TYPE   NO
0NUMBER OF UNITS IN Y DIRECTION            1          LIST FISS PROB MATRIX BY UNIT            NO
0NUMBER OF UNITS IN Z DIRECTION            1          ADJOINT CALCULATION                      NO
0NUMBER OF NUCLIDES READ FROM TAPE        -18         USE EXPONENTIAL TRANSFORM                NO
0ALBEDO TYPE                               1          CALCULATE FLUX                          YES
0SEARCH TYPE                               0          CALCULATE FISSION DENSITIES             YES
0THIS PROBLEM WILL BE RUN WITH SPECULARLY REFLECTING BOUNDARY CONDITION
0THE ALBEDOS ARE +X = 0.          -X = 1.00000E+00 +Y = 0.          -Y = 1.00000E+00 +Z = 1.00000E+00 -Z = 1.00000E+00
0MAXIMUM TIME =  99.0000 MINUTES
0STORAGE LOCATIONS REQUIRED FOR THIS JOB =    34306
 REMAINING AVAILABLE LOCATIONS=    43895
0REQUIRED LCM STORAGE LOCATIONS   33280 (00010400)
 REMAINING LCM AVAILABLE          66420 (00020574)
```

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1                                                                  KENOIV    VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE    8
0[E33K1B1] EXXON 15X15 PWR, 3.38U235, 1706 PPM NAT.BORON
0     MIXTURE  NUCLIDE   DENSITY
          1 -33922331  2.34220E-04
          1  33922381  6.77690E-03
          1   3380004  3.30620E-02
          1  33400000  4.71250E-03
          1   3310001  3.80730E-02
          1   3350100  1.26900E-05
          2     10001  6.67100E-02
          2     80004  3.33600E-02
          2     50100  2.22300E-05
          3     60002  2.61000E-04
          3    250005  1.09000E-03
```

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        5    140005   1.490000E-04
        4    820000   3.296000E-02
        5     10001   2.770000E-02
        5     50000   1.460000E-03
        5      5.304  3.710000E-02
        5    110000   2.600000E-04
        5    120005   2.080000E-04
        5     26000   8.970000E-03
        5    140005   7.670000E-04
        5    260001   6.890000E-05
0

0PROBE SECTIONS READ FROM TAPE

 NUCLIDE =     10001   HYDROGEN--THERMOS ID=1002(X-440) THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =     80004   OXYGEN                           THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =     50000   BORON     NATURAL
 NUCLIDE =     50101   BORON-11
 NUCLIDE =     60001   CARBON    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 561.26 K
 NUCLIDE =    110000   SODIUM    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K
 NUCLIDE =    120005   MAGNESIUM                        THERMAL TEMP =  900.0 K
 NUCLIDE =    130000   ALUMINUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.17 K
 NUCLIDE =    140005   SILICON                          THERMAL TEMP =  900.0 K
 NUCLIDE =    250003   MANGANESE                        THERMAL TEMP =  900.0 K
 NUCLIDE =    260001   IRON      THERMAL TEMP=900.0
 NUCLIDE =    820000   LEAD      NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K
 NUCLIDE =  92132351   URANIUM-235                      THERMAL TEMPERATURE = 294.6 K
 NUCLIDE =  92932361   URANIUM-236M                     THERMAL TEMPERATURE = 294.6 K
 NUCLIDE =     10001   HYDROGEN--THERMOS ID=1003(X-440) THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =     50100   BORON-10
 NUCLIDE =     80004   OXYGEN                           THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =     40000   ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.17 K
1                                                                  VENDIV    VER 1.2A (21/09/67) 90/01/02. 02.26.19. PAGE    9
0CRITICAL          6 PWR, 3.34U235, 1500 PPM NAT.BORON
0GEOMETRY   TYPE   4
0REGION

0
0BOX TYPE   1
0REGION
0  1  GENERAL    1      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  2  GENERAL    2      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  3  GENERAL    3      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  4  GENERAL    4      +X = 0.          -Y = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  5  GENERAL    5      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  6  CUBOID     0      +X = 1.06605E+02   -X =-1.0000E-04   +Y = 1.06605E+02   -Y =-1.0000E+04   +Z = 5.0000E+01   -Z =-1.0000E+04
1                                                                  VENDIV    VER 1.2A (21/09/67) 90/01/02. 02.26.19. PAGE   10
0CRITICAL IRON ISOTOPE 1500 PPM, 3.33U235, 1500 PPM NAT.BORON
0WEIGHTING FUNCTION
0BOX TYPE   1                                  GROUP   WTLOW    WT AVG    WT HI
0       REGION   1 DEFINED BY GEOMETRY CARD   1
                                               1      .167      .500      1.500
                                               GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   2 DEFINED BY GEOMETRY CARD   2
                                               1      .167      .500      1.500
                                               GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   3 DEFINED BY GEOMETRY CARD   3
                                               1      .167      .500      1.500
                                               GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   4 DEFINED BY GEOMETRY CARD   4
                                               1      .167      .500      1.500
                                               GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   5 DEFINED BY GEOMETRY CARD   5
```

```
 .10000E+01Y      -.45236E+02     $
 .10000E+01Y      -.45530E+02     $
 .10000E+01Y      -.24575E+02     $
 .10000E+01Y      -.23876E+02     $
 .10000E+01Y      -.22860E+02     $
 .10000E+01Y      -.22162E+02     $
 .10000E+01Y      -.12065E+01     $
 .10000E+01Y      -.50900E+00     $
 .10000E+01X      -.50000E+00     $
 .10000E+01X      -.12065E+01     $
 .10000E+01X      -.22162E+02     $
 .10000E+01X      -.22860E+02     $
 .10000E+01X      -.23876E+02     $
 .10000E+01X      -.24575E+02     $
 .10000E+01X      -.45530E+02     $
 .10000E+01X      -.46236E+02     $
 .10000E+01X      -.47244E+02     $
 .10000E+01X      -.47943E+02     $
 .10000E+01X      -.69595E+02     $
 .10000E+01X      -.69945E+02     $
 .10000E+01X      -.70100E+02     $
 .10000E+01Y      -.46736E+02     $
 .10000E+01Y      -.47344E+02     $
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1 KENO IV VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE 14

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 FIRST ALLOCATION OF MEMORY HAS BEEN COMPLETED
 REQUIRED SCM FIELD LENGTH  113604 (001BC704B)
 REQUIRED LCM FIELD LENGTH   36900 (00150344B)
 REQUIRED RMS FIELD LENGTH       0 (000000000)
 REQUIRED SCM BLANK COMMON   68876 (0020C414B)
 REQUIRED LCM BLANK COMMON   76900 (00130434B)
 REQUIRED RMS BLANK COMMON       0 (000000000)
 REMAINING SCM AVAILABLE      9276 (000024243)
 REMAINING LCM AVAILABLE     61100 (00177174B)
```

LOCATION OF RELOCATABLE ARRAYS

ARRAY	MAT	LOCATION
FSP/MUBAR	1	SCM
FSP/MUBAR	2	SCM
FSP/MUBAR	3	SCM
FSP/MUBAR	4	LCM
FSP/MUBAR	5	LCM
WGT		SCM
FMABS		SCM
FMFIS		SCM

1 2.095 w/o KENO IV VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE 15

GEE. 'BI) EXXON 15X15 PWR, 3.31U235, ~~1200~~ PPM NAT.BORON

0 VOLUMES

0 BOX TYPE 1

REGION DEFINED BY GEOMETRY CARD	1	VOLUME = 0.	CM..3	CUMULATIVE VOLUME = 0.	*..3
REGION DEFINED BY GEOMETRY CARD	2	VOLUME = 0.	CM..3	CUMULATIVE VOLUME = 0.	*..3
REGION DEFINED BY GEOMETRY CARD	3	VOLUME = 0.	CM..3	CUMULATIVE VOLUME = 0.	*..3
REGION DEFINED BY GEOMETRY CARD	4	VOLUME = 0.	CM..3	CUMULATIVE VOLUME = 0.	*..3

REGION DEFINED BY GEOMETRY CARD 6 VOLUME = 4.37002E+00 CM**3 CUMULATIVE VOLUME = 5.62277E+05 CM**3

0 TOTAL VOLUMES

1	1.00000E+00
2	1.00000E+00
3	1.00000E+00
4	1.00000E+00
5	5.62277E+05
6	4.37002E+00

0VOLUME FRACTION OF THE CORE CONTAINING FISSILE MATERIAL= .17765E-05

0START TYPE = 1

0 THE NEUTRONS WERE STARTED IN THE ARRAY WITH A COSINE DISTRIBUTION.

THE CHOSEN START TYPE MAY NOT BE ADEQUATE. TOO MANY ATTEMPTS MAY BE NEEDED TO START THE NEUTRONS

0 300 NEUTRONS WERE INITIALLY STARTED

.01450 MINUTES WERE REQUIRED FOR STARTING.

1 ZZKSK ... (R/ KENO1V.2 WCP 1.2A (2/09/87) 09/01/02. 02.35.19. PAGE 14

0(ETDEIBI) SI(ON 15X15 PWR, 3.23W235,[illegible] PPM NAT.BORON

0 GENERATION	K-EFFECTIVE	ELAPSED TIME(MIN)	AVG. K-EFF	DEVIATION	MATRIX K-EFF
			WARNING - ONLY 27% INDEPENDENT FISSION POINTS WERE GENERATED.		
1	9.51903E-01	2.66667E-01	1.00000E+00	0.	0.
2	8.45689E-01	5.29333E-01	1.00000E+00	0.	0.
3	8.84695E-01	7.79667E-01	8.84695E-01	0.	0.
4	8.84747E-01	1.03567E+00	8.84721E-01	2.46233E-05	0.
5	9.81153E-01	1.29183E+00	8.77332E-01	1.31892E-02	0.
6	8.81967E-01	1.55200E+00	8.80136E-01	1.86040E-02	0.
7	9.93621E-01	1.80933E+00	8.84235E-01	2.47125E-02	0.
8	8.64977E-01	2.06133E+00	8.81959E-01	1.64072E-02	0.
9	9.23429E-01	2.31933E+00	8.84940E-01	1.48279E-02	0.
10	9.38634E-01	2.57467E+00	8.89155E-01	1.42299E-02	0.
11	9.22949E-01	2.82483E+00	8.91796E-01	1.37316E-02	0.
12	8.94964E-01	3.07850E+00	8.91013E-01	1.26804E-02	0.
13	8.77417E-01	3.33483E+00	8.87140E-01	1.21075E-02	0.
14	8.99652E-01	3.59533E+00	8.88516E-01	1.24794E-02	0.
15	9.08599E-01	3.85383E+00	8.89677E-01	1.30875E-02	0.
16	9.02053E-01	4.11367E+00	8.89346E-01	1.28412E-02	0.
17	9.05601E-01	4.37217E+00	8.89297E-01	1.33994E-02	0.
18	8.54569E-01	4.63083E+00	8.89710E-01	7.49347E-03	0.
19	9.35477E-01	4.89650E+00	8.90326E-01	7.17909E-03	0.
20	9.53122E-01	5.15000E+00	8.91243E-01	7.11200E-03	0.
21	9.11816E-01	5.40800E+00	8.91258E-01	6.72254E-03	0.
22	8.87274E-01	5.66817E+00	8.91118E-01	6.50656E-03	0.
23	9.02002E-01	5.92850E+00	8.91022E-01	6.20162E-03	0.
24	9.75403E-01	6.18617E+00	8.93856E-01	6.60077E-03	0.
25	9.58226E-01	6.44100E+00	8.95706E-01	6.59645E-03	0.
26	8.90357E-01	6.67217E+00	8.94729E-01	6.40309E-03	0.
27	9.20786E-01	6.93917E+00	8.94971E-01	6.14718E-03	0.
28	9.64051E-01	7.20350E+00	8.96489E-01	6.09810E-03	0.
29	9.27595E-01	7.46133E+00	8.96900E-01	5.88230E-03	0.
30	9.50444E-01	7.71767E+00	8.98099E-01	5.79354E-03	0.
31	8.85718E-01	7.96850E+00	8.97668E-01	5.70333E-03	0.
32	9.07714E-01	8.21717E+00	8.97660E-01	5.51857E-03	0.
33	9.15912E-01	8.46950E+00	8.97635E-01	5.33764E-03	0.
34	9.46542E-01	8.72417E+00	8.97870E-01	5.25197E-03	0.
35	9.86617E-01	8.98333E+00	8.99682E-01	5.50358E-03	0.
36	9.69213E-01	9.23800E+00	9.01120E-01	5.53458E-03	0.
37	9.34318E-01	9.50233E+00	9.01497E-01	5.38734E-03	0.
38	9.12989E-01	9.76233E+00	9.01260E-01	5.24089E-03	0.
39	9.16855E-01	1.00243E+01	9.01141E-01	5.09866E-03	0.
40	9.21355E-01	1.02835E+01	9.01147E-01	4.96268E-03	0.
41	9.48283E-01	1.05403E+01	9.01843E-01	4.89358E-03	0.
42	9.51923E-01	1.07960E+01	9.02595E-01	4.81896E-03	0.
43	9.48341E-01	1.10448E+01	9.03223E-01	4.74172E-03	0.
44	9.27326E-01	1.13033E+01	9.03320E-01	4.42847E-03	0.

	46	6.72492E+01	1.18143E+01	9.21449E-01	6.61567E-03	0.
	47	9.32190E+01	1.20725E+01	9.21697E-01	6.51765E-03	0.
	48	9.08511E+01	1.23227E+01	9.21401E-01	6.42763E-03	0.
	49	9.57276E+01	1.25840E+01	9.22164E-01	6.39912E-03	0.
	50	9.31469E+01	1.28405E+01	9.22058E-01	6.31066E-03	0.
	51	9.61315E+01	1.30997E+01	9.23153E-01	6.29617E-03	0.
	52	9.08366E+01	1.33583E+01	9.22857E-01	6.21975E-03	0.
	53	9.31390E+01	1.36107E+01	9.23025E-01	6.17986E-03	0.
	54	9.44729E+01	1.38647E+01	9.23442E-01	6.09058E-03	0.

0	55	9.46767E+01	1.41707E+01	9.23882E-01	6.02697E-03	0.
	56	9.01421E+01	1.43853E+01	9.23466E-01	5.97352E-03	0.
	57	9.50488E+01	1.46377E+01	9.23959E-01	5.93143E-03	0.
	58	8.76857E+01	1.48900E+01	9.23116E-01	5.85114E-03	0.
	59	9.41921E+01	1.51523E+01	9.23445E-01	5.89520E-03	0.
	60	9.17793E+01	1.54130E+01	9.23349E-01	5.82669E-03	0.
	61	9.07741E+01	1.56673E+01	9.23004E-01	5.77253E-03	0.
	62	9.04647E+01	1.59250E+01	9.23277E-01	5.71612E-03	0.
	63	9.52059E+01	1.61845E+01	9.23749E-01	5.68706E-03	0.
	64	9.10931E+01	1.64505E+01	9.23625E-01	5.62827E-03	0.
	65	9.55054E+01	1.67103E+01	9.24124E-01	5.60148E-03	0.
	66	9.56155E+01	1.69798E+01	9.23965E-01	5.53001E-03	0.
	67	9.79162E+01	1.72300E+01	9.24139E-01	5.51348E-03	0.
	68	9.94138E+01	1.74878E+01	9.24350E-01	5.49300E-03	0.
	69	9.24823E+01	1.77513E+01	9.24522E-01	5.45455E-03	0.
	70	9.26856E+01	1.80100E+01	9.24599E-01	5.41114E-03	0.
	71	9.09532E+01	1.82730E+01	9.24381E-01	5.35461E-03	0.
	72	9.40402E+01	1.85287E+01	9.24635E-01	5.31237E-03	0.
	73	9.30066E+01	1.87983E+01	9.24724E-01	5.26364E-03	0.

OTHE MATRIX K-EFF IS THE LARGEST EIGENVALUE OF THE MATRIX OF FISSION PROBABILITIES BY UNIT.
 THERE ARE NBXMAX , NBYMAX , NBZMAX UNITS IN AN ARRAY.

O[E3DK1B1] EXXON 15X15 PWR, 3.3%U235, 1700 PPM NAT.BORON
 0LIFETIME = 2.72170E-05 +OR - 1.80568E-07 GENERATION TIME = 2.00822E-05 +OR - 1.25572E-07
 ONO. OF INITIAL

GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	+OR -	STANDARD DEVIATION	67 PCT CONFIDENCE INTERVAL	95 PCT CONFIDENCE INTERVAL	99 PCT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
0 3	.92428	+ OR -	.00787	.91980 TO .92875	.91730 TO .93125	.91368 TO .93489	21000
0 4	.92486	+ OR -	.00547	.92174 TO .92797	.91942 TO .93030	.91445 TO .93527	20700
0 5	.92534	+ OR -	.00335	.92353 TO .92715	.91925 TO .93143	.91590 TO .93478	20400
0 6	.92885	+ OR -	.00379	.92564 TO .92924	.91906 TO .93264	.91567 TO .93602	20100
0 7	.92634	+ OR -	.00241	.92393 TO .92875	.91952 TO .93315	.91611 TO .93657	19800
0 8	.92574	+ OR -	.00241	.92333 TO .92815	.91892 TO .93256	.91551 TO .93597	19500
0 9	.92578	+ OR -	.00346	.92232 TO .92924	.91805 TO .93271	.91539 TO .93617	19200
0 10	.92559	+ OR -	.00251	.92206 TO .92909	.91855 TO .93263	.91504 TO .93614	18900
0 11	.92546	+ OR -	.00357	.92189 TO .92902	.91832 TO .93259	.91475 TO .93616	18600
0 12	.92846	+ OR -	.00359	.92277 TO .92955	.91877 TO .93714	.91518 TO .93673	18300
0 17	.92839	+ OR -	.00272	.92466 TO .93211	.92046 TO .93580	.91725 TO .93954	16800
0 22	.92859	+ OR -	.00342	.92467 TO .93251	.92074 TO .93644	.91832 TO .94036	15300
0 27	.92848	+ OR -	.00405	.92443 TO .93254	.92038 TO .93659	.91870 TO .94064	13800
0 32	.92890	+ OR -	.00421	.92456 TO .93321	.92027 TO .93753	.91895 TO .94184	12300
0 37	.92589	+ OR -	.00442	.92146 TO .93032	.91703 TO .93475	.91260 TO .93919	10800
0 42	.92918	+ OR -	.00500	.92018 TO .93019	.91516 TO .93519	.91017 TO .94019	9300
0 47	.92725	+ OR -	.00536	.92189 TO .93262	.91652 TO .93798	.91116 TO .94335	7800
0 52	.92579	+ OR -	.00615	.91964 TO .93194	.91350 TO .93809	.90735 TO .94423	6300
0 57	.92293	+ OR -	.00756	.91537 TO .93048	.90781 TO .93804	.90026 TO .94560	4800
0 62	.92617	+ OR -	.00987	.91630 TO .93604	.90643 TO .94591	.89656 TO .95578	3300
0 67	.92153	+ OR -	.00657	.91496 TO .92810	.90839 TO .93467	.90181 TO .94124	1800

O[E3DK1B1] EXXON 15X15 PWR, 3.3%U235, 1700 PPM NAT.BORON
 OGROUP REGION LEAKAGE ABSORPTIONS FISSIONS WITH 3 GENERATIONS SKIPPED
 0 1 0. 2.08542E-05 3.98494E-05

0 3	0.	7.53563E-05	1.13456E-04	
0 4	0.	8.38911E-05	1.30349E-04	
0 5	0.	1.68135E-04	2.81714E-04	
0 6	0.	4.58945E-04	6.99972E-04	
0 7	0.	5.10308E-04	8.74697E-04	
0 8	0.	7.25931E-04	1.27542E-03	
0 9	0.	9.30067E-04	1.56586E-03	
0 10	0.	6.64526E-04	1.09524E-03	
0 11	0.	1.04459E-03	1.91539E-03	
0 12	0.	1.29373E-03	2.50147E-03	
0 13	0.	1.68146E-03	2.93834E-03	
0 14	0.	1.71909E-03	2.93301E-03	
0 15	0.	1.21748E-03	2.02799E-03	
0 16	0.	1.17361E-03	2.49683E-03	
0 17	0.	1.85658E-03	4.07826E-03	
0 18	0.	1.99329E-03	5.12698E-03	
0 19	0.	2.30006E-03	5.79194E-03	
0 20	0.	1.96614E-03	4.82701E-03	
0 21	0.	1.78857E-03	4.26505E-03	
0 22	0.	1.30129E-03	2.86772E-03	
0 23	0.	9.49115E-04	1.82127E-03	
0 24	0.	7.13059E-04	1.00162E-03	
0 25	0.	5.63874E-04	6.84513E-04	
0 26	0.	4.50956E-04	5.22520E-04	
0 27	0.	5.01800E-04	1.16482E-03	

1 KENOIV VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE 20

0[E3D3K1B1] EXXON 15X15 PWR, 3.3WU235 2035 PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0 28	0.	5.45869E-04	8.30962E-04		
0 29	0.	6.78292E-04	9.61350E-04		
0 30	0.	6.66358E-04	9.88612E-04		
0 31	4.76061E-05	8.11439E-04	1.10672E-03		
0 32	0.	5.30765E-04	8.81254E-04		
0 33	4.74183E-05	5.18821E-04	8.74369E-04		
0 34	0.	4.81717E-04	8.37671E-04		
0 35	0.	3.25135E-04	5.79935E-04		
0 36	0.	2.04474E-04	1.70779E-03		
0 37	0.	3.12915E-04	2.35665E-04		
0 38	0.	4.56705E-04	2.54754E-04		
0 39	0.	4.21750E-04	2.33773E-04		
0 40	0.	3.79450E-04	2.01991E-04		
0 41	0.	3.97809E-04	1.98935E-04		
0 42	0.	3.86163E-04	1.90914E-04		
0 43	0.	3.88185E-04	1.84582E-04		
0 44	0.	3.91781E-04	1.80259E-04		
0 45	0.	3.93872E-04	1.77702E-04		
0 46	0.	4.05644E-04	1.72875E-04		
0 47	0.	3.94262E-04	1.63256E-04		
0 48	0.	3.78405E-04	1.51113E-04		
0 49	0.	3.72764E-04	1.47190E-04		
0 50	0.	9.71789E-04	3.74596E-04		
0 51	0.	9.94550E-04	3.67933E-04		
0 52	0.	9.90075E-04	3.57899E-04		
0 53	0.	1.01371E-03	3.56847E-04		
0 54	0.	1.06725E-03	3.73912E-04		

1 KENOIV VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE 21

0[E3D3K1B1] EXXON 15X15 PWR, 3.3WU235 2035 PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0 55	4.47643E-05	1.07695E-03	3.72978E-04		
0 56	0.	1.14810E-03	4.01206E-04		
0 57	0.	1.22410E-03	4.21784E-04		
0 58	0.	1.25741E-03	4.19518E-04		

0 60	0.	1.41794E-02	9.88052E-04
0 61	0.	1.54515E-02	5.54655E-04
0 62	0.	1.69179E-02	6.09319E-04
0 63	0.	1.68231E-02	6.35909E-04
0 64	0.	1.61420E-02	7.12416E-04
0 65	0.	1.72745E-02	7.77148E-04
0 66	0.	1.85172E-02	9.31229E-04
0 67	0.	2.00901E-02	1.02116E-03
0 68	0.	2.41302E-02	1.08155E-03
0 69	0.	2.65659E-02	1.14511E-03
0 70	0.	3.83629E-02	1.57151E-03
0 71	0.	2.99552E-02	1.82827E-03
0 72	0.	3.20073E-02	1.76382E-03
0 73	0.	6.38051E-02	2.03709E-03
0 74	4.20681E-05	3.99548E-02	3.04451E-03
0 75	0.	4.90496E-02	2.41273E-03
0 76	0.	4.05501E-02	2.83155E-03
0 77	0.	7.20836E-02	2.21388E-03
0 78	4.30155E-05	4.47983E-02	2.67797E-03
0 79	0.	7.14984E-02	2.58032E-03
0 80	0.	6.52894E-02	6.87057E-03
0 81	0.	5.81176E-02	4.11082E-03

1 KENOIV VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE 22

0[E33K1BI] EXXON 15X15 PWR, 3.3%U235, 1700 PPM NAT.BORON

OGROUP REGION LEAKAGE ABSORPTIONS FISSIONS WITH 3 GENERATIONS SKIPPED

0 82	0.	1.38840E-02	4.84271E-03
0 83	0.	4.94354E-03	3.17523E-03
0 84	0.	1.89926E-02	5.68136E-03
0 85	0.	7.66379E-03	3.43778E-03
0 86	0.	6.30428E-03	5.12484E-03
0 87	0.	7.87505E-03	1.01346E-02
0 88	0.	2.38856E-02	1.07580E-03
0 89	0.	1.20425E-02	2.37008E-03
0 90	0.	3.63126E-03	4.61698E-04
0 91	0.	4.04879E-03	1.89089E-03
0 92	0.	3.38469E-03	1.29013E-03
0 93	0.	3.85023E-03	1.39507E-03
0 94	0.	1.15052E-02	4.84898E-04
0 95	0.	1.32954E-03	5.72787E-04
0 96	0.	1.35873E-03	5.98011E-04
0 97	0.	1.93009E-03	9.57711E-04
0 98	0.	3.48265E-03	3.22056E-03
0 99	0.	3.89255E-03	4.40169E-03
0100	0.	3.55804E-03	3.29166E-03
0101	0.	3.42426E-03	2.84769E-03
0102	0.	5.17637E-03	4.24681E-03
0103	0.	5.62140E-03	4.93484E-03
0104	1.48606E-06	7.68621E-03	7.14505E-03
0105	0.	1.17650E-02	1.02949E-02
0106	0.	9.55479E-03	1.09265E-02
0107	0.	1.24268E-02	1.41542E-02
0108	0.	1.58229E-02	1.45688E-02

1 KENOIV VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE 23

0[E33K1BI] EXXON 15X15 PWR, 3.3%U235, 1700 PPM NAT.BORON

OGROUP REGION LEAKAGE ABSORPTIONS FISSIONS WITH 3 GENERATIONS SKIPPED

0109	0.	8.54017E-03	8.71523E-03
0110	0.	1.05328E-02	1.06789E-02
0111	0.	1.48465E-02	1.49080E-02
0112	0.	2.09017E-02	2.11193E-02
0113	0.	3.18264E-02	3.16472E-02
0114	0.	4.95574E-02	4.97569E-02
0115	0.	3.60758E-02	3.62887E-02

117	0.	8.934853E-02	5.984732E-02
0118	0.	7.406711E-02	7.491347E-02
0119	0.	8.726611E-02	8.897321E-02
0120	0.	1.000748E-01	1.007732E-01
0121	0.	5.176308E-02	5.144698E-02
0122	0.	5.052278E-02	4.904034E-02
0123	0.	4.335666E-02	4.100078E-02
OTOTAL =	2.357401E-04	1.004411E+00	9.242873E-01

0ELAPSED TIME 18.79833MINUTES

1 KENO1V VER 1.24 (21/04/87) 90/01/02. 02.36.46 PAGE 24

0(EST&IRI) BYRON 1&1&2 PWR, 3.2&U235,1700 PPM NAT.BORON

0---- FISSION DENSITIES ----

REGION	FISSION DENSITY	PERCENT DEVIATION	TOTAL FISSIONS
0BOX TYPE 1			
1	9.245E-01	.38	9.245E-01
2	0.	0.00	0.
3	0.	0.00	0.
4	0.	0.00	0.
5	0.	0.00	0.
6	0.	0.00	0.

0------ WARNING ---------- WARNING ----------

0** FISSION DENSITY AND FLUX WERE COMPUTED USING ARBITRARY VOLUMES (LISTED UNDER - TOTAL VOLUMES =) IN THE REGIONS DESCRIBED BY GENERALIZED GEOM. THEY MUST BE MULTIPLIED BY THE TRUE VOLUME OVER THE ARBITRARY VOLUME TO OBTAIN THE CORRECT VALUES.

1 KENO1V VER 5.1A (21/04/87) 90/01/02. 02.36.49 PAGE 25

0(EST&IRI) BYRON 1&1&2 PWR, 3.2&U235,1700 PPM NAT.BORON

0FIGURES FOR BOX TYPE 1

REGION	1		2		3		4		5		6	
GROUP	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION
1	2.332E+04	98.61	1.147E+04	100.00	6.529E+05	100.00	0.	0.00	0.	0.00	0.	0.00
2	6.795E+04	72.59	5.541E+05	100.00	5.051E+05	100.00	0.	0.00	0.	0.00	0.	0.00
3	0.547E+03	81.12	1.721E+04	100.00	0.	0.00	0.	0.00	0.	0.00	5.795E+05	72.67
4	1.652E+03	85.51	6.295E+04	80.02	4.159E+04	50.79	0.	0.00	0.	0.00	1.727E+05	96.47
5	2.191E+03	38.89	4.580E+04	44.49	1.847E+04	49.50	0.	0.00	0.	0.00	2.813E+04	70.04
6	2.255E+02	19.62	1.764E+03	34.65	1.685E+03	21.02	3.629E+04	100.00	7.057E-10	100.00	4.021E+06	30.89
7	4.145E+02	15.24	6.761E+03	23.33	3.451E+03	19.34	0.	0.00	0.	0.00	1.070E+07	25.97
8	4.996E+02	11.26	6.537E+03	15.41	4.562E+03	19.37	0.	0.00	0.	0.00	1.429E+07	19.61
9	6.395E+02	10.61	9.759E+03	12.82	6.430E+03	14.76	0.	0.00	0.	0.00	2.074E+07	32.49
10	1.079E+01	6.72	1.387E+02	11.68	9.344E+03	11.14	0.	0.00	0.	0.00	2.353E+07	17.24
11	4.303E+01	8.59	1.916E+02	11.97	1.109E+02	11.85	0.	0.00	0.	0.00	3.506E+07	16.39
12	1.971E+01	5.71	2.604E+02	8.59	1.845E+02	8.41	0.	0.00	0.	0.00	4.963E+07	12.93
13	2.713E+01	5.36	3.338E+02	9.44	1.968E+02	9.61	4.271E+05	100.00	1.366E-10	100.00	6.040E+07	13.96
14	2.422E+01	4.84	3.437E+02	8.42	1.918E+02	7.43	0.	0.00	0.	0.00	5.548E+07	9.45
15	2.634E+01	3.85	3.479E+02	8.16	2.169E+02	9.01	0.	0.00	1.364E-10	100.00	7.283E+07	9.82
16	3.842E+01	3.87	4.311E+02	6.39	2.784E+02	6.62	9.894E+05	100.00	8.993E-10	100.00	7.430E+07	11.59
17	4.286E+01	3.68	5.954E+02	6.04	3.272E+02	6.85	1.466E+04	100.00	0.	0.00	8.638E+07	10.02
18	4.293E+01	3.39	6.476E+02	6.48	3.728E+02	6.62	3.900E+04	92.73	0.	0.00	1.185E+06	9.20
19	5.158E+01	3.31	6.378E+02	5.68	4.026E+02	6.74	2.201E+05	100.00	0.	0.00	1.165E+06	9.86
20	4.260E+01	3.46	5.767E+02	5.80	3.640E+02	6.51	1.048E+05	64.27	4.411E-10	100.00	8.877E+07	10.64
21	3.889E+01	3.52	5.007E+02	6.06	3.106E+02	5.94	5.518E+04	83.62	2.607E-11	100.00	8.244E+07	7.88
22	4.309E+01	3.60	5.587E+02	5.45	3.533E+02	6.81	5.101E+04	100.00	1.307E-10	100.00	9.911E+07	9.62
23	4.203E+01	3.09	5.595E+02	4.86	3.551E+02	6.82	9.351E+04	69.61	0.	0.00	1.501E+06	39.54
24	4.628E+01	2.62	6.329E+02	6.01	4.073E+02	5.99	3.775E+03	46.89	1.483E-09	70.76	1.122E+06	9.11
25	4.189E+01	2.70	5.421E+02	4.32	3.639E+02	6.25	4.768E+03	49.35	1.461E-09	63.50	1.086E+06	10.93
26	4.705E+01	2.65	6.196E+02	4.78	4.017E+02	6.40	2.066E+03	58.56	1.065E-09	62.04	1.039E+06	9.61
27	3.452E+01	3.06	4.690E+02	6.07	3.045E+02	6.91	0.	0.00	5.653E-11	100.00	1.038E+06	16.39
28	3.737E+01	2.58	4.369E+02	5.09	2.897E+02	6.74	2.146E+04	100.00	0.	0.00	9.072E+07	12.79

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 92   1.733E+01   2.06   3.212E+02   3.71   1.965E+02   7.73   0.          0.00   5.262E-10   47.91   5.756E-07   13.06
 93   1.797E+01   2.42   3.348E+02   4.12   1.629E+02   8.53   1.467E-07  100.00   5.298E-10   64.73   4.839E-07   16.61
 94   6.122E+02   3.29   1.215E+02   5.94   7.107E+03  10.08   0.          0.00   9.137E-12  100.00   1.575E-07   16.49
 95   6.561E+02   3.05   1.063E+02   6.62   6.495E+03   9.55   0.          0.00   2.221E-10   96.82   1.411E-07   18.50
 96   6.702E+02   3.65   1.223E+02   6.82   6.121E+03  12.09   0.          0.00   5.477E-10   75.15   1.462E-07   18.05
 97   8.129E+02   3.13   1.452E+02   5.66   9.077E+03   9.61   0.          0.00   2.421E-11   72.92   1.732E-07   16.98
 98   9.713E+02   2.69   1.750E+02   5.53   9.187E+03  10.18   0.          0.00   3.020E-10   53.90   3.205E-07   19.65
 99   9.202E+02   2.89   1.494E+02   5.19   8.268E+03  10.91   0.          0.00   2.988E-11  100.00   2.433E-07   17.14
100   9.785E+02   2.82   1.865E+02   5.09   1.019E+02   8.20   0.          0.00   2.272E-10   87.64   2.279E-07   14.32
101   9.455E+02   2.84   1.726E+02   4.94   1.108E+01   6.99   1.279E+03  80.71   8.560E+11   53.39   2.369E-07   10.86
102   1.327E+01   2.12   2.524E+02   3.87   1.651E+02   8.60   2.771E+02   6.24   4.270E+10   66.72   4.445E-07   16.95
103   1.361E+01   2.75   2.427E+02   3.96   1.257E+02   8.27   2.492E-04  100.00   7.274E+11   72.16   2.020E-07   12.84
104   1.570E+01   1.99   3.007E+02   4.20   1.466E+02   8.48   3.07EE+04  100.00   2.429E+10   57.03   9.724E+07   45.5
105   1.692E+01   2.23   3.122E+02   4.04   1.741E+02   8.95   0.          0.00   1.910E+10   49.88   4.225E-07   17.66
106   1.200E+01   2.37   2.320E+02   4.69   1.094E+02   8.47   1.546E+04  100.00   2.763E+10   76.81   3.110E+07   21.15
107   1.359E+01   1.91   2.717E+02   4.38   1.423E+02   7.45   3.251E+05  100.00   1.477E+10   71.40   4.510E+07   19.20
108   1.768E+01   1.86   3.553E+02   3.87   1.941E+02   5.89   1.10EE+03  100.00   1.169E+10   56.21   4.775E+07   11.76
109   8.942E+02   2.54   1.731E+02   4.49   9.229E+03   4.79   2.305E+04  100.00   3.130E+11   72.27   2.594E+07   14.53
                                                                 FROIV    VER 1.2A (21/09/67) 90/01/03. 02.26.19. PAGE   27
110   1.102E+01   2.22   2.208E+02   3.46   1.057E+02   8.53   5.566E+05  100.00   5.812E+11   81.00   3.803E+07   15.0
111   1.405E+01   0.79   3.277E+01   3.02   1.572E+02   5.38   0.          0.00   7.171E+12   46.38   4.878E+07   15.79
112   1.676E+01   1.67   4.307E+02   3.75   1.841E+02   8.23   0.          0.00   6.063E+12  100.00   4.685E+07    8.00
113   2.539E+01   1.27   6.447E+02   2.48   2.020E+02   4.28   3.67EE+04  100.00   1.359E+10   47.07   2.377E+07   12.56
114   2.962E+01   1.01   9.860E+00   3.14   3.402E+02   3.22   1.972E+03  55.23   4.546E+12   52.96   4.174E+07    7.19
115   2.735E+01   1.16   6.701E+02   2.66   2.824E+02   4.17   4.59EE+04  61.76   3.943E+12  100.00   6.267E+07    6.82
116   2.759E+01   1.12   8.141E+02   2.58   2.903E+02   3.66   5.750E+05  60.42   3.959E+11   97.09   7.057E+07    1.09
117   3.207E+01   .28   9.912E+02   2.14   3.526E+02   2.07   2.482E+04  76.07   2.547E+12   42.89   8.520E+07    7.44
118   3.642E+01   .49   1.126E+01   2.10   3.89EE+02   2.20   2.620E+06  70.59   1.443E+12   72.94   9.02EE+07    6.27
119   3.800E+01   .43   1.191E+01   2.20   3.996E+02   2.41   2.60E+04   94.89   6.176E+11   69.17   1.131E+08    5.13
120   3.894E+01   .81   1.218E+01   2.36   3.62EE+02   2.97   3.89EE+05  70.20   4.250E+12  100.00   1.476E+08    7.52
121   1.547E+01   1.09   5.710E+02   2.40   1.562E+01   5.80   1.329E+03  70.96   1.376E+11   99.01   5.10EE+07    4.12
122   1.394E+01   1.22   4.785E+02   2.22   1.20EE+02   5.06   1.044E+04  100.00   4.217E+12  100.00   3.46E+07    9.34
123   8.423E+02   1.52   3.242E+02   2.72   8.497E+01   6.67   0.          0.00   2.377E+12  100.00   1.65EE+07   13.47
                                                                 KENOIV   VER 1.2A (21/09/67) 90/01/02. 02.26.19. PAGE   28
QUEENS(181) EXIOM 15(15 MAR, 3.3EU235,1700 PPM NAT.BORON
0                        FREQUENCY FOR GENERATIONS   4 TO   72

 .8435 TO  .8665     **
 .8665 TO  .8896     ******
 .8896 TO  .9127     ******************
 .9127 TO  .9358     **********************
 .9358 TO  .9589     ******************
 .9589 TO  .9820     ****
 .9820 TO 1.0051     *
0                        FREQUENCY FOR GENERATIONS  22 TO  72

 .8435 TO  .8665     *
 .8665 TO  .8896     *.**
 .8896 TO  .9127     **********
 .9127 TO  .9358     ***************
 .9358 TO  .9589     **************
 .9589 TO  .9820     ****
 .9820 TO 1.0051     *
0                        FREQUENCY FOR GENERATIONS  39 TO  72

 .8435 TO  .8665     *
 .8665 TO  .8896     **
 .8896 TO  .9127     *******
 .9127 TO  .9358     ************
 .9358 TO  .9589     ***********
 .9589 TO  .9820     **
 .9820 TO 1.0051
0                        FREQUENCY FOR GENERATIONS  56 TO  72

 .8435 TO  .8665     *
 .8665 TO  .8896     *
```

```
 .4121 TO .4358     ******
 .4358 TO .9589     ******
 .9589 TO .9820     *
 .9820 TO 1.0051
-EOR-
| MBNY    POWER COMPUTING/990 - NOS 2.7.1.10-     NOS 2.7.1 BT=MAC.    90/01/02. 02.44.43.


 02.34.55.E33X1BI,F1,T2000.   HENRY TRAN
 02.34.55.USER,NX9PSN,,NC.
 02.34.55.ABBC,   0.
 02.34.55. YOUR PASSWORD EXPIRES AT 00.00.00 ON 90/02/08
 02.34.55.CHARGE,N973301,VSC.
 02.34.56. CHARGE = N973301, PROJECT = VSC.
 02.34.57.ZIIIZ01.
 02.34.57.PROC1. SYSTEM PROLOGUE
 02.34.57.COMMENT. SYSTEM PROLOG
 02.34.57.NEWS(A).
 02.34.58.CHEKEXP.
 02.34.59. INQUIRY COMPLETE.
 02.34.59.REVERT.
 02.34.59.TITLE(ET)+1B1I EXIOK IEXIE PWR, 3.3SU225,+340 PER NAT.BOPQN)
 02.35.00.LABEL,TAPE4,D=6E,L=EXSECT,VSN=000421.
 02.36.11.NTIOS, ASSIGNED TO TAPE4, VSN=000421.
 02.36.12.COPYEF,TAPE4,TAPE4.
 02.36.16. COPY    2 FILES          1 RECS      3W7443 WORDS
 02.36.16.REWIND,TAPE4.
 02.36.16.RETURN,TAPE4.
 02.36.17.RFL(SEC=100)
 02.36.17.ATTACHF,RTA04,1,CR.
 02.36.18.    STOP
 02.36.18.    035200 MAXIMUM EXECUTION FL.
 02.36.18.      0.238 CP SECONDS EXECUTION TIME.
 02.36.18.KEM04,PL=777777.
 02.44.42.    STOP
 02.44.42.    372700 MAXIMUM EXECUTION FL.
 02.44.43.    1173.151 CP SECONDS EXECUTION TIME.
 02.44.43.USEF,      3.012MSUNS.
 02.44.43.UEMT,      2.723KUNS.
 02.44.43.UEMS,     33.741KUNS.
 02.44.43.UECP,   1134.406808.
 02.44.43. SRU,   2252.077UNTS.
 02.44.43.$OUT(*/OP=E)
 02.44.43. NO FILES PROCESSED.
 02.44.43.$DAYFILE(OUTPUT,1T=D)
 02.44.43.ABG,    1058 $DBS FN=OUTPUT.
 02.44.43.POWER COMPUTING/990 - NOS 2.7.1.10
 02.44.43.DATE:          90/01/02.
 02.44.43.JSN:           MBNY
END OF FILE
?
```

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03.22.48.USER,VK9FSN,,NC.
03.22.48.ABC,  0.
03.22.48. YOUR PASSWORD EXPIRES AT 00.00.00 ON 90/02/08.
03.22.48.CHARGE,N973301,VSC.
03.22.49. CHARGE = N973301, PROJECT = VSC.
03.22.50.2222701.
03.22.50.PROC1. SYSTEM PROLOGUE
03.22.50.COMMENT. SYSTEM PROLOG
03.22.50.NEWS(A).
03.22.51.CHECKIN.
03.22.52. INQUIRY COMPLETE.
03.22.52.REVERT.
03.22.52.TITLE([E25NUBI] EXXON PWR 15X15, 2.55 U235, BORATED WATER)
03.22.52.ATTACHP(LEB1,1,0).
03.22.56.    STOP
03.22.56.    075200 MAXIMUM EXECUTION FL.
03.22.56.       0.204 CP SECONDS EXECUTION TIME.
03.22.56.ATTACHP(LEB2,1,0).
03.22.56.    STOP
03.22.56.    075200 MAXIMUM EXECUTION FL.
03.22.56.       0.247 CP SECONDS EXECUTION TIME.
03.22.56.ATTACHP(LEB3,1,0).
03.22.57.    STOP
03.22.57.    075200 MAXIMUM EXECUTION FL.
03.22.57.       0.204 CP SECONDS EXECUTION TIME.
03.22.57.REWIND,TAPE1,TAPE2,TAPE3.
03.22.58.ATTACHP,NUCDF,F=1.
03.22.59.    STOP
03.22.59.    075200 MAXIMUM EXECUTION FL.
03.22.59.       0.291 CP SECONDS EXECUTION TIME.
03.22.59.NUCDF(O=477777).
03.23.06.TIME =    000, KEFF = 1.70221
03.23.12.TIME =    000, KEFF = 1.24053
03.23.16.TIME =    000, KEFF = 1.17107
03.23.19.TIME =    000, KEFF = 1.11744
03.23.23.TIME =    000, KEFF = 1.07573
03.23.29.TIME =    000, KEFF = 1.04114
03.23.32.TIME =    000, KEFF = 1.01043
03.23.37.TIME =    000, KEFF =  .98115
03.23.42.TIME =    000, KEFF =  .95177
03.23.46.TIME =    000, KEFF =  .92796
03.23.50.TIME =    000, KEFF =  .90581
03.23.54.TIME =    000, KEFF =  .90391
03.23.54.    STOP  222
03.23.54.    075100 MAXIMUM EXECUTION FL.
03.23.54.      41.174 CP SECONDS EXECUTION TIME.
03.23.54.UCPF,      0.115KUNS.
03.23.55.UCMS,    102.660KUNS.
03.23.55.UECP,     62,514BECS.
03.23.55. SRU,    133.474UNTS.
03.23.55.$OUT(*/OP=E)
03.23.55. NO FILES PROCESSED.
03.23.55.$DAYFILE(OUTPUT,JT=D)
03.23.55.IABO,    472B SDBS FN=OUTPUT.
03.23.55.POWER COMPUTING/990 - NOS 2.7.1.10
03.23.55.DATE:          89/12/29.
03.23.55.JSN:           MHHJ
END OF FILE
```

```
XEDIT 5.1.00
??
E25NXBI MBLE MASSEY JOHN  001 90/01/02. 01:44:04. MID = MAC = NS2
[E25NXBI] EXXON 15X15 PWR, 2.5% U235, 300 PPM NAT.BORON
--EOR--                                                    1077
1                                                  NITAWL   VERS. 1.2  90/01/02. 02.01.51. PAGE    1
0
0
                NN          NN  IIIIIIIIIIII    TTTTTTTTTTTT      AAAAAAAA      WW          WW   LL
                NNN         NN  IIIIIIIIIIII    TTTTTTTTTTTT     AAAAAAAAAA     WW          WW   LL
                NNNN        NN      II              TT          AA        AA     WW          WW   LL
                NN NN       NN      II              TT          AA        AA     WW          WW   LL
                NN  NN      NN      II              TT          AA        AA     WW          WW   LL
                NN   NN     NN      II              TT          AAAAAAAAAAAA     WW    W     WW   LL
                NN    NN    NN      II              TT          AAAAAAAAAAAA     WW   WWW    WW   LL
                NN     NN   NN      II              TT          AA        AA     WW WW WW WW   LL
                NN      NN  NN      II              TT          AA        AA     WW WW   WW WW   LL
                NN       NNNN       II              TT          AA        AA     WWWW     WWWW   LL
                NN        NNN   IIIIIIIIIIII        TT          AA        AA     WWW       WWW   LLLLLLLLLLLL
                NN         NN   IIIIIIIIIIII        TT          AA        AA     WW         WW   LLLLLLLLLLLL
0
0
0
0
0
0
1                                                  NITAWL   VERS. 1.2  90/01/02. 02.01.51. PAGE    2
0        F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                  C O L U M N   N U M B E R
        CARD                        11111111112222222222333333333344444444445555555555666666666677777777778
        NUMBER                  12345678901234567890123456789012345678901234567890123456789012345678901234567890

          1                     1$$  0  2 36 0  0  3  4  0  126  0 -1  0  1
          2                     2$$  10001  80004
          3                          50000  60002  110000 120005  130000
          4                          140005 240003 250005 260001 280003  820000
          5                          50100
          6                           25922351  42922351 50922351
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            6                           2580004   4280004   5080004
            9                           25400000  42400000  50400000
           10                           2510001   4210001   5010001
           11                           2560100   4250100   5050100
           12                           33922351
           13                           33922381
           14                           3380004
           15                           33400000
           16                           3310001
           17                           3350 0
           18                      7
0          ********************************** E N D   O F   I N P U T   L I S T I N G ***********************************
```

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1                                                                                    MORSE   VERS. 1.2  90/01/02. 02.01.51. PAGE    2
0
0    16 ARRAY     12 ENTRIES READ
0    0T
0 MSCM     NUMBER OF EXTRA CROSS SECTIONS                          0
  MMT      NUMBER OF NUCLIDES FROM MASTER LIBRARY                  2
  MXT      NUMBER OF NUCLIDES FROM X-SECT LIBRARY (LOC 2)          7*
  MST      NUMBER OF NUCLIDES FROM X-SECT LIBRARY (LOC 3)          0
  MCR      ANISN/DOT/MORSE OUTPUT TRIGGER                          3
  MGT      TOTAL CROSS SECTION POSITION                            1
  MS       WITHIN-GROUP SCATTERING CROSS SECTION POSITION          2
  NRES     NUMBER OF RESONANCE CALCULATIONS                        0
  JOM      TABLE LENGTH FOR CROSS SECTIONS                      12A
  IFM      IS AN OLD ANISN LIBRARY MOUNTED ? (0/1 NO/YES)          0
  IPR      OUTPUT OPTION TRIGGER                                  -1
  IFG      PRINT CONTROL - ANISN OUTPUT                            0
0THE STORAGE ALLOCATED FOR THIS CASE IS  33000 WORDS
0    28 ARRAY     39 ENTRIES READ
0    0T
0 GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
   TAPE IDENTIFICATION NUMBER                    14
   NUMBER OF NUCLIDES ON TAPE                    26
   NUMBER OF NEUTRON ENERGY GROUPS              123
   FIRST THERMAL NEUTRON ENERGY GROUP            94
   NUMBER OF GAMMA ENERGY GROUPS                  0
- XSDRN TAPE     0
                    SUPER-XSDRN LIBRARY--LAST DIGITS OF ID #'S ARE CODED AS FOLLOWS--       5-900K,6
                    -800K,7-850K,8-750K,9-1000K,ANYTHING ELSE IS PRECISELY THAT--IF THESE THERMAL TE
                    MPERATURES ARE DESIRED, CALL C.W. CRAVEN, IP. 09       N. M. GREENE----ALL THER
                    MAL DATA IS Pu (1F76=94).  ALSO J. WILSON DATA  AND D.F.V NUCLIDES       JULY, 1
                    966                                    -THIS IS A CONVERTED TAPE
-  WORK TAPE    15
0 THIS XSDRN WORKING TAPE WAS CREATED 90/01/02
 THE TITLE OF THE PARENT CASE IS AS FOLLOWS
 XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED-- [E33NXBI] EXXON 15X15 PWR, 3.0% U235
 , 1500 PPM NAT.BORON
   1296 MCC
0 NUCLIDES FROM XSDRN TAPE
     1     HYDROGEN--THERMOS ID=1803(X-6dQ) THERMAL TEMPERATJRE= 294.6 K              10001
     2     OXYGEN                           THERMAL TEMPERATURE= 294.6 K              80004
0 NUCLIDES FROM  WORK TAPE
     3     URANIUM-235                      THERMAL TEMPERATURE = 294.6 K          25922351
     4     URANIUM-235                      THERMAL TEMPERATURE = 294.6 K          42922351
     5     URANIUM-235                      THERMAL TEMPERATURE = 294.6 K          50922351
     6     URANIUM-238R                     THERMAL TEMPERATURE = 294.6 K          25922381
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      URANIUM-238R                    THERMAL TEMPERATURE = 294.6 K          5092381
      HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          2510001
   10 HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          4210001
1                                                                 NITAWL   VERS. 1.2  96/01/02. 02:01.51. PAGE    4
0  11 HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          5010001
   12 BORON     NATURAL                                                       50000
   13 BORON-10                                                                50100
   14 BORON-10                                                              2550100
   15 BORON-10                                                              4250100
   16 BORON-10                                                              5050100
   17 CARBON    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 589.26 K          60001
   18 OXYGEN                          THERMAL TEMPERATURE= 294.6 K          2580004
   19 OXYGEN                          THERMAL TEMPERATURE= 294.6 K          4280004
   20 OXYGEN                          THERMAL TEMPERATURE= 294.6 K          5080004
   21 SODIUM    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 297.6 K          110000
   22 MAGNESIUM                              THERMAL TEMP = 900.0 K          120005
   23 ALUMINUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K         130000
   24 SILICON                                THERMAL TEMP = 900.0 K          140005
   25 CHROMIUM      THERMAL TEMP=294.6                                       240007
   26 MANGANESE                              THERMAL TEMP = 900.0 K          250005
   27 IRON          THERMAL TEMP=294.6                                       260001
   28 NICKEL        THERMAL TEMP=294.6                                       280002
   29 ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K         2540000
   30 ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K         4240000
   31 ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K         5040000
   32 LEAD      NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K          820000
   33 URANIUM-235                     THERMAL TEMPERATURE = 294.6 K          2592351
   34 URANIUM-238R                    THERMAL TEMPERATURE = 294.6 K          2592381
   35 HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K           2510001
   36 BORON-10                                                              3350100
   37 OXYGEN                          THERMAL TEMPERATURE= 294.6 K          3380004
   38 ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K         3340000
0 HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          10001
2 OXYGEN                           THERMAL TEMPERATURE= 294.6 K          80004
TIME OF DAY 02:02:01.
1                                                                 NITAWL   VERS. 1.2  96/01/02. 02:01.51. PAGE    5
0  THIS XSDRN WORKING TAPE WAS CREATED 96/01/02
   THE TITLE OF THE PARENT CASE IS AS FOLLOWS
   THIS XSDRN WORKING TAPE WAS CREATED 96/01/02
   THE TITLE OF THE PARENT CASE IS AS FOLLOWS
   XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED-- (EZINFBT) EXXON 15X15 PWR, 3.25 U235


      TAPE ID                          165        NUMBER OF NUCLIDES              38
      NUMBER OF NEUTRON GROUPS         123        NUMBER OF GAMMA GROUPS           0
      FIRST THERMAL GROUP               94


                                TABLE OF CONTENTS


0     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          ID    10001
      OXYGEN                           THERMAL TEMPERATURE= 294.6 K          ID    80004
      URANIUM-235                      THERMAL TEMPERATURE = 294.6 K         ID  2592351
      URANIUM-235                      THERMAL TEMPERATURE = 294.6 K         ID  4292351
      URANIUM-235                      THERMAL TEMPERATURE = 294.6 K         ID  5092351
      URANIUM-238R                     THERMAL TEMPERATURE = 294.6 K         ID  2592381
      URANIUM-238R                     THERMAL TEMPERATURE = 294.6 K         ID  4292381
      URANIUM-238R                     THERMAL TEMPERATURE = 294.6 K         ID  5092381
      HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          ID   2510001
      HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          ID   4210001
      HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K          ID   5010001
      BORON     NATURAL                                                      ID    50000
```

