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Development of a SCALE Model for High Flux Isotope Reactor Cycle 400

February 2012

Prepared by
Dan Ilas

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Reactor and Nuclear Systems Division

**DEVELOPMENT OF A SCALE MODEL FOR
HIGH FLUX ISOTOPE REACTOR CYCLE 400**

Dan Ilas

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ACRONYMS AND ABBREVIATIONS

2-D	two dimensional
3-D	three dimensional
BOC	beginning of cycle
CE	continuous energy
C/E	calculated to experimental
CR	control element region
DOE	U.S. Department of Energy
EOC	end of cycle
FTT	flux trap target region
HEU	high-enriched uranium
HFIR	High Flux Isotope Reactor
HT	hydraulic tube
ICE	inner control element
IFE	inner fuel element
IRSN	Institut de Radioprotection et de Sûreté Nucléaire (Institute for Radiological Protection and Nuclear Safety)
k_{eff}	effective multiplication constant
LANL	Los Alamos Nuclear Laboratory
LEU	low-enriched uranium
OCE	outer control element
OFE	outer fuel element
ORNL	Oak Ridge National Laboratory
pcm	per cent millirho
PB	permanent beryllium reflector region
PTP	peripheral target position
RB	removable beryllium reflector region
RNSD	Reactor and Nuclear Systems Division

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ABSTRACT

The development of a comprehensive SCALE computational model for the High Flux Isotope Reactor (HFIR) is documented and discussed in this report. The SCALE model has equivalent features and functionality as the reference MCNP model for Cycle 400 that has been used extensively for HFIR safety analyses and for HFIR experiment design and analyses. Numerical comparisons of the SCALE and MCNP models for the multiplication constant, power density distribution in the fuel, and neutron fluxes at several locations in HFIR indicate excellent agreement between the results predicted with the two models. The SCALE HFIR model is presented in sufficient detail to provide the users of the model with a tool that can be easily customized for various safety analysis or experiment design requirements.

1. INTRODUCTION

Comprehensive computational neutronic models for the High Flux Isotope Reactor (HFIR) have been developed for the past 10–20 years with numerous developers contributing to this effort. The endeavor culminated with a full HFIR model for the beginning of cycle (BOC) 400, which was developed and documented by Xoubi and Primm in 2004¹ and became known as the “Cycle 400 reference model.” The Cycle 400 reference model relied on the older model HFIR-V.2, originally developed by J. C. Gehin, L. A. Smith, and J. A. Bucholz.¹

The HFIR Cycle 400 reference model is an MCNP² Monte Carlo model of HFIR that, based on existing documentation and expert opinion, fully describes (most often in terms very close to the physical reality) the central target region, the fueled region, the control elements, and the beryllium reflector, and includes out-of-core components such as irradiation tubes, horizontal tubes, engineering tubes, and the reactor shielding and biological protection, up to an outer radius of 7.20 m and a total height of 3.00 m. Because of their complexity, the fuel elements required the largest amount of simplification in the model. Homogenization methods were applied in this case to reduce the intricacies of the fuel element’s model.

More recently, the Cycle 400 reference model constituted the basis for neutronic and thermal-hydraulic computations for the HEU to LEU fuel conversion study for HFIR.³ For this latter purpose, the Cycle 400 reference MCNP model was further enhanced by refining the meshing in the fueled region, and then was embedded in a depletion model for use with VESTA⁴ to perform full-core depletion for the duration of the cycle length and analyses at discrete points in time during the fuel cycle. Revisions of the Cycle 400 reference model were made in 2008 and 2010. The 2008 revision corrected a material data card in the beryllium removable reflector.⁵ The 2010 revision added more axial layers (19 instead of 7) in both the inner and the outer fuel elements for depletion purposes and changed the material composition for the control elements to account for the actual irradiation history of the control elements prior to Cycle 400.⁶ This revised MCNP model will be referred to as the “MCNP Cycle 400 revised model.”

Over the past several years, the SCALE computational package⁷, developed and maintained by Oak Ridge National Laboratory (ORNL), has undergone significant development and enhancements in its capabilities. Among these, we can enumerate the following capabilities in the latest release, SCALE 6.1: full, realistic geometry description of complex problems; extension to continuous energy treatment for criticality problems; enhancements in multigroup treatment; full-core depletion capabilities (with multigroup energy treatment); sensitivity and uncertainty analysis capabilities (multigroup); and new or improved nuclear data based primarily on ENDF/B-VII. These capabilities make the SCALE package unique in solving problems that necessitate the coupling of different phenomena in a critical system. With the upcoming enhancements for continuous energy Monte Carlo depletion, shielding, and sensitivity/uncertainty analyses the SCALE package has the potential to become the state of the art in terms of its analysis capabilities for neutronic modeling.

A SCALE model of HFIR with capabilities similar to those of the MCNP Cycle 400 reference model is both possible and desirable. The use of this SCALE model will have a reciprocal advantage for the SCALE developers and the potential users of the model: it allows the current capabilities in SCALE to be benchmarked on a realistic reactor problem of importance to ORNL, and it provides users of the model with a tool that can be easily customized to their needs.

The purpose of the work documented in this report was to develop a SCALE model for HFIR Cycle 400 as an alternative reference that is equivalent to the MCNP model for this same

configuration. The SCALE model was built, to the extent possible, using the same framework (i.e., no changes) as the MCNP model. Though the similarity of the MCNP and SCALE models was the primary criterion when developing the SCALE model, a secondary criterion focused on developing the SCALE model in a manner that will facilitate future additions, changes, or improvements to the model, such as employing a more modular representation of the configuration.

The MCNP model has been used extensively at HFIR for safety analyses and by HFIR customers for experiment design and analyses. Its performance has been validated against experimental data available from power distributions and destructive isotopic assay measurements.^{8,9} A SCALE model with equivalent features as the reference MCNP model would facilitate the acceptance of and transition to this new model for HFIR users who are familiar with the MCNP model.

The SCALE model that has been developed for the HFIR is described in this report, and its accuracy is assessed by comparisons with results obtained for the MCNP Cycle 400 revised model. Being based on the MCNP Cycle 400 revised model, the SCALE HFIR model inherits its capability for further use in depletion simulations.

This report is organized as follows. Section 2 contains a brief description of the HFIR. Section 3 describes the SCALE model for HFIR, with a focus on the geometry. Section 4 compares results obtained with the SCALE and the MCNP models. Finally, Section 5 presents a few conclusions. The SCALE input file for the HFIR model is listed as Appendix A.

2. DESCRIPTION OF HFIR

HFIR is a research reactor at ORNL that supports isotope production, material irradiation research, and neutron scattering experiments. It currently operates at 85 MW(t) power. The central flux trap in HFIR provides one of the highest steady-state thermal neutron fluxes among research reactors in the world.¹⁰

The reactor core consists of a series of concentric regions: the central target region (flux trap), two fuel elements separated by a thin water region, the control elements region, the beryllium reflector, and a water region to the edge of the pressure vessel. The reactor is located in a pool of water. Details of the reactor configuration and operation can be found elsewhere¹¹ and also are outlined in the following sections in relation to the SCALE model of the reactor.

There are two fuel elements in HFIR, identified as an inner fuel element (IFE) and an outer fuel element (OFE). They are made up of 171 and 369 involute-shaped thin fuel plates, respectively, and are fuelled with 93.1 wt % enriched uranium. The fuel plates are separated by water channels. Because of their particular shape and the fact that the fuel zone in a fuel plate is radially graded, they are most challenging from a modelling point of view. Fig. 1 presents a schematic of HFIR at core midplane, which illustrates the complexity of the reactor geometry. The drawing was made before the removal of two engineering facilities to allow the enlargement of the HB-2 horizontal tube (prior to Cycle 400).

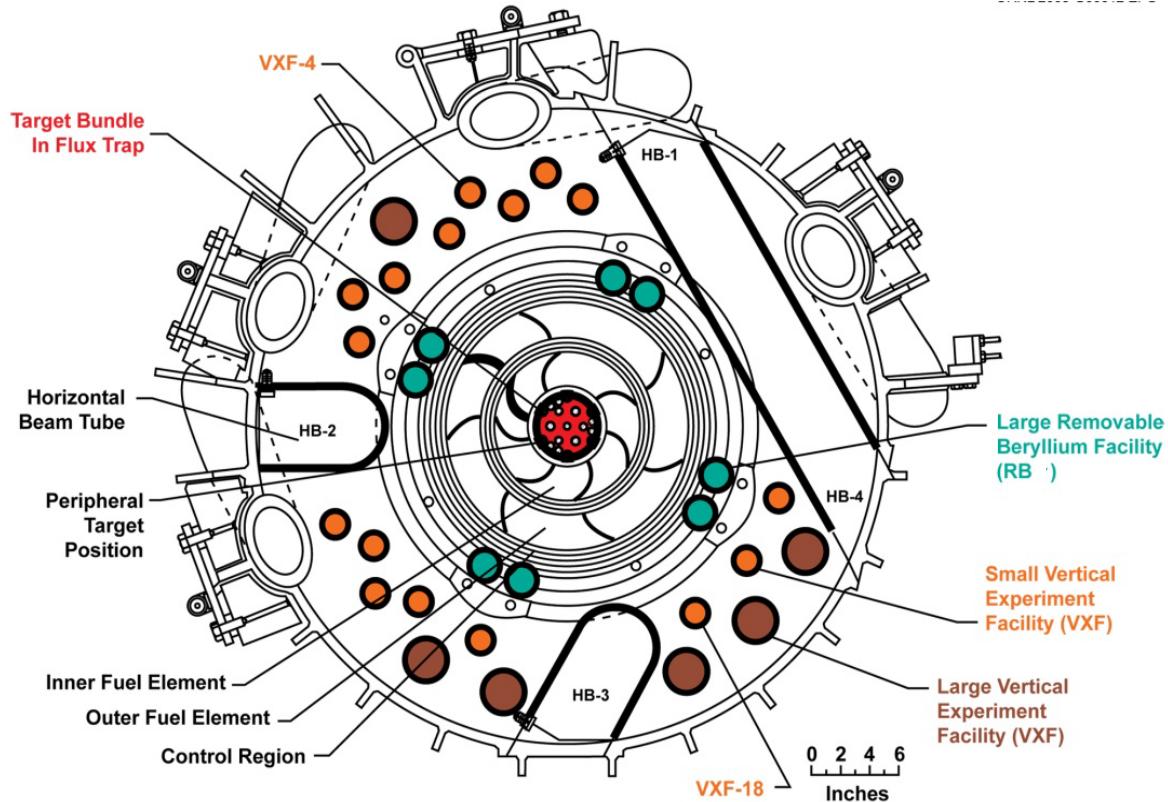


Fig. 1. HFIR schematic at core midplane (before removal of two engineering facilities).

3. DESCRIPTION OF THE SCALE HFIR MODEL

3.1 COMPUTATIONAL METHODS AND CODES

The SCALE model for HFIR was developed using the latest release, SCALE 6.1. The SCALE code system uses automated sequences to provide problem-dependent cross-section processing, reactor lattice physics, criticality safety, radiation shielding, and spent fuel characterization analysis capabilities. For this report, the CSAS26/KENO-VI sequence of SCALE with the continuous energy option for neutron transport was used.

The SCALE HFIR model is a large model containing over 10,000 lines of input. Of these, ~7,000 are material input lines and ~3,000 lines contain the geometry model. The input file is heavily commented, containing ~1,500 comment lines for easier navigation and identification of the different components of the model to enable user changes or additions to the model, such as may be necessary when a particular target or experiment is inserted into the reactor.

The SCALE model uses the KENO-VI geometry capability, which uses the SCALE generalized geometry package and therefore enables the use of the model as a basis for studies with any other module or sequence in SCALE. The KENO-VI code, a Monte Carlo transport code based on combinational geometry, can accept a wide range of geometry shapes to construct practically any geometric configuration of interest. Because of the particularities of this geometry capability in KENO-VI, there are significant differences between the geometry specifications in the SCALE HFIR model and the MCNP Cycle 400 revised model.

At every step during the development of the SCALE HFIR model, comparisons and checks were performed against the MCNP Cycle 400 revised model. The 5.1.51 version of the MCNP code, developed by Los Alamos National Laboratory, was used for this purpose. MCNP is a general-purpose Monte Carlo transport code that can simulate the transport of neutrons, photons, and electrons and calculate various quantities of interest for criticality, shielding, and energy deposition studies.

3.2 GEOMETRY MODEL

The following sub-sections discuss the geometry of the SCALE HFIR model starting from the center of the HFIR core and moving towards the periphery. A flowchart of the whole model is presented in the last sub-section. The flowchart is intended to facilitate navigation through the geometry of the model and later revisions of the input file.

3.2.1 Central Target Region

The central target region (also called the flux trap region) is the central section of the HFIR and includes 37 cylindrical experimental sites arranged in a hexagonal lattice. The arrangement of the target and the labeling scheme is shown in Fig. 2, which illustrates the actual flux trap region in the SCALE HFIR model. Of the 37 experimental sites in the flux trap, 31 are located inside a basket, and 6 are located at the vertices of the hexagonal lattice outside the basket. The experimental sites located outside the basket are identified as peripheral target positions (PTPs), shown as PTP-1 to PTP-6 at locations A-4, D-1, A-1, D-7, G-7, and G-4 in Fig. 2.

The experimental site at location B-3 is occupied by a hydraulic tube (HT) that allows for insertion of experimental specimens during reactor operation. The HT geometry unit, identified as Unit 750 in the SCALE HFIR model, is modeled explicitly to accommodate axially nine specimens, also known as “rabbits”. Also shown in Fig. 2 are two stainless steel targets labeled JP-26 and JP-27,

at locations C-6 and E-2, respectively. The seven dark cylinders at the center of the basket, at locations C-2, D-3, D-4, C-5, E-5, F-5, and E-6, are solid aluminum dummy targets. The other 21 cylindrical units in Fig. 2 are shrouded aluminum dummy targets.

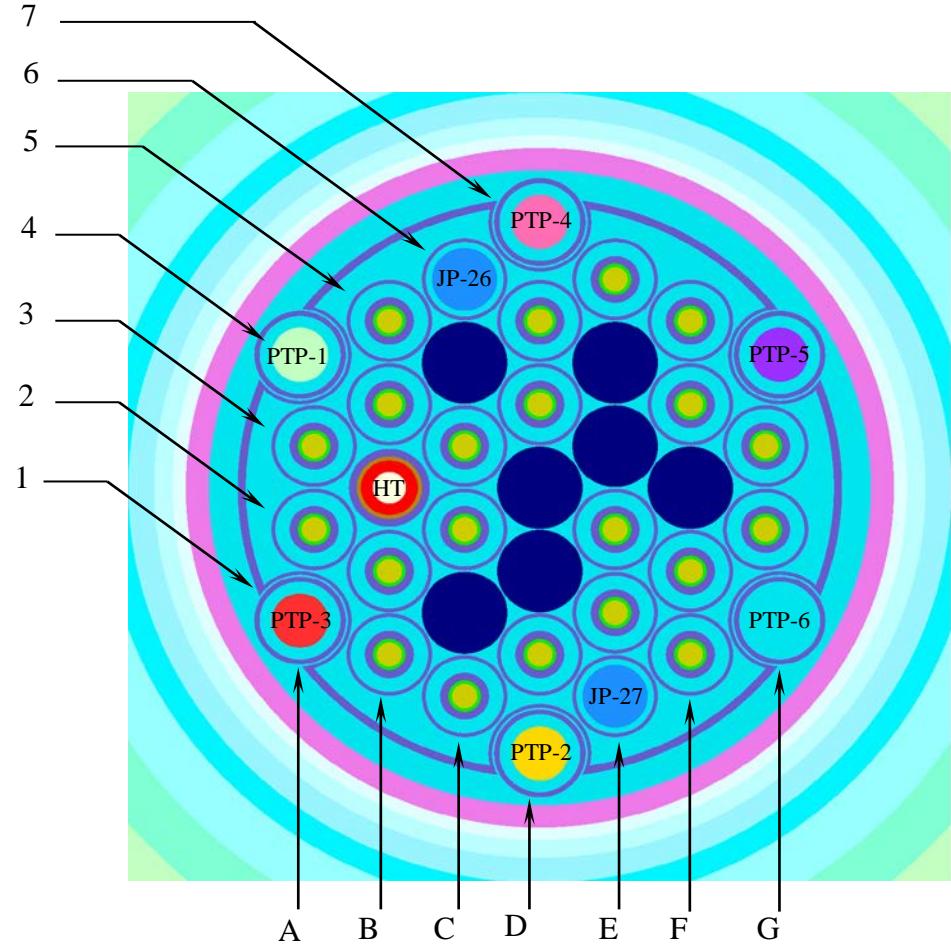


Fig. 2. Numbering scheme for the central target region (radial view) in the SCALE HFIR model.

3.2.2 Fuel and Control Elements Regions

As mentioned previously, two fuel elements in HFIR surround the central flux trap region. The IFE consists of 171 fuel plates, each containing $15.18 \pm 1\%$ grams of ^{235}U . The OFE consists of 369 fuel plates, each containing $18.44 \pm 1\%$ grams of ^{235}U . For modeling purposes, the fuel plates are homogenized in the MCNP Cycle 400 revised model and the same simplification is used in the SCALE HFIR model. The IFE region is modeled by using $(19 \text{ axial}) \times (8 \text{ radial})$ homogenized regions, with the ^{235}U concentration varying radially (peaks toward the outer boundary of the IFE) to account for the radial variation of the fuel meat thickness in each fuel plate. The OFE is modeled by using $(19 \text{ axial}) \times (9 \text{ radial})$ homogenized regions, which also have the ^{235}U concentration varying radially (peaks close to the middle of the radius of the OFE). The dimensions for the radial and axial regions in the two fuel elements are shown in Table 1 and Table 2, respectively.

The control element region consists of two concentric annular regions that surround the OFE. They are identified as the inner control element (ICE) and the outer control element (OCE), each

0.635 cm ($\frac{1}{4}$ in.) thick. The ICE is a full cylinder whose main function is to regulate the reactor power; for this reason, it is also called the control or regulating element. The OCE is made up of four quadrants or safety plates. The OCE is also called the safety element. More details on the control elements, including their lifetimes and material compositions, can be found elsewhere.⁶ There are three axial material regions in each of the two control elements; these regions, known by the names “black,” “gray,” and “white” because of their different neutron-absorption properties, are modeled in the SCALE HFIR model with the same level of detail as in the MCNP Cycle 400 revised model.

Table 1. Radial fuel regions in the SCALE HFIR model

IFE		OFE	
Region #	Outer radius (cm)	Region #	Outer radius (cm)
0 ^a	7.14	0 ^a	15.12951
1	7.50	1	15.50
2	8.00	2	16.00
3	8.50	3	16.50
4	9.50	4	17.50
5	10.50	5	18.50
6	11.50	6	19.50
7	12.00	7	20.00
8	12.60	8	20.50
		9	20.978

^aRegion 0 gives the inner radius for IFE and OFE.

Table 2. Axial fuel layers in the SCALE HFIR model

Layer #	Top boundary (cm) ^a	Layer #	Top boundary (cm) ^a
1	25.4	11	-1.0
2	25.0	12	-4.0
3	23.0	13	-7.0
4	19.0	14	-10.0
5	16.0	15	-13.0
6	13.0	16	-16.0
7	10.0	17	-19.0
8	7.0	18	-23.0
9	4.0	19	-25.0
10	1.0	20 ^b	-25.4

^aLocation is with respect to the core midline (at axial location 0.0 cm).

^bLayer 20 gives the lower boundary of the fuel regions.

An axial cross section of the SCALE HFIR model with details of the fuel region and the control region is shown in Fig. 3. As seen, each of the two fuel elements is bordered radially by sidewalls, and there is a water gap between their adjacent sidewalls. The fueled regions of the fuel elements extend axially for a total height of 50.8 cm and have unfueled regions above and below them. The geometry unit numbers in the SCALE HFIR model are 2000 and 2300 for the IFE and OFE respectively, and 3000 and 3300 for the ICE and OCE, respectively.

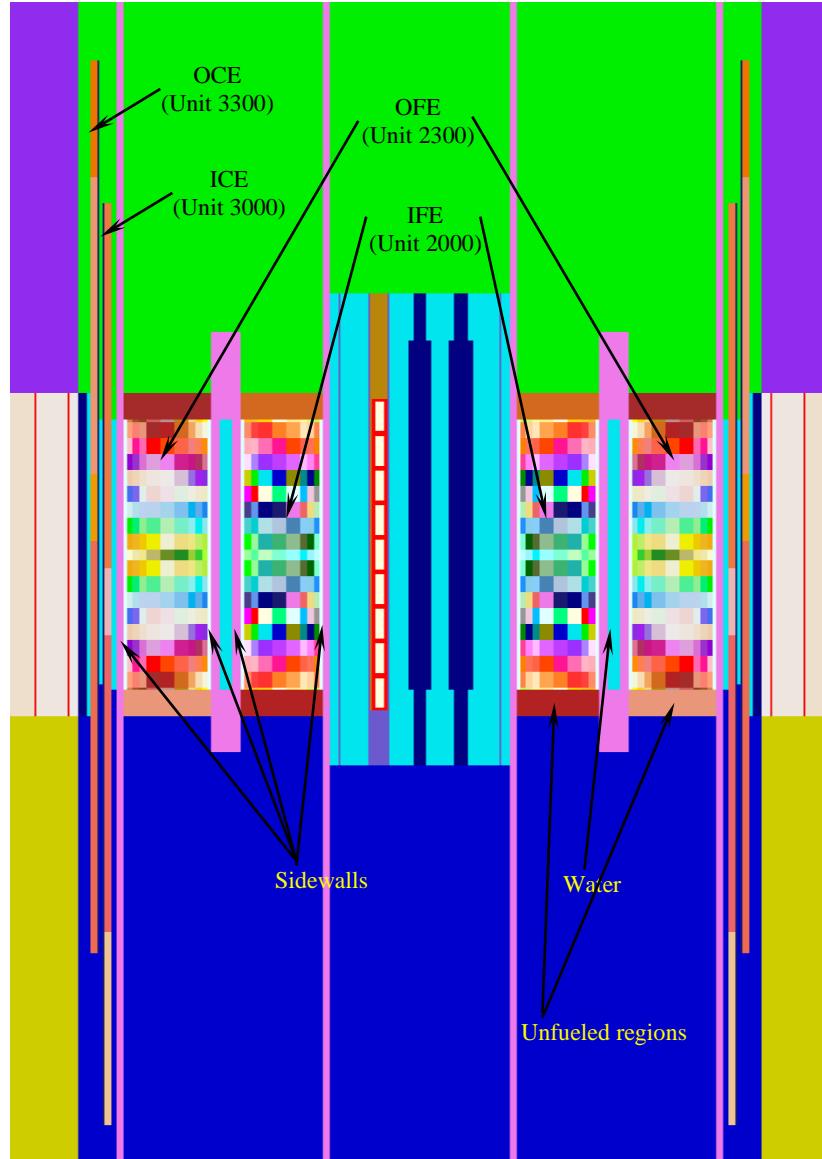


Fig. 3. Fuel and control regions (axial view) in the SCALE HFIR model.

3.2.3 Beryllium Reflector Regions

The beryllium reflector that surrounds the HFIR core contains three annular regions, as shown in Fig. 4, which is a cross section of the SCALE HFIR model at the core midplane. The removable reflector, the innermost region in the reflector, is replaced with fresh beryllium every 40 cycles.¹ It contains four pairs of large experiment facilities (labeled RB-nX, with $n = 1,3,5,7$ and $X = A,B$) and four small experiment facilities (labeled RB-n, with $n = 2,4,6,8$). The removable reflector region is surrounded by the semipermanent beryllium reflector region, which is replaced every 80 cycles and contains eight control rod access plug facilities (labeled CR-n, with $n = 1$ to 8). The outermost reflector region is the permanent beryllium reflector, which is replaced every 135 cycles and contains 22 vertical experimental facilities (labeled VXF-n, with $n = 1$ to 22). Six of the VXF tubes have a

larger diameter than the other VXF tubes. The permanent reflector also contains the tips of the four horizontal beam tubes and is indented at two places on its outer edge by engineering facility tubes, EF-1 and EF-2.

The beryllium reflector extends vertically for 60.96 cm, symmetrically above and below the horizontal midplane.

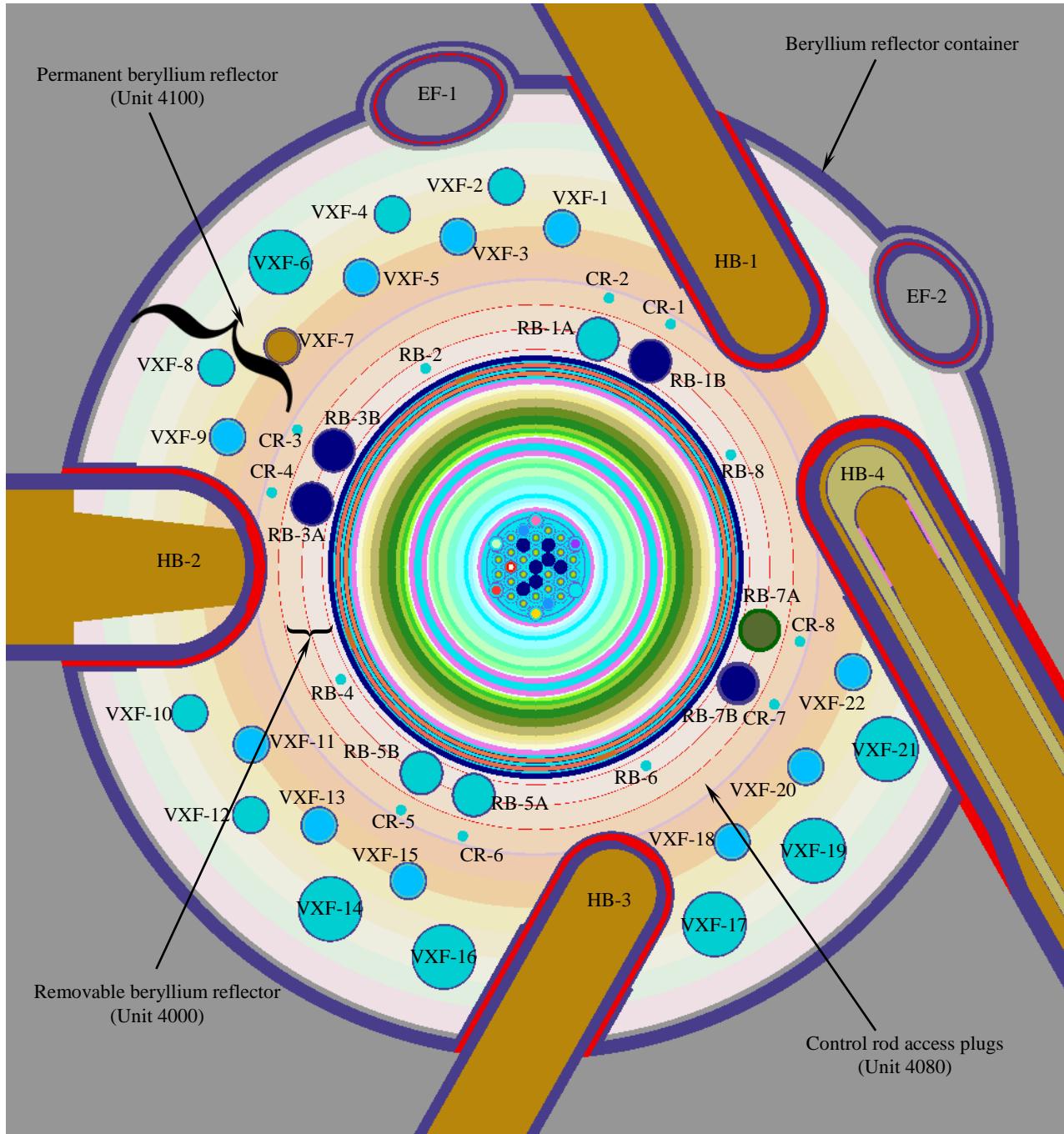


Fig. 4. Beryllium reflector at the horizontal midplane in the Scale HFIR model.

3.2.4 Outer Regions

The main regions outside the beryllium reflector as modeled in the SCALE HFIR model are shown in Fig. 5. The thick biological shielding (Unit 9997 in the geometry model) is made of concrete and is modeled to an outer radius of 720 cm. The water pool (Unit 4170 in the geometry model) is the next major region; it contains the reactor pressure vessel. Inside the pressure vessel and outside the beryllium reflector, there is another region filled with water that provides additional reflection for the reactor core and shielding for the pressure vessel. Cutouts through these regions are filled by the four horizontal beam tubes HB-1 to HB-4.

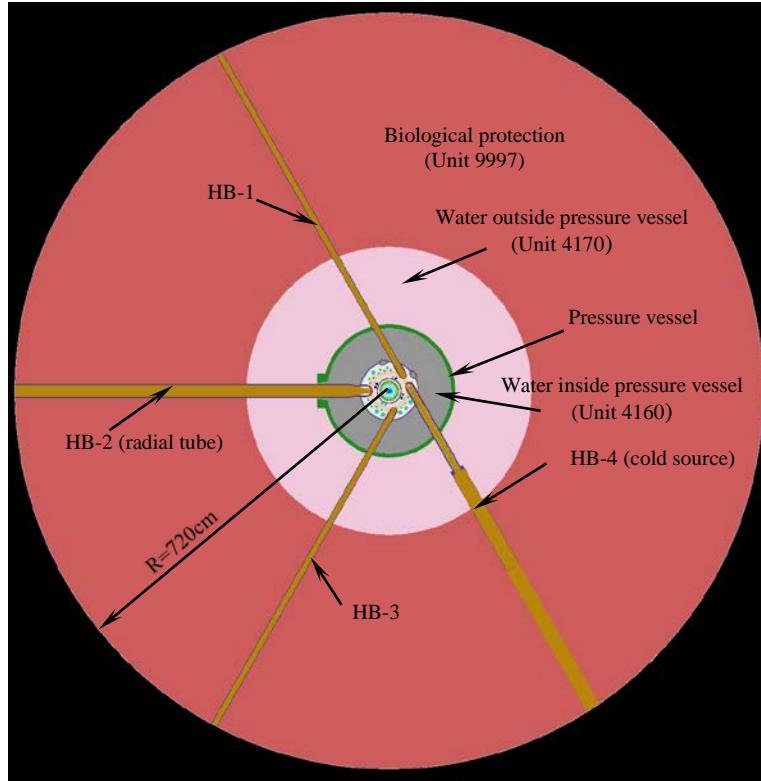


Fig. 5. Main outer core components of the SCALE HFIR model.

3.2.5 Flowchart of the SCALE HFIR Geometry Model

The general flowcharts describing the SCALE HFIR geometry model and the corresponding geometry units are shown in Fig. 6 for the HFIR regions that extend radially from the center to the outer edge of the OFE and in Fig. 7 for the HFIR regions that are radially outside the fuel regions. These flowcharts may be used by the expert users of the SCALE HFIR model to model their particular experimental configurations and to facilitate changes to the model.

Similar to the MCNP Cycle 400 revised model, the SCALE HFIR model has a cylindrical overall shape, with a height of 300 cm (from -150 cm to +150 cm around the core midplane) and an outer diameter of 1,440 cm (720 cm radius).

The general structure of the SCALE HFIR geometry model is based on concentric cylindrical shells. There are 10 such shells corresponding to the major *units* (*italicized* terms correspond strictly to ones used in the SCALE/KENO-VI geometry), as described in Fig. 6 and Fig. 7. Each shell has a

corresponding *unit* number that uniquely identifies it in the SCALE HFIR model. The outermost *unit* corresponds to the *global unit*, and the innermost *unit* comprises the central target region. Many of the major *units* include minor *units* that are embedded in the major ones by using the *hole* feature of the KENO-VI geometry. In all cases, the minor *units* are vertical cylinders with their axis parallel to the *z* axis of the reactor model.

The fuel materials are made up of radial regions, with each group of radial regions embedded in an axial layer region for both the inner and outer fuel elements, as shown in Fig. 6.

The horizontal tubes, labeled HB-1 to HB-4, span five major geometry *units* (blue-colored items in Fig. 7), numbered 4080, 4100, 4160, 4170, and 9997. The two engineering facility slant tubes span two major geometry units, numbered 4100 and 4160 (see Fig. 7).

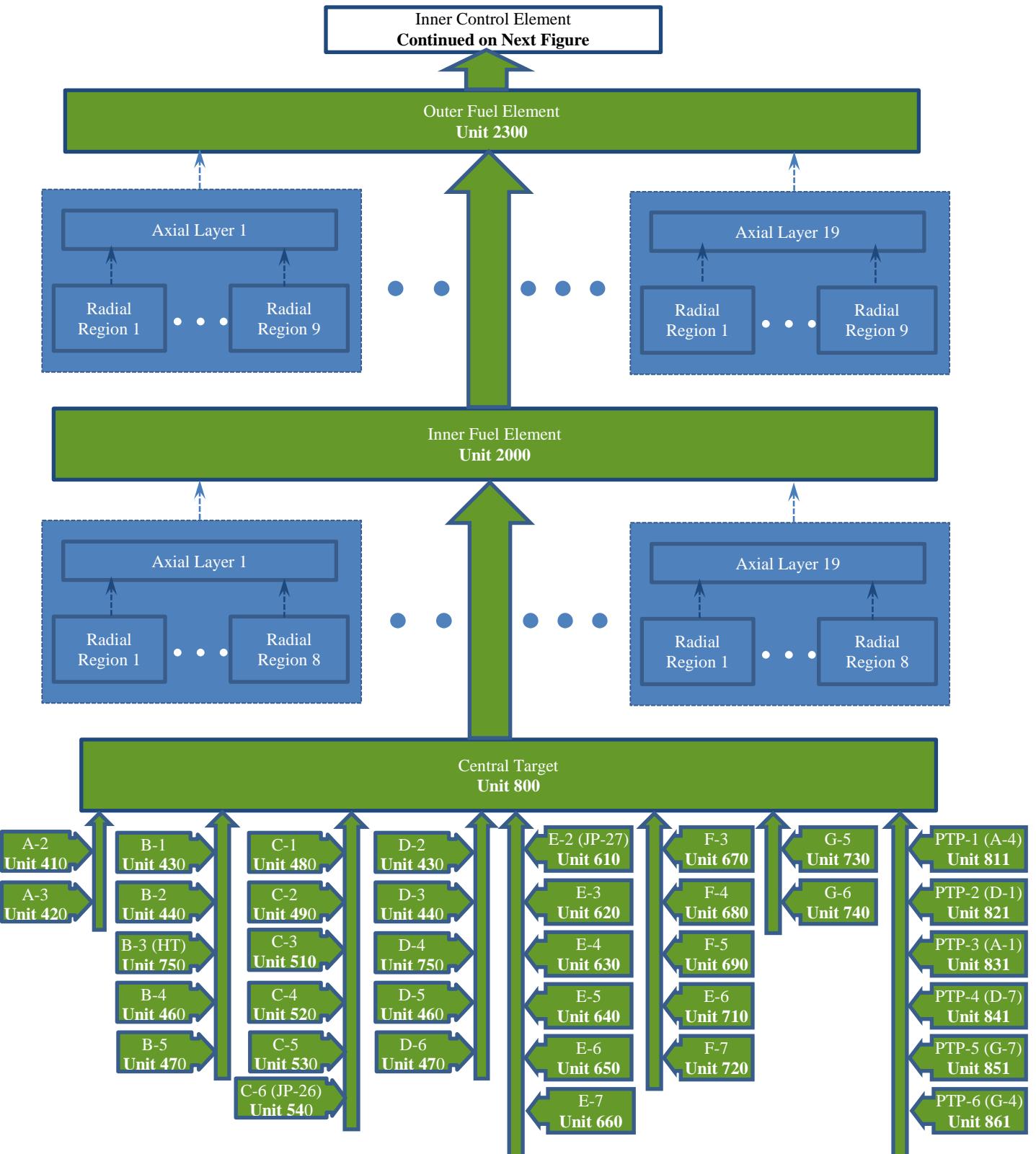


Fig. 6. Flowchart of the HFIR Scale model (fuel and central target regions).

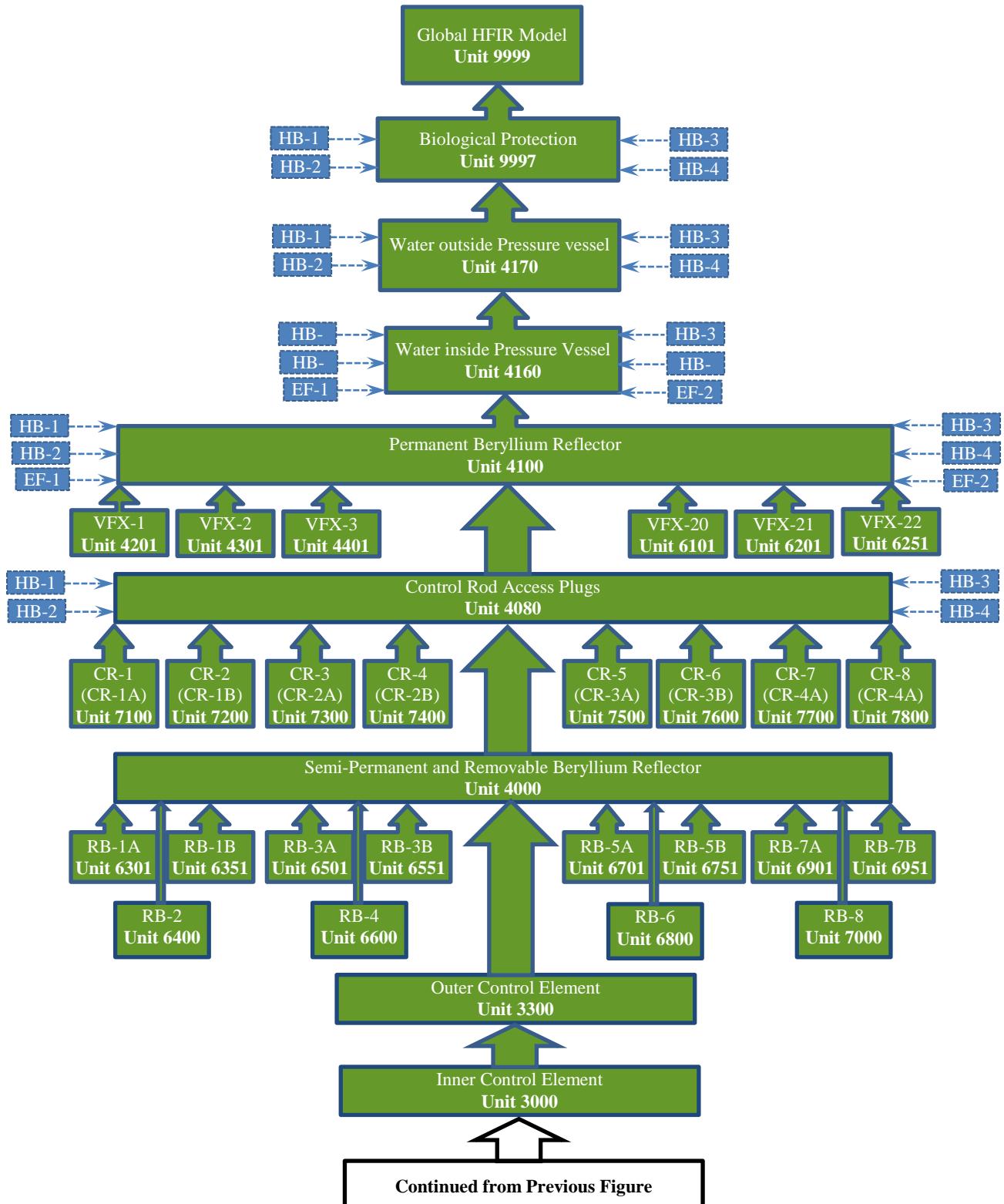


Fig. 7. Flowchart of the HFIR Scale model (outside the fuel region).

3.3 NUCLEAR CROSS-SECTION DATA

Throughout the development of the SCALE HFIR model, the ENDF/B-VII.0 version of the SCALE continuous energy (CE) cross-section library was used; CE ENDF/B-VII.0 data were also used with the MCNP Cycle 400 revised model. The CE library can easily be changed in the SCALE model by simply changing the name of the library. To convert the SCALE HFIR continuous energy model to a multigroup (MG) model, a “*celldata*” block must be added to the existing input to correctly process the cross sections for the problem. The cross sections in both the SCALE model and the MCNP Cycle 400 revised model are considered at 293.6 K temperature.

3.4 MATERIALS

The SCALE HFIR model contains a total of 264 materials defined by their number densities. Several of the features of the material description in the SCALE HFIR model are illustrated in Fig. 8.

The material numbering scheme in the SCALE model is the same as in the MCNP Cycle 400 revised model with the exception of the SCALE material 100, which was added to account for a different density of the same composition as material 1 (water). Similar MCNP structural materials that had a difference in density of less than 0.1% have been modeled as the same material. The fuel materials are labeled according to the scheme $2ar$ or $3ar$ for the IFE and OFE, respectively, where a is the axial layer number (varying from 0 to 9, with midplane symmetry considered and with $a=0$ being the central layer and $a=9$ the top layer) and r is the radial region within the axial layer (varying from 1 to 8 [moving from the center to the outside of HFIR] for the IFE and from 1 to 9 for the OFE). The material numbering for the nine axial layers located in the bottom half of the axial fuel region is based on the same scheme as used for the top-half axial layers, with core midline symmetry considered. For example, the same material number is used for the topmost and bottommost axial layers in a fuel element. The total number of materials used in the fuel region is 170, with 80 in the IFE and 90 in the OFE. As a note, the HFIR core is not axially symmetric, but using axially symmetric material distributions is an approximation that is usually considered to hold well.

```

1 -ccmas26
2 HFIR model, Dan Ilas, May-June 2011
3 cse v7
4 read comp
5
6
7 (3) Material Descriptions
8
9
10 Region I Material Descriptions
11
12
13 Water below core region - Outlet Pressure= 2.572 MPa or 358 psi
14 - Pressure drop= 0.758 MPa or 110 psi pressure drop)
15 - Outlet Temperature= 150F or 69C
16 - Density= 0.9794 g/cm^3
17
18 The number densities for this material on MCNP material cards were manually
19 verified for consistency with density on cell cards ( 1.00000E+00)
20 H-1      1   0   6.59947E-02  293.6 end
21 O-16     1   0   3.29974E-02  293.6 end
22 This is a SCALE only material!
23 It is the same as material 1, but corresponds to a density of 1.00000E+00 on cell cards
24 H-1      100  0   6.68584E-02  293.6 end
25 O-16     100  0   3.34293E-02  293.6 end
26
27 Water in core region - Avg. Density= 0.98465 g/cm^3
28 H-1      2   0   6.63485E-02  293.6 end
29 O-16     2   0   3.31742E-02  293.6 end
30
31 Water above core region - Inlet Pressure= 3.33 MPa or 468 psi
32 - Inlet Temperature= 120F or 49C
33 - Density= 0.9899 g/cm^3
34 H-1      3   0   6.67020E-02  293.6 end
35 O-16     3   0   3.33510E-02  293.6 end
36
37
38 Aluminum in target basket area
39 Al-27    25  0   0.85482E-02  293.6 end
40 H-1      25  0   3.45710E-04  293.6 end
41 Ho-24    25  0   5.28432E-04  293.6 end
42 Ho-25    25  0   6.68980E-05  293.6 end
43 Ho-26    25  0   7.36554E-05  293.6 end
44 Si-28    25  0   3.20373E-04  293.6 end
45 Si-29    25  0   1.62219E-05  293.6 end
46 Si-30    25  0   1.07683E-05  293.6 end
47 Ti-46    25  0   2.10131E-06  293.6 end
48 Ti-47    25  0   1.89500E-06  293.6 end
49 Ti-48    25  0   1.87766E-05  293.6 end
50 Ti-49    25  0   1.37795E-06  293.6 end
51 Ti-50    25  0   1.31937E-06  293.6 end

```

CE library can be changed easily

(3) Material Descriptions

Region I Material Descriptions

Water below core region - Outlet Pressure= 2.572 MPa or 358 psi
- Pressure drop= 0.758 MPa or 110 psi pressure drop)
- Outlet Temperature= 150F or 69C
- Density= 0.9794 g/cm³

The number densities for this material on MCNP material cards were manually verified for consistency with density on cell cards (1.00000E+00)

H-1 1 0 6.59947E-02 293.6 end
O-16 1 0 3.29974E-02 293.6 end

This is a SCALE only material!
It is the same as material 1, but corresponds to a density of 1.00000E+00 on cell cards

H-1 100 0 6.68584E-02 293.6 end
O-16 100 0 3.34293E-02 293.6 end

Water in core region - Avg. Density= 0.98465 g/cm³

H-1 2 0 6.63485E-02 293.6 end
O-16 2 0 3.31742E-02 293.6 end

Water above core region - Inlet Pressure= 3.33 MPa or 468 psi
- Inlet Temperature= 120F or 49C
- Density= 0.9899 g/cm³

H-1 3 0 6.67020E-02 293.6 end
O-16 3 0 3.33510E-02 293.6 end

Aluminum in target basket area

Al-27 25 0 0.85482E-02 293.6 end
H-1 25 0 3.45710E-04 293.6 end
Ho-24 25 0 5.28432E-04 293.6 end
Ho-25 25 0 6.68980E-05 293.6 end
Ho-26 25 0 7.36554E-05 293.6 end
Si-28 25 0 3.20373E-04 293.6 end
Si-29 25 0 1.62219E-05 293.6 end
Si-30 25 0 1.07683E-05 293.6 end
Ti-46 25 0 2.10131E-06 293.6 end
Ti-47 25 0 1.89500E-06 293.6 end
Ti-48 25 0 1.87766E-05 293.6 end
Ti-49 25 0 1.37795E-06 293.6 end
Ti-50 25 0 1.31937E-06 293.6 end

Material number

293.6 K material temperature

Number densities

Fig. 8. A screenshot of the material block showing several features of the material description.