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      BORON-10                                                                  ID   2350100
      BORON-11                                                                  ID   4250100
      BORON-16                                                                  ID   5050160
      CARBON    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 589.26 K            ID     60002
      OXYGEN                          THERMAL TEMPERATURE= 294.6 K              ID   2580004
      OXYGEN                          THERMAL TEMPERATURE= 294.6 K              ID   4280004
      OXYGEN                          THERMAL TEMPERATURE= 294.6 K              ID   5080004
      SODIUM    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K             ID    110000
      MAGNESIUM                            THERMAL TEMP =  900.0 K              ID    120005
      ALUMINUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID    130000
      SILICON                              THERMAL TEMP =  900.0 K              ID    140005
      CHROMIUM      THERMAL TEMP=294.6                                          ID    240002
      MANGANESE                            THERMAL TEMP =  900.0 K              ID    250005
      IRON          THERMAL TEMP=294.6                                          ID    260001
      NICKEL        THERMAL TEMP=294.6                                          ID    280002
      ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID  2500000
      ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID  2400000
      ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID  5040000
      LEAD      NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K             ID    820006
      URANIUM-235                     THERMAL TEMPERATURE = 294.6 K             ID  3392351
      URANIUM-238                     THERMAL TEMPERATURE = 294.6 K             ID  3392391
      HYDROGEN--THERMOR ID=1001 A+440. THERMAL TEMPERATURE= 294.6 K             ID  1310001
      BORON-10                                                                  ID  2350100
      OXYGEN                          THERMAL TEMPERATURE= 294.6 K              ID  8280004
      ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID  3400000
--EOR--
1                                                                  TORREN  WEEK. 1.0A 9/10/-02, 02:02:08. PAGE    2
0          F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
                                                  C O L U M N   N U M B E R
        CARD                          1111111112222222223333333334444444445555555556666666667777777778
       NUMBER                 12345678901234567890123456789012345678901234567890123456789012345678901234567890

                                                                    1077-m Core
          1                   [E25N7B2] EXXON 15X15 PWR, 2.51 U235, ~~400~~ FPA NR1,BOR0N
          2                   100  2  3  11  0  3   3 10  8  2  1   10  12  0  0  0
          3                   200 -2 -1 -1  E
          4                   300  1  0  0   0  4.0  0  0  0  0  0  0   1  0
          5                   400 -1  123  0  -2  1   4  126  -1  0
          6                   500  1.-4 2.-4 1.0 0.0 0.0   1.420892 E
          7                     -
          8                   1300  1
          9                         1  1
         10                         1
         11                         2
         12                         2
         13                         2
         14                         2  3
         15                         2
         16                   1400
         17                         0
         18                         25922351       25922381
         19                         2580004
         20                         0
         21                         25400000
         22                         0
         23                         2510001        2580004
         24                         2550100
         25                   1500
         26                         0.0
         27                         5.8114-4       2.2379-2
         28                         4.5920-2
         29                         0.0
         30                         3.8022-2
```
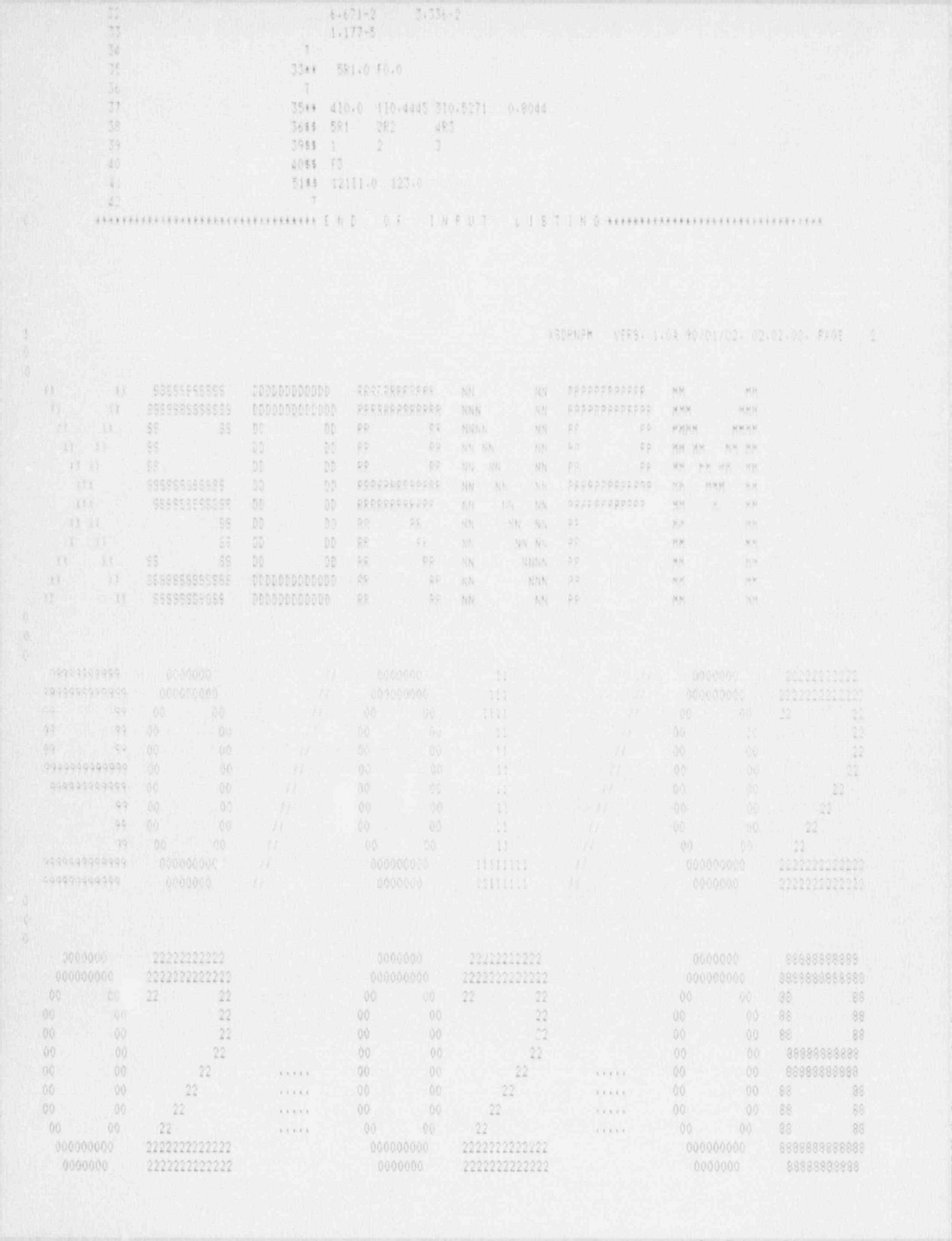

```
32                          6.671-2      3.33E-2
33                          1.177-5
34                        7
35                      33**   581.0 f0.0
36                        7
37                      35**  410.0  110.4445 310.5271   0.8044
38                      36##  581    282      453
39                      39##  1      2        3
40                      40##  F3
41                      51##  12111.0  123.0
42                        7
0       ********************************** E N D   O F   I N P U T   L I S T I N G **********************************
```

```
1                                                                    XSDRNPM  VER5.1.03 90/01/02. 02.02.00. PAGE    2
0
0
```



0 [E25N(BI) EXXON 15X15 PWR, 2.5% U235, ~~1000~~ 1072 PPM NAT.BORON
0 1$ ARRAY 10 ENTRIES READ
0 2$ ARRAY 10 ENTRIES READ
0 3$ ARRAY 12 ENTRIES READ
0 4$ ARRAY 9 ENTRIES READ
0 5* ARRAY 12 ENTRIES READ
0 OT
0 THE FOLLOWING DIRECT ACCESS SPACE IS REQUIRED
LOGICAL UNIT 6 HAS 153 BLOCKS OF LENGTH 1497 WORDS
LOGICAL UNIT 9 HAS 12 BLOCKS OF LENGTH 9047 WORDS
LOGICAL UNIT 10 HAS 492 BLOCKS OF LENGTH 55 WORDS
0GENERAL PROBLEM DESCRIPTION DATA BLOCK
0 GENERAL PROBLEM DATA

IGE 1/2/3 = PLANE/CYLINDER/SPHERE	2	IEN QUADRATURE ORDER	8
IIM NUMBER OF ZONES	3	ISCT ORDER OF SCATTERING	3
IM NUMBER OF SPACIAL INTERVALS	11	IEVT 0/1/2/3/4/5/6=0/K/ALPHA/C/I/B/A	1
IBL 0/1/2/3 = VACUUM/REFL/PER/WHITE	0	IIM INNER ITERATION MAXIMUM	10
IBR RIGHT BOUNDARY CONDITION	1	IOM OUTER ITERATION MAXIMUM	12
MXX NUMBER OF MIXTURES	3	ICLC -1/0/N=FLAT FES/SN/CPI	0
MS MIXING TABLE LENGTH	10	ITH 0/1 = FORWARD/ADJOINT	0
IGM NUMBER OF ENERGY GROUPS	123	IFLU 0/1/2/3/4=L-B/L/E/W/L-W	0
NNG NUMBER OF NEUTRON GROUPS	123	IPRT -2/-1/0/N=MIXTURE XSEC PRINT	-2
NGG NUMBER OF GAMMA GROUPS	0	ID1 0/1/2/3=NO/PRT NO/PCH N/BOTH	-1
IFTG NUMBER OF FIRST THERMAL GROUP	93	IPRT -1/0/1=NONE/FINE/ALL FBL PRT	-1

0 SPECIAL OPTIONS

IBS 0/1 = NONE WEIGHTING CALCULATION	1	IAN DUMMY PARAMETER	0
IVM VOLUMETRIC SOURCES (0/N=NO/YES)	0	IDFM 0/1 = NONE DENSITY FACTORS 33*	0
IPM BOUNDARY SOURCES (0/N=NO/YES)	0	IAT 0/N = NONE/N ACTIVITIES BY ZONE	0
IFN 0/1/2 = INPUT 33*/34*/USE LAST	0	IAI 0/1=NONE/ACTIVITIES BY INTERVAL	0
ITMX MAXIMUM TIME (MINUTES)	0	IFCT 0/1=NO/YES UPSCATTER SCALING	1
IDO1 0/1/2/3=NO/XSECT/SRCE/FLUX-OUT	0	IPVT 0/1/2=NO/K/ALPHA PARAMETRIC SRCH	0

0 WEIGHTING DATA (IFO=1)

ICON -1/0/1=CELL/ZONE/REGION WEIGHT	-1	IHTF TOTAL XSECT RSN IN BRD GP TABLES	3
IGMF NUMBER OF BROAD GROUPS	123	NDBF PEN 0-9 OR FILE NUMBER	4
ITP 0/1/2/3/4/5/6/7/8=EXACT/1/2/3/4/5/6/7/8	0	MUSE TABLE LENGTH OR MAX ORDER	256
IPF -2/-1/0/N=WGTED XSECT PRINT	-2	MSCR EXTRA 1-D X-SECT POSITIONS	0
IAP -1/N ANISN XSECT PRINT	-1		

0 FLOATING POINT PARAMETERS

EV EIGENVALUE GUESS	0.	PW INPUT=1/2--K/ALPHA	0.
EVM EIGENVALUE MODIFIER	0.	EPS OVERALL CONVERGENCE	1.00000E-04
BF BUCKLING FACTOR=1.420892	1.42089E+00	PTC POINT CONVERGENCE	2.00000E-04
DY CYL/PLA HT FOR BUCKLING	0.	XNF NORMALIZATION FACTOR	1.00000E+00

1 XSDRNPM VERS. 1.0A 90/01/02. 02.02.08. PAGE 4

DDZ PLANE DEPTH FOR BUCKLING	0.	EDL EV CHANGE EPS FOR SEARCH	1.00000E-03
VSC VOID STREAMING CORRECTION	0.	XNPM NEW PARAM MOD FOR SEARCH	7.50000E-01

0DATA BLOCK 2 (MIXING TABLE, ETC.)
THIS CASE WILL REQUIRE 17807 LOCATIONS FOR MIXING
THIS CASE HAS BEEN ALLOCATED 30000 LOCATIONS
0 13$ ARRAY 10 ENTRIES READ
0 14$ ARRAY 10 ENTRIES READ
0 15* ARRAY 10 ENTRIES READ
0 OT

1 1077 XSDRNPM VERS. 1.0A 90/01/02. 02.02.08. PAGE 5

0 [E25NXBI' EXXON 15X15 PWR, 2.5% U235, ~~1000~~ PPM NAT.BORON

NUCLIDES REQUESTED	CITATION IDENTIFICATION	MIXING TABLE MIXTURE	COMPONENT	ATOM DENSITY	EXTRA XSECT ID'S
1	0	0	1	0	0
2	0	0	1	25922351	5.81140E-04

```
 4     0          0                    1      2590004       4.59209E-02
 5     0          0                    2            0             0
 6     0          0                    2     25400000       3.80220E-02
 7     0          0                    3            0             0
 8     0          0                    3      2510001       6.67100E-02
 9     0          0                    3      2500004       3.33600E-02
10     0          0                    3      2550100       1.17700E-05
11     0
12     0
13     0
14     0
15     0
16     0
17     0
18     0
19     0
20     0
21     0
22     0
23     0
24     0
25     0
26     0
27     0
28     0
29     0
30     0
31     0
32     0
33     0
34     0
35     0
36     0
37     0
38     0
 TIME OF DAY 02.02.14.
XIDAT1=0 REQUIRES  74659 LOCATIONS. THIS VERSION OF XSDRN ALLOWS A MAXIMUM OF   73000
0 CROSS SECTIONS will BE STORED EXTERNALLY
1   52248 LOCATIONS WILL BE USED
 XD EXECUTING FIRST TIME
0.   33* ARRAY    1353 ENTRIES READ
0    0T
0    35* ARRAY      12 ENTRIES READ
0    36* ARRAY      11 ENTRIES READ
1                                                                  XSDRNPM   VERS. 1.0A 90/01/02. 02.02.08. PAGE    6
0    39* ARRAY       3 ENTRIES READ
0    40* ARRAY       3 ENTRIES READ
0    5Y* ARRAY     120 ENTRIES READ
0    0T
1                                                                  XSDRNPM   VERS. 1.0A 90/01/02. 02.02.08. PAGE    7
0                    [E25NXB3] EXXON 15X15 PWR, 2.5% U235, 900 PPM NAT.BORON
                     NEUTRON GROUP PARAMETERS
0   GP    ENERGY      LETHARGY      MID PT     BROAD GP        CALC                    RIGHT        LEFT
        BOUNDARIES   BOUNDARIES   VELOCITIES   NUMBERS        TYPE                    ALBEDO       ALBEDO
      1  1.49180E+07 -3.99983E-01  5.21033E+09      1            0                 1.00000E+00
      2  1.34990E+07 -3.00031E-01  4.95624E+09      2            0                 1.00000E+00
      3  1.22140E+07 -1.99998E-01  4.71452E+09      3            0                 1.00000E+00
      4  1.10520E+07 -1.00026E-01  4.48459E+09      4            0                 1.00000E+00
      5  1.00000E+07        0      4.26585E+09      5            0                 1.00000E+00
      6  9.04840E+06  9.99971E-02  4.05780E+09      6            0                 1.00000E+00
      7  8.18730E+06  2.00001E-01  3.85990E+09      7            0                 1.00000E+00
      8  7.40820E+06  2.99998E-01  3.67165E+09      8            0                 1.00000E+00
```

10	6.06530E+06	5.00001E+01	3.32224E+09	10	0	1.00000E+00
11	5.48810E+06	6.00007E+01	3.16020E+09	11	0	1.00000E+00
12	4.96580E+06	7.00011E+01	3.00603E+09	12	0	1.00000E+00
13	4.49[illegible]E+06	7.99998E-01	2.85948E+09	13	0	1.00000E+00
14	4.06570E+06	8.99999E-01	2.72002E+09	14	0	1.00000E+00
15	3.67880E+06	9.99998E-01	2.58736E+09	15	0	1.00000E+00
16	3.32870E+06	1.10000E+00	2.46117E+09	16	0	1.00000E+00
17	3.01190E+06	1.20001E+00	2.34113E+09	17	0	1.00000E+00
18	2.72570E+06	1.30001E+00	2.22697E+09	18	0	1.00000E+00
19	2.46600E+06	1.39999E+00	2.11836E+09	19	0	1.00000E+00
20	2.23130E+06	1.50000E+00	2.01505E+09	20	0	1.00000E+00
21	2.01900E+06	1.59998E+00	1.91677E+09	21	0	1.00000E+00
22	1.82680E+06	1.70002E+00	1.82328E+09	22	0	1.00000E+00
23	1.65300E+06	1.79999E+00	1.73427E+09	23	0	1.00000E+00
24	1.49570E+06	1.89999E+00	1.64976E+09	24	0	1.00000E+00
25	1.35330E+06	2.00004E+00	1.56931E+09	25	0	1.00000E+00
26	1.22460E+06	2.09997E+00	1.49278E+09	26	0	1.00000E+00
27	1.10800E+06	2.20003E+00	1.41997E+09	27	0	1.00000E+00
28	1.00260E+06	2.29999E+00	1.35073E+09	28	0	1.00000E+00
29	9.07180E+05	2.40000E+00	1.28485E+09	29	0	1.00000E+00
30	8.20850E+05	2.50000E+00	1.22219E+09	30	0	1.00000E+00
31	7.42740E+05	2.59999E+00	1.16258E+09	31	0	1.00000E+00
32	6.72050E+05	2.70001E+00	1.10588E+09	32	0	1.00000E+00
33	6.08160E+05	2.80000E+00	1.05194E+09	33	0	1.00000E+00
34	5.50230E+05	2.90000E+00	1.00068E+09	34	0	1.00000E+00
35	4.97870E+05	3.00000E+00	9.51837E+08	35	0	1.00000E+00
36	4.50490E+05	3.10000E+00	9.05415E+08	36	0	1.00000E+00
37	4.07620E+05	3.20001E+00	8.61257E+08	37	0	1.00000E+00
38	3.68820E+05	3.30000E+00	8.19352E+08	38	0	1.00000E+00
39	3.33720E+05	3.40001E+00	7.79693E+08	39	0	1.00000E+00
40	3.01970E+05	3.50001E+00	7.41292E+08	40	0	1.00000E+00
41	2.73240E+05	3.59999E+00	7.05137E+08	41	0	1.00000E+00
42	2.47230E+05	3.70002E+00	6.70747E+08	42	0	1.00000E+00
43	2.23710E+05	3.79999E+00	6.38039E+08	43	0	1.00000E+00
44	2.02420E+05	3.90000E+00	6.06923E+08	44	0	1.00000E+00
45	1.83160E+05	3.99998E+00	5.77326E+08	45	0	1.00000E+00
46	1.65730E+05	4.09998E+00	5.49170E+08	46	0	1.00000E+00
47	1.49960E+05	4.19997E+00	5.22389E+08	47	0	1.00000E+00
48	1.35690E+05	4.29997E+00	4.96904E+08	48	0	1.00000E+00
49	1.22770E+05	4.40003E+00	4.72666E+08	49	0	1.00000E+00
50	1.11090E+05	4.50000E+00	4.49606E+08	50	0	1.00000E+00
51	1.00510E+05	4.75000E+00	3.92181E+08	51	0	1.00000E+00
52	6.72790E+04	5.00001E+00	3.37273E+08	52	0	1.00000E+00
53	5.24750E+04	5.25000E+00	2.97643E+08	53	0	1.00000E+00

54	4.08680E+04	5.49999E+00	2.62670E+08	54	0	1.00000E+00
55	3.18280E+04	5.74999E+00	2.31804E+08	55	0	1.00000E+00
56	2.47870E+04	6.00002E+00	2.04564E+08	56	0	1.00000E+00
57	1.93040E+04	6.25003E+00	1.80527E+08	57	0	1.00000E+00
58	1.50340E+04	6.50003E+00	1.59317E+08	58	0	1.00000E+00
59	1.17090E+04	6.74998E+00	1.40597E+08	59	0	1.00000E+00
60	9.11880E+03	7.00000E+00	1.24076E+08	60	0	1.00000E+00
61	7.10170E+03	7.25001E+00	1.09496E+08	61	0	1.00000E+00
62	5.53080E+03	7.50001E+00	9.66303E+07	62	0	1.00000E+00
63	4.30740E+03	7.75001E+00	8.52759E+07	63	0	1.00000E+00
64	3.35460E+03	8.00001E+00	7.52559E+07	64	0	1.00000E+00
65	2.61260E+03	8.24999E+00	6.64134E+07	65	0	1.00000E+00
66	2.03470E+03	8.49999E+00	5.86094E+07	66	0	1.00000E+00
67	1.58460E+03	8.75001E+00	5.17225E+07	67	0	1.00000E+00
68	1.23410E+03	9.00000E+00	4.56451E+07	68	0	1.00000E+00
69	9.61120E+02	9.25000E+00	4.02817E+07	69	0	1.00000E+00
70	7.48520E+02	9.50000E+00	3.55485E+07	70	0	1.00000E+00

72	4.54000E+02	1.00000E+01	2.76850E+07	72	0	1.00000E+00
73	3.53570E+02	1.02500E+01	2.44319E+07	73	0	1.00000E+00
74	2.75260E+02	1.05000E+01	2.15610E+07	74	0	1.00000E+00
75	2.14450E+02	1.07500E+01	1.90273E+07	75	0	1.00000E+00
76	1.67020E+02	1.10000E+01	1.67919E+07	76	0	1.00000E+00
77	1.30070E+02	1.12500E+01	1.48187E+07	77	0	1.00000E+00
78	1.01300E+02	1.15000E+01	1.30775E+07	78	0	1.00000E+00
79	7.88930E+01	1.17500E+01	1.15409E+07	79	0	1.00000E+00
80	6.14420E+01	1.20000E+01	1.01848E+07	80	0	1.00000E+00
81	4.78510E+01	1.22500E+01	8.98801E+06	81	0	1.00000E+00
82	3.72660E+01	1.25000E+01	7.93188E+06	82	0	1.00000E+00
83	2.90230E+01	1.27500E+01	6.99996E+06	83	0	1.00000E+00
84	2.26030E+01	1.30000E+01	6.17723E+06	84	0	1.00000E+00
85	1.76030E+01	1.32500E+01	5.45153E+06	85	0	1.00000E+00
86	1.37100E+01	1.35000E+01	4.81099E+06	86	0	1.00000E+00
87	1.06770E+01	1.37500E+01	4.24565E+06	87	0	1.00000E+00
88	8.31530E+00	1.40000E+01	3.74677E+06	88	0	1.00000E+00
89	6.47590E+00	1.42500E+01	3.30651E+06	89	0	1.00000E+00
90	5.04250E+00	1.45000E+01	2.91800E+06	90	0	1.00000E+00
91	3.92790E+00	1.47500E+01	2.57512E+06	91	0	1.00000E+00
92	3.05900E+00	1.50000E+01	2.27254E+06	92	0	1.00000E+00
93	2.38240E+00	1.52500E+01	2.00651E+06	93	0	1.00000E+00
94	1.85510E+00	1.54980E+01	1.84650E+06	94	0	1.00000E+00
95	1.70900E+00	1.55822E+01	1.76924E+06	95	0	1.00000E+00
96	1.36660E+00	1.58692E+01	1.69238E+06	96	0	1.00000E+00
97	1.42150E+00	1.57594E+01	1.61075E+06	97	0	1.00000E+00
98	1.28630E+00	1.58674E+01	1.51451E+06	98	0	1.00000E+00
99	1.12370E+00	1.59926E+01	1.42692E+06	99	0	1.00000E+00
100	9.99190E-01	1.61189E+01	1.33174E+06	100	0	1.00000E+00
101	8.81030E-01	1.62448E+01	1.25458E+06	101	0	1.00000E+00
102	7.69350E-01	1.63816E+01	1.16506E+06	102	0	1.00000E+00
103	6.55220E-01	1.65409E+01	1.07166E+06	103	0	1.00000E+00
104	5.49000E-01	1.67181E+01	9.74241E+05	104	0	1.00000E+00
105	4.48540E-01	1.69189E+01	8.77651E+05	105	0	1.00000E+00
106	3.61440E-01	1.71358E+01	7.93727E+05	106	0	1.00000E+00
107	2.99450E-01	1.73239E+01	7.23012E+05	107	0	1.00000E+00
108	2.49350E-01	1.75076E+01	6.59317E+05	108	0	1.00000E+00
109	2.07070E-01	1.76928E+01	6.07584E+05	109	0	1.00000E+00
110	1.79840E-01	1.78038E+01	5.69506E+05	110	0	1.00000E+00
111	1.59830E-01	1.79517E+01	5.34763E+05	111	0	1.00000E+00

112	1.39810E-01	1.80856E+01	4.97558E+05	112	0	1.00000E+00
113	1.19780E-01	1.82402E+01	4.57271E+05	113	0	1.00000E+00
114	9.97380E-02	1.84233E+01	4.16334E+05	114	0	1.00000E+00
115	8.22110E-02	1.86153E+01	3.80938E+05	115	0	1.00000E+00
116	6.79050E-02	1.87787E+01	3.51828E+05	116	0	1.00000E+00
117	5.99910E-02	1.89333E+01	3.23341E+05	117	0	1.00000E+00
118	4.98690E-02	1.91165E+01	2.92004E+05	118	0	1.00000E+00
119	3.98370E-02	1.93411E+01	2.56694E+05	119	0	1.00000E+00
120	2.97800E-02	1.96320E+01	2.18923E+05	120	0	1.00000E+00
121	2.10760E-02	1.99777E+01	1.84094E+05	121	0	1.00000E+00
122	1.48910E-02	2.03251E+01	1.52133E+05	122	0	1.00000E+00
123	9.82920E-03	2.07405E+01	1.14283E+05	123	0	1.00000E+00
124	4.74190E-03	2.14694E+01				

0 [E25NXBI] EXXON 15X15 PWR, 2.5% U235, 900 PPM NAT.BORON

MIXTURE BY ZONE	ORDER P(L) BY ZONE	ACTIVITY TABLE MATL NO.	REACTION	QUADRATURE CONSTANTS WEIGHTS	DIRECTIONS	REFL DIREC	WT X COS
1	3			0	-2.79004E-01	3	0
2	3			5.06143E-02	-1.97286E-01	3	-9.98548E-03
3	3			5.06143E-02	1.97286E-01	2	9.98548E-03
4				0	6.04419E-01	8	0

6			5.55953E-02	-2.31301E-01	7 -1.28593E-02
7			5.55953E-02	2.31301E-01	6 1.28593E-02
8			5.55953E-02	5.58410E-01	5 3.10450E-02
9			0	-8.50774E-01	15 0
10			5.22844E-02	-8.21784E-01	15 -4.29665E-02
11			5.22844E-02	-6.01588E-01	14 -3.14537E-02
12			5.22844E-02	-2.20196E-01	13 -1.15128E-02
13			5.22844E-02	2.20196E-01	12 1.15128E-02
14			5.22844E-02	6.01588E-01	11 3.14537E-02
15			5.22844E-02	8.21784E-01	10 4.29665E-02
16			0	-9.83032E-01	24 0
17			4.53355E-02	-9.64143E-01	24 -4.37099E-02
18			4.53355E-02	-8.17361E-01	23 -3.70555E-02
19			4.53355E-02	-5.46143E-01	22 -2.47597E-02
20			4.53355E-02	-1.91780E-01	21 -8.69444E-03
21			4.53355E-02	1.91780E-01	20 8.69444E-03
22			4.53355E-02	5.46143E-01	19 2.47597E-02
23			4.53355E-02	8.17361E-01	16 3.70555E-02
24			4.53355E-02	9.64143E-01	17 4.37099E-02

CONSTANTS FOR R(3) SCATTERING

0 KNOL	SET 1	SET 2	SET 3	SET 4	SET 5
1	-2.74004E-01	8.83275E-01	6.74144E-02	-6.16919E-01	-1.71701E-02
2	-1.97286E-01	8.83275E-01	0.	-4.36227E-01	1.21411E-02
3	1.97286E-01	8.83275E-01	0.	4.36227E-01	-1.21411E-02
4	-6.04419E-01	4.52016E-01	2.16379E-01	-8.04635E-01	-1.74564E-01
5	-3.59411E-01	4.52015E-01	2.22713E-01	-7.43201E-01	-6.68028E-02
6	-2.71201E-01	4.52016E-01	-8.82703E-02	-3.07844E-01	1.61276E-01
7	2.71201E-01	4.52016E-01	-2.22713E-01	7.07844E-01	-1.61276E-01
8	5.59441E-01	4.52016E-01	2.22713E-01	7.43201E+01	6.68028E-02
9	-6.50774E-01	-8.67235E-02	6.26943E-01	-1.98456E-01	-4.31629E-01
10	-8.21784E-01	-8.67235E-02	5.42862E-01	-1.91694E-01	-3.44245E-01
11	-6.01588E-01	-8.67235E-02	0.	-1.40330E-01	3.44245E-01
12	-2.20196E-01	-8.67235E-02	-5.42862E-01	-5.13643E-02	3.44245E-01
13	2.20196E-01	-8.67235E-02	-5.42862E-01	5.13643E-02	-3.44245E-01
14	6.01588E-01	-8.67235E-02	0.	1.40330E-01	-3.44245E-01
15	8.21784E-01	-8.67235E-02	5.42862E-01	1.91694E-01	3.44245E-01
16	-9.83032E-01	-4.49528E-01	8.36885E-01	5.00763E-01	-7.91005E-01
17	-9.64143E-01	-4.49528E-01	7.73181E-01	4.91083E-01	-6.20478E-01
18	-8.17361E-01	-4.49528E-01	3.20262E-01	4.16320E-01	1.46514E-01
19	-5.46143E-01	-4.49528E-01	-3.20262E-01	2.78176E-01	7.16575E-01
20	-1.91780E-01	-4.49528E-01	-7.73181E-01	9.76824E-02	4.17236E-01
21	1.91780E-01	-4.49528E-01	-7.73181E-01	-9.76824E-02	-4.17236E-01
22	5.46143E-01	-4.49528E-01	-3.20262E-01	-2.78176E-01	-7.16575E-01
23	8.17361E-01	-4.49528E-01	3.20262E-01	-4.16320E-01	-1.46514E-01
24	9.64143E-01	-4.49528E-01	7.73181E-01	-4.91083E-01	6.20478E-01

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0 INT	RADII	MID PTS	ZONE NO.	AREAS	VOLUMES	DENS FACT	RADIUS MOD	SPEC(INT)
1	0	4.44500E-02	1	0	2.48287E-02		0	1.00000E+00
2	8.89000E-02	1.33350E-01	1	5.58578E-01	7.44860E-02		0	1.00000E+00
3	1.77800E-01	2.22250E-01	1	1.11718E+00	1.24143E-01		0	1.00000E+00
4	2.66700E-01	3.11150E-01	1	1.67573E+00	1.73801E-01			1.00000E+00
5	3.55600E-01	4.00050E-01	1	2.23430E+00	2.23458E-01			1.00000E+00
6	4.44500E-01	4.65150E-01	2	2.79288E+00	1.20704E-01			0
7	4.85800E-01	5.06450E-01	2	3.05237E+00	1.31422E-01			0
8	5.27100E-01	5.61763E-01	3	3.31187E+00	2.44694E-01			0
9	5.96425E-01	6.31088E-01	3	3.74745E+00	2.74890E-01			0
10	6.65750E-01	7.00413E-01	3	4.18303E+00	3.05087E-01			0
11	7.35075E-01	7.69738E-01	1	4.61861E+00	3.35284E-01			0
12	8.04400E-01			5.05419E+00				

TIME OF DAY 02.02 16.

1 XSDRNPM VERS. 1.0A 90/01/02. 02.02.08. PAGE 12

0 OUTER	INNER	BALANCE	UPSCATTER RATIO	EIGENVALUE	LAMBDA1	LAMBDA2	TIME(MIN)

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    2  1952   1.0000000E+00   1.0081169E+00   1.1300013E+00   1.0632633E+00   1.0698934E+00   .0147
    3  2623   1.0000000E+00   1.0005735E+00   1.1384404E+00   1.0029222E+00   1.0126260E+00   .0191
    4  2880   1.0000000E+00   9.9999992E-01   1.1388094E+00   1.0000566E+00   1.0007408E+00   .0224
    5  3053   1.0000000E+00   1.0000049E+00   1.1388415E+00   1.0000302E+00   1.0000292E+00   .0245

 GRP.   1 REQUIRED   1 ITERATIONS. MFD OF  5.44677E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   2 REQUIRED   1 ITERATIONS. MFD OF  5.46517E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   3 REQUIRED   1 ITERATIONS. MFD OF  5.50410E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   4 REQUIRED   1 ITERATIONS. MFD OF  6.07551E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   5 REQUIRED   1 ITERATIONS. MFD OF  6.57367E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   6 REQUIRED   1 ITERATIONS. MFD OF  6.00854E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   7 REQUIRED   1 ITERATIONS. MFD OF  5.39294E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   8 REQUIRED   1 ITERATIONS. MFD OF  6.15872E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   9 REQUIRED   1 ITERATIONS. MFD OF  6.59628E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  10 REQUIRED   1 ITERATIONS. MFD OF  5.82161E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  11 REQUIRED   1 ITERATIONS. MFD OF  5.14057E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  12 REQUIRED   1 ITERATIONS. MFD OF  5.56522E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  13 REQUIRED   1 ITERATIONS. MFD OF  5.85163E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  14 REQUIRED   1 ITERATIONS. MFD OF  5.99461E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  15 REQUIRED   1 ITERATIONS. MFD OF  5.06618E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  16 REQUIRED   1 ITERATIONS. MFD OF  5.36002E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  17 REQUIRED   1 ITERATIONS. MFD OF  6.32125E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  18 REQUIRED   1 ITERATIONS. MFD OF  6.29784E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  19 REQUIRED   1 ITERATIONS. MFD OF  5.67909E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  20 REQUIRED   1 ITERATIONS. MFD OF  5.19645E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  21 REQUIRED   1 ITERATIONS. MFD OF  5.34973E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  22 REQUIRED   1 ITERATIONS. MFD OF  5.53414E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  23 REQUIRED   1 ITERATIONS. MFD OF  4.76480E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  24 REQUIRED   1 ITERATIONS. MFD OF  5.07762E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  25 REQUIRED   1 ITERATIONS. MFD OF  5.02454E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  26 REQUIRED   1 ITERATIONS. MFD OF  5.01313E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  27 REQUIRED   1 ITERATIONS. MFD OF  4.65199E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  28 REQUIRED   1 ITERATIONS. MFD OF  4.51297E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  29 REQUIRED   1 ITERATIONS. MFD OF  5.18179E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  30 REQUIRED   1 ITERATIONS. MFD OF  5.25046E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  31 REQUIRED   1 ITERATIONS. MFD OF  5.02769E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  32 REQUIRED   1 ITERATIONS. MFD OF  5.11446E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  33 REQUIRED   1 ITERATIONS. MFD OF  4.92770E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  34 REQUIRED   1 ITERATIONS. MFD OF  4.61374E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  35 REQUIRED   1 ITERATIONS. MFD OF  4.49173E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  36 REQUIRED   1 ITERATIONS. MFD OF  4.26347E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  37 REQUIRED   1 ITERATIONS. MFD OF  4.56176E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  38 REQUIRED   1 ITERATIONS. MFD OF  4.85163E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  39 REQUIRED   1 ITERATIONS. MFD OF  5.12302E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  40 REQUIRED   1 ITERATIONS. MFD OF  5.26725E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  41 REQUIRED   1 ITERATIONS. MFD OF  5.26849E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  42 REQUIRED   1 ITERATIONS. MFD OF  5.26756E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  43 REQUIRED   1 ITERATIONS. MFD OF  5.24637E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  44 REQUIRED   1 ITERATIONS. MFD OF  5.21745E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  45 REQUIRED   1 ITERATIONS. MFD OF  5.17820E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  46 REQUIRED   1 ITERATIONS. MFD OF  5.13310E-05 OCCURRED IN INT.  10  COARSE MESH=  1
 GRP.  47 REQUIRED   1 ITERATIONS. MFD OF  5.10040E-05 OCCURRED IN INT.  10  COARSE MESH=  1
 GRP.  48 REQUIRED   1 ITERATIONS. MFD OF  5.04999E-05 OCCURRED IN INT.  10  COARSE MESH=  1
 GRP.  49 REQUIRED   1 ITERATIONS. MFD OF  5.00254E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  50 REQUIRED   1 ITERATIONS. MFD OF  4.32082E-05 OCCURRED IN INT.  10  COARSE MESH=  1
 GRP.  51 REQUIRED   1 ITERATIONS. MFD OF  4.27279E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  52 REQUIRED   1 ITERATIONS. MFD OF  4.20304E-05 OCCURRED IN INT.   9  COARSE MESH=  1
1                                                                    XSDRNPM   VERS. 1.0A 90/01/02. 02.02.09. PAGE   13
0 GRP.  53 REQUIRED   1 ITERATIONS. MFD OF  4.10147E-05 OCCURRED IN INT.   9  COARSE MESH=  1
  GRP.  54 REQUIRED   1 ITERATIONS. MFD OF  4.01856E-05 OCCURRED IN INT.   9  COARSE MESH=  1
  GRP.  55 REQUIRED   1 ITERATIONS. MFD OF  3.91968E-05 OCCURRED IN INT.   9  COARSE MESH=  1
  GRP.  56 REQUIRED   1 ITERATIONS. MFD OF  3.77981E-05 OCCURRED IN INT.   9  COARSE MESH=  1
  GRP.  57 REQUIRED   1 ITERATIONS. MFD OF  3.64348E-05 OCCURRED IN INT.   9  COARSE MESH=  1
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 GRP.  59 REQUIRED   1 ITERATIONS. MFD OF  3.40159E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  60 REQUIRED   1 ITERATIONS. MFD OF  3.24322E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  61 REQUIRED   1 ITERATIONS. MFD OF  3.10425E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  62 REQUIRED   1 ITERATIONS. MFD OF  2.94934E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  63 REQUIRED   1 ITERATIONS. MFD OF  2.82850E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  64 REQUIRED   1 ITERATIONS. MFD OF  2.71857E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  65 REQUIRED   1 ITERATIONS. MFD OF  2.56397E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  66 REQUIRED   1 ITERATIONS. MFD OF  2.39483E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  67 REQUIRED   1 ITERATIONS. MFD OF  2.31668E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  68 REQUIRED   1 ITERATIONS. MFD OF  2.17636E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  69 REQUIRED   1 ITERATIONS. MFD OF  2.07892E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  70 REQUIRED   1 ITERATIONS. MFD OF  1.98112E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  71 REQUIRED   1 ITERATIONS. MFD OF  1.94565E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  72 REQUIRED   1 ITERATIONS. MFD OF  1.89728E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  73 REQUIRED   1 ITERATIONS. MFD OF  1.72750E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  74 REQUIRED   1 ITERATIONS. MFD OF  1.67691E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  75 REQUIRED   1 ITERATIONS. MFD OF  1.48712E-05 OCCURRED IN INT.   9  COARSE MESH=  2
 GRP.  76 REQUIRED   1 ITERATIONS. MFD OF  1.42955E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  77 REQUIRED   1 ITERATIONS. MFD OF  1.36244E-05 OCCURRED IN INT.   9  COARSE MESH=  2
 GRP.  78 REQUIRED   1 ITERATIONS. MFD OF  1.35466E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  79 REQUIRED   1 ITERATIONS. MFD OF  1.28119E-05 OCCURRED IN INT.  11  COARSE MESH=  2
 GRP.  80 REQUIRED   1 ITERATIONS. MFD OF  1.41137E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  81 REQUIRED   1 ITERATIONS. MFD OF  1.33363E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  82 REQUIRED   1 ITERATIONS. MFD OF  1.12031E-05 OCCURRED IN INT.   9  COARSE MESH=  2
 GRP.  83 REQUIRED   1 ITERATIONS. MFD OF  1.34092E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  84 REQUIRED   1 ITERATIONS. MFD OF  1.22936E-05 OCCURRED IN INT.   9  COARSE MESH=  2
 GRP.  85 REQUIRED   1 ITERATIONS. MFD OF  1.31791E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  86 REQUIRED   1 ITERATIONS. MFD OF  1.31158E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  87 REQUIRED   1 ITERATIONS. MFD OF  1.30410E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  88 REQUIRED   1 ITERATIONS. MFD OF  1.26124E-05 OCCURRED IN INT.  11  COARSE MESH=  2
 GRP.  89 REQUIRED   1 ITERATIONS. MFD OF  1.30331E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  90 REQUIRED   1 ITERATIONS. MFD OF  1.26605E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  91 REQUIRED   1 ITERATIONS. MFD OF  1.08467E-05 OCCURRED IN INT.   8  COARSE MESH=  2
 GRP.  92 REQUIRED   1 ITERATIONS. MFD OF  1.27114E-05 OCCURRED IN INT.   2  COARSE MESH=  1
 GRP.  93 REQUIRED   1 ITERATIONS. MFD OF  1.28422E-05 OCCURRED IN INT.   1  COARSE MESH=  1
 GRP.  94 REQUIRED   4 ITERATIONS. MFD OF  4.37054E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  95 REQUIRED   3 ITERATIONS. MFD OF  2.58358E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  96 REQUIRED   3 ITERATIONS. MFD OF  4.30259E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  97 REQUIRED   1 ITERATIONS. MFD OF  1.12094E-05 OCCURRED IN INT.   8  COARSE MESH=  1
 GRP.  98 REQUIRED   3 ITERATIONS. MFD OF  4.39079E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  99 REQUIRED   3 ITERATIONS. MFD OF  3.92178E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP. 100 REQUIRED   3 ITERATIONS. MFD OF  3.69047E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP. 101 REQUIRED   1 ITERATIONS. MFD OF  1.67100E-05 OCCURRED IN INT.   1  COARSE MESH=  1
 GRP. 102 REQUIRED   1 ITERATIONS. MFD OF  1.60365E-05 OCCURRED IN INT.   1  COARSE MESH=  1
 GRP. 103 REQUIRED   1 ITERATIONS. MFD OF  2.05707E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP. 104 REQUIRED   1 ITERATIONS. MFD OF  2.29799E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP. 105 REQUIRED   3 ITERATIONS. MFD OF  6.05862E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP. 106 REQUIRED   1 ITERATIONS. MFD OF  1.49489E-05 OCCURRED IN INT.   8  COARSE MESH=  1
 GRP. 107 REQUIRED   3 ITERATIONS. MFD OF  5.59520E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP. 109 REQUIRED   3 ITERATIONS. MFD OF  3.77842E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP. 109 REQUIRED   4 ITERATIONS. MFD OF  4.13447E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP. 110 REQUIRED   3 ITERATIONS. MFD OF  5.13178E-05 OCCURRED IN INT.  11  COARSE MESH=  1
1                                                                    XSDRNPM   VERS. 1.0A 90/01/02. 02.02.08. PAGE   14
0 GRP. 111 REQUIRED   3 ITERATIONS. MFD OF  7.08772E-05 OCCURRED IN INT.  11  COARSE MESH=  1
  GRP. 112 REQUIRED   3 ITERATIONS. MFD OF  8.38673E-05 OCCURRED IN INT.  11  COARSE MESH=  1
  GRP. 113 REQUIRED   4 ITERATIONS. MFD OF  2.13314E-05 OCCURRED IN INT.  11  COARSE MESH=  1
  GRP. 114 REQUIRED   4 ITERATIONS. MFD OF  2.47336E-05 OCCURRED IN INT.  11  COARSE MESH=  1
  GRP. 115 REQUIRED   4 ITERATIONS. MFD OF  2.18913E-05 OCCURRED IN INT.  11  COARSE MESH=  1
  GRP. 116 REQUIRED   3 ITERATIONS. MFD OF  9.14963E-05 OCCURRED IN INT.  11  COARSE MESH=  1
  GRP. 117 REQUIRED   3 ITERATIONS. MFD OF  9.81611E-05 OCCURRED IN INT.  11  COARSE MESH=  1
  GRP. 118 REQUIRED   3 ITERATIONS. MFD OF  9.19180E-05 OCCURRED IN INT.  11  COARSE MESH=  1
  GRP. 119 REQUIRED   3 ITERATIONS. MFD OF  8.48304E-05 OCCURRED IN INT.  11  COARSE MESH=  2
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GRP. 121 REQUIRED 4 ITERATIONS. MFD OF 4.66540E-05 OCCURRED IN INT. 10 COARSE MESH= 3
GRP. 122 REQUIRED 3 ITERATIONS. MFD OF 3.93031E-05 OCCURRED IN INT. 11 COARSE MESH= 2
GRP. 123 REQUIRED 4 ITERATIONS. MFD OF 6.31202E-06 OCCURRED IN INT. 11 COARSE MESH= 3
6 3236 1.0000000E+00 1.0000041E+00 1.1388703E+00 1.0000249E+00 1.0000365E+00 .0203
FINAL MINITOR LAMBDA 1.1373898E+00 ANGULAR FLUX ON 16
TIME OF DAY 02.02.02.

1 XSDRNPM VERS. 1.0A 90/01/02. 02.02.08. PAGE 15

0(E2SNTRI) Ex 15X15 PWR, 2.5% U235, 400 PPM NAT.BORON

0 INT.	ZONE NU	DER	RADIUS	INT. MIDPOINT	AREA	VOLUME	PROD DENSITY
1	1		0	4.44500E-02	0	2.48297E-02	3.52918E-02
2	1		8.89000E-02	1.33350E-01	5.59575E-01	7.44860E-02	1.36303E-01
3	1		1.77800E-01	2.22250E-01	1.11765E+00	1.24143E-01	2.20180E-01
4	1		2.66700E-01	3.11150E-01	1.67573E+00	1.73801E-01	3.20973E-01
5	1		3.55600E-01	4.00050E-01	2.23430E+00	2.23458E-01	4.24642E-01
6	2		4.44500E-01	4.65150E-01	2.79288E+00	1.20704E-01	0
7	2		4.85800E-01	5.06450E-01	3.05227E+00	1.31422E-01	0
8	3		5.27100E-01	5.61763E-01	3.31187E+00	2.44693E-01	0
9	3		5.96425E-01	6.31089E-01	3.74745E+00	2.74890E-01	0
10	3		6.65750E-01	7.00413E-01	4.18303E+00	3.05087E-01	0
11	3		7.35075E-01	7.69738E-01	4.61861E+00	3.35284E-01	0
12			8.04400E-01		5.05419E+00		

TIME OF DAY 02.03.02.
TIME OF DAY 02.03.03.

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0TRANSPORT CROSS SECTION WEIGHTING FUNCTION

0 ZONE	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	6.56095E-06	1.80722E-05	4.54822E-05	1.02041E-04	2.08826E-04	3.84735E-04	6.47793E-04	1.09319E-03
2	1.27228E-06	2.93456E-05	5.04175E-05	1.12956E-04	2.30506E-04	4.29664E-04	7.42963E-04	1.20492E-03
3	2.59997E-06	7.27240E-06	1.80217E-05	4.07210E-05	8.23312E-05	1.54768E-04	2.66515E-04	4.32773E-04
4	4.28958E-06	1.22832E-05	3.04108E-05	6.81884E-05	1.39135E-04	2.58855E-04	4.48091E-04	7.27147E-04

0 ZONE	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	1.63099E-03	2.25150E-03	3.01667E-03	3.96094E-03	4.73889E-03	5.34091E-03	6.32002E-03	7.72445E-03
2	1.82848E-03	2.57979E-03	3.50389E-03	4.57499E-03	5.57902E-03	6.48987E-03	7.61480E-03	9.11028E-03
3	6.59463E-04	9.38786E-04	1.27921E-03	1.67283E-03	2.05875E-03	2.41122E-03	2.84342E-03	3.39081E-03
4	1.10111E-03	1.54716E-03	2.09179E-03	2.77146E-03	3.31275E-03	3.80796E-03	4.49540E-03	5.42414E-03

0 ZONE	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24
1	8.75215E-03	9.37099E-03	9.76380E-03	9.18493E-03	8.65596E-03	8.54149E-03	9.15983E-03	9.73706E-03
2	1.02825E-02	1.10653E-02	1.16772E-02	1.12752E-02	1.07816E-02	1.17563E-02	1.14052E-02	1.20189E-02
3	3.84726E-03	4.16089E-03	4.45839E-03	4.35023E-03	4.19978E-03	4.57226E-03	4.47965E-03	4.72714E-03
4	6.14040E-03	6.60814E-03	6.97264E-03	6.67129E-03	6.37681E-03	6.98081E-03	6.76742E-03	7.15781E-03

0 ZONE	GRP. 25	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32
1	8.68583E-03	9.37924E-03	7.33617E-03	7.44366E-03	9.98941E-03	1.06351E-02	9.43913E-03	8.54772E-03
2	1.08902E-02	1.16110E-02	9.39053E-03	9.69145E-03	1.23794E-02	1.31227E-02	1.18036E-02	1.06130E-02
3	4.23916E-03	4.60465E-03	3.77769E-03	3.89227E-03	4.91193E-03	5.24759E-03	4.63039E-03	4.27240E-03
4	6.47309E-03	6.93157E-03	5.35584E-03	5.75700E-03	7.38852E-03	7.87562E-03	6.89065E-03	6.36434E-03

0 ZONE	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40
1	7.71919E-03	6.69538E-03	4.06323E-03	3.46857E-03	6.02342E-03	7.31184E-03	6.50672E-03	4.41464E-03
2	9.52212E-03	8.22290E-03	4.99759E-03	4.13578E-03	7.21016E-03	8.93790E-03	6.80320E-03	5.21776E-03
3	3.83475E-03	3.32583E-03	2.10668E-03	1.72443E-03	2.85591E-03	3.54851E-03	2.76615E-03	2.12301E-03
4	5.72639E-03	4.96209E-03	3.06267E-03	2.55547E-03	4.36354E-03	5.37475E-03	4.13423E-03	3.20610E-03

0 ZONE	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45	GRP. 46	GRP. 47	GRP. 48
1	3.77319E-03	3.30637E-03	2.40657E-03	2.57072E-03	2.29333E-03	2.05203E-03	1.68418E-03	1.68204E-03
2	4.35369E-03	3.74047E-03	3.21642E-03	2.77236E-03	2.40509E-03	2.04330E-03	1.69553E-03	1.63360E-03
3	1.77089E-03	1.52303E-03	1.31203E-03	1.13272E-03	9.83986E-04	8.21958E-04	7.77523E-04	6.69791E-04
4	2.70264E-03	2.34260E-03	2.03512E-03	1.77518E-03	1.56005E-03	1.34904E-03	1.25411E-03	1.09842E-03

0 ZONE	GRP. 49	GRP. 50	GRP. 51	GRP. 52	GRP. 53	GRP. 54	GRP. 55	GRP. 56
1	1.48410E-03	3.09209E-03	2.49530E-03	1.98492E-03	1.85081E-03	1.21273E-03	9.92486E-04	8.74673E-04
2	1.38417E-03	2.69198E-03	1.97944E-03	1.36004E-03	8.06579E-04	4.47992E-04	1.87170E-04	4.77960E-05
3	5.70954E-04	1.11468E-03	9.29548E-04	5.77019E-04	3.42578E-04	2.16709E-04	1.06050E-04	8.86462E-06
4	9.50645E-04	1.91412E-03	1.48081E-03	1.10404E-03	7.69062E-04	5.49530E-04	3.86785E-04	2.78069E-04

0 ZONE	GRP. 57	GRP. 58	GRP. 59	GRP. 60	GRP. 61	GRP. 62	GRP. 63	GRP. 64
1	9.52483E-04	1.06032E-03	1.08172E-03	1.14024E-03	1.15217E-03	1.19328E-03	1.14160E-03	1.16092E-03

3	5.78777E-05	1.01193E-04	1.46907E-04	2.03267E-04	2.66236E-04	3.32635E-04	3.94042E-04	4.27504E-04
4	3.46765E-04	4.22321E-04	4.85161E-04	5.30275E-04	5.57297E-04	5.73320E-04	5.86508E-04	5.56476E-04
0 ZONE	GRP. 65	GRP. 66	GRP. 67	GRP. 68	GRP. 69	GRP. 70	GRP. 71	GRP. 72
1	1.23780E-03	1.26738E-03	1.12960E-03	1.38171E-03	1.25834E-03	1.40776E-03	1.38244E-03	1.40617E-03
2	6.94752E-04	7.43997E-04	5.77281E-04	9.29667E-04	9.04078E-04	1.16976E-03	9.41820E-04	9.94385E-04
3	2.66423E-04	2.85274E-04	2.35290E-04	3.58136E-04	3.52311E-04	5.23061E-04	3.68063E-04	3.92790E-04
4	6.16159E-04	6.42057E-04	5.50784E-04	7.41573E-04	7.27937E-04	8.77415E-04	7.48981E-04	7.76644E-04
0 ZONE	GRP. 73	GRP. 74	GRP. 75	GRP. 76	GRP. 77	GRP. 78	GRP. 79	GRP. 80
1	1.51670E-03	1.66356E-03	2.59299E-03	7.81510E-04	3.52136E-03	8.18014E-04	2.92125E-03	1.07384E-03

2	1.76945E-03	1.72782E-03	2.87269E-03	8.29547E-05	4.29209E-03	1.20689E-04	3.32641E-03	5.48981E-04
3	9.09412E-04	5.04869E-04	1.12742E-03	6.60688E-05	1.64793E-03	6.60319E-05	1.27950E-03	2.43766E-04
4	1.20213E-03	9.60746E-04	1.79140E-03	2.86624E-04	2.54566E-03	5.13842E-04	2.03468E-03	5.05072E-04
0 ZONE	GRP. 81	GRP. 82	GRP. 83	GRP. 84	GRP. 85	GRP. 86	GRP. 87	GRP. 88
1	2.02125E-03	5.05892E-03	1.07092E-03	5.63363E-03	9.94071E-04	1.73716E-03	2.09344E-03	6.66550E-03
2	1.97992E-03	7.08514E-03	8.16215E-04	7.69823E-03	2.84213E-04	1.60599E-03	2.13696E-03	9.29419E-03
3	7.70462E-04	2.70965E-03	2.44561E-04	2.93599E-03	1.74039E-04	6.44834E-04	8.41101E-04	3.85422E-03
4	1.30545E-03	3.96966E-03	5.67794E-04	4.35039E-03	4.07866E-04	1.09358E-03	1.78427E-03	5.20768E-03
0 ZONE	GRP. 89	GRP. 90	GRP. 91	GRP. 92	GRP. 93	GRP. 94	GRP. 95	GRP. 96
1	3.72003E-03	1.31794E-03	1.18823E-03	6.58453E-04	9.89209E-04	2.40065E-04	2.53276E-04	2.98571E-04
2	4.55592E-03	1.04379E-03	8.92037E-04	5.64472E-04	6.15055E-04	6.81140E-05	5.45179E-05	2.76912E-04
3	1.78790E-03	4.78065E-04	3.94182E-04	2.59722E-04	2.68653E-04	1.13698E-05	3.06712E-05	1.15749E-04
4	2.72120E-03	8.07167E-04	6.93361E-04	5.10878E-04	5.21324E-04	9.39538E-05	1.01544E-04	2.21.9E-04
0 ZONE	GRP. 97	GRP. 98	GRP. 99	GRP.100	GRP.101	GRP.102	GRP.103	GRP.104
1	4.17449E-04	7.09423E-04	9.72264E-04	7.20647E-04	7.70226E-04	9.57358E-04	1.09561E-03	1.42206E-03
2	2.38769E-04	5.67235E-04	8.48170E-04	5.77481E-04	6.49410E-04	7.38605E-04	9.36657E-04	1.29735E-03
3	9.98724E-05	2.29983E-04	3.37307E-04	2.27740E-04	2.54121E-04	2.87362E-04	3.75174E-04	4.99156E-04
4	2.13097E-04	4.14216E-04	5.62041E-04	4.21622E-04	4.60804E-04	5.47943E-04	6.67283E-04	8.30210E-04
0 ZONE	GRP.105	GRP.106	GRP.107	GRP.108	GRP.109	GRP.110	GRP.111	GRP.112
1	2.13405E-03	1.84022E-03	2.37466E-03	2.87391E-03	1.54729E-03	1.98524E-03	2.67074E-03	3.79905E-03
2	2.18725E-03	2.09408E-03	2.74420E-03	3.26942E-03	1.74967E-03	2.22597E-03	3.08205E-03	4.45657E-03
3	8.48504E-04	8.08151E-04	1.04873E-03	1.26007E-03	6.78727E-04	8.70947E-04	1.21463E-03	1.76136E-03
4	1.40709E-03	1.28279E-03	1.66389E-03	2.00036E-03	1.07559E-03	1.36938E-03	1.89087E-03	2.71579E-03
0 ZONE	GRP.113	GRP.114	GRP.115	GRP.116	GRP.117	GRP.118	GRP.119	GRP.120
1	5.82998E-03	9.25[illegible]E-03	6.76343E-03	8.67895E-03	1.10869E-02	1.76283E-02	1.62106E-02	1.85035E-02
2	6.94592E-03	1.12591E-02	8.40855E-03	1.09325E-02	1.41896E-02	1.77044E-02	2.13962E-02	2.46647E-02
3	2.77793E-03	4.54053E-03	3.39884E-03	4.40611E-03	5.68[illegible]E-03	7.07243E-03	8.51012E-03	9.71250E-03
4	4.32683E-03	6.81159E-03	5.04787E-03	6.52029E-03	8.30963E-03	1.05[illegible]E-02	1.24593E-02	1.41907E-02
0 ZONE	GRP.121	GRP.122	GRP.123	GRP.124				
1	9.34929E-03	9.76029E-02	7.22667E-02	4.72475E-01				
2	1.28512E-02	1.22806E-02	1.04184E-02	5.52269E-01				
3	4.99565E-03	4.70630E-03	3.90404E-03	2.17507E-01				
4	7.29935E-03	6.88362E-03	5.72658E-03	3.26882E-01				

TIME OF DAY 02.02.07.

O[illegible]BNXB11 EXXON 15X15 PWR, 2.51 U235, [illegible] PPM NAT.BORON
OCEL. AVERAGED FLUXES

0 ZONE	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	2.32948E-04	6.85612E-04	1.61489E-03	3.61264E-03	7.45017E-03	1.32843E-02	2.33416E-02	3.77120E-02
2	2.25203E-04	6.34037E-04	1.56144E-03	3.49270E-03	7.20947E-03	1.28289E-02	2.25562E-02	3.64373E-02
3	2.20471E-04	6.20781E-04	1.52853E-03	3.41917E-03	7.05915E-03	1.25455E-02	2.20670E-02	3.56426E-02
4	2.24868E-04	6.33061E-04	1.55898E-03	3.48736E-03	7.19811E-03	1.28063E-02	2.25169E-02	3.63730E-02
0 ZONE	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	5.84479E-02	7.14832E-02	9.40690E-02	1.22281E-01	1.38217E-01	1.42461E-01	1.71388E-01	2.27833E-01
2	5.35143E-02	6.87304E-02	9.03211E-02	1.17386E-01	1.32213E-01	1.35457E-01	1.63114E-01	2.18127E-01
3	5.22995E-02	6.69868E-02	8.79365E-02	1.14258E-01	1.28321E-01	1.30843E-01	1.57659E-01	2.11641E-01
4	5.34116E-02	6.85760E-02	9.01048E-02	1.17096E-01	1.31826E-01	1.34963E-01	1.62528E-01	2.17389E-01
0 ZONE	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24
1	2.66056E-01	2.84754E-01	2.97169E-01	2.63918E-01	2.39769E-01	2.71617E-01	2.59615E-01	2.83879E-01
2	2.55298E-01	2.73275E-01	2.85480E-01	2.52732E-01	2.28982E-01	2.59904E-01	2.48331E-01	2.72034E-01
3	2.47896E-01	2.65188E-01	2.76738E-01	2.44072E-01	2.20557E-01	2.50714E-01	2.39207E-01	2.62370E-01

0 ZONE	GRP. 25	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32
1	2.51220E-01	2.78793E-01	2.13470E-01	2.17290E-01	2.84155E-01	3.04092E-01	2.70883E-01	2.54904E-01
2	2.40491E-01	2.67576E-01	2.04318E-01	2.07656E-01	2.71712E-01	2.90909E-01	2.59741E-01	2.44663E-01
3	2.31492E-01	2.58086E-01	1.96284E-01	1.99385E-01	2.61282E-01	2.79630E-01	2.49807E-01	2.35498E-01
4	2.38631E-01	2.65586E-01	2.02528E-01	2.05878E-01	2.69560E-01	2.88499E-01	2.57475E-01	2.42560E-01
0 ZONE	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40
1	2.38055E-01	2.16300E-01	1.60631E-01	1.47119E-01	1.98166E-01	2.22749E-01	1.90383E-01	1.68270E-01
2	2.28890E-01	2.08451E-01	1.56267E-01	1.43472E-01	1.90962E-01	2.13751E-01	1.83979E-01	1.63519E-01
3	2.20666E-01	2.01295E-01	1.51670E-01	1.39760E-01	1.84896E-01	2.05999E-01	1.77967E-01	1.58992E-01
4	2.26998E-01	2.08764E-01	1.54976E-01	1.42463E-01	1.89694E-01	2.12073E-01	1.82504E-01	1.62386E-01
0 ZONE	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45	GRP. 46	GRP. 47	GRP. 48
1	1.56287E-01	1.46860E-01	1.38726E-01	1.32162E-01	1.26699E-01	1.22198E-01	1.14918E-01	1.09635E-01
2	1.52798E-01	1.43603E-01	1.36011E-01	1.29907E-01	1.24824E-01	1.20616E-01	1.13547E-01	1.08517E-01
3	1.48655E-01	1.40404E-01	1.33275E-01	1.27564E-01	1.22806E-01	1.18979E-01	1.11950E-01	1.07159E-01
4	1.51469E-01	1.42772E-01	1.35279E-01	1.29259E-01	1.24245E-01	1.20165E-01	1.13054E-01	1.08093E-01
0 ZONE	GRP. 49	GRP. 50	GRP. 51	GRP. 52	GRP. 53	GRP. 54	GRP. 55	GRP. 56
1	1.04804E-01	2.43763E-01	2.24416E-01	2.07481E-01	1.93423E-01	1.82042E-01	1.74073E-01	1.67570E-01
2	1.03949E-01	2.42290E-01	2.23768E-01	2.07434E-01	1.93871E-01	1.82962E-01	1.75221E-01	1.68837E-01
3	1.02803E-01	2.40193E-01	2.22151E-01	2.06744E-01	1.93294E-01	1.82582E-01	1.75062E-01	1.68965E-01
4	1.03536E-01	2.41556E-01	2.23043E-01	2.06626E-01	1.93405E-01	1.82466E-01	1.74780E-01	1.68520E-01
0 ZONE	GRP. 57	GRP. 58	GRP. 59	GRP. 60	GRP. 61	GRP. 62	GRP. 63	GRP. 64
1	1.62830E-01	1.58636E-01	1.55147E-01	1.52351E-01	1.50637E-01	1.49101E-01	1.48520E-01	1.47826E-01
2	1.64105E-01	1.60323E-01	1.56844E-01	1.54137E-01	1.52456E-01	1.51000E-01	1.50297E-01	1.49642E-01
3	1.64470E-01	1.60514E-01	1.57138E-01	1.54556E-01	1.52840E-01	1.51420E-01	1.50696E-01	1.50012E-01
4	1.63955E-01	1.59917E-01	1.56493E-01	1.53831E-01	1.52120E-01	1.50688E-01	1.49982E-01	1.49305E-01
0 ZONE	GRP. 65	GRP. 66	GRP. 67	GRP. 68	GRP. 69	GRP. 70	GRP. 71	GRP. 72
1	1.48611E-01	1.45524E-01	1.45269E-01	1.43034E-01	1.42189E-01	1.39804E-01	1.40147E-01	1.39194E-01
2	1.49599E-01	1.47604E-01	1.47033E-01	1.45116E-01	1.44376E-01	1.41931E-01	1.42369E-01	1.41425E-01
3	1.49067E-01	1.48073E-01	1.47409E-01	1.45954E-01	1.45019E-01	1.43129E-01	1.43000E-01	1.42138E-01
4	1.48148E-01	1.47237E-01	1.46709E-01	1.44993E-01	1.44077E-01	1.41971E-01	1.42051E-01	1.41151E-01

0 ZONE	GRP. 73	GRP. 74	GRP. 75	GRP. 76	GRP. 77	GRP. 78	GRP. 79	GRP. 80
1	1.33912E-01	1.35742E-01	1.27019E-01	1.28556E-01	1.18007E-01	1.25835E-01	1.21325E-01	1.31933E-01
2	1.35908E-01	1.38585E-01	1.32990E-01	1.39783E-01	1.27422E-01	1.37161E-01	1.27642E-01	1.33669E-01
3	1.38466E-01	1.39435E-01	1.35264E-01	1.39574E-01	1.30789E-01	1.36758E-01	1.30140E-01	1.32868E-01
4	1.36758E-01	1.38202E-01	1.32464E-01	1.39289E-01	1.26468E-01	1.36643E-01	1.27129E-01	1.33252E-01
0 ZONE	GRP. 81	GRP. 82	GRP. 83	GRP. 84	GRP. 85	GRP. 86	GRP. 87	GRP. 88
1	1.35585E-01	9.01951E-02	1.31999E-01	9.20772E-02	1.24025E-01	1.19852E-01	1.15328E-01	8.08081E-02
2	1.29009E-01	1.13084E-01	1.32479E-01	1.08083E-01	1.25539E-01	1.21608E-01	1.18818E-01	9.60821E-02
3	1.30563E-01	1.18744E-01	1.31272E-01	1.14330E-01	1.25373E-01	1.22781E-01	1.20441E-01	1.03880E-01
4	1.28855E-01	1.10261E-01	1.31643E-01	1.07905E-01	1.24995E-01	1.21440E-01	1.18682E-01	9.59679E-02
0 ZONE	GRP. 89	GRP. 90	GRP. 91	GRP. 92	GRP. 93	GRP. 94	GRP. 95	GRP. 96
1	9.79181E-02	1.10087E-01	1.10005E-01	1.10476E-01	1.09667E-01	9.59553E-02	4.17070E-02	4.11294E-02
2	1.04355E-01	1.12289E-01	1.11959E-01	1.12022E-01	1.11235E-01	4.08577E-02	4.20938E-02	4.17453E-02
3	1.08098E-01	1.12757E-01	1.12024E-01	1.12147E-01	1.11468E-01	4.06417E-02	4.20722E-02	4.19146E-02
4	1.04494E-01	1.11884E-01	1.11571E-01	1.11622E-01	1.10689E-01	4.06513E-02	4.19406E-02	4.16538E-02
0 ZONE	GRP. 97	GRP. 98	GRP. 99	GRP.100	GRP.101	GRP.102	GRP.103	GRP.104
1	5.18200E-02	6.08450E-02	5.61004E-02	6.14726E-02	6.10450E-02	8.43444E-02	8.17431E-02	9.85194E-02
2	5.25361E-02	6.19689E-02	5.74918E-02	6.26024E-02	6.22565E-02	8.58456E-02	8.34579E-02	1.00780E-01
3	5.25943E-02	6.23741E-02	5.82058E-02	6.30461E-02	6.27730E-02	8.64218E-02	8.42876E-02	1.01916E-01
4	5.20507E-02	6.	5.74743E-02	6.25106E-02	6.21813E-02	8.57157E-02	8.34078E-02	1.00738E-01
0 ZONE	GRP.105		.107	GRP.108	GRP.109	GRP.110	GRP.111	GRP.112
1	1.18549E-01	7	.202E-02	1.12700E-01	5.95415E-02	7.44246E-02	9.64541E-02	1.29783E-01
2	1.21965E-01		.09377E-02	1.17394E-01	6.20668E-02	7.76044E-02	1.00807E-01	1.35992E-01
3	1.24028E-01		+.36390E-02	1.20684E-01	6.38250E-02	7.99171E-02	1.04062E-01	1.40732E-01
4	1.22099E-01		+.12829E-02	1.17838E-01	6.22990E-02	7.79531E-02	1.01335E-01	1.36801E-01
0 ZONE	GRP.113	G.	GRP.115	GRP.116	GRP.117	GRP.118	GRP.119	GRP.120
1	1.83147E-01	2.61954E-01	1.72726E-01	2.06191E-01	2.39491E-01	2.66096E-01	2.78224E-01	2.63371E-01
2	1.92679E-01	2.77096E-01	1.83872E-01	2.20571E-01	2.57992E-01	2.88963E-01	3.05557E-01	2.94642E-01
3	2.00301E-01	2.89870E-01	1.93464E-01	2.33103E-01	2.74440E-01	3.10125E-01	3.32377E-01	3.27403E-01
4	1.94118E-01	2.79761E-01	1.85942E-01	2.23331E-01	2.61728E-01	2.94056E-01	3.12515E-01	3.03787E-01
0 ZONE	GRP.121	GRP.122	GRP.123					

2	1.09180E-01	1.06164E-01	7.17501E-02
3	1.46871E-01	1.23384E-01	8.62015E-02
4	1.34285E-01	1.11170E-01	7.57270E-02

FLUX DISADVANTAGE FACTORS (ZONE AVERAGE/CELL AVERAGE-FLUX)

ZONE	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	1.03893E+00	1.03862E+00	1.03506E+00	1.03592E+00	1.03543E+00	1.02733E+00	1.03663E+00	1.03581E+00
2	1.00149E+00	1.00154E+00	1.00158E+00	1.00153E+00	1.00158E+00	1.00177E+00	1.00175E+00	1.00177E+00
3	9.80448E-01	9.80602E-01	9.80467E-01	9.80465E-01	9.80495E-01	9.79679E-01	9.80021E-01	9.79917E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	1.03813E+00	1.04279E+00	1.04400E+00	1.04428E+00	1.04648E+00	1.05556E+00	1.05452E+00	1.04804E+00
2	1.00192E+00	1.00225E+00	1.00240E+00	1.00248E+00	1.00294E+00	1.00366E+00	1.00361E+00	1.00329E+00
3	9.79180E-01	9.76925E-01	9.75935E-01	9.75764E-01	9.77413E-01	9.69473E-01	9.70042E-01	9.72855E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24

1	1.04599E+00	1.04625E+00	1.04614E+00	1.05066E+00	1.05402E+00	1.05181E+00	1.05291E+00	1.05087E+00
2	1.00369E+00	1.00408E+00	1.00500E+00	1.00607E+00	1.00665E+00	1.00645E+00	1.00714E+00	1.00702E+00
3	9.74540E-01	9.74362E-01	9.74222E-01	9.71699E-01	9.69616E-01	9.70870E-01	9.70127E-01	9.71250E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 25	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32
1	1.05275E+00	1.04973E+00	1.05403E+00	1.05547E+00	1.05414E+00	1.05405E+00	1.05208E+00	1.05085E+00
2	1.00775E+00	1.00749E+00	1.00884E+00	1.00864E+00	1.00799E+00	1.00835E+00	1.00880E+00	1.00867E+00
3	9.70085E-01	9.71761E-01	9.69137E-01	9.68267E-01	9.69291E-01	9.69260E-01	9.70219E-01	9.70808E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40
1	1.04873E+00	1.04812E+00	1.05648E+00	1.05725E+00	1.04355E+00	1.05074E+00	1.04717E+00	1.05262E+00
2	1.00874E+00	1.00816E+00	1.00973E+00	1.00955E+00	1.00655E+00	1.00732E+00	1.00808E+00	1.00947E+00
3	9.72117E-01	9.73548E-01	9.78667E-01	9.81031E-01	9.74736E-01	9.71361E-01	9.75140E-01	9.74096E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45	GRP. 46	GRP. 47	GRP. 48
1	1.03194E+00	1.02844E+00	1.02848E+00	1.02246E+00	1.01975E+00	1.01692E+00	1.01849E+00	1.01435E+00
2	1.00626E+00	1.00582E+00	1.00561E+00	1.00502E+00	1.00416E+00	1.00376E+00	1.00436E+00	1.00401E+00
3	9.81547E-01	9.83412E-01	9.85187E-01	9.86891E-01	9.89820E-01	9.90126E-01	9.90231E-01	9.91449E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 49	GRP. 50	GRP. 51	GRP. 52	GRP. 53	GRP. 54	GRP. 55	GRP. 56
1	1.01205E+00	1.00[illegible]E+00	1.00616E+00	1.00318E+00	1.00009E+00	9.97649E-01	9.95951E-01	9.94317E-01
2	1.00379E+00	1.00243E+00	1.00125E+00	1.00294E+00	1.00241E+00	1.00211E+00	1.00253E+00	1.00203E+00
3	9.92728E-01	9.94360E-01	9.95598E-01	9.97663E-01	9.99426E-01	1.00041E+00	1.00162E+00	1.00254E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 57	GRP. 58	GRP. 59	GRP. 60	GRP. 61	GRP. 62	GRP. 63	GRP. 64
1	9.93261E-01	9.91994E-01	9.91397E-01	9.90381E-01	9.90256E-01	9.89654E-01	9.90253E-01	9.90096E-01
2	1.00210E+00	1.00204E+00	1.00224E+00	1.00199E+00	1.00221E+00	1.00225E+00	1.00210E+00	1.00226E+00
3	1.00314E+00	1.00373E+00	1.00412E+00	1.00471E+00	1.00477E+00	1.00505E+00	1.00476E+00	1.00481E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 65	GRP. 66	GRP. 67	GRP. 68	GRP. 69	GRP. 70	GRP. 71	GRP. 72
1	9.88963E-01	9.88366E-01	9.90183E-01	9.86858E-01	9.86894E-01	9.84742E-01	9.86597E-01	9.86136E-01
2	1.00237E+00	1.00280E+00	1.00221E+00	1.00229E+00	1.00221E+00	9.99717E-01	1.00224E+00	1.00195E+00
3	1.00539E+00	1.00568E+00	1.00477E+00	1.00689E+00	1.00653E+00	1.00823E+00	1.00689E+00	1.00700E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 73	GRP. 74	GRP. 75	GRP. 76	GRP. 77	GRP. 78	GRP. 79	GRP. 80
1	9.79190E-01	9.82201E-01	9.58893E-01	9.94733E-01	9.33099E-01	9.94109E-01	9.54426E-01	9.90100E-01
2	9.93785E-01	1.00277E+00	1.00396E+00	1.00354E+00	1.00755E+00	1.00381E+00	1.00324E+00	1.00313E+00
3	1.01249E+00	1.00892E+00	1.02114E+00	1.00205E+00	1.03416E+00	1.00233E+00	1.02368E+00	1.00462E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 81	GRP. 82	GRP. 83	GRP. 84	GRP. 85	GRP. 86	GRP. 87	GRP. 88
1	9.74647E-01	8.45379E-01	1.00270E+00	8.67973E-01	9.92321E-01	9.78524E-01	9.71830E-01	8.42910E-01
2	1.00143E+00	1.02580E+00	1.00635E+00	1.01008E+00	1.00459E+00	1.00204E+00	1.00115E+00	1.00223E+00
3	1.01326E+00	1.07713E+00	9.97175E-01	1.06846E+00	1.00311E+00	1.01105E+00	1.01483E+00	1.08358E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

ZONE	GRP. 89	GRP. 90	GRP. 91	GRP. 92	GRP. 93	GRP. 94	GRP. 95	GRP. 96

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    2 9.98672E-01 1.00263E+00 1.00348E+00 1.00358E+00 1.00312E+00 1.00505E+00 1.00265E+00 1.00220E+00
    3 1.03449E+00 1.00780E+00 1.00675E+00 1.00471E+00 1.00522E+00 9.99765E-01 1.00219E+00 1.00628E+00
    4 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00
1                                                                  XSDRNPM  VER3. 1.0A 90/01/02.  02.02. PAGE  21
0 ZONE   GRP. 97      GRP. 98      GRP. 99      GRP.100      GRP.101      GRP.102      GRP.103      GRP.104
    1 9.89864E-01 9.83641E-01 9.76094E-01 9.83395E-01 9.81726E-01 9.84001E-01 9.80510E-01 9.77976E-01
    2 1.00354E+00 1.00181E+00 1.00030E+00 1.00147E+00 1.00121E+00 1.00152E+00 1.00059E+00 1.00041E+00
    3 1.00465E+00 1.00836E+00 1.01273E+00 1.00857E+00 1.00952E+00 1.00823E+00 1.01030E+00 1.01170E+00
    4 1.00000E+00 1.00090E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00
0 ZONE   GRP.105      GRP.106      GRP.107      GRP.108      GRP.109      GRP.110      GRP.111      GRP.112
    1 9.70924E-01 9.58476E-01 9.53303E-01 9.56400E-01 9.55738E-01 9.50725E-01 9.51823E-01 9.48702E-01
    2 9.98896E-01 9.97027E-01 9.96218E-01 9.96235E-01 9.96273E-01 9.95527E-01 9.94790E-01 9.94008E-01
    3 1.01590E+00 1.02287E+00 1.02581E+00 1.02415E+00 1.02453E+00 1.02519E+00 1.02691E+00 1.02874E+00
    4 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00
0 ZONE   GRP.113      GRP.114      GRP.115      GRP.116      GRP.117      GRP.118      GRP.119      GRP.120
    1 9.47469E-01 9.36747E-01 9.28926E-01 9.23251E-01 9.15037E-01 9.04916E-01 8.90274E-01 8.66959E-01
    2 9.92589E-01 9.90472E-01 9.88869E-01 9.87642E-01 9.85726E-01 9.82679E-01 9.77736E-01 9.69895E-01
    3 1.03185E+00 1.03617E+00 1.04045E+00 1.04376E+00 1.04857E+00 1.05485E+00 1.06756E+00 1.07774E+00
    4 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00 1.00000E+00
0 ZONE   GRP.121      GRP.122      GRP.123
    1 8.80285E-01 8.12469E-01 7.62849E-01
    2 9.61980E-01 9.54973E-01 9.47484E-01
    3 1.09573E+00 1.10957E+00 1.13872E+00
    4 1.00003E+00 1.00000E 00 1.00000E+00
0ZONE       VALUE       VOL  FRACTION

    1   6.20717E+01     7.0835E-01
    2   2.45212E+01     1.34029E-01
    3   1.18994E+00     5.70620E-01
    4   2.07228E+00     1.00000E+00
 TIME OF DAY 02.02.02
++EOR--
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                    NN         NN   IIIIIIIIIIII        TT         AA        AA    MM          MM  111111111111
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          99      00     00 //            00     00       11   //            00     00     22
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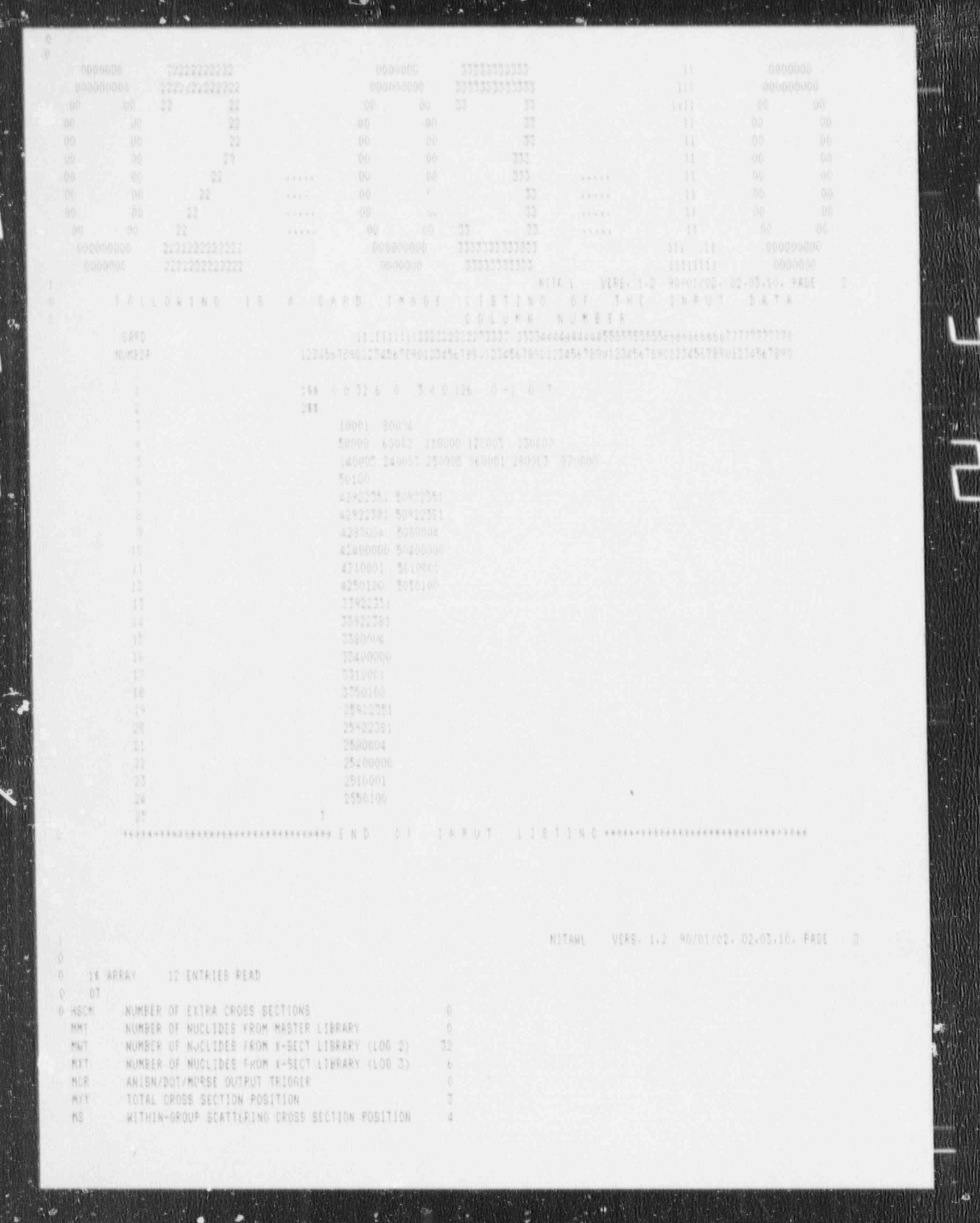

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  ITM     TABLE LENGTH FOR CROSS SECTIONS                    125
  IFA     IS AN OLD ANISN LIBRARY MOUNTED ? (0=1 NO/YES)       0
  IPP     OUTPUT OPTION TRIGGER                               -1
  IPG     PRINT CONTROL - ANISN OUTPUT                         0
0THE STORAGE ALLOCATED FOR THIS CASE IS  33000 WORDS
0    2N ARRAY    38 ENTRIES READ
0    DT
0 GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
   TAPE IDENTIFICATION NUMBER                  162
   NUMBER OF NUCLIDES ON TAPE                    6
   NUMBER OF NEUTRON ENERGY GROUPS             123
   FIRST THERMAL NEUTRON ENERGY GROUP           92
   NUMBER OF GAMMA ENERGY GROUPS                 0
-  WORK TAPE    165
0 THIS XSDRN WORKING TAPE WAS CREATED 90/01/02
 THE TITLE OF THE PARENT CASE IS AS FOLLOWS
 THIS XSDRN WORKING TAPE WAS CREATED 90/01/02
 THE TITLE OF THE PARENT CASE IS AS FOLLOWS
 XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED-- [ZEBRA#1] FIXION 15G/S PWR, 3.2% U235
-  WTD. TAPE    162
0 XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED - [ZEBRA#1] FIXION 15G/S PWR, 3.2% U235
 ,----PPM NAT.BORON
  207
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0 NUCLIDES FROM  WORK TAPE
    1    HYDROGEN--THERMOS ID=1003(X=640) THERMAL TEMPERATURE= 294.6 K          1001
    2    OXYGEN                           THERMAL TEMPERATURE= 294.6 K          8000
    3    URANIUM-235                      THERMAL TEMPERATURE = 294.6 K      92922351
    4    URANIUM-235                      THERMAL TEMPERATURE = 294.6 K      92922351
    5    URANIUM-238                      THERMAL TEMPERATURE = 294.6 K      92922381
    6    URANIUM-238R                     THERMAL TEMPERATURE = 294.6 K      92922381
    7    HYDROGEN--THERMOS ID=1003(X=640) THERMAL TEMPERATURE= 294.6 K          1001
    8    HYDROGEN--THERMOS ID=1003(X=640) THERMAL TEMPERATURE= 294.6 K          1001
    9    BORON     NATURAL                                                     5000
   10    BORON-10                                                              5010
   11    BORON-10                                                              5010
1                                                                  NITAWL    VERS: 1.2  90/01/02. 02:03:10  PAGE    6
0   12    BORON-10                                                              5010
   13    CARBON    NATURAL    BROWN - ST. JOHN KERNEL TEMP. = 889.26 K          6000
   14    OXYGEN                           THERMAL TEMPERATURE= 294.6 K          8000
   15    OXYGEN                           THERMAL TEMPERATURE= 294.6 K          8000
   16    SODIUM    NATURAL    BROWN - ST. JOHN KERNEL TEMP. = 293.6 K         11000
   17    MAGNESIUM                        THERMAL TEMP = 300.0 K             12000
   18    ALUMINUM  NATURAL    BROWN - ST. JOHN KERNEL TEMP. = 627.12 K        13000
   19    SILICON                          THERMAL TEMP = 900.0 K             14000
   20    CHROMIUM      THERMAL TEMP=294.6                                     24000
   21    MANGANESE                        THERMAL TEMP = 900.0 K             25000
   22    IRON          THERMAL TEMP=294.6                                     26000
   23    NICKEL        THERMAL TEMP=294.6                                     28000
   24    ZIRCONIUM NATURAL    BROWN - ST. JOHN KERNEL TEMP. = 627.12 K      92400000
   25    ZIRCONIUM NATURAL    BROWN - ST. JOHN KERNEL TEMP. = 6. .12 K      90400000
   26    LEAD      NATURAL    BROWN - ST. JOHN KERNEL TEMP. = 293.6 K         82000
   27    URANIUM-235                      THERMAL TEMPERATURE = 294.6 K      92922351
   28    URANIUM-238R                     THERMAL TEMPERATURE = 294.6 K      92922381
   29    HYDROGEN--THERMOS ID=1003(X=640) THERMAL TEMPERATURE= 294.6 K          1001
   30    BORON-10                                                              5010
   31    OXYGEN                           THERMAL TEMPERATURE= 294.6 K          8000
   32    ZIRCONIUM NATURAL    BROWN - ST. JOHN KERNEL TEMP. = 627.12 K      92400000
0 NUCLIDES FROM  WTD. TAPE
   33    URANIUM-235                      THERMAL TEMPERATURE = 294.6 K      92922351
   34    URANIUM-238R                     THERMAL TEMPERATURE = 294.6 K      92922381
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   34     BORON-10                                                                2550100
   37     OXYGEN                          THERMAL TEMPERATURE= 294.6 K            2580006
   38     ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K         25400000
 TIME OF DAY 02.03.12.
1                                                                    NITAWL   VERS. 1.2  90/01/02. 02.05.1. PROI    5
0     THIS XSDRN WORKING TAPE WAS CREATED 90/01/02
      THE TITLE OF THE PARENT CASE IS AS FOLLOWS
      XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED-- [E25NXBI] EXXON 15X15 PWR, 3.0% U235
      , 400. PPM NAT.BORON
       (0")"(-(-.


        TAPE ID                          227         NUMBER OF NUCLIDES                 38
        NUMBER OF NEUTRON GROUPS         123         NUMBER OF GAMMA GROUPS              0
        FIRST THERMAL GROUP               50


                                  TABLE OF CONTENTS


        HYDROGEN--THERMOS ID=1800(X=640) THERMAL TEMPERATURE= 294.6 K              ID    100001
        OXYGEN                           THERMAL TEMPERATURE= 294.6 K              ID    800006
        URANIUM-235                      THERMAL TEMPERATURE = 294.6 K             ID  92922351
        URANIUM-235                      THERMAL TEMPERATURE = 294.6 K             ID  92922351
        URANIUM-238                      THERMAL TEMPERATURE = 294.6 K             ID  92922381
        URANIUM-238                      THERMAL TEMPERATURE = 294.6 K             ID  92922381
        HYDROGEN--THERMOS ID=1800(X=640) THERMAL TEMPERATURE= 294.6 K              ID    100001
        HYDROGEN--THERMOS ID=1800(X=640) THERMAL TEMPERATURE= 294.6 K              ID    100001
        BORON     NATURAL                                                          ID    500000
        BORON-10                                                                   ID    500100
        BORON-10                                                                   ID    500100
        BORON-10                                                                   ID    500100
        CARBON    NATURAL      BROWN - ST. JOHN KERNEL TEMP. = 589.26 K            ID    600002
        OXYGEN                           THERMAL TEMPERATURE= 294.6 K              ID    800004
        OXYGEN                           THERMAL TEMPERATURE= 294.6 K              ID    800004
        SODIUM    NATURAL      BROWN - ST. JOHN KERNEL TEMP. = 592.6 K             ID    110000
        MAGNESIUM                              THERMAL TEMP =  900.0 K             ID    120005
        ALUMINUM  NATURAL      BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID    130000
        SILICON                                THERMAL TEMP =  900.0 K             ID    140005
        CHROMIUM       THERMAL TEMP=294.6                                          ID    240002
        MANGANESE                              THERMAL TEMP =  900.0 K             ID    250005
        IRON           THERMAL TEMP=294.6                                          ID    260001
        NICKEL         THERMAL TEMP=294.6                                          ID    280002
        ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID  42400009
        ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID  50400000
        LEAD       NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 592.6 K             ID    820000
        URANIUM-235                      THERMAL TEMPERATURE = 294.6 K             ID  92922351
        URANIUM-238                      THERMAL TEMPERATURE = 294.6 K             ID  92922381
        HYDROGEN--THERMOS ID=1800(X=640) THERMAL TEMPERATURE= 294.6 K              ID    100001
        BORON-10                                                                   ID    500100
        OXYGEN                           THERMAL TEMPERATURE= 294.6 K              ID    800004
        ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID  40400000
        URANIUM-235                      THERMAL TEMPERATURE = 294.6 K             ID  92922351
        URANIUM-238                      THERMAL TEMPERATURE = 294.6 K             ID  92922381
        HYDROGEN--THERMOS ID=1800(X=640) THERMAL TEMPERATURE= 294.6 K              ID    100001
        BORON-10                                                                   ID    500100
        OXYGEN                           THERMAL TEMPERATURE= 294.6 K              ID    800004
        ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K            ID  40400000
 --EOR--
 1 MBLE    POWER COMPUTING/990 - NOS 2.7.1.10.     NOS 2.7.1 BT=MAC.    90/01/02. 02.05.42.

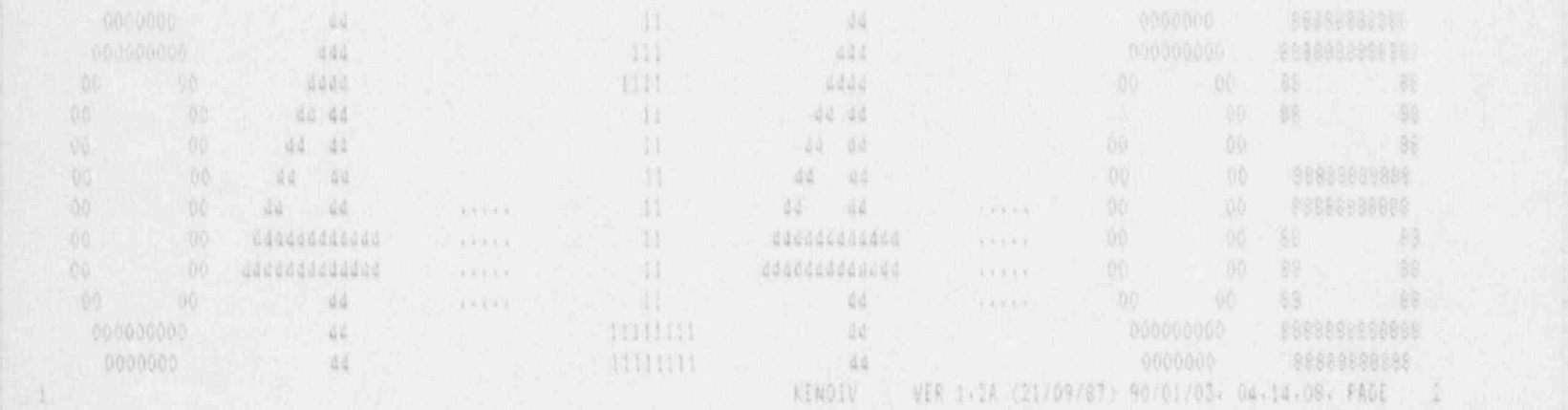

  01.44.00.E25NXBI,P0,T200. HENRY TRAN
```

```
01.44.00.ABSC,  0.
01.44.00.- YOUR PASSWORD EXPIRES AT 00.00.00 ON 90702/08.
01.44.00.CHARGE,N97330J,UBC.
01.44.01. CHARGE = N97330J, PROJECT = UBC
01.44.01.I2I220.
01.44.02.PROC:. SYSTEM PROLOGUE
01.44.02.COMMENT. SYSTEM PROLOG
01.44.02.NEW,(A).
01.44.03.CHECK:P.
01.44.04. INQUIRY COMPLETE.
01.44.04.REVERT.
01.44.04.TITLE(IE2BNXB1) EXXON 15X15 FNR, 2.5% U235, 900 PPM NAT.BORON)
01.44.04.ATTACHP(NITAWL,1,2)
01.44.06.    STOP
01.44.06.    035200 MAXIMUM EXECUTION FL.
01.44.06.      0.201 CP SECONDS EXECUTION TIME.
01.44.06.ATTACHP(RIM123,1,04)
01.44.07.    STOP
01.44.07.    035200 MAXIMUM EXECUTION FL.
01.44.07.      0.042 CP SECONDS EXECUTION TIME.
01.44.07.REWIND,TAPE1.
01.44.07.LABEL,TAPEA,D=0L,L=EXSECT,VSN=007421.
02.01.44.NT105, ASSIGNED TO TAPEA, VSN=007421.
02.01.46.COPYBF,TAPEA,TAPE2.
02.01.50. COPY...  1 FILES        1 RECS     108409 WORDS
02.01.50.REWIND,TAPE2.
02.01.50.RETURN,TAPEA.
02.01.50.NITAWL,PL=777777.
02.01.54.    END  MNITAWL
02.02.04.    225600 MAXIMUM EXECUTION FL.
02.02.04.      4.209 CP SECONDS EXECUTION TIME.
02.02.04.RETURN,TAPE2.
02.02.04.REWIND,TAPE4.
02.02.06.COPYBF,TAPE4,TAPE2.
02.02.09. EOI...  0 FILES        0 RECS     344402 WORDS
02.02.09.REWIND,TAPE4.
02.02.15.ATTACHP,XSDRNPM,1,04.
02.02.17.    STOP
02.02.17.    035200 MAXIMUM EXECUTION FL.
02.02.17.      0.827 CP SECONDS EXECUTION TIME.
02.02.17.XSDRNPM(PL=777777)
02.03.07.     END  XSDRNPM
02.03.07.    245000 MAXIMUM EXECUTION FL.
02.03.07.    108.476 CP SECONDS EXECUTION TIME.
02.03.07. RETRIEVED NORMAL TERMINATION.
02.03.07. JOB RETRIEVED.
02.03.07. RPV - PREVIOUS ERROR CONDITIONS RECOV
02.03.07.REWIND,TAPE2,TAPE3.
02.03.07.RETURN,TAPE4.
02.03.07.ATTACHP,NITAWL,1,2.
02.03.09.    STOP
02.03.09.    035200 MAXIMUM EXECUTION FL.
02.03.09.      0.280 CP SECONDS EXECUTION TIME.
02.03.09.NITAWL(PL=777777)
02.03.14.     END  MNITAWL
02.03.14.    224600 MAXIMUM EXECUTION FL.
02.03.14.      3.101 CP SECONDS EXECUTION TIME.
02.03.14.REWIND,TAPE4.
02.03.14.RETURN,TAPE2,TAPE3.
02.03.14.LABEL,TAPEA,W,D=0L,L=EXSECT,VSN=007421.
02.05.35.NT105, ASSIGNED TO TAPEA, VSN=007421.
02.05.36.COPYBF,TAPE4,TAPEA.
```

```
02.05.36.MT 105, VSNW007421, BLK=000035-WFE.
02.05.41. EDI    4 FILES        1 RECD     347447 WORDS
02.05.41.UEPF,      0.208KUNE.
02.05.41.UEMT,      5.181KUNS.
02.05.41.UEMS,     170.698KUNE.
02.05.41.UECP,     117.648SECS.
02.05.41. BRU,     254.341UNTS.
02.05.41.$OUT(*/OP=E)
02.05.42. NO FILES PROCESSED.
02.05.42.$DAYFILE(OUTPUT,JT=D)
02.05.42.JABO,    133P 50B8 FN=OUTPUT.
02.05.42.POWER COMPUTING/990 - NOS 2.7.1.18
02.05.42.DATE:          90/01/02.
02.05.42.JSN:           MBLE
END OF FILE
??
```

```
XEDIT 3.1.06
=>
[25K1B] MEMO MASSEY JOHN  0C1 90/01/03, 04.04.05, MID = MAC = NB2
[E25K1B1] EXXON 15X15 PWR, 2.5%U235, 300 PPM NAT.BORON
--EOF--                                  1077
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/03, 04.14.08, PAGE    1
0
0
                                KK        KK   EEEEEEEEEEEEE   NN         NN    0000000000
                                KK      KK     EEEEEEEEEEEEE   NNN        NN   00000000000000
                                KK    KK       EE              NNNN       NN  00          00
                                KK  KK         EE              NN NN      NN  00          00
                                KK KK          EE              NN  NN     NN  00          00
                                KKKKKKK        EEEEEEEEE       NN   NN    NN  00          00
                                KKKKKKK        EEEEEEEEE       NN    NN   NN  00          00
                                KK  KK         EE              NN     NN  NN  00          00
                                KK   KK        EE              NN      NN NN  00          00
                                KK    KK       EE              NN       NNNN  00          00
                                KK     KK      EEEEEEEEEEEEE   NN        NNN   00000000000000
                                KK      KK     EEEEEEEEEEEEE   NN         NN    0000000000
0
0
0
```

```
0
0
0
```



```
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/03, 04.14.08, PAGE    2
0
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/03, 04.14.08, PAGE    3
0       F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                    C O L U M N   N U M B E R
        CARD                    1111111111222222222233333333334444444444555555555566666666667777777778
        NUMBER         12345678901234567890123456789012345678901234567890123456789012345678901234567890
                                                                                1077
          1            [E25K1B1] EXXON 15X15 PWR, 2.5%U235, 300 PPM NAT.BORON
          2            99.0  73   300  3    123  75   18   5    22   6
          3            1     1    1    1    -10  1    0    2000 00   1
          4            0     0    0    0    0    00   0    0
```

```
                    1 -2592255I     1.7744-4
                    1  2592230I     6.8230-3
                    1  2580004      3.3060-2
                    1  25400000     4.7125-3
                    1  2510001      3.8075-2
                    1  2550100      6.7160-6
                    2  10001   6.671-2     2  80004   5.336-2     2  50100   1.177-5
                    2  60002   2.6100-4    3  250005  1.0900-3
                    3  260001  8.2800-2    3  140005  1.9000-4
                    4  820000  2.2960-2
                    5  10001   2.7700-2    5  50000   1.4600-3    5  80004   3.7100-2
                    5  110000  2.6900-4    5  125005  2.0800-4    5  130000  8.8700-3
                    5  140005  7.6700-4    5  260001  6.8900-5
                    BOX TYPE  1
                    GENERAL           1 6*0.0    .22*0.5
                    GENERAL           2 6*0.0    .22*0.5
                    GENERAL           3 6*0.0    .22*0.5
                    GENERAL           4 6*0.0    .22*0.5
                    GENERAL           5 6*0.0    .22*0.5
                    CUBOID  0   106.0451 -0.0001 106.0451 -0.0001  50.0001 -0.0001 125*0.5
                       2 GENERALIZED GEOMETRIES OF THE 1:4 TRANSFER CASE.
                    X ZONE BDRY    0.0000,  106.0450
                    Y ZONE BDRY    0.0000,  106.0450
                    Z ZONE BDRY    0.0000,   50.0000
                    ZONE     1    1    1
                    X BLCK BDRY    0.0000,   22.568,   45.726,  106.0450
                    Y BLCK BDRY    0.0000,  106.045
                    Z BLCK BDRY    0.0000,   50.000
                    BLOCK    1    1    1
                    MEDIA          3,   5,   7,   4,   3,   2,   7,   2,   2,   2,
                       2,   2,   2,   1,   3,   2,   5,   2,   1,   2,   1,   2,
                       2,   2,   2,   2,   1,   2,   2, 1000
                    SURFACES       1,   2,   3,   4,   5,   6,   7,   8,   9,  10,
                      11,  12,  13,  14,  15,  16,  17,  18,  19,  20,  21,  22,
                      23,  24,  25
                    SECTOR -1  1  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
                    SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
```


THE FOLLOWING IS A CARD IMAGE LISTING OF THE INPUT DATA


```
CARD      1111111111222222222233333333334444444444555555555566666666667777777778
NUMBER    12345678901234567890123456789012345678901234567890123456789012345678901234567890

                      0  0  0
                    SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      0  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  1
                      0  0 -1
                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  0  0  0  1
                     -1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
```

```
                    VERIFY    VER 1.2A (2/09/87) 05/01/03. 04.14.06. PAGE    5
FOLLOWING IS A CARD IMAGE LISTING OF THE INPUT DATA
                                COLUMN NUMBER
CARD          1111111111222222222333333333A 444444455555555566666666677777777778
NUMBER    12345678901234567890123456789012345678901234567890123456789012345678890

    2,   2,   3,   1,   3,   2,   3,   1,   2,   1,   1,   2,
    3, 1000
 SURFACES      1,   2,   3,   4,   5,   6,   7,   8,  14,  15,
   16,  17,  18,  19,  20,  21,  26,  27,  28,  29,  35
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1
 SECTOR  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  1  0  0 -1 -1
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  1 -1  0
```

```
                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1
                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  1 -1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  1  0  0 -1  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0  0  0  0
                    SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    BLOCK     2    1    1
                    MEDIA          2,   5,   3,   4,   3,   1,   3,   2,   2,   3,
                       2,   1,   2,   3,   2,   3,   3,   2, 1000
                    SURFACES       1,   2,   3,   4,   5,   6,   7,   8,  18,  19,
                       20,  21,  30,  31,  32,  33,  34,  36
                    SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0
                    SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  1
                    SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1
                    SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  1  0  0 -1  1
                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  1  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  1
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1
                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1
1                                                  FENGIV    VER 1.2A (21/09/87) 90/01/03. 04.:8.08. PAGE  1
0     F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                  C O L U M N   N U M B E R
CARD                    1111111111222222222233333333344444444455555555556666666667777777779
NUMBER          12345678901234567890123456789012345678901234567890123456789012345678901234567890

                    SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
                      36 QUADRIC SURFACES IN THE SYSTEM
                         1.0Y$0          1.0X$0   +11245.642     $
                         1.0Y$0          1.0Y$0   +10712.295     $
                         1.0Y$0          1.0Z$0   +8713.2890     $
                         1.0Y$0          1.0X$0   +9595.1461     $
                         1.0Y$0          1.0X$0   +6814.5025     $
                         1.0Y$0          1.0X$0   +6401.4001     $
                         1.0Y$0          1.0X$0   +6199.9876     $
                         1.0Y$0          1.0X$0   +5903.6172     $
                         1.0Y       -70.1040     $
                         1.0Y       -69.5960     $
                         1.0Y       -68.8975     $
                         1.0Y       -47.9425     $
                         1.0Y       -47.2440     $
                         1.0Y       -45.2280     $
                         1.0Y       -45.5295     $
                         1.0Y       -24.5745     $
                         1.0Y       -23.8760     $
                         1.0Y       -22.8600     $
                         1.0Y       -22.1615     $
                         1.0Y        -1.2065     $
```

```
      127                              1.0X       +0.5060     $
      178                              1.0X       -1.20c5     $
      179                              1.0X       +22.1615    $
      180                              1.0X       -22.8600    $
      181                              1.0X       -23.8760    $
      182                              1.0X       +24.57c5    $
      183                              1.0X       +25.5295    $
      184                              1.0X       +46.2280    $
      185                              1.0X       +67.2440    $
      186                              1.0X       +47.9425    $
      187                              1.0X       +68.8975    $
      188                              1.0X       +69.8960    $
      189                              1.0X       +70.1000    $
      190                              1.0Y       +46.7760    $
      191                              1.0Y       +23.5490    $
      192                        END CASE
      193                        END XEND
0          ********************************** E N D   O F   I N P U T   L I S T I N G **********************************
```

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1                                                                KENO IV     VER 1.0A (2/09/87) 90/01/03. 04.16.15. PAGE    7
DIED8K(B2) IXION 15X15 PWR, 2.53U235, 000 PPM NAT.BORON
 NUMBER OF GENERATIONS                 75          START TYPE                              1
 NUMBER PER GENERATION                300          GENERATIONS BETWEEN CHECKPOINTS         0
 NUMBER OF GENERATIONS TO BE SKIPPED    2          LIST INPUT X-SECTIONS READ FROM TAPE   NO
 NUMBER OF ENERGY GROUPS              123          LIST 1-D MIXTURE X SECTIONS            NO
 MAX. NUMBER OF ENERGY TRANSFERS       75          LIST 2-D MIXTURE X-SECTIONS            NO
 NUMBER OF INPUT NUCLIDES              10          LIST FIGS. AND APS. BY REGION          NO
 NUMBER OF MIXTURES                     5          USE X-SECTIONS FROM PREVIOUS CASE      NO
 NUMBER OF MIXING TABLE ENTRIES        22          USE GEOMETRY FROM PREVIOUS CASE        NO
 NUMBER OF GEOMETRY CARDS               6          USE VELOCITIES FROM PREVIOUS CASE      NO
 NUMBER OF BOX TYPES                    1          COMPUTE MATRIX A-EFFECTIVE BY UNIT     NO
 NUMBER OF UNITS IN X DIRECTION         1          COMPUTE MATRIX X-EFFECTIVE BY FOR TYPE  NO
 NUMBER OF UNITS IN Y DIRECTION         1          LIST FIGS FROM MATRIX BY UNIT          NO
 NUMBER OF UNITS IN Z DIRECTION         3          ADJOINT CALCULATION                    NO
 NUMBER OF NUCLIDES READ FROM TAPE    -10          USE EXPONENTIAL TRANSFORM              NO
 ALBEDO TYPE                            1          CALCULATE FLUX                        YES
 SEARCH TYPE                            0          CALCULATE FISSION DENSITIES           YES
0THIS PROBLEM WILL BE RUN WITH SPECULARLY REFLECTING BOUNDARY CONDITION
0THE ALBEDOS ARE +X = 0.          -X = 1.00000E+00 +Y = 0.          -Y = 1.00000E+00 +Z = 1.00000E+00 -Z = 1.00000E+00
0MAXIMUM TIME =  99.0000 MINUTES
0STORAGE LOCATIONS REQUIRED FOR THIS JOB =     36505
 REMAINING AVAILABLE LOCATIONS=     85595
0REQUIRED LCM STORAGE LOCATIONS   32580 (00101454B)
 REMAINING LCM AVAILABLE          66420 (00201744B)
1                                                                KENO IV     VER 1.0A (2/09/87) 90/01/03. 04.16.08. PAGE    2
DIED8K(B2) IXION 15X15 PWR, 2.53U235, 000 PPM NAT.BORON
0    MIXTURE  NUCLIDE   DENSITY
         1 +25922351   1.77460E-04
         1  25922381   6.83300E-03
         1   2580004   3.30600E-02
         1  25400000   4.71250E-07
         1   2510001   3.90730E-02
         1   2550100   6.71600E-06
         2     10001   6.67100E-02
         2     80004   3.33600E-02
         2     50100   1.17700E-05
         3     60002   2.61000E-04
         3    250005   1.09000E-03
```