4. SCALE HFIR MODEL VERIFICATION

The SCALE HFIR model for Cycle 400 was verified by both visual inspection and numerical comparisons against the MCNP Cycle 400 revised model. The combination of these two approaches gives confidence in the similarity of the two models.

4.1 VISUAL COMPARISONS

Visual comparisons were performed for the more complicated geometry regions to confirm the consistency of the geometry modeling in the SCALE and MCNP models. In comparing the plots in the following sub-sections, it should be noted that the MCNP plots include the surface lines while the SCALE plots strictly represent the material regions.

4.1.1 Target Region

A comparison between the representation of the central target region in the SCALE HFIR model and the corresponding representation in the MCNP Cycle 400 revised model is shown in Fig. 9 for the horizontal midplane ($z=0$). Note that, apart from the different colors used by the plotting capabilities of the two software packages, the SCALE HFIR model reproduces with fidelity the MCNP Cycle 400 revised model representation of the central target region. The actual dimensions were compared by direct inspection of the input files for the two models.

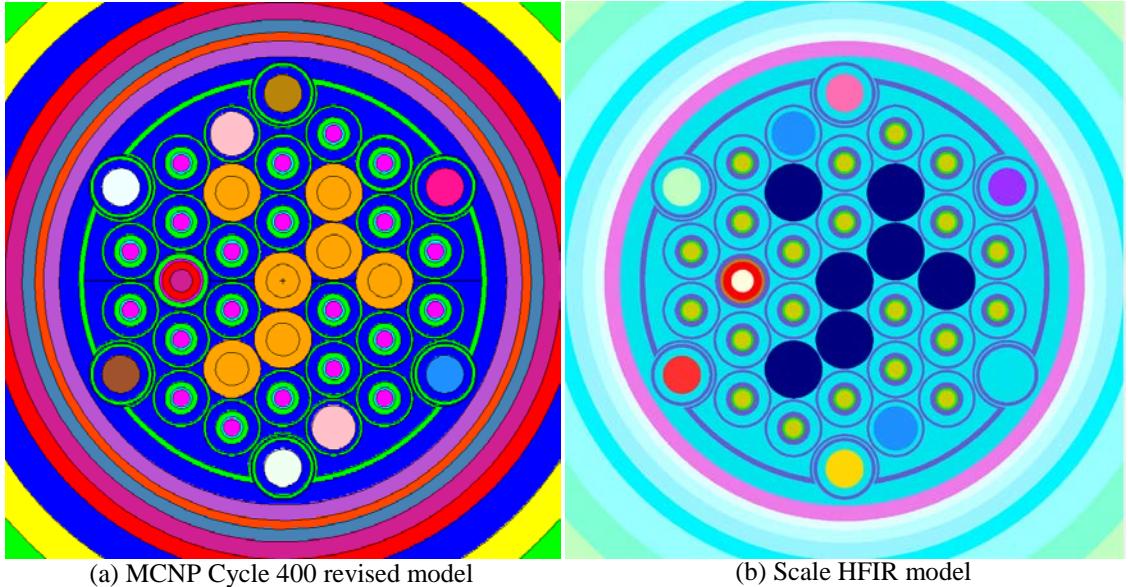


Fig. 9. Comparison of the central target region layouts.

4.1.2 Fuel and Control Regions

The fuel region models are compared in Fig. 10 (see Fig. 3 for region identification), where vertical sections of the HFIR are shown for the SCALE HFIR model and the MCNP Cycle 400 revised model in the plane $y=0$ (note that the plots are enlarged in the radial direction to show details).

Also note the symmetric distribution of the fuel materials with respect to the midplane z=0 and the slight axial asymmetry of the region that separates the two fuel elements.

Also apparent in Fig. 10 is the similar material distribution in the two control regions of the two HFIR models, as well as the axial model of the HT facility and two solid aluminum target facilities in the central flux trap region.

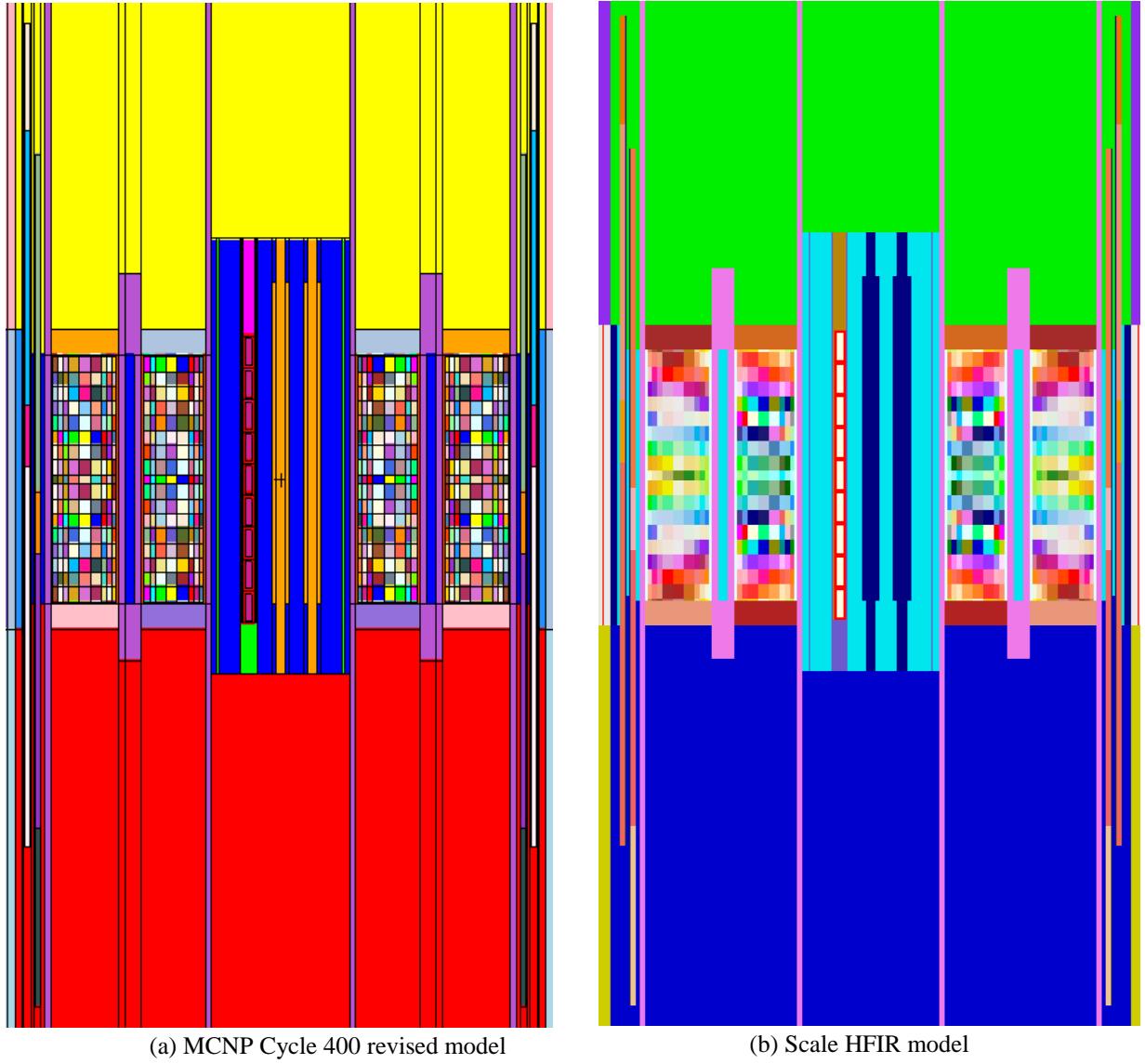
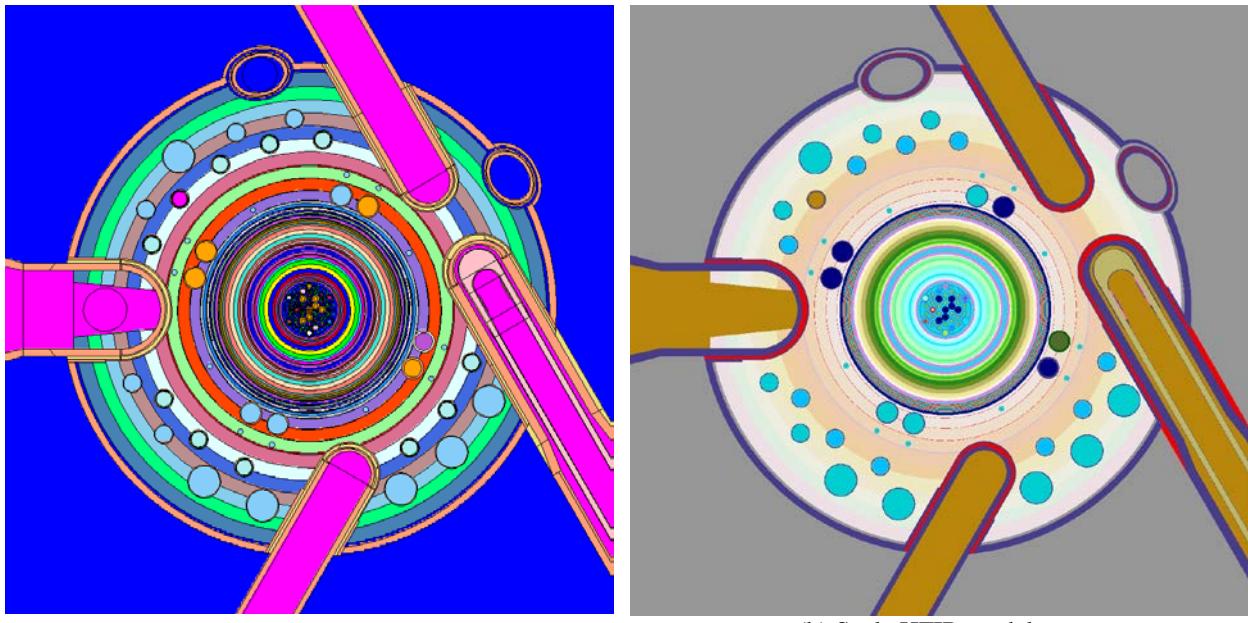


Fig. 10. Comparison of the fuel and control regions.

4.1.3 Beryllium Reflector Regions

The similarity between the SCALE HFIR model and the MCNP Cycle 400 revised model, with respect to the distribution of the irradiation facilities that are embedded in the beryllium reflector, is visible in Fig. 11 where a core midplane ($z=0$) cross section is shown for the two models. The similar positioning of each of the facilities, including the horizontal tubes and the engineering facilities, can be seen.



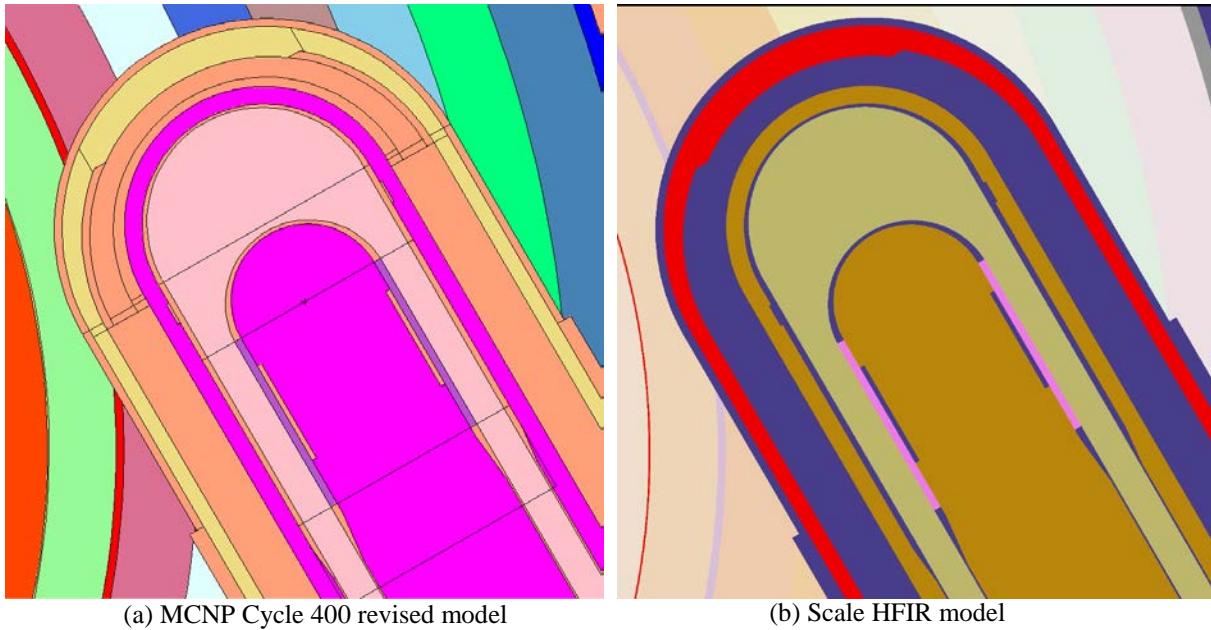
(a) MCNP Cycle 400 revised model

(b) Scale HFIR model

Fig. 11. Beryllium reflector regions with irradiation facilities, horizontal tubes, and engineering facilities.

4.1.4 Horizontal Tube Regions

Correct modeling of the horizontal tubes is important to adequately characterize the neutron fluxes along each of the tubes and is especially important for the cold source tube, HB-4. Fig. 12 compares the details of the tip of the HB-4 tube at $z=0$ in the beryllium reflector, where the similarity of the hydrogen-filled region (light pink for the MCNP model and light yellow for the SCALE model) is apparent.



(a) MCNP Cycle 400 revised model

(b) Scale HFIR model

Fig. 12. Comparison of the HT-4 tip (cold source tube) models.

4.1.5 Outer Regions

Layouts of the outer regions of HFIR (outside the pressure vessel), as obtained with the SCALE and MCNP Cycle 400 revised models, are shown in Fig. 13 for a core midplane cross section. The layouts of the four horizontal tubes are identical all the way to the periphery of the model.

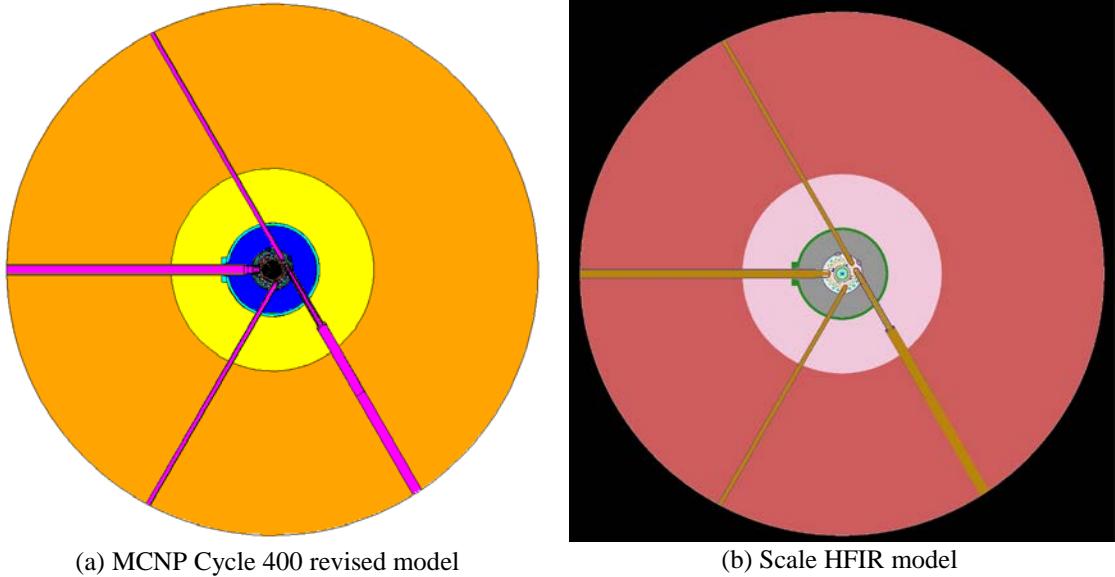


Fig. 13. Comparison of the HFIR outer regions.

4.2 CALCULATIONAL COMPARISONS

4.2.1 Multiplication Constant and Other System Parameters

The multiplication constants (k_{eff}) predicted by the SCALE HFIR model and the MCNP Cycle 400 revised model and the corresponding standard deviations are shown in Table 3. In each case, 2000 neutron active generations (cycles) were used in the Monte Carlo simulation, with each generation tracking 100,000 particles. A number of 200 generations were initially skipped to achieve a better convergence of the neutron source. As seen, there is excellent agreement between the k_{eff} values predicted by the two models, with a difference of 124 pcm.

Table 3. Comparison of multiplication constants

Model	k_{eff}	σ
SCALE HFIR	0.99630	0.00007
MCNP Cycle 400 revised	0.99754	0.00006

Other parameters of interest that globally characterize the HFIR as a critical system are the energy corresponding to the average neutron lethargy causing fission, $\bar{\epsilon}$, and the average number of neutrons produced per fission, \bar{v} . Table 4 summarizes the results obtained with the two models. The number of neutrons produced per fission is identical for the two models up to four significant digits. The energy corresponding to the average neutron lethargy causing fission differs slightly (by ~2%) between the SCALE and MCNP models.

Table 4. Comparison of HFIR system parameters

Model	$\bar{\epsilon}$ (eV)	\bar{v}
SCALE HFIR	0.174	2.439
MCNP Cycle 400 revised	0.170	2.439

4.2.2 Core Power Distribution

It is customary to approximate the relative power distribution in the reactor core with the relative fission reaction rate distribution. In MCNP, the fission reaction rate can be calculated for each cell where fuel is present. This capability is currently lacking in SCALE when used with a continuous energy cross-section library. The $v\Sigma_f$ reaction rate, however, can be extracted directly from the output file for the continuous energy SCALE model for HFIR, for each of the regions that contain fissile material. The relative $v\Sigma_f$ reaction rate density distribution obtained from the SCALE HFIR model output file was normalized to the neutron source in a manner similar to the MCNP results. The relative neutron production rate densities calculated with SCALE are displayed in Fig. 14 both as 3-D surfaces and 2-D contours (at the bottom of the plot), and the corresponding numerical values are given in Table 5. The $v\Sigma_f$ reaction rate peaks at the core midplane in the regions adjacent to the sidewall between the two fuel elements and also near the central flux trap.

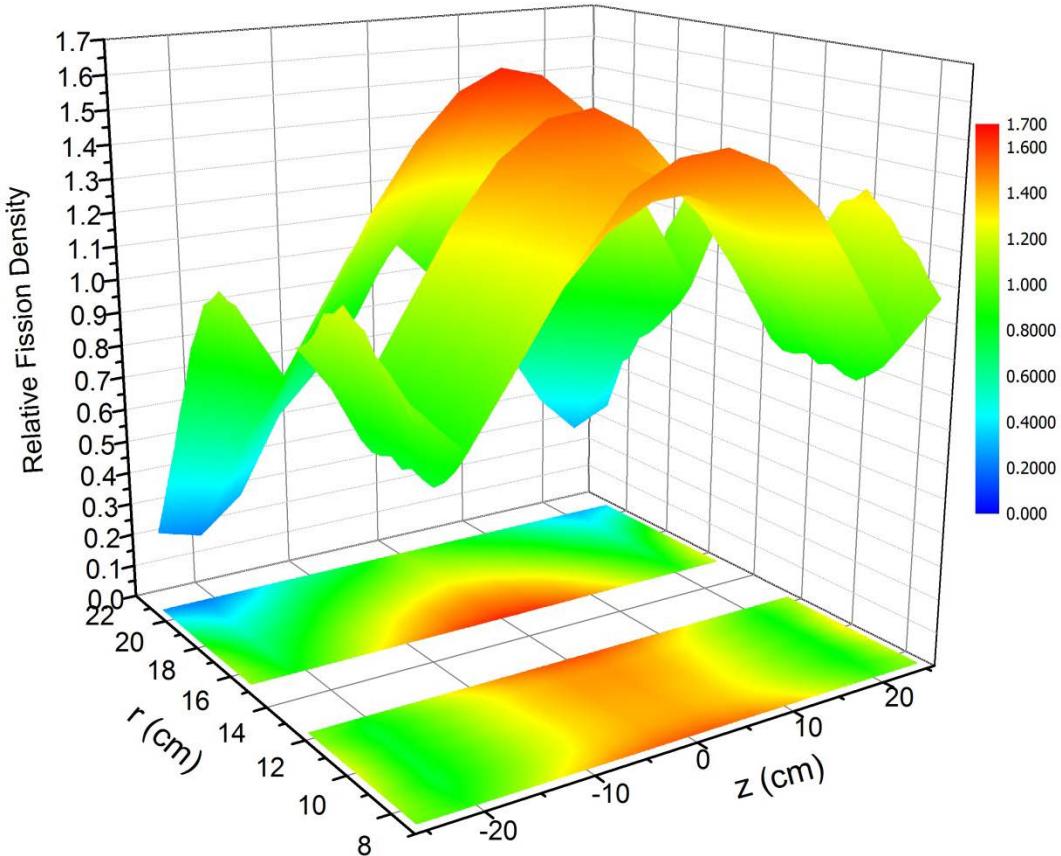


Fig. 14. Relative $v\Sigma_f$ reaction rate density distributions in IFE and OFE of HFIR.

To verify that the relative $v\Sigma_f$ reaction rate density distribution calculated with the SCALE HFIR

model is consistent with the relative fission density distribution predicted by the MCNP Cycle 400 revised model, a mesh-wise comparison of the two datasets was performed, and is illustrated in Fig. 15. Theoretically, the two distributions are the same when the number of neutrons emitted per fission is independent of energy over the energy range of the incident neutrons where most of the fissions occur. The data illustrated in Fig. 15 was calculated for each mesh as

$$100\% \times \frac{SCALE - MCNP}{MCNP}$$

where $SCALE$ is the relative $v\Sigma_f$ reaction rate density calculated with the SCALE model, and $MCNP$ is the relative fission density calculated with the MCNP model.⁶ The data in Fig. 15 is displayed both as 3-D surfaces and 2-D contours (at the bottom of the plot). The difference per mesh between the two models is typically below 0.5% and increases slightly in the smaller meshes located at the top and bottom of the OFE, most likely due to the poorer statistics in these regions. The arithmetic average of the mesh difference between the two models is +0.00% for IFE and -0.01% for OFE with maxima of 0.93% for IFE and 0.99% for OFE and minima of -1.44% for IFE and -1.19% for OFE.

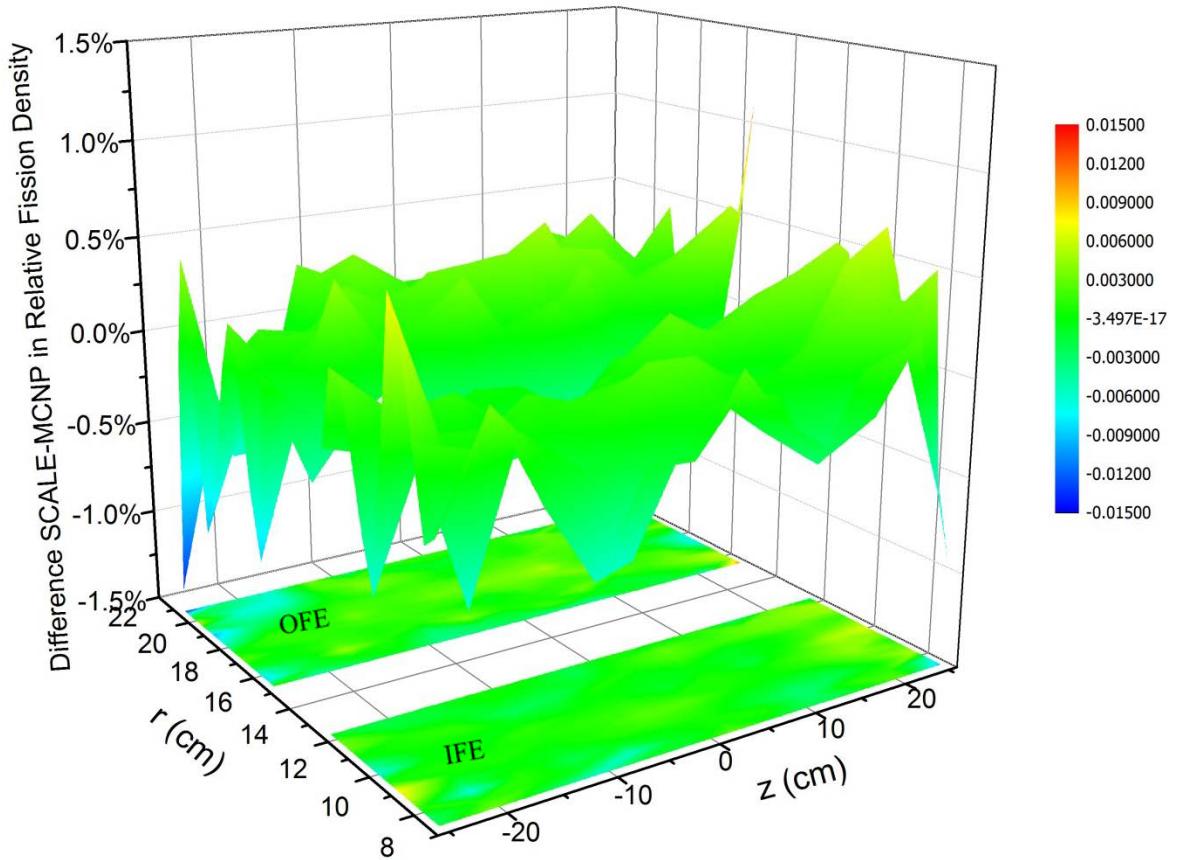


Fig. 15. Comparison of relative $v\Sigma_f$ reaction rate density distribution predicted by the SCALE HFIR model and relative fission density distribution predicted by the MCNP Cycle 400 revised model.

Table 5. Relative $v\Sigma_f$ reaction rate densities predicted by the SCALE HFIR model

Axial ^a layer #	IFE								OFE								
	r=1 ^b	r=2	r=3	r=4	r=5	r=6	r=7	r=8	r=1	r=2	r=3	r=4	r=5	r=6	r=7	r=8	r=9
1	1.087	1.129	1.176	1.254	1.305	1.266	1.182	1.146	1.182	1.201	1.230	1.209	1.043	0.801	0.602	0.472	0.367
2	0.907	0.869	0.844	0.840	0.843	0.838	0.845	0.897	0.933	0.875	0.829	0.759	0.646	0.523	0.424	0.357	0.294
3	0.952	0.896	0.857	0.834	0.832	0.845	0.863	0.925	0.953	0.896	0.850	0.776	0.662	0.542	0.444	0.379	0.313
4	1.088	1.033	0.992	0.971	0.974	0.986	1.007	1.070	1.103	1.047	0.995	0.922	0.793	0.657	0.545	0.471	0.397
5	1.237	1.175	1.128	1.105	1.113	1.127	1.145	1.219	1.262	1.197	1.147	1.067	0.934	0.796	0.686	0.614	0.541
6	1.363	1.301	1.245	1.226	1.232	1.248	1.270	1.353	1.400	1.335	1.275	1.195	1.054	0.920	0.815	0.744	0.676
7	1.460	1.387	1.336	1.315	1.323	1.343	1.372	1.451	1.515	1.443	1.383	1.298	1.152	1.015	0.907	0.836	0.762
8	1.513	1.435	1.393	1.376	1.392	1.410	1.443	1.531	1.595	1.519	1.461	1.372	1.228	1.093	0.990	0.922	0.848
9	1.546	1.473	1.424	1.404	1.424	1.447	1.477	1.571	1.638	1.564	1.507	1.420	1.284	1.163	1.081	1.029	0.973
10	1.552	1.482	1.425	1.408	1.430	1.450	1.488	1.578	1.642	1.572	1.513	1.429	1.295	1.187	1.121	1.073	1.033
11	1.543	1.467	1.416	1.397	1.413	1.435	1.467	1.557	1.620	1.545	1.484	1.400	1.261	1.135	1.040	0.978	0.916
12	1.502	1.429	1.370	1.352	1.366	1.386	1.413	1.503	1.557	1.482	1.423	1.336	1.185	1.038	0.920	0.840	0.748
13	1.427	1.358	1.307	1.280	1.291	1.304	1.331	1.413	1.462	1.395	1.335	1.248	1.098	0.950	0.832	0.753	0.670
14	1.309	1.252	1.205	1.177	1.189	1.199	1.225	1.293	1.343	1.274	1.219	1.135	0.994	0.851	0.742	0.664	0.588
15	1.184	1.119	1.080	1.057	1.064	1.073	1.094	1.157	1.195	1.134	1.083	0.999	0.860	0.717	0.605	0.526	0.447
16	1.040	0.989	0.948	0.925	0.929	0.937	0.952	1.007	1.041	0.981	0.929	0.849	0.715	0.568	0.447	0.364	0.282
17	0.912	0.857	0.815	0.793	0.789	0.793	0.812	0.862	0.889	0.831	0.783	0.710	0.589	0.460	0.355	0.284	0.217
18	0.865	0.827	0.798	0.788	0.787	0.781	0.786	0.830	0.858	0.799	0.753	0.682	0.566	0.438	0.334	0.264	0.200
19	1.014	1.052	1.109	1.180	1.223	1.176	1.094	1.054	1.076	1.085	1.111	1.070	0.898	0.665	0.473	0.360	0.251

^aThe axial layer number increases from the top to the bottom of the fuel elements.

^br=n denotes the radial region number; n varies from 1 to 8 for the IFE and from 1 to 9 for the OFE, with r=1 corresponding to the smallest radius in the fuel element.

4.2.3 Neutron Flux

The neutron flux level is one of the key parameters for characterizing core performance. A comparison was made of three-group flux data estimated with the SCALE HFIR model and the MCNP Cycle 400 revised model for the HFIR core at 85 MW power for three relevant locations in the HFIR geometry. The flux data comparison is presented in Table 6. The statistical relative standard deviation for the tallied flux is less than 1% in all cases. The energy group definition for the three-group data is thermal, <0.625 eV; epithermal, 0.625 eV– 100 keV; and fast, 100 keV– 20 MeV. As the flux results provided by SCALE or MCNP are normalized to the fission source, the values for the flux in $\text{n/cm}^2\text{s}$ were obtained by multiplying the flux tally values by the total source. The total source S was approximated as

$$S = \frac{\bar{v}P}{Eek_{eff}} \quad (5.1)$$

where \bar{v} is the average number of neutrons per fission, P is the reactor power in MW, E is the average energy per fission in MeV, and e is a unit conversion factor (1.602×10^{-19} MJ/MeV). An approximate value of 200 MeV was used for E , whereas the value for k_{eff} and \bar{v} were taken from Table 3 and Table 4, respectively. The value of the total source is 6.47×10^{18} n/s for the MCNP Cycle 400 revised model⁶ and 6.49×10^{18} n/s for the SCALE HFIR model.

The flux data in Table 6 is shown for the following three locations: the central target in the flux trap, the edge of the cold source (hydrogen spherical region at the tip of the cold source), and the VXF-6 location in the beryllium reflector. As observed, the flux values agree well in the SCALE and MCNP models for the central target region and the VXF-6 location in reflector, with differences typically below 2%. The differences between the two models increase slightly to ~5% in the thermal and epithermal components, as well as for the total flux, at the cold source tip.

Table 6. Neutron flux comparison between the SCALE and MCNP models

Location	Model	Thermal flux ($\text{n/cm}^2\text{s}$)	Epithermal flux ($\text{n/cm}^2\text{s}$)	Fast flux ($\text{n/cm}^2\text{s}$)	Total flux ($\text{n/cm}^2\text{s}$)
Central target $r,z = 0$ cm	SCALE	2.25×10^{15}	1.33×10^{15}	1.12×10^{15}	4.71×10^{15}
	MCNP	2.24×10^{15}	1.30×10^{15}	1.13×10^{15}	4.67×10^{15}
Reflector VXF-6	SCALE	2.72×10^{14}	3.64×10^{13}	9.50×10^{12}	3.18×10^{14}
	MCNP	2.67×10^{14}	3.58×10^{13}	9.76×10^{12}	3.13×10^{14}
Cold source tip Unit 4100	SCALE	4.23×10^{14}	9.40×10^{13}	3.81×10^{13}	5.55×10^{14}
	MCNP	4.02×10^{14}	9.02×10^{13}	3.80×10^{13}	5.30×10^{14}

5. CONCLUSIONS

The development of a comprehensive SCALE computational model for HFIR is documented and discussed in this report. This SCALE model has equivalent features as the reference MCNP model for Cycle 400, which has been used extensively at HFIR for safety analyses and by HFIR users for experiment design and analyses.

Numerical and visual comparisons are employed to assess the performance of the SCALE HFIR model relative to the MCNP Cycle 400 revised model that is currently used to evaluate relevant reactor performance parameters for the HFIR. Visual comparisons of the two models show excellent geometry matching. Numerical comparisons for the global parameters of the system, power density distribution in the fuel, and neutron fluxes at several locations in the HFIR indicate excellent agreement between the results predicted with the SCALE model and those given by the MCNP model. The difference in k_{eff} values calculated with the two models is 124 pcm.

The SCALE HFIR model is presented in sufficient detail to provide the users of the model with a tool that can be easily customized for various safety analysis or experiment design requirements. To aid the users of the SCALE HFIR model, a flowchart of the model is included that shows in detail the geometry units describing various sections in the configuration. The input file for the SCALE HFIR model is heavily commented, containing ~1,500 comment lines, for easier navigation and identification of the different components of the model, to enable the user to make changes or to add to the model, such as for the case when a particular target or experiment is inserted in the reactor.

The SCALE HFIR model is based on the SCALE generalized geometry package, and therefore can be used as a basis for studies with other modules or sequences in SCALE, such as for depletion simulations or shielding analyses. Given the diverse capabilities existent or under development in SCALE, there is a potential for more analysis options with SCALE than those provided by MCNP. The SCALE HFIR model provides the modeling basis for future integrated reactor analyses for HFIR and also provides an alternative and a verification tool for the currently used HFIR MCNP model.

6. REFERENCES

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Appendix A

INPUT FILE FOR THE SCALE HFIR MODEL

Appendix A. Input File for the SCALE HFIR Model

```

=csas26
HFIR model, Dan Ilas, May-June 2011
ce_v7
read comp
'-----'
(3) Material Descriptions
'-----'

Region I Material Descriptions
'-----'

Water below core region - Outlet Pressure= 2.572 MPa or 358 psi
- Pressure drop= (0.758 MPa or 110 psi pressure drop)
- Outlet Temperature= 156F or 69C
- Density= 0.9794 g/cm^3
The number densities for this material on MCNP material cards were manually
verified for consistency with density on cell cards ( 1.00000E+00)
H-1          1    0   6.59947E-02   293.6   end
O-16         1    0   3.29974E-02   293.6   end
This is a SCALE only material:
It is the same as material 1, but corresponds to a density of 1.00000E+00 on cell cards
H-1          100   0   6.68584E-02   293.6   end
O-16         100   0   3.34293E-02   293.6   end
'-----'
Water in core region - Avg. Density= 0.98465 g/cm^3
H-1          2    0   6.63485E-02   293.6   end
O-16         2    0   3.31742E-02   293.6   end
'-----'
Water above core region - Inlet Pressure= 3.33 MPa or 468 psi
- Inlet Temperature= 120F or 49C
- Density= 0.9899 g/cm^3
H-1          3    0   6.67020E-02   293.6   end
O-16         3    0   3.33510E-02   293.6   end
'-----'
Aluminum in target basket area
Al-27        25   0   5.85482E-02   293.6   end
H-1          25   0   3.45716E-04   293.6   end
Mg-24         25   0   5.28432E-04   293.6   end
Mg-25         25   0   6.68986E-05   293.6   end
Mg-26         25   0   7.36554E-05   293.6   end
Si-28         25   0   3.20373E-04   293.6   end
Si-29         25   0   1.62219E-05   293.6   end
Si-30         25   0   1.07683E-05   293.6   end
Ti-46         25   0   2.10131E-06   293.6   end
Ti-47         25   0   1.89500E-06   293.6   end
Ti-48         25   0   1.87768E-05   293.6   end
Ti-49         25   0   1.37795E-06   293.6   end
Ti-50         25   0   1.31937E-06   293.6   end
Cr-50         25   0   2.65258E-06   293.6   end
Cr-52         25   0   5.10942E-05   293.6   end
Cr-53         25   0   5.79300E-06   293.6   end
Cr-54         25   0   1.43910E-06   293.6   end
Mn-55         25   0   2.21974E-05   293.6   end
Fe-54         25   0   5.96144E-06   293.6   end
Fe-56         25   0   9.34978E-05   293.6   end
Fe-57         25   0   2.16039E-06   293.6   end
Fe-58         25   0   2.85334E-07   293.6   end
Cu-63         25   0   6.04931E-05   293.6   end
Cu-65         25   0   2.69626E-05   293.6   end
'-----'
Al-1100 clad of target pellets      Total =  6.03240E-02
Al-27        511   0   6.00625E-02   293.6   end
Si-28        511   0   1.33983E-04   293.6   end
Si-29        511   0   6.78416E-06   293.6   end
Si-30        511   0   4.50340E-06   293.6   end
Mn-55         511   0   7.42655E-06   293.6   end
Fe-54         511   0   4.27394E-06   293.6   end
Fe-56         511   0   6.70314E-05   293.6   end
Fe-57         511   0   1.54885E-06   293.6   end
Fe-58         511   0   2.04565E-07   293.6   end
Cu-63         511   0   2.47400E-05   293.6   end
Cu-65         511   0   1.10270E-05   293.6   end
'-----'
Al for shrouded targets           Total =  6.03240E-02