```
          3    140005   1.90000E-04
          4    820000   3.29600E-02
          5     10001   2.77000E-02
          5     50000   1.46000E-03
          5     80004   3.71000E-02
          5    110000   2.60000E-04
          5    120005   2.08000E-04
          5    130000   8.97000E-03
          5    140005   7.67000E-04
          5    260001   4.89060E-05
0

0CROSS SECTIONS READ FROM TAPE

 NUCLIDE =      10001    HYDROGEN--THERMOS ID=1003(1-+40) THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =      80004    OXYGEN                           THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =      50000    BORON      NATURAL
 NUCLIDE =      50100    BORON-10
 NUCLIDE =      60002    CARBON     NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 589.26 K
 NUCLIDE =     110000    SODIUM     NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K
 NUCLIDE =     120005    MAGNESIUM                              THERMAL TEMP =  900.0 K
 NUCLIDE =     130000    ALUMINUM   NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K
 NUCLIDE =     140005    SILICON                                THERMAL TEMP =  900.0 K
 NUCLIDE =     250005    MANGANESE                              THERMAL TEMP =  900.0 K
 NUCLIDE =     260001    IRON          THERMAL TEMP=294.6
 NUCLIDE =     820000    LEAD       NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 297.4 K
 NUCLIDE =   92922351    URANIUM-235                       THERMAL TEMPERATURE = 294.6 K
 NUCLIDE =   92922381    URANIUM-238R                      THERMAL TEMPERATURE = 294.6 K
 NUCLIDE =    2510001    HYDROGEN--THERMOS ID=1003(1-+40) THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =    2550100    BORON-10
 NUCLIDE =    2580004    OXYGEN                            THERMAL TEMPERATURE =  294.6 K
 NUCLIDE =   25400000    ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K
1                                                                KENO IV     VER 1.2A (21/09/87) 90/01/03. 04.14.08. PAGE    9
0[C25x1B1] EXXON 15X15 PWR, 2.5%U235, 1000 PPM NAT.BORON
0GEOMETRY DESCRIPTION
0REGION
0
0BOX TYPE  1
0REGION
0  1  GENERAL     1      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  2  GENERAL     2      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  3  GENERAL     3      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  4  GENERAL     4      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  5  GENERAL     5      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  6  CUBOID      0      +X = 1.0605E+02  -X =-1.0000E-04  +Y = 1.0605E+02  -Y =-1.0000E-04  +Z = 5.0000E+01  -Z =-1.0000E-04
1                                                                KENO IV     VER 1.2A (21/09/87) 90/01/03. 04.14.08. PAGE   10
0[C25x1B1] EXXON 15X15 PWR, 2.5%U235, 1000 PPM NAT.BORON
0WEIGHTING FUNCTION
0BOX TYPE  1                                  GROUP   WTLOW    WT AVG    WT HI
0       REGION   1 DEFINED BY GEOMETRY CARD   1
                                               1      .167      .500     1.500
                                              GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   2 DEFINED BY GEOMETRY CARD   2
                                               1      .167      .500     1.500
                                              GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   3 DEFINED BY GEOMETRY CARD   3
                                               1      .167      .500     1.500
                                              GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   4 DEFINED BY GEOMETRY CARD   4
                                               1      .167      .500     1.500
                                              GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   5 DEFINED BY GEOMETRY CARD   5
```

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                                        GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   6 DEFINED BY GEOMETRY CARD   4
                                           1      .167      .500     1.500
                                        GROUPS 2 TO  123 SAME AS ABOVE
1                                                                 KENDIV    VER 1.2A (21/09/87) 90/01/03. 04.14.02. PAGE   11
0    2    RALIZE  GEOMET
0    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .
 DEAR IT
    WITH THE DEEPEST REGRET I MUST INFORM YOU THAT A DREADFUL MISFORTUNE HAS OCCURRED.
 YOU HAVE FAILED TO MENTION YOUR SEX AND MARITAL STATUS.
                                                    RESPECTFULLY YOURS,
                                                    GEOM
 X ZONE BDRY  0.          ,    .10605E+03
 Y ZONE BDRY  0.          ,    .10605E+03
 Z ZONE BDRY  0.          ,    .50000E+02
0ZONE     3    1    1
 X BLCK BDRY -0.          ,   -.233+0E+02,   -.6673E+02,   -.10603E+03
 Y BLCK BDRY  0.          ,    .10603E+03
 Z BLCK BDRY  0.          ,    .50000E+02
0BLOCK    13    1    1
 MEDIA          3,   5,   3,   4,   3,   2,   3,   2,   3,   2,
     2,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
     3,   2,   2,   2,   1,   2,   3, 1000
 SURFACES       1,   2,   3,   4,   5,   6,   7,   8,   9,  10,
    11,  12,  13,  14,  15,  16,  17,  18,  19,  20,  21,  22,
    23,  24,  25
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1
 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0BLOCK     2    1    1
 MEDIA          3,   5,   3,   4,   3,   2,   3,   2,   3,   2,
     2,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
1                                                                 KENDIV    VER 1.2A (21/09/87) 90/01/03. 04.14.08. PAGE   12
0    3, 1000
 SURFACES       1,   2,   3,   4,   5,   6,   7,   8,  14,  15,
```

```
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  1
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  1  0  0 -1
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  1  0  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1  0  0  0  1 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0 -1  1
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1
 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 BALOCK    3    1    1
 MEDIA          2,   3,   2,   4,   3,   2,   1,   4,   1,   1,
    2,   1,   2,   3,   2,   3,   3,   2, 1000
 SURFACES       1,   2,   3,   4,   5,   6,   7,   8,  10,  12,
   20,  21,  30,  31,  32,  33,  34,  36
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  1
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1
 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0   36 QUADRIC SURFACES IN THE SYSTEM
    .10000E+01Y$0      .10000E+01X$0     -.11246E+05    $
    .10000E+01Y$0      .10000E+01X$0     -.10713E+05    $
    .10000E+01Y$0      .10000E+01X$0     -.87133E+04    $
    .10000E+01Y$0      .10000E+01X$0     -.85951E+04    $
1                                                        KENO1V     VER 3.2A (21/09/87) 90/01/02. 04.14.08. PAGE   13
0   .10000E+01Y$0      .10000E+01X$0     -.68145E+04    $
    .10000E+01Y$0      .10000E+01X$0     -.64016E+04    $
    .10000E+01Y$0      .10000E+01X$0     -.62000E+04    $
    .10000E+01Y$0      .10000E+01X$0     -.59036E+04    $
    .10000E+01Y       -.70104E+02    $
    .10000E+01Y       -.69596E+02    $
    .10000E+01Y       -.68898E+02    $
    .10000E+01Y       -.47943E+02    $
```

```
 .10000E+01Y      -.46228E+02    $
 .10000E+01Y      -.45530E+02    $
 .10000E+01Y      -.24575E+02    $
 .10000E+01Y      -.25876E+02    $
 .10000E+01Y      -.22860E+02    $
 .10000E+01Y      -.22142E+02    $
 .10000E+01Y      -.12065E+01    $
 .10000E+01Y      -.50800E+00    $
 .10000E+01X      -.50800E+00    $
 .10000E+01X      -.12065E+01    $
 .10000E+01X      -.22142E+02    $
 .10000E+01X      -.22860E+02    $
 .10000E+01X      -.25876E+02    $
 .10000E+01X      -.24575E+02    $
 .10000E+01X      -.45530E+02    $
 .10000E+01X      -.46228E+02    $
 .10000E+01X      -.87244E+02    $
 .10000E+01Y      -.47963E+02    $
 .10000E+01X      -.68298E+02    $
 .10000E+01X      -.69546E+02    $
 .10000E+01X      -.70164E+02    $
 .10000E+01Y      -.68756E+02    $
 .10000E+01Y      -.27368E+02    $
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/03. 04.14.08. PAGE   14
0


 ******************************************
 FINAL ALLOCATION OF MEMORY HAS BEEN COMPLETED
 ******************************************
0REQUIRED SCM FIELD LENGTH  113694 (0033B704B)
 REQUIRED LCM FIELD LENGTH   36400 (0011C844B)
 REQUIRED RMS FIELD LENGTH       0 (00000000B)
0REQUIRED SCM BLANK COMMON   68876 (0020C41CB)
 REQUIRED LCM BLANK COMMON   36400 (0011C844B)
 REQUIRED RMS BLANK COMMON       0 (00000000B)
0REMAINING SCM AVAILABLE     9276 (000224C4B)
 REMAINING LCM AVAILABLE    63100 (0019B75CB)
0 ******************************************


0LOCATION OF RELOCATABLE ARRAYS
 ARRAY        MAT      LOCATION


 FSP/MUBAR     1         SCM
 FSF/MUBAR     2         SCM
 FSF/MUBAR     3         SCM
 FSP/MUBAR     4         LCM
 FSP/MUBAR     5         LCM
 WGT                     SCM
 FMABS                   SCM
 FMFIS                   SCM
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/03. 04.14.08. PAGE   15
0[E25KIBI] EXXON 15X15 PWR, 2.58U235, 400 PPM NAT.BORON
0 VOLUMES
0 BOX TYPE    1
          REGION DEFINED BY GEOMETRY CARD     1   VOLUME =    0.          CM..3       CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD     2   VOLUME =    0.          CM..3       CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD     3   VOLUME =    0.          CM..3       CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD     4   VOLUME =    0.          CM..3       CUMULATIVE VOLUME =    0.          CM..3
```

REGION DEFINED BY GEOMETRY CARD 6 VOLUME = 4.37002E+00 CM.**3 CUMULATIVE VOLUME = 5.62281E+05 CM.**3

0 TOTAL VOLUMES

1	1.00000E+00
2	1.00000E+00
3	1.00000E+00
4	1.00000E+00
5	5.62277E+05
6	4.37002E+00

0VOLUME FRACTION OF THE CORE CONTAINING FISSILE MATERIAL= .1776E-05

0START TYPE = 1

0 THE NEUTRONS WERE STARTED IN THE ARRAY WITH A COSINE DISTRIBUTION.

THE CHOSEN START TYPE MAY NOT BE ADEQUATE. TOO MANY ATTEMPTS MAY BE NEEDED TO START THE NEUTRONS

0 500 NEUTRONS WERE INITIALLY STARTED

.01450 MINUTES WERE REQUIRED FOR STARTING

1 KENO IV VER 1.2A (21/09/87) 90/01/02. 04.14.08. PAGE 15

D(EDSYUBI) EXXON 15X15 PWR, 2.510235, 1000 PPM NAT.BORON

# GENERATION	K-EFFECTIVE	ELAPSED TIME(MIN)	AVG. K-EFF	DEVIATION	MATRIX K-EFF
1	8.44018E-01	3.25833E-01	1.00000E+00	0.	0.
				WARNING - ONLY 264 INDEPENDENT FISSION POINTS WERE GENERATED.	
2	8.38218E-01	6.26233E-01	1.00000E+00	0.	0.
3	8.81655E-01	9.24167E-01	8.81655E-01	0.	0.
4	8.83268E-01	1.23667E+00	8.82461E-01	8.06164E-04	0.
5	9.40345E-01	1.53567E+00	9.01756E-01	1.43002E-02	0.
6	9.45401E-01	1.82800E+00	9.12667E-01	1.78730E-02	0.
7	9.37411E-01	2.12000E+00	9.17616E-01	1.44108E-02	0.
8	9.47249E-01	2.41650E+00	9.13855E-01	1.24475E-02	0.
9	9.93196E-01	2.72017E+00	9.19646E-01	1.09147E-02	0.
10	9.02219E-01	3.00900E+00	9.09893E-01	9.51092E-03	0.
11	9.20616E-01	3.29117E+00	9.10818E-01	8.47680E-03	0.
12	9.25902E-01	3.58933E+00	9.17726E-01	7.99605E-03	0.
13	9.64410E-01	3.88017E+00	9.1797 2-01	8.50783E-03	0.
14	9.47329E-01	4.17017E+00	9.20064E-01	8.11941E-03	0.
15	8.89093E-01	4.47067E+00	9.25392E-01	9.16207E-03	0.
16	1.00654E+00	4.76850E+00	9.31045E-01	1.01944E-02	0.
17	8.98608E-01	5.06900E+00	9.28803E-01	9.72376E-03	0.
18	9.75350E-01	5.36933E+00	9.31787E-01	9.55704E-03	0.
19	9.29320E-01	5.66467E+00	9.31642E-01	8.97045E-03	0.
20	9.68901E-01	5.95283E+00	9.33714E-01	8.71491E-03	0.
21	9.56675E-01	6.25633E+00	9.34923E-01	8.22158E-03	0.
22	9.73269E-01	6.55117E+00	9.36840E-01	8.12325E-03	0.
23	9.29729E-01	6.84633E+00	9.36501E-01	7.74367E-03	0.
24	9.33905E-01	7.15033E+00	9.36382E-01	7.38425E-03	0.
25	9.11906E-01	7.46100E+00	9.35219E-01	7.12570E-03	0.
26	9.03724E-01	7.76117E+00	9.34003E-01	6.95759E-03	0.
27	9.31939E-01	8.06433E+00	9.33920E-01	6.67400E-03	0.
28	9.29269E-01	8.35233E+00	9.33741E-01	6.41467E-03	0.
29	9.64845E-01	8.65650E+00	9.34878E-01	6.27640E-03	0.
30	9.31543E-01	8.94917E+00	9.34759E-01	6.04926E-03	0.
31	9.52980E-01	9.25717E+00	9.35388E-01	5.87069E-03	0.
32	9.32865E-01	9.56050E+00	9.35304E-01	5.67224E-03	0.
33	9.36966E-01	9.85883E+00	9.35256E-01	5.48645E-03	0.
34	9.73791E-01	1.01505E+01	9.36543E-01	5.44359E-03	0.
35	9.73193E-01	1.04558E+01	9.37672E-01	5.39546E-03	0.
36	9.73400E-01	1.07482E+01	9.38722E-01	5.33880E-03	0.
37	9.04957E-01	1.10277E+01	9.37758E-01	5.27302E-03	0.
38	9.53810E-01	1.13167E+01	9.38204E-01	5.14382E-03	0.
39	8.72892E-01	1.15992E+01	9.36438E-01	5.30514E-03	0.
40	9.86025E-01	1.19092E+01	9.37743E-01	5.32598E-03	0.
41	9.53234E-01	1.22135E+01	9.38140E-01	5.20260E-03	0.
42	9.38959E-01	1.25102E+01	9.38161E-01	5.07110E-03	0.
43	9.63836E-01	1.28052E+01	9.38787E-01	4.98536E-03	0.
44	9.61169E-01	1.31085E+01	9.39320E-01	4.89431E-03	0.

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      46     9.67975E-01     1.37145E+01     9.38146E-01     4.61505E-03     0.
      47     9.72022E-01     1.40128E+01     9.38028E-01     4.70653E-03     0.
      48     9.10556E-01     1.43112E+01     9.37430E-01     4.64150E-03     0.
      49     9.75509E-01     1.46137E+01     9.38241E-01     4.61357E-03     0.
      50     9.84669E-01     1.49073E+01     9.39208E-01     4.61066E-03     0.
      51     9.83022E-01     1.52125E+01     9.39490E-01     4.53219E-03     0.
      52     9.86487E-01     1.55147E+01     9.39630E-01     4.44203E-03     0.
      53     9.36377E-01     1.58238E+01     9.39565E-01     4.35572E-03     0.
      54     9.20891E-01     1.61227E+01     9.39360E-01     4.27568E-03     0.
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/03. 04.14.08. PAGE   17
0     55     9.47115E-01     1.64113E+01     9.39506E-01     4.19678E-03     0.
      56     9.32128E-01     1.67167E+01     9.39184E-01     4.12088E-03     0.
      57     9.46209E-01     1.70145E+01     9.39212E-01     4.05709E-03     0.
      58     9.29797E-01     1.73267E+01     9.39142E-01     3.98760E-03     0.
      59     9.31222E-01     1.76315E+01     9.39007E-01     3.91949E-03     0.
      60     9.46139E-01     1.79368E+01     9.39126E-01     3.85328E-03     0.
      61     9.41974E-01     1.82377E+01     9.39174E-01     3.78771E-03     0.
      62     9.48727E-01     1.85342E+01     9.29234E-01     3.72745E-03     0.
      63     9.17328E-01     1.88328E+01     9.38975E-01     3.68256E-03     0.
      64     9.20214E-01     1.91402E+01     9.38735E-01     3.62145E-03     0.
      65     9.44633E-01     1.94415E+01     9.38629E-01     3.57456E-03     0.
      66     9.30460E-01     1.97335E+01     9.38648E-01     3.52070E-03     0.
      67     9.10572E-01     2.00252E+01     9.38327E-01     3.48597E-03     0.
      68     9.45085E-01     2.03250E+01     9.38722E-01     3.45656E-03     0.
      69     9.00968E-01     2.06177E+01     9.38169E-01     3.45092E-03     0.
      70     9.74241E-01     2.09175E+01     9.38699E-01     3.44093E-03     0.
      71     9.38013E-01     2.12092E+01     9.38701E-01     3.39070E-03     0.
      72     9.82097E-01     2.15128E+01     9.39321E-01     3.39891E-03     0.
      73     9.16613E-01     2.18245E+01     9.39043E-01     3.36566E-03     0.
0THE MATRIX K-EFF IS THE LARGEST EIGENVALUE OF THE MATRIX OF FISSION PROBABILITIES BY UNIT.
 THERE ARE NBIMAX , NBYMAX , NBZMAX UNITS IN AN ARRAY.
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/03. 04.14.08. PAGE   18
0[E25K1BI] EXXON 15X15 PWR, 2.5%U235,  900 PPM NAT.BORON
0LIFETIME =  3.70524E-05 + 0P -  2.80899E-07         GENERATION TIME =  2.71132E-05 + 0P -  1.86427E-07
0NO. OF INITIAL
 GENERATIONS      AVERAGE                      67 PER CENT          95 PER CENT          99 PER CENT      NUMBER OF
   SKIPPED      K-EFFECTIVE      DEVIATION    CONFIDENCE INTERVAL  CONFIDENCE INTERVAL  CONFIDENCE INTERVAL  HISTORIES
0     3          .93902   + OR -  .00531     .93451 TO  .94353     .93320 TO  .94485     .92989 TO  .94816      21000
0     4          .94064   + OR -  .00326     .93739 TO  .94390     .93613 TO  .94515     .93089 TO  .95041      20700
0     5          .94065   + OR -  .00330     .93734 TO  .94396     .93606 TO  .94525     .93076 TO  .95056      20400
0     6          .94058   + OR -  .00335     .93722 TO  .94393     .93587 TO  .94528     .93052 TO  .95063      20100
0     7          .94062   + OR -  .00340     .93722 TO  .94403     .93582 TO  .94542     .93041 TO  .95083      19800
0     8          .94135   + OR -  .00329     .93798 TO  .94473     .93460 TO  .94810     .93123 TO  .95148      19500
0     9          .94211   + OR -  .00334     .93876 TO  .94545     .93502 TO  .94879     .93208 TO  .95213      19200
0    10          .94278   + OR -  .00333     .93940 TO  .94607     .93607 TO  .94941     .93273 TO  .95274      18900
0    11          .94310   + OR -  .00337     .93972 TO  .94646     .93636 TO  .94983     .93299 TO  .95320      18600
0    12          .94321   + OR -  .00342     .93979 TO  .94664     .93627 TO  .95006     .93294 TO  .95348      18300
0    17          .94171   + OR -  .00334     .93837 TO  .94506     .93502 TO  .94840     .93166 TO  .95175      16800
0    22          .93985   + OR -  .00349     .93636 TO  .94334     .93289 TO  .94683     .92959 TO  .95032      15300
0    27          .94177   + OR -  .00372     .93805 TO  .94548     .93434 TO  .94920     .93062 TO  .95291      13800
0    32          .94171   + OR -  .00410     .93761 TO  .94581     .93351 TO  .94991     .92940 TO  .95402      12300
0    37          .94021   + OR -  .00428     .93593 TO  .94450     .93165 TO  .94878     .92737 TO  .95306      10800
0    42          .94009   + OR -  .00416     .9359  TO  .94425     .93176 TO  .94842     .92760 TO  .95258       9300
0    47          .94069   + OR -  .00435     .93634 TO  .94505     .93198 TO  .94940     .92763 TO  .95376       7800
0    52          .93751   + OR -  .00433     .93318 TO  .94184     .92885 TO  .94617     .92452 TO  .95050       6300
0    57          .93794   + OR -  .00555     .93239 TO  .94349     .92685 TO  .94904     .92130 TO  .95459       4800
0    62          .93720   + OR -  .00802     .92918 TO  .94522     .92117 TO  .95324     .91315 TO  .96126       3300
0    67          .94634   + OR -  .01341     .93293 TO  .95975     .91951 TO  .97316     .90610 TO  .98657       1800
1                                                    KENOIV    VER 1.2A (21/09/87) 90/01/03. 04.14.08. PAGE   19
0[E25K1BI] EXXON 15X15 PWR, 2.5%U235,  900 PPM NAT.BORON
0GROUP   REGION     LEAKAGE       ABSORPTIONS      FISSIONS      WITH    3 GENERATIONS SKIPPED
0  1             0.              9.02643E-06     1.33378E-05
```

0	5	0.	3.73875E-05	4.16538E-05
0	6	0.	8.81940E-05	1.06927E-04
0	7	0.	1.82669E-04	2.80095E-04
0	8	0.	3.59023E-04	5.63695E-04
0	9	0.	4.58971E-04	8.79093E-04
0	10	0.	7.17561E-04	1.21253E-03
0	11	0.	9.67630E-04	1.62403E-03
0	12	4.41773E-05	6.27250E-04	1.08882E-03
0	13	0.	1.01564E-03	1.92608E-03
0	14	0.	1.12149E-03	2.15479E-03
0	15	0.	1.65061E-03	2.86289E-03
0	16	0.	1.22763E-03	2.71726E-03
0	17	0.	1.16252E-03	3.18663E-03
0	18	0.	1.71660E-03	4.61316E-03
0	19	0.	1.97790E-03	4.92921E-03
0	20	4.28578E-06	1.97602E-03	5.09259E-03
0	21	0.	2.05290E-03	5.16280E-03
0	22	0.	1.48235E-03	4.42127E-03
0	23	0.	1.71554E-03	4.09965E-03
0	24	0.	1.38317E-03	2.96742E-03
0	25	0.	9.40345E-04	1.78624E-03
0	26	0.	6.56430E-04	8.90816E-04
0	27	0.	5.21638E-04	4.86494E-04
0	28	0.	6.06686E-04	4.29303E-04
0	29	0.	4.62410E-04	2.89499E-04

1 KENO IV VER 1.2A (21/09/87) 90/01/03. 04.18.08. PAGE 20

0[E25KIBI] EXXON 15X15 PWR, 2.58U235, ~~900~~ PPM NAT.BORON

GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0	28	0.	4.97366E-04	2.49389E-04	
0	29	0.	6.51027E-04	2.80794E-04	
0	30	0.	6.83085E-04	2.87112E-04	
0	31	0.	5.97747E-04	2.44998E-04	
0	32	0.	5.16203E-04	2.16112E-04	
0	33	0.	4.76613E-04	2.01180E-04	
0	34	0.	4.30954E-04	1.81974E-04	
0	35	4.69950E-05	3.10816E-04	1.28038E-04	
0	36	0.	2.91252E-04	1.21050E-04	
0	37	0.	2.67070E-04	1.76146E-04	
0	38	0.	4.50180E-04	2.04040E-04	
0	39	0.	3.95654E-04	1.76950E-04	
0	40	4.94501E-05	3.48221E-04	1.59558E-04	
0	41	0.	3.55771E-04	1.47254E-04	
0	42	0.	3.57796E-04	1.41465E-04	
0	43	4.71437E-05	3.51671E-04	1.33862E-04	
0	44	0.	3.85424E-04	1.29128E-04	
0	45	0.	3.70620E-04	1.30408E-04	
0	46	0.	3.70634E-04	1.25819E-04	
0	47	0.	3.61425E-04	1.15036E-04	
0	48	0.	3.83418E-04	1.21921E-04	
0	49	0.	3.64206E-04	1.14105E-04	
0	50	0.	9.17571E-04	2.82353E-04	
0	51	0.	9.24716E-04	2.69849E-04	
0	52	0.	9.24950E-04	2.64208E-04	
0	53	0.	9.50338E-04	2.68555E-04	
0	54	0.	1.02412E-03	2.84954E-04	

1 KENO IV VER 1.2A (21/09/87) 90/01/03. 04.18.08. PAGE 21

0[E25KIBI] EXXON 15X15 PWR, 2.58U235, ~~900~~ PPM NAT.BORON

GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0	55	0.	1.04248E-03	2.87438E-04	
0	56	9.27505E-05	1.07677E-03	2.98651E-04	
0	57	0.	1.13060E-03	3.10946E-04	
0	58	0.	1.22139E-03	3.24646E-04	

0 60	0.	1.35860E-03	3.72241E-04
0 61	0.	1.48959E-03	6.28842E-04
0 62	0.	1.67035E-03	4.25518E-04
0 63	0.	1.55277E-03	4.73613E-04
0 64	0.	1.51857E-03	5.42760E-04
0 65	0.	1.62081E-03	5.95642E-04
0 66	0.	1.63125E-03	6.75512E-04
0 67	0.	1.84846E-03	7.76872E-04
0 68	0.	2.16786E-03	9.06366E-04
0 69	0.	2.47052E-03	8.79072E-04
0 70	0.	3.49265E-03	1.25657E-03
0 71	0.	2.65050E-03	1.35592E-03
0 72	0.	2.78968E-03	1.30151E-03
0 73	0.	6.12820E-03	1.67977E-03
0 74	0.	5.51364E-03	2.32589E-03
0 75	0.	6.27757E-03	1.79139E-03
0 76	0.	5.39831E-03	2.07070E-03
0 77	0.	7.20169E-03	1.77623E-03
0 78	0.	8.82970E-03	2.03915E-03
0 79	0.	6.98161E-03	2.06209E-03
0 80	0.	7.47239E-03	5.21052E-03
0 81	0.	5.21566E-03	2.19624E-03

1 XENDIV VER 1.2A (21/09/87) 90/01/03. 04.16.08. PAGE 22

0[E25K1B1] EXXON 15X15 PWR, 2.51U235, ~~600~~ 672.6 PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0 82	0.		1.21621E-02	3.77234E-03	
0 83	0.		6.12936E-03	2.97761E-03	
0 84	0.		1.80527E-02	6.26040E-03	
0 85	0.		8.93502E-03	2.77319E-03	
0 86	0.		6.66678E-03	3.93054E-03	
0 87	0.		6.13518E-03	8.20446E-03	
0 88	0.		2.03049E-02	8.06816E-04	
0 89	0.		1.22879E-02	1.88980E-03	
0 90	0.		2.47042E-03	3.49778E-04	
0 91	0.		3.23524E-03	2.35694E-03	
0 92	0.		2.72916E-02	1.03056E-02	
0 93	0.		3.04542E-03	1.06072E-03	
0 94	0.		9.58740E-04	3.94055E-04	
0 95	0.		1.02312E-03	4.43564E-04	
0 96	0.		9.94461E-04	4.46334E-04	
0 97	0.		1.47016E-03	2.12884E-04	
0 98	0.		2.61205E-03	2.46855E-03	
0 99	0.		2.09403E-03	7.23630E-03	
0100	0.		2.85754E-03	2.64314E-03	
0101	0.		2.76060E-03	2.32895E-03	
0102	0.		4.01923E-03	3.40833E-03	
0103	0.		4.35344E-03	5.80641E-03	
0104	0.		6.10597E-03	8.68265E-03	
0105	0.		9.36612E-03	9.75280E-03	
0106	0.		7.88861E-03	9.00043E-03	
0107	0.		1.02092E-02	1.17020E-02	
0108	0.		1.32917E-02	1.39481E-02	

1 XENDIV VER 1.2A (21/09/87) 90/01/03. 04.16.08. PAGE 23

0[E25K1B1] EXXON 15X15 PWR, 2.51U235, ~~600~~ 672.6 PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0109	0.		7.14927E-03	7.29840E-03	
0110	0.		9.42007E-03	9.49277E-03	
0111	0.		1.33108E-02	1.34278E-02	
0112	0.		1.93671E-02	1.93451E-02	
0113	0.		3.08796E-02	3.13193E-02	
0114	0.		4.93603E-02	5.05150E-02	
0115	0.		3.62131E-02	3.72887E-02	

0117	0.	6.14359E-02	6.41267E-02
0118	0.	9.73836E-02	8.05036E-02
0119	0.	9.36502E-02	9.82933E-02
0120	0.	1.09654E-01	1.19062E-01
0121	0.	5.76925E-02	6.02009E-02
0122	0.	5.59630E-02	5.75770E-02
0123	0.	4.93179E-02	8.99791E-02
TOTAL =	3.18370E-04	1.00179E+00	9.39825E-01

ELAPSED TIME 21.02400MINUTES

1 FENDIV VER 1.2A (21/09/87) 90/01/05. 04.14.08. PAGE 24

0[(25:(81) EXXON 15X15 PWR, 2.55U235, 600 PPM NAT.BORON

0.... FISSION DENSITIES ....

REGION	FISSION DENSITY	PERCENT DEVIATION	TOTAL FISSIONS
OBJECT TYPE 1			
1	4.398E-01	.35	9.398E+01
2	0.	0.00	0.
3	0.	0.00	0.
4	0.	0.00	0.
5	0.	0.00	0.
6	0.	0.00	0.

0******** WARNING ************** WARNING **********

THE FISSION DENSITY AND FLUX WERE COMPUTED USING ARBITRARY VOLUMES (LISTED UNDER - TOTAL VOLUMES -) IN THE REGIONS DISCRIBED BY GENERALIZED GEOM. THEY MUST BE MULTIPLIED BY THE TRUE VOLUME OVER THE ARBITRARY VOLUME TO OBTAIN THE CORRECT VALUES.

1 FENDIV VER 1.2A (21/09/87) 90/01/05. 04.14.08. PAGE 25

0[(25:(81) EXXON 15X15 PWR, 2.55U235, 600 PPM NAT.BORON

0FLUXES FOR BOX TYPE 1

	REGION 1		REGION 2		REGION 3		REGION 4		REGION 5		REGION 6	
GROUP	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION	FLUX	PERCENT DEVIATION
1	8.828E-04	64.08	1.201E-04	100.00	1.184E-04	100.00	0.	0.00	0.	0.00	1.618E+00	70.42
2	1.247E-04	100.00	0.	0.00	0.	0.00	0.	0.00	0.	0.00	0.	0.00
3	2.368E-03	83.85	8.175E-04	94.11	4.650E-04	90.89	0.	0.00	0.	0.00	1.217E+00	86.41
4	5.986E-03	36.67	4.529E-04	44.28	3.087E-04	44.31	0.	0.00	0.	0.00	5.247E+00	100.00
5	9.503E-03	25.21	1.098E-03	32.61	7.844E-04	36.69	0.	0.00	0.	0.00	1.864E+00	81.60
6	1.406E-02	16.10	1.616E-03	29.68	1.164E-03	31.66	0.	0.00	0.	0.00	1.612E+00	29.72
7	1.393E-02	15.11	5.190E-03	32.34	2.388E-03	23.15	0.	0.00	0.	0.00	6.822E+00	25.96
8	5.583E-02	12.05	8.917E-03	18.20	5.169E-03	18.26	6.111E-04	100.00	3.417E+00	100.00	1.297E+07	22.93
9	9.824E-02	8.85	1.392E-02	18.69	7.613E-03	15.59	6.993E-04	68.44	0.	0.00	1.069E+07	12.02
10	1.074E-01	8.17	1.895E-02	14.31	9.563E-03	12.80	7.672E-04	80.58	9.226E-10	100.00	2.425E+07	15.55
11	1.715E-01	6.11	2.791E-02	15.47	1.132E-02	13.96	5.875E-04	61.71	0.	0.00	3.259E+07	14.07
12	1.750E-01	5.32	2.629E-02	10.72	1.380E-02	10.65	6.476E-04	100.00	0.	0.00	4.453E+07	16.18
13	2.334E-01	5.08	3.349E-02	9.59	1.830E-02	8.94	1.949E-03	71.91	0.	0.00	5.850E+07	11.84
14	2.249E-01	4.00	3.029E-02	8.91	1.746E-02	9.47	7.714E-04	71.05	4.673E-10	100.00	5.422E+07	11.13
15	2.557E-01	3.72	3.604E-02	7.62	2.204E-02	8.00	6.665E-04	100.00	0.	0.00	7.257E+07	14.65
16	3.076E-01	3.71	5.226E-02	7.61	2.689E-02	6.88	0.	0.00	5.076E-10	100.00	9.050E+07	12.23
17	4.434E-01	3.47	5.573E-02	7.48	3.224E-02	7.82	5.323E-04	71.05	3.648E-10	100.00	8.059E+07	9.57
18	4.426E-01	3.56	6.469E-02	5.77	3.409E-02	5.96	1.678E-03	100.00	1.201E-09	74.69	1.051E+06	9.19
19	4.530E-01	3.56	6.030E-02	4.72	3.927E-02	5.76	9.111E-04	70.41	1.746E-10	100.00	9.909E+07	7.72
20	4.118E-01	3.37	5.912E-02	6.33	3.336E-02	6.49	6.653E-04	96.38	5.558E-10	100.00	1.003E+06	10.22
21	3.853E-01	3.26	5.639E-02	4.67	3.225E-02	5.59	4.602E-05	100.00	0.	0.00	1.162E+06	9.85
22	4.576E-01	2.91	6.572E-02	4.96	4.194E-02	5.79	2.606E-03	71.61	7.598E-10	87.50	1.373E+06	13.20
23	4.395E-01	2.87	6.111E-02	5.60	3.887E-02	5.61	5.777E-03	67.83	2.518E-10	100.00	1.107E+06	9.23
24	4.489E-01	3.36	6.158E-02	4.72	4.174E-02	6.69	1.486E-03	93.48	1.028E-11	100.00	1.062E+06	9.12
25	4.016E-01	3.41	5.546E-02	5.92	3.639E-02	7.09	5.221E-03	45.81	5.231E-10	100.00	8.943E+07	11.61
26	4.557E-01	2.63	5.807E-02	4.55	3.841E-02	5.52	1.179E-02	100.00	2.705E-10	100.00	1.405E+06	24.11
27	3.416E-01	2.63	4.375E-02	6.69	3.157E-02	7.29	4.053E-04	100.00	4.820E-10	75.07	8.026E+07	7.93
28	3.595E-01	2.16	4.547E-02	5.50	2.975E-02	8.12	5.031E-03	43.57	1.755E-09	88.21	9.408E+07	10.60

```
                                                GROUPS 2 TO  123 SAME AS ABOVE
0       REGION  4 DEFINED BY GEOMETRY CARD  4
                                                    1      .167      .500     1.500
                                                GROUPS 2 TO  123 SAME AS ABOVE
1                                                                    KENO1V     VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE   11
0   2    RALIZE  GEOMET
0    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .
 DEAR IT
    WITH THE DEEPEST REGRET I MUST INFORM YOU THAT A DREADFUL MISFORTUNE HAS OCCURRED.
 YOU HAVE FAILED TO MENTION YOUR SEX AND MARITAL STATUS.
                                                          RESPECTFULLY YOURS,
                                                          OEOM
 X ZONE BDRY  0.          ,   .1060E+03
 Y ZONE BDRY  0.          ,   .2060E+03
 Z ZONE BDRY  0.          ,   .5600E+02
0ZONE     3    1    1
 X BLCK BDRY  0.          ,   .2736E+02,   .4673E+02,   .1060E+03
 Y BLCK BDRY  0.          ,   .1040E+03
 Z BLCK BDRY  0.          ,   .8000E+02
0BLOCK    3    3    1
 MEDIA          3,   5,   7,   4,   1,   3,   7,   2,   5,   2,
     2,   8,   5,   1,   3,   2,   3,   2,   2,   2,   1,   2,
     2,   5,   3,   4,   1,   2,   3, 1000
 SURFACES       1,   2,   3,   4,   8,   6,   7,   5,   9,  10,
    11,  12,  13,  14,  15,  16,  17,  18,  20,  21,  22,
    23,  24,  25
 SECTOR -1  1  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
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0
 SECTOR  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 -1  1
 SECTOR  1  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
0BLOCK    2    1    1
 MEDIA          3,   5,   3,   4,   3,   2,   3,   2,   3,   2,
     2,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
1                                                                    KENO1V     VER 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE   12
0   3, 1000
 SURFACES       1,   2,   3,   4,   5,   6,   7,   8,  14,  15,
```

```
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0  1
 SECTOR  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  1  0  0 -1 -1
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  0 -1
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  1  0  0 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1  0  0  0 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1  0 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0
 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0BLOCK    5    1    1
 MEDIA          1,   2,   3,   4,   5,   6,   7,   8,   9,  10,
    11,  12,  13,  14,  15,  16,  17,  18, 1000
 SURFACE        1,   2,   3,   4,   5,   6,   7,   8,  19,  17,
    20,  21,  10,  31,  32,  33,  34,  35
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0  1
 SECTOR  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  1  0  0 -1 -1
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  0 -1
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  1  0  0 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1  0  0  0 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1  0 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0
 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0   36 QUADRIC SURFACES IN THE SYSTEM
    .10000E+01Y$0      .10000E+01X$0     -.11246E+05    $
    .10000E+01Y$0      .10000E+01X$0     -.10713E+05    $
    .10000E+01Y$0      .10000E+01X$0     -.87133E+04    $
    .10000E+01Y$0      .10000E+01X$0     -.85951E+04    $
1                                                                KENO IV     V1R 1.2A (21/09/87) 90/01/02. 02.36.19. PAGE   13
0   .10000E+01Y$0      .10000E+01X$0     -.68145E+04    $
    .10000E+01Y$0      .10000E+01X$0     -.64016E+04    $
    .10000E+01Y$0      .10000E+01X$0     -.62000E+04    $
    .10000E+01Y$0      .10000E+01X$0     -.59036E+04    $
    .10000E+01Y       -.70104E+02    $
    .10000E+01Y       -.69596E+02    $
    .10000E+01Y       -.68898E+02    $
    .10000E+01Y       -.47943E+02    $
```

92	1.796E-01	2.26	4.265E-02	3.96	3.806E-02	8.60	0.	0.00	6.066E-10	50.28	5.233E-07	11.96
93	1.748E-01	2.07	4.255E-02	4.52	1.952E-02	7.08	3.251E-04	100.00	3.167E-10	61.29	3.947E-07	11.86
94	6.660E-02	3.80	4.349E-02	6.08	8.509E-03	9.53	8.959E-04	100.00	1.529E-10	58.12	1.541E-07	15.05
95	7.327E-02	3.57	1.[illegible]	5.80	6.768E-03	8.62	0.	0.00	4.648E-10	51.10	2.276E-07	25.87
96	6.405E-02	3.51	1.[illegible]	[illegible]	6.237E-03	10.95	0.	0.00	7.530E-11	74.50	3.201E-07	29.74
97	7.920E-02	2.82	1.533E-02	5.61	8.102E-03	11.48	8.566E-05	100.00	1.105E-10	70.83	2.404E-07	16.52
98	9.727E-02	3.15	1.853E-02	5.64	7.672E-03	9.55	0.	0.00	9.920E-11	67.02	1.639E-07	18.04
99	9.163E-02	3.01	1.813E-02	5.46	8.995E-03	10.94	1.225E-03	100.00	3.102E-10	60.99	2.289E-07	19.94
100	1.041E-01	2.39	2.125E-02	4.22	9.894E-03	9.10	0.	0.00	2.886E-10	90.53	2.944E-07	16.42
101	1.042E-01	3.08	1.970E-02	4.56	1.079E-02	10.09	0.	0.00	2.285E-10	67.25	2.686E-07	22.34
102	1.405E-01	2.34	2.540E-02	4.01	1.526E-02	7.92	1.233E-03	100.00	1.574E-10	58.20	4.017E-07	15.72
103	1.335E-01	2.61	2.575E-02	4.59	1.325E-02	8.77	0.	0.00	2.900E-10	38.92	3.892E-07	13.64
104	1.634E-01	2.06	3.044E-02	4.32	1.689E-02	8.62	1.949E-03	74.75	4.890E-10	48.69	6.169E-07	20.81
105	1.958E-01	2.12	3.771E-02	3.47	2.069E-02	6.79	1.032E-03	7.50	2.939E-10	39.24	5.418E-07	19.13
106	1.282E-01	2.49	2.602E-02	4.11	1.326E-02	8.43	4.299E-05	10.00	5.872E-10	57.17	2.936E-07	16.01
107	1.465E-01	1.74	2.881E-02	3.77	1.527E-02	8.13	0.	.00	4.565E-10	45.58	4.807E-07	20.35
108	1.906E-01	1.81	4.122E-02	4.06	2.048E-02	6.27	3.917E-04	1.00.00	3.191E-10	44.42	4.777E-07	12.43
109	1.007E-01	2.46	2.264E-02	3.89	1.009E-02	7.85	0.	0.00	2.204E-10	60.22	2.484E-07	18.42

110	1.285E-01	1.92	2.748E-02	3.14	1.518E-02	6.64	3.565E-04	100.00	1.397E-10	52.78	3.434E-07	11.63
111	1.700E-01	1.79	4.045E-02	3.53	1.856E-02	5.70	2.331E-04	100.00	5.226E-11	75.04	4.7[illegible]E-07	11.21
112	2.232E-01	1.42	5.987E-02	2.91	2.515E-02	4.61	0.	0.00	3.476E-10	56.66	6.[illegible]2E-07	9.00
113	3.284E-01	1.20	9.010E-02	2.51	3.488E-02	3.96	9.785E-04	100.00	1.922E-10	56.14	1.032E-06	8.02
114	4.758E-01	.96	1.3[illegible]E-01	2.45	4.695E-02	3.57	1.34[illegible]E-03	63.69	1.900E-10	39.51	1.265E-06	6.15
115	3.107E-01	1.13	9.350E-02	2.40	3.110E-02	3.25	3.029E-04	60.37	8.129E-11	49.75	8.950E-07	9.27
116	.770E-01	1.04	1.[illegible]56E-01	2.14	3.755E-02	3.44	8.293E-04	82.75	2.737E-11	81.96	1.023E-06	6.25
117	4.487E-01	.95	1.[illegible]45E-[illegible]	2.42	4.391E-02	3.28	2.445E-04	68.96	5.713E-11	58.53	1.159E-06	5.72
118	5.012E-01	.93	1.[illegible]67E-01	2.54	4.[illegible]E-02	3.15	8.267E-04	86.20	6.219E-11	80.76	1.336E-06	5.58
119	5.262E-01	.87	1.[illegible]30E-01	2.10	4.997E-02	3.00	[illegible].98E-04	64.46	4.634E-11	64.46	1.299E-06	4.66
120	5.147E-01	.94	1.[illegible]75E-01	2.09	4.969E-02	3.08	9.815E-04	69.18	3.726E-[illegible]	61.66	1.432E-06	5.61
121	2.278E-01	.93	8.[illegible]15E-02	2.48	2.[illegible]73E-02	4.35	3.229E-04	96.81	1.406E-11	91.[illegible]	6.186E-07	7.57
122	1.878E-01	.93	7.254E-02	2.36	1.751E-02	4.17	1.492E-04	76.23	4.552E-11	71.53	4.882E-07	8.82
123	1.311E-01	1.26	5.[illegible]73E-02	2.87	1.056E-02	5.48	1.114E-04	100.00	1.139E-11	85.58	3.[illegible]32E-07	10.00

0[E25R1B1] [11ON 15X15 PWR, 3.5%U235, 900 PPM NAT.BORON

0 FREQUENCY FOR GENERATIONS 4 TO 73

.8590 TO .8821	*
.8821 TO .9052	*********
.9052 TO .9283	********
.9283 TO .9514	********************************
.9514 TO .9745	*****************
.9745 TO .9976	******
.9976 TO 1.0207	*

0 FREQUENCY FOR GENERATIONS 22 TO 73

.8590 TO .8821	*
.8821 TO .9052	****
.9052 TO .9283	*******
.9283 TO .9514	************************
.9514 TO .9745	************
.9745 TO .9976	****
.9976 TO 1.0207	

0 FREQUENCY FOR GENERATIONS 39 TO 73

.8590 TO .8821	*
.8821 TO .9052	**
.9052 TO .9283	******
.9283 TO .9514	*****************
.9514 TO .9745	******
.9745 TO .9976	****
.9976 TO 1.0207	

0 FREQUENCY FOR GENERATIONS 56 TO 73

.8590 TO .8821	
.8821 TO .9052	*

```
  .9283 TO  .9514     *********
  .9514 TO  .9745     **
  .9745 TO  .9976     *
  .9976 TO 1.0207
--EOR--
1 MEMO    POWER COMPUTING/990 - NOS 2.7.1.10.     NOS 2.7.1 ST=MAC.    90/01/03. 04.24.09.


 04.04.01.E25KEB1,F0,T2000.   HENRY TRAN
 04.04.01.USER,VK9PSH,,NC.
 04.04.01.ABSC,  0.
 04.04.01. YOUR PASSWORD EXPIRES AT 00.00.00 ON  90/08.
 04.04.01.CHARGE,N97SI01,V8C.
 04.04.02. CHARGE = N97SI01, PROJECT = V8C.
 04.04.03.ZZZZI01.
 04.04.03.PROC1. SYSTEM PROLOGUE
 04.04.03.COMMENT. SYSTEM PROLOG
 04.04.03.NEWS(A).
 04.04.04.CHECKP.
 04.04.05. INQUIRY COMPLETE.
 04.04.05.REVERT.
 04.04.05.TITLE(I25K1B1) EXXOR 15X15 PWR, 2.58U235, 1440 PPM NAT.BORON)
 04.04.05.LABEL,TAPE4,D=6E,L=EXXECT,VSN=007421.
 04.14.01.NT10I, ASSIGNED TO TAPE4, VSN=007421.
 04.14.02.COPYBF,TAPE4,TAPE6.
 04.14.05.  COPY    1 FILES         1 RECS      3.0426 WORDS
 04.14.05.REWIND,TAPE6.
 04.14.05.RETURN,TAPE6.
 04.14.05.PFL(EC=10)
 04.14.06.ATTACHP,KENO6,1,JA.
 04.14.07.     STOP
 04.14.07.     035200 MAXIMUM EXECUTION FL.
 04.14.07.       0.229 CP SECONDS EXECUTION TIME.
 04.14.07.KENO4,FL=777777.
 04.24.09.     STOP
 04.24.09.     372700 MAXIMUM EXECUTION FL.
 04.24.09.   1114.692 CP SECONDS EXECUTION TIME.
 04.24.09.UEPF,       0.145KUNS.
 04.24.09.UEMT,       2.747KUNS.
 04.24.09.UEMB,      36.315KUNS.
 04.24.09.UECP,    1116.024SECS.
 04.24.09. SRU,    2609.596UNTS.
 04.24.09.$OUT(+/OP=E)
 04.24.09. NO FILES PROCESSED.
 04.24.09.$DAYFILE(OUTPUT,JT=D)
 04.24.09.JABO,    105B SDBS FN=OUTPUT.
 04.24.09.POWER COMPUTING/990 - NOS 2.7.1.10
 04.24.09.DATE:          90/01/03.
 04.24.09.JSN:           MEMO
END OF FILE
??
```

```
04.04.21.USER,V69PSN,,NC.
04.04.21.ABOC,  0.
04.04.21. YOUR PASSWORD EXPIRES AT 00.00.00 ON 90/02/08.
04.04.21.CHARGE,N973301,VBC.
04.04.22. CHARGE = N973301, PROJECT = VBC.
04.04.22.7777701.
04.04.23.PROC1. SYSTEM PROLOGUE
04.04.23.COMMENT. SYSTEM PROLOG
04.04.23.NEWS(A).
04.04.24.CHECK=F.
04.04.25. INQUIRY COMPLETE.
04.04.25.REVERT.
04.04.25.TITLE([E42NUBI] EXXON PWR 15X15, 4.2% U235, BORATED WATER)
04.04.25.ATTACHM(LIB1,1,0)
04.04.27.    $TOP
04.04.27.    025200 MAXIMUM EXECUTION FL.
04.04.27.      0.243 CP SECONDS EXECUTION TIME.
04.04.27.ATTACHM(LIB2,1,0)
04.04.29.    $TOP
04.04.29.    025200 MAXIMUM EXECUTION FL.
04.04.29.      0.342 CP SECONDS EXECUTION TIME.
04.04.29.ATTACHM(LIB3,1,0)
04.04.31.    $TOP
04.04.31.    025200 MAXIMUM EXECUTION FL.
04.04.31.      0.243 CP SECONDS EXECUTION TIME.
04.04.31.REWIND,TAPE1,TAPE2,TAPE3.
04.04.31.ATTACHM,MULTI,M,1.
04.04.32.    $TOP
04.04.33.    025200 MAXIMUM EXECUTION FL.
04.04.33.      0.285 CP SECONDS EXECUTION TIME.
04.04.33.MULTI(PL=7777772)
04.04.45.TIME =    000, KEFF = 1.46089
04.04.50.TIME =    000, KEFF = 1.39894
04.04.56.TIME =    000, KEFF = 1.32500
04.05.02.TIME =    000, KEFF = 1.27504
04.05.07.TIME =    000, KEFF = 1.24417
04.05.12.TIME =    000, KEFF = 1.21484
04.05.18.TIME =    000, KEFF = 1.18716
04.05.22.TIME =    000, KEFF = 1.16090
04.05.27.TIME =    000, KEFF = 1.13595
04.05.32.TIME =    000, KEFF = 1.11220
04.05.37.TIME =    000, KEFF = 1.08942
04.05.41.TIME =    000, KEFF = 1.06778
04.05.46.TIME =    000, KEFF = 1.04779
04.05.46.    $TOP 222
04.05.46.    250100 MAXIMUM EXECUTION FL.
04.05.46.     66.247 CP SECONDS EXECUTION TIME.
04.05.47.UEPF,      0.116KUNS.
04.05.47.UEMS,    110.294KUNS.
04.05.47.UECP,     67.378SECS.
04.05.47. SRU,    143.294UNTS.
04.05.47.$OUT(*/OP=E)
04.05.47. NO FILES PROCESSED.
04.05.47.$DAYFILE(OUTPUT,JT=D)
04.05.47.JABC,    517B SDBS FN=OUTPUT.
04.05.47.POWER COMPUTING/990 - NOS 2.7.1.10
04.05.47.DATE:          89/12/29.
04.05.47.JSN:           MHJ.
END OF FILE
```

```
 XEDIT 5.1.00
 ===
 [42N1B] MESD MASSEY JOHN  001 90/01/03. 02:37:04. MID = MAC = NB2
 [E42N1B1] EXXON 15X15 PWR, 4.2% U235, 330 PPM NAT.BORON
--EOR--                                  2783
1                                                          XSDRNPM   VERS. 1.0A 90/01/03. 02:39:46. PAGE    1
0        F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                          C O L U M N   N U M B E R
          CARD                          11111111112222222223333333334444444445555555556666666667777777778
         NUMBER                1234567890123456789012345678901234567890123456789012345678901234567890
                                                                                  2783
            1                  [E42N1B1] EXXON 15X15 PWR, 4.2% U235, 330 PPM NAT.BORON
            2                  1## 2 3 11 0 3 2 10 0 3 1 10 12 0 0 0
            3                  2## -2 -1 -1 1
            4                  3## 1 0 0 0 0.0 0 0 0 0 0 0 1 0
            5                  4## -1 123 0 -2 2 4 126 -1 0
            6                  5## 1.-4 2.-4 1.0 0.0 0.0 1.420092 1
            7                   7
            8                  13## 1
            9                       1 1
           10                       1
           11                       2
           12                       2
           13                       3
           14                       3 3
           15                       3
           16                  14##
           17                       0
           18                       4292225     4292230
           19                       4280004
           20                       0
           21                       42000000
           22                       0
           23                       4280001     4280004
           24                       4250100
           25                  15##
           26                       0.0
           27                       9.7632-4    2.1899-2
           28                       4.5930-2
           29                       0.0
           30                       3.8022-2
           31                       0.0
           32                       6.671-2     3.336+2
           33                       3.007+5
           34                   7
           35                  33##  5R1.0 F0.0
           36                   7
           37                  35##  m10:0  110.4445 310:3271  0.8044
           38                  36##  5R1   2R2     4R7
           39                  39##  1     2       3
           40                  40##  F1
           41                  51##  12I1:0  123:0
           42                   7
0        ********************************** E N D   O F   I N P U T   L I S T I N G **********************************
1                                                          XSDRNPM   VERS. 1.0A 90/01/03. 02:39:46. PAGE    2
0
0
```

[E42N16] EXXON 05X15 PWR, 4.2% U235, [illegible] PPM NAT.BORON

16 XERAY 15 ENTRIES READ
26 APRAY 10 ENTRIES READ
24 APRAY 12 ENTRIES READ
48 [illegible]Y 9 ENTRIES READ
[illegible] ARRAY 12 ENTRIES READ

THE FOLLOWING DIRECT ACCESS SPACE IS REQUIRED

LOGICAL UNIT 8 HAS 153 BLOCKS OF LENGTH 1497 WORDS
LOGICAL UNIT 9 HAS 12 BLOCKS OF LENGTH 9047 WORDS
LOGICAL UNIT 10 HAS 492 BLOCKS OF LENGTH 55 WORDS

0GENERAL PROBLEM DESCRIPTION DATA BLOCK

GENERAL PROBLEM DATA

IGE	1/2/3 = PLANE/CYLINDER/SPHERE	2	ISN	QUADRATURE ORDER	8
IIM	NUMBER OF ZONES	3	ISCT	ORDER OF SCATTERING	3
IM	NUMBER OF SPACIAL INTERVALS	11	IEVT	0/1/2/3/4/5/6=0/K/ALPHA/C/I/R/H	1
IBL	0/1/2/3 = VACUUM/REFL/PER/WHITE	0	IIM	INNER ITERATION MAXIMUM	10
IBR	RIGHT BOUNDARY CONDITION	3	ICM	OUTER ITERATION MAXIMUM	12
MXX	NUMBER OF MIXTURES	3	IOLC	-1/0/N--FLAT RES/BN/OPT	0

```
 IGN  NUMBER OF ENERGY GROUPS          123        IFLU 0/1/2/3/4=L-B/L/B/M/L=M          0
 NNG  NUMBER OF NEUTRON GROUPS         123        IPRT +2/-1/0/N=MIXTURE XSEC PRINT     +2
 NGG  NUMBER OF GAMMA GROUPS             0        IDI  0/1/2/3=NO/PRT NO/PCH N BOTH     +3
 IFTG NUMBER OF FIRST THERMAL GROUP     94        IPRT +1/0/1=NONE/FINE/ALL BAL. PRT    +1
0                          SPECIAL OPTIONS

 IFD  0/1 = NONE/WEIGHTING CALCULATION   1        IPN  DUMMY PARAMETER                  0
 IDN  VOLUMETRIC SOURCES (0/N=NO/YES)    0        IDFN 0/1 = NONE/DENSITY FACTORS TO+   0
 IPM  BOUNDARY SOURCES (0/N=NO/YES)      0        IA2  0/N = NONE/N ACTIVITIES BY ZONS   0
 IDN  0/1/2 = INPUT ZS+/ZA+/USE LAST     0        IA1  0/1=NONE/ACTIVITIES BY INTERVAL  0
 ITM1 MAXIMUM TIME (MINUTES)             4        IFCT 0/1=NO/YES UPSCATTER SCALING     1
 IDT1 0/1/2/3=NO/XSECT/SRCE/FLUX--OUT    0        IPVT 0/1/2=NO/K/ALPHA PARAMETRIC SRCH 0
0                          WEIGHTING DATA (IFD=1)

 ICON -1/0/1=CELL/ZONE/REGION WEIGHT    +1        INTT TOTAL XSECT PRN IN ORD OF TABLES 3
 IGNF NUMBER OF BROAD GROUPS           123        NDSF PRN 0-6 OF FILE NUMBER           4
 ITP  0/10/20/30/40 D/C/E/AC/A           0        MXSF TABLE LENGTH OF MAX ORDER      126
 IPF  -2/-1/0/N=ADTED XSECT PRINT       +2        MSCM EXTRA 1-D X-SECT POSITIONS       0
 IAP  -1/N ANISN XSECT PRINT            -1
0                          FLOATING POINT PARAMETERS

 EV   EIGENVALUE GUESS          0.        PU   IPVT=1/2=K/ALPHA          0.
 EVM  EIGENVALUE MODIFIER       0.        EPS  OVERALL CONVERGENCE          .00050E-04
 BF   BUCKLING FACTOR=1.020892  1.020892E+00  PTC  POINT CONVERGENCE       2.00000E+04
 DY   CYL/PLA HT FOR BUCKLING   0.          ENF  NORMALIZATION FACTOR       1.00000E+00
1                                                                  ISDRAMP  VERS. 1.0 MO 01/02, 02.39.08. PAGE   2
 DEZ  PLANE DEPTH FOR BUCKLING  0.          EDL  EV CHANGE CPS FOR SEARCH  1.00000E-05
 VBC  VOID STREAMING CORRECTION 0.          XNPM NON PARAM MOD FOR SEARCH  1.50000E+01
0DATA BLOCK 2 (MIXING TABLE, ETC.)
    THIS CASE WILL REQUIRE    17907 LOCATIONS FOR MIXING
    THIS CASE HAS BEEN ALLOCATED  23000 LOCATIONS
0   13A ARRAY     10 ENTRIES READ
0   18A ARRAY     10 ENTRIES READ
0   15A ARRAY     10 ENTRIES READ
0
1                                                                  ISDRAMP  VERS. 1.0A MO 01/02, 02.23.46. PAGE   5
0                    (6A2,A1) EXXON 19X15 PWR, 4.2% U235, 2500 PPM NAT.BORON

    NUCLIDE       CITATION                        MIXING TABLE                                  EXTRA
    REQUESTED     IDENTIFICATION          MIXTURE   COMPONENT     ATOM DENSITY                XSECT ID'S
     1      0          0                    1          0            0
     2      0          0                    1      42922351      9.76320E-04
     3      0          0                    1      42922381      2.19890E-02
     4      0          0                    1       4280004      4.59300E-02
     5      0          0                    2          0            0
     6      0          0                    2      42400000      2.80220E-02
     7      0          0                    3          0            0
     8      0          0                    3       4210001      6.67100E-02
     9      0          0                    3       4280004      3.33600E-02
    10      0          0                    3       4250100      3.00700E-05
    11      0
    12      0
    13      0
    14      0
    15      0
    16      0
    17      0
    18      0
    19      0
    20      0
    21      0
    22      0
    23      0
```

```
 25       0
 26       0
 27       0
 28       0
 29       0
 30       0
 31       0
 32       0
 33       0
 34       0
 35       0
 36       0
 37       0
 38       0
 TIME OF DAY 02.39.51.
0IDBA1=0 REQUIRES   7w638 LOCATIONS. THIS VERSION OF ISDRN ALLOWS A MAXIMUM OF   33000
0 CROSS SECTIONS WILL BE STORED EXTERNALLY
0   32248 LOCATIONS WILL BE USED
 AD EXECUTING FIRST TIME
0   32* ARRAY    1250 ENTRIES READ
0    0T
0   75* ARRAY      12 ENTRIES READ
0   3=1 ARRAY      11 ENTRIES READ
1                                                                    ISDRNPM  VER6. 1.0A 90/01/02. 02.39.46. PAGE    6
0   79* ARRAY       3 ENTRIES READ
0   80* ARRAY       3 ENTRIES READ
0   81* ARRAY     123 ENTRIES READ
0    0T
1                                                                    ISDRNPM  VER6. 1.0A 90/01/02. 02.39.46. PAGE    7
0                    [E42NXR1] EXXON 15X15 FWR, 4.2% U235, ~~1500~~ PPM NAT.BORON
                     NEUTRON GROUP PARAMETERS
0  GP    ENERGY      LETHARGY      MID PT     GROUP GP        CR.C                    RIGHT          LEFT
      BOUNDARIES   BOUNDARIES   VELOCITIES    NUMBERS        TYPE                    ALBEDO         ALBEDO
       1 1.49180E+07 -3.99993E-01 5.21033E+09       1          0                  1.00000E+00
       2 1.34990E+07 -3.00031E-01 4.95624E+09       2          0                  1.00000E+00
       3 1.22140E+07 -1.99998E-01 4.71452E+09       3          0                  1.00000E+00
       4 1.10520E+07 -1.00026E-01 4.48459E+09       4          0                  1.00000E+00
       5 1.00000E+07  0.          4.26585E+09       5          0                  1.00000E+00
       6 9.04840E+06  9.99975E-02 4.05780E+09       6          0                  1.00000E+00
       7 8.18730E+06  2.00001E-01 3.85990E+09       7          0                  1.00000E+00
       8 7.40820E+06  2.99998E-01 3.67165E+09       8          0                  1.00000E+00
       9 6.70320E+06  4.00000E-01 3.49259E+09       9          0                  1.00000E+00
      10 6.06530E+06  5.00001E-01 3.32224E+09      10          0                  1.00000E+00
      11 5.48810E+06  6.00003E-01 3.16020E+09      11          0                  1.00000E+00
      12 4.96590E+06  7.00011E-01 3.00608E+09      12          0                  1.00000E+00
      13 4.49330E+06  7.99998E-01 2.85946E+09      13          0                  1.00000E+00
      14 4.06570E+06  8.99999E-01 2.72002E+09      14          0                  1.00000E+00
      15 3.67890E+06  9.99998E-01 2.58736E+09      15          0                  1.00000E+00
      16 3.32870E+06  1.10000E+00 2.46117E+09      16          0                  1.00000E+00
      17 3.01190E+06  1.20001E+00 2.34113E+09      17          0                  1.00000E+00
      18 2.72530E+06  1.30001E+00 2.22697E+09      18          0                  1.00000E+00
      19 2.46600E+06  1.39999E+00 2.11836E+09      19          0                  1.00000E+00
      20 2.23130E+06  1.50000E+00 2.01505E+09      20          0                  1.00000E+00
      21 2.01900E+06  1.59998E+00 1.91677E+09      21          0                  1.00000E+00
      22 1.82680E+06  1.70002E+00 1.82328E+09      22          0                  1.00000E+00
      23 1.65300E+06  1.79999E+00 1.73437E+09      23          0                  1.00000E+00
      24 1.49570E+06  1.89999E+00 1.64976E+09      24          0                  1.00000E+00
      25 1.35330E+06  2.00004E+00 1.56931E+09      25          0                  1.00000E+00
      26 1.22460E+06  2.09997E+00 1.49278E+09      26          0                  1.00000E+00
      27 1.10800E+06  2.20003E+00 1.41997E+09      27          0                  1.00000E+00
      28 1.00260E+06  2.29999E+00 1.35073E+09      28          0                  1.00000E+00
      29 9.07180E+05  2.40000E+00 1.28485E+09      29          0                  1.00000E+00
```

31	7.42740E+05	2.59999E+00	1.16258E+09	31	0	1.00000E+00
32	6.72050E+05	2.70001E+00	1.10588E+09	32	0	1.00000E+00
33	6.08100E+05	2.80000E+00	1.05194E+09	33	0	1.00000E+00
34	5.50230E+05	2.90000E+00	1.00064E+09	34	0	1.00000E+00
35	4.97870E+05	3.00000E+00	9.51837E+08	35	0	1.00000E+00
36	4.50490E+05	3.10000E+00	9.05415E+08	36	0	1.00000E+00
37	4.07620E+05	3.20001E+00	8.61257E+08	37	0	1.00000E+00
38	3.68830E+05	3.30000E+00	8.19252E+08	38	0	1.00000E+00
39	3.33730E+05	3.40001E+00	7.79295E+08	39	0	1.00000E+00
40	3.01970E+05	3.50001E+00	7.41292E+08	40	0	1.00000E+00
41	2.73240E+05	3.59999E+00	7.05137E+08	41	0	1.00000E+00
42	2.47230E+05	3.70002E+00	6.70747E+08	42	0	1.00000E+00
43	2.23710E+05	3.79999E+00	6.38039E+08	43	0	1.00000E+00
44	2.02420E+05	3.90000E+00	6.06923E+08	44	0	1.00000E+00
45	1.83160E+05	3.99998E+00	5.77325E+08	45	0	1.00000E+00
46	1.65730E+05	4.09998E+00	5.49170E+08	46	0	1.00000E+00
47	1.49960E+05	4.19997E+00	5.22398E+08	47	0	1.00000E+00
48	1.35690E+05	4.29997E+00	4.96904E+08	48	0	1.00000E+00
49	1.22770E+05	4.40003E+00	4.72666E+08	49	0	1.00000E+00
50	1.11090E+05	4.50000E+00	4.49568E+08	50	0	1.00000E+00
51	8.51700E+04	4.75000E+00	3.92181E+08	51	0	1.00000E+00
52	6.53790E+04	5.00001E+00	3.37233E+08	52	0	1.00000E+00
53	5.04750E+04	5.25000E+00	2.87643E+08	53	0	1.00000E+00
54	4.08680E+04	5.49999E+00	2.62670E+08	54	0	1.00000E+00
55	3.18280E+04	5.74999E+00	2.21804E+08	55	0	1.00000E+00
56	2.47870E+04	6.00002E+00	1.84564E+08	56	0	1.00000E+00
57	1.93000E+04	6.25003E+00	1.50527E+08	57	0	1.00000E+00
58	1.50340E+04	6.50003E+00	1.22517E+08	58	0	1.00000E+00
59	1.17090E+04	6.74998E+00	1.00367E+08	59	0	1.00000E+00
60	9.11880E+03	7.00000E+00	8.24076E+07	60	0	1.00000E+00
61	7.10170E+03	7.25001E+00	6.69496E+07	61	0	1.00000E+00
62	5.53080E+03	7.50001E+00	5.46630E+07	62	0	1.00000E+00
63	4.30740E+03	7.75001E+00	4.52789E+07	63	0	1.00000E+00
64	3.35460E+03	8.00001E+00	3.52859E+07	64	0	1.00000E+00
65	2.61260E+03	8.24999E+00	2.64136E+07	65	0	1.00000E+00
66	2.03470E+03	8.49999E+00	2.06094E+07	66	0	1.00000E+00
67	1.58460E+03	8.75001E+00	1.72225E+07	67	0	1.00000E+00
68	1.23410E+03	9.00000E+00	1.56451E+07	68	0	1.00000E+00
69	9.61120E+02	9.25000E+00	1.02817E+07	69	0	1.00000E+00
70	7.48520E+02	9.50000E+00	8.55485E+06	70	0	1.00000E+00
71	5.82950E+02	9.74999E+00	6.13714E+06	71	0	1.00000E+00
72	4.54000E+02	1.00000E+01	2.76850E+07	72	0	1.00000E+00
73	3.53570E+02	1.02500E+01	2.04319E+07	73	0	1.00000E+00
74	2.75360E+02	1.05000E+01	2.15610E+07	74	0	1.00000E+00
75	2.14450E+02	1.07500E+01	1.90277E+07	75	0	1.00000E+00
76	1.67020E+02	1.10000E+01	1.67919E+07	76	0	1.00000E+00
77	1.30070E+02	1.12500E+01	1.48187E+07	77	0	1.00000E+00
78	1.01300E+02	1.15000E+01	1.30775E+07	78	0	1.00000E+00
79	7.88930E+01	1.17500E+01	1.15409E+07	79	0	1.00000E+00
80	6.14420E+01	1.20000E+01	1.01848E+07	80	0	1.00000E+00
81	4.78510E+01	1.22500E+01	8.98801E+06	81	0	1.00000E+00
82	3.72660E+01	1.25000E+01	7.93188E+06	82	0	1.00000E+00
83	2.90230E+01	1.27500E+01	6.99986E+06	83	0	1.00000E+00
84	2.26030E+01	1.30000E+01	6.17233E+06	84	0	1.00000E+00
85	1.76030E+01	1.32500E+01	5.45153E+06	85	0	1.00000E+00
86	1.37100E+01	1.35000E+01	4.81099E+06	86	0	1.00000E+00
87	1.06770E+01	1.37500E+01	4.24565E+06	87	0	1.00000E+00
88	8.31530E+00	1.40000E+01	3.74677E+06	88	0	1.00000E+00
89	6.47590E+00	1.42500E+01	3.30651E+06	89	0	1.00000E+00
90	5.04350E+00	1.45000E+01	2.91800E+06	90	0	1.00000E+00
91	3.90E+00	1.47500E+01	2.57512E+06	91	0	1.00000E+00

93	2.38240E+00	1.52600E+01	2.00651E+06	93	0	1.00000E+00
94	1.85910E+00	1.54980E+01	1.84660E+06	94	0	1.00000E+00
95	1.70900E+00	1.55822E+01	1.76924E+06	95	0	1.00000E+00
96	1.56660E+00	1.56692E+01	1.69258E+06	96	0	1.00000E+00
97	1.43150E+00	1.57594E+01	1.61075E+06	97	0	1.00000E+00
98	1.28490E+00	1.58674E+01	1.51951E+06	98	0	1.00000E+00
99	1.13370E+00	1.59926E+01	1.42692E+06	99	0	1.00000E+00
100	9.89190E-01	1.61189E+01	1.33974E+06	100	0	1.00000E+00
101	8.81030E-01	1.62448E+01	1.25458E+06	101	0	1.00000E+00
102	7.68350E-01	1.63816E+01	1.16506E+06	102	0	1.00000E+00
103	6.85220E-01	1.65409E+01	1.07106E+06	103	0	1.00000E+00
104	5.48860E-01	1.67181E+01	9.74241E+05	104	0	1.00000E+00
105	4.48569E-01	1.69199E+01	8.77651E+05	105	0	1.00000E+00
106	3.61440E-01	1.71358E+01	7.93327E+05	106	0	1.00000E+00
107	2.99650E-01	1.73239E+01	7.23012E+05	107	0	1.00000E+00
108	2.49350E-01	1.75070E+01	6.59317E+05	106	0	1.00000E+00
109	2.07070E-01	1.76928E+01	6.07594E+05	109	0	1.00000E+00
110	1.79860E-01	1.78338E+01	5.69506E+05	110	0	1.00000E+00
111	1.59821E-01	1.79517E+01	5.34763E+05	111	0	1.00000E+00

112	1.39810E-01	1.80856E+01	4.97557E+05	112	0	1.00000E+00
113	1.19780E-01	1.82402E+01	4.50271E+05	113	0	1.00000E+00
114	9.97380E-02	1.84033E+01	4.16334E+05	114	0	1.00000E+00
115	8.22110E-02	1.86157E+01	3.80438E+05	115	0	1.00000E+00
116	6.99050E-02	1.87787E+01	3.51828E+05	116	0	1.00000E+00
117	5.99910E-02	1.89333E+01	3.23361E+05	117	0	1.00000E+00
118	4.96690E-02	1.91165E+01	2.92006E+05	118	0	1.00000E+00
119	3.98370E-02	1.93411E+01	2.56694E+05	119	0	1.00000E+00
120	2.97800E-02	1.96330E+01	2.18923E+05	120	0	1.00000E+00
121	2.10760E-02	1.99777E+01	1.84094E+05	121	0	1.00000E+00
122	1.48910E-02	2.03281E+01	1.52133E+05	122	0	1.00000E+00
123	9.82420E-03	2.07403E+01	1.14283E+05	123	0	1.00000E+00
124	4.74190E-03	2.14694E+01				

[E43N(BI) EXXON 15X15 PWR, 4.2% U235, ~~2.5WT%~~ PPM NAT.BORON

MIXTURE BY ZONE	ORDER P(L) BY ZONE	ACTIVITY TABLE MAT NO.	REACTION	QUADRATURE CONSTANTS WEIGHTS	DIRECTIONS	REFL DIREC	WT * 2DB
1	1	5		0	-2.79004E-01	0	0
2	2	3		5.06143E-02	-1.97286E-01	3	-9.98548E-03
3	3	2		5.06143E-02	1.97286E-01	2	9.98548E-03
4				0	-6.04479E-01	8	0
5				5.55953E-02	-5.58410E-01	9	-3.10450E-02
6				5.55953E-02	-2.31301E-01	7	-1.28593E-02
7				5.55953E-02	2.31301E-01	6	1.28593E-02
8				5.55953E-02	5.58410E-01	5	3.10450E-02
9				0	-8.50774E-01	15	0
10				5.22844E-02	-8.21784E-01	15	-4.29665E-02
11				5.22844E-02	-6.01588E-01	14	-3.14537E-02
12				5.22844E-02	-2.20196E-01	13	-1.15128E-02
13				5.22844E-02	2.20196E-01	12	1.15128E-02
14				5.22844E-02	6.01588E-01	11	3.14537E-02
15				5.22844E-02	8.21784E-01	10	4.29665E-02
16				0	-9.83032E-01	24	0
17				4.53355E-02	-9.64143E-01	24	-4.37099E-02
18				4.53355E-02	-8.17361E-01	23	-3.70555E-02
19				4.53355E-02	-5.46143E-01	22	-2.47597E-02
20				4.53355E-02	-1.91780E-01	21	-8.69444E-03
21				4.53355E-02	1.91780E-01	20	8.69444E-03
22				4.53355E-02	5.46143E-01	19	2.47597E-02
23				4.53355E-02	8.17361E-01	18	3.70555E-02
24				4.53355E-02	9.64143E-01	17	4.37099E-02

0CONSTANTS FOR P(J) SCATTERING

```
  1 -2.79004E-01  8.83235E-01  6.74144E-02 -6.16919E-01 -1.71761E-02
  2 -1.97286E-01  8.83235E-01  0.          -4.36227E-01  1.21511E-02
  3  1.97286E-01  8.83235E-01  0.           4.36227E-01 -1.21511E-02
  4 -6.04419E-01  4.52016E-01  3.16379E-01 -8.04435E-01 -1.74864E-01
  5 -5.58411E-01  4.52016E-01  2.23713E-01 -7.43201E-01 -6.68028E-02
  6 -2.31301E-01  4.52016E-01 -2.23713E-01 -3.07844E-01  1.61276E-01
  7  2.31301E-01  4.52016E-01 -2.23713E-01  3.07844E-01 -1.61276E-01
  8  5.58410E-01  4.52016E-01  2.23713E-01  7.43201E-01  6.68028E-02
  9 -8.50774E-01 -8.57235E-02  6.26843E-01 -1.78456E-01 -4.86825E-01
 10 -8.21784E-01 -8.57235E-02  5.42862E-01 -1.91694E-01 -3.44245E-01
 11 -6.01588E-01 -8.57235E-02  0.          -1.40330E-01  3.44244E-01
 12 -2.20196E-01 -8.57235E-02 -5.42862E-01 -5.13643E-02  3.44245E-01
 13  2.20196E-01 -8.57235E-02 -5.42862E-01  5.13643E-02 -3.44244E-01
 14  6.01588E-01 -8.57235E-02  0.          1.40330E-01 -3.44244E-01
 15  8.21784E-01 -8.57235E-02  5.42862E-01  1.91694E-01  3.44244E-01
 16 -9.83022E-01 -4.49528E-01  8.36883E-01  5.00703E-01 -7.81005E-01
 17 -9.64143E-01 -4.49528E-01  7.73181E-01  6.91063E-01 -6.24438E-01
 18 -8.07361E-01 -4.49528E-01  7.20262E-01  4.16320E-01  1.40514E+01
 19 -8.46147E-01 -4.49528E-01 -7.20262E-01  2.78176E-01  7.36575E-01
 20 -1.91780E-01 -4.49528E-01 -7.73181E-01  9.76824E-02  4.17236E-01
 21  1.91780E-01 -4.49528E-01 -7.73181E-01 -9.76824E-02 -4.17236E-01
 22  8.46147E-01 -4.49528E-01 -7.20262E-01 -2.78176E-01 -7.36575E-01
 23  8.17361E-01 -8.49528E-01  7.20262E-01 -4.16320E-01 -1.40514E-01
 24  9.64143E-01 -4.49528E-01  7.73181E-01 -6.91063E-01  6.24438E-01

1                                                                    ASDRNPM   VERS. 1.0A 90/01/03. 02.39.46.  PAGE   11
0 INT    RADII       MID PTS     ZONE NO.      AREAS       VOLUMES     DENS FACT    RADIUS MOD     SPACING
    1        0      4.44500E-02        0           0      2.48287E-02                  0       1.00000E+00
    2  8.89000E-02  1.33350E-01        0      5.58575E-01  7.44860E-02                  0       1.00000E+00
    3  1.77800E-01  2.22250E-01        1      1.11715E+00  1.24143E-01                  0       1.06080E+00
    4  2.66700E-01  3.11150E-01        1      1.67573E+00  1.73801E-01                          1.00000E+00
    5  3.55600E-01  4.00050E-01        1      2.23430E+00  2.23458E-01                          1.00000E+00
    6  4.44500E-01  4.88950E-01        2      2.79286E+00  1.20704E-01                                  9
    7  4.85800E-01  5.06450E-01        2      3.05237E+00  1.51422E-01                                  0
    8  5.27100E-01  5.61783E-01        3      3.31187E+00  2.44694E-01                                  0
    9  5.96425E-01  6.31089E-01        3      3.74745E+00  2.74890E-01                                  0
   10  6.65750E-01  7.00413E-01        3      4.18303E+00  3.05087E-01                                  0
   11  7.35075E-01  7.69738E-01        3      4.61861E+00  3.35284E-01                                  0
   12  8.04400E-01                     3      5.05419E+00
 TIME OF DAY 02:39.53.

1                                                                    ASDRNPM   VERS. 1.0A 90/01/03. 02.39.46.  PAGE   12
0 OUTER INNER      BALANCE    UPSCATTER RATIO    EIGENVALUE        LAMBDA)        LAMBDA2  TIME(MIN)
    1  1076  1.0000000E+00   0.                 8.8491673E-01   1.0382807E+00   0.                .0079
    2  1964  1.0000000E+00   1.0125012E+00      1.1023420E+00   1.0633657E+00   1.2224878E+00     .0140
    3  2644  1.0000000E+00   1.0008691E+00      1.1095724E+00   1.0036810E+00   1.0092349E+00     .0192
    4  2917  1.0000000E+00   1.0000022E+00      1.1098587E+00   1.0000592E+00   1.0004754E+00     .0223
    5  3111  1.0000000E+00   1.0000060E+00      1.1098867E+00   1.0000258E+00   1.0000326E+00     .0255
 GRP.   1 REQUIRED   1 ITERATIONS. MFD OF  5.42155E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   2 REQUIRED   1 ITERATIONS. MFD OF  5.44139E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   3 REQUIRED   1 ITERATIONS. MFD OF  5.51377E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   4 REQUIRED   1 ITERATIONS. MFD OF  6.03803E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   5 REQUIRED   1 ITERATIONS. MFD OF  6.53499E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   6 REQUIRED   1 ITERATIONS. MFD OF  5.97871E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   7 REQUIRED   1 ITERATIONS. MFD OF  5.37168E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   8 REQUIRED   1 ITERATIONS. MFD OF  6.14313E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.   9 REQUIRED   1 ITERATIONS. MFD OF  6.59884E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  10 REQUIRED   1 ITERATIONS. MFD OF  5.82138E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  11 REQUIRED   1 ITERATIONS. MFD OF  5.14290E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  12 REQUIRED   1 ITERATIONS. MFD OF  5.58762E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  13 REQUIRED   1 ITERATIONS. MFD OF  5.85422E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  14 REQUIRED   1 ITERATIONS. MFD OF  5.99835E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  15 REQUIRED   1 ITERATIONS. MFD OF  5.07048E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  16 REQUIRED   1 ITERATIONS. MFD OF  5.30339E-05 OCCURRED IN INT.  11  COARSE MESH=  1
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 GRP.  18 REQUIRED   1 ITERATIONS. MFD OF  6.29896E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  19 REQUIRED   1 ITERATIONS. MFD OF  5.68034E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  20 REQUIRED   1 ITERATIONS. MFD OF  5.18920E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  21 REQUIRED   1 ITERATIONS. MFD OF  5.35419E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  22 REQUIRED   1 ITERATIONS. MFD OF  5.52890E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  23 REQUIRED   1 ITERATIONS. MFD OF  4.76833E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  24 REQUIRED   1 ITERATIONS. MFD OF  5.57814E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  25 REQUIRED   1 ITERATIONS. MFD OF  5.02817E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  26 REQUIRED   1 ITERATIONS. MFD OF  5.02270E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  27 REQUIRED   1 ITERATIONS. MFD OF  4.65812E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  28 REQUIRED   1 ITERATIONS. MFD OF  4.51642E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  29 REQUIRED   1 ITERATIONS. MFD OF  5.18698E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  30 REQUIRED   1 ITERATIONS. MFD OF  5.25861E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  31 REQUIRED   1 ITERATIONS. MFD OF  5.23278E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  32 REQUIRED   1 ITERATIONS. MFD OF  5.11940E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  33 REQUIRED   1 ITERATIONS. MFD OF  4.95207E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  34 REQUIRED   1 ITERATIONS. MFD OF  4.61732E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  35 REQUIRED   1 ITERATIONS. MFD OF  4.48396E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  36 REQUIRED   1 ITERATIONS. MFD OF  4.26497E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  37 REQUIRED   1 ITERATIONS. MFD OF  4.56370E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  38 REQUIRED   1 ITERATIONS. MFD OF  4.83408E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  39 REQUIRED   1 ITERATIONS. MFD OF  5.12580E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  40 REQUIRED   1 ITERATIONS. MFD OF  5.25024E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  41 REQUIRED   1 ITERATIONS. MFD OF  5.27141E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  42 REQUIRED   1 ITERATIONS. MFD OF  5.27028E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  43 REQUIRED   1 ITERATIONS. MFD OF  5.24381E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  44 REQUIRED   1 ITERATIONS. MFD OF  5.21970E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  45 REQUIRED   1 ITERATIONS. MFD OF  5.18036E-05 OCCURRED IN INT.  11  COARSE MESH=  1
 GRP.  46 REQUIRED   1 ITERATIONS. MFD OF  5.13528E-05 OCCURRED IN INT.  10  COARSE MESH=  1
 GRP.  47 REQUIRED   1 ITERATIONS. MFD OF  5.10247E-05 OCCURRED IN INT.  10  COARSE MESH=  1
 GRP.  48 REQUIRED   1 ITERATIONS. MFD OF  5.05211E-05 OCCURRED IN INT.  10  COARSE MESH=  1
 GRP.  49 REQUIRED   1 ITERATIONS. MFD OF  5.00469E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  50 REQUIRED   1 ITERATIONS. MFD OF  4.93109E-05 OCCURRED IN INT.  10  COARSE MESH=  1
 GRP.  51 REQUIRED   1 ITERATIONS. MFD OF  4.27509E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  52 REQUIRED   1 ITERATIONS. MFD OF  4.20543E-05 OCCURRED IN INT.   9  COARSE MESH=  1
                                                                    XSDRNPM  VERS. 1.0F 96/01/03. 02:29:46. PAGE  17
 GRP.  53 REQUIRED   1 ITERATIONS. MFD OF  4.10395E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  54 REQUIRED   1 ITERATIONS. MFD OF  4.02116E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  55 REQUIRED   1 ITERATIONS. MFD OF  3.92241E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  56 REQUIRED   1 ITERATIONS. MFD OF  3.78279E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  57 REQUIRED   1 ITERATIONS. MFD OF  3.64465E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  58 REQUIRED   1 ITERATIONS. MFD OF  3.53517E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  59 REQUIRED   1 ITERATIONS. MFD OF  3.40506E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  60 REQUIRED   1 ITERATIONS. MFD OF  3.24691E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  61 REQUIRED   1 ITERATIONS. MFD OF  3.10807E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  62 REQUIRED   1 ITERATIONS. MFD OF  2.95351E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  63 REQUIRED   1 ITERATIONS. MFD OF  2.83251E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  64 REQUIRED   1 ITERATIONS. MFD OF  2.72245E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  65 REQUIRED   1 ITERATIONS. MFD OF  2.56872E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  66 REQUIRED   1 ITERATIONS. MFD OF  2.40054E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  67 REQUIRED   1 ITERATIONS. MFD OF  2.32183E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  68 REQUIRED   1 ITERATIONS. MFD OF  2.18269E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  69 REQUIRED   1 ITERATIONS. MFD OF  2.08501E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  70 REQUIRED   1 ITERATIONS. MFD OF  1.98753E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  71 REQUIRED   1 ITERATIONS. MFD OF  1.95051E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  72 REQUIRED   1 ITERATIONS. MFD OF  1.90082E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  73 REQUIRED   1 ITERATIONS. MFD OF  1.73349E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  74 REQUIRED   1 ITERATIONS. MFD OF  1.68282E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  75 REQUIRED   1 ITERATIONS. MFD OF  1.49572E-05 OCCURRED IN INT.   9  COARSE MESH=  2
 GRP.  76 REQUIRED   1 ITERATIONS. MFD OF  1.63045E-05 OCCURRED IN INT.   9  COARSE MESH=  1
 GRP.  77 REQUIRED   1 ITERATIONS. MFD OF  1.37023E-05 OCCURRED IN INT.   9  COARSE MESH=  2
 GRP.  78 REQUIRED   1 ITERATIONS. MFD OF  1.55288E-05 OCCURRED IN INT.   9  COARSE MESH=  1
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GRP. 80 REQUIRED 1 ITERATIONS. MFD OF 1.45975E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 81 REQUIRED 1 ITERATIONS. MFD OF 1.36999E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 82 REQUIRED 1 ITERATIONS. MFD OF 1.13046E-05 OCCURRED IN INT. 9 COARSE MESH= 2
GRP. 83 REQUIRED 1 ITERATIONS. MFD OF 1.33243E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 84 REQUIRED 1 ITERATIONS. MFD OF 1.22976E-05 OCCURRED IN INT. 9 COARSE MESH= 2
GRP. 85 REQUIRED 1 ITERATIONS. MFD OF 1.30338E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 86 REQUIRED 1 ITERATIONS. MFD OF 1.29511E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 87 REQUIRED 1 ITERATIONS. MFD OF 1.28247E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 88 REQUIRED 1 ITERATIONS. MFD OF 1.21257E-05 OCCURRED IN INT. 11 COARSE MESH= 2
GRP. 89 REQUIRED 1 ITERATIONS. MFD OF 1.27142E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 90 REQUIRED 1 ITERATIONS. MFD OF 1.22980E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 91 REQUIRED 1 ITERATIONS. MFD OF 1.22596E-05 OCCURRED IN INT. 9 COARSE MESH= 1
GRP. 92 REQUIRED 1 ITERATIONS. MFD OF 1.22212E-05 OCCURRED IN INT. 8 COARSE MESH= 1
GRP. 93 REQUIRED 1 ITERATIONS. MFD OF 1.25[illegible]E-05 OCCURRED IN INT. 2 COARSE MESH= 1
GRP. 94 REQUIRED 4 ITERATIONS. MFD OF 5.47786E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 95 REQUIRED 3 ITERATIONS. MFD OF 2.60809E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 96 REQUIRED 3 ITERATIONS. MFD OF 4.41038E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 97 REQUIRED 1 ITERATIONS. MFD OF 1.23234E-05 OCCURRED IN INT. 2 COARSE MESH= 1
GRP. 98 REQUIRED 3 ITERATIONS. MFD OF 7.67942E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 99 REQUIRED 3 ITERATIONS. MFD OF 5.00095E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 100 REQUIRED 3 ITERATIONS. MFD OF 5.15736E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 101 REQUIRED 1 ITERATIONS. MFD OF 1.46625E-05 OCCURRED IN INT. 1 COARSE MESH= 1
GRP. 102 REQUIRED 1 ITERATIONS. MFD OF 1.86134E-03 OCCURRED IN INT. 1 COARSE MESH= 1
GRP. 103 REQUIRED 3 ITERATIONS. MFD OF 2.57240E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 104 REQUIRED 3 ITERATIONS. MFD OF 4.21389E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 105 REQUIRED 3 ITERATIONS. MFD OF 5.48190E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 106 REQUIRED 3 ITERATIONS. MFD OF 2.61006E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 107 REQUIRED 3 ITERATIONS. MFD OF 8.53345E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 108 REQUIRED 3 ITERATIONS. MFD OF 5.11121E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 109 REQUIRED 4 ITERATIONS. MFD OF 6.81675E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 110 REQUIRED 3 ITERATIONS. MFD OF 5.71547E-05 OCCURRED IN INT. 11 COARSE MESH= 1

! XSDRNPM VERS: 1.0A 90/01/03. 02.39.46. PAGE 14

0 GRP. 111 REQUIRED 3 ITERATIONS. MFD OF 4.38296E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 112 REQUIRE. 4 ITERATIONS. MFD OF 2.11267E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 113 REQUIRED 4 ITERATIONS. MFD OF 2.74473E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 114 REQUIRED 4 ITERATIONS. MFD OF 3.18065E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 115 REQUIRED 4 ITERATIONS. MFD OF 3.73540E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 116 REQUIRED 4 ITERATIONS. MFD OF 2.04914E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 117 REQUIRED 4 ITERATIONS. MFD OF 2.15806E-05 OCCURRED IN INT. 11 COARSE MESH= 1
GRP. 118 REQUIRED 4 ITERATIONS. MFD OF 1.22220E-05 OCCURRED IN INT. 10 COARSE MESH= 2
GRP. 119 REQUIRED 3 ITERATIONS. MFD OF 9.91613E-05 OCCURRED IN INT. 11 COARSE MESH= 2
GRP. 120 REQUIRED 3 ITERATIONS. MFD OF 6.26532E-05 OCCURRED IN INT. 11 COARSE MESH= 2
GRP. 121 REQUIRED 10 ITERATIONS. MFD OF 1.46693E-02 OCCURRED IN INT. 1 COARSE MESH= 2
GRP. 122 REQUIRED 3 ITERATIONS. MFD OF 7.95539E-05 OCCURRED IN INT. 11 COARSE MESH= 2
GRP. 123 REQUIRED 4 ITERATIONS. MFD OF 2.03804E-05 OCCURRED IN INT. 11 COARSE MESH= 2
6 3305 1.0000000E+00 1.0000049E+00 1.1099116E+00 1.0000221E+00 1.0000273E+00 .0285
FINAL MINITOR LAMBDA 1.1084759E+00 ANGULAR FLUX ON 16
TIME OF DAY 02.40.41.

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0[E42NXB1] EXTON 15X15 PWR, 4.2% U235, ~~2300~~ 2763 PPM NAT.BORON

0 INT. ZONE NUMBER RADIUS INT. MIDPOINT AREA VOLUME PROD DENSITY

1	1	0	4.44500E-02	0	2.48287E-02	3.39356E-02
2	1	8.8[illegible]00E-02	1.33350E-01	5.58575E-01	7.44860E-02	1.30676E-01
3	1	1.778[illegible]0E-01	2.22250E-01	1.11715E+00	1.24143E-01	2.12181E-01
4	1	2.66700E-01	3.11150E-01	1.67573E+00	1.73801E-01	3.11996E-01
5	1	3.55600E-01	4.00050E-01	2.23430E+00	2.23458E-01	4.19687E-01
6	2	4.44500E-01	4.65150E-01	2.79288E+00	1.20704E-01	0
7	2	4.85800E-01	5.06450E-01	3.05237E+00	1.31422E-01	0
8	3	5.27100E-01	5.61763E-01	3.31187E+00	2.44694E-01	0
9	3	5.96425E-01	6.31088E-01	3.74745E+00	2.74890E-01	0
10	3	6.65750E-01	7.00413E-01	4.18303E+00	3.05087E-01	0
11	3	7.35075E-01	7.69738E-01	4.61861E+00	3.35284E-01	0

TIME OF DAY 02:40:41.

TIME OF DAY 02:40:43.

0TRANSPORT CROSS SECTION WEIGHTING FUNCTION

0 ZONE	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	6.49066E-06	1.81788E-05	4.50061E-05	1.01025E-04	2.06705E-04	3.80852E-04	6.61282E-04	1.07285E-03
2	7.28039E-06	2.03540E-05	5.04337E-05	1.12905E-04	2.30550E-04	4.29760E-04	7.42816E-04	1.20530E-03
3	2.60108E-06	7.27540E-06	1.80375E-05	4.03810E-05	8.23480E-05	1.54401E-04	2.66605E-04	4.32911E-04
4	4.36914E-06	1.22269E-05	3.02905E-05	6.78752E-05	1.38702E-04	2.57791E-04	4.46184E-04	7.24117E-04

0 ZONE	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	1.61561E-03	2.22985E-03	3.06797E-03	3.92436E-03	4.69405E-03	5.28795E-03	5.25935E-03	7.65906E-03
2	1.82905E-03	2.59054E-03	3.50518E-03	4.57680E-03	5.59122E-03	6.46237E-03	7.61779E-03	9.11393E-03
3	6.59666E-04	9.39055E-04	1.27968E-03	1.67349E-03	2.05955E-03	2.41212E-03	2.84470E-03	3.39216E-03
4	1.09660E-03	1.53679E-03	2.08344E-03	2.72089E-03	3.36078E-03	3.79261E-03	4.47932E-03	5.40473E-03

0 ZONE	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24
1	8.47965E-03	9.29230E-03	9.66003E-03	9.06862E-03	8.56905E-03	9.45339E-03	9.07033E-03	9.64424E-03
2	1.02863E-02	1.10690E-02	1.16776E-02	1.12333E-02	1.07785E-02	1.17503E-02	1.13959E-02	1.20080E-02
3	3.84475E-03	4.16190E-03	4.45953E-03	4.24947E-03	4.19856E-03	4.56934E-03	4.47602E-03	4.71897E-03
4	6.11972E-03	6.58503E-03	6.94931E-03	6.64426E-03	6.34919E-03	6.85161E-03	6.73317E-03	7.12758E-03

0 ZONE	GRP. 25	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32
1	8.60533E-03	9.30172E-03	9.26708E-03	9.36854E-03	9.91003E-03	1.05556E-02	9.16458E-03	8.48067E-03
2	1.08623E-02	1.16015E-02	9.34275E-03	9.67152E-03	1.03496E-02	1.31367E-02	1.14784E-02	1.05805E-02
3	4.32594E-03	4.60095E-03	3.77332E-03	3.88461E-03	4.90040E-03	5.22262E-03	4.61719E-03	4.25973E-03
4	6.64563E-03	6.90461E-03	5.32964E-03	5.73729E-03	7.35402E-03	7.83890E-03	6.85537E-03	6.32268E-03

0 ZONE	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40
1	7.45649E-03	6.63852E-03	4.01723E-03	3.42567E-03	5.97661E-03	3.28991E-03	8.55575E-03	4.37285E-03
2	9.49077E-03	8.19278E-03	4.97573E-03	4.11601E-03	7.18792E-03	4.09450E-03	6.76648E-03	5.16074E-03
3	3.82212E-03	3.31407E-03	2.09810E-03	1.71697E-03	2.84459E-03	1.53222E-03	2.75516E-03	2.11008E-03
4	5.69603E-03	4.93429E-03	3.04105E-03	2.53637E-03	4.32391QE-03	2.34521E-03	6.10716E-03	3.18187E-03

0 ZONE	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45	GRP. 46	GRP. 47	GRP. 48
1	3.32529E-03	3.27136E-03	2.87210E-03	2.54102E-03	2.26619E-03	2.02660E-03	1.86094E-03	1.66071E-03
2	4.32320E-03	4.31148E-03	3.78940E-03	2.74694E-03	2.39106E-03	2.02053E-03	1.87399E-03	1.61252E-03
3	1.75896E-03	1.51169E-03	1.30145E-03	1.12277E-03	9.74573E-04	8.13083E-04	7.69074E-04	6.61915E-04
4	2.68047E-03	2.32184E-03	2.01597E-03	1.75737E-03	1.54341E-03	1.37345E-03	1.23952E-03	1.08492E-03

ZONE	GRP. 49	GRP. 50	GRP. 51	GRP. 52	GRP. 53	GRP. 54	GRP. 55	GRP. 56
1	1.46462E-03	1.04767E-03	3.45520E-03	1.94828E-03	1.51772E-03	1.10109E-03	9.61204E-04	8.49676E-04
2	1.03660E-03	2.64775E-03	1.93715E-03	1.31999E-03	7.68661E-04	4.11081E-04	1.49829E-04	8.54625E-05
3	5.63660E-04	1.09733E-03	8.12959E-04	5.61201E-04	3.27744E-04	2.02207E-04	9.11096E-05	1.85532E-05
4	4.38234E-04	1.88516E-03	1.45385E-03	1.07882E-03	7.45669E-04	5.27016E-04	3.64248E-04	2.96000E-04

0 ZONE	GRP. 57	GRP. 58	GRP. 59	GRP. 60	GRP. 61	GRP. 62	GRP. 63	GRP. 64
1	9.78539E-04	1.08624E-03	1.11115E-03	1.17147E-03	1.18799E-03	1.23150E-03	1.18542E-03	1.21023E-03
2	2.25384E-04	3.70868E-04	4.79405E-04	5.82692E-04	6.04055E-04	6.74818E-04	6.37620E-04	6.62043E-04
3	7.33821E-05	1.17582E-04	1.65204E-04	2.22590E-04	2.29242E-04	2.56131E-04	2.50664E-04	2.57885E-04
4	3.68854E-04	4.44777E-04	4.90416E-04	5.56995E-04	5.67913E-04	6.05892E-04	5.87590E-04	5.98812E-04

0 ZONE	GRP. 65	GRP. 66	GRP. 67	GRP. 68	GRP. 69	GRP. 70	GRP. 71	GRP. 72
1	1.29186E-03	1.32796E-03	1.20476E-03	1.46934E-03	1.45294E-03	1.52255E-03	1.50948E-03	1.55019E-03
2	7.79105E-04	8.38253E-04	6.92221E-04	1.06438E-03	1.04936E-03	1.34309E-03	1.13806E-03	1.21461E-03
3	2.99248E-04	3.21961E-04	2.79748E-04	4.10350E-04	4.00699E-04	5.09413E-04	4.43203E-04	4.77573E-04
4	6.61860E-04	6.93178E-04	6.13231E-04	8.14831E-04	8.07029E-04	9.67825E-04	8.54704E-04	8.96750E-04

0 ZONE	GRP. 73	GRP. 74	GRP. 75	GRP. 76	GRP. 77	GRP. 78	GRP. 79	GRP. 80
1	1.68458E-03	1.89565E-03	2.74383E-03	1.04284E-03	3.61391E-03	1.07583E-03	3.04320E-03	1.56487E-03

0	2	2.01269E-03	1.68008E-03	3.10982E-03	4.76447E-04	4.44882E-03	5.12402E-04	3.52701E-03	1.28522E-03
	3	1.00033E-03	6.40861E-04	1.22091E-03	2.17673E-04	1.70824E-03	2.37053E-04	1.36038E-03	5.24217E-04
	4	1.33483E-03	1.15290E-03	1.92022E-03	5.01734E-04	2.63005E-03	5.27235E-04	2.14296E-03	9.36368E-04

0 ZONE	GRP. 81	GRP. 82	GRP. 83	GRP. 84	GRP. 85	GRP. 86	GRP. 87	GRP. 88
1	2.31764E-03	5.17335E-03	7.34541E-04	5.77876E-03	1.21057E-03	2.33568E-03	2.73017E-03	6.45213E-03
2	2.42257E-03	7.31709E-03	1.06968E-04	7.97982E-03	7.74153E-04	2.51820E-03	3.11251E-03	9.01161E-03
3	9.44282E-04	2.80457E-03	3.36456E-05	3.05066E-03	3.64698E-04	9.94615E-04	1.21765E-03	3.44522E-03
4	1.54649E-03	4.08757E-03	2.56759E-04	4.49505E-03	6.73770E-04	1.59308E-03	1.91451E-03	5.05378E-03

0 ZONE	GRP. 89	GRP. 90	GRP. 91	GRP. 92	GRP. 93	GRP. 94	GRP. 95	GRP. 96
1	3.80996E-03	1.39154E-03	1.36274E-03	1.00881E-03	1.08212E-03	1.96846E-04	2.74379E-04	4.13901E-04

3	1.96348E-03	5.39709E-04	5.10538E-04	3.09044E-04	3.41317E-04	6.35413E-06	5.10179E-05	1.32162E-04
4	2.81452E-03	9.83191E-04	8.54957E-04	5.68939E-04	6.24160E-04	6.53038E-05	1.26149E-04	2.41177E-04

0 ZONE	GRP. 97	GRP. 98	GRP. 99	GRP.100	GRP.101	GRP.102	GRP.103	GRP.104
1	4.86283E-04	8.83330E-04	1.07720E-03	8.65342E-04	8.88672E-04	1.13423E-03	1.28949E-03	1.70497E-03
2	3.20884E-04	8.01493E-04	1.17620E-03	8.21606E-04	8.56852E-04	1.04730E-03	1.29020E-03	1.77780E-03
3	1.23671E-04	3.31287E-04	4.57657E-04	3.21894E-04	3.34491E-04	4.06847E-04	5.04338E-04	6.85066E-04
4	2.58855E-04	5.64437E-04	7.35957E-04	5.49815E-04	5.68499E-04	7.08390E-04	8.41253E-04	1.13202E-03

0 ZONE	GRP.105	GRP.106	GRP.107	GRP.108	GRP.109	GRP.110	GRP.111	GRP.112
1	2.62694E-03	2.27507E-03	2.90653E-03	3.40871E-03	1.74915E-03	2.12927E-03	2.77611E-03	3.72881E-03
2	3.00196E-03	2.80405E-03	3.62734E-03	4.19728E-03	2.15197E-03	2.62842E-03	3.45968E-03	4.68629E-03
3	1.15967E-03	1.07785E-03	1.38575E-03	1.62094E-03	8.34899E-04	1.02704E-03	1.35896E-03	1.85124E-03
4	1.83620E-03	1.65752E-03	2.12814E-03	2.48638E-03	1.27742E-03	1.56222E-03	2.05245E-03	2.77618E-03

0 ZONE	GRP.113	GRP.114	GRP.115	GRP.116	GRP.117	GRP.118	GRP.119	GRP.120
1	5.37901E-03	8.01746E-03	5.62051E-03	7.00061E-03	6.68104E-03	1.03370E-02	1.18223E-02	1.27920E-02
2	6.85789E-03	1.03807E-02	7.39324E-03	9.29985E-03	1.16764E-02	1.40695E-02	1.62139E-02	1.80104E-02
3	2.72616E-03	4.15260E-03	2.96524E-03	3.72447E-03	4.65679E-03	5.59373E-03	6.47935E-03	7.07872E-03
4	4.04866E-03	6.10520E-03	4.32523E-03	5.41636E-03	6.75623E-03	8.09333E-03	9.33393E-03	1.01791E-02

0 ZONE	GRP.121	GRP.122	GRP.123	GRP.124
1	6.29988E-03	5.71386E-03	4.48544E-03	4.49603E-01
2	8.05076E-03	8.36819E-03	6.79969E-03	5.03278E-01
3	3.51194E-03	3.20699E-03	2.54872E-03	2.09965E-01
4	5.05022E-03	4.61260E-03	3.65223E-03	3.23183E-01

TIME OF DAY 02:40:46.