```

```

' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 4.82102E-02)
Al-27      512    0   4.80012E-02   293.6   end
Si-28      512    0   1.07078E-04   293.6   end
Si-29      512    0   5.42182E-06   293.6   end
Si-30      512    0   3.59906E-06   293.6   end
Mn-55      512    0   5.93521E-06   293.6   end
Fe-54       512    0   3.41568E-06   293.6   end
Fe-56       512    0   5.35707E-05   293.6   end
Fe-57       512    0   1.23782E-06   293.6   end
Fe-58       512    0   1.63486E-07   293.6   end
Cu-63      512    0   1.97719E-05   293.6   end
Cu-65      512    0   8.81264E-06   293.6   end
'

' Dummy solid Al targets ( change to Al-1100) Total =  6.03240E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 6.02423E-02)
Al-27      530    0   5.99811E-02   293.6   end
Si-28      530    0   1.33801E-04   293.6   end
Si-29      530    0   6.77497E-06   293.6   end
Si-30      530    0   4.49730E-06   293.6   end
Mn-55      530    0   7.41649E-06   293.6   end
Fe-54       530    0   4.26815E-06   293.6   end
Fe-56       530    0   6.69406E-05   293.6   end
Fe-57       530    0   1.54675E-06   293.6   end
Fe-58       530    0   2.04288E-07   293.6   end
Cu-63      530    0   2.47065E-05   293.6   end
Cu-65      530    0   1.10121E-05   293.6   end
'

'

' material for Jp-26 & Jp-27 solid SST targets in Al holders Total =  5.97E-02 (communication w/ Randy Hobbs 8/9/2004)
' The total number density on MCNP material cards ( 5.96631E-02)
' is not the same as on cell cards ( 5.97000E-02)
Al-27      535    0   3.22199E-02   293.6   end
Fe-54       535    0   1.10633E-03   293.6   end
Fe-56       535    0   1.73515E-02   293.6   end
Fe-57       535    0   4.00928E-04   293.6   end
Fe-58       535    0   5.29528E-05   293.6   end
Cr-50       535    0   2.41574E-04   293.6   end
Cr-52       535    0   4.65323E-03   293.6   end
Cr-53       535    0   5.27576E-04   293.6   end
Cr-54       535    0   1.31061E-04   293.6   end
Ni-58       535    0   1.67581E-03   293.6   end
Ni-60       535    0   6.45411E-04   293.6   end
Ni-61       535    0   2.80614E-05   293.6   end
Ni-62       535    0   8.93533E-05   293.6   end
Ni-64       535    0   2.28922E-05   293.6   end
Mn-55      535    0   5.53342E-04   293.6   end
'

'

'

' Material of PTP Experiments Loading
-----
'

'

' PTP-1 experiments
'

' #1 (bottom) experiment material (s1) Al spacer Al-1100 Total =  5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      711    0   5.91171E-02   293.6   end
Si-28      711    0   1.31874E-04   293.6   end
Si-29      711    0   6.67737E-06   293.6   end
Si-30      711    0   4.43251E-06   293.6   end
Mn-55      711    0   7.30965E-06   293.6   end
Fe-54       711    0   4.20667E-06   293.6   end
Fe-56       711    0   6.59763E-05   293.6   end
Fe-57       711    0   1.52447E-06   293.6   end
Fe-58       711    0   2.01345E-07   293.6   end
Cu-63      711    0   2.43506E-05   293.6   end
Cu-65      711    0   1.08534E-05   293.6   end
'

' # 2 experiment material (SO3E-003) sst/Al Total =  4.47398E-02
' PTP1 experiment material
Al-27      712    0   3.56263E-02   293.6   end
C          712    0   4.06300E-04   293.6   end
Si-28      712    0   2.81486E-04   293.6   end
Si-29      712    0   1.42528E-05   293.6   end
Si-30      712    0   9.46120E-06   293.6   end
Fe-54       712    0   4.81391E-04   293.6   end

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Fe-56      712    0   7.55002E-03   293.6   end
Fe-57      712    0   1.74453E-04   293.6   end
Fe-58      712    0   2.30409E-05   293.6   end
Mo-92      712    0   2.56880E-05   293.6   end
Mo-94      712    0   1.60118E-05   293.6   end
Mo-95      712    0   2.75575E-05   293.6   end
Mo-96      712    0   2.88731E-05   293.6   end
Mo-97      712    0   1.65311E-05   293.6   end
Mo-98      712    0   4.17690E-05   293.6   end
Mo-100     712    0   1.66695E-05   293.6   end
'
'
' # 3 experiment material (NM-634) W Total = 3.38204E-02
W-186     713    0   1.02360E-03   293.6   end
O-16       713    0   2.09630E-03   293.6   end
Al-27      713    0   3.07005E-02   293.6   end
'
'
' # 4 experiment material (NM-627) W Total = 3.36267E-02
W-186     714    0   9.54300E-04   293.6   end
O-16       714    0   1.97190E-03   293.6   end
Al-27      714    0   3.07005E-02   293.6   end
'
'
' # 5 experiment material (S2) Mo/V Total = 2.32122E-02
V          715    0   1.72431E-02   293.6   end
Mo-92      715    0   8.85814E-04   293.6   end
Mo-94      715    0   5.52142E-04   293.6   end
Mo-95      715    0   9.50281E-04   293.6   end
Mo-96      715    0   9.95646E-04   293.6   end
Mo-97      715    0   5.70049E-04   293.6   end
Mo-98      715    0   1.44034E-03   293.6   end
Mo-100     715    0   5.74824E-04   293.6   end
'
'
' # 6 experiment material (NM-659) Ra Total = 3.50519E-02
' No radon cross section
O-16       716    0   1.00001E-07   293.6   end
Al-27      716    0   3.50518E-02   293.6   end
'
'
' # 7 experiment material top (T031) SST Tensile Total = 6.4716E-03
Fe-54      717    0   3.91600E-04   293.6   end
Fe-56      717    0   5.92790E-03   293.6   end
Fe-57      717    0   1.34500E-04   293.6   end
Fe-58      717    0   1.76000E-05   293.6   end
'
'
'
PTP-2 experiments
'
'
#1 (bottom) experiment material Gr/Al Total=5.65355-2
Al-27      721    0   2.85703E-02   293.6   end
Si-28      721    0   4.25273E-04   293.6   end
Si-29      721    0   2.15334E-05   293.6   end
Si-30      721    0   1.42941E-05   293.6   end
Fe-54      721    0   5.17316E-05   293.6   end
Fe-56      721    0   8.11345E-04   293.6   end
Fe-57      721    0   1.87472E-05   293.6   end
Fe-58      721    0   2.47604E-06   293.6   end
C-graphite 721    0   2.62709E-02   293.6   end
Mo-92      721    0   5.17768E-05   293.6   end
Mo-94      721    0   3.22733E-05   293.6   end
Mo-95      721    0   5.55449E-05   293.6   end
Mo-96      721    0   5.81965E-05   293.6   end
Mo-97      721    0   3.33200E-05   293.6   end
Mo-98      721    0   8.41896E-05   293.6   end
Mo-100     721    0   3.35991E-05   293.6   end
'
'
#2 experiment material SiC/V Total= 4.34300-2
' The total number density on MCNP material cards ( 5.48665E-02)
' is not the same as on cell cards ( 6.00000E-02)
Al-27      722    0   1.90817E-02   293.6   end
Si-28      722    0   1.15348E-02   293.6   end
Si-29      722    0   5.84056E-04   293.6   end
Si-30      722    0   3.87703E-04   293.6   end
C-graphite 722    0   1.25065E-02   293.6   end
Fe-54      722    0   5.14027E-05   293.6   end
Fe-56      722    0   8.06187E-04   293.6   end
Fe-57      722    0   1.86280E-05   293.6   end
Fe-58      722    0   2.46030E-06   293.6   end
V          722    0   1.48368E-02   293.6   end
Mo-92      722    0   2.81564E-05   293.6   end
Mo-94      722    0   1.75504E-05   293.6   end

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Mo-95      722    0   3.02055E-05  293.6  end
Mo-96      722    0   3.16475E-05  293.6  end
Mo-97      722    0   1.81196E-05  293.6  end
Mo-98      722    0   4.57827E-05  293.6  end
Mo-100     722    0   1.82714E-05  293.6  end
'
'
'
' #3 experiment material (s1) Al spacer Al-1100 Total = 5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      723    0   5.91171E-02  293.6  end
Si-28      723    0   1.31874E-04  293.6  end
Si-29      723    0   6.67737E-06  293.6  end
Si-30      723    0   4.43251E-06  293.6  end
Mn-55      723    0   7.30965E-06  293.6  end
Fe-54      723    0   4.20667E-06  293.6  end
Fe-56      723    0   6.59763E-05  293.6  end
Fe-57      723    0   1.52447E-06  293.6  end
Fe-58      723    0   2.01345E-07  293.6  end
Cu-63      723    0   2.43506E-05  293.6  end
Cu-65      723    0   1.08534E-05  293.6  end
'
'
'
' #4 experiment material Gr/V Total=5.89491-2
Al-27      724    0   1.75354E-02  293.6  end
Si-28      724    0   4.33941E-04  293.6  end
Si-29      724    0   2.19724E-05  293.6  end
Si-30      724    0   1.45855E-05  293.6  end
Fe-54      724    0   5.14741E-05  293.6  end
Fe-56      724    0   8.07307E-04  293.6  end
Fe-57      724    0   1.86539E-05  293.6  end
Fe-58      724    0   2.46372E-06  293.6  end
C-graphite 724    0   2.62254E-02  293.6  end
V          724    0   1.35332E-02  293.6  end
Mo-92      724    0   4.52322E-05  293.6  end
Mo-94      724    0   2.81940E-05  293.6  end
Mo-95      724    0   4.85241E-05  293.6  end
Mo-96      724    0   5.08405E-05  293.6  end
Mo-97      724    0   2.91084E-05  293.6  end
Mo-98      724    0   7.35481E-05  293.6  end
Mo-100     724    0   2.93522E-05  293.6  end
'
'
'
' #5 experiment material Gr/V Total=5.89252-2
Al-27      725    0   1.74621E-02  293.6  end
Si-28      725    0   4.32374E-04  293.6  end
Si-29      725    0   2.18930E-05  293.6  end
Si-30      725    0   1.45328E-05  293.6  end
Fe-54      725    0   5.13221E-05  293.6  end
Fe-56      725    0   8.04923E-04  293.6  end
Fe-57      725    0   1.85988E-05  293.6  end
Fe-58      725    0   2.45644E-06  293.6  end
C-graphite 725    0   2.62644E-02  293.6  end
V          725    0   1.34952E-02  293.6  end
Mo-92      725    0   5.30382E-05  293.6  end
Mo-94      725    0   3.30595E-05  293.6  end
Mo-95      725    0   5.68981E-05  293.6  end
Mo-96      725    0   5.96143E-05  293.6  end
Mo-97      725    0   3.41317E-05  293.6  end
Mo-98      725    0   8.62406E-05  293.6  end
Mo-100     725    0   3.44176E-05  293.6  end
'
'
'
' #6 experiment material (s1) Al spacer Al-1100 Total = 5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      726    0   5.91171E-02  293.6  end
Si-28      726    0   1.31874E-04  293.6  end
Si-29      726    0   6.67737E-06  293.6  end
Si-30      726    0   4.43251E-06  293.6  end
Mn-55      726    0   7.30965E-06  293.6  end
Fe-54      726    0   4.20667E-06  293.6  end
Fe-56      726    0   6.59763E-05  293.6  end
Fe-57      726    0   1.52447E-06  293.6  end
Fe-58      726    0   2.01345E-07  293.6  end
Cu-63      726    0   2.43506E-05  293.6  end
Cu-65      726    0   1.08534E-05  293.6  end
'
'
'
' #7 experiment material Gr/V Total=6.03159-2

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```

Al-27      727    0   1.74755E-02  293.6  end
Si-28      727    0   4.32650E-04  293.6  end
Si-29      727    0   2.19070E-05  293.6  end
Si-30      727    0   1.45421E-05  293.6  end
Fe-54      727    0   5.20649E-05  293.6  end
Fe-56      727    0   8.16574E-04  293.6  end
Fe-57      727    0   1.88680E-05  293.6  end
Fe-58      727    0   2.49200E-06  293.6  end
C-graphite 727    0   2.63554E-02  293.6  end
V          727    0   1.47856E-02  293.6  end
Mo-92      727    0   5.05153E-05  293.6  end
Mo-94      727    0   3.14869E-05  293.6  end
Mo-95      727    0   5.41916E-05  293.6  end
Mo-96      727    0   5.67786E-05  293.6  end
Mo-97      727    0   3.25081E-05  293.6  end
Mo-98      727    0   8.21384E-05  293.6  end
Mo-100     727    0   3.27804E-05  293.6  end
'
'
' PTP-3 experiments
'
' #1 (bottom) experiment material  Gr/Al      Total=5.64033-2
Al-27      731    0   2.85243E-02  293.6  end
Si-28      731    0   4.32373E-04  293.6  end
Si-29      731    0   2.18930E-05  293.6  end
Si-30      731    0   1.45328E-05  293.6  end
Fe-54      731    0   5.22931E-05  293.6  end
Fe-56      731    0   8.20152E-04  293.6  end
Fe-57      731    0   1.89507E-05  293.6  end
Fe-58      731    0   2.50292E-06  293.6  end
C-graphite 731    0   2.61596E-02  293.6  end
Mo-92      731    0   5.29342E-05  293.6  end
Mo-94      731    0   3.29947E-05  293.6  end
Mo-95      731    0   5.67865E-05  293.6  end
Mo-96      731    0   5.94975E-05  293.6  end
Mo-97      731    0   3.40648E-05  293.6  end
Mo-98      731    0   8.60715E-05  293.6  end
Mo-100     731    0   3.43501E-05  293.6  end
'
'
' #2 experiment material  SiC/V      Total= 4.31828-2
' The total number density on MCNP material cards ( 5.43818E-02)
' is not the same as on cell cards ( 6.00000E-02)
Al-27      732    0   1.92518E-02  293.6  end
Si-28      732    0   1.13958E-02  293.6  end
Si-29      732    0   5.77020E-04  293.6  end
Si-30      732    0   3.83032E-04  293.6  end
C-graphite 732    0   1.23559E-02  293.6  end
Fe-54      732    0   5.18609E-05  293.6  end
Fe-56      732    0   8.13373E-04  293.6  end
Fe-57      732    0   1.87940E-05  293.6  end
Fe-58      732    0   2.48223E-06  293.6  end
V          732    0   1.49586E-02  293.6  end
Mo-92      732    0   2.84074E-05  293.6  end
Mo-94      732    0   1.77068E-05  293.6  end
Mo-95      732    0   3.04748E-05  293.6  end
Mo-96      732    0   3.19296E-05  293.6  end
Mo-97      732    0   1.82811E-05  293.6  end
Mo-98      732    0   4.61908E-05  293.6  end
Mo-100     732    0   1.84342E-05  293.6  end
'
'
' #3 experiment material (s1) Al spacer Al-1100  Total =  5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      733    0   5.91171E-02  293.6  end
Si-28      733    0   1.31874E-04  293.6  end
Si-29      733    0   6.67737E-06  293.6  end
Si-30      733    0   4.43251E-06  293.6  end
Mn-55      733    0   7.30965E-06  293.6  end
Fe-54      733    0   4.20667E-06  293.6  end
Fe-56      733    0   6.59763E-05  293.6  end
Fe-57      733    0   1.52447E-06  293.6  end
Fe-58      733    0   2.01345E-07  293.6  end
Cu-63      733    0   2.43506E-05  293.6  end
Cu-65      733    0   1.08534E-05  293.6  end
'
'
' #4 experiment material (S4) Mo/V  Total =  2.59550E-02
V          734    0   1.99828E-02  293.6  end
Mo-92      734    0   8.86274E-04  293.6  end
Mo-94      734    0   5.52429E-04  293.6  end

```

```

Mo-95      734    0   9.50774E-04   293.6   end
Mo-96      734    0   9.96163E-04   293.6   end
Mo-97      734    0   5.70345E-04   293.6   end
Mo-98      734    0   1.44109E-03   293.6   end
Mo-100     734    0   5.75123E-04   293.6   end
'
'
' #5 experiment material (S4) Mo/V Total = 2.32314E-02
V          735    0   1.72623E-02   293.6   end
Mo-92      735    0   8.85814E-04   293.6   end
Mo-94      735    0   5.52142E-04   293.6   end
Mo-95      735    0   9.50281E-04   293.6   end
Mo-96      735    0   9.95646E-04   293.6   end
Mo-97      735    0   5.70049E-04   293.6   end
Mo-98      735    0   1.44034E-03   293.6   end
Mo-100     735    0   5.74824E-04   293.6   end
'
'
' #6 experiment material (s1) Al spacer Al-1100 Total = 5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      736    0   5.91171E-02   293.6   end
Si-28      736    0   1.31874E-04   293.6   end
Si-29      736    0   6.67737E-06   293.6   end
Si-30      736    0   4.43251E-06   293.6   end
Mn-55      736    0   7.30965E-06   293.6   end
Fe-54      736    0   4.20667E-06   293.6   end
Fe-56      736    0   6.59763E-05   293.6   end
Fe-57      736    0   1.52447E-06   293.6   end
Fe-58      736    0   2.01345E-07   293.6   end
Cu-63      736    0   2.43506E-05   293.6   end
Cu-65      736    0   1.08534E-05   293.6   end
'
' #7 experiment material Gr/V Total=5.98973E-02
Al-27      737    0   1.74177E-02   293.6   end
Si-28      737    0   4.25640E-04   293.6   end
Si-29      737    0   2.15521E-05   293.6   end
Si-30      737    0   1.43065E-05   293.6   end
Fe-54      737    0   5.18953E-05   293.6   end
Fe-56      737    0   8.13913E-04   293.6   end
Fe-57      737    0   1.88065E-05   293.6   end
Fe-58      737    0   2.48388E-06   293.6   end
C-graphite 737    0   2.60117E-02   293.6   end
V          737    0   1.47777E-02   293.6   end
Mo-92      737    0   5.07082E-05   293.6   end
Mo-94      737    0   3.16072E-05   293.6   end
Mo-95      737    0   5.43985E-05   293.6   end
Mo-96      737    0   5.69955E-05   293.6   end
Mo-97      737    0   3.26323E-05   293.6   end
Mo-98      737    0   8.24521E-05   293.6   end
Mo-100     737    0   3.29056E-05   293.6   end
'
'
PTP-4 experiments
'
'
#1 (bottom) experiment material Gr/Al Total=8.16415E-02
'
C-graphite 741    0   4.30656E-02   293.6   end
Al-27      741    0   3.61430E-02   293.6   end
Si-28      741    0   2.24386E-03   293.6   end
Si-29      741    0   1.13616E-04   293.6   end
Si-30      741    0   7.54199E-05   293.6   end
'
'
#2 experiment material SiC/V Total= 4.31234E-02
' The total number density on MCNP material cards ( 5.42013E-02)
' is not the same as on cell cards ( 6.00000E-02)
Al-27      742    0   1.93159E-02   293.6   end
Si-28      742    0   1.13102E-02   293.6   end
Si-29      742    0   5.72679E-04   293.6   end
Si-30      742    0   3.80151E-04   293.6   end
C-graphite 742    0   1.22629E-02   293.6   end
Fe-54      742    0   5.20335E-05   293.6   end
Fe-56      742    0   8.16080E-04   293.6   end
Fe-57      742    0   1.88566E-05   293.6   end
Fe-58      742    0   2.49049E-06   293.6   end
V          742    0   1.50767E-02   293.6   end
Mo-92      742    0   2.85019E-05   293.6   end
Mo-94      742    0   1.77658E-05   293.6   end
Mo-95      742    0   3.05762E-05   293.6   end

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Mo-96      742    0   3.20359E-05   293.6   end
Mo-97      742    0   1.83419E-05   293.6   end
Mo-98      742    0   4.63445E-05   293.6   end
Mo-100     742    0   1.84956E-05   293.6   end
'
'
' #3 experiment material (s1) Al spacer Al-1100 Total = 5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      743    0   5.91171E-02   293.6   end
Si-28      743    0   1.31874E-04   293.6   end
Si-29      743    0   6.67737E-06   293.6   end
Si-30      743    0   4.43251E-06   293.6   end
Mn-55      743    0   7.30965E-06   293.6   end
Fe-54      743    0   4.20667E-06   293.6   end
Fe-56      743    0   6.59763E-05   293.6   end
Fe-57      743    0   1.52447E-06   293.6   end
Fe-58      743    0   2.01345E-07   293.6   end
Cu-63      743    0   2.43506E-05   293.6   end
Cu-65      743    0   1.08534E-05   293.6   end
'
'
' #4 experiment material (S4) Mo/Al Total = 4.89927E-02
' The total number density on MCNP material cards ( 4.37744E-02)
' is not the same as on cell cards ( 4.89927E-02)
Al-27      744    0   4.83627E-02   293.6   end
Fe-54      744    0   1.44828E-05   293.6   end
Fe-56      744    0   2.27145E-04   293.6   end
Fe-57      744    0   5.24846E-06   293.6   end
Fe-58      744    0   6.93193E-07   293.6   end
Mo-92      744    0   5.67532E-05   293.6   end
Mo-94      744    0   3.53752E-05   293.6   end
Mo-95      744    0   6.08834E-05   293.6   end
Mo-96      744    0   6.37900E-05   293.6   end
Mo-97      744    0   3.65225E-05   293.6   end
Mo-98      744    0   9.22812E-05   293.6   end
Mo-100     744    0   3.68284E-05   293.6   end
'
'
' #5 experiment material (S4) Mo/Al Total = 4.90794E-02
' The total number density on MCNP material cards ( 4.38951E-02)
' is not the same as on cell cards ( 4.90794E-02)
Al-27      745    0   4.84500E-02   293.6   end
Fe-54      745    0   1.44685E-05   293.6   end
Fe-56      745    0   2.26921E-04   293.6   end
Fe-57      745    0   5.24329E-06   293.6   end
Fe-58      745    0   6.92510E-07   293.6   end
Mo-92      745    0   5.66973E-05   293.6   end
Mo-94      745    0   3.53403E-05   293.6   end
Mo-95      745    0   6.08234E-05   293.6   end
Mo-96      745    0   6.37272E-05   293.6   end
Mo-97      745    0   3.64865E-05   293.6   end
Mo-98      745    0   9.21903E-05   293.6   end
Mo-100     745    0   3.67921E-05   293.6   end
'
'
' #6 experiment material (s-23) Al spacer Al-1100 Total = 5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      746    0   5.91171E-02   293.6   end
Si-28      746    0   1.31874E-04   293.6   end
Si-29      746    0   6.67737E-06   293.6   end
Si-30      746    0   4.43251E-06   293.6   end
Mn-55      746    0   7.30965E-06   293.6   end
Fe-54      746    0   4.20667E-06   293.6   end
Fe-56      746    0   6.59763E-05   293.6   end
Fe-57      746    0   1.52447E-06   293.6   end
Fe-58      746    0   2.01345E-07   293.6   end
Cu-63      746    0   2.43506E-05   293.6   end
Cu-65      746    0   1.08534E-05   293.6   end
'
'
' #7 experiment material Gr/V Total=5.98063-2
' The total number density on MCNP material cards ( 5.97922E-02)
' is not the same as on cell cards ( 5.98063E-02)
Al-27      747    0   1.75063E-02   293.6   end
Si-28      747    0   4.25373E-04   293.6   end
Si-29      747    0   2.15385E-05   293.6   end
Si-30      747    0   1.42975E-05   293.6   end
Fe-54      747    0   5.17321E-05   293.6   end
Fe-56      747    0   8.11353E-04   293.6   end
Fe-57      747    0   1.87473E-05   293.6   end

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Fe-58      747    0   2.47606E-06  293.6  end
C-graphite 747    0   2.58227E-02  293.6  end
V          747    0   1.47900E-02  293.6  end
Mo-92      747    0   5.07203E-05  293.6  end
Mo-94      747    0   3.16148E-05  293.6  end
Mo-95      747    0   5.44114E-05  293.6  end
Mo-96      747    0   5.70090E-05  293.6  end
Mo-97      747    0   3.26401E-05  293.6  end
Mo-98      747    0   8.24716E-05  293.6  end
Mo-100     747    0   3.29135E-05  293.6  end
'
'
'
PTP-5 experiments

'
'

#1 (bottom) experiment material (s-4) Al spacer Al-1100 Total = 5.93745E-02
The total number density on MCNP material cards ( 6.03240E-02)
is not the same as on cell cards ( 5.93745E-02)
Al-27      751    0   5.91171E-02  293.6  end
Si-28      751    0   1.31874E-04  293.6  end
Si-29      751    0   6.67737E-06  293.6  end
Si-30      751    0   4.43251E-06  293.6  end
Mn-55      751    0   7.30965E-06  293.6  end
Fe-54      751    0   4.20667E-06  293.6  end
Fe-56      751    0   6.59763E-05  293.6  end
Fe-57      751    0   1.52447E-06  293.6  end
Fe-58      751    0   2.01345E-07  293.6  end
Cu-63      751    0   2.43506E-05  293.6  end
Cu-65      751    0   1.08534E-05  293.6  end
'
#2 experiment material SiC/V Total= 4.32788-2
The total number density on MCNP material cards ( 5.45761E-02)
is not the same as on cell cards ( 6.00000E-02)
Al-27      752    0   1.91832E-02  293.6  end
Si-28      752    0   1.14549E-02  293.6  end
Si-29      752    0   5.80011E-04  293.6  end
Si-30      752    0   3.85018E-04  293.6  end
C-graphite 752    0   1.24199E-02  293.6  end
Fe-54      752    0   5.16763E-05  293.6  end
Fe-56      752    0   8.10477E-04  293.6  end
Fe-57      752    0   1.87271E-05  293.6  end
Fe-58      752    0   2.47339E-06  293.6  end
V          752    0   1.49028E-02  293.6  end
Mo-92      752    0   2.83062E-05  293.6  end
Mo-94      752    0   1.76438E-05  293.6  end
Mo-95      752    0   3.03663E-05  293.6  end
Mo-96      752    0   3.18159E-05  293.6  end
Mo-97      752    0   1.82160E-05  293.6  end
Mo-98      752    0   4.60263E-05  293.6  end
Mo-100     752    0   1.83686E-05  293.6  end
'
'
#3 experiment material Lo3-106 assume equale to LO3-F7, -106) Total= 4.74972-2
The total number density on MCNP material cards ( 4.74971E-02)
is not the same as on cell cards ( 6.00000E-02)
Al-27      753    0   5.26979E-02  293.6  end
Fe-54      753    0   1.63022E-05  293.6  end
Fe-56      753    0   2.55680E-04  293.6  end
Fe-57      753    0   5.90780E-06  293.6  end
Fe-58      753    0   7.80275E-07  293.6  end
Mo-92      753    0   1.04228E-03  293.6  end
Mo-94      753    0   6.49670E-04  293.6  end
Mo-95      753    0   1.11813E-03  293.6  end
Mo-96      753    0   1.17151E-03  293.6  end
Mo-97      753    0   6.70740E-04  293.6  end
Mo-98      753    0   1.69476E-03  293.6  end
Mo-100     753    0   6.76359E-04  293.6  end
'
'
#4 experiment material (Lo3-100) Total = 7.00373E-02
Si-28      754    0   1.34632E-02  293.6  end
Si-29      754    0   6.81699E-04  293.6  end
Si-30      754    0   4.52519E-04  293.6  end
C          754    0   1.45951E-02  293.6  end
Al-27      754    0   2.16858E-02  293.6  end
V          754    0   1.91590E-02  293.6  end
'
'
#5 experiment material (Lo3-101) Total = 7.00373E-02
Si-28      755    0   1.34632E-02  293.6  end

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Si-29      755   0   6.81699E-04   293.6   end
Si-30      755   0   4.52519E-04   293.6   end
C          755   0   1.45951E-02   293.6   end
Al-27      755   0   2.16858E-02   293.6   end
V          755   0   1.91590E-02   293.6   end
'
'
' #6 experiment material (s-9) Al spacer Al-1100 Total = 5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      756   0   5.91171E-02   293.6   end
Si-28      756   0   1.31874E-04   293.6   end
Si-29      756   0   6.67737E-06   293.6   end
Si-30      756   0   4.43251E-06   293.6   end
Mn-55     756   0   7.30965E-06   293.6   end
Fe-54      756   0   4.20667E-06   293.6   end
Fe-56      756   0   6.59763E-05   293.6   end
Fe-57      756   0   1.52447E-06   293.6   end
Fe-58      756   0   2.01345E-07   293.6   end
Cu-63      756   0   2.43506E-05   293.6   end
Cu-65      756   0   1.08534E-05   293.6   end
'
' #7 experiment material Gr/V Total=6.00335-2
Al-27      757   0   1.74852E-02   293.6   end
Si-28      757   0   4.32929E-04   293.6   end
Si-29      757   0   2.19210E-05   293.6   end
Si-30      757   0   1.45514E-05   293.6   end
Fe-54      757   0   5.21880E-05   293.6   end
Fe-56      757   0   8.18503E-04   293.6   end
Fe-57      757   0   1.89125E-05   293.6   end
Fe-58      757   0   2.49788E-06   293.6   end
C-graphite 757   0   2.60474E-02   293.6   end
V          757   0   1.48011E-02   293.6   end
Mo-92      757   0   5.01890E-05   293.6   end
Mo-94      757   0   3.12836E-05   293.6   end
Mo-95      757   0   5.38415E-05   293.6   end
Mo-96      757   0   5.64119E-05   293.6   end
Mo-97      757   0   3.22982E-05   293.6   end
Mo-98      757   0   8.16078E-05   293.6   end
Mo-100     757   0   3.25688E-05   293.6   end
'
'
' PTP-6 experiments
'
' #1 (bottom) experiment material Gr/Al Total=5.63347-2
Al-27      761   0   2.84792E-02   293.6   end
Si-28      761   0   4.32005E-04   293.6   end
Si-29      761   0   2.18743E-05   293.6   end
Si-30      761   0   1.45204E-05   293.6   end
Fe-54      761   0   5.14157E-05   293.6   end
Fe-56      761   0   8.06391E-04   293.6   end
Fe-57      761   0   1.86327E-05   293.6   end
Fe-58      761   0   2.46092E-06   293.6   end
C-graphite 761   0   2.62091E-02   293.6   end
Mo-92      761   0   4.43864E-05   293.6   end
Mo-94      761   0   2.76668E-05   293.6   end
Mo-95      761   0   4.76167E-05   293.6   end
Mo-96      761   0   4.98899E-05   293.6   end
Mo-97      761   0   2.85641E-05   293.6   end
Mo-98      761   0   7.21728E-05   293.6   end
Mo-100     761   0   2.88033E-05   293.6   end
'
'
' # 2 experiment material (SO3E-001) sst/Al Total = 4.49341E-02
' PTP1 experiment material
Al-27      762   0   3.58373E-02   293.6   end
C          762   0   4.06300E-04   293.6   end
Si-28      762   0   2.81486E-04   293.6   end
Si-29      762   0   1.42528E-05   293.6   end
Si-30      762   0   9.46120E-06   293.6   end
Fe-54      762   0   4.80004E-04   293.6   end
Fe-56      762   0   7.52827E-03   293.6   end
Fe-57      762   0   1.73950E-04   293.6   end
Fe-58      762   0   2.29746E-05   293.6   end
Mo-92      762   0   2.67268E-05   293.6   end
Mo-94      762   0   1.66593E-05   293.6   end
Mo-95      762   0   2.86719E-05   293.6   end
Mo-96      762   0   3.00407E-05   293.6   end
Mo-97      762   0   1.71996E-05   293.6   end
Mo-98      762   0   4.34581E-05   293.6   end
Mo-100     762   0   1.73436E-05   293.6   end

```

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'
'

' # 3 experiment material (SO3E-001) sst/Al   Total = 3.98252E-02
' PTP1 experiment material
Al-27      763    0   3.53814E-02  293.6  end
C          763    0   4.06300E-04  293.6  end
Si-28      763    0   2.81486E-04  293.6  end
Si-29      763    0   1.42528E-05  293.6  end
Si-30      763    0   9.46120E-06  293.6  end
Fe-54      763    0   2.08219E-04  293.6  end
Fe-56      763    0   3.26566E-03  293.6  end
Fe-57      763    0   7.54572E-05  293.6  end
Fe-58      763    0   9.96604E-06  293.6  end
Mo-92      763    0   2.56732E-05  293.6  end
Mo-94      763    0   1.60025E-05  293.6  end
Mo-95      763    0   2.75416E-05  293.6  end
Mo-96      763    0   2.88564E-05  293.6  end
Mo-97      763    0   1.65215E-05  293.6  end
Mo-98      763    0   4.17449E-05  293.6  end
Mo-100     763    0   1.66599E-05  293.6  end
'
'

'

' #4 experiment material Gr/V   Total=8.80417-2
Si-28      764    0   2.24386E-03  293.6  end
Si-29      764    0   1.13616E-04  293.6  end
Si-30      764    0   7.54199E-05  293.6  end
C-graphite 764    0   4.30656E-02  293.6  end
Al-27      764    0   2.53001E-02  293.6  end
V          764    0   1.72431E-02  293.6  end
'
'

' #5 experiment material Gr/V   Total=8.80417
Si-28      765    0   2.24386E-03  293.6  end
Si-29      765    0   1.13616E-04  293.6  end
Si-30      765    0   7.54199E-05  293.6  end
C-graphite 765    0   4.30656E-02  293.6  end
Al-27      765    0   2.53001E-02  293.6  end
V          765    0   1.72431E-02  293.6  end
'
'

' #6 experiment material (s-20) Al spacer Al-1100   Total = 5.93745E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 5.93745E-02)
Al-27      766    0   5.91171E-02  293.6  end
Si-28      766    0   1.31874E-04  293.6  end
Si-29      766    0   6.67737E-06  293.6  end
Si-30      766    0   4.43251E-06  293.6  end
Mn-55      766    0   7.30965E-06  293.6  end
Fe-54      766    0   4.20667E-06  293.6  end
Fe-56      766    0   6.59763E-05  293.6  end
Fe-57      766    0   1.52447E-06  293.6  end
Fe-58      766    0   2.01345E-07  293.6  end
Cu-63      766    0   2.43506E-05  293.6  end
Cu-65      766    0   1.08534E-05  293.6  end
'
'

' #7 experiment material Lo3-106 assume equale to LO3-F7, -106)      Total= 4.74972-2
' The total number density on MCNP material cards ( 4.74971E-02)
' is not the same as on cell cards ( 6.02427E-02)
Al-27      767    0   5.29110E-02  293.6  end
Fe-54      767    0   1.63681E-05  293.6  end
Fe-56      767    0   2.56714E-04  293.6  end
Fe-57      767    0   5.93169E-06  293.6  end
Fe-58      767    0   7.83431E-07  293.6  end
Mo-92      767    0   1.04650E-03  293.6  end
Mo-94      767    0   6.52298E-04  293.6  end
Mo-95      767    0   1.12266E-03  293.6  end
Mo-96      767    0   1.17625E-03  293.6  end
Mo-97      767    0   6.73453E-04  293.6  end
Mo-98      767    0   1.70161E-03  293.6  end
Mo-100     767    0   6.79095E-04  293.6  end
'
'

'

'

Region II ( IFE) Material Descriptions
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```

'      Aluminum Sidewalls
'      Aluminum fuel element sidewalls
' The number densities for this material on MCNP material cards were manually
' verified for consistency with density on cell cards ( 2.70000E+00)
Al-27      20   0   5.86577E-02   293.6   end
H-1        20   0   3.46363E-04   293.6   end
Mg-24       20   0   5.29421E-04   293.6   end
Mg-25       20   0   6.70238E-05   293.6   end
Mg-26       20   0   7.37932E-05   293.6   end
Si-28       20   0   3.20972E-04   293.6   end
Si-29       20   0   1.62522E-05   293.6   end
Si-30       20   0   1.07884E-05   293.6   end
Ti-46       20   0   2.10524E-06   293.6   end
Ti-47       20   0   1.89855E-06   293.6   end
Ti-48       20   0   1.88119E-05   293.6   end
Ti-49       20   0   1.38053E-06   293.6   end
Ti-50       20   0   1.32184E-06   293.6   end
Cr-50       20   0   2.65754E-06   293.6   end
Cr-52       20   0   5.11898E-05   293.6   end
Cr-53       20   0   5.80384E-06   293.6   end
Cr-54       20   0   1.44179E-06   293.6   end
Mn-55       20   0   2.22389E-05   293.6   end
Fe-54       20   0   5.97259E-06   293.6   end
Fe-56       20   0   9.36727E-05   293.6   end
Fe-57       20   0   2.16443E-06   293.6   end
Fe-58       20   0   2.85868E-07   293.6   end
Cu-63       20   0   6.06063E-05   293.6   end
Cu-65       20   0   2.70130E-05   293.6   end

'      Upper and lower Unfuelled Core Regions (50% H2O-50% Al-6061) *
'      Inner fuel element--lower uncontrolled region
H-1        70   0   3.35240E-02   293.6   end
O-16       70   0   1.66756E-02   293.6   end
Al-27       70   0   2.92741E-02   293.6   end
Si-28       70   0   1.60187E-04   293.6   end
Si-29       70   0   8.11094E-06   293.6   end
Si-30       70   0   5.38413E-06   293.6   end
Ti-46       70   0   1.05065E-06   293.6   end
Ti-47       70   0   9.47498E-07   293.6   end
Ti-48       70   0   9.38838E-06   293.6   end
Ti-49       70   0   6.88973E-07   293.6   end
Ti-50       70   0   6.59682E-07   293.6   end
Cr-50       70   0   1.32629E-06   293.6   end
Cr-52       70   0   2.55471E-05   293.6   end
Cr-53       70   0   2.89649E-06   293.6   end
Cr-54       70   0   7.19549E-07   293.6   end
Mn-55       70   0   1.10987E-05   293.6   end
Fe-54       70   0   2.98072E-06   293.6   end
Fe-56       70   0   4.67489E-05   293.6   end
Fe-57       70   0   1.08019E-06   293.6   end
Fe-58       70   0   1.42667E-07   293.6   end
Cu-63       70   0   3.02466E-05   293.6   end
Cu-65       70   0   1.34813E-05   293.6   end
Mg-24       70   0   2.64216E-04   293.6   end
Mg-25       70   0   3.34493E-05   293.6   end
Mg-26       70   0   3.68277E-05   293.6   end

'      Inner fuel element--upper uncontrolled region
H-1        71   0   3.31702E-02   293.6   end
O-16       71   0   1.64987E-02   293.6   end
Al-27       71   0   2.92741E-02   293.6   end
Si-28       71   0   1.60187E-04   293.6   end
Si-29       71   0   8.11095E-06   293.6   end
Si-30       71   0   5.38414E-06   293.6   end
Ti-46       71   0   1.05065E-06   293.6   end
Ti-47       71   0   9.47499E-07   293.6   end
Ti-48       71   0   9.38839E-06   293.6   end
Ti-49       71   0   6.88974E-07   293.6   end
Ti-50       71   0   6.59683E-07   293.6   end
Cr-50       71   0   1.32629E-06   293.6   end
Cr-52       71   0   2.55471E-05   293.6   end
Cr-53       71   0   2.89649E-06   293.6   end
Cr-54       71   0   7.19550E-07   293.6   end
Mn-55       71   0   1.10987E-05   293.6   end
Fe-54       71   0   2.98072E-06   293.6   end
Fe-56       71   0   4.67489E-05   293.6   end
Fe-57       71   0   1.08019E-06   293.6   end
Fe-58       71   0   1.42667E-07   293.6   end
Cu-63       71   0   3.02466E-05   293.6   end
Cu-65       71   0   1.34813E-05   293.6   end
Mg-24       71   0   2.64216E-04   293.6   end
Mg-25       71   0   3.34493E-05   293.6   end

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Mg-26      71    0   3.68277E-05   293.6   end
.
| Inner Fuel Element
| unheated region material (al+h2o)/2.  6/9/95      total nd = 7.98825-2
| used in all unfuelled regions
H-1        200    0   3.35240E-02   293.6   end
O-16       200    0   1.66756E-02   293.6   end
Al-27      200    0   2.92741E-02   293.6   end
Si-28      200    0   1.60187E-04   293.6   end
Si-29      200    0   8.11095E-06   293.6   end
Si-30      200    0   5.38414E-06   293.6   end
Ti-46      200    0   1.05065E-06   293.6   end
Ti-47      200    0   9.47499E-07   293.6   end
Ti-48      200    0   9.38839E-06   293.6   end
Ti-49      200    0   6.88974E-07   293.6   end
Ti-50      200    0   6.59683E-07   293.6   end
Cr-50      200    0   1.32629E-06   293.6   end
Cr-52      200    0   2.55471E-05   293.6   end
Cr-53      200    0   2.89649E-06   293.6   end
Cr-54      200    0   7.19550E-07   293.6   end
Mn-55      200    0   1.10987E-05   293.6   end
Fe-54      200    0   2.98072E-06   293.6   end
Fe-56      200    0   4.67489E-05   293.6   end
Fe-57      200    0   1.08019E-06   293.6   end
Fe-58      200    0   1.42667E-07   293.6   end
Cu-63      200    0   3.02466E-05   293.6   end
Cu-65      200    0   1.34813E-05   293.6   end
Mg-24      200    0   2.64216E-04   293.6   end
Mg-25      200    0   3.34493E-05   293.6   end
Mg-26      200    0   3.68277E-05   293.6   end
.
| Inner fuel element--fueled Axial region 1
| total atom density = 8.00804E-02 a/b-cm
| 8.008040E-02
H-1        211    0   3.32434E-02   293.6   end
B-10       211    0   2.04121E-05   293.6   end
B-11       211    0   8.26896E-05   293.6   end
O-16       211    0   1.71757E-02   293.6   end
Mg-24      211    0   1.05686E-04   293.6   end
Mg-25      211    0   1.33797E-05   293.6   end
Mg-26      211    0   1.47310E-05   293.6   end
Al-27      211    0   2.89993E-02   293.6   end
Si-28      211    0   1.02644E-04   293.6   end
Si-29      211    0   5.19729E-06   293.6   end
Si-30      211    0   3.45002E-06   293.6   end
Ti-46      211    0   4.20262E-07   293.6   end
Ti-47      211    0   3.79000E-07   293.6   end
Ti-48      211    0   3.75536E-06   293.6   end
Ti-49      211    0   2.75590E-07   293.6   end
Ti-50      211    0   2.63873E-07   293.6   end
Cr-50      211    0   5.30517E-07   293.6   end
Cr-52      211    0   1.02189E-05   293.6   end
Cr-53      211    0   1.15860E-06   293.6   end
Cr-54      211    0   2.87821E-07   293.6   end
Mn-55      211    0   6.57731E-06   293.6   end
Fe-54      211    0   2.42259E-06   293.6   end
Fe-56      211    0   3.79953E-05   293.6   end
Fe-57      211    0   8.77930E-07   293.6   end
Fe-58      211    0   1.15953E-07   293.6   end
Cu-63      211    0   1.92203E-05   293.6   end
Cu-65      211    0   8.56676E-06   293.6   end
U-234     211    0   2.20708E-06   293.6   end
U-235     211    0   2.05700E-04   293.6   end
U-236     211    0   8.82838E-07   293.6   end
U-238     211    0   1.19182E-05   293.6   end
.
| total atom density = 8.00839E-02 a/b-cm
| 8.008390E-02
H-1        212    0   3.32434E-02   293.6   end
B-10       212    0   1.77513E-05   293.6   end
B-11       212    0   7.19107E-05   293.6   end
O-16       212    0   1.73053E-02   293.6   end
Mg-24      212    0   1.05686E-04   293.6   end
Mg-25      212    0   1.33797E-05   293.6   end
Mg-26      212    0   1.47310E-05   293.6   end
Al-27      212    0   2.88388E-02   293.6   end
Si-28      212    0   1.02285E-04   293.6   end
Si-29      212    0   5.17912E-06   293.6   end
Si-30      212    0   3.43796E-06   293.6   end
Ti-46      212    0   4.20262E-07   293.6   end
Ti-47      212    0   3.79000E-07   293.6   end
Ti-48      212    0   3.75536E-06   293.6   end

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Ti-49      212    0   2.75590E-07  293.6  end
Ti-50      212    0   2.63873E-07  293.6  end
Cr-50      212    0   5.30517E-07  293.6  end
Cr-52      212    0   1.02189E-05  293.6  end
Cr-53      212    0   1.15860E-06  293.6  end
Cr-54      212    0   2.87821E-07  293.6  end
Mn-55      212    0   6.55746E-06  293.6  end
Fe-54      212    0   2.41117E-06  293.6  end
Fe-56      212    0   3.78162E-05  293.6  end
Fe-57      212    0   8.73792E-07  293.6  end
Fe-58      212    0   1.15406E-07  293.6  end
Cu-63      212    0   1.91542E-05  293.6  end
Cu-65      212    0   8.53729E-06  293.6  end
U-234     212    0   2.69313E-06  293.6  end
U-235     212    0   2.51000E-04  293.6  end
U-236     212    0   1.07726E-06  293.6  end
U-238     212    0   1.45429E-05  293.6  end
'   total atom density =  8.00880E-02 a/b-cm
' 8.00880E-02
H-1        213    0   3.32435E-02  293.6  end
B-10       213    0   1.46911E-05  293.6  end
B-11       213    0   5.95139E-05  293.6  end
O-16       213    0   1.74543E-02  293.6  end
Mg-24       213    0   1.05686E-04  293.6  end
Mg-25       213    0   1.33797E-05  293.6  end
Mg-26       213    0   1.47310E-05  293.6  end
Al-27       213    0   2.86541E-02  293.6  end
Si-28       213    0   1.01874E-04  293.6  end
Si-29       213    0   5.15831E-06  293.6  end
Si-30       213    0   3.42415E-06  293.6  end
Ti-46       213    0   4.20263E-07  293.6  end
Ti-47       213    0   3.79001E-07  293.6  end
Ti-48       213    0   3.75537E-06  293.6  end
Ti-49       213    0   2.75590E-07  293.6  end
Ti-50       213    0   2.63873E-07  293.6  end
Cr-50       213    0   5.30518E-07  293.6  end
Cr-52       213    0   1.02189E-05  293.6  end
Cr-53       213    0   1.15860E-06  293.6  end
Cr-54       213    0   2.87821E-07  293.6  end
Mn-55       213    0   6.53464E-06  293.6  end
Fe-54       213    0   2.39803E-06  293.6  end
Fe-56       213    0   3.76103E-05  293.6  end
Fe-57       213    0   8.69031E-07  293.6  end
Fe-58       213    0   1.14778E-07  293.6  end
Cu-63       213    0   1.90782E-05  293.6  end
Cu-65       213    0   8.50342E-06  293.6  end
U-234       213    0   3.25215E-06  293.6  end
U-235       213    0   3.03100E-04  293.6  end
U-236       213    0   1.30087E-06  293.6  end
U-238       213    0   1.75616E-05  293.6  end
'   total atom density =  8.00937E-02 a/b-cm
' 8.009370E-02
H-1        214    0   3.32434E-02  293.6  end
B-10       214    0   1.03798E-05  293.6  end
B-11       214    0   4.20486E-05  293.6  end
O-16       214    0   1.76644E-02  293.6  end
Mg-24       214    0   1.05686E-04  293.6  end
Mg-25       214    0   1.33797E-05  293.6  end
Mg-26       214    0   1.47310E-05  293.6  end
Al-27       214    0   2.83940E-02  293.6  end
Si-28       214    0   1.01293E-04  293.6  end
Si-29       214    0   5.12887E-06  293.6  end
Si-30       214    0   3.40461E-06  293.6  end
Ti-46       214    0   4.20262E-07  293.6  end
Ti-47       214    0   3.79000E-07  293.6  end
Ti-48       214    0   3.75536E-06  293.6  end
Ti-49       214    0   2.75590E-07  293.6  end
Ti-50       214    0   2.63873E-07  293.6  end
Cr-50       214    0   5.30517E-07  293.6  end
Cr-52       214    0   1.02189E-05  293.6  end
Cr-53       214    0   1.15860E-06  293.6  end
Cr-54       214    0   2.87821E-07  293.6  end
Mn-55       214    0   6.50246E-06  293.6  end
Fe-54       214    0   2.37952E-06  293.6  end
Fe-56       214    0   3.73198E-05  293.6  end
Fe-57       214    0   8.62321E-07  293.6  end
Fe-58       214    0   1.13891E-07  293.6  end
Cu-63       214    0   1.89710E-05  293.6  end
Cu-65       214    0   8.45562E-06  293.6  end
U-234       214    0   4.03970E-06  293.6  end
U-235       214    0   3.76500E-04  293.6  end

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U-236      214   0   1.61589E-06   293.6   end
U-238      214   0   2.18144E-05   293.6   end
'   total atom density =  8.00993E-02 a/b-cm
'  8.009930E-02
H-1        215   0   3.32434E-02   293.6   end
B-10       215   0   6.18010E-06   293.6   end
B-11       215   0   2.50356E-05   293.6   end
O-16       215   0   1.78689E-02   293.6   end
Mg-24       215   0   1.05686E-04   293.6   end
Mg-25       215   0   1.33797E-05   293.6   end
Mg-26       215   0   1.47310E-05   293.6   end
Al-27       215   0   2.81406E-02   293.6   end
Si-28       215   0   1.00727E-04   293.6   end
Si-29       215   0   5.10026E-06   293.6   end
Si-30       215   0   3.38560E-06   293.6   end
Ti-46       215   0   4.20262E-07   293.6   end
Ti-47       215   0   3.79000E-07   293.6   end
Ti-48       215   0   3.75536E-06   293.6   end
Ti-49       215   0   2.75590E-07   293.6   end
Ti-50       215   0   2.63873E-07   293.6   end
Cr-50       215   0   5.30518E-07   293.6   end
Cr-52       215   0   1.02189E-05   293.6   end
Cr-53       215   0   1.15860E-06   293.6   end
Cr-54       215   0   2.87821E-07   293.6   end
Mn-55       215   0   6.47114E-06   293.6   end
Fe-54       215   0   2.36149E-06   293.6   end
Fe-56       215   0   3.70370E-05   293.6   end
Fe-57       215   0   8.55788E-07   293.6   end
Fe-58       215   0   1.13028E-07   293.6   end
Cu-63       215   0   1.88666E-05   293.6   end
Cu-65       215   0   8.40911E-06   293.6   end
U-234       215   0   4.80687E-06   293.6   end
U-235       215   0   4.48000E-04   293.6   end
U-236       215   0   1.92276E-06   293.6   end
U-238       215   0   2.59571E-05   293.6   end
'   total atom density =  8.00998E-02 a/b-cm
'  8.009980E-02
H-1        216   0   3.32434E-02   293.6   end
B-10       216   0   5.79830E-06   293.6   end
B-11       216   0   2.34889E-05   293.6   end
O-16       216   0   1.78875E-02   293.6   end
Mg-24       216   0   1.05686E-04   293.6   end
Mg-25       216   0   1.33797E-05   293.6   end
Mg-26       216   0   1.47310E-05   293.6   end
Al-27       216   0   2.81176E-02   293.6   end
Si-28       216   0   1.00676E-04   293.6   end
Si-29       216   0   5.09768E-06   293.6   end
Si-30       216   0   3.38390E-06   293.6   end
Ti-46       216   0   4.20262E-07   293.6   end
Ti-47       216   0   3.79000E-07   293.6   end
Ti-48       216   0   3.75536E-06   293.6   end
Ti-49       216   0   2.75590E-07   293.6   end
Ti-50       216   0   2.63873E-07   293.6   end
Cr-50       216   0   5.30517E-07   293.6   end
Cr-52       216   0   1.02189E-05   293.6   end
Cr-53       216   0   1.15860E-06   293.6   end
Cr-54       216   0   2.87821E-07   293.6   end
Mn-55       216   0   6.46828E-06   293.6   end
Fe-54       216   0   2.35985E-06   293.6   end
Fe-56       216   0   3.70113E-05   293.6   end
Fe-57       216   0   8.55193E-07   293.6   end
Fe-58       216   0   1.12950E-07   293.6   end
Cu-63       216   0   1.88571E-05   293.6   end
Cu-65       216   0   8.40487E-06   293.6   end
U-234       216   0   4.87661E-06   293.6   end
U-235       216   0   4.54500E-04   293.6   end
U-236       216   0   1.95066E-06   293.6   end
U-238       216   0   2.63337E-05   293.6   end
'   total atom density =  8.00968E-02 a/b-cm
'  8.009680E-02
H-1        217   0   3.32434E-02   293.6   end
B-10       217   0   7.99507E-06   293.6   end
B-11       217   0   3.23880E-05   293.6   end
O-16       217   0   1.77805E-02   293.6   end
Mg-24       217   0   1.05686E-04   293.6   end
Mg-25       217   0   1.33797E-05   293.6   end
Mg-26       217   0   1.47310E-05   293.6   end
Al-27       217   0   2.82501E-02   293.6   end
Si-28       217   0   1.00972E-04   293.6   end
Si-29       217   0   5.11262E-06   293.6   end
Si-30       217   0   3.39382E-06   293.6   end