(E42NXE3) EXXON 15X15 PWR, 4.2% U235, ~~3300~~ 2053 PPM NAT.BORON

MODEL AVERAGED FLUXES

0 ZONE	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	2.32936E-04	6.55385E-04	1.61470E-03	7.61201E-03	7.45164E-03	1.32818E-02	2.03598E-02	3.77091E-02
2	2.25279E-04	6.34253E-04	1.56195E-03	7.48338E-03	7.21057E-03	1.28312E-02	2.05625E-02	3.68474E-02
3	2.20525E-04	6.20974E-04	1.52879E-03	7.41953E-03	7.05962E-03	1.25486E-02	2.00713E-02	3.56494E-02
4	2.24904E-04	6.32167E-04	1.55912E-03	7.48747E-03	7.19804E-03	1.28064E-02	2.05195E-02	3.65773E-02

0 ZONE	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	5.54476E-02	7.14754E-02	9.40643E-02	1.22278E-01	1.38211E-01	1.42451E-01	1.71378E-01	2.27827E-01
2	5.35292E-02	6.87493E-02	9.03524E-02	1.17429E-01	1.32264E-01	1.35515E-01	1.63181E-01	2.18206E-01
3	5.23095E-02	6.69995E-02	8.79585E-02	1.14209E-01	1.28359E-01	1.30802E-01	1.57706E-01	2.11697E-01
4	5.34178E-02	6.83877E-02	8.98198E-02	1.17118E-01	1.31851E-01	1.34989E-01	1.62560E-01	2.17400E-01

0 ZONE	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24
1	2.66043E-01	2.84724E-01	2.97106E-01	2.63823E-01	2.39657E-01	2.71460E-01	2.59423E-01	2.85683E-01
2	2.55377E-01	2.73304E-01	2.85521E-01	2.52745E-01	2.28991E-01	2.59059E-01	2.48281E-01	2.71919E-01
3	2.47930E-01	2.65231E-01	2.76755E-01	2.44062E-01	2.20534E-01	2.50651E-01	2.39112E-01	2.62242E-01
4	2.54796E-01	2.72189E-01	2.84056E-01	2.51173E-01	2.27421E-01	2.58147E-01	2.46047E-01	2.69980E-01

0 ZONE	GRP. 25	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32
1	2.81029E-01	2.78577E-01	2.13268E-01	2.17013E-01	2.83735E-01	3.03580E-01	2.70393E-01	2.54426E-01
2	2.40295E-01	2.67459E-01	2.04214E-01	2.07481E-01	2.71399E-01	2.90505E-01	2.59349E-01	2.44174E-01
3	2.31291E-01	2.57956E-01	1.96170E-01	1.99208E-01	2.60977E-01	2.79241E-01	2.49426E-01	2.35124E-01
4	2.38504E-01	2.65421E-01	2.02769E-01	2.05671E-01	2.69219E-01	2.88070E-01	2.57040E-01	2.42152E-01

0 ZONE	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40
1	2.37582E-01	2.15858E-01	1.60301E-01	1.46813E-01	1.97716E-01	2.22214E-01	1.89991E-01	1.67817E-01
2	2.28502E-01	2.08087E-01	1.56002E-01	1.43189E-01	1.90597E-01	2.13271E-01	1.83553E-01	1.63125E-01
3	2.20294E-01	2.00945E-01	1.51415E-01	1.39524E-01	1.84547E-01	2.05565E-01	1.77566E-01	1.58620E-01
4	2.26591E-01	2.06385E-01	1.54697E-01	1.42206E-01	1.89319E-01	2.11605E-01	1.82072E-01	1.61987E-01

0 ZONE	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45	GRP. 46	GRP. 47	GRP. 48
1	1.55857E-01	1.46446E-01	1.38328E-01	1.31777E-01	1.26325E-01	1.21831E-01	1.14570E-01	1.09249E-01
2	1.52021E-01	1.43238E-01	1.35658E-01	1.29563E-01	1.24487E-01	1.20285E-01	1.13231E-01	1.08211E-01
3	1.48299E-01	1.40059E-01	1.32941E-01	1.27239E-01	1.22487E-01	1.18663E-01	1.11650E-01	1.06868E-01
4	1.51069E-01	1.42403E-01	1.34923E-01	1.28913E-01	1.23907E-01	1.19832E-01	1.12738E-01	1.07777E-01

0 ZONE	GRP. 49	GRP. 50	GRP. 51	GRP. 52	GRP. 53	GRP. 54	GRP. 55	GRP. 56
1	1.04482E-01	2.42987E-01	2.23668E-01	2.06757E-01	1.92723E-01	1.82352E-01	1.73385E-01	1.66872E-01
2	1.03653E-01	2.41675E-01	2.23075E-01	2.06762E-01	1.93218E-01	1.83315E-01	1.74576E-01	1.68223E-01
3	1.02522E-01	2.39513E-01	2.21491E-01	2.05704E-01	1.92671E-01	1.82966E-01	1.74449E-01	1.68343E-01
4	1.03260E-01	2.40842E-01	2.22352E-01	2.06157E-01	1.92755E-01	1.82822E-01	1.74140E-01	1.67879E-01

1	1.62152E+01	1.57902E+01	1.54377E+01	1.51548E+01	1.49281E+01	1.48199E+01	1.47549E+01	1.46773E+01
2	1.63674E+01	1.59635E+01	1.56126E+01	1.53390E+01	1.51664E+01	1.50166E+01	1.49404E+01	1.48675E+01
3	1.63833E+01	1.59962E+01	1.56460E+01	1.53852E+01	1.52096E+01	1.50638E+01	1.49862E+01	1.49126E+01
4	1.63289E+01	1.59235E+01	1.55782E+01	1.53091E+01	1.51336E+01	1.49835E+01	1.49099E+01	1.48352E+01

0 ZONE	GRP. 65	GRP. 66	GRP. 67	GRP. 68	GRP. 69	GRP. 70	GRP. 71	GRP. 72
1	1.45486E+01	1.44306E+01	1.43912E+01	1.41823E+01	1.40359E+01	1.37975E+01	1.38133E+01	1.36959E+01
2	1.47572E+01	1.46499E+01	1.45810E+01	1.43967E+01	1.42939E+01	1.40316E+01	1.40582E+01	1.39447E+01
3	1.48091E+01	1.47047E+01	1.46285E+01	1.44720E+01	1.43695E+01	1.41667E+01	1.41361E+01	1.40351E+01
4	1.47231E+01	1.46142E+01	1.45502E+01	1.43650E+01	1.42638E+01	1.40572E+01	1.40290E+01	1.39203E+01

0 ZONE	GRP. 73	GRP. 74	GRP. 75	GRP. 76	GRP. 77	GRP. 78	GRP. 79	GRP. 80
1	1.31447E+01	1.32632E+01	1.24162E+01	1.04995E+01	1.15155E+01	1.31958E+01	1.17472E+01	1.26206E+01
2	1.33767E+01	1.35905E+01	1.30515E+01	1.14677E+01	1.24817E+01	1.33722E+01	1.24867E+01	1.28835E+01
3	1.36524E+01	1.37104E+01	1.32975E+01	1.16816E+01	1.26297E+01	1.35873E+01	1.27218E+01	1.29697E+01
4	1.34632E+01	1.35607E+01	1.29479E+01	1.16242E+01	1.25852E+01	1.35271E+01	1.26053E+01	1.28536E+01

0 ZONE	GRP. 81	GRP. 82	GRP. 83	GRP. 84	GRP. 85	GRP. 86	GRP. 87	GRP. 88
1	1.20676E+01	8.88038E+02	1.25596E+01	8.76916E+02	1.17925E+01	1.10615E+01	1.06305E+01	7.66612E+02
2	1.26674E+01	1.09122E+01	1.26805E+01	1.07385E+01	1.20006E+01	1.14548E+01	1.10960E+01	8.14670E+02
3	1.26570E+01	1.14955E+01	1.26310E+01	1.09604E+01	1.20245E+01	1.16447E+01	1.13035E+01	8.34646E+02
4	1.24525E+01	1.06345E+01	1.24163E+01	1.02279E+01	1.15507E+01	1.10471E+01	1.10951E+01	8.12243E+02

0 ZONE	GRP. 89	GRP. 90	GRP. 91	GRP. 92	GRP. 93	GRP. 94	GRP. 95	GRP. 96
1	9.17089E+02	1.07908E+01	1.07004E+01	1.07914E+01	1.02603E+01	3.79949E+02	3.90011E+02	3.80118E+02
2	9.84744E+02	1.06252E+01	1.05271E+01	1.05557E+01	1.04743E+01	3.82142E+02	3.94285E+02	3.90573E+02
3	1.02337E+01	1.06826E+01	1.05687E+01	1.05765E+01	1.04724E+01	3.91648E+02	3.94029E+02	3.92589E+02
4	9.86129E+02	1.05362E+01	1.04930E+01	1.05174E+01	1.04019E+01	3.81206E+02	3.92863E+02	3.89759E+02

0 ZONE	GRP. 97	GRP. 98	GRP. 99	GRP.100	GRP.101	GRP.102	GRP.103	GRP.104
1	4.82113E+02	5.56731E+02	6.08000E+02	5.59706E+02	5.55598E+02	7.63473E+02	7.33419E+02	8.76243E+02
2	4.89962E+02	5.70688E+02	6.25634E+02	5.73637E+02	5.70116E+02	7.81599E+02	7.54019E+02	9.04011E+02
3	4.91303E+02	5.77754E+02	6.35791E+02	5.80399E+02	5.77251E+02	7.90801E+02	7.65483E+02	9.20446E+02
4	4.83329E+02	5.70103E+02	6.26044E+02	5.73264E+02	5.69846E+02	7.81067E+02	7.54276E+02	9.05113E+02

0 ZONE	GRP.105	GRP.106	GRP.107	GRP.108	GRP.109	GRP.110	GRP.111	GRP.112
1	1.03244E+01	8.36932E+02	7.22427E+02	9.12787E+02	4.64706E+02	5.58230E+02	6.89498E+02	8.70472E+02
2	1.07568E+01	8.73443E+02	7.72103E+02	9.70279E+02	4.96189E+02	5.94209E+02	7.35215E+02	9.33508E+02
3	1.10439E+01	9.00559E+02	8.08033E+02	1.01297E+01	5.16075E+02	6.21768E+02	7.71951E+02	9.83776E+02
4	1.07886E+01	8.77196E+02	7.77437E+02	9.77001E+02	4.97675E+02	5.99035E+02	7.41329E+02	9.42944E+02

0 ZONE	GRP.113	GRP.114	GRP.115	GRP.116	GRP.117	GRP.118	GRP.119	GRP.120
1	1.14995E+01	1.53197E+01	9.63910E+02	1.11477E+01	1.25206E+01	1.34104E+01	1.34694E+02	1.21002E+01
2	1.24012E+01	1.66970E+01	1.06094E+01	1.23663E+01	1.40432E+01	1.52494E+01	1.53113E+02	1.45603E+01
3	1.31539E+01	1.78594E+01	1.14472E+01	1.34265E+01	1.53936E+01	1.69176E+01	1.70313E+02	1.68147E+01
4	1.25520E+01	1.69385E+01	1.07912E+01	1.25986E+01	1.42496E+01	1.56399E+01	1.61096E+02	1.51771E+01

0 ZONE	GRP.121	GRP.122	GRP.123
1	5.02347E+02	3.89024E+02	2.37158E+02
2	6.23843E+02	5.04200E+02	3.35545E+02
3	7.46700E+02	6.20623E+02	4.30134E+02
4	6.56849E+02	5.35482E+02	3.59476E+02

[illegible] FACTORS (ZONE AVERAGE/CELL AVERAGE FLUX)

0 ZONE	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	1.03571E+00	1.03541E+00	1.03565E+00	1.03571E+00	1.03523E+00	1.03712E+00	1.03642E+00	1.03661E+00
2	1.00167E+00	1.00171E+00	1.00175E+00	1.00170E+00	1.00174E+00	1.00193E+00	1.00191E+00	1.00193E+00
3	9.80528E-01	9.80680E-01	9.80544E-01	9.80521E-01	9.80769E-01	9.79713E-01	9.80094E-01	9.79990E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

0 ZONE	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	1.03792E+00	1.04217E+00	1.04377E+00	1.04406E+00	1.04824E+00	1.05527E+00	1.05425E+00	1.04782E+00
2	1.00209E+00	1.00243E+00	1.00258E+00	1.00266E+00	1.00313E+00	1.00389E+00	1.00382E+00	1.00357E+00
3	9.79253E-01	9.76906E-01	9.76017E-01	9.75845E-01	9.73506E-01	9.69576E-01	9.70141E-01	9.73635E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

0 ZONE	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24

0	1.04578E+00	1.04605E+00	1.04594E+00	1.05036E+00	1.05381E+00	1.05157E+00	1.05265E+00	1.05065E+00
2	1.00386E+00	1.00424E+00	1.00516E+00	1.00626E+00	1.00686E+00	1.00663E+00	1.00732E+00	1.00718E+00
3	9.74663E-01	9.74436E-01	9.74296E-01	9.71690E-01	9.69715E-01	9.70961E-01	9.70234E-01	9.71337E-01

0 ZONE	GRP. 25	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32
1	1.05251E+00	1.04952E+00	1.05376E+00	1.05815E+00	1.05392E+00	1.05384E+00	1.05187E+00	1.05061E+00
2	1.00793E+00	1.00764E+00	1.00902E+00	1.00880E+00	1.00210E+00	1.00865E+00	1.00890E+00	1.00876E+00
3	9.70175E-01	9.71838E-01	9.69274E-01	9.68576E-01	9.69385E-01	9.69351E-01	9.70210E-01	9.70974E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40
1	1.04851E+00	1.04590E+00	1.03623E+00	1.03243E+00	1.04475E+00	1.05014E+00	1.04294E+00	1.03599E+00
2	1.00843E+00	1.00825E+00	1.00843E+00	1.00691E+00	1.00675E+00	1.00767E+00	1.00813E+00	1.00702E+00
3	9.72210E-01	9.73645E-01	9.78781E-01	9.81143E-01	9.74797E-01	9.71459E-01	9.75252E-01	9.79215E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45	GRP. 46	GRP. 47	GRP. 48
1	1.03170E+00	1.02639E+00	1.02524E+00	1.02222E+00	1.01951E+00	1.01669E+00	1.01625E+00	1.01412E+00
2	1.00631E+00	1.00506E+00	1.00545E+00	1.00505E+00	1.00468E+00	1.00378E+00	1.00437E+00	1.00403E+00
3	9.81667E-01	9.83935E-01	9.85210E-01	9.87017E-01	9.88561E-01	9.90248E-01	9.90352E-01	9.91568E-01
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP. 49	GRP. 50	GRP. 51	GRP. 52	GRP. 53	GRP. 54	GRP. 55	GRP. 56
1	1.01183E+00	1.00891E+00	1.00592E+00	1.00291E+00	9.99875E-01	9.97430E-01	9.95665E-01	9.94000E-01
2	1.00380E+00	1.00346E+00	1.00325E+00	1.00294E+00	1.00240E+00	1.00270E+00	1.00251E+00	1.00259E+00
3	9.92845E-01	9.94462E-01	9.96127E-01	9.97803E-01	9.99566E-01	1.00079E+00	1.00177E+00	1.00276E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP. 57	GRP. 58	GRP. 59	GRP. 60	GRP. 61	GRP. 62	GRP. 63	GRP. 64
1	9.92914E-01	9.91630E-01	9.90976E-01	9.89921E-01	9.89728E-01	9.89061E-01	9.89606E-01	9.89356E-01
2	1.00211E+00	1.00251E+00	1.00221E+00	1.00195E+00	1.00217E+00	1.00221E+00	1.00205E+00	1.00219E+00
3	1.00733E+00	1.00793E+00	1.00475E+00	1.00497E+00	1.00503E+00	1.00532E+00	1.00512E+00	1.00522E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP. 65	GRP. 66	GRP. 67	GRP. 68	GRP. 69	GRP. 70	GRP. 71	GRP. 72
1	9.88146E-01	9.87434E-01	9.86973E-01	9.85189E-01	9.85425E-01	9.83243E-01	9.84624E-01	9.82862E-01
2	1.00231E+00	1.00244E+00	1.00212E+00	1.0022.E+00	1.00211E+00	9.99594E-01	1.00208E+00	1.00175E+00
3	1.00584E+00	1.00619E+00	1.00539E+00	1.00745E+00	1.00730E+00	1.00621E+00	1.00776E+00	1.00624E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP. 73	GRP. 74	GRP. 75	GRP. 76	GRP. 77	GRP. 78	GRP. 79	GRP. 80
1	9.76747E-01	9.78356E-01	9.85249E-01	9.90842E-01	9.95779E-01	9.90149E-01	9.50978E-01	9.82179E-01
2	9.93575E-01	1.00250E+00	1.00412E+00	1.00319E+00	1.00779E+00	1.00246E+00	1.00320E+00	1.00252E+00
3	1.01405E+00	1.01104E+00	1.02305E+00	1.00421E+00	1.02598E+00	1.00451E+00	1.02551E+00	1.00903E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP. 81	GRP. 82	GRP. 83	GRP. 84	GRP. 85	GRP. 86	GRP. 87	GRP. 88
1	9.69012E-01	9.75940E-01	9.95505E-01	9.97380E-01	9.86765E-01	9.[illegible]6E-01	9.56125E-01	9.40360E-01
2	1.00111E+00	1.02708E+00	1.00572E+00	1.01081E+00	1.00415E+00	1.00211E+00	1.00309E+00	1.00266E+00
3	1.01634E+00	1.08196E+00	1.00116E+00	1.07397E+00	1.00617E+00	1.01762E+00	1.02279E+00	1.00455E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP. 89	GRP. 90	GRP. 91	GRP. 92	GRP. 93	GRP. 94	GRP. 95	GRP. 96
1	9.29989E-01	9.81524E-01	9.91643E-01	9.88021E-01	9.86293E-01	9.96754E-01	9.92742E-01	9.85547E-01
2	9.98596E-01	1.00367E+00	1.00324E+00	1.00364E+00	1.00202E+00	1.00508E+00	1.00362E+00	1.00213E+00
3	1.03777E+00	1.00909E+00	1.00912E+00	1.00562E+00	1.00668E+00	1.00063E+00	1.00210E+00	1.00727E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

(SDKNPM VER5. 1.08 90/01/03. 02.39.46. PAGE 21)

0 ZONE	GRP. 97	GRP. 98	GRP. 99	GRP.100	GRP.101	GRP.102	GRP.103	GRP.104
1	9.87271E-01	9.75833E-01	9.[illegible]99E-01	9.76486E-01	9.75523E-01	9.77450E-01	9.73061E-01	9.68656E-01
2	1.00334E+00	1.00099E+00	9.99201E-01	1.00065E+00	1.00047E+00	1.00065E+00	9.99668E-01	9.99235E-01
3	1.00608E+00	1.01271E+00	1.01853E+00	1.01244E+00	1.01300E+00	1.01192E+00	1.01449E+00	1.01694E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP.105	GRP.106	GRP.107	GRP.108	GRP.109	GRP.110	GRP.111	GRP.112
1	9.56981E-01	9.37645E-01	9.29242E-01	9.34198E-01	9.33755E-01	9.32315E-01	9.27984E-01	9.23143E-01
2	9.97056E-01	9.94516E-01	9.93139E-01	9.93039E-01	9.92995E-01	9.91960E-01	9.90949E-01	9.89994E-01
3	1.02366E+00	1.03456E+00	1.03936E+00	1.03673E+00	1.03697E+00	1.03797E+00	1.04050E+00	1.04330E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP.113	GRP.114	GRP.115	GRP.116	GRP.117	GRP.118	GRP.119	GRP.120
1	9.15275E-01	9.04375E-01	8.93239E-01	8.84836E-01	8.72539E-01	8.57457E-01	8.36046E-01	8.02541E-01
2	9.87986E-01	9.85174E-01	9.83152E-01	9.81558E-01	9.79067E-01	9.75038E-01	9.69068E-01	9.59399E-01
3	1.04795E+00	1.05439E+00	1.06079E+00	1.06564E+00	1.07276E+00	1.08170E+00	1.09446E+00	1.11449E+00
4	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00
0 ZONE	GRP.121	GRP.122	GRP.123					

```
    2  9.49752E-01  9.41768E-01  9.33426E-01
    3  1.13679E+00  1.15902E+00  1.19656E+00
    4  1.00000E+00  1.00000E+00  1.00000E+00
0ZONE       VOLUME       VOL. FRACTION

    1     6.20717E-01      3.05351E-01
    2     2.52126E-01      1.24029E-01
    3     1.15995E+00      5.70620E-01
    4     2.03280E+00      1.00000E+00
 TIME OF DAY 02.40.46.
--EOR--
1                                                            NITAWL    VERS. 1.2  90/01/03. 02.40.49. PAGE    1
0
0
```

NITAWL

90/01/03

02.40.49

```
1                                                            NITAWL    VERS. 1.2  90/01/03. 02.40.49. PAGE    2
0        F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                    C O L U M N   N U M B E R
         CARD                                 11111111112222222222333333333344444444445555555555666666666677777777778
         NUMBER                      12345678901234567890123456789012345678901234567890123456789012345678901234567890
```

```
            2                       2$$
            3                         10001  80004
            4                         50000  60002  110000 120005  170000
            5                         140005 240002 250005 260001 280003  820000
            6                         50100
            7                         50922351
            8                         50922381
            9                         5080004
           10                         50400000
           11                         5010001
           12                         5  4100
           13                         33922351
           14                         33922381
           15                         3280004
           16                         33400000
           17                         3310001
           18                         3350100
           19                         25922351
           20                         25922381
           21                         2580004
           22                         25400000
           27                         2510001
                                      2550100
           25                         42922351
           26                         42922381
           27                         4280004
           28                         4240000
           29                         4210001
           30                         4250100
           31                    1
0          ********************************** E N D   O F   I N P U T   L I S T I N G ********** **************************
```

```
                                                                    NITAWL    VERS. 1.2  90/017.   02.40.49. PAGE    3
0
0    1$ ARRAY     12 ENTRIES READ
0    0T
0 MSCM     NUMBER OF EXTRA CROSS SECTIONS                          0
  NMT      NUMBER OF NUCLIDES FROM MASTER LIBRARY                  0
  NWT      NUMBER OF NUCLIDES FROM X-SECT LIBRARY (LOG 2)         32
  NXT      NUMBER OF NUCLIDES FROM X-SECT LIBRARY (LOG 3)          6
  MCR      ANISN/DOT/MORSE OUTPUT TRIGGER                          0
  MT       TOTAL CROSS SECTION POSITION                            1
  MS       WITHIN-GROUP SCATTERING CROSS SECTION POSITION          4
  IRES     NUMBER OF RESONANCE CALCULATIONS                        0
  IHM      TABLE LENGTH FOR CROSS SECTIONS                       126
  IPM      IS AN OLD ANISN LIBRARY MOUNTED ? (0/1 NO/YES)          0
  IPP      OUTPUT OPTION TRIGGER                                  -1
  IFG      PRINT CONTROL - ANISN OUTPUT                            0
0THE STORAGE ALLOCATED FOR THIS CASE IS  33000 WORDS
0    2$ ARRAY     38 ENTRIES READ
0    0T
0 GENERAL INFORMATION CONCERNING CROSS SECTION LIBRARY
    TAPE IDENTIFICATION NUMBER                  162
    NUMBER OF NUCLIDES ON TAPE                    6
    NUMBER OF NEUTRON ENERGY GROUPS             123
    FIRST THERMAL NEUTRON ENERGY GROUP           94
    NUMBER OF GAMMA ENERGY GROUPS                 0
-  WORK TAPE    327
```

```
 THE TITLE OF THE PARENT CASE IS AS FOLLOWS
 XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED-- [E25NXBI] EXXON 15X15 PWR, 2.5% U235
 , 900 PPM NAT.BORON

-  WTD. TAPE    162
0 XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED-- [E42NXBI] EXXON 15X15 PWR, 4.2% U235
 , 2300 PPM NAT.BORON



0 NUCLIDES FROM  WORK TAPE
      1     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K              10001
      2     OXYGEN                          THERMAL TEMPERATURE= 294.6 K              80004
      3     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K            50922351
      4     URANIUM-238R                   THERMAL TEMPERATURE = .'4.6 K            50922381
      5     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= .94.6 K            5010001
      6     BORON     NATURAL                                                       50000
      7     BORON-10                                                                50100
      8     BORON-10                                                              5050100
      9     CARBON     NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 509.26 K           60002
     10     OXYGEN                          THERMAL TEMPERATURE= 294.6 K            5080004
     11     SODIUM     NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K           110000
1                                                                     NITAWL    VERS. 1.2  90/01/03. 02.40.49. PAGE    4
0    12     MAGNESIUM                            THERMAL TEMP =  900.0 K            120005
     13     ALUMINUM   NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K         130000
     14     SILICON                              THERMAL TEMP =  900.0 K            140005
     15    CHROMIUM       THERMAL TEMP=294.6                                        240003
     16     MANGANESE                            THERMAL TEMP =  900.0 K            250005
     17    IRON           THERMAL TEMP=294.6                                        260001
     18    NICKEL         THERMAL TEMP=294.6                                        280003
     19     ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K        50400000
     20     LEAD       NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K           820000
     21     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K            33922351
     22     URANIUM-238R                   THERMAL TEMPERATURE = 294.6 K            33922381
     23     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K            3310001
     24     BORON-10                                                              3350100
     25     OXYGEN                          THERMAL TEMPERATURE= 294.6 K            3380004
     26     ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K        33400000
     27     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K            25922351
     28     URANIUM-238R                   THERMAL TEMPERATURE = 294.6 K            25922381
     29     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K            2510001
     30     BORON-10                                                              2550100
     31     OXYGEN                          THERMAL TEMPERATURE= 294.6 K            2580004
     32     ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K        25400000
0 NUCLIDES FROM  WTD. TAPE
     33     URANIUM-235                    THERMAL TEMPERATURE = 294.6 K            42922351
     34     URANIUM-238R                   THERMAL TEMPERATURE = 294.6 K            42922381
     35     HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K            4210001
     36     BORON-10                                                              4250100
     37     OXYGEN                          THERMAL TEMPERATURE= 294.6 K            4280004
     38     ZIRCONIUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.13 K        42400000
 TIME OF DAY 02.40.51.
1                                                                     NITAWL    VERS. 1.2  90/01/03. 02.40.49. PAGE    5
0      THIS XSDRN WORKING TAPE WAS CREATED 90/01/03
       THE TITLE OF THE PARENT CASE IS AS FOLLOWS
       XSDRN WEIGHTED TAPE--PARENT CASE ENTITLED-- [E42NXBI] EXXON 15X15 PWR, 4.2% U235
       , 2300 PPM NAT.BORON
         2753


          TAPE ID                         489          NUMBER OF NUCLIDES                   38
          NUMBER OF NEUTRON GROUPS        123          NUMBER OF GAMMA GROUPS                0
```

TABLE OF CONTENTS

--EOR--

I MESG POWER COMPUTING/990 - NOS 2.7.1.10. NOS 2.7.1 ST=MAC. 90/01/03. 02.42.14.

02.37.00.E42NXBI,P0,T200. HENRY TRAN
02.37.00.USER,VK99SN,,NC.
02.37.00.ABSC, 0.
02.37.00. YOUR PASSWORD EXPIRES AT 00.00.00 ON 90/02/08.
02.37.00.CHARGE,N973301,VSC.
02.37.01. CHARGE = N973301, PROJECT = VSC.
02.37.01.ZZZZQ1.
02.37.02.PROC1. SYSTEM PROLOGUE
02.37.02.COMMENT. SYSTEM PROLOG
02.37.02.NEWS(A).
02.37.03.CHEKEXP.
02.37.04. INQUIRY COMPLETE.
02.37.04.REVERT.
02.37.04.TITLE([E42NXBI] EXXON 15X15 PWR, 4.2% U235, ~~2300~~ PPM NAT.BORON)
02.37.04.LABEL,TAPEA,D=GE,L=EXSECT,VSN=007421.
02.39.37.NT101, ASSIGNED TO TAPEA, VSN=007421.

```
02.39.41. COPY    1 FILES         1 RECS      347443 WORDS
02.39.41.RETURN,TAPE4.
02.39.42.REWIND,TAPE4.
02.39.42.COPYBF,TAPE4,TAPE2.
02.39.43. COPY    1 FILES         1 RECS      347443 WORDS
02.39.43.REWIND,TAPE4.
02.39.43.ATTACHF,XSDRNPM,1,GA.
02.39.45.     STOP
02.39.45.     035200 MAXIMUM EXECUTION FL.
02.39.45.      0.837 CP SECONDS EXECUTION TIME.
02.39.45.XSDRNPM(PL=777777)
02.40.46.      END  XSDRNPM
02.40.46.     245000 MAXIMUM EXECUTION FL.
02.40.46.    109.705 CP SECONDS EXECUTION TIME.
02.40.46. REPRIEVED NORMAL TERMINATION.
02.40.46. JOB REPRIEVED.
02.40.46. RPV - PREVIOUS ERROR CONDITIONS RESET.
02.40.46.REWIND,TAPE2,TAPE3.
02.40.46.RETURN,TAPE4.
02.40.46.ATTACHF,MITAWL,1,2.
02.40.48.     STOP
02.40.48.     035200 MAXIMUM EXECUTION FL.
02.40.49.      0.279 CP SECONDS EXECUTION TIME.
02.40.49.MITAWL(PL=777777)
02.40.53.      END  MNITAWL
02.40.53.     224600 MAXIMUM EXECUTION FL.
02.40.57.      3.122 CP SECONDS EXECUTION TIME.
02.40.53.REWIND,TAPE4.
02.40.53.RETURN,TAPE2,TAPE3.
02.40.53.LABEL,TAPE8,W,D=DE,L=ESBLOT,VBN=007421.
02.42.07.MT101, ASSIGNED TO TAPE8, VSN=007421.
02.42.08.COPYBF,TAPE4,TAPE8.
02.42.11. EOI     1 FILES         1 RECS      350424 WORDS
02.42.12.UEPF,        0.218KUNS.
02.42.12.UEMT,        5.468KUNS.
02.42.12.UEMS,      122.312KUNS.
02.42.12.UECP,       11.037SECS.
02.42.12. BPU,      234.250UNTS.
02.42.12.$OUT(+/OR=E)
02.42.14. NO FILES PROCESSED.
02.42.14.$DAYFILE(OUTPUT,JT=D)
02.42.14.IABG,     1155 SDSS FN=OUTPUT.
02.42.14.POWER COMPUTING/990 - NOS 2.7.1.10
02.42.14.DATE:          90/01/05.
02.42.14.JSN:           MES0
END OF FILE
?
```

```
XEDIT S.  .0
??
E42KEBI MEVT MASSEY JOHN  001 90/01/03. 03.30.14. MID = MAC = NS2
[E42KEBI] EXXON 15X15 PWR, 4.2%U235, 2300 PPM NAT.BORON
--EOR--
                                                                  2753
1                                                  KENOIV     VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE    1
0
0
                    KK        KK   EEEEEEEEEEEEE   NN         NN    00000000000
                    KK       KK    EEEEEEEEEEEEE   NNN        NN   0000000000000
                    KK      KK     EE              NNNN       NN   00         00
                    KK     KK      EE              NN NN      NN   00         00
                    KK    KK       EE              NN  NN     NN   00         00
                    KKKKKKK        EEEEEEEE        NN   NN    NN   00         00
                    KKKKKKK        EEEEEEEE        NN    NN   NN   00         00
                    KK    KK       EE              NN     NN  NN   00         00
                    KK     KK      EE              NN      NN NN   00         00
                    KK      KK     EE              NN       NNNN   00         00
                    KK       KK    EEEEEEEEEEEEE   NN        NNN   0000000000000
                    KK        KK   EEEEEEEEEEEEE   NN         NN    00000000000
0
0
0
    999999999999      0000000          //      0000000          11          //      0000000      3333333333
   99999999999999    00000000          //     00000000         111          //     00000000     3333333333333
  99          99   00      00         //     00      00       1111          //     00      00   33          33
  99          99   00      00        //      00      00         11         //      00      00             33
  99          99   00      00       //       00      00         11        //      00      00             33
  9999999999999   00      00      //        00      00         11       //       00      00          333
   9999999999999  00      00     //         00      00         11      //        00      00          333
            99    00      00    //          00      00         11     //         00      00            33
            99    00      00   //           00      00         11    //          00      00            33
            99    00      00  //            00      00         11   //           00      00            33
            99    00      00 //             00      00         11  //            00      00    33      33
   99999999999    000000000  //              000000000    11111111 //             000000000   3333333333333
    9999999999    0000000    //               0000000     11111111 //              0000000     333333333
0
0
0
     0000000     3333333333                  2222222222        11                  3333333333     0000000
    00000000    333333333333                2222222222222     111                3333333333333   00000000
   00      00   33      33                  22      22      1111               33      33   00      00
  00        00         33                          22        11                       33  00        00
  00        00         33                          22        11                       33  00        00
  00        00       333                         222         11                     333   00        00
  00        00       333       .....             222         11         .....       333   00        00
  00        00         33      .....               22        11         .....         33  00        00
  00        00         33      .....               22        11         .....         33  00        00
   00      00   33      33      .....       33      22        11         .....  33      33   00      00
    00000000    333333333333                2222222222222     11111111           3333333333333   00000000
     0000000     33333333333                 2222222222222     11111111            33333333333     0000000
1                                                  KENOIV     VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE    2
0
1                                                  KENOIV     VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE    3
0       F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                                                 C O L U M N   N U M B E R
          CARD                        1111111111222222222233333333334444444444555555555566666666667777777778
          NUMBER                 12345678901234567890123456789012345678901234567890123456789012345678901234567890

                                                                                  2753 pin
            1                     [E42KEBI] EXXON 15X15 PWR, 4.2%U235, 2300 PPM NAT.BORON
            2                     99.0  73   300  3    123  75   18   5    22   6
            3                     1     1    1    1    -18  1    0    2000 00   1
            4                     0     0    0    0    0    00   0    0
```

```
     6                    1 -42922381     2.9810-4
     7                    1  42922381     6.7138-3
     8                    1  4280004      3.3063-2
     9                    1  42400000     4.7125-3
    10                    1  4210001      3.8073-2
    11                    1  4250100      1.7160-5
    12                    2  10001   6.671-2    2  80004   3.336-2    2  50100   3.607-5
    13                    3  60002   2.6100-4   3  250005  1.0900-3
    14                    3  260001  8.2800-2   3  140005  1.9000-4
    15                    4  820000  3.2960-2
    16                    5  10001   2.7700-2   5  50000   1.4600-3   5  80004   3.7100-2
    17                    5  110000  2.6000-4   5  120005  2.0800-4   5  130000  8.4700-3
    18                    5  140005  7.6700-4   5  260001  4.8900-5
    19                    BOI TYPE  1
    20                    GENERAL          1 6*0.0    123*0.5
    21                    GENERAL          2 6*0.0    123*0.5
    22                    GENERAL          3 6*0.0    123*0.5
    23                    GENERAL          4 6*0.0    123*0.5
    24                    GENERAL          5 6*0.0    123*0.5
    25                    CUBOID  0   106.0451 +0.0001 106.0451 +0.0001  50.0001 +0.0001 123*0.5
    26                       2 GENERALIZED GEOMETRIES OF THE 1:4 TRANSFER CASE.
    27                    X ZONE BDRY    0.0000,  106.0450
    28                    Y ZONE BDRY    0.0000,  106.0450
    29                    Z ZONE BDRY    0.0000,   50.0000
    30                    ZONE     1     1     1
    31                    X BLCK BDRY    0.0000,   23.368,    46.736,  106.0450
    32                    Y BLCK BDRY    0.0000,  106.045
    33                    Z BLCK BDRY    0.0000,   50.000
    34                    BLOCK    1     1     1
    35                    MEDIA          3,    5,    3,    4,    3,    2,    3,    2,    3,    2,
    36                       2,    2,    5,    1,    3,    2,    3,    2,    2,    2,    1,    2,
    37                       3,    2,    2,    2,    1,    2,    3, 1000
    38                    SURFACES       1,    2,    3,    4,    5,    6,    7,    8,    9,   10,
    39                      11,   12,   13,   14,   15,   16,   17,   18,   19,   20,   21,   22,
    40                      23,   24,   25
    41                    SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
    42                      0  0  0
    43                    SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
    44                      0  0  0
    45                    SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
    46                      0  0  0
    47                    SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
    48                      0  0  0
    49                    SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
    50                      0  0  0
    51                    SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
1                                                    KENOIV    VER 1.0A (01/09/87) 90/01/03. 02.31.30. PAGE    4
0       F O L L O W I N G    I S    A    C A R D    I M A G E    L I S T I N G    O F    T H E    I N P U T    D A T A
0                                                    C O L U M N    N U M B E R
     CARD                          1111111111222222222233333333334444444444555555555566666666667777777778
    NUMBER                 1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

    52                      0  0  0
    53                    SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
    54                      0  0  0
    55                    SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
    56                      0  0  0
    57                    SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  1
    58                      0  0 -1
    59                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  0  0  1
    60                     -1  0  0
    61                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
```

```
 64                    0  1 -1
 65                   SECTOR  0  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0 -1
 66                    0  0  0
 67                   SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0
 68                    1 -1  0
 69                   SECTOR  0  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0
 70                    0  0  1
 71                   SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0
 72                    1 -1  0
 73                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1
 74                    0  0 -1
 75                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  1
 76                   -1  0  0
 77                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0
 78                    1 -1  0
 79                   SECTOR  0  0  0  0  0  0  0  1  0  0  0  0  0 -1  0  0  1  0  0  0  0  0
 80                    0  1 -1
 81                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0
 82                    1 -1  0
 83                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0
 84                    1 -1  0
 85                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1
 86                    0  0 -1
 87                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1
 88                   -1  0  0
 89                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0
 90                    1 -1  0
 91                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0
 92                    0  1 -1
 93                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0
 94                    1 -1  0
 95                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0
 96                    1 -1  0
 97                   SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1
 98                    0  0 -1
 99                   SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0        0  0  0  0  0  0  0
100                    0  0  0
101                   BLOCK     2   1   1
102                   MEDIA          3,   5,   3,   4,   2,   2,   3,   2,   3,   2,
1                                         KENOIV    VER 1.2A (21/09/37) 90/01/03. 03.31.20. PAGE   5
0       F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
0                                              C O L U M N   N U M B E R
 CARD                           11111111112222222222333333333344444444445555555555666666666677777777778
NUMBER                 12345678901234567890123456789012345678901234567890123456789012345678901234567890

103                      2,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
104                      3, 1000
105                   SURFACES       1,    2,    3,    4,    5,    6,    7,    8,   14,   15,
106                     16,   17,   18,   19,   20,   21,   26,   27,   28,   29,   35
107                   SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
108                   SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
109                   SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
110                   SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
111                   SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
112                   SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
113                   SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
114                   SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  1
115                   SECTOR  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  1  0  0 -1 -1
116                   SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  1 -1  0  0  0
117                   SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  1 -1  0  0
118                   SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  1 -1  0
```

```
120                    SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  1 -1  0  0
121                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1
122                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  1 -1  0  0
123                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1  0  0 -1  0
124                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0
125                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0  0
126                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0
127                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0
128                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0
129                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0
130                    SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
131                    BLOCK     3    1    1
132                    MEDIA          1,   5,   3,   4,   3,   2,   7,   2,   2,   3,
133                       2,   1,   2,   3,   2,   7,   3,   2, 1000,
134                    SURFACES       1,   2,   7,   4,   5,   6,   7,   8,  18,  19,
135                      20,  21,  30,  31,  32,  33,  34,  36
136                    SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
137                    SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
138                    SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
139                    SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
140                    SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
141                    SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
142                    SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
143                    SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  1
144                    SECTOR  0  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  1 -1
145                    SECTOR  0  0  0  0  0  0  0  0  1  0  0  0 -1  0  0 -1  0 -1
146                    SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0  0
147                    SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0  0
148                    SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0  0
149                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  0  0 -1
150                    SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0  0
151                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1 -1
152                    SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0  0
153                    SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0  0  0
1                                                  KENOIV    VER 1.0A (21/09/87) 90/01/02. 03.21.30. PAGE    6
0  F O L L O W I N G   I S   A   C A R D   I M A G E   L I S T I N G   O F   T H E   I N P U T   D A T A
                                                   C O L U M N   N U M B E R
 CARD                        1111111111222222222233333333334444444444555555555566666666677777777780
NUMBER          12345678901234567890123456789012345678901234567890123456789012345678901234567890

154                    SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
155                       36 QUADRIC SURFACES IN THE SYSTEM
156                             1.0YS0          1.0XS0   -11245.542     $
157                             1.0YS0          1.0XS0   -10713.285     $
158                             1.0YS0          1.0XS0   -8713.2890     $
159                             1.0YS0          1.0XS0   -8595.1441     $
160                             1.0YS0          1.0XS0   -6814.5025     $
161                             1.0YS0          1.0XS0   -6401.6001     $
162                             1.0YS0          1.0XS0   -6199.9876     $
163                             1.0YS0          1.0XS0   -5903.6172     $
164                             1.0Y         -70.1040     $
165                             1.0Y         -69.5960     $
166                             1.0Y         -68.8975     $
167                             1.0Y         -47.9425     $
168                             1.0Y         -47.2440     $
169                             1.0Y         -46.2280     $
170                             1.0Y         -45.5295     $
171                             1.0Y         -24.5745     $
172                             1.0Y         -23.8760     $
173                             1.0Y         -22.8600     $
174                             1.0Y         -22.1615     $
175                             1.0Y          -1.2015     $
```

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177                                1.0X       -0.5080     $
178                                1.0X       -1.2065     $
179                                1.0X       -22.1615    $
180                                1.0X       -22.8600    $
181                                1.0X       -23.8760    $
182                                1.0X       -24.5745    $
183                                1.0X       -45.5295    $
184                                1.0X       -46.2280    $
185                                1.0X       -47.2440    $
186                                1.0X       -47.9425    $
187                                1.0X       -68.8975    $
188                                1.0X       -69.5960    $
189                                1.0X       -70.1040    $
190                                1.0Y       -46.7360    $
191                                1.0Y       -23.3680    $
192                          END CASE
193                          END KENO
0          ********************************** E N D   O F   I N P U T   L I S T I N G **********************************
```

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                                                                  KENO1V    VER 1.2A (2)/09/87) 90/01/03. 03.31.30. PAGE    7
0[E42KCE1] EXXON 15X15 PWR, 4.25U235, 2300 PPM NAT.BORON
0NUMBER OF GENERATIONS                    75                      START TYPE                                1
0NUMBER PER GENERATION                   300                      GENERATIONS BETWEEN CHECKPOINTS           0
0NUMBER OF GENERATIONS TO BE SKIPPED       3                      LIST INPUT X-SECTIONS READ FROM TAPE      NO
0NUMBER OF ENERGY GROUPS                 123                      LIST 1-D MIXTURE X SECTIONS               NO
0MAX. NUMBER OF ENERGY TRANSFERS          75                      LIST 2-D MIXTURE X-SECTIONS               NO
0NUMBER OF INPUT NUCLIDES                 18                      LIST FIDO, AND ABS. BY REGION             NO
0NUMBER OF MIXTURES                        5                      USE X-SECTIONS FROM PREVIOUS CASE         NO
0NUMBER OF MIXING TABLE ENTRIES           22                      USE GEOMETRY FROM PREVIOUS CASE           NO
0NUMBER OF GEOMETRY CARDS                  6                      USE VELOCITIES FROM PREVIOUS CASE         NO
0NUMBER OF BOX TYPES                       1                      COMPUTE MATRIX K-EFFECTIVE BY UNIT        NO
0NUMBER OF UNITS IN X DIRECTION            1                      COMPUTE MATRIX K-EFFECTIVE BY BOX TYPE    NO
0NUMBER OF UNITS IN Y DIRECTION            1                      LIST FIDO PROB MATRIX BY UNIT             NO
0NUMBER OF UNITS IN Z DIRECTION            1                      ADJOINT CALCULATION                       NO
0NUMBER OF NUCLIDES READ FROM TAPE       -18                      USE EXPONENTIAL TRANSFORM                 NO
0ALBEDO TYPE                               1                      CALCULATE FLUX                            YES
0SEARCH TYPE                               0                      CALCULATE FISSION DENSITIES               YES
0THIS PROBLEM WILL BE RUN WITH SPECULARLY REFLECTING BOUNDARY CONDITION
0THE ALBEDOS ARE +X = 0.          -X = 1.00000E+00 +Y = 0.          -Y = 1.00000E+00 +Z = 1.00000E+00 -Z = 1.00000E+00
0MAXIMUM TIME =  99.0000 MINUTES
0STORAGE LOCATIONS REQUIRED FOR THIS JOB =    34305
 REMAINING AVAILABLE LOCATIONS=    45595
0REQUIRED LCM STORAGE LOCATIONS   33800 (001014548)
 REMAINING LCM AVAILABLE          66420 (0020196481)
1                                                                 KENO1V    VER 1.2A (2)/09/87) 90/01/03. 03.31.30. PAGE    8
0[E42KEB1] EXXON 15X15 PWR, 4.25U235, 2300 PPM NAT.BORON
0     MIXTURE  NUCLIDE   DENSITY
          1 -42922351   2.98100E-04
          1  42922381   6.71380E-03
          1   4280004   3.30630E-02
          1  42400000   4.71250E-03
          1   4210001   3.80730E-02
          1   4250100   1.71600E-05
          2     10001   6.67100E-02
          2     80004   3.33600E-02
          2     50100   3.00700E-05
          3     60002   2.61000E-04
          3    250005   1.09000E-03
```

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        3    140005   1.40000E-04
        4    820000   3.29600E-02
        5     10901   2.77000E-02
        5     50000   1.46000E-03
        5     80004   3.71000E-02
        5    110000   2.60000E-04
        5    120005   2.08000E-04
        5    130000   8.47000E-03
        5    140005   7.67000E-04
        5    260001   4.89000E-05
0

0CROSS SECTIONS READ FROM TAPE

 NUCLIDE =     10001   HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =     80004   OXYGEN                           THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =     50000   BORON     NATURAL
 NUCLIDE =     50100   BORON-10
 NUCLIDE =     60002   CARBON    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 589.2a K
 NUCLIDE =    110000   SODIUM    NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 293.6 K
 NUCLIDE =    120005   MAGNESIUM                              THERMAL TEMP = 900.0 K
 NUCLIDE =    130005   ALUMINUM  NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K
 NUCLIDE =    140005   SILICON                                THERMAL TEMP = 900.0 K
 NUCLIDE =    250005   MANGANESE                              THERMAL TEMP = 900.0 K
 NUCLIDE =    260001   IRON           THERMAL TEMP=294.6
 NUCLIDE =    820000   LEAD      NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 295.6 K
 NUCLIDE =  92922251   URANIUM-235                      THERMAL TEMPERATURE = 294.6 K
 NUCLIDE =  92922381   URANIUM-238                      THERMAL TEMPERATURE = 294.6 K
 NUCLIDE =   4010001   HYDROGEN--THERMOS ID=1803(X-640) THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =   4250100   BORON-10
 NUCLIDE =   4280004   OXYGEN                           THERMAL TEMPERATURE= 294.6 K
 NUCLIDE =  42360000   ZIRCONIUM NATURAL     BROWN - ST. JOHN KERNEL TEMP. = 627.12 K
1                                                                KENOIV     VER 1.2A (21/09/87) 90/01/03. 03.21.30. PAGE   9
0[E42KEBI] EXXON 15X15 PWR, 4.2%U235, ~~2300~~ PPM NAT.BORON
0GEOMETRY DESCRIPTION                                2753
0REGION
0
0BOX TYPE   1
0REGION
0  1  GENERAL     1      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  2  GENERAL     2      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  3  GENERAL     3      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  4  GENERAL     4      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  5  GENERAL     5      +X = 0.          -X = 0.          +Y = 0.          -Y = 0.          +Z = 0.          -Z = 0.
0  6  CUBOID      0      +X = 1.0605E+02  -X =-1.0000E-04  +Y = 1.0605E+02  -Y =-1.0000E-04  +Z = 5.0000E+01  -Z =-1.0000E-04
1                                                                KENOIV     VER 1.2A (21/09/87) 90/01/03. 03.21.30. PAGE  10
0[E42KEBI] EXXON 15X15 PWR, 4.2%U235, ~~2300~~ PPM NAT.BORON
0WEIGHTING FUNCTION
0BOX TYPE   1                                    GROUP   WTLOW    WT AVG    WT HI
0       REGION   1 DEFINED BY GEOMETRY CARD   1
                                                  1      .167      .500     1.500
                                                 GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   2 DEFINED BY GEOMETRY CARD   2
                                                  1      .167      .500     1.500
                                                 GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   3 DEFINED BY GEOMETRY CARD   3
                                                  1      .167      .500     1.500
                                                 GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   4 DEFINED BY GEOMETRY CARD   4
                                                  1      .167      .500     1.500
                                                 GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   5 DEFINED BY GEOMETRY CARD   5
```

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                                        GROUPS 2 TO  123 SAME AS ABOVE
0       REGION   6 DEFINED BY GEOMETRY CARD   6
                                          1      .167      .500     1.500
                                        GROUPS 2 TO  123 SAME AS ABOVE
1                                                          KENOIV    VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE   11
0   2    RALIZE  GEOMET
0    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .    .
 DEAR IT
   WITH THE DEEPEST REGRET I MUST INFORM YOU THAT A DREADFUL MISFORTUNE HAS OCCURRED.
 YOU HAVE FAILED TO MENTION YOUR SEX AND MARITAL STATUS.
                                                  RESPECTFULLY YOURS,
                                                  GEOM

 X ZONE BDRY  0.          ,   .10605E+03
 Y ZONE BDRY  0.          ,   .10605E+03
 Z ZONE BDRY  0.          ,   .50000E+02
0ZONE     1    1    1
 X BLCK BDRY  0.          ,   .23368E+02,   .46736E+02,   .10605E+03
 Y BLCK BDRY  0.          ,   .10605E+03
 Z BLCK BDRY  0.          ,   .50000E+02
0BLOCK    1    1    1
 MEDIA          3,   5,   3,   4,   3,   2,   3,   2,   3,   2,
     3,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
     3,   2,   2,   2,   1,   2,   3, 1000
 SURFACES       1,   2,   3,   4,   5,   6,   7,   8,   9,  10,
    11,  12,  13,  14,  15,  16,  17,  18,  19,  20,  21,  22,
    23,  24,  25
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  1  0  0 -1
 SECTOR  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  0  0  1 -1
 SECTOR  0  0  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  1  0  0 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  1 -1  0  0
 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0BLOCK    2    1    1
 MEDIA          3,   5,   3,   4,   3,   2,   3,   2,   3,   2,
     2,   2,   3,   1,   3,   2,   3,   2,   2,   2,   1,   2,
1                                                          KENOIV    VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE   12
0    3, 1000
 SURFACES       1,   2,   3,   4,   5,   6,   7,   8,  14,  15,
```

```
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  0  0  0  1
 SECTOR  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  1  0  0 -1 -1
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  0  0  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  0 -1
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1  0  0 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0
 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0BLOCK     3    1    1
 MEDIA           3,    5,    5,    4,    3,    2,    3,    2,    2,    3,
     2,    1,    2,    3,    2,    3,    3,    2, 1000
 SURFACES        1,    2,    3,    4,    5,    6,    7,    8,   18,   19,
    20,   21,   30,   31,   32,   33,   34,   36
 SECTOR -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0 -1  1  0  0  0  0  0  0  0  0  0  0
 SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  0  1
 SECTOR  0  0  0  0  0  0  0 -1  0  0  0  0  0  0  0  0  1 -1
 SECTOR  0  0  0  0  0  0  0  0  1  0  0  0  1  0  0 -1  0 -1
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  1 -1  0  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0 -1  1  0  0  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  0  0  1  0  0  1 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0 -1  0  0  0  0 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0 -1  1  0  1 -1  0  0  0
 SECTOR  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1 -1 -1
 SECTOR  0  0  0  0  0  0  0  0  0  0  0 -1  1  0  0 -1  0  0
 SECTOR  0  0  0  0  0  0  0  0 -1  1  0  0  0  1 -1  0  0  0
 SECTOR  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0   36 QUADRIC SURFACES IN THE SYSTEM
    .10000E+01YSQ      .10000E+01XSQ     -.11246E+05     $
    .10000E+01YSQ      .10000E+01XSQ     -.10713E+05     $
    .10000E+01YSQ      .10000E+01XSQ     -.87133E+04     $
    .10000E+01YSQ      .10000E+01XSQ     -.85951E+04     $
1                                                                     KENOIV     VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE   13
0   .10000E+01YSQ      .10000E+01XSQ     -.68145E+04     $
    .10000E+01YSQ      .10000E+01XSQ     -.64016E+04     $
    .10000E+01YSQ      .10000E+01XSQ     -.62000E+04     $
    .10000E+01YSQ      .10000E+01XSQ     -.59036E+04     $
    .10000E+01Y      -.70104E+02     $
    .10000E+01Y      -.69596E+02     $
    .10000E+01Y      -.68898E+02     $
    .10000E+01Y      -.47943E+02     $
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```
 .10000E+01Y      -.46228E+02    $
 .10000E+01Y      -.45530E+02    $
 .10000E+01Y      -.24575E+02    $
 .10000E+01Y      -.23876E+02    $
 .10000E+01Y      -.22860E+02    $
 .10000E+01Y      -.22162E+02    $
 .10000E+01Y      -.12065E+01    $
 .10000E+01Y      -.50800E+00    $
 .10000E+01X      -.50800E+00    $
 .10000E+01X      -.12065E+01    $
 .10000E+01X      -.22162E+02    $
 .10000E+01X      -.22860E+02    $
 .10000E+01Y      -.23876E+02    $
 .10000E+01X      -.24575E+02    $
 .10000E+01X      -.45530E+02    $
 .10000E+01X      -.46228E+02    $
 .10000E+01X      -.47244E+02    $
 .10000E+01X      -.47943E+02    $
 .10000E+01Y      -.68890E+02    $
 .10000E+01X      -.69596E+02    $
 .10000E+01X      -.70104E+02    $
 .10000E+01Y      -.46736E+02    $
 .10000E+01Y      -.23368E+02    $
1                                                    KENOIV     VER 1.2A (21/09/27) 90/01/03. 03.21.30. PAGE   14
 0
```

```
 ..........................................
 FINAL ALLOCATION OF MEMORY HAS BEEN COMPLETED
 ..........................................
0REQUIRED SCM FIELD LENGTH  117604 (003257048)
 REQUIRED LCM FIELD LENGTH   36900 (001100448)
 REQUIRED RMS FIELD LENGTH       0 (000000008)
0REQUIRED SCM BLANK COMMON   69876 (002064148)
 REQUIRED LCM BLANK COMMON   36900 (001100448)
 REQUIRED RMS BLANK COMMON       0 (000000008)
0REMAINING SCM AVAILABLE     19276 (000220748)
 REMAINING LCM AVAILABLE     63100 (001731748)
0.........................................
```

```
0LOCATION OF RELOCATABLE ARRAYS
0ARRAY        MAT      LOCATION

 FSP/MUBAS      1          SCM
 FSP/MUBAR      2          SCM
 FSP/MUBAR      3          SCM
 FSP/MUBAR      4          LCM
 FSP/MUBAR      5          LCM
 WGT                       SCM
 FMABS                     SCM
 FMFIS                     SCM
1                                                    KENOIV     VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE   15
0[E42KEB1] EXXON 15X15 PWR, 4.2%U235, 2300 PPM NAT.BORON
0 VOLUMES
0 BOX TYPE    1
          REGION DEFINED BY GEOMETRY CARD      1   VOLUME =    0.          CM..3        CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD      2   VOLUME =    0.          CM..3        CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD      3   VOLUME =    0.          CM..3        CUMULATIVE VOLUME =    0.          CM..3
          REGION DEFINED BY GEOMETRY CARD      4   VOLUME =    0.          CM..3        CUMULATIVE VOLUME =    0.          CM..3
```

REGION DEFINED BY GEOMETRY CARD 6 VOLUME = 4.37002E+00 CM..3 CUMULATIVE VOLUME = 5.62281E+05 CM..3

0 TOTAL VOLUMES

1	1.00000E+00
2	1.00000E+00
3	1.00000E+00
4	1.00000E+00
5	5.62277E+05
6	4.37002E+00

0VOLUME FRACTION OF THE CORE CONTAINING FISSILE MATERIAL= .17785E-05

0START TYPE = 1

0 THE NEUTRONS WERE STARTED IN THE ARRAY WITH A COSINE DISTRIBUTION.

THE CHOSEN START TYPE MAY NOT BE ADEQUATE. TOO MANY ATTEMPTS MAY BE NEEDED TO START THE NEUTRONS

0 300 NEUTRONS WERE INITIALLY STARTED

.01450 MINUTES WERE REQUIRED FOR STARTING.