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Ti-46      217   0   4.20262E-07  293.6  end
Ti-47      217   0   3.79000E-07  293.6  end
Ti-48      217   0   3.75536E-06  293.6  end
Ti-49      217   0   2.75590E-07  293.6  end
Ti-50      217   0   2.63873E-07  293.6  end
Cr-50      217   0   5.30517E-07  293.6  end
Cr-52      217   0   1.02189E-05  293.6  end
Cr-53      217   0   1.15860E-06  293.6  end
Cr-54      217   0   2.87821E-07  293.6  end
Mn-55      217   0   6.48467E-06  293.6  end
Fe-54      217   0   2.36928E-06  293.6  end
Fe-56      217   0   3.71592E-05  293.6  end
Fe-57      217   0   8.58611E-07  293.6  end
Fe-58      217   0   1.13401E-07  293.6  end
Cu-63      217   0   1.89118E-05  293.6  end
Cu-65      217   0   8.42923E-06  293.6  end
U-234     217   0   4.47532E-06  293.6  end
U-235     217   0   4.17100E-04   293.6  end
U-236     217   0   1.79014E-06  293.6  end
U-238     217   0   2.41667E-05  293.6  end
'      total atom density =  8.00933E-02 a/b-cm
'  8.009330E-02
H-1        218   0   3.32434E-02  293.6  end
B-10       218   0   1.06559E-05  293.6  end
B-11       218   0   4.31670E-05  293.6  end
O-16       218   0   1.76509E-02  293.6  end
Mg-24      218   0   1.05686E-04  293.6  end
Mg-25      218   0   1.33797E-05  293.6  end
Mg-26      218   0   1.47310E-05  293.6  end
Al-27      218   0   2.84107E-02  293.6  end
Si-28      218   0   1.01330E-04  293.6  end
Si-29      218   0   5.13079E-06  293.6  end
Si-30      218   0   3.40588E-06  293.6  end
Ti-46      218   0   4.20262E-07  293.6  end
Ti-47      218   0   3.79000E-07  293.6  end
Ti-48      218   0   3.75536E-06  293.6  end
Ti-49      218   0   2.75590E-07  293.6  end
Ti-50      218   0   2.63873E-07  293.6  end
Cr-50      218   0   5.30517E-07  293.6  end
Cr-52      218   0   1.02189E-05  293.6  end
Cr-53      218   0   1.15860E-06  293.6  end
Cr-54      218   0   2.87821E-07  293.6  end
Mn-55      218   0   6.50452E-06  293.6  end
Fe-54      218   0   2.38070E-06  293.6  end
Fe-56      218   0   3.73384E-05  293.6  end
Fe-57      218   0   8.62751E-07  293.6  end
Fe-58      218   0   1.13948E-07  293.6  end
Cu-63      218   0   1.89779E-05  293.6  end
Cu-65      218   0   8.45870E-06  293.6  end
U-234     218   0   3.98927E-06  293.6  end
U-235     218   0   3.71800E-04   293.6  end
U-236     218   0   1.59572E-06  293.6  end
U-238     218   0   2.15420E-05  293.6  end
'
'      Inner fuel element--fueled Axial region 2
'      total atom density =  8.00804E-02 a/b-cm
'  8.008040E-02
H-1        221   0   3.32434E-02  293.6  end
B-10       221   0   2.04121E-05  293.6  end
B-11       221   0   8.26896E-05  293.6  end
O-16       221   0   1.71757E-02  293.6  end
Mg-24      221   0   1.05686E-04  293.6  end
Mg-25      221   0   1.33797E-05  293.6  end
Mg-26      221   0   1.47310E-05  293.6  end
Al-27      221   0   2.89993E-02  293.6  end
Si-28      221   0   1.02644E-04  293.6  end
Si-29      221   0   5.19729E-06  293.6  end
Si-30      221   0   3.45002E-06  293.6  end
Ti-46      221   0   4.20262E-07  293.6  end
Ti-47      221   0   3.79000E-07  293.6  end
Ti-48      221   0   3.75536E-06  293.6  end
Ti-49      221   0   2.75590E-07  293.6  end
Ti-50      221   0   2.63873E-07  293.6  end
Cr-50      221   0   5.30517E-07  293.6  end
Cr-52      221   0   1.02189E-05  293.6  end
Cr-53      221   0   1.15860E-06  293.6  end
Cr-54      221   0   2.87821E-07  293.6  end
Mn-55      221   0   6.57731E-06  293.6  end
Fe-54      221   0   2.42259E-06  293.6  end
Fe-56      221   0   3.79953E-05  293.6  end
Fe-57      221   0   8.77930E-07  293.6  end

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Fe-58      221   0   1.15953E-07  293.6  end
Cu-63      221   0   1.92203E-05  293.6  end
Cu-65      221   0   8.56676E-06  293.6  end
U-234      221   0   2.20708E-06  293.6  end
U-235      221   0   2.05700E-04  293.6  end
U-236      221   0   8.82838E-07  293.6  end
U-238      221   0   1.19182E-05  293.6  end
'   total atom density =  8.00839E-02 a/b-cm
' 8.008390E-02
H-1        222   0   3.32434E-02  293.6  end
B-10       222   0   1.77513E-05  293.6  end
B-11       222   0   7.19107E-05  293.6  end
O-16       222   0   1.73053E-02  293.6  end
Mg-24       222   0   1.05686E-04  293.6  end
Mg-25       222   0   1.33797E-05  293.6  end
Mg-26       222   0   1.47310E-05  293.6  end
Al-27       222   0   2.88388E-02  293.6  end
Si-28       222   0   1.02285E-04  293.6  end
Si-29       222   0   5.17912E-06  293.6  end
Si-30       222   0   3.43796E-06  293.6  end
Ti-46       222   0   4.20262E-07  293.6  end
Ti-47       222   0   3.79000E-07  293.6  end
Ti-48       222   0   3.75536E-06  293.6  end
Ti-49       222   0   2.75590E-07  293.6  end
Ti-50       222   0   2.63873E-07  293.6  end
Cr-50       222   0   5.30517E-07  293.6  end
Cr-52       222   0   1.02189E-05  293.6  end
Cr-53       222   0   1.15860E-06  293.6  end
Cr-54       222   0   2.87821E-07  293.6  end
Mn-55       222   0   6.55746E-06  293.6  end
Fe-54       222   0   2.41117E-06  293.6  end
Fe-56       222   0   3.78162E-05  293.6  end
Fe-57       222   0   8.73792E-07  293.6  end
Fe-58       222   0   1.15406E-07  293.6  end
Cu-63       222   0   1.91542E-05  293.6  end
Cu-65       222   0   8.53729E-06  293.6  end
U-234       222   0   2.69313E-06  293.6  end
U-235       222   0   2.51000E-04  293.6  end
U-236       222   0   1.07726E-06  293.6  end
U-238       222   0   1.45429E-05  293.6  end
'   total atom density =  8.00880E-02 a/b-cm
' 8.008800E-02
H-1        223   0   3.32435E-02  293.6  end
B-10       223   0   1.46911E-05  293.6  end
B-11       223   0   5.95139E-05  293.6  end
O-16       223   0   1.74543E-02  293.6  end
Mg-24       223   0   1.05686E-04  293.6  end
Mg-25       223   0   1.33797E-05  293.6  end
Mg-26       223   0   1.47310E-05  293.6  end
Al-27       223   0   2.86541E-02  293.6  end
Si-28       223   0   1.01874E-04  293.6  end
Si-29       223   0   5.15831E-06  293.6  end
Si-30       223   0   3.42415E-06  293.6  end
Ti-46       223   0   4.20263E-07  293.6  end
Ti-47       223   0   3.79001E-07  293.6  end
Ti-48       223   0   3.75537E-06  293.6  end
Ti-49       223   0   2.75590E-07  293.6  end
Ti-50       223   0   2.63873E-07  293.6  end
Cr-50       223   0   5.30518E-07  293.6  end
Cr-52       223   0   1.02189E-05  293.6  end
Cr-53       223   0   1.15860E-06  293.6  end
Cr-54       223   0   2.87821E-07  293.6  end
Mn-55       223   0   6.53464E-06  293.6  end
Fe-54       223   0   2.39803E-06  293.6  end
Fe-56       223   0   3.76103E-05  293.6  end
Fe-57       223   0   8.69031E-07  293.6  end
Fe-58       223   0   1.14778E-07  293.6  end
Cu-63       223   0   1.90782E-05  293.6  end
Cu-65       223   0   8.50342E-06  293.6  end
U-234       223   0   3.25215E-06  293.6  end
U-235       223   0   3.03100E-04  293.6  end
U-236       223   0   1.30087E-06  293.6  end
U-238       223   0   1.75616E-05  293.6  end
'   total atom density =  8.00937E-02 a/b-cm
' 8.009370E-02
H-1        224   0   3.32434E-02  293.6  end
B-10       224   0   1.03798E-05  293.6  end
B-11       224   0   4.20486E-05  293.6  end
O-16       224   0   1.76644E-02  293.6  end
Mg-24       224   0   1.05686E-04  293.6  end
Mg-25       224   0   1.33797E-05  293.6  end

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Mg-26      224    0   1.47310E-05   293.6   end
Al-27      224    0   2.83940E-02   293.6   end
Si-28      224    0   1.01293E-04   293.6   end
Si-29      224    0   5.12887E-06   293.6   end
Si-30      224    0   3.40461E-06   293.6   end
Ti-46      224    0   4.20262E-07   293.6   end
Ti-47      224    0   3.79000E-07   293.6   end
Ti-48      224    0   3.75536E-06   293.6   end
Ti-49      224    0   2.75590E-07   293.6   end
Ti-50      224    0   2.63873E-07   293.6   end
Cr-50      224    0   5.30517E-07   293.6   end
Cr-52      224    0   1.02189E-05   293.6   end
Cr-53      224    0   1.15860E-06   293.6   end
Cr-54      224    0   2.87821E-07   293.6   end
Mn-55      224    0   6.50246E-06   293.6   end
Fe-54      224    0   2.37952E-06   293.6   end
Fe-56      224    0   3.73198E-05   293.6   end
Fe-57      224    0   8.62321E-07   293.6   end
Fe-58      224    0   1.13891E-07   293.6   end
Cu-63      224    0   1.89710E-05   293.6   end
Cu-65      224    0   8.45562E-06   293.6   end
U-234     224    0   4.03970E-06   293.6   end
U-235     224    0   3.76500E-04   293.6   end
U-236     224    0   1.61589E-06   293.6   end
U-238     224    0   2.18144E-05   293.6   end
' total atom density =  8.00993E-02 a/b-cm
' 8.009930E-02
H-1        225    0   3.32434E-02   293.6   end
B-10       225    0   6.18010E-06   293.6   end
B-11       225    0   2.50356E-05   293.6   end
O-16       225    0   1.78689E-02   293.6   end
Mg-24       225    0   1.05686E-04   293.6   end
Mg-25       225    0   1.33797E-05   293.6   end
Mg-26       225    0   1.47310E-05   293.6   end
Al-27       225    0   2.81406E-02   293.6   end
Si-28       225    0   1.00727E-04   293.6   end
Si-29       225    0   5.10026E-06   293.6   end
Si-30       225    0   3.38560E-06   293.6   end
Ti-46       225    0   4.20262E-07   293.6   end
Ti-47       225    0   3.79000E-07   293.6   end
Ti-48       225    0   3.75536E-06   293.6   end
Ti-49       225    0   2.75590E-07   293.6   end
Ti-50       225    0   2.63873E-07   293.6   end
Cr-50       225    0   5.30518E-07   293.6   end
Cr-52       225    0   1.02189E-05   293.6   end
Cr-53       225    0   1.15860E-06   293.6   end
Cr-54       225    0   2.87821E-07   293.6   end
Mn-55       225    0   6.47114E-06   293.6   end
Fe-54       225    0   2.36149E-06   293.6   end
Fe-56       225    0   3.70370E-05   293.6   end
Fe-57       225    0   8.55788E-07   293.6   end
Fe-58       225    0   1.13028E-07   293.6   end
Cu-63       225    0   1.88666E-05   293.6   end
Cu-65       225    0   8.40911E-06   293.6   end
U-234       225    0   4.80687E-06   293.6   end
U-235       225    0   4.48000E-04   293.6   end
U-236       225    0   1.92276E-06   293.6   end
U-238       225    0   2.59571E-05   293.6   end
' total atom density =  8.00998E-02 a/b-cm
' 8.009980E-02
H-1        226    0   3.32434E-02   293.6   end
B-10       226    0   5.79830E-06   293.6   end
B-11       226    0   2.34889E-05   293.6   end
O-16       226    0   1.78875E-02   293.6   end
Mg-24       226    0   1.05686E-04   293.6   end
Mg-25       226    0   1.33797E-05   293.6   end
Mg-26       226    0   1.47310E-05   293.6   end
Al-27       226    0   2.81176E-02   293.6   end
Si-28       226    0   1.00676E-04   293.6   end
Si-29       226    0   5.09768E-06   293.6   end
Si-30       226    0   3.38390E-06   293.6   end
Ti-46       226    0   4.20262E-07   293.6   end
Ti-47       226    0   3.79000E-07   293.6   end
Ti-48       226    0   3.75536E-06   293.6   end
Ti-49       226    0   2.75590E-07   293.6   end
Ti-50       226    0   2.63873E-07   293.6   end
Cr-50       226    0   5.30517E-07   293.6   end
Cr-52       226    0   1.02189E-05   293.6   end
Cr-53       226    0   1.15860E-06   293.6   end
Cr-54       226    0   2.87821E-07   293.6   end
Mn-55       226    0   6.46828E-06   293.6   end

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Fe-54      226    0   2.35985E-06  293.6  end
Fe-56      226    0   3.70113E-05  293.6  end
Fe-57      226    0   8.55193E-07  293.6  end
Fe-58      226    0   1.12950E-07  293.6  end
Cu-63      226    0   1.88571E-05  293.6  end
Cu-65      226    0   8.40487E-06  293.6  end
U-234     226    0   4.87661E-06  293.6  end
U-235     226    0   4.54500E-04   293.6  end
U-236     226    0   1.95066E-06  293.6  end
U-238     226    0   2.63337E-05  293.6  end
'      total atom density =  8.00968E-02 a/b-cm
'  8.009680E-02
H-1       227    0   3.32434E-02  293.6  end
B-10      227    0   7.99507E-06  293.6  end
B-11       227    0   3.23880E-05  293.6  end
O-16       227    0   1.77805E-02  293.6  end
Mg-24      227    0   1.05686E-04  293.6  end
Mg-25      227    0   1.33797E-05  293.6  end
Mg-26      227    0   1.47310E-05  293.6  end
Al-27      227    0   2.82501E-02  293.6  end
Si-28      227    0   1.00972E-04  293.6  end
Si-29      227    0   5.11262E-06  293.6  end
Si-30      227    0   3.39382E-06  293.6  end
Ti-46       227    0   4.20262E-07  293.6  end
Ti-47       227    0   3.79000E-07  293.6  end
Ti-48       227    0   3.75536E-06  293.6  end
Ti-49       227    0   2.75590E-07  293.6  end
Ti-50       227    0   2.63873E-07  293.6  end
Cr-50       227    0   5.30517E-07  293.6  end
Cr-52       227    0   1.02189E-05  293.6  end
Cr-53       227    0   1.15860E-06  293.6  end
Cr-54       227    0   2.87821E-07  293.6  end
Mn-55       227    0   6.48467E-06  293.6  end
Fe-54       227    0   2.36928E-06  293.6  end
Fe-56       227    0   3.71592E-05  293.6  end
Fe-57       227    0   8.58611E-07  293.6  end
Fe-58       227    0   1.13401E-07  293.6  end
Cu-63       227    0   1.89118E-05  293.6  end
Cu-65       227    0   8.42923E-06  293.6  end
U-234      227    0   4.47532E-06  293.6  end
U-235      227    0   4.17100E-04   293.6  end
U-236      227    0   1.79014E-06  293.6  end
U-238      227    0   2.41667E-05  293.6  end
'      total atom density =  8.00933E-02 a/b-cm
'  8.009330E-02
H-1       228    0   3.32434E-02  293.6  end
B-10      228    0   1.06559E-05  293.6  end
B-11       228    0   4.31670E-05  293.6  end
O-16       228    0   1.76509E-02  293.6  end
Mg-24      228    0   1.05686E-04  293.6  end
Mg-25      228    0   1.33797E-05  293.6  end
Mg-26      228    0   1.47310E-05  293.6  end
Al-27      228    0   2.84107E-02  293.6  end
Si-28      228    0   1.01330E-04  293.6  end
Si-29      228    0   5.13079E-06  293.6  end
Si-30      228    0   3.40588E-06  293.6  end
Ti-46       228    0   4.20262E-07  293.6  end
Ti-47       228    0   3.79000E-07  293.6  end
Ti-48       228    0   3.75536E-06  293.6  end
Ti-49       228    0   2.75590E-07  293.6  end
Ti-50       228    0   2.63873E-07  293.6  end
Cr-50       228    0   5.30517E-07  293.6  end
Cr-52       228    0   1.02189E-05  293.6  end
Cr-53       228    0   1.15860E-06  293.6  end
Cr-54       228    0   2.87821E-07  293.6  end
Mn-55       228    0   6.50452E-06  293.6  end
Fe-54       228    0   2.38070E-06  293.6  end
Fe-56       228    0   3.73384E-05  293.6  end
Fe-57       228    0   8.62751E-07  293.6  end
Fe-58       228    0   1.13948E-07  293.6  end
Cu-63       228    0   1.89779E-05  293.6  end
Cu-65       228    0   8.45870E-06  293.6  end
U-234      228    0   3.98927E-06  293.6  end
U-235      228    0   3.71800E-04   293.6  end
U-236      228    0   1.59572E-06  293.6  end
U-238      228    0   2.15420E-05  293.6  end
'
'      Inner fuel element--fueled Axial region 3
'      total atom density =  8.00804E-02 a/b-cm
'  8.008040E-02
H-1       231    0   3.32434E-02  293.6  end

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B-10      231   0   2.04121E-05   293.6   end
B-11      231   0   8.26896E-05   293.6   end
O-16      231   0   1.71757E-02   293.6   end
Mg-24     231   0   1.05686E-04   293.6   end
Mg-25     231   0   1.33797E-05   293.6   end
Mg-26     231   0   1.47310E-05   293.6   end
Al-27     231   0   2.89993E-02   293.6   end
Si-28     231   0   1.02644E-04   293.6   end
Si-29     231   0   5.19729E-06   293.6   end
Si-30     231   0   3.45002E-06   293.6   end
Ti-46     231   0   4.20262E-07   293.6   end
Ti-47     231   0   3.79000E-07   293.6   end
Ti-48     231   0   3.75536E-06   293.6   end
Ti-49     231   0   2.75590E-07   293.6   end
Ti-50     231   0   2.63873E-07   293.6   end
Cr-50     231   0   5.30517E-07   293.6   end
Cr-52     231   0   1.02189E-05   293.6   end
Cr-53     231   0   1.15860E-06   293.6   end
Cr-54     231   0   2.87821E-07   293.6   end
Mn-55     231   0   6.57731E-06   293.6   end
Fe-54     231   0   2.42259E-06   293.6   end
Fe-56     231   0   3.79953E-05   293.6   end
Fe-57     231   0   8.77930E-07   293.6   end
Fe-58     231   0   1.15953E-07   293.6   end
Cu-63     231   0   1.92203E-05   293.6   end
Cu-65     231   0   8.56676E-06   293.6   end
U-234    231   0   2.20708E-06   293.6   end
U-235    231   0   2.05700E-04   293.6   end
U-236    231   0   8.82838E-07   293.6   end
U-238    231   0   1.19182E-05   293.6   end
'   total atom density =  8.00839E-02 a/b-cm
' 8.008390E-02
H-1       232   0   3.32434E-02   293.6   end
B-10     232   0   1.77513E-05   293.6   end
B-11     232   0   7.19107E-05   293.6   end
O-16     232   0   1.73053E-02   293.6   end
Mg-24     232   0   1.05686E-04   293.6   end
Mg-25     232   0   1.33797E-05   293.6   end
Mg-26     232   0   1.47310E-05   293.6   end
Al-27     232   0   2.88388E-02   293.6   end
Si-28     232   0   1.02285E-04   293.6   end
Si-29     232   0   5.17912E-06   293.6   end
Si-30     232   0   3.43796E-06   293.6   end
Ti-46     232   0   4.20262E-07   293.6   end
Ti-47     232   0   3.79000E-07   293.6   end
Ti-48     232   0   3.75536E-06   293.6   end
Ti-49     232   0   2.75590E-07   293.6   end
Ti-50     232   0   2.63873E-07   293.6   end
Cr-50     232   0   5.30517E-07   293.6   end
Cr-52     232   0   1.02189E-05   293.6   end
Cr-53     232   0   1.15860E-06   293.6   end
Cr-54     232   0   2.87821E-07   293.6   end
Mn-55     232   0   6.55746E-06   293.6   end
Fe-54     232   0   2.41117E-06   293.6   end
Fe-56     232   0   3.78162E-05   293.6   end
Fe-57     232   0   8.73792E-07   293.6   end
Fe-58     232   0   1.15406E-07   293.6   end
Cu-63     232   0   1.91542E-05   293.6   end
Cu-65     232   0   8.53729E-06   293.6   end
U-234    232   0   2.69313E-06   293.6   end
U-235    232   0   2.51000E-04   293.6   end
U-236    232   0   1.07726E-06   293.6   end
U-238    232   0   1.45429E-05   293.6   end
'   total atom density =  8.00880E-02 a/b-cm
' 8.008800E-02
H-1       233   0   3.32435E-02   293.6   end
B-10     233   0   1.46911E-05   293.6   end
B-11     233   0   5.95139E-05   293.6   end
O-16     233   0   1.74543E-02   293.6   end
Mg-24     233   0   1.05686E-04   293.6   end
Mg-25     233   0   1.33797E-05   293.6   end
Mg-26     233   0   1.47310E-05   293.6   end
Al-27     233   0   2.86541E-02   293.6   end
Si-28     233   0   1.01874E-04   293.6   end
Si-29     233   0   5.15831E-06   293.6   end
Si-30     233   0   3.42415E-06   293.6   end
Ti-46     233   0   4.20263E-07   293.6   end
Ti-47     233   0   3.79001E-07   293.6   end
Ti-48     233   0   3.75537E-06   293.6   end
Ti-49     233   0   2.75590E-07   293.6   end
Ti-50     233   0   2.63873E-07   293.6   end

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Cr-50      233   0   5.30518E-07  293.6  end
Cr-52      233   0   1.02189E-05  293.6  end
Cr-53      233   0   1.15860E-06  293.6  end
Cr-54      233   0   2.87821E-07  293.6  end
Mn-55      233   0   6.53464E-06  293.6  end
Fe-54      233   0   2.39803E-06  293.6  end
Fe-56      233   0   3.76103E-05  293.6  end
Fe-57      233   0   8.69031E-07  293.6  end
Fe-58      233   0   1.14778E-07  293.6  end
Cu-63      233   0   1.90782E-05  293.6  end
Cu-65      233   0   8.50342E-06  293.6  end
U-234     233   0   3.25215E-06  293.6  end
U-235     233   0   3.03100E-04   293.6  end
U-236     233   0   1.30087E-06  293.6  end
U-238     233   0   1.75616E-05  293.6  end
'       total atom density =  8.00937E-02 a/b-cm
'  8.009370E-02
H-1        234   0   3.32434E-02  293.6  end
B-10       234   0   1.03798E-05  293.6  end
B-11       234   0   4.20486E-05  293.6  end
O-16       234   0   1.76644E-02  293.6  end
Mg-24      234   0   1.05686E-04  293.6  end
Mg-25      234   0   1.33797E-05  293.6  end
Mg-26      234   0   1.47310E-05  293.6  end
Al-27       234   0   2.83940E-02  293.6  end
Si-28       234   0   1.01293E-04  293.6  end
Si-29       234   0   5.12887E-06  293.6  end
Si-30       234   0   3.40461E-06  293.6  end
Ti-46       234   0   4.20262E-07  293.6  end
Ti-47       234   0   3.79000E-07  293.6  end
Ti-48       234   0   3.75536E-06  293.6  end
Ti-49       234   0   2.75590E-07  293.6  end
Ti-50       234   0   2.63873E-07  293.6  end
Cr-50       234   0   5.30517E-07  293.6  end
Cr-52       234   0   1.02189E-05  293.6  end
Cr-53       234   0   1.15860E-06  293.6  end
Cr-54       234   0   2.87821E-07  293.6  end
Mn-55       234   0   6.50246E-06  293.6  end
Fe-54       234   0   2.37952E-06  293.6  end
Fe-56       234   0   3.73198E-05  293.6  end
Fe-57       234   0   8.62321E-07  293.6  end
Fe-58       234   0   1.13891E-07  293.6  end
Cu-63       234   0   1.89710E-05  293.6  end
Cu-65       234   0   8.45562E-06  293.6  end
U-234      234   0   4.03970E-06  293.6  end
U-235      234   0   3.76500E-04   293.6  end
U-236      234   0   1.61589E-06  293.6  end
U-238      234   0   2.18144E-05  293.6  end
'       total atom density =  8.00993E-02 a/b-cm
'  8.009930E-02
H-1        235   0   3.32434E-02  293.6  end
B-10       235   0   6.18010E-06  293.6  end
B-11       235   0   2.50356E-05  293.6  end
O-16       235   0   1.78689E-02  293.6  end
Mg-24      235   0   1.05686E-04  293.6  end
Mg-25      235   0   1.33797E-05  293.6  end
Mg-26      235   0   1.47310E-05  293.6  end
Al-27       235   0   2.81406E-02  293.6  end
Si-28       235   0   1.00727E-04  293.6  end
Si-29       235   0   5.10026E-06  293.6  end
Si-30       235   0   3.38560E-06  293.6  end
Ti-46       235   0   4.20262E-07  293.6  end
Ti-47       235   0   3.79000E-07  293.6  end
Ti-48       235   0   3.75536E-06  293.6  end
Ti-49       235   0   2.75590E-07  293.6  end
Ti-50       235   0   2.63873E-07  293.6  end
Cr-50       235   0   5.30518E-07  293.6  end
Cr-52       235   0   1.02189E-05  293.6  end
Cr-53       235   0   1.15860E-06  293.6  end
Cr-54       235   0   2.87821E-07  293.6  end
Mn-55       235   0   6.47114E-06  293.6  end
Fe-54       235   0   2.36149E-06  293.6  end
Fe-56       235   0   3.70370E-05  293.6  end
Fe-57       235   0   8.55788E-07  293.6  end
Fe-58       235   0   1.13028E-07  293.6  end
Cu-63       235   0   1.88666E-05  293.6  end
Cu-65       235   0   8.40911E-06  293.6  end
U-234      235   0   4.80687E-06  293.6  end
U-235      235   0   4.48000E-04   293.6  end
U-236      235   0   1.92276E-06  293.6  end
U-238      235   0   2.59571E-05  293.6  end

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'      total atom density =  8.00998E-02 a/b-cm
'  8.009980E-02
H-1          236    0   3.32434E-02   293.6  end
B-10         236    0   5.79830E-06   293.6  end
B-11         236    0   2.34889E-05   293.6  end
O-16         236    0   1.78875E-02   293.6  end
Mg-24        236    0   1.05686E-04   293.6  end
Mg-25        236    0   1.33797E-05   293.6  end
Mg-26        236    0   1.47310E-05   293.6  end
Al-27        236    0   2.81176E-02   293.6  end
Si-28        236    0   1.00676E-04   293.6  end
Si-29        236    0   5.09768E-06   293.6  end
Si-30        236    0   3.38390E-06   293.6  end
Ti-46         236    0   4.20262E-07   293.6  end
Ti-47         236    0   3.79000E-07   293.6  end
Ti-48         236    0   3.75536E-06   293.6  end
Ti-49         236    0   2.75590E-07   293.6  end
Ti-50         236    0   2.63873E-07   293.6  end
Cr-50         236    0   5.30517E-07   293.6  end
Cr-52         236    0   1.02189E-05   293.6  end
Cr-53         236    0   1.15860E-06   293.6  end
Cr-54         236    0   2.87821E-07   293.6  end
Mn-55         236    0   6.46828E-06   293.6  end
Fe-54         236    0   2.35985E-06   293.6  end
Fe-56         236    0   3.70113E-05   293.6  end
Fe-57         236    0   8.55193E-07   293.6  end
Fe-58         236    0   1.12950E-07   293.6  end
Cu-63         236    0   1.88571E-05   293.6  end
Cu-65         236    0   8.40487E-06   293.6  end
U-234         236    0   4.87661E-06   293.6  end
U-235         236    0   4.54500E-04   293.6  end
U-236         236    0   1.95066E-06   293.6  end
U-238         236    0   2.63337E-05   293.6  end
'      total atom density =  8.00968E-02 a/b-cm
'  8.009680E-02
H-1          237    0   3.32434E-02   293.6  end
B-10         237    0   7.99507E-06   293.6  end
B-11         237    0   3.23880E-05   293.6  end
O-16         237    0   1.77805E-02   293.6  end
Mg-24        237    0   1.05686E-04   293.6  end
Mg-25        237    0   1.33797E-05   293.6  end
Mg-26        237    0   1.47310E-05   293.6  end
Al-27        237    0   2.82501E-02   293.6  end
Si-28        237    0   1.00972E-04   293.6  end
Si-29        237    0   5.11262E-06   293.6  end
Si-30        237    0   3.39382E-06   293.6  end
Ti-46         237    0   4.20262E-07   293.6  end
Ti-47         237    0   3.79000E-07   293.6  end
Ti-48         237    0   3.75536E-06   293.6  end
Ti-49         237    0   2.75590E-07   293.6  end
Ti-50         237    0   2.63873E-07   293.6  end
Cr-50         237    0   5.30517E-07   293.6  end
Cr-52         237    0   1.02189E-05   293.6  end
Cr-53         237    0   1.15860E-06   293.6  end
Cr-54         237    0   2.87821E-07   293.6  end
Mn-55         237    0   6.48467E-06   293.6  end
Fe-54         237    0   2.36928E-06   293.6  end
Fe-56         237    0   3.71592E-05   293.6  end
Fe-57         237    0   8.58611E-07   293.6  end
Fe-58         237    0   1.13401E-07   293.6  end
Cu-63         237    0   1.89118E-05   293.6  end
Cu-65         237    0   8.42923E-06   293.6  end
U-234         237    0   4.47532E-06   293.6  end
U-235         237    0   4.17100E-04   293.6  end
U-236         237    0   1.79014E-06   293.6  end
U-238         237    0   2.41667E-05   293.6  end
'      total atom density =  8.00933E-02 a/b-cm
'  8.009330E-02
H-1          238    0   3.32434E-02   293.6  end
B-10         238    0   1.06559E-05   293.6  end
B-11         238    0   4.31670E-05   293.6  end
O-16         238    0   1.76509E-02   293.6  end
Mg-24        238    0   1.05686E-04   293.6  end
Mg-25        238    0   1.33797E-05   293.6  end
Mg-26        238    0   1.47310E-05   293.6  end
Al-27        238    0   2.84107E-02   293.6  end
Si-28        238    0   1.01330E-04   293.6  end
Si-29        238    0   5.13079E-06   293.6  end
Si-30        238    0   3.40588E-06   293.6  end
Ti-46         238    0   4.20262E-07   293.6  end
Ti-47         238    0   3.79000E-07   293.6  end

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Ti-48	238	0	3.75536E-06	293.6	end
Ti-49	238	0	2.75590E-07	293.6	end
Ti-50	238	0	2.63873E-07	293.6	end
Cr-50	238	0	5.30517E-07	293.6	end
Cr-52	238	0	1.02189E-05	293.6	end
Cr-53	238	0	1.15860E-06	293.6	end
Cr-54	238	0	2.87821E-07	293.6	end
Mn-55	238	0	6.50452E-06	293.6	end
Fe-54	238	0	2.38070E-06	293.6	end
Fe-56	238	0	3.73384E-05	293.6	end
Fe-57	238	0	8.62751E-07	293.6	end
Fe-58	238	0	1.13948E-07	293.6	end
Cu-63	238	0	1.89779E-05	293.6	end
Cu-65	238	0	8.45870E-06	293.6	end
U-234	238	0	3.98927E-06	293.6	end
U-235	238	0	3.71800E-04	293.6	end
U-236	238	0	1.59572E-06	293.6	end
U-238	238	0	2.15420E-05	293.6	end

' Inner fuel element--fueled Axial region 4
' total atom density = 8.00804E-02 a/b-cm
' 8.008040E-02

H-1	241	0	3.32434E-02	293.6	end
B-10	241	0	2.04121E-05	293.6	end
B-11	241	0	8.26896E-05	293.6	end
O-16	241	0	1.71757E-02	293.6	end
Mg-24	241	0	1.05686E-04	293.6	end
Mg-25	241	0	1.33797E-05	293.6	end
Mg-26	241	0	1.47310E-05	293.6	end
Al-27	241	0	2.89993E-02	293.6	end
Si-28	241	0	1.02644E-04	293.6	end
Si-29	241	0	5.19729E-06	293.6	end
Si-30	241	0	3.45002E-06	293.6	end
Ti-46	241	0	4.20262E-07	293.6	end
Ti-47	241	0	3.79000E-07	293.6	end
Ti-48	241	0	3.75536E-06	293.6	end
Ti-49	241	0	2.75590E-07	293.6	end
Ti-50	241	0	2.63873E-07	293.6	end
Cr-50	241	0	5.30517E-07	293.6	end
Cr-52	241	0	1.02189E-05	293.6	end
Cr-53	241	0	1.15860E-06	293.6	end
Cr-54	241	0	2.87821E-07	293.6	end
Mn-55	241	0	6.55731E-06	293.6	end
Fe-54	241	0	2.42259E-06	293.6	end
Fe-56	241	0	3.79953E-05	293.6	end
Fe-57	241	0	8.77930E-07	293.6	end
Fe-58	241	0	1.15953E-07	293.6	end
Cu-63	241	0	1.92203E-05	293.6	end
Cu-65	241	0	8.56676E-06	293.6	end
U-234	241	0	2.20708E-06	293.6	end
U-235	241	0	2.05700E-04	293.6	end
U-236	241	0	8.82838E-07	293.6	end
U-238	241	0	1.19182E-05	293.6	end

' total atom density = 8.00839E-02 a/b-cm
' 8.008390E-02

H-1	242	0	3.32434E-02	293.6	end
B-10	242	0	1.77513E-05	293.6	end
B-11	242	0	7.19107E-05	293.6	end
O-16	242	0	1.73053E-02	293.6	end
Mg-24	242	0	1.05686E-04	293.6	end
Mg-25	242	0	1.33797E-05	293.6	end
Mg-26	242	0	1.47310E-05	293.6	end
Al-27	242	0	2.88388E-02	293.6	end
Si-28	242	0	1.02285E-04	293.6	end
Si-29	242	0	5.17912E-06	293.6	end
Si-30	242	0	3.43796E-06	293.6	end
Ti-46	242	0	4.20262E-07	293.6	end
Ti-47	242	0	3.79000E-07	293.6	end
Ti-48	242	0	3.75536E-06	293.6	end
Ti-49	242	0	2.75590E-07	293.6	end
Ti-50	242	0	2.63873E-07	293.6	end
Cr-50	242	0	5.30517E-07	293.6	end
Cr-52	242	0	1.02189E-05	293.6	end
Cr-53	242	0	1.15860E-06	293.6	end
Cr-54	242	0	2.87821E-07	293.6	end
Mn-55	242	0	6.55746E-06	293.6	end
Fe-54	242	0	2.41117E-06	293.6	end
Fe-56	242	0	3.78162E-05	293.6	end
Fe-57	242	0	8.73792E-07	293.6	end
Fe-58	242	0	1.15406E-07	293.6	end
Cu-63	242	0	1.91542E-05	293.6	end

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Cu-65      242    0   8.53729E-06   293.6   end
U-234      242    0   2.69313E-06   293.6   end
U-235      242    0   2.51000E-04   293.6   end
U-236      242    0   1.07726E-06   293.6   end
U-238      242    0   1.45429E-05   293.6   end
'   total atom density =  8.00880E-02 a/b-cm
' 8.00880E-02
H-1        243    0   3.32435E-02   293.6   end
B-10       243    0   1.46911E-05   293.6   end
B-11       243    0   5.95139E-05   293.6   end
O-16       243    0   1.74543E-02   293.6   end
Mg-24      243    0   1.05686E-04   293.6   end
Mg-25      243    0   1.33797E-05   293.6   end
Mg-26      243    0   1.47310E-05   293.6   end
Al-27      243    0   2.86541E-02   293.6   end
Si-28      243    0   1.01874E-04   293.6   end
Si-29      243    0   5.15831E-06   293.6   end
Si-30      243    0   3.42415E-06   293.6   end
Ti-46       243    0   4.20263E-07   293.6   end
Ti-47       243    0   3.79001E-07   293.6   end
Ti-48       243    0   3.75537E-06   293.6   end
Ti-49       243    0   2.75590E-07   293.6   end
Ti-50       243    0   2.63873E-07   293.6   end
Cr-50       243    0   5.30518E-07   293.6   end
Cr-52       243    0   1.02189E-05   293.6   end
Cr-53       243    0   1.15860E-06   293.6   end
Cr-54       243    0   2.87821E-07   293.6   end
Mn-55       243    0   6.53464E-06   293.6   end
Fe-54       243    0   2.39803E-06   293.6   end
Fe-56       243    0   3.76103E-05   293.6   end
Fe-57       243    0   8.69031E-07   293.6   end
Fe-58       243    0   1.14778E-07   293.6   end
Cu-63       243    0   1.90782E-05   293.6   end
Cu-65       243    0   8.50342E-06   293.6   end
U-234       243    0   3.25215E-06   293.6   end
U-235       243    0   3.03100E-04   293.6   end
U-236       243    0   1.30087E-06   293.6   end
U-238       243    0   1.75616E-05   293.6   end
'   total atom density =  8.00937E-02 a/b-cm
' 8.00937E-02
H-1        244    0   3.32434E-02   293.6   end
B-10       244    0   1.03798E-05   293.6   end
B-11       244    0   4.20486E-05   293.6   end
O-16       244    0   1.76644E-02   293.6   end
Mg-24      244    0   1.05686E-04   293.6   end
Mg-25      244    0   1.33797E-05   293.6   end
Mg-26      244    0   1.47310E-05   293.6   end
Al-27      244    0   2.83940E-02   293.6   end
Si-28      244    0   1.01293E-04   293.6   end
Si-29      244    0   5.12887E-06   293.6   end
Si-30      244    0   3.40461E-06   293.6   end
Ti-46       244    0   4.20262E-07   293.6   end
Ti-47       244    0   3.79000E-07   293.6   end
Ti-48       244    0   3.75536E-06   293.6   end
Ti-49       244    0   2.75590E-07   293.6   end
Ti-50       244    0   2.63873E-07   293.6   end
Cr-50       244    0   5.30517E-07   293.6   end
Cr-52       244    0   1.02189E-05   293.6   end
Cr-53       244    0   1.15860E-06   293.6   end
Cr-54       244    0   2.87821E-07   293.6   end
Mn-55       244    0   6.50246E-06   293.6   end
Fe-54       244    0   2.37952E-06   293.6   end
Fe-56       244    0   3.73198E-05   293.6   end
Fe-57       244    0   8.62321E-07   293.6   end
Fe-58       244    0   1.13891E-07   293.6   end
Cu-63       244    0   1.89710E-05   293.6   end
Cu-65       244    0   8.45562E-06   293.6   end
U-234       244    0   4.03970E-06   293.6   end
U-235       244    0   3.76500E-04   293.6   end
U-236       244    0   1.61589E-06   293.6   end
U-238       244    0   2.18144E-05   293.6   end
'   total atom density =  8.00993E-02 a/b-cm
' 8.00993E-02
H-1        245    0   3.32434E-02   293.6   end
B-10       245    0   6.18010E-06   293.6   end
B-11       245    0   2.50356E-05   293.6   end
O-16       245    0   1.78689E-02   293.6   end
Mg-24      245    0   1.05686E-04   293.6   end
Mg-25      245    0   1.33797E-05   293.6   end
Mg-26      245    0   1.47310E-05   293.6   end
Al-27      245    0   2.81406E-02   293.6   end

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Si-28      245   0   1.00727E-04   293.6   end
Si-29      245   0   5.10026E-06   293.6   end
Si-30      245   0   3.38560E-06   293.6   end
Ti-46      245   0   4.20262E-07   293.6   end
Ti-47      245   0   3.79000E-07   293.6   end
Ti-48      245   0   3.75536E-06   293.6   end
Ti-49      245   0   2.75590E-07   293.6   end
Ti-50      245   0   2.63873E-07   293.6   end
Cr-50      245   0   5.30518E-07   293.6   end
Cr-52      245   0   1.02189E-05   293.6   end
Cr-53      245   0   1.15860E-06   293.6   end
Cr-54      245   0   2.87821E-07   293.6   end
Mn-55      245   0   6.47114E-06   293.6   end
Fe-54      245   0   2.36149E-06   293.6   end
Fe-56      245   0   3.70370E-05   293.6   end
Fe-57      245   0   8.55788E-07   293.6   end
Fe-58      245   0   1.13028E-07   293.6   end
Cu-63      245   0   1.88666E-05   293.6   end
Cu-65      245   0   8.40911E-06   293.6   end
U-234     245   0   4.80687E-06   293.6   end
U-235     245   0   4.48000E-04   293.6   end
U-236     245   0   1.92276E-06   293.6   end
U-238     245   0   2.59571E-05   293.6   end
'    total atom density =  8.00998E-02 a/b-cm
'  8.009980E-02
H-1        246   0   3.32434E-02   293.6   end
B-10     246   0   5.79830E-06   293.6   end
B-11      246   0   2.34889E-05   293.6   end
O-16      246   0   1.78875E-02   293.6   end
Mg-24     246   0   1.05686E-04   293.6   end
Mg-25     246   0   1.33797E-05   293.6   end
Mg-26     246   0   1.47310E-05   293.6   end
Al-27     246   0   2.81176E-02   293.6   end
Si-28     246   0   1.00676E-04   293.6   end
Si-29     246   0   5.09768E-06   293.6   end
Si-30     246   0   3.38390E-06   293.6   end
Ti-46     246   0   4.20262E-07   293.6   end
Ti-47     246   0   3.79000E-07   293.6   end
Ti-48     246   0   3.75536E-06   293.6   end
Ti-49     246   0   2.75590E-07   293.6   end
Ti-50     246   0   2.63873E-07   293.6   end
Cr-50     246   0   5.30517E-07   293.6   end
Cr-52     246   0   1.02189E-05   293.6   end
Cr-53     246   0   1.15860E-06   293.6   end
Cr-54     246   0   2.87821E-07   293.6   end
Mn-55     246   0   6.46828E-06   293.6   end
Fe-54     246   0   2.35985E-06   293.6   end
Fe-56     246   0   3.70113E-05   293.6   end
Fe-57     246   0   8.55193E-07   293.6   end
Fe-58     246   0   1.12950E-07   293.6   end
Cu-63     246   0   1.88571E-05   293.6   end
Cu-65     246   0   8.40487E-06   293.6   end
U-234     246   0   4.87661E-06   293.6   end
U-235     246   0   4.54500E-04   293.6   end
U-236     246   0   1.95066E-06   293.6   end
U-238     246   0   2.63337E-05   293.6   end
'    total atom density =  8.00968E-02 a/b-cm
'  8.009680E-02
H-1        247   0   3.32434E-02   293.6   end
B-10     247   0   7.99507E-06   293.6   end
B-11      247   0   3.23880E-05   293.6   end
O-16      247   0   1.77805E-02   293.6   end
Mg-24     247   0   1.05686E-04   293.6   end
Mg-25     247   0   1.33797E-05   293.6   end
Mg-26     247   0   1.47310E-05   293.6   end
Al-27     247   0   2.82501E-02   293.6   end
Si-28     247   0   1.00972E-04   293.6   end
Si-29     247   0   5.11262E-06   293.6   end
Si-30     247   0   3.39382E-06   293.6   end
Ti-46     247   0   4.20262E-07   293.6   end
Ti-47     247   0   3.79000E-07   293.6   end
Ti-48     247   0   3.75536E-06   293.6   end
Ti-49     247   0   2.75590E-07   293.6   end
Ti-50     247   0   2.63873E-07   293.6   end
Cr-50     247   0   5.30517E-07   293.6   end
Cr-52     247   0   1.02189E-05   293.6   end
Cr-53     247   0   1.15860E-06   293.6   end
Cr-54     247   0   2.87821E-07   293.6   end
Mn-55     247   0   6.48467E-06   293.6   end
Fe-54     247   0   2.36928E-06   293.6   end
Fe-56     247   0   3.71592E-05   293.6   end

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Fe-57      247   0   8.58611E-07  293.6  end
Fe-58      247   0   1.13401E-07  293.6  end
Cu-63      247   0   1.89118E-05  293.6  end
Cu-65      247   0   8.42923E-06  293.6  end
U-234      247   0   4.47532E-06  293.6  end
U-235      247   0   4.17100E-04  293.6  end
U-236      247   0   1.79014E-06  293.6  end
U-238      247   0   2.41667E-05  293.6  end
'      total atom density =  8.00933E-02 a/b-cm
'  8.009330E-02
H-1        248   0   3.32434E-02  293.6  end
B-10       248   0   1.06559E-05  293.6  end
B-11       248   0   4.31670E-05  293.6  end
O-16       248   0   1.76509E-02  293.6  end
Mg-24       248   0   1.05686E-04  293.6  end
Mg-25       248   0   1.33797E-05  293.6  end
Mg-26       248   0   1.47310E-05  293.6  end
Al-27       248   0   2.84107E-02  293.6  end
Si-28       248   0   1.01330E-04  293.6  end
Si-29       248   0   5.13079E-06  293.6  end
Si-30       248   0   3.40588E-06  293.6  end
Ti-46       248   0   4.20262E-07  293.6  end
Ti-47       248   0   3.79000E-07  293.6  end
Ti-48       248   0   3.75536E-06  293.6  end
Ti-49       248   0   2.75590E-07  293.6  end
Ti-50       248   0   2.63873E-07  293.6  end
Cr-50       248   0   5.30517E-07  293.6  end
Cr-52       248   0   1.02189E-05  293.6  end
Cr-53       248   0   1.15860E-06  293.6  end
Cr-54       248   0   2.87821E-07  293.6  end
Mn-55       248   0   6.50452E-06  293.6  end
Fe-54       248   0   2.38070E-06  293.6  end
Fe-56       248   0   3.73384E-05  293.6  end
Fe-57       248   0   8.62751E-07  293.6  end
Fe-58       248   0   1.13948E-07  293.6  end
Cu-63       248   0   1.89779E-05  293.6  end
Cu-65       248   0   8.45870E-06  293.6  end
U-234       248   0   3.98927E-06  293.6  end
U-235       248   0   3.71800E-04  293.6  end
U-236       248   0   1.59572E-06  293.6  end
U-238       248   0   2.15420E-05  293.6  end
'
'      Inner fuel element--fueled Axial region 5
'      total atom density =  8.00804E-02 a/b-cm
'  8.008040E-02
H-1        251   0   3.32434E-02  293.6  end
B-10       251   0   2.04121E-05  293.6  end
B-11       251   0   8.26896E-05  293.6  end
O-16       251   0   1.71757E-02  293.6  end
Mg-24       251   0   1.05686E-04  293.6  end
Mg-25       251   0   1.33797E-05  293.6  end
Mg-26       251   0   1.47310E-05  293.6  end
Al-27       251   0   2.89993E-02  293.6  end
Si-28       251   0   1.02644E-04  293.6  end
Si-29       251   0   5.19729E-06  293.6  end
Si-30       251   0   3.45002E-06  293.6  end
Ti-46       251   0   4.20262E-07  293.6  end
Ti-47       251   0   3.79000E-07  293.6  end
Ti-48       251   0   3.75536E-06  293.6  end
Ti-49       251   0   2.75590E-07  293.6  end
Ti-50       251   0   2.63873E-07  293.6  end
Cr-50       251   0   5.30517E-07  293.6  end
Cr-52       251   0   1.02189E-05  293.6  end
Cr-53       251   0   1.15860E-06  293.6  end
Cr-54       251   0   2.87821E-07  293.6  end
Mn-55       251   0   6.57731E-06  293.6  end
Fe-54       251   0   2.42259E-06  293.6  end
Fe-56       251   0   3.79953E-05  293.6  end
Fe-57       251   0   8.77930E-07  293.6  end
Fe-58       251   0   1.15953E-07  293.6  end
Cu-63       251   0   1.92203E-05  293.6  end
Cu-65       251   0   8.56676E-06  293.6  end
U-234       251   0   2.20708E-06  293.6  end
U-235       251   0   2.05700E-04  293.6  end
U-236       251   0   8.82838E-07  293.6  end
U-238       251   0   1.19182E-05  293.6  end
'
'      total atom density =  8.00839E-02 a/b-cm
'  8.008390E-02
H-1        252   0   3.32434E-02  293.6  end
B-10       252   0   1.77513E-05  293.6  end
B-11       252   0   7.19107E-05  293.6  end

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O-16      252    0   1.73053E-02   293.6   end
Mg-24     252    0   1.05686E-04   293.6   end
Mg-25     252    0   1.33797E-05   293.6   end
Mg-26     252    0   1.47310E-05   293.6   end
Al-27     252    0   2.88388E-02   293.6   end
Si-28     252    0   1.02285E-04   293.6   end
Si-29     252    0   5.17912E-06   293.6   end
Si-30     252    0   3.43796E-06   293.6   end
Ti-46     252    0   4.20262E-07   293.6   end
Ti-47     252    0   3.79000E-07   293.6   end
Ti-48     252    0   3.75536E-06   293.6   end
Ti-49     252    0   2.75590E-07   293.6   end
Ti-50     252    0   2.63873E-07   293.6   end
Cr-50     252    0   5.30517E-07   293.6   end
Cr-52     252    0   1.02189E-05   293.6   end
Cr-53     252    0   1.15860E-06   293.6   end
Cr-54     252    0   2.87821E-07   293.6   end
Mn-55     252    0   6.55746E-06   293.6   end
Fe-54     252    0   2.41117E-06   293.6   end
Fe-56     252    0   3.78162E-05   293.6   end
Fe-57     252    0   8.73792E-07   293.6   end
Fe-58     252    0   1.15406E-07   293.6   end
Cu-63     252    0   1.91542E-05   293.6   end
Cu-65     252    0   8.53729E-06   293.6   end
U-234     252    0   2.69313E-06   293.6   end
U-235     252    0   2.51000E-04   293.6   end
U-236     252    0   1.07726E-06   293.6   end
U-238     252    0   1.45429E-05   293.6   end
'   total atom density =  8.00880E-02 a/b-cm
' 8.008800E-02
H-1       253    0   3.32435E-02   293.6   end
B-10      253    0   1.46911E-05   293.6   end
B-11      253    0   5.95139E-05   293.6   end
O-16      253    0   1.74543E-02   293.6   end
Mg-24     253    0   1.05686E-04   293.6   end
Mg-25     253    0   1.33797E-05   293.6   end
Mg-26     253    0   1.47310E-05   293.6   end
Al-27     253    0   2.86541E-02   293.6   end
Si-28     253    0   1.01874E-04   293.6   end
Si-29     253    0   5.15831E-06   293.6   end
Si-30     253    0   3.42415E-06   293.6   end
Ti-46     253    0   4.20263E-07   293.6   end
Ti-47     253    0   3.79001E-07   293.6   end
Ti-48     253    0   3.75537E-06   293.6   end
Ti-49     253    0   2.75590E-07   293.6   end
Ti-50     253    0   2.63873E-07   293.6   end
Cr-50     253    0   5.30518E-07   293.6   end
Cr-52     253    0   1.02189E-05   293.6   end
Cr-53     253    0   1.15860E-06   293.6   end
Cr-54     253    0   2.87821E-07   293.6   end
Mn-55     253    0   6.53464E-06   293.6   end
Fe-54     253    0   2.39803E-06   293.6   end
Fe-56     253    0   3.76103E-05   293.6   end
Fe-57     253    0   8.69031E-07   293.6   end
Fe-58     253    0   1.14778E-07   293.6   end
Cu-63     253    0   1.90782E-05   293.6   end
Cu-65     253    0   8.50342E-06   293.6   end
U-234     253    0   3.25215E-06   293.6   end
U-235     253    0   3.03100E-04   293.6   end
U-236     253    0   1.30087E-06   293.6   end
U-238     253    0   1.75616E-05   293.6   end
'   total atom density =  8.00937E-02 a/b-cm
' 8.009370E-02
H-1       254    0   3.32434E-02   293.6   end
B-10      254    0   1.03798E-05   293.6   end
B-11      254    0   4.20486E-05   293.6   end
O-16      254    0   1.76644E-02   293.6   end
Mg-24     254    0   1.05686E-04   293.6   end
Mg-25     254    0   1.33797E-05   293.6   end
Mg-26     254    0   1.47310E-05   293.6   end
Al-27     254    0   2.83940E-02   293.6   end
Si-28     254    0   1.01293E-04   293.6   end
Si-29     254    0   5.12887E-06   293.6   end
Si-30     254    0   3.40461E-06   293.6   end
Ti-46     254    0   4.20262E-07   293.6   end
Ti-47     254    0   3.79000E-07   293.6   end
Ti-48     254    0   3.75536E-06   293.6   end
Ti-49     254    0   2.75590E-07   293.6   end
Ti-50     254    0   2.63873E-07   293.6   end
Cr-50     254    0   5.30517E-07   293.6   end
Cr-52     254    0   1.02189E-05   293.6   end

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Cr-53      254    0   1.15860E-06  293.6  end
Cr-54      254    0   2.87821E-07  293.6  end
Mn-55      254    0   6.50246E-06  293.6  end
Fe-54      254    0   2.37952E-06  293.6  end
Fe-56      254    0   3.73198E-05  293.6  end
Fe-57      254    0   8.62321E-07  293.6  end
Fe-58      254    0   1.13891E-07  293.6  end
Cu-63      254    0   1.89710E-05  293.6  end
Cu-65      254    0   8.45562E-06  293.6  end
U-234     254    0   4.03970E-06  293.6  end
U-235     254    0   3.76500E-04  293.6  end
U-236     254    0   1.61589E-06  293.6  end
U-238     254    0   2.18144E-05  293.6  end
'   total atom density =  8.00993E-02 a/b-cm
'  8.009930E-02
H-1        255    0   3.32434E-02  293.6  end
B-10       255    0   6.18010E-06  293.6  end
B-11       255    0   2.50356E-05  293.6  end
O-16       255    0   1.78689E-02  293.6  end
Mg-24      255    0   1.05686E-04  293.6  end
Mg-25      255    0   1.33797E-05  293.6  end
Mg-26      255    0   1.47310E-05  293.6  end
Al-27      255    0   2.81406E-02  293.6  end
Si-28      255    0   1.00727E-04  293.6  end
Si-29      255    0   5.10026E-06  293.6  end
Si-30      255    0   3.38560E-06  293.6  end
Ti-46      255    0   4.20262E-07  293.6  end
Ti-47      255    0   3.79000E-07  293.6  end
Ti-48      255    0   3.75536E-06  293.6  end
Ti-49      255    0   2.75590E-07  293.6  end
Ti-50      255    0   2.63873E-07  293.6  end
Cr-50      255    0   5.30518E-07  293.6  end
Cr-52      255    0   1.02189E-05  293.6  end
Cr-53      255    0   1.15860E-06  293.6  end
Cr-54      255    0   2.87821E-07  293.6  end
Mn-55      255    0   6.47114E-06  293.6  end
Fe-54      255    0   2.36149E-06  293.6  end
Fe-56      255    0   3.70370E-05  293.6  end
Fe-57      255    0   8.55788E-07  293.6  end
Fe-58      255    0   1.13028E-07  293.6  end
Cu-63      255    0   1.88666E-05  293.6  end
Cu-65      255    0   8.40911E-06  293.6  end
U-234     255    0   4.80687E-06  293.6  end
U-235     255    0   4.48000E-04  293.6  end
U-236     255    0   1.92276E-06  293.6  end
U-238     255    0   2.59571E-05  293.6  end
'   total atom density =  8.00998E-02 a/b-cm
'  8.009980E-02
H-1        256    0   3.32434E-02  293.6  end
B-10       256    0   5.79830E-06  293.6  end
B-11       256    0   2.34889E-05  293.6  end
O-16       256    0   1.78875E-02  293.6  end
Mg-24      256    0   1.05686E-04  293.6  end
Mg-25      256    0   1.33797E-05  293.6  end
Mg-26      256    0   1.47310E-05  293.6  end
Al-27      256    0   2.81176E-02  293.6  end
Si-28      256    0   1.00676E-04  293.6  end
Si-29      256    0   5.09768E-06  293.6  end
Si-30      256    0   3.38390E-06  293.6  end
Ti-46      256    0   4.20262E-07  293.6  end
Ti-47      256    0   3.79000E-07  293.6  end
Ti-48      256    0   3.75536E-06  293.6  end
Ti-49      256    0   2.75590E-07  293.6  end
Ti-50      256    0   2.63873E-07  293.6  end
Cr-50      256    0   5.30517E-07  293.6  end
Cr-52      256    0   1.02189E-05  293.6  end
Cr-53      256    0   1.15860E-06  293.6  end
Cr-54      256    0   2.87821E-07  293.6  end
Mn-55      256    0   6.46828E-06  293.6  end
Fe-54      256    0   2.35985E-06  293.6  end
Fe-56      256    0   3.70113E-05  293.6  end
Fe-57      256    0   8.55193E-07  293.6  end
Fe-58      256    0   1.12950E-07  293.6  end
Cu-63      256    0   1.88571E-05  293.6  end
Cu-65      256    0   8.40487E-06  293.6  end
U-234     256    0   4.87661E-06  293.6  end
U-235     256    0   4.54500E-04  293.6  end
U-236     256    0   1.95066E-06  293.6  end
U-238     256    0   2.63337E-05  293.6  end
'   total atom density =  8.00968E-02 a/b-cm
'  8.009680E-02

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H-1          257    0   3.32434E-02   293.6   end
B-10         257    0   7.99507E-06   293.6   end
B-11         257    0   3.23880E-05   293.6   end
O-16          257    0   1.77805E-02   293.6   end
Mg-24         257    0   1.05686E-04   293.6   end
Mg-25         257    0   1.33797E-05   293.6   end
Mg-26         257    0   1.47310E-05   293.6   end
Al-27         257    0   2.82501E-02   293.6   end
Si-28         257    0   1.00972E-04   293.6   end
Si-29         257    0   5.11262E-06   293.6   end
Si-30         257    0   3.39382E-06   293.6   end
Ti-46          257    0   4.20262E-07   293.6   end
Ti-47          257    0   3.79000E-07   293.6   end
Ti-48          257    0   3.75536E-06   293.6   end
Ti-49          257    0   2.75590E-07   293.6   end
Ti-50          257    0   2.63873E-07   293.6   end
Cr-50          257    0   5.30517E-07   293.6   end
Cr-52          257    0   1.02189E-05   293.6   end
Cr-53          257    0   1.15860E-06   293.6   end
Cr-54          257    0   2.87821E-07   293.6   end
Mn-55          257    0   6.48467E-06   293.6   end
Fe-54          257    0   2.36928E-06   293.6   end
Fe-56          257    0   3.71592E-05   293.6   end
Fe-57          257    0   8.58611E-07   293.6   end
Fe-58          257    0   1.13401E-07   293.6   end
Cu-63          257    0   1.89118E-05   293.6   end
Cu-65          257    0   8.42923E-06   293.6   end
U-234          257    0   4.47532E-06   293.6   end
U-235          257    0   4.17100E-04   293.6   end
U-236          257    0   1.79014E-06   293.6   end
U-238          257    0   2.41667E-05   293.6   end
'      total atom density =  8.00933E-02 a/b-cm
'  8.009330E-02
H-1          258    0   3.32434E-02   293.6   end
B-10         258    0   1.06559E-05   293.6   end
B-11         258    0   4.31670E-05   293.6   end
O-16          258    0   1.76509E-02   293.6   end
Mg-24         258    0   1.05686E-04   293.6   end
Mg-25         258    0   1.33797E-05   293.6   end
Mg-26         258    0   1.47310E-05   293.6   end
Al-27         258    0   2.84107E-02   293.6   end
Si-28         258    0   1.01330E-04   293.6   end
Si-29         258    0   5.13079E-06   293.6   end
Si-30         258    0   3.40588E-06   293.6   end
Ti-46          258    0   4.20262E-07   293.6   end
Ti-47          258    0   3.79000E-07   293.6   end
Ti-48          258    0   3.75536E-06   293.6   end
Ti-49          258    0   2.75590E-07   293.6   end
Ti-50          258    0   2.63873E-07   293.6   end
Cr-50          258    0   5.30517E-07   293.6   end
Cr-52          258    0   1.02189E-05   293.6   end
Cr-53          258    0   1.15860E-06   293.6   end
Cr-54          258    0   2.87821E-07   293.6   end
Mn-55          258    0   6.50452E-06   293.6   end
Fe-54          258    0   2.38070E-06   293.6   end
Fe-56          258    0   3.73384E-05   293.6   end
Fe-57          258    0   8.62751E-07   293.6   end
Fe-58          258    0   1.13948E-07   293.6   end
Cu-63          258    0   1.89779E-05   293.6   end
Cu-65          258    0   8.45870E-06   293.6   end
U-234          258    0   3.98927E-06   293.6   end
U-235          258    0   3.71800E-04   293.6   end
U-236          258    0   1.59572E-06   293.6   end
U-238          258    0   2.15420E-05   293.6   end
'
'      Inner fuel element--fueled Axial region 6
'      total atom density =  8.00804E-02 a/b-cm
'  8.008040E-02
H-1          261    0   3.32434E-02   293.6   end
B-10         261    0   2.04121E-05   293.6   end
B-11         261    0   8.26896E-05   293.6   end
O-16          261    0   1.71757E-02   293.6   end
Mg-24         261    0   1.05686E-04   293.6   end
Mg-25         261    0   1.33797E-05   293.6   end
Mg-26         261    0   1.47310E-05   293.6   end
Al-27         261    0   2.89993E-02   293.6   end
Si-28         261    0   1.02644E-04   293.6   end
Si-29         261    0   5.19729E-06   293.6   end
Si-30         261    0   3.45002E-06   293.6   end
Ti-46          261    0   4.20262E-07   293.6   end
Ti-47          261    0   3.79000E-07   293.6   end

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Ti-48      261  0  3.75536E-06  293.6  end
Ti-49      261  0  2.75590E-07  293.6  end
Ti-50      261  0  2.63873E-07  293.6  end
Cr-50      261  0  5.30517E-07  293.6  end
Cr-52      261  0  1.02189E-05  293.6  end
Cr-53      261  0  1.15860E-06  293.6  end
Cr-54      261  0  2.87821E-07  293.6  end
Mn-55      261  0  6.57731E-06  293.6  end
Fe-54      261  0  2.42259E-06  293.6  end
Fe-56      261  0  3.79953E-05  293.6  end
Fe-57      261  0  8.77930E-07  293.6  end
Fe-58      261  0  1.15953E-07  293.6  end
Cu-63      261  0  1.92203E-05  293.6  end
Cu-65      261  0  8.56676E-06  293.6  end
U-234     261  0  2.20708E-06  293.6  end
U-235     261  0  2.05700E-04  293.6  end
U-236     261  0  8.82838E-07  293.6  end
U-238     261  0  1.19182E-05  293.6  end
'   total atom density =  8.00839E-02 a/b-cm
' 8.008390E-02
H-1        262  0  3.32434E-02  293.6  end
B-10       262  0  1.77513E-05  293.6  end
B-11       262  0  7.19107E-05  293.6  end
O-16       262  0  1.73053E-02  293.6  end
Mg-24       262  0  1.05686E-04  293.6  end
Mg-25       262  0  1.33797E-05  293.6  end
Mg-26       262  0  1.47310E-05  293.6  end
Al-27       262  0  2.88388E-02  293.6  end
Si-28       262  0  1.02285E-04  293.6  end
Si-29       262  0  5.17912E-06  293.6  end
Si-30       262  0  3.43796E-06  293.6  end
Ti-46       262  0  4.20262E-07  293.6  end
Ti-47       262  0  3.79000E-07  293.6  end
Ti-48       262  0  3.75536E-06  293.6  end
Ti-49       262  0  2.75590E-07  293.6  end
Ti-50       262  0  2.63873E-07  293.6  end
Cr-50       262  0  5.30517E-07  293.6  end
Cr-52       262  0  1.02189E-05  293.6  end
Cr-53       262  0  1.15860E-06  293.6  end
Cr-54       262  0  2.87821E-07  293.6  end
Mn-55       262  0  6.55746E-06  293.6  end
Fe-54       262  0  2.41117E-06  293.6  end
Fe-56       262  0  3.78162E-05  293.6  end
Fe-57       262  0  8.73792E-07  293.6  end
Fe-58       262  0  1.15406E-07  293.6  end
Cu-63       262  0  1.91542E-05  293.6  end
Cu-65       262  0  8.53729E-06  293.6  end
U-234       262  0  2.69313E-06  293.6  end
U-235       262  0  2.51000E-04  293.6  end
U-236       262  0  1.07726E-06  293.6  end
U-238       262  0  1.45429E-05  293.6  end
'   total atom density =  8.00880E-02 a/b-cm
' 8.008800E-02
H-1        263  0  3.32435E-02  293.6  end
B-10       263  0  1.46911E-05  293.6  end
B-11       263  0  5.95139E-05  293.6  end
O-16       263  0  1.74543E-02  293.6  end
Mg-24       263  0  1.05686E-04  293.6  end
Mg-25       263  0  1.33797E-05  293.6  end
Mg-26       263  0  1.47310E-05  293.6  end
Al-27       263  0  2.86541E-02  293.6  end
Si-28       263  0  1.01874E-04  293.6  end
Si-29       263  0  5.15831E-06  293.6  end
Si-30       263  0  3.42415E-06  293.6  end
Ti-46       263  0  4.20263E-07  293.6  end
Ti-47       263  0  3.79001E-07  293.6  end
Ti-48       263  0  3.75537E-06  293.6  end
Ti-49       263  0  2.75590E-07  293.6  end
Ti-50       263  0  2.63873E-07  293.6  end
Cr-50       263  0  5.30518E-07  293.6  end
Cr-52       263  0  1.02189E-05  293.6  end
Cr-53       263  0  1.15860E-06  293.6  end
Cr-54       263  0  2.87821E-07  293.6  end
Mn-55       263  0  6.53464E-06  293.6  end
Fe-54       263  0  2.39803E-06  293.6  end
Fe-56       263  0  3.76103E-05  293.6  end
Fe-57       263  0  8.69031E-07  293.6  end
Fe-58       263  0  1.14778E-07  293.6  end
Cu-63       263  0  1.90782E-05  293.6  end
Cu-65       263  0  8.50342E-06  293.6  end
U-234       263  0  3.25215E-06  293.6  end

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U-235      263   0   3.03100E-04   293.6   end
U-236      263   0   1.30087E-06   293.6   end
U-238      263   0   1.75616E-05   293.6   end
'   total atom density =  8.00937E-02 a/b-cm
' 8.009370E-02
H-1        264   0   3.32434E-02   293.6   end
B-10       264   0   1.03798E-05   293.6   end
B-11       264   0   4.20486E-05   293.6   end
O-16       264   0   1.76644E-02   293.6   end
Mg-24       264   0   1.05686E-04   293.6   end
Mg-25       264   0   1.33797E-05   293.6   end
Mg-26       264   0   1.47310E-05   293.6   end
Al-27       264   0   2.83940E-02   293.6   end
Si-28       264   0   1.01293E-04   293.6   end
Si-29       264   0   5.12887E-06   293.6   end
Si-30       264   0   3.40461E-06   293.6   end
Ti-46       264   0   4.20262E-07   293.6   end
Ti-47       264   0   3.79000E-07   293.6   end
Ti-48       264   0   3.75536E-06   293.6   end
Ti-49       264   0   2.75590E-07   293.6   end
Ti-50       264   0   2.63873E-07   293.6   end
Cr-50       264   0   5.30517E-07   293.6   end
Cr-52       264   0   1.02189E-05   293.6   end
Cr-53       264   0   1.15860E-06   293.6   end
Cr-54       264   0   2.87821E-07   293.6   end
Mn-55       264   0   6.50246E-06   293.6   end
Fe-54       264   0   2.37952E-06   293.6   end
Fe-56       264   0   3.73198E-05   293.6   end
Fe-57       264   0   8.62321E-07   293.6   end
Fe-58       264   0   1.13891E-07   293.6   end
Cu-63       264   0   1.89710E-05   293.6   end
Cu-65       264   0   8.45562E-06   293.6   end
U-234       264   0   4.03970E-06   293.6   end
U-235       264   0   3.76500E-04   293.6   end
U-236       264   0   1.61589E-06   293.6   end
U-238       264   0   2.18144E-05   293.6   end
'   total atom density =  8.00993E-02 a/b-cm
' 8.009930E-02
H-1        265   0   3.32434E-02   293.6   end
B-10       265   0   6.18010E-06   293.6   end
B-11       265   0   2.50356E-05   293.6   end
O-16       265   0   1.78689E-02   293.6   end
Mg-24       265   0   1.05686E-04   293.6   end
Mg-25       265   0   1.33797E-05   293.6   end
Mg-26       265   0   1.47310E-05   293.6   end
Al-27       265   0   2.81406E-02   293.6   end
Si-28       265   0   1.00727E-04   293.6   end
Si-29       265   0   5.10026E-06   293.6   end
Si-30       265   0   3.38560E-06   293.6   end
Ti-46       265   0   4.20262E-07   293.6   end
Ti-47       265   0   3.79000E-07   293.6   end
Ti-48       265   0   3.75536E-06   293.6   end
Ti-49       265   0   2.75590E-07   293.6   end
Ti-50       265   0   2.63873E-07   293.6   end
Cr-50       265   0   5.30518E-07   293.6   end
Cr-52       265   0   1.02189E-05   293.6   end
Cr-53       265   0   1.15860E-06   293.6   end
Cr-54       265   0   2.87821E-07   293.6   end
Mn-55       265   0   6.47114E-06   293.6   end
Fe-54       265   0   2.36149E-06   293.6   end
Fe-56       265   0   3.70370E-05   293.6   end
Fe-57       265   0   8.55788E-07   293.6   end
Fe-58       265   0   1.13028E-07   293.6   end
Cu-63       265   0   1.88666E-05   293.6   end
Cu-65       265   0   8.40911E-06   293.6   end
U-234       265   0   4.80687E-06   293.6   end
U-235       265   0   4.48000E-04   293.6   end
U-236       265   0   1.92276E-06   293.6   end
U-238       265   0   2.59571E-05   293.6   end
'   total atom density =  8.00998E-02 a/b-cm
' 8.009980E-02
H-1        266   0   3.32434E-02   293.6   end
B-10       266   0   5.79830E-06   293.6   end
B-11       266   0   2.34889E-05   293.6   end
O-16       266   0   1.78875E-02   293.6   end
Mg-24       266   0   1.05686E-04   293.6   end
Mg-25       266   0   1.33797E-05   293.6   end
Mg-26       266   0   1.47310E-05   293.6   end
Al-27       266   0   2.81176E-02   293.6   end
Si-28       266   0   1.00676E-04   293.6   end
Si-29       266   0   5.09768E-06   293.6   end

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Si-30      266    0   3.38390E-06  293.6  end
Ti-46      266    0   4.20262E-07  293.6  end
Ti-47      266    0   3.79000E-07  293.6  end
Ti-48      266    0   3.75536E-06  293.6  end
Ti-49      266    0   2.75590E-07  293.6  end
Ti-50      266    0   2.63873E-07  293.6  end
Cr-50      266    0   5.30517E-07  293.6  end
Cr-52      266    0   1.02189E-05  293.6  end
Cr-53      266    0   1.15860E-06  293.6  end
Cr-54      266    0   2.87821E-07  293.6  end
Mn-55      266    0   6.46828E-06  293.6  end
Fe-54      266    0   2.35985E-06  293.6  end
Fe-56      266    0   3.70113E-05  293.6  end
Fe-57      266    0   8.55193E-07  293.6  end
Fe-58      266    0   1.12950E-07  293.6  end
Cu-63      266    0   1.88571E-05  293.6  end
Cu-65      266    0   8.40487E-06  293.6  end
U-234     266    0   4.87661E-06  293.6  end
U-235     266    0   4.54500E-04  293.6  end
U-236     266    0   1.95066E-06  293.6  end
U-238     266    0   2.63337E-05  293.6  end
'   total atom density =  8.00968E-02 a/b-cm
' 8.009680E-02
H-1        267    0   3.32434E-02  293.6  end
B-10       267    0   7.99507E-06  293.6  end
B-11       267    0   3.23880E-05  293.6  end
O-16       267    0   1.77805E-02  293.6  end
Mg-24      267    0   1.05686E-04  293.6  end
Mg-25      267    0   1.33797E-05  293.6  end
Mg-26      267    0   1.47310E-05  293.6  end
Al-27      267    0   2.82501E-02  293.6  end
Si-28      267    0   1.00972E-04  293.6  end
Si-29      267    0   5.11262E-06  293.6  end
Si-30      267    0   3.39382E-06  293.6  end
Ti-46      267    0   4.20262E-07  293.6  end
Ti-47      267    0   3.79000E-07  293.6  end
Ti-48      267    0   3.75536E-06  293.6  end
Ti-49      267    0   2.75590E-07  293.6  end
Ti-50      267    0   2.63873E-07  293.6  end
Cr-50      267    0   5.30517E-07  293.6  end
Cr-52      267    0   1.02189E-05  293.6  end
Cr-53      267    0   1.15860E-06  293.6  end
Cr-54      267    0   2.87821E-07  293.6  end
Mn-55      267    0   6.48467E-06  293.6  end
Fe-54      267    0   2.36928E-06  293.6  end
Fe-56      267    0   3.71592E-05  293.6  end
Fe-57      267    0   8.58611E-07  293.6  end
Fe-58      267    0   1.13401E-07  293.6  end
Cu-63      267    0   1.89118E-05  293.6  end
Cu-65      267    0   8.42923E-06  293.6  end
U-234     267    0   4.47532E-06  293.6  end
U-235     267    0   4.17100E-04  293.6  end
U-236     267    0   1.79014E-06  293.6  end
U-238     267    0   2.41667E-05  293.6  end
'   total atom density =  8.00933E-02 a/b-cm
' 8.009330E-02
H-1        268    0   3.32434E-02  293.6  end
B-10       268    0   1.06559E-05  293.6  end
B-11       268    0   4.31670E-05  293.6  end
O-16       268    0   1.76509E-02  293.6  end
Mg-24      268    0   1.05686E-04  293.6  end
Mg-25      268    0   1.33797E-05  293.6  end
Mg-26      268    0   1.47310E-05  293.6  end
Al-27      268    0   2.84107E-02  293.6  end
Si-28      268    0   1.01330E-04  293.6  end
Si-29      268    0   5.13079E-06  293.6  end
Si-30      268    0   3.40588E-06  293.6  end
Ti-46      268    0   4.20262E-07  293.6  end
Ti-47      268    0   3.79000E-07  293.6  end
Ti-48      268    0   3.75536E-06  293.6  end
Ti-49      268    0   2.75590E-07  293.6  end
Ti-50      268    0   2.63873E-07  293.6  end
Cr-50      268    0   5.30517E-07  293.6  end
Cr-52      268    0   1.02189E-05  293.6  end
Cr-53      268    0   1.15860E-06  293.6  end
Cr-54      268    0   2.87821E-07  293.6  end
Mn-55      268    0   6.50452E-06  293.6  end
Fe-54      268    0   2.38070E-06  293.6  end
Fe-56      268    0   3.73384E-05  293.6  end
Fe-57      268    0   8.62751E-07  293.6  end
Fe-58      268    0   1.13948E-07  293.6  end

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Cu-63      268   0   1.89779E-05  293.6  end
Cu-65      268   0   8.45870E-06  293.6  end
U-234      268   0   3.98927E-06  293.6  end
U-235      268   0   3.71800E-04  293.6  end
U-236      268   0   1.59572E-06  293.6  end
U-238      268   0   2.15420E-05  293.6  end
'
'           Inner fuel element--fueled Axial region 7
'           total atom density =  8.00804E-02 a/b-cm
' 8.008040E-02
H-1        271   0   3.32434E-02  293.6  end
B-10       271   0   2.04121E-05  293.6  end
B-11       271   0   8.26896E-05  293.6  end
O-16       271   0   1.71757E-02  293.6  end
Mg-24      271   0   1.05686E-04  293.6  end
Mg-25      271   0   1.33797E-05  293.6  end
Mg-26      271   0   1.47310E-05  293.6  end
Al-27      271   0   2.89993E-02  293.6  end
Si-28      271   0   1.02644E-04  293.6  end
Si-29      271   0   5.19729E-06  293.6  end
Si-30      271   0   3.45002E-06  293.6  end
Ti-46      271   0   4.20262E-07  293.6  end
Ti-47      271   0   3.79000E-07  293.6  end
Ti-48      271   0   3.75536E-06  293.6  end
Ti-49      271   0   2.75590E-07  293.6  end
Ti-50      271   0   2.63873E-07  293.6  end
Cr-50      271   0   5.30517E-07  293.6  end
Cr-52      271   0   1.02189E-05  293.6  end
Cr-53      271   0   1.15860E-06  293.6  end
Cr-54      271   0   2.87821E-07  293.6  end
Mn-55      271   0   6.57731E-06  293.6  end
Fe-54      271   0   2.42259E-06  293.6  end
Fe-56      271   0   3.79953E-05  293.6  end
Fe-57      271   0   8.77930E-07  293.6  end
Fe-58      271   0   1.15953E-07  293.6  end
Cu-63      271   0   1.92203E-05  293.6  end
Cu-65      271   0   8.56676E-06  293.6  end
U-234      271   0   2.20708E-06  293.6  end
U-235      271   0   2.05700E-04  293.6  end
U-236      271   0   8.82838E-07  293.6  end
U-238      271   0   1.19182E-05  293.6  end
'
'           total atom density =  8.00839E-02 a/b-cm
' 8.008390E-02
H-1        272   0   3.32434E-02  293.6  end
B-10       272   0   1.77513E-05  293.6  end
B-11       272   0   7.19107E-05  293.6  end
O-16       272   0   1.73053E-02  293.6  end
Mg-24      272   0   1.05686E-04  293.6  end
Mg-25      272   0   1.33797E-05  293.6  end
Mg-26      272   0   1.47310E-05  293.6  end
Al-27      272   0   2.88388E-02  293.6  end
Si-28      272   0   1.02285E-04  293.6  end
Si-29      272   0   5.17912E-06  293.6  end
Si-30      272   0   3.43796E-06  293.6  end
Ti-46      272   0   4.20262E-07  293.6  end
Ti-47      272   0   3.79000E-07  293.6  end
Ti-48      272   0   3.75536E-06  293.6  end
Ti-49      272   0   2.75590E-07  293.6  end
Ti-50      272   0   2.63873E-07  293.6  end
Cr-50      272   0   5.30517E-07  293.6  end
Cr-52      272   0   1.02189E-05  293.6  end
Cr-53      272   0   1.15860E-06  293.6  end
Cr-54      272   0   2.87821E-07  293.6  end
Mn-55      272   0   6.55746E-06  293.6  end
Fe-54      272   0   2.41117E-06  293.6  end
Fe-56      272   0   3.78162E-05  293.6  end
Fe-57      272   0   8.73792E-07  293.6  end
Fe-58      272   0   1.15406E-07  293.6  end
Cu-63      272   0   1.91542E-05  293.6  end
Cu-65      272   0   8.53729E-06  293.6  end
U-234      272   0   2.69313E-06  293.6  end
U-235      272   0   2.51000E-04  293.6  end
U-236      272   0   1.07726E-06  293.6  end
U-238      272   0   1.45429E-05  293.6  end
'
'           total atom density =  8.00880E-02 a/b-cm
' 8.008800E-02
H-1        273   0   3.32435E-02  293.6  end
B-10       273   0   1.46911E-05  293.6  end
B-11       273   0   5.95139E-05  293.6  end
O-16       273   0   1.74543E-02  293.6  end
Mg-24      273   0   1.05686E-04  293.6  end

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Mg-25      273   0   1.33797E-05  293.6  end
Mg-26      273   0   1.47310E-05  293.6  end
Al-27      273   0   2.86541E-02  293.6  end
Si-28      273   0   1.01874E-04  293.6  end
Si-29      273   0   5.15831E-06  293.6  end
Si-30      273   0   3.42415E-06  293.6  end
Ti-46      273   0   4.20263E-07  293.6  end
Ti-47      273   0   3.79001E-07  293.6  end
Ti-48      273   0   3.75537E-06  293.6  end
Ti-49      273   0   2.75590E-07  293.6  end
Ti-50      273   0   2.63873E-07  293.6  end
Cr-50      273   0   5.30518E-07  293.6  end
Cr-52      273   0   1.02189E-05  293.6  end
Cr-53      273   0   1.15860E-06  293.6  end
Cr-54      273   0   2.87821E-07  293.6  end
Mn-55      273   0   6.53464E-06  293.6  end
Fe-54      273   0   2.39803E-06  293.6  end
Fe-56      273   0   3.76103E-05  293.6  end
Fe-57      273   0   8.69031E-07  293.6  end
Fe-58      273   0   1.14778E-07  293.6  end
Cu-63      273   0   1.90782E-05  293.6  end
Cu-65      273   0   8.50342E-06  293.6  end
U-234     273   0   3.25215E-06  293.6  end
U-235     273   0   3.03100E-04  293.6  end
U-236     273   0   1.30087E-06  293.6  end
U-238     273   0   1.75616E-05  293.6  end
'      total atom density =  8.00937E-02 a/b-cm
'  8.009370E-02
H-1        274   0   3.32434E-02  293.6  end
B-10       274   0   1.03798E-05  293.6  end
B-11       274   0   4.20486E-05  293.6  end
O-16       274   0   1.76644E-02  293.6  end
Mg-24       274   0   1.05686E-04  293.6  end
Mg-25       274   0   1.33797E-05  293.6  end
Mg-26       274   0   1.47310E-05  293.6  end
Al-27       274   0   2.83940E-02  293.6  end
Si-28       274   0   1.01293E-04  293.6  end
Si-29       274   0   5.12887E-06  293.6  end
Si-30       274   0   3.40461E-06  293.6  end
Ti-46       274   0   4.20262E-07  293.6  end
Ti-47       274   0   3.79000E-07  293.6  end
Ti-48       274   0   3.75536E-06  293.6  end
Ti-49       274   0   2.75590E-07  293.6  end
Ti-50       274   0   2.63873E-07  293.6  end
Cr-50       274   0   5.30517E-07  293.6  end
Cr-52       274   0   1.02189E-05  293.6  end
Cr-53       274   0   1.15860E-06  293.6  end
Cr-54       274   0   2.87821E-07  293.6  end
Mn-55       274   0   6.50246E-06  293.6  end
Fe-54       274   0   2.37952E-06  293.6  end
Fe-56       274   0   3.73198E-05  293.6  end
Fe-57       274   0   8.62321E-07  293.6  end
Fe-58       274   0   1.13891E-07  293.6  end
Cu-63       274   0   1.89710E-05  293.6  end
Cu-65       274   0   8.45562E-06  293.6  end
U-234       274   0   4.03970E-06  293.6  end
U-235       274   0   3.76500E-04  293.6  end
U-236       274   0   1.61589E-06  293.6  end
U-238       274   0   2.18144E-05  293.6  end
'      total atom density =  8.00993E-02 a/b-cm
'  8.009930E-02
H-1        275   0   3.32434E-02  293.6  end
B-10       275   0   6.18010E-06  293.6  end
B-11       275   0   2.50356E-05  293.6  end
O-16       275   0   1.78689E-02  293.6  end
Mg-24       275   0   1.05686E-04  293.6  end
Mg-25       275   0   1.33797E-05  293.6  end
Mg-26       275   0   1.47310E-05  293.6  end
Al-27       275   0   2.81406E-02  293.6  end
Si-28       275   0   1.00727E-04  293.6  end
Si-29       275   0   5.10026E-06  293.6  end
Si-30       275   0   3.38560E-06  293.6  end
Ti-46       275   0   4.20262E-07  293.6  end
Ti-47       275   0   3.79000E-07  293.6  end
Ti-48       275   0   3.75536E-06  293.6  end
Ti-49       275   0   2.75590E-07  293.6  end
Ti-50       275   0   2.63873E-07  293.6  end
Cr-50       275   0   5.30518E-07  293.6  end
Cr-52       275   0   1.02189E-05  293.6  end
Cr-53       275   0   1.15860E-06  293.6  end
Cr-54       275   0   2.87821E-07  293.6  end

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Mn-55      275   0   6.47114E-06  293.6  end
Fe-54      275   0   2.36149E-06  293.6  end
Fe-56      275   0   3.70370E-05  293.6  end
Fe-57      275   0   8.55788E-07  293.6  end
Fe-58      275   0   1.13028E-07  293.6  end
Cu-63      275   0   1.88666E-05  293.6  end
Cu-65      275   0   8.40911E-06  293.6  end
U-234     275   0   4.80687E-06  293.6  end
U-235     275   0   4.48000E-04   293.6  end
U-236     275   0   1.92276E-06  293.6  end
U-238     275   0   2.59571E-05  293.6  end
'   total atom density =  8.00998E-02 a/b-cm
'  8.009980E-02
H-1        276   0   3.32434E-02  293.6  end
B-10       276   0   5.79830E-06  293.6  end
B-11       276   0   2.34889E-05  293.6  end
O-16       276   0   1.78875E-02  293.6  end
Mg-24      276   0   1.05686E-04  293.6  end
Mg-25      276   0   1.33797E-05  293.6  end
Mg-26      276   0   1.47310E-05  293.6  end
Al-27      276   0   2.81176E-02  293.6  end
Si-28      276   0   1.00676E-04  293.6  end
Si-29      276   0   5.09768E-06  293.6  end
Si-30      276   0   3.38390E-06  293.6  end
Ti-46      276   0   4.20262E-07  293.6  end
Ti-47      276   0   3.79000E-07  293.6  end
Ti-48      276   0   3.75536E-06  293.6  end
Ti-49      276   0   2.75590E-07  293.6  end
Ti-50      276   0   2.63873E-07  293.6  end
Cr-50      276   0   5.30517E-07  293.6  end
Cr-52      276   0   1.02189E-05  293.6  end
Cr-53      276   0   1.15860E-06  293.6  end
Cr-54      276   0   2.87821E-07  293.6  end
Mn-55      276   0   6.46828E-06  293.6  end
Fe-54      276   0   2.35985E-06  293.6  end
Fe-56      276   0   3.70113E-05  293.6  end
Fe-57      276   0   8.55193E-07  293.6  end
Fe-58      276   0   1.12950E-07  293.6  end
Cu-63      276   0   1.88571E-05  293.6  end
Cu-65      276   0   8.40487E-06  293.6  end
U-234     276   0   4.87661E-06  293.6  end
U-235     276   0   4.54500E-04   293.6  end
U-236     276   0   1.95066E-06  293.6  end
U-238     276   0   2.63337E-05  293.6  end
'   total atom density =  8.00968E-02 a/b-cm
'  8.009680E-02
H-1        277   0   3.32434E-02  293.6  end
B-10       277   0   7.99507E-06  293.6  end
B-11       277   0   3.23880E-05  293.6  end
O-16       277   0   1.77805E-02  293.6  end
Mg-24      277   0   1.05686E-04  293.6  end
Mg-25      277   0   1.33797E-05  293.6  end
Mg-26      277   0   1.47310E-05  293.6  end
Al-27      277   0   2.82501E-02  293.6  end
Si-28      277   0   1.00972E-04  293.6  end
Si-29      277   0   5.11262E-06  293.6  end
Si-30      277   0   3.39382E-06  293.6  end
Ti-46      277   0   4.20262E-07  293.6  end
Ti-47      277   0   3.79000E-07  293.6  end
Ti-48      277   0   3.75536E-06  293.6  end
Ti-49      277   0   2.75590E-07  293.6  end
Ti-50      277   0   2.63873E-07  293.6  end
Cr-50      277   0   5.30517E-07  293.6  end
Cr-52      277   0   1.02189E-05  293.6  end
Cr-53      277   0   1.15860E-06  293.6  end
Cr-54      277   0   2.87821E-07  293.6  end
Mn-55      277   0   6.48467E-06  293.6  end
Fe-54      277   0   2.36928E-06  293.6  end
Fe-56      277   0   3.71592E-05  293.6  end
Fe-57      277   0   8.58611E-07  293.6  end
Fe-58      277   0   1.13401E-07  293.6  end
Cu-63      277   0   1.89118E-05  293.6  end
Cu-65      277   0   8.42923E-06  293.6  end
U-234     277   0   4.47532E-06  293.6  end
U-235     277   0   4.17100E-04   293.6  end
U-236     277   0   1.79014E-06  293.6  end
U-238     277   0   2.41667E-05  293.6  end
'   total atom density =  8.00933E-02 a/b-cm
'  8.009330E-02
H-1        278   0   3.32434E-02  293.6  end
B-10       278   0   1.06559E-05  293.6  end

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B-11	278	0	4.31670E-05	293.6	end
O-16	278	0	1.76509E-02	293.6	end
Mg-24	278	0	1.05686E-04	293.6	end
Mg-25	278	0	1.33797E-05	293.6	end
Mg-26	278	0	1.47310E-05	293.6	end
Al-27	278	0	2.84107E-02	293.6	end
Si-28	278	0	1.01330E-04	293.6	end
Si-29	278	0	5.13079E-06	293.6	end
Si-30	278	0	3.40588E-06	293.6	end
Ti-46	278	0	4.20262E-07	293.6	end
Ti-47	278	0	3.79000E-07	293.6	end
Ti-48	278	0	3.75536E-06	293.6	end
Ti-49	278	0	2.75590E-07	293.6	end
Ti-50	278	0	2.63873E-07	293.6	end
Cr-50	278	0	5.30517E-07	293.6	end
Cr-52	278	0	1.02189E-05	293.6	end
Cr-53	278	0	1.15860E-06	293.6	end
Cr-54	278	0	2.87821E-07	293.6	end
Mn-55	278	0	6.50452E-06	293.6	end
Fe-54	278	0	2.38070E-06	293.6	end
Fe-56	278	0	3.73384E-05	293.6	end
Fe-57	278	0	8.62751E-07	293.6	end
Fe-58	278	0	1.13948E-07	293.6	end
Cu-63	278	0	1.89779E-05	293.6	end
Cu-65	278	0	8.45870E-06	293.6	end
U-234	278	0	3.98927E-06	293.6	end
U-235	278	0	3.71800E-04	293.6	end
U-236	278	0	1.59572E-06	293.6	end
U-238	278	0	2.15420E-05	293.6	end