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0[642KEBI] EXXON 15X15 PWR, 4.2%U235, 2300 PPM NAT.BORON

0 GENERATION	K-EFFECTIVE	ELAPSED TIME(MIN)	AVG. K-EFF	DEVIATION	MATRIX K-EFF
			WARNING - ONLY 282 INDEPENDENT FISSION POINTS WERE GENERATED.		
1	8.5964E-01	2.47667E+01	1.00000E+00	0.	0.
2	8.44[illegible]E-01	4.70500E+01	1.00000E+00	0.	0.
3	9.15247E-01	7.11500E+01	9.15247E-01	0.	0.
4	8.98472E-01	9.46667E+01	9.06859E-01	8.38118E-03	0.
5	8.90282E-01	1.19217E+00	9.01334E-01	7.34725E-03	0.
6	8.73036E-01	1.41567E+00	8.94259E-01	8.77709E-03	0.
7	9.36069E-01	1.64650E+00	9.02621E-01	1.07770E-02	0.
8	8.88223E-01	1.88033E+00	9.00222E-01	9.12068E-03	0.
9	9.59959E-01	2.11600E+00	9.08759E-01	1.18999E-02	0.
10	8.47834E-01	2.35000E+00	9.13600E-01	1.10927E-02	0.
11	9.20685E-01	2.58033E+00	9.14423E-01	9.81409E-03	0.
12	9.16145E-01	2.81850E+00	9.14595E-01	8.77967E-03	0.
13	8.60779E-01	3.05450E+00	9.09703E-01	9.32753E-03	0.
14	8.76861E-01	3.28417E+00	9.06966E-01	8.94388E-03	0.
15	9.01795E-01	3.52083E+00	9.06568E-01	8.23678E-03	0.
16	9.08198E-01	3.75633E+00	9.06685E-01	7.62667E-03	0.
17	8.86907E-01	3.98750E+00	9.05366E-01	7.22143E-03	0.
18	9.26815E-01	4.22417E+00	9.06707E-01	6.89676E-03	0.
19	9.00036E-01	4.46333E+00	9.06314E-01	6.48098E-03	0.
20	8.53499E-01	4.69683E+00	9.03380E-01	6.77822E-03	0.
21	9.12643E-01	4.93250E+00	9.03868E-01	6.43006E-03	0.
22	9.38109E-01	5.17767E+00	9.05590E-01	6.03579E-03	0.
23	9.67263E-01	5.40333E+00	9.08517E-01	6.70425E-03	0.
24	8.94811E-01	5.63450E+00	9.07894E-01	6.42254E-03	0.
25	9.10788E-01	5.87433E+00	9.09020E-01	6.13824E-03	0.
26	9.05477E-01	6.11083E+00	9.07914E-01	5.87787E-03	0.
27	9.29670E-01	6.34033E+00	9.08784E-01	5.70462E-03	0.
28	9.30272E-01	6.57117E+00	9.09611E-01	5.54279E-03	0.
29	9.49705E-01	6.80067E+00	9.11095E-01	5.53641E-03	0.
30	8.92954E-01	7.04067E+00	9.10448E-01	5.37422E-03	0.
31	9.74941E-01	7.27533E+00	9.12671E-01	5.64236E-03	0.
32	9.45580E-01	7.50717E+00	9.13768E-01	5.56032E-03	0.
33	9.72678E-01	7.74533E+00	9.15669E-01	5.70383E-03	0.
34	9.23161E-01	7.98267E+00	9.15903E-01	5.52767E-03	0.
35	9.38281E-01	8.21517E+00	9.16581E-01	5.40029E-03	0.
36	8.98818E-01	8.44583E+00	9.16059E-01	5.26503E-03	0.
37	9.26467E-01	8.67433E+00	9.16356E-01	5.12103E-03	0.
38	9.69509E-01	8.91033E+00	9.17832E-01	5.19115E-03	0.
39	9.16661E-01	9.14483E+00	9.17801E-01	5.04900E-03	0.
40	9.13672E-01	9.38183E+00	9.17692E-01	4.91553E-03	0.
41	9.47686E-01	9.61417E+00	9.18461E-01	4.84921E-03	0.
42	8.69283E-01	9.85717E+00	9.17232E-01	4.88371E-03	0.
43	9.17462E-01	1.00975E+01	9.17237E-01	4.76311E-03	0.
44	9.15810E-01	1.03330E+01	9.17203E-01	4.64845E-03	0.

	46	9.01275E-01	1.07955E+01	9.18018E-01	4.60457E-03	0.
	47	9.21751E-01	1.10238E+01	9.18101E-01	4.50185E-03	0.
	48	8.93824E-01	1.12550E+01	9.17573E-01	4.43441E-03	0.
	49	9.43036E-01	1.14890E+01	9.18115E-01	4.37273E-03	0.
	50	9.09215E-01	1.17168E+01	9.17930E-01	4.28467E-03	0.
	51	9.52076E-01	1.19568E+01	9.18626E-01	4.25379E-03	0.
	52	9.15943E-01	1.21630E+01	9.18573E-01	4.16819E-03	0.
	53	9.84964E-01	1.24163E+01	9.19875E-01	4.28802E-03	0.
	54	9.00331E-01	1.26527E+01	9.19499E-01	4.22152E-03	0.

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0	55	9.66004E-01	1.28807E+01	9.20754E-01	4.32704E-03	0.
	56	9.56957E-01	1.31148E+01	9.21424E-01	4.29876E-03	0.
	57	9.04917E-01	1.33468E+01	9.21124E-01	4.23053E-03	0.
	58	9.41475E-01	1.35842E+01	9.21487E-01	4.17017E-03	0.
	59	9.25049E-01	1.38223E+01	9.21550E-01	4.09683E-03	0.
	60	9.46913E-01	1.40505E+01	9.21967E-01	4.04926E-03	0.
	61	9.19629E-01	1.42803E+01	9.21947E-01	3.98023E-03	0.
	62	9.05179E-01	1.45188E+01	9.21668E-01	3.92330E-03	0.
	63	8.95950E-01	1.47492E+01	9.21246E-01	3.88141E-03	0.
	64	9.31128E-01	1.49792E+01	9.21405E-01	3.82162E-03	0.
	65	9.37993E-01	1.52147E+01	9.21669E-01	3.76968E-03	0.
	66	9.19427E-01	1.54483E+01	9.21634E-01	3.71047E-03	0.
	67	9.26373E-01	1.56815E+01	9.21707E-01	3.65367E-03	0.
	68	9.17107E-01	1.59153E+01	9.21677E-01	3.59856E-03	0.
	69	9.80201E-01	1.61482E+01	9.22511E-01	3.65063E-03	0.
	70	9.41705E-01	1.63827E+01	9.23087E-01	3.64244E-03	0.
	71	9.42003E-01	1.66200E+01	9.23362E-01	3.59972E-03	0.
	72	9.04729E-01	1.68495E+01	9.23095E-01	3.55789E-03	0.
	73	8.97274E-01	1.70820E+01	9.22732E-01	3.51602E-03	0.

0THE MATRIX K-EFF IS THE LARGEST EIGENVALUE OF THE MATRIX OF FISSION PROBABILITIES BY UNIT.
 THERE ARE NBXMAX , NBYMAX , NBZMAX UNITS IN AN ARRAY.

1 KENO IV VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE 18

0[E42KEBI] EXXON 15X15 PWR, 4.2%U235, ~~2500~~ 2753 PPM NAT.BORON

0LIFETIME = 2.22676E-05 + OR - 1.67928E-07 GENERATION TIME = 1.59141E-05 + OR - 1.18018E-07

 NO. OF INITIAL

GENERATIONS SKIPPED	AVERAGE K-EFFECTIVE	STANDARD DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
0 3	.92284 + OR - .00358	.919 TO .92641	.91569 TO .92999	.91211 TO .93356	21000
0 4	.92319 + OR - .00361	.91958 TO .92680	.9157 TO .93041	.91236 TO .93402	20700
0 5	.92368 + OR - .00363	.92005 TO .92731	.91642 TO .93094	.912 TO .93457	20400
0 6	.92443 + OR - .00360	.92083 TO .92804	.91722 TO .93164	.91362 TO .9352	20100
0 7	.92426 + OR - .00365	.92060 TO .92791	.91695 TO .92156	.91329 TO .93522	19800
0 8	.92481 + OR - .00367	.92114 TO .92848	.91747 TO .93215	.91380 TO .93581	19500
0 9	.92426 + OR - .00368	.92058 TO .92794	.91689 TO .93163	.91321 TO .93531	19200
0 10	.92389 + OR - .00372	.92016 TO .92761	.91644 TO .93133	.91271 TO .93506	18900
0 11	.92394 + OR - .00378	.92015 TO .92772	.91637 TO .93151	.91259 TO .93529	18600
0 12	.92407 + OR - .00384	.92022 TO .92791	.91638 TO .93175	.91253 TO .93560	18300
0 17	.92738 + OR - .00383	.92356 TO .93121	.91973 TO .93504	.91590 TO .93886	16800
0 22	.92946 + OR - .00389	.92558 TO .93334	.92170 TO .93721	.91782 TO .94109	15300
0 27	.93031 + OR - .00410	.92621 TO .93441	.92212 TO .93851	.91802 TO .94261	13800
0 32	.92929 + OR - .00433	.92496 TO .93362	.92063 TO .93795	.91630 TO .94228	12300
0 37	.92893 + OR - .00470	.92423 TO .93363	.91954 TO .93832	.91484 TO .94302	10800
0 42	.92983 + OR - .00484	.92498 TO .93467	.92014 TO .93952	.91530 TO .94436	9300
0 47	.93075 + OR - .00541	.92533 TO .93616	.91992 TO .94157	.91451 TO .94698	7800
0 52	.93263 + OR - .00623	.92640 TO .93887	.92017 TO .94510	.91394 TO .95133	6300
0 57	.92826 + OR - .00578	.92248 TO .93404	.91670 TO .93981	.91092 TO .94559	4800
0 62	.92854 + OR - .00790	.92063 TO .93644	.91273 TO .94434	.90482 TO .95225	3300
0 67	.93384 + OR - .01349	.92035 TO .94732	.90686 TO .96081	.89338 TO .97430	1800

1 KENO IV VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE 19

0[E42KEBI] EXXON 15X15 PWR, 4.2%U235, ~~2500~~ 2753 PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0 1		0.	1.25282E-05	1.35254E-05	

0 3	0.	5.14205E-05	6.17076E-05	
0 4	0.	7.95562E-05	9.10481E-05	
0 5	0.	2.04727E-04	3.15454E-04	
0 6	0.	3.72912E-04	5.61943E-04	
0 7	0.	6.83367E-04	9.31153E-04	
0 8	0.	7.94664E-04	1.38185E-03	
0 9	0.	9.15436E-04	1.50762E-03	
0 10	0.	6.38216E-04	1.53809E-03	
0 11	0.	9.97590E-04	1.88529E-03	
0 12	4.08201E-05	1.27153E-03	2.45354E-03	
0 13	0.	1.48085E-03	2.57800E-03	
0 14	0.	1.24813E-03	2.77563E-03	
0 15	0.	1.12726E-03	3.09097E-03	
0 16	0.	1.64254E-03	4.41535E-03	
0 17	0.	1.82472E-03	4.79079E-03	
0 18	0.	2.02567E-03	5.21424E-03	
0 19	0.	2.08778E-03	5.26552E-03	
0 20	0.	1.99576E-03	4.90520E-03	
0 21	0.	1.73003E-03	4.13218E-03	
0 22	0.	1.36903E-03	3.02020E-03	
0 23	0.	9.71386E-04	1.88484E-03	
0 24	0.	7.08511E-04	1.03994E-03	
0 25	0.	5.70605E-04	6.81084E-04	
0 26	0.	6.46480E-04	5.90972E-04	
0 27	0.	5.17259E-04	4.11054E-04	

1 KENDIV VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE 20

0[E42KEBI] EXXON 15X15 PWR, 4.2%U235, ~~2300~~ PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0 28	0.		5.38281E-04	3.78773E-04	
0 29	0.		6.95083E-04	4.40155E-04	
0 30	0.		7.45346E-04	4.59131E-04	
0 31	0.		6.31280E-04	3.87319E-04	
0 32	3.75901E-05		5.63450E-04	3.52701E-04	
0 33	0.		5.32160E-04	3.35621E-04	
0 34	0.		4.74391E-04	3.07406E-04	
0 35	0.		3.57110E-04	2.38442E-04	
0 36	0.		3.28070E-04	2.19300E-04	
0 37	0.		4.37778E-04	2.93938E-04	
0 38	0.		5.14955E-04	3.45643E-04	
0 39	0.		4.66519E-04	3.08138E-04	
0 40	0.		4.41374E-04	2.81978E-04	
0 41	0.		4.04319E-04	2.49081E-04	
0 42	0.		4.21016E-04	2.50604E-04	
0 43	0.		4.12952E-04	2.37420E-04	
0 44	0.		4.10935E-04	2.26067E-04	
0 45	0.		4.33849E-04	2.28890E-04	
0 46	0.		4.33037E-04	2.22664E-04	
0 47	0.		4.29409E-04	2.14990E-04	
0 48	0.		4.01043E-04	1.93914E-04	
0 49	0.		3.98607E-04	1.88657E-04	
0 50	4.68507E-05		1.00545E-03	4.69395E-04	
0 51	0.		1.02482E-03	4.58641E-04	
0 52	0.		1.04877E-03	4.57808E-04	
0 53	0.		1.08896E-03	4.64701E-04	
0 54	0.		1.08778E-03	4.59809E-04	

1 KENDIV VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE 21

0[E42KEBI] EXXON 15X15 PWR, 4.2%U235, ~~2300~~ PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0 55	4.64623E-05		1.13717E-03	4.76219E-04	
0 56	0.		1.15843E-03	4.89027E-04	
0 57	0.		1.25963E-03	5.24824E-04	
0 58	4.57519E-05		1.35689E-03	5.48362E-04	

0 60	0.	1.53406E-03	6.37015E-04
0 61	0.	1.62375E-03	7.01647E-04
0 62	0.	1.70787E-03	7.36755E-04
0 63	0.	1.79105E-03	8.10463E-04
0 64	0.	1.71349E-03	8.90144E-04
0 65	0.	1.86415E-03	9.90320E-04
0 66	0.	1.91164E-03	1.12937E-03
0 67	0.	2.15683E-03	1.27714E-03
0 68	9.19258E-05	2.62387E-03	1.37417E-03
0 69	0.	2.92425E-03	1.48162E-03
0 70	0.	3.99755E-03	1.92616E-03
0 71	0.	3.29991E-03	2.31530E-03
0 72	0.	3.37303E-03	2.13009E-03
0 73	0.	6.54326E-03	2.50181E-03
0 74	0.	4.68847E-03	4.00094E-03
0 75	0.	5.19742E-03	2.96259E-03
0 76	0.	4.49100E-03	3.49443E-03
0 77	0.	7.72250E-03	2.84106E-03
0 78	0.	5.41880E-03	3.30657E-03
0 79	0.	7.32457E-03	3.13695E-03
0 80	0.	5.37190E-03	8.25656E-03
0 81	4.39882E-05	6.62411E-03	5.22521E-03

1 KENOIV VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE 22

0[E42KEBI] EXXON 15X15 PWR, 4.2%U235, ~~2700~~ 2750 PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0 82	0.	1.33021E-02	5.90228E-03		
0 83	3.71006E-05	5.81853E-03	6.41427E-03		
0 84	7.44403E-05	1.93186E-02	6.95140E-03		
0 85	0.	4.42367E-03	4.49652E-03		
0 86	0.	7.69478E-03	6.28557E-03		
0 87	0.	9.17255E-03	1.30957E-02		
0 88	0.	2.40844E-02	1.35836E-03		
0 89	2.96966E-05	1.34240E-02	2.99777E-03		
0 90	0.	4.17457E-03	5.72179E-04		
0 91	0.	4.85707E-03	3.63981E-03		
0 92	0.	3.85865E-0.	1.60914E-03		
0 93	0.	4.44544E-03	1.66556E-03		
0 94	0.	1.48090E-03	6.36851E-04		
0 95	0.	1.56003E-03	6.94579E-04		
0 96	0.	1.63234E-03	7.54337E-04		
0 97	0.	2.23340E-03	1.17380E-03		
0 98	0.	4.35488E-03	4.09040E-03		
0 99	0.	4.60063E-03	5.32411E-03		
0100	0.	4.14923E-03	3.96437E-03		
0101	0.	4.03710E-03	3.47210E-03		
0102	0.	5.95459E-03	5.13149E-03		
0103	0.	6.99930E-03	6.02588E-03		
0104	0.	9.19000E-03	8.86992E-03		
0105	0.	1.36975E-02	1.44271E-02		
0106	0.	1.10656E-02	1.29051E-02		
0107	0.	1.43343E-02	1.66300E-02		
0108	0.	1.81408E-02	1.93859E-02		

1 KENOIV VER 1.2A (21/09/87) 90/01/03. 03.31.30. PAGE 23

0[E42KEBI] EXXON 15X15 PWR, 4.2%U235, ~~2700~~ 2753 PPM NAT.BORON

0GROUP	REGION	LEAKAGE	ABSORPTIONS	FISSIONS	WITH 3 GENERATIONS SKIPPED
0109	0.	9.42668E-03	9.70728E-03		
0110	0.	1.16557E-02	1.19986E-02		
0111	0.	1.59913E-02	1.64562E-02		
0112	0.	2.17423E-02	2.24562E-02		
0113	0.	3.21061E-02	3.26538E-02		
0114	0.	4.96598E-02	5.04749E-02		
0115	0.	3.51007E-02	3.59257E-02		

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0117            0.              5.63030E-02     5.60392E-02
0118            0.              6.83793E-02     6.87209E-02
0119            0.              8.07406E-02     8.06920E-02
0120            0.              9.19695E-02     9.09242E-02
0121            0.              8.75622E-02     8.61041E-02
0122            0.              6.49704E-02     6.26661E-02
0123            0.              3.04530E-02     3.52681E-02
0TOTAL =        5.34625E-04     9.97890E-01     9.22839E-01
0*ELAPSED TIME  17.00200MINUTES
1                                                    KENO'V    VER 1.2A (21/09/87) 90/01/03. 07.31.2'  PAGE   24
0[E42KE2I] EXXON 15X15 PWR, 4.25U235, 0300 PPM NAT.BORON
0---- FISSION DENSITIES ----


                  FISSION   PERCENT        TOTAL
            REGION DENSITY  DEVIATION     FISSIONS
0BOX TYPE    1
                1  9.228E-01    .39        9.228E-01
                2  0.           0.00       0.
                3  0.           0.00       0.
                4  0.           0.00       0.
                5  0.           0.00       0.
                6  0.           0.00       0.


0********** WARNING ********** WARNING **********
 THE FISSION DENSITY AND FLUX WERE SCORED USING ARBITRARY VOLUMES (LISTED UNDER - TOTAL VOLUMES -) IN THE REGIONS DESCRIBED BY
 GENERALIZED GEOM. THEY MUST BE MULTIPLIED BY THE TRUE VOLUME OVER THE ARBITRARY VOLUME TO OBTAIN THE CORRECT VALUES.
1                                                    KENO'V    VER 1.2A (21/09/87) 90/01/03. 07.31.30. PAGE   25
0[E42KE2I] EXXON 15X15 PWR, 4.25U235, 0300 PPM NAT.BORON
0FLUXES FOR BOX TYPE    1
          REGION  1          REGION  2          REGION  3          REGION  4          REGION  5          REGION  6
BORON#    FLUX    PERCENT    FLUX    PERCENT    FLUX    PERCENT    FLUX    PERCENT    FLUX    PERCENT    FLUX    PERCENT
                  DEVIATION          DEVIATION          DEVIATION          DEVIATION          DEVIATION          DEVIATION
   1   3.968E-04  100.00   1.025E-05  100.00   0.         0.00     0.         0.00     0.         0.00     0.         0.00
   2   1.277E-03   83.48   7.695E-04   86.14   4.111E-04   82.02   0.         0.00     0.         0.00   2.160E-09  100.00
   3   1.987E-02   54.56   4.055E-04   70.44   1.015E-04  100.00   0.         0.00     0.         0.00   1.106E-06   59.69
   4   2.304E-03   42.57   1.490E-03   60.69   4.550E-04   53.50   0.         0.00     0.         0.00   2.950E-09  100.00
   5   1.162E-02   28.18   9.657E-04   41.88   6.359E-04   46.41   0.         0.00     0.         0.00   2.367E-08   54.96
   6   1.961E-02   17.95   2.464E-03   27.26   1.167E-03   29.32   0.         0.00     0.         0.00   3.640E-08   34.19
   7   3.237E-02   15.00   5.664E-03   27.93   3.046E-03   26.10   1.172E-04  100.00   0.         0.00   6.796E-08   24.54
   8   5.849E-02    9.05   6.417E-03   17.93   4.230E-03   14.50   3.169E-04  100.00   0.         0.00   1.158E-07   19.71
   9   8.205E-02    9.91   1.315E-02   16.00   6.803E-03   14.50   0.         0.00     0.         0.00   1.767E-07   26.52
  10   1.019E-01    7.91   1.208E-02   16.06   6.226E-03   14.96   2.111E-04  100.00   0.         0.00   1.544E-07   20.14
  11   1.339E-01    6.64   1.888E-02   12.15   1.117E-02   11.07   6.830E-05  100.00   0.         0.00   3.325E-07   25.94
  12   1.945E-01    5.49   3.099E-02    9.90   1.530E-02    8.94   5.119E-04  100.00   7.921E-10  100.00   3.285E-07   14.95
  13   1.953E-01    4.96   3.057E-02   11.63   1.713E-02   11.10   3.124E-03   51.36   0.         0.00   4.282E-07   12.64
  14   2.277E-01    4.79   3.111E-02   12.96   1.752E-02    9.21   0.         0.00     0.         0.00   4.651E-07   11.85
  15   2.582E-01    4.32   3.255E-02    7.55   1.870E-02    7.49   6.926E-04  100.00   1.001E-09  100.00   4.740E-07   11.47
  16   2.736E-01    3.86   4.513E-02    6.62   2.683E-02    7.19   5.049E-08  100.00   6.061E-10  100.00   8.433E-07   10.20
  17   3.967E-01    3.78   5.124E-02    6.81   3.069E-02    5.66   1.227E-03   78.73   2.944E-11  100.00   9.188E-07    8.61
  18   4.358E-01    3.67   6.102E-02    5.72   3.473E-02    5.39   2.161E-03   79.72   7.242E-10   72.76   9.860E-07    9.70
  19   4.452E-01    3.30   7.102E-02    5.84   4.032E-02    5.60   3.976E-03   56.67   1.452E-09   55.79   1.085E-06    9.79
  20   4.237E-01    3.89   5.846E-02    5.52   3.197E-02    5.30   1.892E-03   59.79   6.667E-10   62.73   9.713E-07    7.76
  21   3.896E-01    3.57   5.153E-02    6.62   2.813E-02    7.42   0.         0.00     3.320E-10  100.00   7.805E-07   11.06
  22   4.320E-01    3.10   5.635E-02    6.15   3.970E-02    6.34   7.350E-04   94.32   7.197E-10   82.59   1.094E-06   10.50
  23   4.072E-01    3.04   5.570E-02    5.89   3.188E-02    7.03   2.802E-03   60.45   2.254E-09   62.53   9.600E-07   15.90
  24   4.359E-01    2.84   5.807E-02    6.35   3.583E-02    6.11   1.850E-03   79.77   6.456E-11  100.00   8.868E-07    7.71
  25   3.912E-01    2.74   5.334E-02    5.49   3.368E-02    5.99   1.451E-03   70.75   1.312E-09   98.23   8.584E-07    9.54
  26   4.436E-01    2.62   6.261E-02    4.95   3.855E-02    6.52   1.578E-03   57.83   1.590E-09   66.53   1.212E-06   13.08
  27   3.401E-01    2.78   4.790E-02    5.35   3.192E-02    8.62   7.509E-04   89.05   4.758E-11  100.00   1.057E-06   19.82
  28   3.445E-01    3.12   4.461E-02    5.31   2.783E-02    7.40   3.161E-03   57.33   1.656E-09   59.30   7.347E-07   10.13
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30	4.875E-01	2.89	6.253E-02	8.54	4.182E-02	6.25	1.408E-03	73.98	1.945E-10	62.60	1.096E-06	7.88
31	4.306E-01	2.80	5.930E-02	4.66	3.961E-02	6.66	5.524E-03	85.98	8.511E-10	70.64	9.848E-07	8.62
32	3.861E-01	2.62	5.059E-02	5.30	3.847E-02	7.07	6.993E-03	39.41	1.260E-09	69.75	1.013E-06	10.45
33	3.800E-01	2.75	5.235E-02	5.18	3.743E-02	7.30	6.381E-03	84.60	9.472E-10	76.71	1.022E-06	11.15
34	3.503E-01	2.77	4.806E-02	4.73	2.949E-02	5.81	2.918E-03	84.48	1.859E-09	68.09	8.562E-07	10.12
35	2.605E-01	2.51	3.570E-02	4.78	2.236E-02	8.48	5.799E-03	86.51	1.438E-09	67.17	6.978E-07	12.39
36	2.584E-01	2.71	3.508E-02	4.93	2.221E-02	6.90	1.516E-03	82.15	1.306E-09	60.08	6.944E-07	12.20
37	3.174E-01	2.77	4.584E-02	5.80	3.126E-02	7.99	8.086E-03	82.83	1.584E-09	61.59	8.549E-07	10.94
38	3.605E-01	2.38	5.000E-02	4.96	3.227E-02	7.00	4.556E-03	69.94	5.087E-09	66.24	7.883E-07	7.99
39	3.086E-01	2.57	4.034E-02	5.02	2.763E-02	7.89	4.502E-03	87.24	1.604E-09	57.84	6.801E-07	10.51
40	2.452E-01	2.62	3.895E-02	5.74	2.502E-02	7.68	3.575E-03	85.17	1.503E-09	66.79	7.125E-07	10.09
41	2.410E-01	3.07	3.487E-02	4.60	2.116E-02	7.67	2.733E-07	81.66	1.557E-09	53.83	6.220E-07	10.32
42	2.467E-01	2.54	3.056E-02	5.62	1.831E-02	10.86	4.506E-03	59.31	1.098E-09	77.46	4.776E-07	15.57
43	2.247E-01	2.46	3.328E-02	5.61	2.012E-02	10.05	9.952E-03	73.88	4.201E-10	60.25	5.590E-07	16.52
44	2.148E-01	2.95	3.027E-02	5.64	2.004E-02	9.12	2.457E-03	33.15	1.624E-09	58.07	6.962E-07	12.34
45	2.092E-01	2.82	2.127E-02	3.89	2.125E-02	9.74	1.769E-03	62.65	1.586E-09	52.90	5.014E-07	12.28
46	2.040E-01	2.99	2.728E-02	5.07	1.622E-02	8.97	1.837E-03	72.16	1.492E-09	57.24	4.125E-07	11.51
47	1.887E-01	2.40	2.630E-02	5.31	1.578E-02	9.22	2.978E-04	100.00	9.200E-10	51.80	4.055E-07	14.95
48	1.721E-01	3.10	2.565E-02	5.65	1.726E-02	9.10	1.453E-03	90.35	1.728E-09	39.55	4.481E-07	12.18
49	1.675E-01	2.28	2.485E-02	5.62	1.870E-02	10.59	8.429E-05	77.59	1.194E-09	42.26	4.134E-07	13.47
50	1.898E-01	2.21	5.356E-02	3.53	3.276E-02	6.19	1.347E-02	58.84	2.003E-09	39.55	1.156E-06	20.64
51	3.591E-01	1.99	5.172E-02	3.42	1.534E-01	6.97	2.403E-07	59.14	2.45[illegible]	28.61	9.218E-07	9.69

[illegible] WINDIV V1.3 1.24 (21/09/87) 90/01/02 03:21:30 PAGE 2

52	3.349E-01	1.89	4.697E-02	3.67	2.884E-02	7.37	1.190E-03	78.23	1.398E-09	42.33	7.345E-07	10.92
53	3.242E-01	1.83	4.822E-02	4.42	3.166E-02	6.88	0.	0.00	1.817E-09	37.69	7.990E-07	11.02
54	2.915E-01	2.02	4.282E-02	3.61	2.416E-02	7.64	0.	0.00	1.479E-09	43.48	6.759E-07	11.62
55	2.817E-01	1.96	4.427E-02	4.09	2.664E-02	9.30	3.415E-03	100.00	1.817E-09	46.92	7.191E-07	11.62
56	2.669E-01	2.26	4.071E-02	4.18	2.705E-02	8.19	1.116E-03	99.96	2.499E-10	47.09	7.822E-07	10.25
57	2.715E-01	2.19	4.216E-02	4.23	2.376E-02	9.24	1.027E-03	75.00	1.515E-09	55.76	6.096E-07	10.46
58	2.644E-01	1.71	3.906E-02	3.80	2.085E-02	6.75	2.425E-04	100.00	2.050E-09	42.45	6.089E-07	10.66
59	2.500E-01	2.20	3.847E-02	4.32	2.467E-02	7.08	3.639E-03	62.87	9.210E-10	40.05	9.580E-07	20.60
60	2.5[illegible] -01	1.68	3.716E-02	3.85	2.202E-0[illegible]	7.40	3.054E-03	73.90	1.664E-09	33.01	5.491E-07	15.17
61	2.459E-01	1.92	3.740E-02	4.06	2.255E-02	6.19	1.052E-03	100.00	2.463E-09	43.24	6.665E-07	14.78
62	2.378E-01	1.89	3.925E-02	3.88	2.420E-02	7.22	0.	0.00	2.684E-09	42.59	6.828E-07	11.26
63	2.391E-01	2.07	3.939E-02	3.81	2.213E-02	6.80	1.958E-04	100.00	1.858E-09	35.56	4.905E-07	9.62
64	2.325E-01	1.81	3.603E-02	3.62	2.127E-02	8.59	1.774E-03	74.90	1.937E-09	38.40	5.764E-07	9.67
65	2.333E-01	1.89	3.868E-02	3.79	2.140E-02	8.93	4.409E-04	100.00	3.588E-10	57.29	5.084E-07	10.10
66	2.250E-01	2.02	3.674E-02	4.34	2.269E-02	8.29	6.848E-04	100.00	1.511E-09	34.28	5.950E-07	14.40
67	2.217E-01	2.20	3.866E-02	3.94	2.303E-02	6.62	0.	0.00	7.820E-10	70.01	5.709E-07	13.08
68	2.271E-01	2.07	3.525E-02	3.71	2.244E-02	7.35	0.	0.00	8.315E-10	52.44	6.28[illegible]-07	13.58
69	2.276E-01	2.17	3.780E-02	[illegible].39	2.268E-02	7.24	2.571E-03	60.34	1.079E-09	41.51	5.699E-07	10.04
70	2.310E-01	1.75	3.879E-02	3.64	2.041E-02	7.81	3.829E-03	75.26	2.755E-09	39.05	5.597E-07	9.41
71	2.349E-01	2.22	3.690E-02	3.08	2.027E-02	7.94	1.173E-03	81.38	1.040E-09	43.89	6.210E-07	15.80
72	2.132E-01	1.89	3.613E-02	4.00	1.961E-02	6.67	1.107E-03	90.24	1.311E-09	46.45	5.045E-07	13.33
73	2.081E-01	2.27	3.817E-02	4.28	2.295E-02	6.14	8.023E-04	100.00	1.405E-09	40.73	8.543E-07	40.56
74	2.202E-01	1.40	3.645E-02	4.37	2.244E-02	7.03	0.	0.00	7.326E-10	41.40	7.370E-07	15.55
75	2.041E-01	2.26	3.445E-02	4.24	2.150E-02	7.95	9.[illegible]E-04	91.26	1.151E-09	40.87	5.515E-07	11.51
76	2.238E-01	1.83	3.824E-02	4.47	2.503E-02	6.79	3.282E-03	94.22	7.[illegible]46E-10	54.53	5.872E-07	14.27
77	1.997E-01	1.77	3.421E-02	3.62	2.225E-02	7.38	8.819E-04	100.00	1.226E-09	37.91	5.937E-07	15.56
78	2.103E-01	2.19	3.716E-02	3.34	2.208E-02	7.42	8.707E-04	74.05	1.108E-09	42.30	5.104E-07	12.63
79	1.902E-01	2.78	3.612E-02	3.47	2.010E-02	8.25	0.	0.00	1.496E-09	34.07	4.593E-07	14.48
80	2.063E-01	2.16	3.597E-02	4.42	1.844E-02	8.17	5.696E-03	62.73	2.410E-09	[illegible]	5.110E-07	11.62
81	2.049E-01	2.23	3.562E-02	4.21	2.200E-02	7.52	3.995E-03	88.82	9.654E-10	37.[illegible]	5.713E-07	13.39
82	1.723E-01	1.99	3.506E-02	4.65	2.128E-02	7.68	2.684E-03	67.84	1.539E-09	34.30	5.160E-07	13.57
83	2.063E-01	1.86	3.601E-02	4.05	1.910E-02	7.75	9.746E-08	100.00	1.342E-09	40.98	5.036E-07	12.55
84	1.680E-01	2.34	3.402E-02	4.56	2.037E-02	7.76	1.188E-03	76.62	1.076E-09	48.18	5.108E-07	13.17
85	1.951E-01	1.84	3.733E-02	3.51	2.531E-02	7.14	2.440E-03	71.73	7.539E-10	38.96	5.150E-07	13.65
86	1.868E-01	2.13	3.361E-02	3.94	1.791E-02	6.95	4.174E-03	92.57	1.522E-09	30.50	6.015E-07	13.15
87	1.860E-01	1.80	3.354E-02	3.73	2.007E-02	7.12	8.363E-04	70.21	6.465E-10	46.93	4.510E-07	13.31
88	1.500E-01	1.92	3.200E-02	4.21	1.826E-02	6.91	1.992E-03	100.00	1.007E-09	44.28	3.974E-07	13.61
89	1.628E-01	2.30	3.083E-02	4.00	1.657E-02	8.01	5.549E-04	100.00	6.992E-10	39.82	3.692E-07	12.41
90	1.739E-01	2.06	3.280E-02	3.34	1.845E-02	8.21	9.751E-04	100.00	1.090E-09	40.98	4.120E-07	10.76

```
 92   1.689E+01   1.90   3.266E+02   4.03   1.597E+02   7.66   2.522E+03   80.82   6.631E+10   41.45   3.785E+07   14.21
 93   1.678E+01   2.11   3.265E+02   4.26   1.628E+02   7.53   2.053E+03   57.00   8.023E+10   32.47   4.032E+07   12.50
 94   6.325E+02   3.77   1.201E+02   5.31   5.178E+02  10.39   5.220E+04  100.00   2.749E+10   61.05   1.492E+07   22.00
 95   6.362E+02   3.71   1.262E+02   6.56   6.944E+02  11.70   0.          0.00   2.206E+10   69.52   1.421E+07   23.51
 96   6.442E+02   3.06   1.237E+02   6.40   6.685E+02  10.71   6.102E+04   86.39   6.593E+10   56.19   1.159E+07   22.20
 97   8.112E+02   3.49   1.475E+02   5.49   7.924E+02   9.26   0.          0.00   1.828E+10   64.72   2.722E+07   33.27
 98   9.360E+02   2.70   1.753E+02   6.34   9.439E+02  12.60   0.          0.00   1.636E+10   51.75   4.232E+07   36.41
 99   8.239E+02   2.93   1.609E+02   4.66   8.890E+02   9.73   0.          0.00   2.501E+11   87.77   1.942E+07   17.59
100   9.600E+02   2.94   1.663E+02   5.11   9.604E+02  10.63   0.          0.00   8.356E+10   42.29   2.138E+07   18.63
101   6.971E+02   2.88   1.814E+02   5.18   1.071E+02  10.14   0.          0.00   9.881E+11   71.28   2.480E+07   23.73
102   1.253E+01   2.47   2.415E+02   4.29   1.466E+02   8.77   0.          0.00   4.611E+11   68.21   3.424E+07   17.50
103   1.314E+01   2.82   2.431E+02   4.51   1.187E+02   7.63   0.          0.00   9.157E+11   69.99   3.107E+07   17.11
104   1.528E+01   2.19   2.992E+02   5.66   1.813E+02   7.86   0.          0.00   1.473E+10   47.94   4.038E+07   15.06
105   1.760E+01   1.89   3.401E+02   5.64   1.854E+02   7.12   0.          0.00   6.245E+10   31.77   4.856E+07   11.73
106   1.110E+01   2.36   2.169E+02   4.59   1.165E+02   6.40   0.          0.00   4.941E+10   44.15   3.128E+07   15.19
107   1.267E+01   2.20   2.640E+02   6.34   1.309E+02   6.85   0.          0.00   1.650E+10   60.96   3.462E+07   13.46
108   1.615E+01   1.92   3.067E+02   5.58   1.755E+02   6.45   6.150E+04  100.00   2.891E+10   49.80   3.757E+07   13.06
109   8.182E 02   2.60   1.795E+02   6.19   6.875E+02   5.73   0.          0.00   2.827E+10   56.04   2.119E+07   21.99
1                                                                 KENO1V    VER 1.2A (21/09/87) 90/01/03. 03.21.20. PAGE   27
011   9.958E+02   1.80   2.183E+02   4.28   9.684E+02   6.24   7.166E+04   94.66   3.534E+11   71.13   3.218E+07   15.07
111   1.237E+01   2.05   2.987E+02   5.25   1.252E+02   7.41   6.442E+04  100.00   5.525E+12   71.22   4.107E+07   16.45
112   1.505E+01   1.61   3.978E+02   5.30   1.605E+02   5.13   4.257E+04  100.00   1.211E+10   66.12   5.441E+07   14.49
113   2.117E+01   1.32   5.593E+02   5.02   2.292E+02   4.92   1.972E+04  100.00   2.528E+10   38.77   7.110E+07   10.90
114   2.080E+01   1.15   6.526E+02   2.57   3.022E+02   5.75   1.200E+04   75.42   2.414E+10   39.92   7.147E+07   7.85
115   1.679E+01   1.43   5.620E+02   2.57   1.977E+02   6.30   5.873E+04   75.44   2.026E+10   62.54   4.366E+07   8.12
116   2.155E+01   1.09   7.170E+02   2.62   2.439E+02   5.80   2.983E+04   72.84   1.001E+10   50.66   5.627E+07   6.31
117   2.449E+01   1.17   8.442E+02   2.25   2.950E+02   3.68   0.          0.00   1.727E+10   51.52   8.040E+07   8.63
118   2.684E+01   .96   9.132E+02   2.69   3.103E+02   5.56   2.128E+04   72.76   3.891E+11   68.59   7.681E+07   6.27
119   2.769E+01   .96   1.031E+03   2.54   3.100E+02   6.04   1.462E+04   95.05   2.452E+10   50.89   8.335E+07   6.66
120   2.410E+01   1.00   1.026E+03   2.25   3.025E+02   3.94   0.          0.00   1.206E+10   45.27   7.702E+07   8.14
121   1.145E+01   1.29   4.524E+02   1.59   1.224E+02   5.27   0.          0.00   1.541E+11   69.12   2.613E+07   12.09
122   9.248E+02   1.37   3.876E+02   2.55   9.271E+03   6.27   0.          0.00   0.          0.00   2.021E+07   9.72
123   6.310E+02   1.94   2.980E+02   2.27   5.367E+03   7.47   0.          0.00   3.877E+11   76.14   1.331E+07   12.16
1                                                                 KENO1V    VER 1.2A (21/09/87) 90/01/03. 03.21.20. PAGE   28
01E42(ERIT EXXON 15X15 PWR, 4.240235, 2305 PPM NAT.BORON
0                          FREQUENCY FOR GENERATIONS    4 TO   73

  .8420 TO  .8651     **
  .8651 TO  .8882     ****
  .8882 TO  .9113     ********************
  .9113 TO  .9344     ********************
  .9344 TO  .9575     ***************
  .9575 TO  .9806     ********
  .9806 TO 1.0037     **
0                          FREQUENCY FOR GENERATIONS   22 TO   73

  .8420 TO  .8651
  .8651 TO  .8882     *
  .8882 TO  .9113     ***************
  .9113 TO  .9344     ******************
  .9344 TO  .9575     ************
  .9575 TO  .9806     *******
  .9806 TO 1.0037     **
0                          FREQUENCY FOR GENERATIONS   39 TO   73

  .8420 TO  .8651
  .8651 TO  .8882     *
  .8882 TO  .9113     *********
  .9113 TO  .9344     ************
  .9344 TO  .9575     ********
  .9575 TO  .9806     ***
  .9806 TO 1.0037     **
0                          FREQUENCY FOR GENERATIONS   56 TO   73

  .8420 TO  .8651
  .8651 TO  .8882
```

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  .9433 TO  .9588     ******
  .9588 TO  .9675     *****
  .9675 TO  .9806     **
  .9806 TO 1.0037
--EOR--
1 MEVT    POWER COMPUTING/990 - NOS 2.7.1.10.     NOS 2.7.1 ET=MAC.    90/01/03. 02.40.15.


 03.30.06.E42KEBI,P0,T2000.   HENRY TRAN
 03.30.06.UBER,VK9P8N,,NC.
 03.30.06.ABBC,  0.
 03.30.06. YOUR PASSWORD EXPIRES AT 00.00.00 ON 90/02/08.
 03.30.06.CHARGE,N973301,VSC.
 03.30.08. CHARGE = N973301, PROJECT = VSC.
 03.30.09.2221101.
 03.30.09.PROC). SYSTEM PROLOGUE
 03.30.09.COMMENT. SYSTEM PROLOG
 03.30.09.NEWB(A).
 03.30.11.CHEKERP.
 03.30.13. INQUIRY COMPLETE.
 03.30.13.REVERT.                                    273
 03.30.14.TITLE([E42KEBI] EXXON 15X15 PWR, 4.2%U235 ~~93%~~ PPM NAT.BORON)
 03.30.14.LABEL,TAPEA,D=6F,L=EXSECT,VSN=007421.                    MC
 03.31.23.MT107, ASSIGNED TO TAPEA, VSN=007421.
 03.31.24.COPYBF,TAPEA,TAPE4.
 03.31.27. COPY    1 FILES          1 RECS     350424 WORDS
 03.31.27.REWIND,TAPE4.
 03.31.27.RETURN,TAPEA.
 03.31.28.RFL(EC=10)
 03.31.28.ATTACHP,KENO4,L,24.
 03.31.29.    STOP
 03.31.29.    035200 MAXIMUM EXECUTION FL.
 03.31.29.      0.238 CP SECONDS EXECUTION TIME.
 03.31.29.KENO4,PL=777777.
 03.40.14.    STOP
 03.40.14.    372700 MAXIMUM EXECUTION FL.
 03.40.14.  1020.453 CP SECONDS EXECUTION TIME.
 03.40.15.UEPI,      0.124KUNE.
 03.40.15.UEMT,      2.747KUNS.
 03.40.15.UEMS,     35.165KUNS.
 03.40.15.UECP,   1021.723BECS.
 03.40.15. BRU,   2050.561UNTS.
 03.40.15.$OUT(*/OF=E)
 03.40.15. NO FILES PROCESSED.
 03.40.15.$DAYFILE(OUTPUT,JT=U)
 03.40.15.JABO,    105B SDBS FN=OUTPUT.
 03.40.15.POWER COMPUTING/990 - NOS 2.7.1.10
 03.40.15.DATE:          90/01/03.
 03.40.15.JSN:           MEVT
END OF FILE
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04.14.34.USER,VK9PSN,,NC.
04.14.34.ABBC,  0.
04.14.34. YOUR PASSWORD EXPIRES AT 00.00.00 ON 90/02/08.
04.14.34.CHARGE,N973301,VBC.
04.14.35. CHARGE = N973301, PROJECT = VBC.
04.14.36.ZZZZZGI.
04.14.36.PROC1. SYSTEM PROLOGUE
04.14.36.COMMENT. SYSTEM PROLOG
04.14.36.NEWS(A).
04.14.37.CHEKEXP.
04.14.38. INQUIRY COMPLETE.
04.14.38.REVERT.
04.14.38.TITLE([ESONUBI] EXXON PWR 15x15, 5.0% U235, BORATED WATER)
04.14.38.ATTACHP(LEB1,1,0)
04.14.40.    STOP
04.14.40.    035200 MAXIMUM EXECUTION FL.
04.14.40.      0.243 CP SECONDS EXECUTION TIME.
04.14.40.ATTACHP(LEB2,1,0)
04.14.41.    STOP
04.14.41.    035200 MAXIMUM EXECUTION FL.
04.14.41.      0.244 CP SECONDS EXECUTION TIME.
04.14.42.ATTACHP(LEB3,1,0)
04.14.42.    STOP
04.14.42.    035200 MAXIMUM EXECUTION FL.
04.14.43.      0.244 CP SECONDS EXECUTION TIME.
04.14.43.REWIND,TAPE1,TAPE2,TAPE3.
04.14.43.ATTACHP,NULIF,A,J.
04.14.45.    STOP
04.14.45.    035200 MAXIMUM EXECUTION FL.
04.14.45.      0.241 CP SECONDS EXECUTION TIME.
04.14.45.NULIF(PL=777777)
04.14.53.TIME =    000, KEFF = 1.69181
04.14.58.TIME =    000, KEFF = 1.43527
04.15.02.TIME =    000, KEFF = 1.34796
04.15.07.TIME =    000, KEFF = 1.32145
04.15.11.TIME =    000, KEFF = 1.29269
04.15.15.TIME =    000, KEFF = 1.26525
04.15.20.TIME =    000, KEFF = 1.23424
04.15.24.TIME =    000, KEFF = 1.21435
04.15.28.TIME =    000, KEFF = 1.19069
04.15.32.TIME =    000, KEFF = 1.16802
04.15.37.TIME =    000, KEFF = 1.14641
04.15.42.TIME =    000, KEFF = 1.12566
04.15.47.TIME =    000, KEFF = 1.12566
04.15.47.    STOP  222
04.15.47.    230100 MAXIMUM EXECUTION FL.
04.15.47.     66.182 CP SECONDS EXECUTION TIME.
04.15.48.UEPF,      0.116KUNS.
04.15.48.UEMS,    110.300KUNS.
04.15.48.UECP,     67.321BECS.
04.15.48. SRU,    143.711UNTS.
04.15.48.$OUT(*/OP=E)
04.15.48. NO FILES PROCESSED.
04.15.48.$DAYFILE(OUTPUT,JT=D)
04.15.48.IABO,    517B SDBS FN=OUTPUT.
04.15.48.POWER COMPUTING/990 - NOS 2.7.1.10
04.15.48.DATE:          89/12/29.
04.15.48.JSN:           MHK0
END OF FILE
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CALCULATION SHEET

TABLE (2-1)

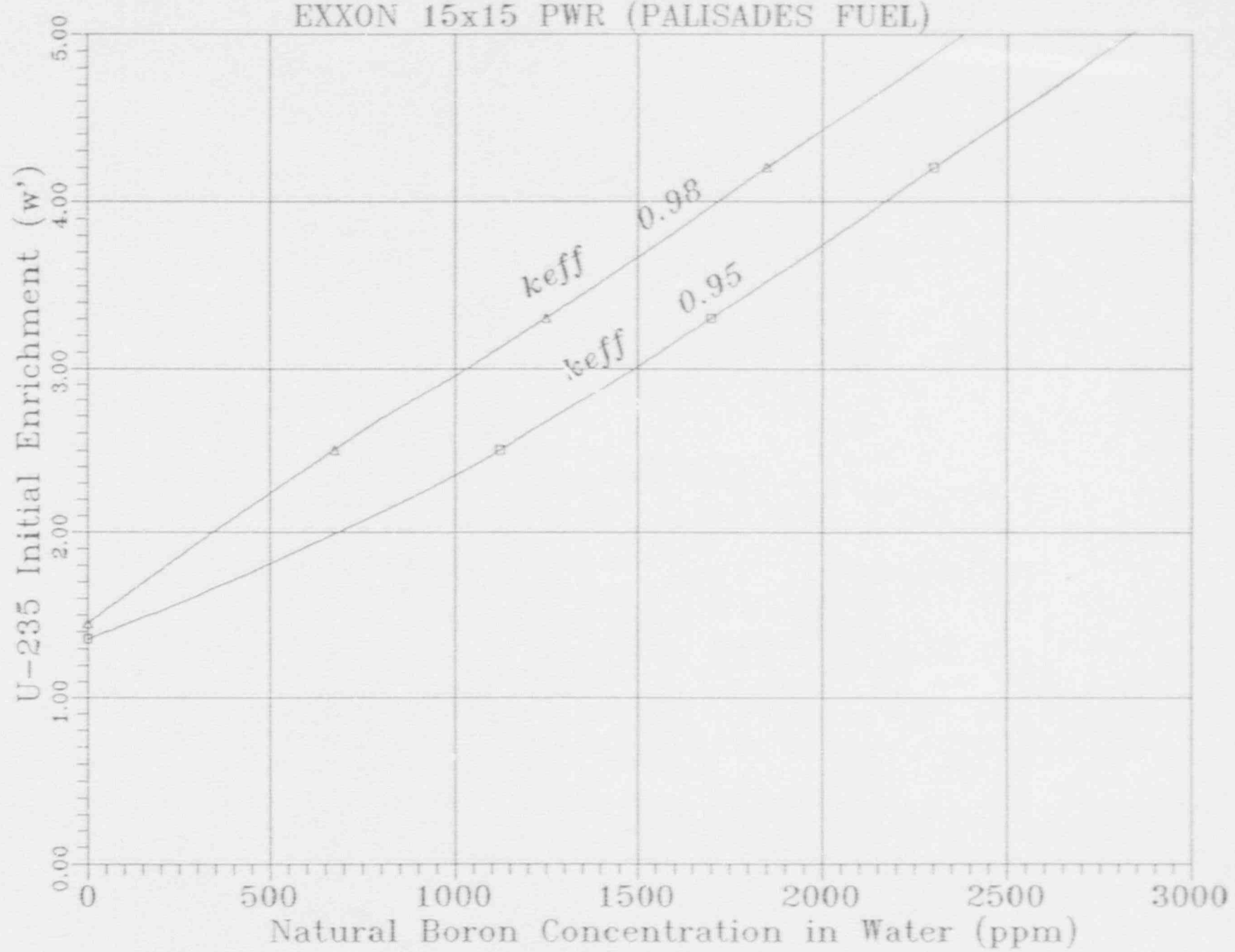
SECTION	LENGTH	NAT. U [ppm]	AVERAGE E-EFF	± SIGMA	FINAL * E-EFF
1-1	3.503	1500	0.9376	0.006	0.9436
1-2	3.203	1700	0.9243	0.007	0.9313
1-3	2.908	900	0.9799	0.005	0.9849
1-4	2.205	2300	0.9256	0.008	0.9336
1-5	2.004	[illegible] ppm			0.9500 **

* Include all uncertainties

** Estimate from Figure (2-1)

CLIENT:	JOB NO.	REVISION:
ORIGINATOR: HENRY TRAN	DATE:	CALC. NO. :
CHECKER:	DATE:	PAGE: 1

Figure (2-1)


EXXON 15x15 PWR (PALISADES FUEL)
U-235 Initial Enrichment (w')
0.00
1.00
2.00
3.00
4.00
5.00
0
500
1000
1500
2000
2500
3000
Natural Boron Concentration in Water (ppm)
keff
0.98
keff
0.95

CALCULATION SHEET

2.2 Analysis

(a) From Ref (12), the overall uncertainty due to variation in assembly locations, water density, fuel homogenization, and KENO-IV bias is

$$\Delta k_{total} = 0.013$$

Thus, the "Final k-eff" in Table (2-1) are calculated from:

$$\text{Final } K_{eff} = \text{Average } K_{eff} + 2\sigma + \Delta k_{total}$$

Ex

Section 4.1: $0.9376 + 2 * 0.004 + 0.013 = 0.9586$

(b) From Ref (12), the reactivity gained per 1% of U-235 initial enrichment is:

$$\delta k_{enrichment} = 0.329$$

(c) From Table (2-1), the reactivity reduced per 100 ppm of natural boron in water is:

$$\delta k_{boron} = \frac{0.9243 - 0.9376}{(1700 - 1500)} = -0.0067$$

CLIENT:	JOB NO.	REVISION:
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CHECKER:	DATE:	PAGE: 1

CALCULATION SHEET

(d) Boron contration to have $k_{eff} \approx 0.945$ (≤ 0.95)

Enrichment (%)	Nat. Boron Concentration [PPM]
1.36	ϕ (From Ref (12))
2.5	$900 + \left[\frac{0.945 - 0.9588}{-0.0067} * 100\right] = 1125$
3.3	1700 (From Table 2-1)
4.2	2300 (From Table 2-1)
5.ϕ	2800 (From Figure 2-1)

(e) Boron concentration to have $k_{eff} \leq 0.98$

Enrichment (%)	Nat. Boron Concentrations [ppm]
$1.36 + \frac{0.98 - 0.95}{0.329} = 1.45$	ϕ
2.5	$1125 + \frac{(.98 - .95)}{-0.0067} * 100 = 675$
3.3	$1700 + \frac{(.98 - .95) * 100}{-.0067} = 1250$
4.2	$2300 +$ " $= 1850$
5.ϕ	$2800 +$ " $= 2350$