Inner fuel element--fueled Axial region 8
total atom density = 8.00804E-02 a/b-cm

H-1	281	0	3.32434E-02	293.6	end
B-10	281	0	2.04121E-05	293.6	end
B-11	281	0	8.26896E-05	293.6	end
O-16	281	0	1.71757E-02	293.6	end
Mg-24	281	0	1.05686E-04	293.6	end
Mg-25	281	0	1.33797E-05	293.6	end
Mg-26	281	0	1.47310E-05	293.6	end
Al-27	281	0	2.89993E-02	293.6	end
Si-28	281	0	1.02644E-04	293.6	end
Si-29	281	0	5.19729E-06	293.6	end
Si-30	281	0	3.45002E-06	293.6	end
Ti-46	281	0	4.20262E-07	293.6	end
Ti-47	281	0	3.79000E-07	293.6	end
Ti-48	281	0	3.75536E-06	293.6	end
Ti-49	281	0	2.75590E-07	293.6	end
Ti-50	281	0	2.63873E-07	293.6	end
Cr-50	281	0	5.30517E-07	293.6	end
Cr-52	281	0	1.02189E-05	293.6	end
Cr-53	281	0	1.15860E-06	293.6	end
Cr-54	281	0	2.87821E-07	293.6	end
Mn-55	281	0	6.57731E-06	293.6	end
Fe-54	281	0	2.42259E-06	293.6	end
Fe-56	281	0	3.79953E-05	293.6	end
Fe-57	281	0	8.77930E-07	293.6	end
Fe-58	281	0	1.15953E-07	293.6	end
Cu-63	281	0	1.92203E-05	293.6	end
Cu-65	281	0	8.56676E-06	293.6	end
U-234	281	0	2.20708E-06	293.6	end
U-235	281	0	2.05700E-04	293.6	end
U-236	281	0	8.82838E-07	293.6	end
U-238	281	0	1.19182E-05	293.6	end

total atom density = 8.00839E-02 a/b-cm
8.008390E-02

H-1	282	0	3.32434E-02	293.6	end
B-10	282	0	1.77513E-05	293.6	end
B-11	282	0	7.19107E-05	293.6	end
O-16	282	0	1.73053E-02	293.6	end
Mg-24	282	0	1.05686E-04	293.6	end
Mg-25	282	0	1.33797E-05	293.6	end
Mg-26	282	0	1.47310E-05	293.6	end
Al-27	282	0	2.88388E-02	293.6	end
Si-28	282	0	1.02285E-04	293.6	end
Si-29	282	0	5.17912E-06	293.6	end
Si-30	282	0	3.43796E-06	293.6	end
Ti-46	282	0	4.20262E-07	293.6	end
Ti-47	282	0	3.79000E-07	293.6	end
Ti-48	282	0	3.75536E-06	293.6	end
Ti-49	282	0	2.75590E-07	293.6	end

Ti-50	282	0	2.63873E-07	293.6	end
Cr-50	282	0	5.30517E-07	293.6	end
Cr-52	282	0	1.02189E-05	293.6	end
Cr-53	282	0	1.15860E-06	293.6	end
Cr-54	282	0	2.87821E-07	293.6	end
Mn-55	282	0	6.55746E-06	293.6	end
Fe-54	282	0	2.41117E-06	293.6	end
Fe-56	282	0	3.78162E-05	293.6	end
Fe-57	282	0	8.73792E-07	293.6	end
Fe-58	282	0	1.15406E-07	293.6	end
Cu-63	282	0	1.91542E-05	293.6	end
Cu-65	282	0	8.53729E-06	293.6	end
U-234	282	0	2.69313E-06	293.6	end
U-235	282	0	2.51000E-04	293.6	end
U-236	282	0	1.07726E-06	293.6	end
U-238	282	0	1.45429E-05	293.6	end
total atom density = 8.00880E-02 a/b-cm					
8.00880E-02					
H-1	283	0	3.32435E-02	293.6	end
B-10	283	0	1.46911E-05	293.6	end
B-11	283	0	5.95139E-05	293.6	end
O-16	283	0	1.74543E-02	293.6	end
Mg-24	283	0	1.05686E-04	293.6	end
Mg-25	283	0	1.33797E-05	293.6	end
Mg-26	283	0	1.47310E-05	293.6	end
Al-27	283	0	2.86541E-02	293.6	end
Si-28	283	0	1.01874E-04	293.6	end
Si-29	283	0	5.15831E-06	293.6	end
Si-30	283	0	3.42415E-06	293.6	end
Ti-46	283	0	4.20263E-07	293.6	end
Ti-47	283	0	3.79001E-07	293.6	end
Ti-48	283	0	3.75537E-06	293.6	end
Ti-49	283	0	2.75590E-07	293.6	end
Ti-50	283	0	2.63873E-07	293.6	end
Cr-50	283	0	5.30518E-07	293.6	end
Cr-52	283	0	1.02189E-05	293.6	end
Cr-53	283	0	1.15860E-06	293.6	end
Cr-54	283	0	2.87821E-07	293.6	end
Mn-55	283	0	6.53464E-06	293.6	end
Fe-54	283	0	2.39803E-06	293.6	end
Fe-56	283	0	3.76103E-05	293.6	end
Fe-57	283	0	8.69031E-07	293.6	end
Fe-58	283	0	1.14778E-07	293.6	end
Cu-63	283	0	1.90782E-05	293.6	end
Cu-65	283	0	8.50342E-06	293.6	end
U-234	283	0	3.25215E-06	293.6	end
U-235	283	0	3.03100E-04	293.6	end
U-236	283	0	1.30087E-06	293.6	end
U-238	283	0	1.75616E-05	293.6	end
total atom density = 8.00937E-02 a/b-cm					
8.00937E-02					
H-1	284	0	3.32434E-02	293.6	end
B-10	284	0	1.03798E-05	293.6	end
B-11	284	0	4.20486E-05	293.6	end
O-16	284	0	1.76644E-02	293.6	end
Mg-24	284	0	1.05686E-04	293.6	end
Mg-25	284	0	1.33797E-05	293.6	end
Mg-26	284	0	1.47310E-05	293.6	end
Al-27	284	0	2.83940E-02	293.6	end
Si-28	284	0	1.01293E-04	293.6	end
Si-29	284	0	5.12887E-06	293.6	end
Si-30	284	0	3.40461E-06	293.6	end
Ti-46	284	0	4.20262E-07	293.6	end
Ti-47	284	0	3.79000E-07	293.6	end
Ti-48	284	0	3.75536E-06	293.6	end
Ti-49	284	0	2.75590E-07	293.6	end
Ti-50	284	0	2.63873E-07	293.6	end
Cr-50	284	0	5.30517E-07	293.6	end
Cr-52	284	0	1.02189E-05	293.6	end
Cr-53	284	0	1.15860E-06	293.6	end
Cr-54	284	0	2.87821E-07	293.6	end
Mn-55	284	0	6.50246E-06	293.6	end
Fe-54	284	0	2.37952E-06	293.6	end
Fe-56	284	0	3.73198E-05	293.6	end
Fe-57	284	0	8.62321E-07	293.6	end
Fe-58	284	0	1.13891E-07	293.6	end
Cu-63	284	0	1.89710E-05	293.6	end
Cu-65	284	0	8.45562E-06	293.6	end
U-234	284	0	4.03970E-06	293.6	end
U-235	284	0	3.76500E-04	293.6	end
U-236	284	0	1.61589E-06	293.6	end

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U-238      284    0   2.18144E-05   293.6   end
' total atom density =  8.00993E-02 a/b-cm
' 8.009930E-02
H-1        285    0   3.32434E-02   293.6   end
B-10       285    0   6.18010E-06   293.6   end
B-11       285    0   2.50356E-05   293.6   end
O-16       285    0   1.78689E-02   293.6   end
Mg-24      285    0   1.05686E-04   293.6   end
Mg-25      285    0   1.33797E-05   293.6   end
Mg-26      285    0   1.47310E-05   293.6   end
Al-27      285    0   2.81406E-02   293.6   end
Si-28      285    0   1.00727E-04   293.6   end
Si-29      285    0   5.10026E-06   293.6   end
Si-30      285    0   3.38560E-06   293.6   end
Ti-46      285    0   4.20262E-07   293.6   end
Ti-47      285    0   3.79000E-07   293.6   end
Ti-48      285    0   3.75536E-06   293.6   end
Ti-49      285    0   2.75590E-07   293.6   end
Ti-50      285    0   2.63873E-07   293.6   end
Cr-50      285    0   5.30518E-07   293.6   end
Cr-52      285    0   1.02189E-05   293.6   end
Cr-53      285    0   1.15860E-06   293.6   end
Cr-54      285    0   2.87821E-07   293.6   end
Mn-55      285    0   6.47114E-06   293.6   end
Fe-54      285    0   2.36149E-06   293.6   end
Fe-56      285    0   3.70370E-05   293.6   end
Fe-57      285    0   8.55788E-07   293.6   end
Fe-58      285    0   1.13028E-07   293.6   end
Cu-63      285    0   1.88666E-05   293.6   end
Cu-65      285    0   8.40911E-06   293.6   end
U-234     285    0   4.80687E-06   293.6   end
U-235     285    0   4.48000E-04   293.6   end
U-236     285    0   1.92276E-06   293.6   end
U-238     285    0   2.59571E-05   293.6   end
' total atom density =  8.00998E-02 a/b-cm
' 8.009980E-02
H-1        286    0   3.32434E-02   293.6   end
B-10       286    0   5.79830E-06   293.6   end
B-11       286    0   2.34889E-05   293.6   end
O-16       286    0   1.78875E-02   293.6   end
Mg-24      286    0   1.05686E-04   293.6   end
Mg-25      286    0   1.33797E-05   293.6   end
Mg-26      286    0   1.47310E-05   293.6   end
Al-27      286    0   2.81176E-02   293.6   end
Si-28      286    0   1.00676E-04   293.6   end
Si-29      286    0   5.09768E-06   293.6   end
Si-30      286    0   3.38390E-06   293.6   end
Ti-46      286    0   4.20262E-07   293.6   end
Ti-47      286    0   3.79000E-07   293.6   end
Ti-48      286    0   3.75536E-06   293.6   end
Ti-49      286    0   2.75590E-07   293.6   end
Ti-50      286    0   2.63873E-07   293.6   end
Cr-50      286    0   5.30517E-07   293.6   end
Cr-52      286    0   1.02189E-05   293.6   end
Cr-53      286    0   1.15860E-06   293.6   end
Cr-54      286    0   2.87821E-07   293.6   end
Mn-55      286    0   6.46828E-06   293.6   end
Fe-54      286    0   2.35985E-06   293.6   end
Fe-56      286    0   3.70113E-05   293.6   end
Fe-57      286    0   8.55193E-07   293.6   end
Fe-58      286    0   1.12950E-07   293.6   end
Cu-63      286    0   1.88571E-05   293.6   end
Cu-65      286    0   8.40487E-06   293.6   end
U-234     286    0   4.87661E-06   293.6   end
U-235     286    0   4.54500E-04   293.6   end
U-236     286    0   1.95066E-06   293.6   end
U-238     286    0   2.63337E-05   293.6   end
' total atom density =  8.00968E-02 a/b-cm
' 8.009680E-02
H-1        287    0   3.32434E-02   293.6   end
B-10       287    0   7.99507E-06   293.6   end
B-11       287    0   3.23880E-05   293.6   end
O-16       287    0   1.77805E-02   293.6   end
Mg-24      287    0   1.05686E-04   293.6   end
Mg-25      287    0   1.33797E-05   293.6   end
Mg-26      287    0   1.47310E-05   293.6   end
Al-27      287    0   2.82501E-02   293.6   end
Si-28      287    0   1.00972E-04   293.6   end
Si-29      287    0   5.11262E-06   293.6   end
Si-30      287    0   3.39382E-06   293.6   end
Ti-46      287    0   4.20262E-07   293.6   end

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Ti-47      287    0   3.79000E-07  293.6  end
Ti-48      287    0   3.75536E-06  293.6  end
Ti-49      287    0   2.75590E-07  293.6  end
Ti-50      287    0   2.63873E-07  293.6  end
Cr-50      287    0   5.30517E-07  293.6  end
Cr-52      287    0   1.02189E-05  293.6  end
Cr-53      287    0   1.15860E-06  293.6  end
Cr-54      287    0   2.87821E-07  293.6  end
Mn-55      287    0   6.48467E-06  293.6  end
Fe-54      287    0   2.36928E-06  293.6  end
Fe-56      287    0   3.71592E-05  293.6  end
Fe-57      287    0   8.58611E-07  293.6  end
Fe-58      287    0   1.13401E-07  293.6  end
Cu-63      287    0   1.89118E-05  293.6  end
Cu-65      287    0   8.42923E-06  293.6  end
U-234     287    0   4.47532E-06  293.6  end
U-235     287    0   4.17100E-04  293.6  end
U-236     287    0   1.79014E-06  293.6  end
U-238     287    0   2.41667E-05  293.6  end
'   total atom density =  8.00933E-02 a/b-cm
'  8.009330E-02
H-1        288    0   3.32434E-02  293.6  end
B-10       288    0   1.06559E-05  293.6  end
B-11       288    0   4.31670E-05  293.6  end
O-16       288    0   1.76509E-02  293.6  end
Mg-24       288    0   1.05686E-04  293.6  end
Mg-25       288    0   1.33797E-05  293.6  end
Mg-26       288    0   1.47310E-05  293.6  end
Al-27       288    0   2.84107E-02  293.6  end
Si-28       288    0   1.01330E-04  293.6  end
Si-29       288    0   5.13079E-06  293.6  end
Si-30       288    0   3.40588E-06  293.6  end
Ti-46       288    0   4.20262E-07  293.6  end
Ti-47       288    0   3.79000E-07  293.6  end
Ti-48       288    0   3.75536E-06  293.6  end
Ti-49       288    0   2.75590E-07  293.6  end
Ti-50       288    0   2.63873E-07  293.6  end
Cr-50       288    0   5.30517E-07  293.6  end
Cr-52       288    0   1.02189E-05  293.6  end
Cr-53       288    0   1.15860E-06  293.6  end
Cr-54       288    0   2.87821E-07  293.6  end
Mn-55       288    0   6.50452E-06  293.6  end
Fe-54       288    0   2.38070E-06  293.6  end
Fe-56       288    0   3.73384E-05  293.6  end
Fe-57       288    0   8.62751E-07  293.6  end
Fe-58       288    0   1.13948E-07  293.6  end
Cu-63       288    0   1.89779E-05  293.6  end
Cu-65       288    0   8.45870E-06  293.6  end
U-234       288    0   3.98927E-06  293.6  end
U-235       288    0   3.71800E-04  293.6  end
U-236       288    0   1.59572E-06  293.6  end
U-238       288    0   2.15420E-05  293.6  end
'
'   Inner fuel element--fueled Axial region 9
'   total atom density =  8.00804E-02 a/b-cm
'  8.008040E-02
H-1        291    0   3.32434E-02  293.6  end
B-10       291    0   2.04121E-05  293.6  end
B-11       291    0   8.26896E-05  293.6  end
O-16       291    0   1.71757E-02  293.6  end
Mg-24       291    0   1.05686E-04  293.6  end
Mg-25       291    0   1.33797E-05  293.6  end
Mg-26       291    0   1.47310E-05  293.6  end
Al-27       291    0   2.89993E-02  293.6  end
Si-28       291    0   1.02644E-04  293.6  end
Si-29       291    0   5.19729E-06  293.6  end
Si-30       291    0   3.45002E-06  293.6  end
Ti-46       291    0   4.20262E-07  293.6  end
Ti-47       291    0   3.79000E-07  293.6  end
Ti-48       291    0   3.75536E-06  293.6  end
Ti-49       291    0   2.75590E-07  293.6  end
Ti-50       291    0   2.63873E-07  293.6  end
Cr-50       291    0   5.30517E-07  293.6  end
Cr-52       291    0   1.02189E-05  293.6  end
Cr-53       291    0   1.15860E-06  293.6  end
Cr-54       291    0   2.87821E-07  293.6  end
Mn-55       291    0   6.57731E-06  293.6  end
Fe-54       291    0   2.42259E-06  293.6  end
Fe-56       291    0   3.79953E-05  293.6  end
Fe-57       291    0   8.77930E-07  293.6  end
Fe-58       291    0   1.15953E-07  293.6  end

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Cu-63      291   0   1.92203E-05   293.6   end
Cu-65      291   0   8.56676E-06   293.6   end
U-234      291   0   2.20708E-06   293.6   end
U-235      291   0   2.05700E-04   293.6   end
U-236      291   0   8.82838E-07   293.6   end
U-238      291   0   1.19182E-05   293.6   end
'   total atom density =  8.00839E-02 a/b-cm
'  8.008390E-02
H-1        292   0   3.32434E-02   293.6   end
B-10       292   0   1.77513E-05   293.6   end
B-11       292   0   7.19107E-05   293.6   end
O-16       292   0   1.73053E-02   293.6   end
Mg-24      292   0   1.05686E-04   293.6   end
Mg-25      292   0   1.33797E-05   293.6   end
Mg-26      292   0   1.47310E-05   293.6   end
Al-27      292   0   2.88388E-02   293.6   end
Si-28      292   0   1.02285E-04   293.6   end
Si-29      292   0   5.17912E-06   293.6   end
Si-30      292   0   3.43796E-06   293.6   end
Ti-46      292   0   4.20262E-07   293.6   end
Ti-47      292   0   3.79000E-07   293.6   end
Ti-48      292   0   3.75536E-06   293.6   end
Ti-49      292   0   2.75590E-07   293.6   end
Ti-50      292   0   2.63873E-07   293.6   end
Cr-50      292   0   5.30517E-07   293.6   end
Cr-52      292   0   1.02189E-05   293.6   end
Cr-53      292   0   1.15860E-06   293.6   end
Cr-54      292   0   2.87821E-07   293.6   end
Mn-55      292   0   6.55746E-06   293.6   end
Fe-54      292   0   2.41117E-06   293.6   end
Fe-56      292   0   3.78162E-05   293.6   end
Fe-57      292   0   8.73792E-07   293.6   end
Fe-58      292   0   1.15406E-07   293.6   end
Cu-63      292   0   1.91542E-05   293.6   end
Cu-65      292   0   8.53729E-06   293.6   end
U-234      292   0   2.69313E-06   293.6   end
U-235      292   0   2.51000E-04   293.6   end
U-236      292   0   1.07726E-06   293.6   end
U-238      292   0   1.45429E-05   293.6   end
'   total atom density =  8.00880E-02 a/b-cm
'  8.008800E-02
H-1        293   0   3.32435E-02   293.6   end
B-10       293   0   1.46911E-05   293.6   end
B-11       293   0   5.95139E-05   293.6   end
O-16       293   0   1.74543E-02   293.6   end
Mg-24      293   0   1.05686E-04   293.6   end
Mg-25      293   0   1.33797E-05   293.6   end
Mg-26      293   0   1.47310E-05   293.6   end
Al-27      293   0   2.86541E-02   293.6   end
Si-28      293   0   1.01874E-04   293.6   end
Si-29      293   0   5.15831E-06   293.6   end
Si-30      293   0   3.42415E-06   293.6   end
Ti-46      293   0   4.20263E-07   293.6   end
Ti-47      293   0   3.79001E-07   293.6   end
Ti-48      293   0   3.75537E-06   293.6   end
Ti-49      293   0   2.75590E-07   293.6   end
Ti-50      293   0   2.63873E-07   293.6   end
Cr-50      293   0   5.30518E-07   293.6   end
Cr-52      293   0   1.02189E-05   293.6   end
Cr-53      293   0   1.15860E-06   293.6   end
Cr-54      293   0   2.87821E-07   293.6   end
Mn-55      293   0   6.53464E-06   293.6   end
Fe-54      293   0   2.39803E-06   293.6   end
Fe-56      293   0   3.76103E-05   293.6   end
Fe-57      293   0   8.69031E-07   293.6   end
Fe-58      293   0   1.14778E-07   293.6   end
Cu-63      293   0   1.90782E-05   293.6   end
Cu-65      293   0   8.50342E-06   293.6   end
U-234      293   0   3.25215E-06   293.6   end
U-235      293   0   3.03100E-04   293.6   end
U-236      293   0   1.30087E-06   293.6   end
U-238      293   0   1.75616E-05   293.6   end
'   total atom density =  8.00937E-02 a/b-cm
'  8.009370E-02
H-1        294   0   3.32434E-02   293.6   end
B-10       294   0   1.03798E-05   293.6   end
B-11       294   0   4.20486E-05   293.6   end
O-16       294   0   1.76644E-02   293.6   end
Mg-24      294   0   1.05686E-04   293.6   end
Mg-25      294   0   1.33797E-05   293.6   end
Mg-26      294   0   1.47310E-05   293.6   end

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Al-27      294   0   2.83940E-02   293.6   end
Si-28      294   0   1.01293E-04   293.6   end
Si-29      294   0   5.12887E-06   293.6   end
Si-30      294   0   3.40461E-06   293.6   end
Ti-46      294   0   4.20262E-07   293.6   end
Ti-47      294   0   3.79000E-07   293.6   end
Ti-48      294   0   3.75536E-06   293.6   end
Ti-49      294   0   2.75590E-07   293.6   end
Ti-50      294   0   2.63873E-07   293.6   end
Cr-50      294   0   5.30517E-07   293.6   end
Cr-52      294   0   1.02189E-05   293.6   end
Cr-53      294   0   1.15860E-06   293.6   end
Cr-54      294   0   2.87821E-07   293.6   end
Mn-55      294   0   6.50246E-06   293.6   end
Fe-54      294   0   2.37952E-06   293.6   end
Fe-56      294   0   3.73198E-05   293.6   end
Fe-57      294   0   8.62321E-07   293.6   end
Fe-58      294   0   1.13891E-07   293.6   end
Cu-63      294   0   1.89710E-05   293.6   end
Cu-65      294   0   8.45562E-06   293.6   end
U-234      294   0   4.03970E-06   293.6   end
U-235      294   0   3.76500E-04   293.6   end
U-236      294   0   1.61589E-06   293.6   end
U-238      294   0   2.18144E-05   293.6   end
'       total atom density =  8.00993E-02 a/b-cm
'  8.009930E-02
H-1        295   0   3.32434E-02   293.6   end
B-10       295   0   6.18010E-06   293.6   end
B-11       295   0   2.50356E-05   293.6   end
O-16       295   0   1.78689E-02   293.6   end
Mg-24       295   0   1.05686E-04   293.6   end
Mg-25       295   0   1.33797E-05   293.6   end
Mg-26       295   0   1.47310E-05   293.6   end
Al-27       295   0   2.81406E-02   293.6   end
Si-28       295   0   1.00727E-04   293.6   end
Si-29       295   0   5.10026E-06   293.6   end
Si-30       295   0   3.38560E-06   293.6   end
Ti-46       295   0   4.20262E-07   293.6   end
Ti-47       295   0   3.79000E-07   293.6   end
Ti-48       295   0   3.75536E-06   293.6   end
Ti-49       295   0   2.75590E-07   293.6   end
Ti-50       295   0   2.63873E-07   293.6   end
Cr-50       295   0   5.30518E-07   293.6   end
Cr-52       295   0   1.02189E-05   293.6   end
Cr-53       295   0   1.15860E-06   293.6   end
Cr-54       295   0   2.87821E-07   293.6   end
Mn-55       295   0   6.47114E-06   293.6   end
Fe-54       295   0   2.36149E-06   293.6   end
Fe-56       295   0   3.70370E-05   293.6   end
Fe-57       295   0   8.55788E-07   293.6   end
Fe-58       295   0   1.13028E-07   293.6   end
Cu-63       295   0   1.88666E-05   293.6   end
Cu-65       295   0   8.40911E-06   293.6   end
U-234       295   0   4.80687E-06   293.6   end
U-235       295   0   4.48000E-04   293.6   end
U-236       295   0   1.92276E-06   293.6   end
U-238       295   0   2.59571E-05   293.6   end
'       total atom density =  8.00998E-02 a/b-cm
'  8.009980E-02
H-1        296   0   3.32434E-02   293.6   end
B-10       296   0   5.79830E-06   293.6   end
B-11       296   0   2.34889E-05   293.6   end
O-16       296   0   1.78875E-02   293.6   end
Mg-24       296   0   1.05686E-04   293.6   end
Mg-25       296   0   1.33797E-05   293.6   end
Mg-26       296   0   1.47310E-05   293.6   end
Al-27       296   0   2.81176E-02   293.6   end
Si-28       296   0   1.00676E-04   293.6   end
Si-29       296   0   5.09768E-06   293.6   end
Si-30       296   0   3.38390E-06   293.6   end
Ti-46       296   0   4.20262E-07   293.6   end
Ti-47       296   0   3.79000E-07   293.6   end
Ti-48       296   0   3.75536E-06   293.6   end
Ti-49       296   0   2.75590E-07   293.6   end
Ti-50       296   0   2.63873E-07   293.6   end
Cr-50       296   0   5.30517E-07   293.6   end
Cr-52       296   0   1.02189E-05   293.6   end
Cr-53       296   0   1.15860E-06   293.6   end
Cr-54       296   0   2.87821E-07   293.6   end
Mn-55       296   0   6.46828E-06   293.6   end
Fe-54       296   0   2.35985E-06   293.6   end

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Fe-56      296    0   3.70113E-05  293.6  end
Fe-57      296    0   8.55193E-07  293.6  end
Fe-58      296    0   1.12950E-07  293.6  end
Cu-63      296    0   1.88571E-05  293.6  end
Cu-65      296    0   8.40487E-06  293.6  end
U-234      296    0   4.87661E-06  293.6  end
U-235      296    0   4.54500E-04  293.6  end
U-236      296    0   1.95066E-06  293.6  end
U-238      296    0   2.63337E-05  293.6  end
'   total atom density =  8.00968E-02 a/b-cm
' 8.009680E-02
H-1        297    0   3.32434E-02  293.6  end
B-10       297    0   7.99507E-06  293.6  end
B-11       297    0   3.23880E-05  293.6  end
O-16       297    0   1.77805E-02  293.6  end
Mg-24       297    0   1.05686E-04  293.6  end
Mg-25       297    0   1.33797E-05  293.6  end
Mg-26       297    0   1.47310E-05  293.6  end
Al-27       297    0   2.82501E-02  293.6  end
Si-28       297    0   1.00972E-04  293.6  end
Si-29       297    0   5.11262E-06  293.6  end
Si-30       297    0   3.39382E-06  293.6  end
Ti-46       297    0   4.20262E-07  293.6  end
Ti-47       297    0   3.79000E-07  293.6  end
Ti-48       297    0   3.75536E-06  293.6  end
Ti-49       297    0   2.75590E-07  293.6  end
Ti-50       297    0   2.63873E-07  293.6  end
Cr-50       297    0   5.30517E-07  293.6  end
Cr-52       297    0   1.02189E-05  293.6  end
Cr-53       297    0   1.15860E-06  293.6  end
Cr-54       297    0   2.87821E-07  293.6  end
Mn-55       297    0   6.48467E-06  293.6  end
Fe-54       297    0   2.36928E-06  293.6  end
Fe-56       297    0   3.71592E-05  293.6  end
Fe-57       297    0   8.58611E-07  293.6  end
Fe-58       297    0   1.13401E-07  293.6  end
Cu-63       297    0   1.89118E-05  293.6  end
Cu-65       297    0   8.42923E-06  293.6  end
U-234       297    0   4.47532E-06  293.6  end
U-235       297    0   4.17100E-04  293.6  end
U-236       297    0   1.79014E-06  293.6  end
U-238       297    0   2.41667E-05  293.6  end
'   total atom density =  8.00933E-02 a/b-cm
' 8.009330E-02
H-1        298    0   3.32434E-02  293.6  end
B-10       298    0   1.06559E-05  293.6  end
B-11       298    0   4.31670E-05  293.6  end
O-16       298    0   1.76509E-02  293.6  end
Mg-24       298    0   1.05686E-04  293.6  end
Mg-25       298    0   1.33797E-05  293.6  end
Mg-26       298    0   1.47310E-05  293.6  end
Al-27       298    0   2.84107E-02  293.6  end
Si-28       298    0   1.01330E-04  293.6  end
Si-29       298    0   5.13079E-06  293.6  end
Si-30       298    0   3.40588E-06  293.6  end
Ti-46       298    0   4.20262E-07  293.6  end
Ti-47       298    0   3.79000E-07  293.6  end
Ti-48       298    0   3.75536E-06  293.6  end
Ti-49       298    0   2.75590E-07  293.6  end
Ti-50       298    0   2.63873E-07  293.6  end
Cr-50       298    0   5.30517E-07  293.6  end
Cr-52       298    0   1.02189E-05  293.6  end
Cr-53       298    0   1.15860E-06  293.6  end
Cr-54       298    0   2.87821E-07  293.6  end
Mn-55       298    0   6.50452E-06  293.6  end
Fe-54       298    0   2.38070E-06  293.6  end
Fe-56       298    0   3.73384E-05  293.6  end
Fe-57       298    0   8.62751E-07  293.6  end
Fe-58       298    0   1.13948E-07  293.6  end
Cu-63       298    0   1.89779E-05  293.6  end
Cu-65       298    0   8.45870E-06  293.6  end
U-234       298    0   3.98927E-06  293.6  end
U-235       298    0   3.71800E-04  293.6  end
U-236       298    0   1.59572E-06  293.6  end
U-238       298    0   2.15420E-05  293.6  end
'
'   Inner fuel element--fueled central Axial region
'   total atom density =  8.00804E-02 a/b-cm
' 8.008040E-02
H-1        201    0   3.32434E-02  293.6  end
B-10       201    0   2.04121E-05  293.6  end

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B-11      201  0  8.26896E-05  293.6  end
O-16      201  0  1.71757E-02  293.6  end
Mg-24     201  0  1.05686E-04  293.6  end
Mg-25     201  0  1.33797E-05  293.6  end
Mg-26     201  0  1.47310E-05  293.6  end
Al-27     201  0  2.89993E-02  293.6  end
Si-28     201  0  1.02644E-04  293.6  end
Si-29     201  0  5.19729E-06  293.6  end
Si-30     201  0  3.45002E-06  293.6  end
Ti-46     201  0  4.20262E-07  293.6  end
Ti-47     201  0  3.79000E-07  293.6  end
Ti-48     201  0  3.75536E-06  293.6  end
Ti-49     201  0  2.75590E-07  293.6  end
Ti-50     201  0  2.63873E-07  293.6  end
Cr-50     201  0  5.30517E-07  293.6  end
Cr-52     201  0  1.02189E-05  293.6  end
Cr-53     201  0  1.15860E-06  293.6  end
Cr-54     201  0  2.87821E-07  293.6  end
Mn-55     201  0  6.57731E-06  293.6  end
Fe-54     201  0  2.42259E-06  293.6  end
Fe-56     201  0  3.79953E-05  293.6  end
Fe-57     201  0  8.77930E-07  293.6  end
Fe-58     201  0  1.15953E-07  293.6  end
Cu-63     201  0  1.92203E-05  293.6  end
Cu-65     201  0  8.56676E-06  293.6  end
U-234    201  0  2.20708E-06  293.6  end
U-235    201  0  2.05700E-04  293.6  end
U-236    201  0  8.82838E-07  293.6  end
U-238    201  0  1.19182E-05  293.6  end
'   total atom density =  8.00839E-02 a/b-cm
' 8.00839E-02
H-1       202  0  3.32434E-02  293.6  end
B-10      202  0  1.77513E-05  293.6  end
B-11      202  0  7.19107E-05  293.6  end
O-16      202  0  1.73053E-02  293.6  end
Mg-24     202  0  1.05686E-04  293.6  end
Mg-25     202  0  1.33797E-05  293.6  end
Mg-26     202  0  1.47310E-05  293.6  end
Al-27     202  0  2.88388E-02  293.6  end
Si-28     202  0  1.02285E-04  293.6  end
Si-29     202  0  5.17912E-06  293.6  end
Si-30     202  0  3.43796E-06  293.6  end
Ti-46     202  0  4.20262E-07  293.6  end
Ti-47     202  0  3.79000E-07  293.6  end
Ti-48     202  0  3.75536E-06  293.6  end
Ti-49     202  0  2.75590E-07  293.6  end
Ti-50     202  0  2.63873E-07  293.6  end
Cr-50     202  0  5.30517E-07  293.6  end
Cr-52     202  0  1.02189E-05  293.6  end
Cr-53     202  0  1.15860E-06  293.6  end
Cr-54     202  0  2.87821E-07  293.6  end
Mn-55     202  0  6.55746E-06  293.6  end
Fe-54     202  0  2.41117E-06  293.6  end
Fe-56     202  0  3.78162E-05  293.6  end
Fe-57     202  0  8.73792E-07  293.6  end
Fe-58     202  0  1.15406E-07  293.6  end
Cu-63     202  0  1.91542E-05  293.6  end
Cu-65     202  0  8.53729E-06  293.6  end
U-234    202  0  2.69313E-06  293.6  end
U-235    202  0  2.51000E-04  293.6  end
U-236    202  0  1.07726E-06  293.6  end
U-238    202  0  1.45429E-05  293.6  end
'   total atom density =  8.00880E-02 a/b-cm
' 8.00880E-02
H-1       203  0  3.32435E-02  293.6  end
B-10      203  0  1.46911E-05  293.6  end
B-11      203  0  5.95139E-05  293.6  end
O-16      203  0  1.74543E-02  293.6  end
Mg-24     203  0  1.05686E-04  293.6  end
Mg-25     203  0  1.33797E-05  293.6  end
Mg-26     203  0  1.47310E-05  293.6  end
Al-27     203  0  2.86541E-02  293.6  end
Si-28     203  0  1.01874E-04  293.6  end
Si-29     203  0  5.15831E-06  293.6  end
Si-30     203  0  3.42415E-06  293.6  end
Ti-46     203  0  4.20263E-07  293.6  end
Ti-47     203  0  3.79001E-07  293.6  end
Ti-48     203  0  3.75537E-06  293.6  end
Ti-49     203  0  2.75590E-07  293.6  end
Ti-50     203  0  2.63873E-07  293.6  end
Cr-50     203  0  5.30518E-07  293.6  end

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Cr-52      203   0   1.02189E-05   293.6   end
Cr-53      203   0   1.15860E-06   293.6   end
Cr-54      203   0   2.87821E-07   293.6   end
Mn-55      203   0   6.53464E-06   293.6   end
Fe-54      203   0   2.39803E-06   293.6   end
Fe-56      203   0   3.76103E-05   293.6   end
Fe-57      203   0   8.69031E-07   293.6   end
Fe-58      203   0   1.14778E-07   293.6   end
Cu-63      203   0   1.90782E-05   293.6   end
Cu-65      203   0   8.50342E-06   293.6   end
U-234     203   0   3.25215E-06   293.6   end
U-235     203   0   3.03100E-04   293.6   end
U-236     203   0   1.30087E-06   293.6   end
U-238     203   0   1.75616E-05   293.6   end
'   total atom density =  8.00937E-02 a/b-cm
' 8.009370E-02
H-1        204   0   3.32434E-02   293.6   end
B-10       204   0   1.03798E-05   293.6   end
B-11       204   0   4.20486E-05   293.6   end
O-16       204   0   1.76644E-02   293.6   end
Mg-24       204   0   1.05686E-04   293.6   end
Mg-25       204   0   1.33797E-05   293.6   end
Mg-26       204   0   1.47310E-05   293.6   end
Al-27       204   0   2.83940E-02   293.6   end
Si-28       204   0   1.01293E-04   293.6   end
Si-29       204   0   5.12887E-06   293.6   end
Si-30       204   0   3.40461E-06   293.6   end
Ti-46       204   0   4.20262E-07   293.6   end
Ti-47       204   0   3.79000E-07   293.6   end
Ti-48       204   0   3.75536E-06   293.6   end
Ti-49       204   0   2.75590E-07   293.6   end
Ti-50       204   0   2.63873E-07   293.6   end
Cr-50       204   0   5.30517E-07   293.6   end
Cr-52       204   0   1.02189E-05   293.6   end
Cr-53       204   0   1.15860E-06   293.6   end
Cr-54       204   0   2.87821E-07   293.6   end
Mn-55       204   0   6.50246E-06   293.6   end
Fe-54       204   0   2.37952E-06   293.6   end
Fe-56       204   0   3.73198E-05   293.6   end
Fe-57       204   0   8.62321E-07   293.6   end
Fe-58       204   0   1.13891E-07   293.6   end
Cu-63       204   0   1.89710E-05   293.6   end
Cu-65       204   0   8.45562E-06   293.6   end
U-234      204   0   4.03970E-06   293.6   end
U-235      204   0   3.76500E-04   293.6   end
U-236      204   0   1.61589E-06   293.6   end
U-238      204   0   2.18144E-05   293.6   end
'   total atom density =  8.00993E-02 a/b-cm
' 8.009930E-02
H-1        205   0   3.32434E-02   293.6   end
B-10       205   0   6.18010E-06   293.6   end
B-11       205   0   2.50356E-05   293.6   end
O-16       205   0   1.78689E-02   293.6   end
Mg-24       205   0   1.05686E-04   293.6   end
Mg-25       205   0   1.33797E-05   293.6   end
Mg-26       205   0   1.47310E-05   293.6   end
Al-27       205   0   2.81406E-02   293.6   end
Si-28       205   0   1.00727E-04   293.6   end
Si-29       205   0   5.10026E-06   293.6   end
Si-30       205   0   3.38560E-06   293.6   end
Ti-46       205   0   4.20262E-07   293.6   end
Ti-47       205   0   3.79000E-07   293.6   end
Ti-48       205   0   3.75536E-06   293.6   end
Ti-49       205   0   2.75590E-07   293.6   end
Ti-50       205   0   2.63873E-07   293.6   end
Cr-50       205   0   5.30518E-07   293.6   end
Cr-52       205   0   1.02189E-05   293.6   end
Cr-53       205   0   1.15860E-06   293.6   end
Cr-54       205   0   2.87821E-07   293.6   end
Mn-55       205   0   6.47114E-06   293.6   end
Fe-54       205   0   2.36149E-06   293.6   end
Fe-56       205   0   3.70370E-05   293.6   end
Fe-57       205   0   8.55788E-07   293.6   end
Fe-58       205   0   1.13028E-07   293.6   end
Cu-63       205   0   1.88666E-05   293.6   end
Cu-65       205   0   8.40911E-06   293.6   end
U-234      205   0   4.80687E-06   293.6   end
U-235      205   0   4.48000E-04   293.6   end
U-236      205   0   1.92276E-06   293.6   end
U-238      205   0   2.59571E-05   293.6   end
'   total atom density =  8.00998E-02 a/b-cm

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' 8.009980E-02
H-1      206   0   3.32434E-02   293.6   end
B-10     206   0   5.79830E-06   293.6   end
B-11     206   0   2.34889E-05   293.6   end
O-16     206   0   1.78875E-02   293.6   end
Mg-24    206   0   1.05686E-04   293.6   end
Mg-25    206   0   1.33797E-05   293.6   end
Mg-26    206   0   1.47310E-05   293.6   end
Al-27    206   0   2.81176E-02   293.6   end
Si-28    206   0   1.00676E-04   293.6   end
Si-29    206   0   5.09768E-06   293.6   end
Si-30    206   0   3.38390E-06   293.6   end
Ti-46    206   0   4.20262E-07   293.6   end
Ti-47    206   0   3.79000E-07   293.6   end
Ti-48    206   0   3.75536E-06   293.6   end
Ti-49    206   0   2.75590E-07   293.6   end
Ti-50    206   0   2.63873E-07   293.6   end
Cr-50    206   0   5.30517E-07   293.6   end
Cr-52    206   0   1.02189E-05   293.6   end
Cr-53    206   0   1.15860E-06   293.6   end
Cr-54    206   0   2.87821E-07   293.6   end
Mn-55    206   0   6.46828E-06   293.6   end
Fe-54    206   0   2.35985E-06   293.6   end
Fe-56    206   0   3.70113E-05   293.6   end
Fe-57    206   0   8.55193E-07   293.6   end
Fe-58    206   0   1.12950E-07   293.6   end
Cu-63    206   0   1.88571E-05   293.6   end
Cu-65    206   0   8.40487E-06   293.6   end
U-234   206   0   4.87661E-06   293.6   end
U-235   206   0   4.54500E-04   293.6   end
U-236   206   0   1.95066E-06   293.6   end
U-238   206   0   2.63337E-05   293.6   end
' total atom density = 8.00968E-02 a/b-cm
' 8.009680E-02
H-1      207   0   3.32434E-02   293.6   end
B-10     207   0   7.99507E-06   293.6   end
B-11     207   0   3.23880E-05   293.6   end
O-16     207   0   1.77805E-02   293.6   end
Mg-24    207   0   1.05686E-04   293.6   end
Mg-25    207   0   1.33797E-05   293.6   end
Mg-26    207   0   1.47310E-05   293.6   end
Al-27    207   0   2.82501E-02   293.6   end
Si-28    207   0   1.00972E-04   293.6   end
Si-29    207   0   5.11262E-06   293.6   end
Si-30    207   0   3.39382E-06   293.6   end
Ti-46    207   0   4.20262E-07   293.6   end
Ti-47    207   0   3.79000E-07   293.6   end
Ti-48    207   0   3.75536E-06   293.6   end
Ti-49    207   0   2.75590E-07   293.6   end
Ti-50    207   0   2.63873E-07   293.6   end
Cr-50    207   0   5.30517E-07   293.6   end
Cr-52    207   0   1.02189E-05   293.6   end
Cr-53    207   0   1.15860E-06   293.6   end
Cr-54    207   0   2.87821E-07   293.6   end
Mn-55    207   0   6.48467E-06   293.6   end
Fe-54    207   0   2.36928E-06   293.6   end
Fe-56    207   0   3.71592E-05   293.6   end
Fe-57    207   0   8.58611E-07   293.6   end
Fe-58    207   0   1.13401E-07   293.6   end
Cu-63    207   0   1.89118E-05   293.6   end
Cu-65    207   0   8.42923E-06   293.6   end
U-234   207   0   4.47532E-06   293.6   end
U-235   207   0   4.17100E-04   293.6   end
U-236   207   0   1.79014E-06   293.6   end
U-238   207   0   2.41667E-05   293.6   end
' total atom density = 8.00933E-02 a/b-cm
' 8.009330E-02
H-1      208   0   3.32434E-02   293.6   end
B-10     208   0   1.06559E-05   293.6   end
B-11     208   0   4.31670E-05   293.6   end
O-16     208   0   1.76509E-02   293.6   end
Mg-24    208   0   1.05686E-04   293.6   end
Mg-25    208   0   1.33797E-05   293.6   end
Mg-26    208   0   1.47310E-05   293.6   end
Al-27    208   0   2.84107E-02   293.6   end
Si-28    208   0   1.01330E-04   293.6   end
Si-29    208   0   5.13079E-06   293.6   end
Si-30    208   0   3.40588E-06   293.6   end
Ti-46    208   0   4.20262E-07   293.6   end
Ti-47    208   0   3.79000E-07   293.6   end
Ti-48    208   0   3.75536E-06   293.6   end

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Ti-49	208	0	2.75590E-07	293.6	end
Ti-50	208	0	2.63873E-07	293.6	end
Cr-50	208	0	5.30517E-07	293.6	end
Cr-52	208	0	1.02189E-05	293.6	end
Cr-53	208	0	1.15860E-06	293.6	end
Cr-54	208	0	2.87821E-07	293.6	end
Mn-55	208	0	6.50452E-06	293.6	end
Fe-54	208	0	2.38070E-06	293.6	end
Fe-56	208	0	3.73384E-05	293.6	end
Fe-57	208	0	8.62751E-07	293.6	end
Fe-58	208	0	1.13948E-07	293.6	end
Cu-63	208	0	1.89779E-05	293.6	end
Cu-65	208	0	8.45870E-06	293.6	end
U-234	208	0	3.98927E-06	293.6	end
U-235	208	0	3.71800E-04	293.6	end
U-236	208	0	1.59572E-06	293.6	end
U-238	208	0	2.15420E-05	293.6	end

Outer Fuel element Material Descriptions

Aluminum Sidewalls

Outer fuel element--upper uncontrolled region

H-1	72	0	3.35240E-02	293.6	end
O-16	72	0	1.66756E-02	293.6	end
Al-27	72	0	2.92741E-02	293.6	end
Si-28	72	0	1.60187E-04	293.6	end
Si-29	72	0	8.11094E-06	293.6	end
Si-30	72	0	5.38413E-06	293.6	end
Ti-46	72	0	1.05065E-06	293.6	end
Ti-47	72	0	9.47498E-07	293.6	end
Ti-48	72	0	9.38838E-06	293.6	end
Ti-49	72	0	6.88973E-07	293.6	end
Ti-50	72	0	6.59682E-07	293.6	end
Cr-50	72	0	1.32629E-06	293.6	end
Cr-52	72	0	2.55471E-05	293.6	end
Cr-53	72	0	2.89649E-06	293.6	end
Cr-54	72	0	7.19549E-07	293.6	end
Mn-55	72	0	1.10987E-05	293.6	end
Fe-54	72	0	2.98072E-06	293.6	end
Fe-56	72	0	4.67489E-05	293.6	end
Fe-57	72	0	1.08019E-06	293.6	end
Fe-58	72	0	1.42667E-07	293.6	end
Cu-63	72	0	3.02466E-05	293.6	end
Cu-65	72	0	1.34813E-05	293.6	end
Mg-24	72	0	2.64216E-04	293.6	end
Mg-25	72	0	3.34493E-05	293.6	end
Mg-26	72	0	3.68277E-05	293.6	end