CLIENT:	JOB NO.	REVISION:
ORIGINATOR: HENRY TRAN	DATE:	CALC. NO. :
CHECKER:	DATE:	PAGE: 1

FIGURE (2-2)

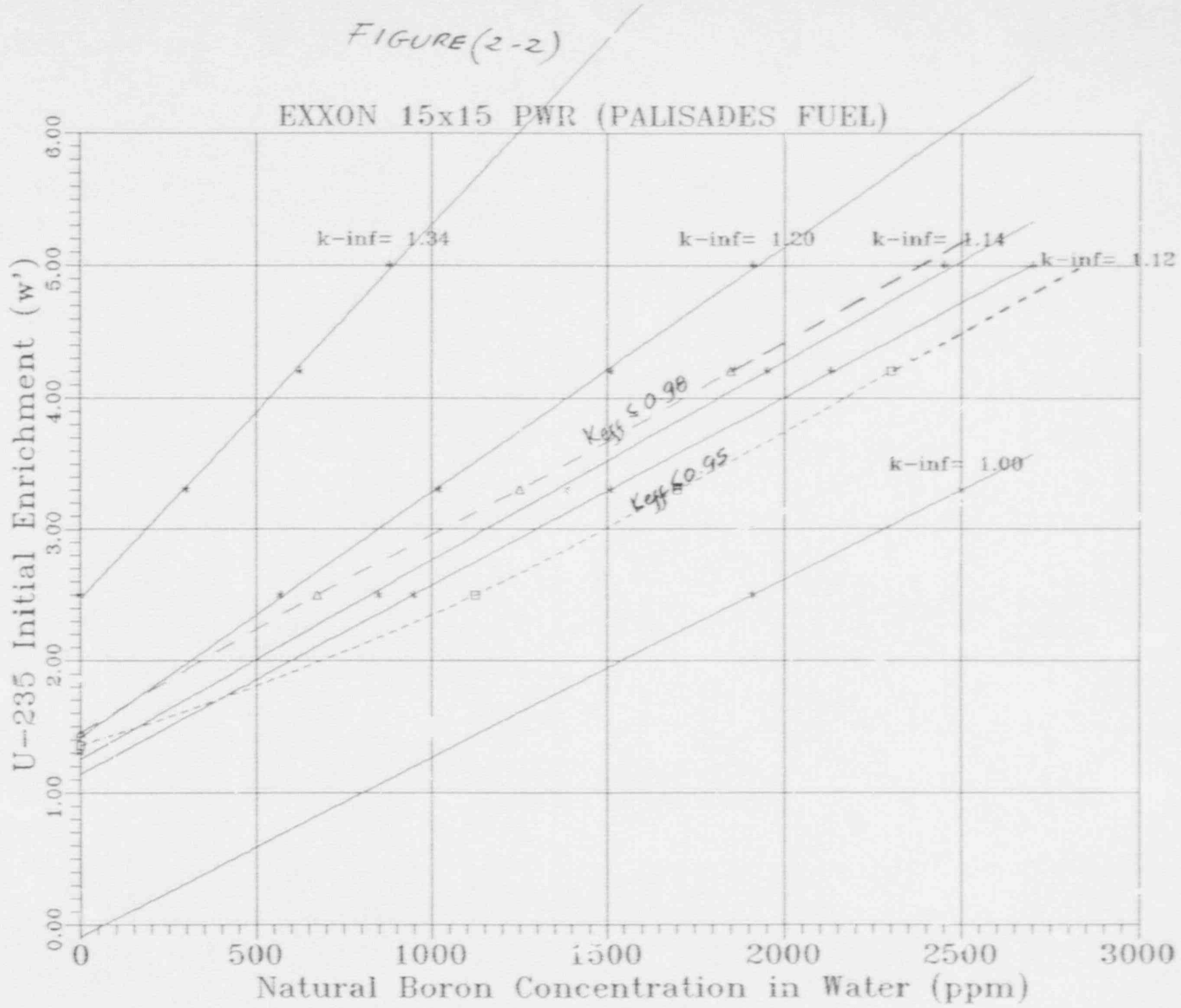

EXXON 15x15 PWR (PALISADES FUEL)
k-inf= 1.34
k-inf= 1.20
k-inf= 1.14
k-inf= 1.12
k-inf= 1.00
Keff=0.98
Keff=0.95
U-235 Initial Enrichment (w')
0.00
1.00
2.00
3.00
4.00
5.00
6.00
0
500
1000
1500
2000
2500
3000
Natural Boron Concentration in Water (ppm)

Figure (2-3)

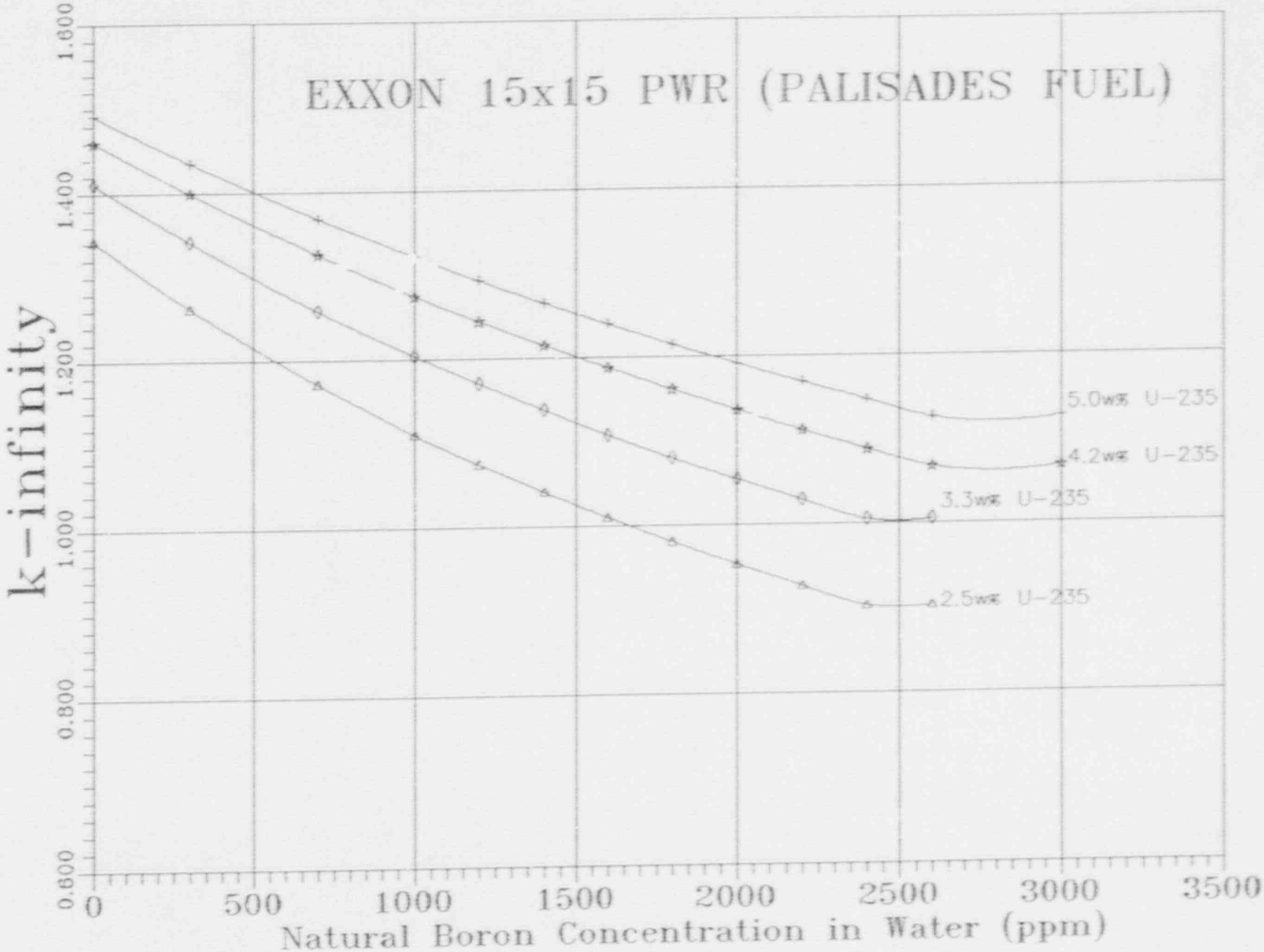

EXXON 15x15 PWR (PALISADES FUEL)
k-infinity
1.600
1.400
1.200
1.000
0.800
0.600
0
500
1000
1500
2000
2500
3000
3500
Natural Boron Concentration in Water (ppm)
5.0wt% U-235
4.2wt% U-235
3.3wt% U-235
2.5wt% U-235

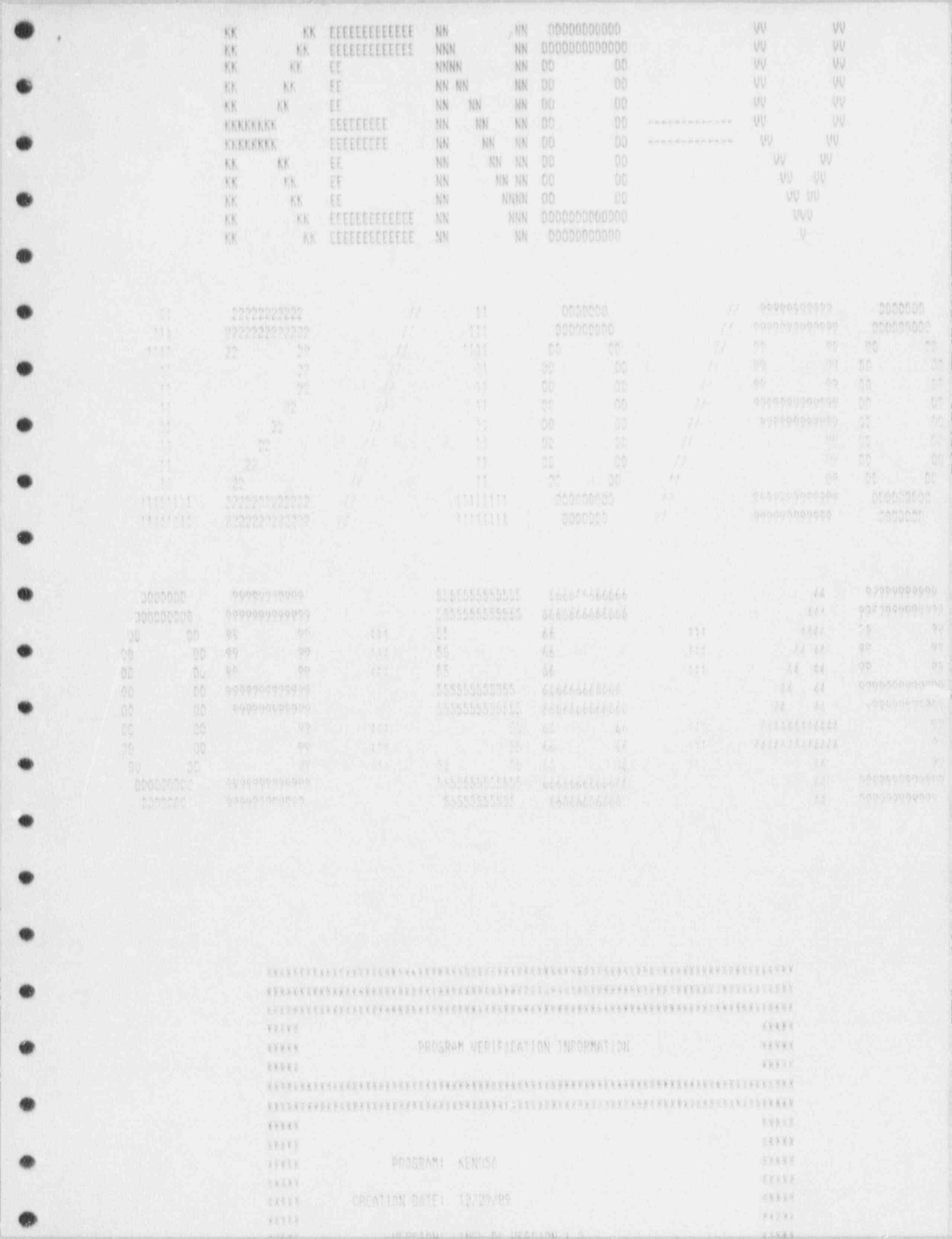
Table (4-2)

H (in water) : 6.671E-02 [atoms/barn.cm]
H (homo. fuel): 3.807E-02 [atoms/barn.cm]

NAT. BORON CONCENTRATION [ppm]	NULIF & XSDRNPM B-10 ATOM [atoms/barn.cm]	KENO-IV B-10 ATOM [atoms/barn.cm]
0	0.000E+00	0.000E+00
100	1.308E-06 (*)	7.462E-07 (**)
200	2.615E-06	1.492E-06
300	3.923E-06	2.239E-06
400	5.230E-06	2.985E-06
500	6.538E-06	3.731E-06
600	7.845E-06	4.477E-06
700	9.153E-06	5.224E-06
800	1.046E-05	5.970E-06
900	1.177E-05	6.716E-06
1000	1.308E-05	7.462E-06
1100	1.438E-05	8.209E-06
1200	1.569E-05	8.955E-06
1300	1.700E-05	9.701E-06
1400	1.831E-05	1.045E-05
1500	1.961E-05	1.119E-05
2034 1600	2.092E-05	1.194E-05
~~1700~~	2.223E-05	1.269E-05
1800	2.354E-05	1.343E-05
1900	2.484E-05	1.418E-05
2000	2.615E-05	1.492E-05
2100	2.746E-05	1.567E-05
2200	2.877E-05	1.642E 05
2300	3.007E-05	1.716E-05
2841 ~~2400~~	3.138E-05	1.791E-05
2500	3.269E-05	1.866E-05
2600	3.400E-05	1.940E-05
2700	3.530E-05	2.015E-05
2800	3.661E-05	2.089E-05
2900	3.792E-05	2.164E-05
3000	3.923E-05	2.239E-05
3100	4.053E-05	2.313E-05
3200	4.184E-05	2.388E-05

(*) $100\ ppm * \frac{10^{-6}}{ppm} * 6.671 \times 10^{-2} \frac{atoms\ H}{barn\ cm} * 0.196 \frac{B10}{Bnat} = 1.308 \times 10^{-6} \frac{atom\ B-10}{barn\ cm}$

(**) $100\ ppm * \frac{10^{-6}}{ppm} * 3.807 \times 10^{-2} \frac{atoms\ H}{barn\ cm} * 0.196 \frac{B10}{Bnat} = 7.462 \times 10^{-7} \frac{atoms\ B-10}{barn\ cm}$



DATE OF EXECUTION: 12/10/90

TIME OF EXECUTION: 09:56:49

USC-24:5.0&ENRICH:2000 WOOMB,70F

NUMERIC PARAMETERS

TME	MAXIMUM PROBLEM TIME (MIN)	XXXXX	
TBA	TIME PER GENERATION (MIN)	10.00	
GEN	NUMBER OF GENERATIONS	70	
NPG	NUMBER PER GENERATION	300	
NSK	NUMBER OF GENERATIONS TO BE SKIPPED	0	
BEG	BEGINNING GENERATION NUMBER	1	
RCE	GENERATIONS BETWEEN CHECKPOINTS	0	
NXD	NUMBER OF EXTRA 1-D CROSS SECTIONS	0	
NBK	NEUTRON BANK SIZE	325	
XNB	EXTRA POSITIONS IN NEUTRON BANK	0	
NFB	FISSION BANK SIZE	500	
XFB	EXTRA POSITIONS IN FISSION BANK	0	
WTA	DEFAULT VALUE OF WEIGHT AVERAGE	0.5000	
WTH	WEIGHT WISH FOR SPLITTING	2.0000	
WTL	WEIGHT LOW FOR RUSSIAN ROULETTE	0.2500	
RND	STARTING RANDOM NUMBER	4D8FA8000000000	
NRB	NUMBER OF D.A. BLOCKS ON UNIT 8	200	
N18	LENGTH OF D.A. BLOCKS ON UNIT 8	512	
ADI	MODE OF CALCULATION	FORWARD	
	INPUT DATA WRITTEN ON RESTART UNIT	NO	
	BINARY DATA INTERFACE	NO	

VSC-2A1S.0$ENRICH;2820 WPDMB,70P

XXXXXX LOGICAL PARAMETERS XXXXXX

RUN	EXECUTE PROBLEM AFTER CHECKING DATA	YES	PLT	PLOT PICTURE MAP(S)	NO
FLX	COMPUTE FLUX	NO	FDN	COMPUTE FISSION DENSITIES	NO
SMU	COMPUTE AVG UNIT SELF-MULTIPLICATION	NO	NUB	COMPUTE NU-BAR & AVG FISSION GROUP	NO
MKU	COMPUTE MATRIX K-EFF BY UNIT NUMBER	NO	MKP	COMPUTE MATRIX K-EFF BY UNIT LOCATION	NO
CKU	COMPUTE COFACTOR K-EFF BY UNIT NUMBER	NO	CKP	COMPUTE COFACTOR K-EFF BY UNIT LOCATION	NO
FMU	PRINT FISS PROD MATRIX BY UNIT NUMBER	NO	FMP	PRINT FISS PROD MATRIX BY UNIT LOCATION	NO
MKH	COMPUTE MATRIX K-EFF BY HOLE NUMBER	NO	MKA	COMPUTE MATRIX K-EFF BY ARRAY NUMBER	NO
CKH	COMPUTE COFACTOR K-EFF BY HOLE NUMBER	NO	CKA	COMPUTE COFACTOR K-EFF BY ARRAY NUMBER	NO
FMH	PRINT FISS PROD MATRIX BY HOLE NUMBER	NO	FMA	PRINT FISS PROD MATRIX BY ARRAY NUMBER	NO
HOL	COLLECT MATRIX BY HIGHEST HOLE LEVEL	NO	HOL	COLLECT MATRIX BY HIGHEST ARRAY LEVEL	NO
XMX	PRINT XSEC MIXED CROSS SECTIONS	NO	CAR	PRINT FIS. AND ABS. BY REGION	NO
XS1	PRINT 1-D MIXTURE X-SECTIONS	NO	DAY	PRINT XSEC-FLUX-DOSE CORRELATION TABLES	NO
XS2	PRINT 2-D MIXTURE X-SECTIONS	NO	PWT	PRINT WEIGHT SUCRAOL ARRAY	NO
TAB	PRINT MIXTURE ANGLES & PROBABILITIES	NO	DGN	PRINT INPUT GEOMETRY	NO
DXS	PRINT FISSION SPECTRUM	NO	DOS	PRINT DOSE INFORMATION	NO
XSD	PRINT EXTRA 1-D CROSS SECTIONS	NO	TRK	PRINT TRACKING INFORMATION	NO

PARAMETER INPUT COMPLETED

0 0 IS IS WERE USED READING THE PARAMETER DATA

XXXXXXXXXXXXXX DATA READING COMPLETED XXXXXXXXXXXXXX

VSC-2A1S.0$ENRICH;2820 WPDMB,70P

UNIT NUMBER	DATA SET NAME	VOLUME NAME	UNIT FUNCTION

XSC	14	DATASET NAME		SERNUM	MIXED CROSS SECTIONS	
ALB	79	DATASET NAME		SERNUM	INPUT ALBEDOS	
WTS	80	DATASET NAME		SERNUM	INPUT WEIGHTS	
SKT	16	DATASET NAME		SERNUM	WRITE SCRATCH DATA	
LIB	41	DATASET NAME		SERNUM	INPUT AMPX WORKING LIBRARY	
	8	DATASET NAME		SERNUM	INPUT DATA DIRECT ACCESS	
	9	DATASET NAME		SERNUM	SUPER GROUPED DIRECT ACCESS	
	10	DATASET NAME		SERNUM	XSEC MIXING DIRECT ACCESS	

0 ..... 0 10'S WERE USED PREPARING INPUT DATA .....
1 VSC-24I5.ORENRICH42B2G WPPMB,70F
0 MIXING TABLE

NUMBER OF SCATTERING ANGLES = 1
CROSS SECTION MESSAGE THRESHOLD = 0.5E-05

ENTRY	MIXTURE	NUCLIDE	DENSITY
1	1	0100	4.5B342E-02
2	1	92508	1.16229E-03
3	1	92810	5.1854BE-02
4	2	A0100	4.221009E-02
5	3	B100	3.3B4B2E-02
6	3	0102	4.471202E-02
7	3	5125	1.566B95E-04
B	4	100	7.000000E-00

0 CROSS SECTIONS READ FROM THE AMPX WORKING LIBRARY ON UNIT 41

100 CARBON STEEL 7.B26/CM 6=.000921, FE=.003491
0102 HYDROGEN GAS HANSEN ROACH
5100 BORON HANSEN ROACH
0100 OXYGEN HANSEN ROACH
A0100 ZIRCONIUM HANSEN ROACH
92508 U-235-PR SIG P = 1000 HANSEN ROACH
92810 U-238 SIG P = 55 HANSEN ROACH DPC MOD
0 0 1010 WERE USED MIXING CROSS-SECTIONS .....
0 0 1010 WERE USED PREPARING THE CROSS SECTIONS .....

VSC-24I5.ORENRICH2B2G WPPMB,70F

ADDITIONAL INFORMATION

NUMBER OF ENERGY GROUPS	16	USE LATTICE GEOMETRY	YES
NO. OF FISSION SPECTRUM SOURCE GROUP	1	GLOBAL ARRAY NUMBER	5
NO. OF SCATTERING ANGLES IN XSECS	1	NUMBER OF UNITS IN THE GLOBAL X DIR.	1
ENTRIES/NEUTRON IN THE NEUTRON BANK	26	NUMBER OF UNITS IN THE GLOBAL Y DIR.	1

NUMBER OF MIXTURES USED	4	USE A GLOBAL REFLECTOR	NO		
NUMBER OF BIAS ID'S USED	1	USE NESTED HOLES	NO		
NUMBER OF DIFFERENTIAL ALBEDOS USED	0	NUMBER OF HOLES	4		
TOTAL INPUT GEOMETRY REGIONS	16	MAXIMUM HOLE NESTING LEVEL	1		
NUMBER OF GEOMETRY REGIONS USED	16	USE NESTED ARRAYS	YES		
NUMBER OF GEOMETRY UNITS	6	NUMBER OF ARRAYS USED	5		
LARGEST ARRAY NUMBER	5	MAXIMUM ARRAY NESTING LEVEL	3		
+X BOUNDARY CONDITION	VACUUM	-X BOUNDARY CONDITION	VACUUM		
+Y BOUNDARY CONDITION	VACUUM	-Y BOUNDARY CONDITION	VACUUM		
+Z BOUNDARY CONDITION	MIRROR	-Z BOUNDARY CONDITION	MIRROR		

****** SPACE AND SUPERGROUP INFORMATION ******

35000 WORDS IS THE TOTAL SPACE AVAILABLE.

10511 WORDS WERE USED FOR NON-SUPERGROUP STORAGE.

19489 WORDS OF STORAGE ARE AVAILABLE FOR SUPERGROUPED DATA.

24602 WORDS OF STORAGE ARE AVAILABLE FOR CONSTRUCTING THE SUPERGROUPS.

10451 WORDS OF STORAGE ARE AVAILABLE TO EACH SUPERGROUP.

152 WORDS ARE NEEDED FOR THE LARGEST GROUP.

15291 WORDS OF STORAGE IS SUFFICIENT TO RUN THIS PROBLEM.

16727 WORDS OF STORAGE WILL ALLOW THE PROBLEM TO RUN WITH ONE SUPERGROUP.

17080 WORDS OF STORAGE WILL BE USED TO RUN THIS PROBLEM.

SUPERGROUP	STARTING GROUP	ENDING GROUP	NSEC LENGTH	ALBEDO LENGTH	TOTAL LENGTH
1	1	16	199	0	1239

0 SETS WERE USED IN SUPERGROUPING

ARRAY NUMBER	UNITS IN X DIR.	UNITS IN Y DIR.	UNITS IN Z DIR.	NESTING LEVEL
1	15	15	1	3
2	4	4	1	2
3	2	1	1	2
4	1	2	1	2
5 GLOBAL	1	1	1	1

0 ..... 0 ID'S WERE USED LOADING THE DATA .....

USC-24I5.CMENRICH12820 WPPMB,7DF

MEDIA BIAS ... GEOMETRY DESCRIPTION FOR THOSE UNITS UTILIZED IN THIS PROBLEM

REGION NUM ID

0

----- UNIT 1 -----

0 1 CYLINDER 1 1 RADIUS = 0.44450 +Z = 50.000 Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

0 2 CYLINDER 0 1 RADIUS = 0.47420 +Z = 50.000 Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

0 3 CYLINDER 2 1 RADIUS = 0.52210 Z = 50.000 Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

0 4 CUBOID 0 1 +X = 0.69850 -X = -0.69850 +Y = 0.69850 -Y = -0.69850 +Z = 50.000 -Z = 0.00000

0

----- UNIT 2 -----

0 5 CUBOID 3 1 +X = 0.69850 -X = -0.69850 +Y = 0.69850 -Y = -0.69850 +Z = 50.000 -Z = 0.00000

0

----- UNIT 3 EXTERNAL TO LATTICE 1 -----

0 1 ARRAY NUMBER 1 +X = 10.477 -X = -10.477 +Y = 10.477 -Y = -10.477 +Z = 50.000 -Z = 0.00000

0 5 CUBOID 0 1 +X = 11.176 -X = -11.176 +Y = 11.176 -Y = -11.176 +Z = 50.000 -Z = 0.00000

2 2 CUBOID 4 1 +X = 11.084 -X = -11.084 +Y = 11.684 -Y = -11.084 +Z = 50.000 -Z = 0.00000

1

----- UNIT 4 EXTERNAL TO LATTICE 2 -----

0 1 ARRAY NUMBER 3 +X = 23.367 -X = -23.367 +Y = 11.684 -Y = -11.684 +Z = 50.000 -Z = 0.00000

0

----- UNIT 5 EXTERNAL TO LATTICE 3 -----

0 1 ARRAY NUMBER 1 +X = 11.684 -X = -11.684 +Y = 23.367 -Y = -23.367 +Z = 50.000 -Z = 0.00000

0

----- UNIT 6 EXTERNAL TO LATTICE 4 -----

0 1 ARRAY NUMBER 2 +X = 46.734 -X = -46.734 +Y = 46.734 -Y = -46.734 +Z = 50.000 -Z = 0.00000

0 2 CYLINDER 0 1 RADIUS = 76.835 +Z = 50.000 Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

0 HOLE NUMBER 1 AT X = 0.00000 Y = 58.420 Z = 0.00000 IS UNIT NUMBER 4

0 HOLE NUMBER 2 AT X = 0.00000 Y = -58.420 Z = 0.00000 IS UNIT NUMBER 4

0 HOLE NUMBER 3 AT X = 58.420 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 5

0 HOLE NUMBER 4 AT X = -58.420 Y = 0.00000 Z = 0.00000 IS UNIT NUMBER 5

0 3 CYLINDER 4 1 RADIUS = 78.740 +Z = 50.000 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

0 4 CYLINDER 3 1 RADIUS = 80.010 +Z = 50.000 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

0 5 CYLINDER 4 1 RADIUS = 82.550 +Z = 50.000 -Z = 0.00000 CENTERLINE IS AT X = 0.00000 Y = 0.00000

0 6 CUBOID 0 1 +X = 82.550 -X = -82.550 +Y = 82.550 -Y = -82.550 +Z = 50.000 -Z = 0.00000

USC-24I5.CMENRICH12820 WPPMB,7DF

0 ----- UNIT ORIENTATION DESCRIPTION FOR ARRAY 1 -----

02 LAYER 1, X COLUMN 1 TO 15 LEFT TO RIGHT, Y ROW 1 TO 15 BOTTOM TO TOP

0 1 1 1 1 1 1 1 1 1 1 1 1 1 1

0 1 1 1 1 1 1 1 1 1 1 1 1 1 1

0 1 1 1 1 1 1 1 1 1 1 1 1 1 1

```
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 2 2 2 2 2 2 2 2 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1
0                ------- UNIT ORIENTATION DESCRIPTION FOR ARRAY   2       -------
DZ LAYER  -1, X COLUMN   0 TO   4 LEFT TO RIGHT   Y ROW   1 TO   4  BOTTOM TO TOP
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0                ------- UNIT ORIENTATION DESCRIPTION FOR ARRAY   3       -------
DZ LAYER  -1, X COLUMN   0 TO   5 LEFT TO RIGHT   Y ROW   1 TO   1  BOTTOM TO TOP
0 0 0
```

```
0                ------- UNIT ORIENTATION DESCRIPTION FOR ARRAY   4       -------
DZ LAYER  -1, X COLUMN   0 TO   4 LEFT TO RIGHT   Y ROW   1 TO   2  BOTTOM TO TOP
0 0
0 0
0                ------- UNIT ORIENTATION DESCRIPTION FOR ARRAY   5       -------
DZ LAYER  -1, X COLUMN   0 TO   1 LEFT TO RIGHT   Y ROW   1 TO   1  BOTTOM TO TOP
0 0
```

```
0                                  GEOMETRY                                  CUMULATIVE
UNIT    REGION    MIX/DEN              VOLUME                                  VOLUME
0          1         1          5.1035E+01 CM**3                          5.1035E+01 CM**3
           2         5          1.1407E+00 CM**3                          5.2476E+01 CM**3
           3         8          1.1654E+01 CM**3                          6.4130E+01 CM**3
           4         4          5.0939E+01 CM**3                          1.1507E+02 CM**3
           5         6          9.7586E+01 CM**3                          2.1265E+02 CM**3
0                SURROUNDING GEOMETRY VOLUMES -  GEOMETRY REGION     6 IS AN ARRAY PLACEMENT BOUNDARY REGION
0          2         1          6          2.1955E+04 CM**3                          2.1955E+04 CM**3
           2         3          7          3.0249E+03 CM**3                          2.4980E+04 CM**3
           3         8          8          5.2202E+03 CM**3                          3.0200E+04 CM**3
0                SURROUNDING GEOMETRY VOLUMES -  GEOMETRY REGION     9 IS AN ARRAY PLACEMENT BOUNDARY REGION
0          4         1          9          5.4601E+04 CM**3                          5.4601E+04 CM**3
0                SURROUNDING GEOMETRY VOLUMES -  GEOMETRY REGION    10 IS AN ARRAY PLACEMENT BOUNDARY REGION
0          5         1         10          5.4601E+04 CM**3                          5.4601E+04 CM**3
0                SURROUNDING GEOMETRY VOLUMES -  GEOMETRY REGION    11 IS AN ARRAY PLACEMENT BOUNDARY REGION
0          6         1         11          4.2691E+05 CM**3                          4.9681E+05 CM**3
           2         12          2.7211E+05 CM**3                          9.2733E+05 CM**3
           3         13          4.6553E+04 CM**3                          9.7089E+05 CM**3
           4         14          9.1669E+04 CM**3                          1.0056E+06 CM**3
           5         15          6.4858E+04 CM**3                          1.0705E+06 CM**3
           6         16          2.9248E+05 CM**3                          1.3629E+06 CM**3
```

```
0                                UNIT     USES    REGION     MIXTURE       TOTAL VOLUME
0                                   1     5184        1           1       1.6089E+05 CM**3
                                                      2           0       7.4686E+03 CM**3
                                                      3           2       5.7882E+04 CM**3
                                                      4           3       2.7961E+05 CM**3
```

0		2	216	1	3	2.10774E+04 CM**3
0		3	24	1		5.26934E+05 CM**3
				2	3	7.2599BE+04 CM**3
				3	1	5.5665BE+04 CM**3
0		4	2	1		1.09203E+05 CM**3
0		5	2	1		1.09203E+05 CM**3
0		6	1	1		4.36813E+05 CM**3
				2	3	3.7211BE+05 CM**3
				3	4	4.6553BE+04 CM**3
				4	3	3.16693E+04 CM**3
				5	4	6.4858BE+04 CM**3
				6	3	2.92401E+05 CM**3

0 TOTAL MIXTURE VOLUMES

MIXTURE	TOTAL VOLUME
0	2.99930E+03 CM**3
1	1.60B93E+05 CM**3
2	5.78824E+04 CM**3
3	4.77BB1E+05 CM**3
4	1.67099E+05 CM**3

0 **

***

*** TRACKING INFORMATION ***

***

*** A DEFAULT WEIGHT OF 0.500 WILL BE USED FOR ALL DXGB/DXYZ ***

***

****

0 0.3010 HERE USED IN KENO-V BEFORE TRACKING

0 0.950000MINUTES HERE USED PROCESSING DATA.

0VOLUME FRACTION OF FISSILE MATERIAL IN THE CORE= 0.11805E+00

DEFART TYPE 0 WAS USED

OTHE NEUTRONS WERE STARTED WITH A FLAT DISTRIBUTION IN A CUBOID DEFINED BY:

+X= 1.65130E+01 -X= 0.00000E+00 +Y= 1.65130E+01 -Y= 0.00000E+00 +Z= 5.00000E+01 -Z= 0.00000E+00

01 00000 MINUTES WERE REQUIRED FOR STARTING. TOTAL LOADED TIME IS 1.95000 MINUTES.

VSOP-B615 DECEMBER97B70 WORMD,70F

GENERATION	K EFFECTIVE	ELAPSED TIME MINUTES	AVERAGE K EFFECTIVE	AVG K/OT DEVIATION	MATRIX K EFFECTIVE	MATRIX K/OT DEVIATION
1	9.19403E-01	1.00000E+00	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.98940E-01	1.04667E+01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.92487E-01	1.47833E+01	9.97487E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.98058E-01	1.90833E+01	9.94723E-01	5.71843E-03	0.00000E+00	0.00000E+00
5	9.24349E-01	2.34500E+01	9.71129E-01	8.85278E-03	0.00000E+00	0.00000E+00
6	9.89811E-01	2.78167E+01	9.75924E-01	1.72603E-02	0.00000E+00	0.00000E+00
7	1.00240E+00	3.20000E+01	9.81502E-01	1.43874E-02	0.00000E+00	0.00000E+00
8	9.38162E-01	3.65000E+01	9.74042E-01	1.27662E-02	0.00000E+00	0.00000E+00
9	9.80521E-01	4.08500E+01	9.74979E-01	1.16706E-02	0.00000E+00	0.00000E+00
10	9.61084E-01	4.52000E+01	9.73239E-01	1.02385E-02	0.00000E+00	0.00000E+00
11	9.24086E-01	4.94500E+01	9.67954E-01	1.05129E-02	0.00000E+00	0.00000E+00
12	1.03802E+00	5.38000E+01	9.74959E-01	1.17254E-02	0.00000E+00	0.00000E+00
13	9.93440E-01	5.84333E+01	9.77194E-01	1.12572E-02	0.00000E+00	0.00000E+00
14	9.83353E-01	6.25833E+01	9.77198E-01	1.03266E-02	0.00000E+00	0.00000E+00
15	9.66007E-01	6.68333E+01	9.76963E-01	9.58047E-03	0.00000E+00	0.00000E+00
16	9.85149E-01	7.11333E+01	9.77988E-01	8.92990E-03	0.00000E+00	0.00000E+00
17	9.86866E-01	7.59167E+01	9.78980E-01	8.07201E-03	0.00000E+00	0.00000E+00
18	9.47180E-01	7.97000E+01	9.77368E-01	7.99550E-03	0.00000E+00	0.00000E+00
19	9.84028E-01	8.40417E+01	9.77930E-01	7.55955E-03	0.00000E+00	0.00000E+00
20	9.93609E-01	8.85667E+01	9.78418E-01	7.22577E-03	0.00000E+00	0.00000E+00
21	9.64099E-01	9.26833E+01	9.77943E-01	6.85147E-03	0.00000E+00	0.00000E+00
22	9.86179E-01	9.68000E+01	9.78105E-01	6.60259E-03	0.00000E+00	0.00000E+00
23	1.03579E+00	1.01000E+02	9.79039E-01	6.93208E-03	0.00000E+00	0.00000E+00

26	1.02374E+00	1.13533E+02	9.79156E-01	6.40463E-03	0.00000E+00	0.00000E+00
27	1.01654E+00	1.17667E+02	9.80652E-01	6.32287E-03	0.00000E+00	0.00000E+00
28	9.39468E-01	1.22133E+02	9.79068E-01	6.27730E-03	0.00000E+00	0.00000E+00
29	9.43297E-01	1.26433E+02	9.77743E-01	6.18418E-03	0.00000E+00	0.00000E+00
30	1.00020E+00	1.30650E+02	9.78545E-01	6.01315E-03	0.00000E+00	0.00000E+00
31	1.00578E+00	1.34817E+02	9.79484E-01	5.87742E-03	0.00000E+00	0.00000E+00
32	1.01466E+00	1.38983E+02	9.80656E-01	5.79807E-03	0.00000E+00	0.00000E+00
33	1.02529E+00	1.43133E+02	9.82096E-01	5.79013E-03	0.00000E+00	0.00000E+00
34	9.51019E-01	1.47350E+02	9.81125E-01	5.68972E-03	0.00000E+00	0.00000E+00
35	9.17388E-01	1.51750E+02	9.79194E-01	5.84383E-03	0.00000E+00	0.00000E+00
36	9.50760E-01	1.55950E+02	9.78357E-01	5.73009E-03	0.00000E+00	0.00000E+00
37	9.62414E-01	1.60267E+02	9.77902E-01	5.59251E-03	0.00000E+00	0.00000E+00
38	9.99667E-01	1.64817E+02	9.78507E-01	5.45872E-03	0.00000E+00	0.00000E+00
39	1.04866E+00	1.69183E+02	9.80403E-01	5.63702E-03	0.00000E+00	0.00000E+00
40	9.82686E-01	1.73583E+02	9.80463E-01	5.48754E-03	0.00000E+00	0.00000E+00
41	1.01911E+00	1.77950E+02	9.81454E-01	5.43504E-03	0.00000E+00	0.00000E+00
42	9.59103E-01	1.82450E+02	9.79495E-01	5.44996E-03	0.00000E+00	0.00000E+00
43	9.18663E-01	1.86817E+02	9.78011E-01	5.70540E-03	0.00000E+00	0.00000E+00
44	9.73435E-01	1.90883E+02	9.77903E-01	5.56700E-03	0.00000E+00	0.00000E+00
45	9.48084E-01	1.95067E+02	9.77015E-01	5.58546E-03	0.00000E+00	0.00000E+00
46	9.80744E-01	1.99533E+02	9.77452E-01	5.59971E-03	0.00000E+00	0.00000E+00
47	1.02119E+00	2.03967E+02	9.78074E-01	5.25840E-03	0.00000E+00	0.00000E+00
48	9.99746E-01	2.08183E+02	9.78617E-01	5.25959E-03	0.00000E+00	0.00000E+00
49	9.64921E-01	2.12567E+02	9.78521E-01	5.15496E-03	0.00000E+00	0.00000E+00
50	9.82413E-01	2.16817E+02	9.78915E-01	5.04173E-03	0.00000E+00	0.00000E+00
51	9.99761E-01	2.21100E+02	9.78932E-01	4.95324E-03	0.00000E+00	0.00000E+00
52	1.07032E+00	2.25567E+02	9.80760E-01	5.18841E-03	0.00000E+00	0.00000E+00
53	1.03126E+00	2.30750E+02	9.81752E-01	5.18240E-03	0.00000E+00	0.00000E+00
54	1.03721E+00	2.34100E+02	9.82818E-01	5.13248E-03	0.00000E+00	0.00000E+00
55	9.68003E-01	2.38183E+02	9.82539E-01	5.16130E-03	0.00000E+00	0.00000E+00
56	9.33084E-01	2.42400E+02	9.81619E-01	5.08985E-03	0.00000E+00	0.00000E+00
57	9.39061E-01	2.46683E+02	9.80643E-01	5.00396E-03	0.00000E+00	0.00000E+00
58	9.81872E-01	2.50950E+02	9.80463E-01	4.99915E-03	0.00000E+00	0.00000E+00
59	1.00001E+00	2.55600E+02	9.81399E-01	4.93238E-03	0.00000E+00	0.00000E+00
60	1.00874E+00	2.59017E+02	9.81571E-01	4.85104E-03	0.00000E+00	0.00000E+00
61	1.00082E+00	2.63800E+02	9.81084E-01	4.72840E-03	0.00000E+00	0.00000E+00
62	9.71312E-01	2.68133E+02	9.81309E-01	4.80375E-03	0.00000E+00	0.00000E+00
63	9.68193E-01	2.72617E+02	9.81044E-01	4.84202E-03	0.00000E+00	0.00000E+00
64	9.45903E-01	2.76683E+02	9.80477E-01	4.85134E-03	0.00000E+00	0.00000E+00
65	9.46194E-01	2.80983E+02	9.80208E-01	4.85110E-03	0.00000E+00	0.00000E+00
66	9.94875E-01	2.85383E+02	9.80150E-01	4.49770E-03	0.00000E+00	0.00000E+00
67	1.02407E+00	2.89467E+02	9.81199E-01	4.46875E-03	0.00000E+00	0.00000E+00
68	1.02263E+00	2.93800E+02	9.81524E-01	4.41232E-03	0.00000E+00	0.00000E+00
69	9.93687E-01	2.98150E+02	9.81766E-01	4.36497E-03	0.00000E+00	0.00000E+00
70	9.69111E-01	3.02067E+02	9.81985E-01	4.30597E-03	0.00000E+00	0.00000E+00

ENDMD MESSAGE NUMBER KS-103 EXECUTION TERMINATED DUE TO COMPLETION OF THE SPECIFIED NUMBER OF GENERATIONS.

USC-8435.GENERIC(GA020) WORKD,70F

DURATION = 1.41105E+05 +/- DR = 1.02437E-02 GENERATION TIME = 1.28300E-05 +/- DR = 7.55615E-08

GENERATIONS SKIPPED	NO. OF INITIAL ENTITIES	AVERAGE K-EFFECTIVE	+/- DEVIATION	67 PER CENT CONFIDENCE INTERVAL	95 PER CENT CONFIDENCE INTERVAL	99 PER CENT CONFIDENCE INTERVAL	NUMBER OF HISTORIES
0	0	0.98104	+ OR - 0.00486	0.97640 TO 0.98541	0.97292 TO 0.98977	0.96795 TO 0.99414	20100
0	4	0.99098	+ OR - 0.00413	0.97645 TO 0.98530	0.97302 TO 0.98973	0.96759 TO 0.99416	19000
0	5	0.98175	+ OR - 0.00441	0.97704 TO 0.98618	0.97293 TO 0.99056	0.96852 TO 0.99497	18500
0	6	0.98162	+ OR - 0.00448	0.97714 TO 0.98610	0.97267 TO 0.99057	0.96819 TO 0.99505	19200
0	7	0.98129	+ OR - 0.00454	0.97675 TO 0.98583	0.97222 TO 0.99036	0.96768 TO 0.99490	18900
0	8	0.98199	+ OR - 0.00455	0.97743 TO 0.98654	0.97288 TO 0.99109	0.96832 TO 0.99565	18400
0	9	0.98201	+ OR - 0.00462	0.97738 TO 0.98664	0.97275 TO 0.99127	0.96812 TO 0.99590	18300
0	10	0.98234	+ OR - 0.00470	0.97765 TO 0.98704	0.97275 TO 0.99170	0.96826 TO 0.99643	18000
0	11	0.98332	+ OR - 0.00467	0.97865 TO 0.98799	0.97398 TO 0.99266	0.96930 TO 0.99733	17700
0	12	0.98238	+ OR - 0.00465	0.97772 TO 0.98703	0.97307 TO 0.99169	0.96841 TO 0.99634	17400
0	13	0.98364	+ OR - 0.00498	0.97865 TO 0.98862	0.97367 TO 0.99360	0.96869 TO 0.99858	15900

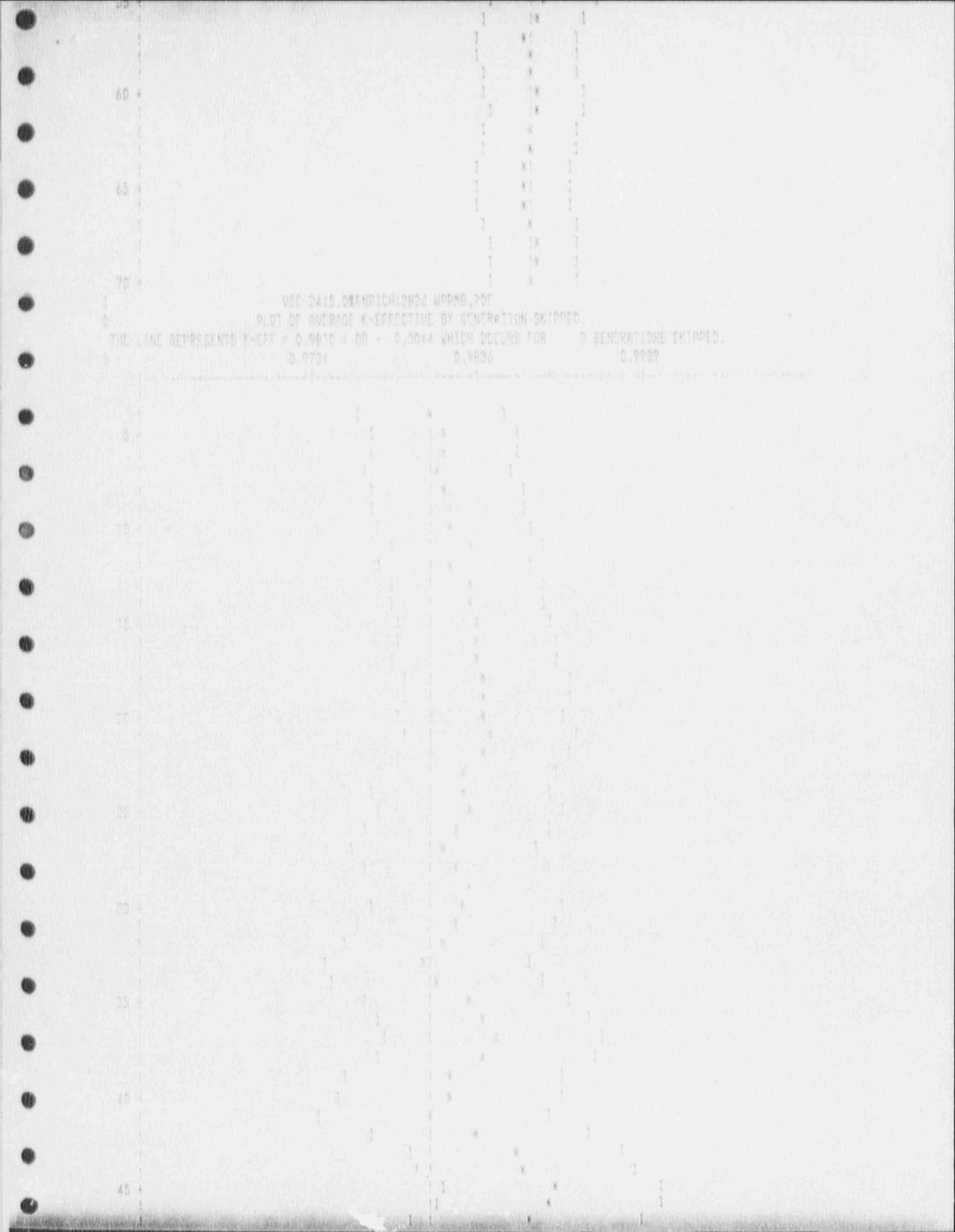
0	22	0.98428	+ OR - 0.00543	0.97885 TO 0.98970	0.97342 TO 0.99513	12900
0	27	0.98165	+ OR - 0.00579	0.97587 TO 0.98744	0.97008 TO 0.99323	12900
0	[illegible]	0.98178	+ OR - 0.00627	0.97552 TO 0.98805	0.96925 TO 0.99431	11400
0	37	0.98487	+ OR - 0.00664	0.97823 TO 0.99151	0.97159 TO 0.99816	9900
0	42	0.98384	+ OR - 0.00674	0.97710 TO 0.99059	0.97035 TO 0.99733	8400
0	47	0.98698	+ OR - 0.00724	0.97974 TO 0.99422	0.97251 TO 1.00146	6900
0	52	0.98275	+ OR - 0.00776	0.97498 TO 0.99051	0.96722 TO 0.99827	5400
0	57	0.98392	+ OR - 0.00694	0.97698 TO 0.99086	0.97004 TO 0.99779	3900
0	62	0.98111	+ OR - 0.00961	0.97150 TO 0.99072	0.96190 TO 1.00033	2400
0	67	0.98315	+ OR - 0.01524	0.96791 TO 0.99839	0.95267 TO 1.01363	900

1 VSC-24;5.0%ENRICH;2820 WPPMB,70F

0 PLOT OF AVERAGE K-EFFECTIVE BY GENERATION RUN.

THE LINE REPRESENTS K-EFF = 0.9810 + OR - 0.0044 WHICH OCCURS FOR 70 GENERATIONS RUN.

0 0.9582 0.9751 0.9921


USC-2415.ONENRICH:2R30 MPRMD,20F
PLOT OF AVERAGE K-EFFECTIVE BY GENERATION SKIPPED.
THE LINE REPRESENTS K-EFF = 0.9810 + OR -- 0.0044 WHICH OCCURS FOR 0 GENERATIONS SKIPPED.
0.9734
0.9836
0.9939

VSC-24:5.0&ENRICH:2820 WPRMB,70F

GGROUP	FISSION FRACTION	UNIT REGION	FISSIONS	PERCENT DEVIATION	ABSORPTIONS	PERCENT DEVIATION	LEAKAGE	SKIPPING 0 GENERATIONS PERCENT DEVIATION
0 1	0.0246		5.40945E-02	0.5054	1.07979E-02	0.2220	1.92258E-04	69.9791
0 2	0.0369		8.10891E-02	0.7022	1.60162E-02	0.4252	7.92880E-04	50.0146
0 3	0.0037		8.58294E-03	2.0494	3.03468E-03	.9608	2.03649E-04	59.1813
0 4	0.0024		5.32946E-03	1.8055	4.04048E-03	1.2137	4.04710E-04	29.3189
0 5	0.5041		4.02784E-03	1.5588	5.90397E-03	1.4398	7.13103E-04	24.6199
0 6	0.0040		4.28071E-03	1.7224	9.44529E-03	1.4558	1.03691E-04	22.4475
0 7	0.0064		6.20425E-03	1.9253	1.18482E-02	1.8368	9.39992E-04	41.4638
0 8	0.0105		1.09066E-02	2.2167	1.98274E-02	2.0587	1.91247E-04	49.0108
0 9	0.0240		2.37037E-02	1.6922	2.92082E-02	1.5026	1.91667E-03	49.0674
0 10	0.0304		2.98066E-02	2.0574	4.56390E-02	1.7216	1.82484E-03	49.8570
0 11	0.0249		2.89182E-02	2.2758	3.25979E-02	2.0811	4.07868E-05	100.0000
0 12	0.0190		1.86649E-02	2.4293	6.42251E-02	2.0379	1.24481E-01	99.8771
0 13	0.0195		1.91503E-02	2.6311	0.42232E-02	1.4220	0.00000E+00	0.0000
0 14	0.0063		6.55842E-02	2.7664	3.46250E-02	1.5626	0.00000E+00	0.0000
0 15	0.1871		1.83571E-01	1.3779	1.63001E-01	0.9506	1.05744E-04	59.3088
0 16	0.5650		5.54316E-01	0.7406	5.42259E-01	0.4256	1.39044E-04	47.5491
0SYSTEM TOTAL =			9.81043E-01	0.4448	9.94609E-01	0.1899	4.19401E-03	10.6295

ELAPSED TIME 002.45000 MINUTES

RANDOM NUMBER= 0*F000000000000

VSC-24:5.0&ENRICH:2820 WPRMB,70F

0 FREQUENCY FOR GENERATIONS 4 TO 20

0.8926 TO 0.9157	x
0.9157 TO 0.9388	xxxxxxx
0.9388 TO 0.9619	xxxxxxxxx
0.9619 TO 0.9849	xxxxxxxxxxx
0.9849 TO 1.0080	xxxxxxxxxxxxxxxxxxxx
1.0080 TO 1.0311	xxxxxx
1.0311 TO 1.0542	xxxxx
1.0542 TO 1.0773	x

0 FREQUENCY FOR GENERATIONS 21 TO 70

0.8926 TO 0.9157	x
0.9157 TO 0.9388	xxxx
0.9388 TO 0.9619	xxxxxxx
0.9619 TO 0.9849	xxxxxxxxx
0.9849 TO 1.0080	xxxxxxxxxxxxx
1.0080 TO 1.0311	xxxxxx

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1.0311 TO 1.0542    XXX
1.0542 TO 1.0773    X
0                        FREQUENCY FOR GENERATIONS   37 TO   70
 0.8926 TO 0.9157    X
 0.9157 TO 0.9388    XXX
 0.9388 TO 0.9619    XXXX
 0.9619 TO 0.9849    XXXXXXXX
 0.9849 TO 1.0080    XXXXXXXXXX
 1.0080 TO 1.0311    XXX
 1.0311 TO 1.0542    XXX
 1.0542 TO 1.0773    X
0                        FREQUENCY FOR GENERATIONS   54 TO   70
 0.8926 TO 0.9157
 0.9157 TO 0.9388    XX
 0.9388 TO 0.9619    XXX
 0.9619 TO 0.9849    XXX
 0.9849 TO 1.0080    XXXXXXX
 1.0080 TO 1.0311    X
 1.0311 TO 1.0542    X
 1.0542 TO 1.0773

0         CONGRATULATIONS!  YOU HAVE SUCCESSFULLY TRAVERSED THE PERILOUS PATH THROUGH XEND V IN 002.45000 MINUTES
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