Outer fuel element--lower uncontrolled region

H-1	73	0	3.31702E-02	293.6	end
O-16	73	0	1.64987E-02	293.6	end
Al-27	73	0	2.92741E-02	293.6	end
Si-28	73	0	1.60187E-04	293.6	end
Si-29	73	0	8.11095E-06	293.6	end
Si-30	73	0	5.38414E-06	293.6	end
Ti-46	73	0	1.05065E-06	293.6	end
Ti-47	73	0	9.47499E-07	293.6	end
Ti-48	73	0	9.38839E-06	293.6	end
Ti-49	73	0	6.88974E-07	293.6	end
Ti-50	73	0	6.59683E-07	293.6	end
Cr-50	73	0	1.32629E-06	293.6	end
Cr-52	73	0	2.55471E-05	293.6	end
Cr-53	73	0	2.89649E-06	293.6	end
Cr-54	73	0	7.19550E-07	293.6	end
Mn-55	73	0	1.10987E-05	293.6	end
Fe-54	73	0	2.98072E-06	293.6	end
Fe-56	73	0	4.67489E-05	293.6	end
Fe-57	73	0	1.08019E-06	293.6	end
Fe-58	73	0	1.42667E-07	293.6	end
Cu-63	73	0	3.02466E-05	293.6	end
Cu-65	73	0	1.34813E-05	293.6	end
Mg-24	73	0	2.64216E-04	293.6	end
Mg-25	73	0	3.34493E-05	293.6	end
Mg-26	73	0	3.68277E-05	293.6	end

Outer Fuel Element fueled region 1

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'      total atom density =  8.00583E-02 a/b-cm
'  8.005830E-02
H-1          311    0   3.32434E-02   293.6  end
O-16         311    0   1.77945E-02   293.6  end
Mg-24        311    0   1.05686E-04   293.6  end
Mg-25        311    0   1.33797E-05   293.6  end
Mg-26        311    0   1.47310E-05   293.6  end
Al-27        311    0   2.82328E-02   293.6  end
Si-28        311    0   1.00933E-04   293.6  end
Si-29        311    0   5.11066E-06   293.6  end
Si-30        311    0   3.39252E-06   293.6  end
Ti-46         311    0   4.20262E-07   293.6  end
Ti-47         311    0   3.79000E-07   293.6  end
Ti-48         311    0   3.75536E-06   293.6  end
Ti-49         311    0   2.75590E-07   293.6  end
Ti-50         311    0   2.63873E-07   293.6  end
Cr-50         311    0   5.30517E-07   293.6  end
Cr-52         311    0   1.02189E-05   293.6  end
Cr-53         311    0   1.15860E-06   293.6  end
Cr-54         311    0   2.87821E-07   293.6  end
Mn-55         311    0   6.48252E-06   293.6  end
Fe-54         311    0   2.36804E-06   293.6  end
Fe-56         311    0   3.71398E-05   293.6  end
Fe-57         311    0   8.58163E-07   293.6  end
Fe-58         311    0   1.13342E-07   293.6  end
Cu-63         311    0   1.89046E-05   293.6  end
Cu-65         311    0   8.42602E-06   293.6  end
U-234         311    0   4.52789E-06   293.6  end
U-235         311    0   4.22000E-04   293.6  end
U-236         311    0   1.81117E-06   293.6  end
U-238         311    0   2.44506E-05   293.6  end
'      total atom density =  8.00895E-02 a/b-cm
'  8.008950E-02
H-1          312    0   3.32434E-02   293.6  end
O-16         312    0   1.80329E-02   293.6  end
Mg-24        312    0   1.05686E-04   293.6  end
Mg-25        312    0   1.33797E-05   293.6  end
Mg-26        312    0   1.47310E-05   293.6  end
Al-27        312    0   2.79375E-02   293.6  end
Si-28        312    0   1.00274E-04   293.6  end
Si-29        312    0   5.07732E-06   293.6  end
Si-30        312    0   3.37038E-06   293.6  end
Ti-46         312    0   4.20262E-07   293.6  end
Ti-47         312    0   3.79000E-07   293.6  end
Ti-48         312    0   3.75536E-06   293.6  end
Ti-49         312    0   2.75590E-07   293.6  end
Ti-50         312    0   2.63873E-07   293.6  end
Cr-50         312    0   5.30517E-07   293.6  end
Cr-52         312    0   1.02189E-05   293.6  end
Cr-53         312    0   1.15860E-06   293.6  end
Cr-54         312    0   2.87821E-07   293.6  end
Mn-55         312    0   6.44602E-06   293.6  end
Fe-54         312    0   2.34704E-06   293.6  end
Fe-56         312    0   3.68104E-05   293.6  end
Fe-57         312    0   8.50550E-07   293.6  end
Fe-58         312    0   1.12337E-07   293.6  end
Cu-63         312    0   1.87830E-05   293.6  end
Cu-65         312    0   8.37182E-06   293.6  end
U-234         312    0   5.42167E-06   293.6  end
U-235         312    0   5.05300E-04   293.6  end
U-236         312    0   2.16868E-06   293.6  end
U-238         312    0   2.92770E-05   293.6  end
'      total atom density =  8.01228E-02 a/b-cm
'  8.012280E-02
H-1          313    0   3.32434E-02   293.6  end
O-16         313    0   1.82870E-02   293.6  end
Mg-24        313    0   1.05686E-04   293.6  end
Mg-25        313    0   1.33797E-05   293.6  end
Mg-26        313    0   1.47310E-05   293.6  end
Al-27        313    0   2.76228E-02   293.6  end
Si-28        313    0   9.95724E-05   293.6  end
Si-29        313    0   5.04178E-06   293.6  end
Si-30        313    0   3.34679E-06   293.6  end
Ti-46         313    0   4.20262E-07   293.6  end
Ti-47         313    0   3.79000E-07   293.6  end
Ti-48         313    0   3.75536E-06   293.6  end
Ti-49         313    0   2.75590E-07   293.6  end
Ti-50         313    0   2.63873E-07   293.6  end
Cr-50         313    0   5.30517E-07   293.6  end
Cr-52         313    0   1.02189E-05   293.6  end
Cr-53         313    0   1.15860E-06   293.6  end

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Cr-54      313   0   2.87821E-07  293.6  end
Mn-55      313   0   6.40711E-06  293.6  end
Fe-54      313   0   2.32464E-06  293.6  end
Fe-56      313   0   3.64591E-05  293.6  end
Fe-57      313   0   8.42433E-07  293.6  end
Fe-58      313   0   1.11265E-07  293.6  end
Cu-63      313   0   1.86534E-05  293.6  end
Cu-65      313   0   8.31405E-06  293.6  end
U-234      313   0   6.37446E-06  293.6  end
U-235      313   0   5.94100E-04  293.6  end
U-236      313   0   2.54980E-06  293.6  end
U-238      313   0   3.44221E-05  293.6  end
'   total atom density =  8.01530E-02 a/b-cm
'  8.015300E-02
H-1        314   0   3.32434E-02  293.6  end
O-16       314   0   1.85176E-02  293.6  end
Mg-24      314   0   1.05686E-04  293.6  end
Mg-25      314   0   1.33797E-05  293.6  end
Mg-26      314   0   1.47310E-05  293.6  end
Al-27      314   0   2.73372E-02  293.6  end
Si-28      314   0   9.89350E-05  293.6  end
Si-29      314   0   5.00951E-06  293.6  end
Si-30      314   0   3.32537E-06  293.6  end
Ti-46      314   0   4.20262E-07  293.6  end
Ti-47      314   0   3.79000E-07  293.6  end
Ti-48      314   0   3.75536E-06  293.6  end
Ti-49      314   0   2.75590E-07  293.6  end
Ti-50      314   0   2.63873E-07  293.6  end
Cr-50      314   0   5.30517E-07  293.6  end
Cr-52      314   0   1.02189E-05  293.6  end
Cr-53      314   0   1.15860E-06  293.6  end
Cr-54      314   0   2.87821E-07  293.6  end
Mn-55      314   0   6.37178E-06  293.6  end
Fe-54      314   0   2.30432E-06  293.6  end
Fe-56      314   0   3.61403E-05  293.6  end
Fe-57      314   0   8.35068E-07  293.6  end
Fe-58      314   0   1.10292E-07  293.6  end
Cu-63      314   0   1.85357E-05  293.6  end
Cu-65      314   0   8.26161E-06  293.6  end
U-234      314   0   7.23926E-06  293.6  end
U-235      314   0   6.74700E-04  293.6  end
U-236      314   0   2.89573E-06  293.6  end
U-238      314   0   3.90920E-05  293.6  end
'   total atom density =  8.01437E-02 a/b-cm
'  8.014370E-02
H-1        315   0   3.32434E-02  293.6  end
O-16       315   0   1.84469E-02  293.6  end
Mg-24      315   0   1.05686E-04  293.6  end
Mg-25      315   0   1.33797E-05  293.6  end
Mg-26      315   0   1.47310E-05  293.6  end
Al-27      315   0   2.74247E-02  293.6  end
Si-28      315   0   9.91306E-05  293.6  end
Si-29      315   0   5.01941E-06  293.6  end
Si-30      315   0   3.33194E-06  293.6  end
Ti-46      315   0   4.20262E-07  293.6  end
Ti-47      315   0   3.79000E-07  293.6  end
Ti-48      315   0   3.75536E-06  293.6  end
Ti-49      315   0   2.75590E-07  293.6  end
Ti-50      315   0   2.63873E-07  293.6  end
Cr-50      315   0   5.30517E-07  293.6  end
Cr-52      315   0   1.02189E-05  293.6  end
Cr-53      315   0   1.15860E-06  293.6  end
Cr-54      315   0   2.87821E-07  293.6  end
Mn-55      315   0   6.38261E-06  293.6  end
Fe-54      315   0   2.31055E-06  293.6  end
Fe-56      315   0   3.62380E-05  293.6  end
Fe-57      315   0   8.37326E-07  293.6  end
Fe-58      315   0   1.10590E-07  293.6  end
Cu-63      315   0   1.85717E-05  293.6  end
Cu-65      315   0   8.27767E-06  293.6  end
U-234      315   0   6.97424E-06  293.6  end
U-235      315   0   6.50000E-04  293.6  end
U-236      315   0   2.78972E-06  293.6  end
U-238      315   0   3.76609E-05  293.6  end
'   total atom density =  8.00985E-02 a/b-cm
'  8.009850E-02
H-1        316   0   3.32434E-02  293.6  end
O-16       316   0   1.81013E-02  293.6  end
Mg-24      316   0   1.05686E-04  293.6  end
Mg-25      316   0   1.33797E-05  293.6  end
Mg-26      316   0   1.47310E-05  293.6  end

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Al-27      316   0   2.78528E-02   293.6   end
Si-28      316   0   1.00085E-04   293.6   end
Si-29      316   0   5.06774E-06   293.6   end
Si-30      316   0   3.36403E-06   293.6   end
Ti-46      316   0   4.20262E-07   293.6   end
Ti-47      316   0   3.79000E-07   293.6   end
Ti-48      316   0   3.75536E-06   293.6   end
Ti-49      316   0   2.75590E-07   293.6   end
Ti-50      316   0   2.63873E-07   293.6   end
Cr-50      316   0   5.30517E-07   293.6   end
Cr-52      316   0   1.02189E-05   293.6   end
Cr-53      316   0   1.15860E-06   293.6   end
Cr-54      316   0   2.87821E-07   293.6   end
Mn-55      316   0   6.43555E-06   293.6   end
Fe-54      316   0   2.34101E-06   293.6   end
Fe-56      316   0   3.67158E-05   293.6   end
Fe-57      316   0   8.48365E-07   293.6   end
Fe-58      316   0   1.12048E-07   293.6   end
Cu-63      316   0   1.87481E-05   293.6   end
Cu-65      316   0   8.35629E-06   293.6   end
U-234      316   0   5.67811E-06   293.6   end
U-235      316   0   5.29200E-04   293.6   end
U-236      316   0   2.27126E-06   293.6   end
U-238      316   0   3.06618E-05   293.6   end
'   total atom density =  8.00555E-02 a/b-cm
'  8.005550E-02
H-1        317   0   3.32434E-02   293.6   end
O-16       317   0   1.77731E-02   293.6   end
Mg-24      317   0   1.05686E-04   293.6   end
Mg-25      317   0   1.33797E-05   293.6   end
Mg-26      317   0   1.47310E-05   293.6   end
Al-27      317   0   2.82593E-02   293.6   end
Si-28      317   0   1.00993E-04   293.6   end
Si-29      317   0   5.11370E-06   293.6   end
Si-30      317   0   3.39453E-06   293.6   end
Ti-46      317   0   4.20262E-07   293.6   end
Ti-47      317   0   3.79000E-07   293.6   end
Ti-48      317   0   3.75536E-06   293.6   end
Ti-49      317   0   2.75590E-07   293.6   end
Ti-50      317   0   2.63873E-07   293.6   end
Cr-50      317   0   5.30517E-07   293.6   end
Cr-52      317   0   1.02189E-05   293.6   end
Cr-53      317   0   1.15860E-06   293.6   end
Cr-54      317   0   2.87821E-07   293.6   end
Mn-55      317   0   6.48581E-06   293.6   end
Fe-54      317   0   2.36993E-06   293.6   end
Fe-56      317   0   3.71695E-05   293.6   end
Fe-57      317   0   8.58848E-07   293.6   end
Fe-58      317   0   1.13433E-07   293.6   end
Cu-63      317   0   1.89155E-05   293.6   end
Cu-65      317   0   8.43090E-06   293.6   end
U-234      317   0   4.44742E-06   293.6   end
U-235      317   0   4.14500E-04   293.6   end
U-236      317   0   1.77898E-06   293.6   end
U-238      317   0   2.40161E-05   293.6   end
'   total atom density =  8.00271E-02 a/b-cm
'  8.002710E-02
H-1        318   0   3.32434E-02   293.6   end
O-16       318   0   1.75562E-02   293.6   end
Mg-24      318   0   1.05686E-04   293.6   end
Mg-25      318   0   1.33797E-05   293.6   end
Mg-26      318   0   1.47310E-05   293.6   end
Al-27      318   0   2.85280E-02   293.6   end
Si-28      318   0   1.01591E-04   293.6   end
Si-29      318   0   5.14401E-06   293.6   end
Si-30      318   0   3.41465E-06   293.6   end
Ti-46      318   0   4.20262E-07   293.6   end
Ti-47      318   0   3.79000E-07   293.6   end
Ti-48      318   0   3.75536E-06   293.6   end
Ti-49      318   0   2.75590E-07   293.6   end
Ti-50      318   0   2.63873E-07   293.6   end
Cr-50      318   0   5.30517E-07   293.6   end
Cr-52      318   0   1.02189E-05   293.6   end
Cr-53      318   0   1.15860E-06   293.6   end
Cr-54      318   0   2.87821E-07   293.6   end
Mn-55      318   0   6.51903E-06   293.6   end
Fe-54      318   0   2.38905E-06   293.6   end
Fe-56      318   0   3.74693E-05   293.6   end
Fe-57      318   0   8.65776E-07   293.6   end
Fe-58      318   0   1.14348E-07   293.6   end
Cu-63      318   0   1.90262E-05   293.6   end

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Cu-65      318    0   8.48022E-06   293.6   end
U-234      318    0   3.63412E-06   293.6   end
U-235      318    0   3.38700E-04   293.6   end
U-236      318    0   1.45366E-06   293.6   end
U-238      318    0   1.96242E-05   293.6   end
'   total atom density =  8.00013E-02 a/b-cm
' 8.000130E-02
H-1        319    0   3.32434E-02   293.6   end
O-16       319    0   1.73591E-02   293.6   end
Mg-24      319    0   1.05686E-04   293.6   end
Mg-25      319    0   1.33797E-05   293.6   end
Mg-26      319    0   1.47310E-05   293.6   end
Al-27      319    0   2.87722E-02   293.6   end
Si-28      319    0   1.02136E-04   293.6   end
Si-29      319    0   5.17160E-06   293.6   end
Si-30      319    0   3.43297E-06   293.6   end
Ti-46      319    0   4.20262E-07   293.6   end
Ti-47      319    0   3.79000E-07   293.6   end
Ti-48      319    0   3.75536E-06   293.6   end
Ti-49      319    0   2.75590E-07   293.6   end
Ti-50      319    0   2.63873E-07   293.6   end
Cr-50      319    0   5.30517E-07   293.6   end
Cr-52      319    0   1.02189E-05   293.6   end
Cr-53      319    0   1.15860E-06   293.6   end
Cr-54      319    0   2.87821E-07   293.6   end
Mn-55      319    0   6.54922E-06   293.6   end
Fe-54      319    0   2.40643E-06   293.6   end
Fe-56      319    0   3.77418E-05   293.6   end
Fe-57      319    0   8.72072E-07   293.6   end
Fe-58      319    0   1.15179E-07   293.6   end
Cu-63      319    0   1.91268E-05   293.6   end
Cu-65      319    0   8.52504E-06   293.6   end
U-234      319    0   2.89485E-06   293.6   end
U-235      319    0   2.69800E-04   293.6   end
U-236      319    0   1.15795E-06   293.6   end
U-238      319    0   1.56322E-05   293.6   end
'

'   Outer Fuel Element fueled region 2
'   total atom density =  8.00583E-02 a/b-cm
' 8.005830E-02
H-1        321    0   3.32434E-02   293.6   end
O-16       321    0   1.77945E-02   293.6   end
Mg-24      321    0   1.05686E-04   293.6   end
Mg-25      321    0   1.33797E-05   293.6   end
Mg-26      321    0   1.47310E-05   293.6   end
Al-27      321    0   2.82328E-02   293.6   end
Si-28      321    0   1.00933E-04   293.6   end
Si-29      321    0   5.11066E-06   293.6   end
Si-30      321    0   3.39252E-06   293.6   end
Ti-46      321    0   4.20262E-07   293.6   end
Ti-47      321    0   3.79000E-07   293.6   end
Ti-48      321    0   3.75536E-06   293.6   end
Ti-49      321    0   2.75590E-07   293.6   end
Ti-50      321    0   2.63873E-07   293.6   end
Cr-50      321    0   5.30517E-07   293.6   end
Cr-52      321    0   1.02189E-05   293.6   end
Cr-53      321    0   1.15860E-06   293.6   end
Cr-54      321    0   2.87821E-07   293.6   end
Mn-55      321    0   6.48252E-06   293.6   end
Fe-54      321    0   2.36804E-06   293.6   end
Fe-56      321    0   3.71398E-05   293.6   end
Fe-57      321    0   8.58163E-07   293.6   end
Fe-58      321    0   1.13342E-07   293.6   end
Cu-63      321    0   1.89046E-05   293.6   end
Cu-65      321    0   8.42602E-06   293.6   end
U-234      321    0   4.52789E-06   293.6   end
U-235      321    0   4.22000E-04   293.6   end
U-236      321    0   1.81117E-06   293.6   end
U-238      321    0   2.44506E-05   293.6   end
'

'   total atom density =  8.00895E-02 a/b-cm
' 8.008950E-02
H-1        322    0   3.32434E-02   293.6   end
O-16       322    0   1.80329E-02   293.6   end
Mg-24      322    0   1.05686E-04   293.6   end
Mg-25      322    0   1.33797E-05   293.6   end
Mg-26      322    0   1.47310E-05   293.6   end
Al-27      322    0   2.79375E-02   293.6   end
Si-28      322    0   1.00274E-04   293.6   end
Si-29      322    0   5.07732E-06   293.6   end
Si-30      322    0   3.37038E-06   293.6   end
Ti-46      322    0   4.20262E-07   293.6   end

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Ti-47      322   0   3.79000E-07  293.6  end
Ti-48      322   0   3.75536E-06  293.6  end
Ti-49      322   0   2.75590E-07  293.6  end
Ti-50      322   0   2.63873E-07  293.6  end
Cr-50      322   0   5.30517E-07  293.6  end
Cr-52      322   0   1.02189E-05  293.6  end
Cr-53      322   0   1.15860E-06  293.6  end
Cr-54      322   0   2.87821E-07  293.6  end
Mn-55      322   0   6.44602E-06  293.6  end
Fe-54      322   0   2.34704E-06  293.6  end
Fe-56      322   0   3.68104E-05  293.6  end
Fe-57      322   0   8.50550E-07  293.6  end
Fe-58      322   0   1.12337E-07  293.6  end
Cu-63      322   0   1.87830E-05  293.6  end
Cu-65      322   0   8.37182E-06  293.6  end
U-234     322   0   5.42167E-06  293.6  end
U-235     322   0   5.05300E-04   293.6  end
U-236     322   0   2.16868E-06  293.6  end
U-238     322   0   2.92770E-05  293.6  end
'   total atom density =  8.01228E-02 a/b-cm
' 8.012280E-02
H-1        323   0   3.32434E-02  293.6  end
O-16       323   0   1.82870E-02  293.6  end
Mg-24      323   0   1.05686E-04  293.6  end
Mg-25      323   0   1.33797E-05  293.6  end
Mg-26      323   0   1.47310E-05  293.6  end
Al-27      323   0   2.76228E-02  293.6  end
Si-28      323   0   9.95724E-05  293.6  end
Si-29      323   0   5.04178E-06  293.6  end
Si-30      323   0   3.34679E-06  293.6  end
Ti-46      323   0   4.20262E-07  293.6  end
Ti-47      323   0   3.79000E-07  293.6  end
Ti-48      323   0   3.75536E-06  293.6  end
Ti-49      323   0   2.75590E-07  293.6  end
Ti-50      323   0   2.63873E-07  293.6  end
Cr-50      323   0   5.30517E-07  293.6  end
Cr-52      323   0   1.02189E-05  293.6  end
Cr-53      323   0   1.15860E-06  293.6  end
Cr-54      323   0   2.87821E-07  293.6  end
Mn-55      323   0   6.40711E-06  293.6  end
Fe-54      323   0   2.32464E-06  293.6  end
Fe-56      323   0   3.64591E-05  293.6  end
Fe-57      323   0   8.42433E-07  293.6  end
Fe-58      323   0   1.11265E-07  293.6  end
Cu-63      323   0   1.86534E-05  293.6  end
Cu-65      323   0   8.31405E-06  293.6  end
U-234     323   0   6.37446E-06  293.6  end
U-235     323   0   5.94100E-04   293.6  end
U-236     323   0   2.54980E-06  293.6  end
U-238     323   0   3.44221E-05  293.6  end
'   total atom density =  8.01530E-02 a/b-cm
' 8.015300E-02
H-1        324   0   3.32434E-02  293.6  end
O-16       324   0   1.85176E-02  293.6  end
Mg-24      324   0   1.05686E-04  293.6  end
Mg-25      324   0   1.33797E-05  293.6  end
Mg-26      324   0   1.47310E-05  293.6  end
Al-27      324   0   2.73372E-02  293.6  end
Si-28      324   0   9.89350E-05  293.6  end
Si-29      324   0   5.00951E-06  293.6  end
Si-30      324   0   3.32537E-06  293.6  end
Ti-46      324   0   4.20262E-07  293.6  end
Ti-47      324   0   3.79000E-07  293.6  end
Ti-48      324   0   3.75536E-06  293.6  end
Ti-49      324   0   2.75590E-07  293.6  end
Ti-50      324   0   2.63873E-07  293.6  end
Cr-50      324   0   5.30517E-07  293.6  end
Cr-52      324   0   1.02189E-05  293.6  end
Cr-53      324   0   1.15860E-06  293.6  end
Cr-54      324   0   2.87821E-07  293.6  end
Mn-55      324   0   6.37178E-06  293.6  end
Fe-54      324   0   2.30432E-06  293.6  end
Fe-56      324   0   3.61403E-05  293.6  end
Fe-57      324   0   8.35068E-07  293.6  end
Fe-58      324   0   1.10292E-07  293.6  end
Cu-63      324   0   1.85357E-05  293.6  end
Cu-65      324   0   8.26161E-06  293.6  end
U-234     324   0   7.23926E-06  293.6  end
U-235     324   0   6.74700E-04   293.6  end
U-236     324   0   2.89573E-06  293.6  end
U-238     324   0   3.90920E-05  293.6  end

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'      total atom density =  8.01437E-02 a/b-cm
'  8.014370E-02
H-1          325    0   3.32434E-02   293.6  end
O-16         325    0   1.84469E-02   293.6  end
Mg-24        325    0   1.05686E-04   293.6  end
Mg-25        325    0   1.33797E-05   293.6  end
Mg-26        325    0   1.47310E-05   293.6  end
Al-27        325    0   2.74247E-02   293.6  end
Si-28        325    0   9.91306E-05   293.6  end
Si-29        325    0   5.01941E-06   293.6  end
Si-30        325    0   3.33194E-06   293.6  end
Ti-46         325    0   4.20262E-07   293.6  end
Ti-47         325    0   3.79000E-07   293.6  end
Ti-48         325    0   3.75536E-06   293.6  end
Ti-49         325    0   2.75590E-07   293.6  end
Ti-50         325    0   2.63873E-07   293.6  end
Cr-50         325    0   5.30517E-07   293.6  end
Cr-52         325    0   1.02189E-05   293.6  end
Cr-53         325    0   1.15860E-06   293.6  end
Cr-54         325    0   2.87821E-07   293.6  end
Mn-55         325    0   6.38261E-06   293.6  end
Fe-54         325    0   2.31055E-06   293.6  end
Fe-56         325    0   3.62380E-05   293.6  end
Fe-57         325    0   8.37326E-07   293.6  end
Fe-58         325    0   1.10590E-07   293.6  end
Cu-63         325    0   1.85717E-05   293.6  end
Cu-65         325    0   8.27767E-06   293.6  end
U-234        325    0   6.97424E-06   293.6  end
U-235        325    0   6.50000E-04    293.6  end
U-236        325    0   2.78972E-06   293.6  end
U-238        325    0   3.76609E-05   293.6  end
'      total atom density =  8.00985E-02 a/b-cm
'  8.009850E-02
H-1          326    0   3.32434E-02   293.6  end
O-16         326    0   1.81013E-02   293.6  end
Mg-24        326    0   1.05686E-04   293.6  end
Mg-25        326    0   1.33797E-05   293.6  end
Mg-26        326    0   1.47310E-05   293.6  end
Al-27        326    0   2.78528E-02   293.6  end
Si-28        326    0   1.00085E-04   293.6  end
Si-29        326    0   5.06774E-06   293.6  end
Si-30        326    0   3.36403E-06   293.6  end
Ti-46         326    0   4.20262E-07   293.6  end
Ti-47         326    0   3.79000E-07   293.6  end
Ti-48         326    0   3.75536E-06   293.6  end
Ti-49         326    0   2.75590E-07   293.6  end
Ti-50         326    0   2.63873E-07   293.6  end
Cr-50         326    0   5.30517E-07   293.6  end
Cr-52         326    0   1.02189E-05   293.6  end
Cr-53         326    0   1.15860E-06   293.6  end
Cr-54         326    0   2.87821E-07   293.6  end
Mn-55         326    0   6.43555E-06   293.6  end
Fe-54         326    0   2.34101E-06   293.6  end
Fe-56         326    0   3.67158E-05   293.6  end
Fe-57         326    0   8.48365E-07   293.6  end
Fe-58         326    0   1.12048E-07   293.6  end
Cu-63         326    0   1.87481E-05   293.6  end
Cu-65         326    0   8.35629E-06   293.6  end
U-234        326    0   5.67811E-06   293.6  end
U-235        326    0   5.29200E-04    293.6  end
U-236        326    0   2.27126E-06   293.6  end
U-238        326    0   3.06618E-05   293.6  end
'      total atom density =  8.00555E-02 a/b-cm
'  8.005550E-02
H-1          327    0   3.32434E-02   293.6  end
O-16         327    0   1.77731E-02   293.6  end
Mg-24        327    0   1.05686E-04   293.6  end
Mg-25        327    0   1.33797E-05   293.6  end
Mg-26        327    0   1.47310E-05   293.6  end
Al-27        327    0   2.82593E-02   293.6  end
Si-28        327    0   1.00993E-04   293.6  end
Si-29        327    0   5.11370E-06   293.6  end
Si-30        327    0   3.39453E-06   293.6  end
Ti-46         327    0   4.20262E-07   293.6  end
Ti-47         327    0   3.79000E-07   293.6  end
Ti-48         327    0   3.75536E-06   293.6  end
Ti-49         327    0   2.75590E-07   293.6  end
Ti-50         327    0   2.63873E-07   293.6  end
Cr-50         327    0   5.30517E-07   293.6  end
Cr-52         327    0   1.02189E-05   293.6  end
Cr-53         327    0   1.15860E-06   293.6  end

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Cr-54      327    0   2.87821E-07  293.6  end
Mn-55      327    0   6.48581E-06  293.6  end
Fe-54      327    0   2.36993E-06  293.6  end
Fe-56      327    0   3.71695E-05  293.6  end
Fe-57      327    0   8.58848E-07  293.6  end
Fe-58      327    0   1.13433E-07  293.6  end
Cu-63      327    0   1.89155E-05  293.6  end
Cu-65      327    0   8.43090E-06  293.6  end
U-234      327    0   4.44742E-06  293.6  end
U-235      327    0   4.14500E-04   293.6  end
U-236      327    0   1.77898E-06  293.6  end
U-238      327    0   2.40161E-05  293.6  end
'   total atom density =  8.00271E-02 a/b-cm
'  8.002710E-02
H-1        328    0   3.32434E-02  293.6  end
O-16       328    0   1.75562E-02  293.6  end
Mg-24       328    0   1.05686E-04  293.6  end
Mg-25       328    0   1.33797E-05  293.6  end
Mg-26       328    0   1.47310E-05  293.6  end
Al-27       328    0   2.85280E-02  293.6  end
Si-28       328    0   1.01591E-04  293.6  end
Si-29       328    0   5.14401E-06  293.6  end
Si-30       328    0   3.41465E-06  293.6  end
Ti-46       328    0   4.20262E-07  293.6  end
Ti-47       328    0   3.79000E-07  293.6  end
Ti-48       328    0   3.75536E-06  293.6  end
Ti-49       328    0   2.75590E-07  293.6  end
Ti-50       328    0   2.63873E-07  293.6  end
Cr-50       328    0   5.30517E-07  293.6  end
Cr-52       328    0   1.02189E-05  293.6  end
Cr-53       328    0   1.15860E-06  293.6  end
Cr-54       328    0   2.87821E-07  293.6  end
Mn-55       328    0   6.51903E-06  293.6  end
Fe-54       328    0   2.38905E-06  293.6  end
Fe-56       328    0   3.74693E-05  293.6  end
Fe-57       328    0   8.65776E-07  293.6  end
Fe-58       328    0   1.14348E-07  293.6  end
Cu-63       328    0   1.90262E-05  293.6  end
Cu-65       328    0   8.48022E-06  293.6  end
U-234       328    0   3.63412E-06  293.6  end
U-235       328    0   3.38700E-04   293.6  end
U-236       328    0   1.45366E-06  293.6  end
U-238       328    0   1.96242E-05  293.6  end
'   total atom density =  8.00013E-02 a/b-cm
'  8.000130E-02
H-1        329    0   3.32434E-02  293.6  end
O-16       329    0   1.73591E-02  293.6  end
Mg-24       329    0   1.05686E-04  293.6  end
Mg-25       329    0   1.33797E-05  293.6  end
Mg-26       329    0   1.47310E-05  293.6  end
Al-27       329    0   2.87722E-02  293.6  end
Si-28       329    0   1.02136E-04  293.6  end
Si-29       329    0   5.17160E-06  293.6  end
Si-30       329    0   3.43297E-06  293.6  end
Ti-46       329    0   4.20262E-07  293.6  end
Ti-47       329    0   3.79000E-07  293.6  end
Ti-48       329    0   3.75536E-06  293.6  end
Ti-49       329    0   2.75590E-07  293.6  end
Ti-50       329    0   2.63873E-07  293.6  end
Cr-50       329    0   5.30517E-07  293.6  end
Cr-52       329    0   1.02189E-05  293.6  end
Cr-53       329    0   1.15860E-06  293.6  end
Cr-54       329    0   2.87821E-07  293.6  end
Mn-55       329    0   6.54922E-06  293.6  end
Fe-54       329    0   2.40643E-06  293.6  end
Fe-56       329    0   3.77418E-05  293.6  end
Fe-57       329    0   8.72072E-07  293.6  end
Fe-58       329    0   1.15179E-07  293.6  end
Cu-63       329    0   1.91268E-05  293.6  end
Cu-65       329    0   8.52504E-06  293.6  end
U-234       329    0   2.89485E-06  293.6  end
U-235       329    0   2.69800E-04   293.6  end
U-236       329    0   1.15795E-06  293.6  end
U-238       329    0   1.56322E-05  293.6  end
'
'   Outer Fuel Element fueled region 3
'   total atom density =  8.00583E-02 a/b-cm
'  8.005830E-02
H-1        331    0   3.32434E-02  293.6  end
O-16       331    0   1.77945E-02  293.6  end
Mg-24       331    0   1.05686E-04  293.6  end

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Mg-25      331   0   1.33797E-05   293.6   end
Mg-26      331   0   1.47310E-05   293.6   end
Al-27      331   0   2.82328E-02   293.6   end
Si-28      331   0   1.00933E-04   293.6   end
Si-29      331   0   5.11066E-06   293.6   end
Si-30      331   0   3.39252E-06   293.6   end
Ti-46      331   0   4.20262E-07   293.6   end
Ti-47      331   0   3.79000E-07   293.6   end
Ti-48      331   0   3.75536E-06   293.6   end
Ti-49      331   0   2.75590E-07   293.6   end
Ti-50      331   0   2.63873E-07   293.6   end
Cr-50      331   0   5.30517E-07   293.6   end
Cr-52      331   0   1.02189E-05   293.6   end
Cr-53      331   0   1.15860E-06   293.6   end
Cr-54      331   0   2.87821E-07   293.6   end
Mn-55      331   0   6.48252E-06   293.6   end
Fe-54      331   0   2.36804E-06   293.6   end
Fe-56      331   0   3.71398E-05   293.6   end
Fe-57      331   0   8.58163E-07   293.6   end
Fe-58      331   0   1.13342E-07   293.6   end
Cu-63      331   0   1.89046E-05   293.6   end
Cu-65      331   0   8.42602E-06   293.6   end
U-234     331   0   4.52789E-06   293.6   end
U-235     331   0   4.22000E-04   293.6   end
U-236     331   0   1.81117E-06   293.6   end
U-238     331   0   2.44506E-05   293.6   end
'   total atom density =  8.00895E-02 a/b-cm
' 8.008950E-02
H-1        332   0   3.32434E-02   293.6   end
O-16       332   0   1.80329E-02   293.6   end
Mg-24      332   0   1.05686E-04   293.6   end
Mg-25      332   0   1.33797E-05   293.6   end
Mg-26      332   0   1.47310E-05   293.6   end
Al-27      332   0   2.79375E-02   293.6   end
Si-28      332   0   1.00274E-04   293.6   end
Si-29      332   0   5.07732E-06   293.6   end
Si-30      332   0   3.37038E-06   293.6   end
Ti-46      332   0   4.20262E-07   293.6   end
Ti-47      332   0   3.79000E-07   293.6   end
Ti-48      332   0   3.75536E-06   293.6   end
Ti-49      332   0   2.75590E-07   293.6   end
Ti-50      332   0   2.63873E-07   293.6   end
Cr-50      332   0   5.30517E-07   293.6   end
Cr-52      332   0   1.02189E-05   293.6   end
Cr-53      332   0   1.15860E-06   293.6   end
Cr-54      332   0   2.87821E-07   293.6   end
Mn-55      332   0   6.44602E-06   293.6   end
Fe-54      332   0   2.34704E-06   293.6   end
Fe-56      332   0   3.68104E-05   293.6   end
Fe-57      332   0   8.50550E-07   293.6   end
Fe-58      332   0   1.12337E-07   293.6   end
Cu-63      332   0   1.87830E-05   293.6   end
Cu-65      332   0   8.37182E-06   293.6   end
U-234     332   0   5.42167E-06   293.6   end
U-235     332   0   5.05300E-04   293.6   end
U-236     332   0   2.16868E-06   293.6   end
U-238     332   0   2.92770E-05   293.6   end
'   total atom density =  8.01228E-02 a/b-cm
' 8.012280E-02
H-1        333   0   3.32434E-02   293.6   end
O-16       333   0   1.82870E-02   293.6   end
Mg-24      333   0   1.05686E-04   293.6   end
Mg-25      333   0   1.33797E-05   293.6   end
Mg-26      333   0   1.47310E-05   293.6   end
Al-27      333   0   2.76228E-02   293.6   end
Si-28      333   0   9.95724E-05   293.6   end
Si-29      333   0   5.04178E-06   293.6   end
Si-30      333   0   3.34679E-06   293.6   end
Ti-46      333   0   4.20262E-07   293.6   end
Ti-47      333   0   3.79000E-07   293.6   end
Ti-48      333   0   3.75536E-06   293.6   end
Ti-49      333   0   2.75590E-07   293.6   end
Ti-50      333   0   2.63873E-07   293.6   end
Cr-50      333   0   5.30517E-07   293.6   end
Cr-52      333   0   1.02189E-05   293.6   end
Cr-53      333   0   1.15860E-06   293.6   end
Cr-54      333   0   2.87821E-07   293.6   end
Mn-55      333   0   6.40711E-06   293.6   end
Fe-54      333   0   2.32464E-06   293.6   end
Fe-56      333   0   3.64591E-05   293.6   end
Fe-57      333   0   8.42433E-07   293.6   end

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Fe-58      333   0   1.11265E-07  293.6  end
Cu-63      333   0   1.86534E-05  293.6  end
Cu-65      333   0   8.31405E-06  293.6  end
U-234      333   0   6.37446E-06  293.6  end
U-235      333   0   5.94100E-04  293.6  end
U-236      333   0   2.54980E-06  293.6  end
U-238      333   0   3.44221E-05  293.6  end
'      total atom density =  8.01530E-02 a/b-cm
'  8.015300E-02
H-1        334   0   3.32434E-02  293.6  end
O-16       334   0   1.85176E-02  293.6  end
Mg-24      334   0   1.05686E-04  293.6  end
Mg-25      334   0   1.33797E-05  293.6  end
Mg-26      334   0   1.47310E-05  293.6  end
Al-27       334   0   2.73372E-02  293.6  end
Si-28       334   0   9.89350E-05  293.6  end
Si-29       334   0   5.00951E-06  293.6  end
Si-30       334   0   3.32537E-06  293.6  end
Ti-46       334   0   4.20262E-07  293.6  end
Ti-47       334   0   3.79000E-07  293.6  end
Ti-48       334   0   3.75536E-06  293.6  end
Ti-49       334   0   2.75590E-07  293.6  end
Ti-50       334   0   2.63873E-07  293.6  end
Cr-50       334   0   5.30517E-07  293.6  end
Cr-52       334   0   1.02189E-05  293.6  end
Cr-53       334   0   1.15860E-06  293.6  end
Cr-54       334   0   2.87821E-07  293.6  end
Mn-55       334   0   6.37178E-06  293.6  end
Fe-54       334   0   2.30432E-06  293.6  end
Fe-56       334   0   3.61403E-05  293.6  end
Fe-57       334   0   8.35068E-07  293.6  end
Fe-58       334   0   1.10292E-07  293.6  end
Cu-63       334   0   1.85357E-05  293.6  end
Cu-65       334   0   8.26161E-06  293.6  end
U-234       334   0   7.23926E-06  293.6  end
U-235       334   0   6.74700E-04  293.6  end
U-236       334   0   2.89573E-06  293.6  end
U-238       334   0   3.90920E-05  293.6  end
'      total atom density =  8.01437E-02 a/b-cm
'  8.014370E-02
H-1        335   0   3.32434E-02  293.6  end
O-16       335   0   1.84469E-02  293.6  end
Mg-24      335   0   1.05686E-04  293.6  end
Mg-25      335   0   1.33797E-05  293.6  end
Mg-26      335   0   1.47310E-05  293.6  end
Al-27       335   0   2.74247E-02  293.6  end
Si-28       335   0   9.91306E-05  293.6  end
Si-29       335   0   5.01941E-06  293.6  end
Si-30       335   0   3.33194E-06  293.6  end
Ti-46       335   0   4.20262E-07  293.6  end
Ti-47       335   0   3.79000E-07  293.6  end
Ti-48       335   0   3.75536E-06  293.6  end
Ti-49       335   0   2.75590E-07  293.6  end
Ti-50       335   0   2.63873E-07  293.6  end
Cr-50       335   0   5.30517E-07  293.6  end
Cr-52       335   0   1.02189E-05  293.6  end
Cr-53       335   0   1.15860E-06  293.6  end
Cr-54       335   0   2.87821E-07  293.6  end
Mn-55       335   0   6.38261E-06  293.6  end
Fe-54       335   0   2.31055E-06  293.6  end
Fe-56       335   0   3.62380E-05  293.6  end
Fe-57       335   0   8.37326E-07  293.6  end
Fe-58       335   0   1.10590E-07  293.6  end
Cu-63       335   0   1.85717E-05  293.6  end
Cu-65       335   0   8.27767E-06  293.6  end
U-234       335   0   6.97424E-06  293.6  end
U-235       335   0   6.50000E-04  293.6  end
U-236       335   0   2.78972E-06  293.6  end
U-238       335   0   3.76609E-05  293.6  end
'      total atom density =  8.00985E-02 a/b-cm
'  8.009850E-02
H-1        336   0   3.32434E-02  293.6  end
O-16       336   0   1.81013E-02  293.6  end
Mg-24      336   0   1.05686E-04  293.6  end
Mg-25      336   0   1.33797E-05  293.6  end
Mg-26      336   0   1.47310E-05  293.6  end
Al-27       336   0   2.78528E-02  293.6  end
Si-28       336   0   1.00085E-04  293.6  end
Si-29       336   0   5.06774E-06  293.6  end
Si-30       336   0   3.36403E-06  293.6  end
Ti-46       336   0   4.20262E-07  293.6  end

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Ti-47	336	0	3.79000E-07	293.6	end
Ti-48	336	0	3.75536E-06	293.6	end
Ti-49	336	0	2.75590E-07	293.6	end
Ti-50	336	0	2.63873E-07	293.6	end
Cr-50	336	0	5.30517E-07	293.6	end
Cr-52	336	0	1.02189E-05	293.6	end
Cr-53	336	0	1.15860E-06	293.6	end
Cr-54	336	0	2.87821E-07	293.6	end
Mn-55	336	0	6.43555E-06	293.6	end
Fe-54	336	0	2.34101E-06	293.6	end
Fe-56	336	0	3.67158E-05	293.6	end
Fe-57	336	0	8.48365E-07	293.6	end
Fe-58	336	0	1.12048E-07	293.6	end
Cu-63	336	0	1.87481E-05	293.6	end
Cu-65	336	0	8.35629E-06	293.6	end
U-234	336	0	5.67811E-06	293.6	end
U-235	336	0	5.29200E-04	293.6	end
U-236	336	0	2.27126E-06	293.6	end
U-238	336	0	3.06618E-05	293.6	end
total atom density = 8.00555E-02 a/b-cm					
8.005550E-02					
H-1	337	0	3.32434E-02	293.6	end
O-16	337	0	1.77731E-02	293.6	end
Mg-24	337	0	1.05686E-04	293.6	end
Mg-25	337	0	1.33797E-05	293.6	end
Mg-26	337	0	1.47310E-05	293.6	end
Al-27	337	0	2.82593E-02	293.6	end
Si-28	337	0	1.00993E-04	293.6	end
Si-29	337	0	5.11370E-06	293.6	end
Si-30	337	0	3.39453E-06	293.6	end
Ti-46	337	0	4.20262E-07	293.6	end
Ti-47	337	0	3.79000E-07	293.6	end
Ti-48	337	0	3.75536E-06	293.6	end
Ti-49	337	0	2.75590E-07	293.6	end
Ti-50	337	0	2.63873E-07	293.6	end
Cr-50	337	0	5.30517E-07	293.6	end
Cr-52	337	0	1.02189E-05	293.6	end
Cr-53	337	0	1.15860E-06	293.6	end
Cr-54	337	0	2.87821E-07	293.6	end
Mn-55	337	0	6.48581E-06	293.6	end
Fe-54	337	0	2.36993E-06	293.6	end
Fe-56	337	0	3.71695E-05	293.6	end
Fe-57	337	0	8.58848E-07	293.6	end
Fe-58	337	0	1.13433E-07	293.6	end
Cu-63	337	0	1.89155E-05	293.6	end
Cu-65	337	0	8.43090E-06	293.6	end
U-234	337	0	4.44742E-06	293.6	end
U-235	337	0	4.14500E-04	293.6	end
U-236	337	0	1.77898E-06	293.6	end
U-238	337	0	2.40161E-05	293.6	end
total atom density = 8.00271E-02 a/b-cm					
8.002710E-02					
H-1	338	0	3.32434E-02	293.6	end
O-16	338	0	1.75562E-02	293.6	end
Mg-24	338	0	1.05686E-04	293.6	end
Mg-25	338	0	1.33797E-05	293.6	end
Mg-26	338	0	1.47310E-05	293.6	end
Al-27	338	0	2.85280E-02	293.6	end
Si-28	338	0	1.01591E-04	293.6	end
Si-29	338	0	5.14401E-06	293.6	end
Si-30	338	0	3.41465E-06	293.6	end
Ti-46	338	0	4.20262E-07	293.6	end
Ti-47	338	0	3.79000E-07	293.6	end
Ti-48	338	0	3.75536E-06	293.6	end
Ti-49	338	0	2.75590E-07	293.6	end
Ti-50	338	0	2.63873E-07	293.6	end
Cr-50	338	0	5.30517E-07	293.6	end
Cr-52	338	0	1.02189E-05	293.6	end
Cr-53	338	0	1.15860E-06	293.6	end
Cr-54	338	0	2.87821E-07	293.6	end
Mn-55	338	0	6.51903E-06	293.6	end
Fe-54	338	0	2.38905E-06	293.6	end
Fe-56	338	0	3.74693E-05	293.6	end
Fe-57	338	0	8.65776E-07	293.6	end
Fe-58	338	0	1.14348E-07	293.6	end
Cu-63	338	0	1.90262E-05	293.6	end
Cu-65	338	0	8.48022E-06	293.6	end
U-234	338	0	3.63412E-06	293.6	end
U-235	338	0	3.38700E-04	293.6	end
U-236	338	0	1.45366E-06	293.6	end
U-238	338	0	1.96242E-05	293.6	end

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'      total atom density =  8.00013E-02 a/b-cm
'  8.000130E-02
H-1          339    0   3.32434E-02   293.6  end
O-16         339    0   1.73591E-02   293.6  end
Mg-24        339    0   1.05686E-04   293.6  end
Mg-25        339    0   1.33797E-05   293.6  end
Mg-26        339    0   1.47310E-05   293.6  end
Al-27        339    0   2.87722E-02   293.6  end
Si-28        339    0   1.02136E-04   293.6  end
Si-29        339    0   5.17160E-06   293.6  end
Si-30        339    0   3.43297E-06   293.6  end
Ti-46        339    0   4.20262E-07   293.6  end
Ti-47        339    0   3.79000E-07   293.6  end
Ti-48        339    0   3.75536E-06   293.6  end
Ti-49        339    0   2.75590E-07   293.6  end
Ti-50        339    0   2.63873E-07   293.6  end
Cr-50        339    0   5.30517E-07   293.6  end
Cr-52        339    0   1.02189E-05   293.6  end
Cr-53        339    0   1.15860E-06   293.6  end
Cr-54        339    0   2.87821E-07   293.6  end
Mn-55        339    0   6.54922E-06   293.6  end
Fe-54        339    0   2.40643E-06   293.6  end
Fe-56        339    0   3.77418E-05   293.6  end
Fe-57        339    0   8.72072E-07   293.6  end
Fe-58        339    0   1.15179E-07   293.6  end
Cu-63        339    0   1.91268E-05   293.6  end
Cu-65        339    0   8.52504E-06   293.6  end
U-234       339    0   2.89485E-06   293.6  end
U-235       339    0   2.69800E-04   293.6  end
U-236       339    0   1.15795E-06   293.6  end
U-238       339    0   1.56322E-05   293.6  end
'
'      Outer Fuel Element fueled region 4
'      total atom density =  8.00583E-02 a/b-cm
'  8.005830E-02
H-1          341    0   3.32434E-02   293.6  end
O-16         341    0   1.77945E-02   293.6  end
Mg-24        341    0   1.05686E-04   293.6  end
Mg-25        341    0   1.33797E-05   293.6  end
Mg-26        341    0   1.47310E-05   293.6  end
Al-27        341    0   2.82328E-02   293.6  end
Si-28        341    0   1.00933E-04   293.6  end
Si-29        341    0   5.11066E-06   293.6  end
Si-30        341    0   3.39252E-06   293.6  end
Ti-46        341    0   4.20262E-07   293.6  end
Ti-47        341    0   3.79000E-07   293.6  end
Ti-48        341    0   3.75536E-06   293.6  end
Ti-49        341    0   2.75590E-07   293.6  end
Ti-50        341    0   2.63873E-07   293.6  end
Cr-50        341    0   5.30517E-07   293.6  end
Cr-52        341    0   1.02189E-05   293.6  end
Cr-53        341    0   1.15860E-06   293.6  end
Cr-54        341    0   2.87821E-07   293.6  end
Mn-55        341    0   6.48252E-06   293.6  end
Fe-54        341    0   2.36804E-06   293.6  end
Fe-56        341    0   3.71398E-05   293.6  end
Fe-57        341    0   8.58163E-07   293.6  end
Fe-58        341    0   1.13342E-07   293.6  end
Cu-63        341    0   1.89046E-05   293.6  end
Cu-65        341    0   8.42602E-06   293.6  end
U-234       341    0   4.52789E-06   293.6  end
U-235       341    0   4.22000E-04   293.6  end
U-236       341    0   1.81117E-06   293.6  end
U-238       341    0   2.44506E-05   293.6  end
'
      total atom density =  8.00895E-02 a/b-cm
'  8.008950E-02
H-1          342    0   3.32434E-02   293.6  end
O-16         342    0   1.80329E-02   293.6  end
Mg-24        342    0   1.05686E-04   293.6  end
Mg-25        342    0   1.33797E-05   293.6  end
Mg-26        342    0   1.47310E-05   293.6  end
Al-27        342    0   2.79375E-02   293.6  end
Si-28        342    0   1.00274E-04   293.6  end
Si-29        342    0   5.07732E-06   293.6  end
Si-30        342    0   3.37038E-06   293.6  end
Ti-46        342    0   4.20262E-07   293.6  end
Ti-47        342    0   3.79000E-07   293.6  end
Ti-48        342    0   3.75536E-06   293.6  end
Ti-49        342    0   2.75590E-07   293.6  end
Ti-50        342    0   2.63873E-07   293.6  end
Cr-50        342    0   5.30517E-07   293.6  end

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Cr-52      342    0   1.02189E-05  293.6  end
Cr-53      342    0   1.15860E-06  293.6  end
Cr-54      342    0   2.87821E-07  293.6  end
Mn-55      342    0   6.44602E-06  293.6  end
Fe-54      342    0   2.34704E-06  293.6  end
Fe-56      342    0   3.68104E-05  293.6  end
Fe-57      342    0   8.50550E-07  293.6  end
Fe-58      342    0   1.12337E-07  293.6  end
Cu-63      342    0   1.87830E-05  293.6  end
Cu-65      342    0   8.37182E-06  293.6  end
U-234     342    0   5.42167E-06  293.6  end
U-235     342    0   5.05300E-04   293.6  end
U-236     342    0   2.16868E-06  293.6  end
U-238     342    0   2.92770E-05  293.6  end
'   total atom density =  8.01228E-02 a/b-cm
' 8.012280E-02
H-1        343    0   3.32434E-02  293.6  end
O-16       343    0   1.82870E-02  293.6  end
Mg-24      343    0   1.05686E-04  293.6  end
Mg-25      343    0   1.33797E-05  293.6  end
Mg-26      343    0   1.47310E-05  293.6  end
Al-27      343    0   2.76228E-02  293.6  end
Si-28      343    0   9.95724E-05  293.6  end
Si-29      343    0   5.04178E-06  293.6  end
Si-30      343    0   3.34679E-06  293.6  end
Ti-46      343    0   4.20262E-07  293.6  end
Ti-47      343    0   3.79000E-07  293.6  end
Ti-48      343    0   3.75536E-06  293.6  end
Ti-49      343    0   2.75590E-07  293.6  end
Ti-50      343    0   2.63873E-07  293.6  end
Cr-50      343    0   5.30517E-07  293.6  end
Cr-52      343    0   1.02189E-05  293.6  end
Cr-53      343    0   1.15860E-06  293.6  end
Cr-54      343    0   2.87821E-07  293.6  end
Mn-55      343    0   6.40711E-06  293.6  end
Fe-54      343    0   2.32464E-06  293.6  end
Fe-56      343    0   3.64591E-05  293.6  end
Fe-57      343    0   8.42433E-07  293.6  end
Fe-58      343    0   1.11265E-07  293.6  end
Cu-63      343    0   1.86534E-05  293.6  end
Cu-65      343    0   8.31405E-06  293.6  end
U-234     343    0   6.37446E-06  293.6  end
U-235     343    0   5.94100E-04   293.6  end
U-236     343    0   2.54980E-06  293.6  end
U-238     343    0   3.44221E-05  293.6  end
'   total atom density =  8.01530E-02 a/b-cm
' 8.015300E-02
H-1        344    0   3.32434E-02  293.6  end
O-16       344    0   1.85176E-02  293.6  end
Mg-24      344    0   1.05686E-04  293.6  end
Mg-25      344    0   1.33797E-05  293.6  end
Mg-26      344    0   1.47310E-05  293.6  end
Al-27      344    0   2.73372E-02  293.6  end
Si-28      344    0   9.89350E-05  293.6  end
Si-29      344    0   5.00951E-06  293.6  end
Si-30      344    0   3.32537E-06  293.6  end
Ti-46      344    0   4.20262E-07  293.6  end
Ti-47      344    0   3.79000E-07  293.6  end
Ti-48      344    0   3.75536E-06  293.6  end
Ti-49      344    0   2.75590E-07  293.6  end
Ti-50      344    0   2.63873E-07  293.6  end
Cr-50      344    0   5.30517E-07  293.6  end
Cr-52      344    0   1.02189E-05  293.6  end
Cr-53      344    0   1.15860E-06  293.6  end
Cr-54      344    0   2.87821E-07  293.6  end
Mn-55      344    0   6.37178E-06  293.6  end
Fe-54      344    0   2.30432E-06  293.6  end
Fe-56      344    0   3.61403E-05  293.6  end
Fe-57      344    0   8.35068E-07  293.6  end
Fe-58      344    0   1.10292E-07  293.6  end
Cu-63      344    0   1.85357E-05  293.6  end
Cu-65      344    0   8.26161E-06  293.6  end
U-234     344    0   7.23926E-06  293.6  end
U-235     344    0   6.74700E-04   293.6  end
U-236     344    0   2.89573E-06  293.6  end
U-238     344    0   3.90920E-05  293.6  end
'   total atom density =  8.01437E-02 a/b-cm
' 8.014370E-02
H-1        345    0   3.32434E-02  293.6  end
O-16       345    0   1.84469E-02  293.6  end
Mg-24      345    0   1.05686E-04  293.6  end

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Mg-25      345   0   1.33797E-05  293.6  end
Mg-26      345   0   1.47310E-05  293.6  end
Al-27      345   0   2.74247E-02  293.6  end
Si-28      345   0   9.91306E-05  293.6  end
Si-29      345   0   5.01941E-06  293.6  end
Si-30      345   0   3.33194E-06  293.6  end
Ti-46      345   0   4.20262E-07  293.6  end
Ti-47      345   0   3.79000E-07  293.6  end
Ti-48      345   0   3.75536E-06  293.6  end
Ti-49      345   0   2.75590E-07  293.6  end
Ti-50      345   0   2.63873E-07  293.6  end
Cr-50      345   0   5.30517E-07  293.6  end
Cr-52      345   0   1.02189E-05  293.6  end
Cr-53      345   0   1.15860E-06  293.6  end
Cr-54      345   0   2.87821E-07  293.6  end
Mn-55      345   0   6.38261E-06  293.6  end
Fe-54      345   0   2.31055E-06  293.6  end
Fe-56      345   0   3.62380E-05  293.6  end
Fe-57      345   0   8.37326E-07  293.6  end
Fe-58      345   0   1.10590E-07  293.6  end
Cu-63      345   0   1.85717E-05  293.6  end
Cu-65      345   0   8.27767E-06  293.6  end
U-234     345   0   6.97424E-06  293.6  end
U-235     345   0   6.50000E-04   293.6  end
U-236     345   0   2.78972E-06  293.6  end
U-238     345   0   3.76609E-05  293.6  end
'    total atom density =  8.00985E-02 a/b-cm
'  8.009850E-02
H-1        346   0   3.32434E-02  293.6  end
O-16       346   0   1.81013E-02  293.6  end
Mg-24      346   0   1.05686E-04  293.6  end
Mg-25      346   0   1.33797E-05  293.6  end
Mg-26      346   0   1.47310E-05  293.6  end
Al-27      346   0   2.78528E-02  293.6  end
Si-28      346   0   1.00085E-04  293.6  end
Si-29      346   0   5.06774E-06  293.6  end
Si-30      346   0   3.36403E-06  293.6  end
Ti-46      346   0   4.20262E-07  293.6  end
Ti-47      346   0   3.79000E-07  293.6  end
Ti-48      346   0   3.75536E-06  293.6  end
Ti-49      346   0   2.75590E-07  293.6  end
Ti-50      346   0   2.63873E-07  293.6  end
Cr-50      346   0   5.30517E-07  293.6  end
Cr-52      346   0   1.02189E-05  293.6  end
Cr-53      346   0   1.15860E-06  293.6  end
Cr-54      346   0   2.87821E-07  293.6  end
Mn-55      346   0   6.43555E-06  293.6  end
Fe-54      346   0   2.34101E-06  293.6  end
Fe-56      346   0   3.67158E-05  293.6  end
Fe-57      346   0   8.48365E-07  293.6  end
Fe-58      346   0   1.12048E-07  293.6  end
Cu-63      346   0   1.87481E-05  293.6  end
Cu-65      346   0   8.35629E-06  293.6  end
U-234     346   0   5.67811E-06  293.6  end
U-235     346   0   5.29200E-04   293.6  end
U-236     346   0   2.27126E-06  293.6  end
U-238     346   0   3.06618E-05  293.6  end
'    total atom density =  8.00555E-02 a/b-cm
'  8.005550E-02
H-1        347   0   3.32434E-02  293.6  end
O-16       347   0   1.77731E-02  293.6  end
Mg-24      347   0   1.05686E-04  293.6  end
Mg-25      347   0   1.33797E-05  293.6  end
Mg-26      347   0   1.47310E-05  293.6  end
Al-27      347   0   2.82593E-02  293.6  end
Si-28      347   0   1.00993E-04  293.6  end
Si-29      347   0   5.11370E-06  293.6  end
Si-30      347   0   3.39453E-06  293.6  end
Ti-46      347   0   4.20262E-07  293.6  end
Ti-47      347   0   3.79000E-07  293.6  end
Ti-48      347   0   3.75536E-06  293.6  end
Ti-49      347   0   2.75590E-07  293.6  end
Ti-50      347   0   2.63873E-07  293.6  end
Cr-50      347   0   5.30517E-07  293.6  end
Cr-52      347   0   1.02189E-05  293.6  end
Cr-53      347   0   1.15860E-06  293.6  end
Cr-54      347   0   2.87821E-07  293.6  end
Mn-55      347   0   6.48581E-06  293.6  end
Fe-54      347   0   2.36993E-06  293.6  end
Fe-56      347   0   3.71695E-05  293.6  end
Fe-57      347   0   8.58848E-07  293.6  end

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Fe-58      347   0   1.13433E-07  293.6  end
Cu-63      347   0   1.89155E-05  293.6  end
Cu-65      347   0   8.43090E-06  293.6  end
U-234      347   0   4.44742E-06  293.6  end
U-235      347   0   4.14500E-04  293.6  end
U-236      347   0   1.77898E-06  293.6  end
U-238      347   0   2.40161E-05  293.6  end
'      total atom density =  8.00271E-02 a/b-cm
'  8.002710E-02
H-1        348   0   3.32434E-02  293.6  end
O-16       348   0   1.75562E-02  293.6  end
Mg-24      348   0   1.05686E-04  293.6  end
Mg-25      348   0   1.33797E-05  293.6  end
Mg-26      348   0   1.47310E-05  293.6  end
Al-27      348   0   2.85280E-02  293.6  end
Si-28      348   0   1.01591E-04  293.6  end
Si-29      348   0   5.14401E-06  293.6  end
Si-30      348   0   3.41465E-06  293.6  end
Ti-46      348   0   4.20262E-07  293.6  end
Ti-47      348   0   3.79000E-07  293.6  end
Ti-48      348   0   3.75536E-06  293.6  end
Ti-49      348   0   2.75590E-07  293.6  end
Ti-50      348   0   2.63873E-07  293.6  end
Cr-50      348   0   5.30517E-07  293.6  end
Cr-52      348   0   1.02189E-05  293.6  end
Cr-53      348   0   1.15860E-06  293.6  end
Cr-54      348   0   2.87821E-07  293.6  end
Mn-55      348   0   6.51903E-06  293.6  end
Fe-54      348   0   2.38905E-06  293.6  end
Fe-56      348   0   3.74693E-05  293.6  end
Fe-57      348   0   8.65776E-07  293.6  end
Fe-58      348   0   1.14348E-07  293.6  end
Cu-63      348   0   1.90262E-05  293.6  end
Cu-65      348   0   8.48022E-06  293.6  end
U-234      348   0   3.63412E-06  293.6  end
U-235      348   0   3.38700E-04  293.6  end
U-236      348   0   1.45366E-06  293.6  end
U-238      348   0   1.96242E-05  293.6  end
'      total atom density =  8.00013E-02 a/b-cm
'  8.000130E-02
H-1        349   0   3.32434E-02  293.6  end
O-16       349   0   1.73591E-02  293.6  end
Mg-24      349   0   1.05686E-04  293.6  end
Mg-25      349   0   1.33797E-05  293.6  end
Mg-26      349   0   1.47310E-05  293.6  end
Al-27      349   0   2.87722E-02  293.6  end
Si-28      349   0   1.02136E-04  293.6  end
Si-29      349   0   5.17160E-06  293.6  end
Si-30      349   0   3.43297E-06  293.6  end
Ti-46      349   0   4.20262E-07  293.6  end
Ti-47      349   0   3.79000E-07  293.6  end
Ti-48      349   0   3.75536E-06  293.6  end
Ti-49      349   0   2.75590E-07  293.6  end
Ti-50      349   0   2.63873E-07  293.6  end
Cr-50      349   0   5.30517E-07  293.6  end
Cr-52      349   0   1.02189E-05  293.6  end
Cr-53      349   0   1.15860E-06  293.6  end
Cr-54      349   0   2.87821E-07  293.6  end
Mn-55      349   0   6.54922E-06  293.6  end
Fe-54      349   0   2.40643E-06  293.6  end
Fe-56      349   0   3.77418E-05  293.6  end
Fe-57      349   0   8.72072E-07  293.6  end
Fe-58      349   0   1.15179E-07  293.6  end
Cu-63      349   0   1.91268E-05  293.6  end
Cu-65      349   0   8.52504E-06  293.6  end
U-234      349   0   2.89485E-06  293.6  end
U-235      349   0   2.69800E-04  293.6  end
U-236      349   0   1.15795E-06  293.6  end
U-238      349   0   1.56322E-05  293.6  end
'
Outer Fuel Element fueled region
'      total atom density =  8.00583E-02 a/b-cm
'  8.005830E-02
H-1        351   0   3.32434E-02  293.6  end
O-16       351   0   1.77945E-02  293.6  end
Mg-24      351   0   1.05686E-04  293.6  end
Mg-25      351   0   1.33797E-05  293.6  end
Mg-26      351   0   1.47310E-05  293.6  end
Al-27      351   0   2.82328E-02  293.6  end
Si-28      351   0   1.00933E-04  293.6  end
Si-29      351   0   5.11066E-06  293.6  end

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Si-30	351	0	3.39252E-06	293.6	end
Ti-46	351	0	4.20262E-07	293.6	end
Ti-47	351	0	3.79000E-07	293.6	end
Ti-48	351	0	3.75536E-06	293.6	end
Ti-49	351	0	2.75590E-07	293.6	end
Ti-50	351	0	2.63873E-07	293.6	end
Cr-50	351	0	5.30517E-07	293.6	end
Cr-52	351	0	1.02189E-05	293.6	end
Cr-53	351	0	1.15860E-06	293.6	end
Cr-54	351	0	2.87821E-07	293.6	end
Mn-55	351	0	6.48252E-06	293.6	end
Fe-54	351	0	2.36804E-06	293.6	end
Fe-56	351	0	3.71398E-05	293.6	end
Fe-57	351	0	8.58163E-07	293.6	end
Fe-58	351	0	1.13342E-07	293.6	end
Cu-63	351	0	1.89046E-05	293.6	end
Cu-65	351	0	8.42602E-06	293.6	end
U-234	351	0	4.52789E-06	293.6	end
U-235	351	0	4.22000E-04	293.6	end
U-236	351	0	1.81117E-06	293.6	end
U-238	351	0	2.44506E-05	293.6	end
' total atom density = 8.00895E-02 a/b-cm					
' 8.008950E-02					
H-1	352	0	3.32434E-02	293.6	end
O-16	352	0	1.80329E-02	293.6	end
Mg-24	352	0	1.05686E-04	293.6	end
Mg-25	352	0	1.33797E-05	293.6	end
Mg-26	352	0	1.47310E-05	293.6	end
Al-27	352	0	2.79375E-02	293.6	end
Si-28	352	0	1.00274E-04	293.6	end
Si-29	352	0	5.07732E-06	293.6	end
Si-30	352	0	3.37038E-06	293.6	end
Ti-46	352	0	4.20262E-07	293.6	end
Ti-47	352	0	3.79000E-07	293.6	end
Ti-48	352	0	3.75536E-06	293.6	end
Ti-49	352	0	2.75590E-07	293.6	end
Ti-50	352	0	2.63873E-07	293.6	end
Cr-50	352	0	5.30517E-07	293.6	end
Cr-52	352	0	1.02189E-05	293.6	end
Cr-53	352	0	1.15860E-06	293.6	end
Cr-54	352	0	2.87821E-07	293.6	end
Mn-55	352	0	6.44602E-06	293.6	end
Fe-54	352	0	2.34704E-06	293.6	end
Fe-56	352	0	3.68104E-05	293.6	end
Fe-57	352	0	8.50550E-07	293.6	end
Fe-58	352	0	1.12337E-07	293.6	end
Cu-63	352	0	1.87830E-05	293.6	end
Cu-65	352	0	8.37182E-06	293.6	end
U-234	352	0	5.42167E-06	293.6	end
U-235	352	0	5.05300E-04	293.6	end
U-236	352	0	2.16868E-06	293.6	end
U-238	352	0	2.92770E-05	293.6	end
' total atom density = 8.01228E-02 a/b-cm					
' 8.012280E-02					
H-1	353	0	3.32434E-02	293.6	end
O-16	353	0	1.82870E-02	293.6	end
Mg-24	353	0	1.05686E-04	293.6	end
Mg-25	353	0	1.33797E-05	293.6	end
Mg-26	353	0	1.47310E-05	293.6	end
Al-27	353	0	2.76228E-02	293.6	end
Si-28	353	0	9.95724E-05	293.6	end
Si-29	353	0	5.04178E-06	293.6	end
Si-30	353	0	3.34679E-06	293.6	end
Ti-46	353	0	4.20262E-07	293.6	end
Ti-47	353	0	3.79000E-07	293.6	end
Ti-48	353	0	3.75536E-06	293.6	end
Ti-49	353	0	2.75590E-07	293.6	end
Ti-50	353	0	2.63873E-07	293.6	end
Cr-50	353	0	5.30517E-07	293.6	end
Cr-52	353	0	1.02189E-05	293.6	end
Cr-53	353	0	1.15860E-06	293.6	end
Cr-54	353	0	2.87821E-07	293.6	end
Mn-55	353	0	6.40711E-06	293.6	end
Fe-54	353	0	2.32464E-06	293.6	end
Fe-56	353	0	3.64591E-05	293.6	end
Fe-57	353	0	8.42433E-07	293.6	end
Fe-58	353	0	1.11265E-07	293.6	end
Cu-63	353	0	1.86534E-05	293.6	end
Cu-65	353	0	8.31405E-06	293.6	end
U-234	353	0	6.37446E-06	293.6	end
U-235	353	0	5.94100E-04	293.6	end

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U-236      353   0   2.54980E-06   293.6   end
U-238      353   0   3.44221E-05   293.6   end
'   total atom density =  8.01530E-02 a/b-cm
'  8.015300E-02
H-1        354   0   3.32434E-02   293.6   end
O-16       354   0   1.85176E-02   293.6   end
Mg-24      354   0   1.05686E-04   293.6   end
Mg-25      354   0   1.33797E-05   293.6   end
Mg-26      354   0   1.47310E-05   293.6   end
Al-27      354   0   2.73372E-02   293.6   end
Si-28      354   0   9.89350E-05   293.6   end
Si-29      354   0   5.00951E-06   293.6   end
Si-30      354   0   3.32537E-06   293.6   end
Ti-46      354   0   4.20262E-07   293.6   end
Ti-47      354   0   3.79000E-07   293.6   end
Ti-48      354   0   3.75536E-06   293.6   end
Ti-49      354   0   2.75590E-07   293.6   end
Ti-50      354   0   2.63873E-07   293.6   end
Cr-50      354   0   5.30517E-07   293.6   end
Cr-52      354   0   1.02189E-05   293.6   end
Cr-53      354   0   1.15860E-06   293.6   end
Cr-54      354   0   2.87821E-07   293.6   end
Mn-55      354   0   6.37178E-06   293.6   end
Fe-54      354   0   2.30432E-06   293.6   end
Fe-56      354   0   3.61403E-05   293.6   end
Fe-57      354   0   8.35068E-07   293.6   end
Fe-58      354   0   1.10292E-07   293.6   end
Cu-63      354   0   1.85357E-05   293.6   end
Cu-65      354   0   8.26161E-06   293.6   end
U-234     354   0   7.23926E-06   293.6   end
U-235     354   0   6.74700E-04   293.6   end
U-236     354   0   2.89573E-06   293.6   end
U-238     354   0   3.90920E-05   293.6   end
'   total atom density =  8.01437E-02 a/b-cm
'  8.014370E-02
H-1        355   0   3.32434E-02   293.6   end
O-16       355   0   1.84469E-02   293.6   end
Mg-24      355   0   1.05686E-04   293.6   end
Mg-25      355   0   1.33797E-05   293.6   end
Mg-26      355   0   1.47310E-05   293.6   end
Al-27      355   0   2.74247E-02   293.6   end
Si-28      355   0   9.91306E-05   293.6   end
Si-29      355   0   5.01941E-06   293.6   end
Si-30      355   0   3.33194E-06   293.6   end
Ti-46      355   0   4.20262E-07   293.6   end
Ti-47      355   0   3.79000E-07   293.6   end
Ti-48      355   0   3.75536E-06   293.6   end
Ti-49      355   0   2.75590E-07   293.6   end
Ti-50      355   0   2.63873E-07   293.6   end
Cr-50      355   0   5.30517E-07   293.6   end
Cr-52      355   0   1.02189E-05   293.6   end
Cr-53      355   0   1.15860E-06   293.6   end
Cr-54      355   0   2.87821E-07   293.6   end
Mn-55      355   0   6.38261E-06   293.6   end
Fe-54      355   0   2.31055E-06   293.6   end
Fe-56      355   0   3.62380E-05   293.6   end
Fe-57      355   0   8.37326E-07   293.6   end
Fe-58      355   0   1.10590E-07   293.6   end
Cu-63      355   0   1.85717E-05   293.6   end
Cu-65      355   0   8.27767E-06   293.6   end
U-234     355   0   6.97424E-06   293.6   end
U-235     355   0   6.50000E-04   293.6   end
U-236     355   0   2.78972E-06   293.6   end
U-238     355   0   3.76609E-05   293.6   end
'   total atom density =  8.00985E-02 a/b-cm
'  8.009850E-02
H-1        356   0   3.32434E-02   293.6   end
O-16       356   0   1.81013E-02   293.6   end
Mg-24      356   0   1.05686E-04   293.6   end
Mg-25      356   0   1.33797E-05   293.6   end
Mg-26      356   0   1.47310E-05   293.6   end
Al-27      356   0   2.78528E-02   293.6   end
Si-28      356   0   1.00085E-04   293.6   end
Si-29      356   0   5.06774E-06   293.6   end
Si-30      356   0   3.36403E-06   293.6   end
Ti-46      356   0   4.20262E-07   293.6   end
Ti-47      356   0   3.79000E-07   293.6   end
Ti-48      356   0   3.75536E-06   293.6   end
Ti-49      356   0   2.75590E-07   293.6   end
Ti-50      356   0   2.63873E-07   293.6   end
Cr-50      356   0   5.30517E-07   293.6   end

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Cr-52      356   0   1.02189E-05  293.6  end
Cr-53      356   0   1.15860E-06  293.6  end
Cr-54      356   0   2.87821E-07  293.6  end
Mn-55      356   0   6.43555E-06  293.6  end
Fe-54      356   0   2.34101E-06  293.6  end
Fe-56      356   0   3.67158E-05  293.6  end
Fe-57      356   0   8.48365E-07  293.6  end
Fe-58      356   0   1.12048E-07  293.6  end
Cu-63      356   0   1.87481E-05  293.6  end
Cu-65      356   0   8.35629E-06  293.6  end
U-234     356   0   5.67811E-06  293.6  end
U-235     356   0   5.29200E-04  293.6  end
U-236     356   0   2.27126E-06  293.6  end
U-238     356   0   3.06618E-05  293.6  end
'   total atom density =  8.00555E-02 a/b-cm
' 8.00555E-02
H-1        357   0   3.32434E-02  293.6  end
O-16       357   0   1.77731E-02  293.6  end
Mg-24      357   0   1.05686E-04  293.6  end
Mg-25      357   0   1.33797E-05  293.6  end
Mg-26      357   0   1.47310E-05  293.6  end
Al-27      357   0   2.82593E-02  293.6  end
Si-28      357   0   1.00993E-04  293.6  end
Si-29      357   0   5.11370E-06  293.6  end
Si-30      357   0   3.39453E-06  293.6  end
Ti-46      357   0   4.20262E-07  293.6  end
Ti-47      357   0   3.79000E-07  293.6  end
Ti-48      357   0   3.75536E-06  293.6  end
Ti-49      357   0   2.75590E-07  293.6  end
Ti-50      357   0   2.63873E-07  293.6  end
Cr-50      357   0   5.30517E-07  293.6  end
Cr-52      357   0   1.02189E-05  293.6  end
Cr-53      357   0   1.15860E-06  293.6  end
Cr-54      357   0   2.87821E-07  293.6  end
Mn-55      357   0   6.48581E-06  293.6  end
Fe-54      357   0   2.36993E-06  293.6  end
Fe-56      357   0   3.71695E-05  293.6  end
Fe-57      357   0   8.58848E-07  293.6  end
Fe-58      357   0   1.13433E-07  293.6  end
Cu-63      357   0   1.89155E-05  293.6  end
Cu-65      357   0   8.43090E-06  293.6  end
U-234     357   0   4.44742E-06  293.6  end
U-235     357   0   4.14500E-04  293.6  end
U-236     357   0   1.77898E-06  293.6  end
U-238     357   0   2.40161E-05  293.6  end
'   total atom density =  8.00271E-02 a/b-cm
' 8.00271E-02
H-1        358   0   3.32434E-02  293.6  end
O-16       358   0   1.75562E-02  293.6  end
Mg-24      358   0   1.05686E-04  293.6  end
Mg-25      358   0   1.33797E-05  293.6  end
Mg-26      358   0   1.47310E-05  293.6  end
Al-27      358   0   2.85280E-02  293.6  end
Si-28      358   0   1.01591E-04  293.6  end
Si-29      358   0   5.14401E-06  293.6  end
Si-30      358   0   3.41465E-06  293.6  end
Ti-46      358   0   4.20262E-07  293.6  end
Ti-47      358   0   3.79000E-07  293.6  end
Ti-48      358   0   3.75536E-06  293.6  end
Ti-49      358   0   2.75590E-07  293.6  end
Ti-50      358   0   2.63873E-07  293.6  end
Cr-50      358   0   5.30517E-07  293.6  end
Cr-52      358   0   1.02189E-05  293.6  end
Cr-53      358   0   1.15860E-06  293.6  end
Cr-54      358   0   2.87821E-07  293.6  end
Mn-55      358   0   6.51903E-06  293.6  end
Fe-54      358   0   2.38905E-06  293.6  end
Fe-56      358   0   3.74693E-05  293.6  end
Fe-57      358   0   8.65776E-07  293.6  end
Fe-58      358   0   1.14348E-07  293.6  end
Cu-63      358   0   1.90262E-05  293.6  end
Cu-65      358   0   8.48022E-06  293.6  end
U-234     358   0   3.63412E-06  293.6  end
U-235     358   0   3.38700E-04  293.6  end
U-236     358   0   1.45366E-06  293.6  end
U-238     358   0   1.96242E-05  293.6  end
'   total atom density =  8.00013E-02 a/b-cm
' 8.00013E-02
H-1        359   0   3.32434E-02  293.6  end
O-16       359   0   1.73591E-02  293.6  end
Mg-24      359   0   1.05686E-04  293.6  end

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Mg-25	359	0	1.33797E-05	293.6	end
Mg-26	359	0	1.47310E-05	293.6	end
Al-27	359	0	2.87722E-02	293.6	end
Si-28	359	0	1.02136E-04	293.6	end
Si-29	359	0	5.17160E-06	293.6	end
Si-30	359	0	3.43297E-06	293.6	end
Ti-46	359	0	4.20262E-07	293.6	end
Ti-47	359	0	3.79000E-07	293.6	end
Ti-48	359	0	3.75536E-06	293.6	end
Ti-49	359	0	2.75590E-07	293.6	end
Ti-50	359	0	2.63873E-07	293.6	end
Cr-50	359	0	5.30517E-07	293.6	end
Cr-52	359	0	1.02189E-05	293.6	end
Cr-53	359	0	1.15860E-06	293.6	end
Cr-54	359	0	2.87821E-07	293.6	end
Mn-55	359	0	6.54922E-06	293.6	end
Fe-54	359	0	2.40643E-06	293.6	end
Fe-56	359	0	3.77418E-05	293.6	end
Fe-57	359	0	8.72072E-07	293.6	end
Fe-58	359	0	1.15179E-07	293.6	end
Cu-63	359	0	1.91268E-05	293.6	end
Cu-65	359	0	8.52504E-06	293.6	end
U-234	359	0	2.89485E-06	293.6	end
U-235	359	0	2.69800E-04	293.6	end
U-236	359	0	1.15795E-06	293.6	end
U-238	359	0	1.56322E-05	293.6	end

' Outer Fuel Element fueled region 6
' total atom density = 8.00583E-02 a/b-cm
' 8.005830E-02

H-1	361	0	3.32434E-02	293.6	end
O-16	361	0	1.77945E-02	293.6	end
Mg-24	361	0	1.05686E-04	293.6	end
Mg-25	361	0	1.33797E-05	293.6	end
Mg-26	361	0	1.47310E-05	293.6	end
Al-27	361	0	2.82328E-02	293.6	end
Si-28	361	0	1.00933E-04	293.6	end
Si-29	361	0	5.11066E-06	293.6	end
Si-30	361	0	3.39252E-06	293.6	end
Ti-46	361	0	4.20262E-07	293.6	end
Ti-47	361	0	3.79000E-07	293.6	end
Ti-48	361	0	3.75536E-06	293.6	end
Ti-49	361	0	2.75590E-07	293.6	end
Ti-50	361	0	2.63873E-07	293.6	end
Cr-50	361	0	5.30517E-07	293.6	end
Cr-52	361	0	1.02189E-05	293.6	end
Cr-53	361	0	1.15860E-06	293.6	end
Cr-54	361	0	2.87821E-07	293.6	end
Mn-55	361	0	6.48252E-06	293.6	end
Fe-54	361	0	2.36804E-06	293.6	end
Fe-56	361	0	3.71398E-05	293.6	end
Fe-57	361	0	8.58163E-07	293.6	end
Fe-58	361	0	1.13342E-07	293.6	end
Cu-63	361	0	1.89046E-05	293.6	end
Cu-65	361	0	8.42602E-06	293.6	end
U-234	361	0	4.52789E-06	293.6	end
U-235	361	0	4.22000E-04	293.6	end
U-236	361	0	1.81117E-06	293.6	end
U-238	361	0	2.44506E-05	293.6	end

' total atom density = 8.00895E-02 a/b-cm
' 8.008950E-02

H-1	362	0	3.32434E-02	293.6	end
O-16	362	0	1.80329E-02	293.6	end
Mg-24	362	0	1.05686E-04	293.6	end
Mg-25	362	0	1.33797E-05	293.6	end
Mg-26	362	0	1.47310E-05	293.6	end
Al-27	362	0	2.79375E-02	293.6	end
Si-28	362	0	1.00274E-04	293.6	end
Si-29	362	0	5.07732E-06	293.6	end
Si-30	362	0	3.37038E-06	293.6	end
Ti-46	362	0	4.20262E-07	293.6	end
Ti-47	362	0	3.79000E-07	293.6	end
Ti-48	362	0	3.75536E-06	293.6	end
Ti-49	362	0	2.75590E-07	293.6	end
Ti-50	362	0	2.63873E-07	293.6	end
Cr-50	362	0	5.30517E-07	293.6	end
Cr-52	362	0	1.02189E-05	293.6	end
Cr-53	362	0	1.15860E-06	293.6	end
Cr-54	362	0	2.87821E-07	293.6	end
Mn-55	362	0	6.44602E-06	293.6	end
Fe-54	362	0	2.34704E-06	293.6	end

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Fe-56      362   0   3.68104E-05  293.6  end
Fe-57      362   0   8.50550E-07  293.6  end
Fe-58      362   0   1.12337E-07  293.6  end
Cu-63      362   0   1.87830E-05  293.6  end
Cu-65      362   0   8.37182E-06  293.6  end
U-234      362   0   5.42167E-06  293.6  end
U-235      362   0   5.05300E-04  293.6  end
U-236      362   0   2.16868E-06  293.6  end
U-238      362   0   2.92770E-05  293.6  end
'   total atom density =  8.01228E-02 a/b-cm
'  8.012280E-02
H-1        363   0   3.32434E-02  293.6  end
O-16       363   0   1.82870E-02  293.6  end
Mg-24      363   0   1.05686E-04  293.6  end
Mg-25      363   0   1.33797E-05  293.6  end
Mg-26      363   0   1.47310E-05  293.6  end
Al-27      363   0   2.76228E-02  293.6  end
Si-28      363   0   9.95724E-05  293.6  end
Si-29      363   0   5.04178E-06  293.6  end
Si-30      363   0   3.34679E-06  293.6  end
Ti-46      363   0   4.20262E-07  293.6  end
Ti-47      363   0   3.79000E-07  293.6  end
Ti-48      363   0   3.75536E-06  293.6  end
Ti-49      363   0   2.75590E-07  293.6  end
Ti-50      363   0   2.63873E-07  293.6  end
Cr-50      363   0   5.30517E-07  293.6  end
Cr-52      363   0   1.02189E-05  293.6  end
Cr-53      363   0   1.15860E-06  293.6  end
Cr-54      363   0   2.87821E-07  293.6  end
Mn-55      363   0   6.40711E-06  293.6  end
Fe-54      363   0   2.32464E-06  293.6  end
Fe-56      363   0   3.64591E-05  293.6  end
Fe-57      363   0   8.42433E-07  293.6  end
Fe-58      363   0   1.11265E-07  293.6  end
Cu-63      363   0   1.86534E-05  293.6  end
Cu-65      363   0   8.31405E-06  293.6  end
U-234      363   0   6.37446E-06  293.6  end
U-235      363   0   5.94100E-04  293.6  end
U-236      363   0   2.54980E-06  293.6  end
U-238      363   0   3.44221E-05  293.6  end
'   total atom density =  8.01530E-02 a/b-cm
'  8.015300E-02
H-1        364   0   3.32434E-02  293.6  end
O-16       364   0   1.85176E-02  293.6  end
Mg-24      364   0   1.05686E-04  293.6  end
Mg-25      364   0   1.33797E-05  293.6  end
Mg-26      364   0   1.47310E-05  293.6  end
Al-27      364   0   2.73372E-02  293.6  end
Si-28      364   0   9.89350E-05  293.6  end
Si-29      364   0   5.00951E-06  293.6  end
Si-30      364   0   3.32537E-06  293.6  end
Ti-46      364   0   4.20262E-07  293.6  end
Ti-47      364   0   3.79000E-07  293.6  end
Ti-48      364   0   3.75536E-06  293.6  end
Ti-49      364   0   2.75590E-07  293.6  end
Ti-50      364   0   2.63873E-07  293.6  end
Cr-50      364   0   5.30517E-07  293.6  end
Cr-52      364   0   1.02189E-05  293.6  end
Cr-53      364   0   1.15860E-06  293.6  end
Cr-54      364   0   2.87821E-07  293.6  end
Mn-55      364   0   6.37178E-06  293.6  end
Fe-54      364   0   2.30432E-06  293.6  end
Fe-56      364   0   3.61403E-05  293.6  end
Fe-57      364   0   8.35068E-07  293.6  end
Fe-58      364   0   1.10292E-07  293.6  end
Cu-63      364   0   1.85357E-05  293.6  end
Cu-65      364   0   8.26161E-06  293.6  end
U-234      364   0   7.23926E-06  293.6  end
U-235      364   0   6.74700E-04  293.6  end
U-236      364   0   2.89573E-06  293.6  end
U-238      364   0   3.90920E-05  293.6  end
'   total atom density =  8.01437E-02 a/b-cm
'  8.014370E-02
H-1        365   0   3.32434E-02  293.6  end
O-16       365   0   1.84469E-02  293.6  end
Mg-24      365   0   1.05686E-04  293.6  end
Mg-25      365   0   1.33797E-05  293.6  end
Mg-26      365   0   1.47310E-05  293.6  end
Al-27      365   0   2.74247E-02  293.6  end
Si-28      365   0   9.91306E-05  293.6  end
Si-29      365   0   5.01941E-06  293.6  end

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Si-30      365    0   3.33194E-06  293.6  end
Ti-46      365    0   4.20262E-07  293.6  end
Ti-47      365    0   3.79000E-07  293.6  end
Ti-48      365    0   3.75536E-06  293.6  end
Ti-49      365    0   2.75590E-07  293.6  end
Ti-50      365    0   2.63873E-07  293.6  end
Cr-50      365    0   5.30517E-07  293.6  end
Cr-52      365    0   1.02189E-05  293.6  end
Cr-53      365    0   1.15860E-06  293.6  end
Cr-54      365    0   2.87821E-07  293.6  end
Mn-55      365    0   6.38261E-06  293.6  end
Fe-54      365    0   2.31055E-06  293.6  end
Fe-56      365    0   3.62380E-05  293.6  end
Fe-57      365    0   8.37326E-07  293.6  end
Fe-58      365    0   1.10590E-07  293.6  end
Cu-63      365    0   1.85717E-05  293.6  end
Cu-65      365    0   8.27767E-06  293.6  end
U-234     365    0   6.97424E-06  293.6  end
U-235     365    0   6.50000E-04   293.6  end
U-236     365    0   2.78972E-06  293.6  end
U-238     365    0   3.76609E-05  293.6  end
'      total atom density =  8.00985E-02 a/b-cm
'  8.009850E-02
H-1        366    0   3.32434E-02  293.6  end
O-16       366    0   1.81013E-02  293.6  end
Mg-24      366    0   1.05686E-04  293.6  end
Mg-25      366    0   1.33797E-05  293.6  end
Mg-26      366    0   1.47310E-05  293.6  end
Al-27      366    0   2.78528E-02  293.6  end
Si-28      366    0   1.00085E-04  293.6  end
Si-29      366    0   5.06774E-06  293.6  end
Si-30      366    0   3.36403E-06  293.6  end
Ti-46      366    0   4.20262E-07  293.6  end
Ti-47      366    0   3.79000E-07  293.6  end
Ti-48      366    0   3.75536E-06  293.6  end
Ti-49      366    0   2.75590E-07  293.6  end
Ti-50      366    0   2.63873E-07  293.6  end
Cr-50      366    0   5.30517E-07  293.6  end
Cr-52      366    0   1.02189E-05  293.6  end
Cr-53      366    0   1.15860E-06  293.6  end
Cr-54      366    0   2.87821E-07  293.6  end
Mn-55      366    0   6.43555E-06  293.6  end
Fe-54      366    0   2.34101E-06  293.6  end
Fe-56      366    0   3.67158E-05  293.6  end
Fe-57      366    0   8.48365E-07  293.6  end
Fe-58      366    0   1.12048E-07  293.6  end
Cu-63      366    0   1.87481E-05  293.6  end
Cu-65      366    0   8.35629E-06  293.6  end
U-234     366    0   5.67811E-06  293.6  end
U-235     366    0   5.29200E-04   293.6  end
U-236     366    0   2.27126E-06  293.6  end
U-238     366    0   3.06618E-05  293.6  end
'      total atom density =  8.00555E-02 a/b-cm
'  8.005550E-02
H-1        367    0   3.32434E-02  293.6  end
O-16       367    0   1.77731E-02  293.6  end
Mg-24      367    0   1.05686E-04  293.6  end
Mg-25      367    0   1.33797E-05  293.6  end
Mg-26      367    0   1.47310E-05  293.6  end
Al-27      367    0   2.82593E-02  293.6  end
Si-28      367    0   1.00993E-04  293.6  end
Si-29      367    0   5.11370E-06  293.6  end
Si-30      367    0   3.39453E-06  293.6  end
Ti-46      367    0   4.20262E-07  293.6  end
Ti-47      367    0   3.79000E-07  293.6  end
Ti-48      367    0   3.75536E-06  293.6  end
Ti-49      367    0   2.75590E-07  293.6  end
Ti-50      367    0   2.63873E-07  293.6  end
Cr-50      367    0   5.30517E-07  293.6  end
Cr-52      367    0   1.02189E-05  293.6  end
Cr-53      367    0   1.15860E-06  293.6  end
Cr-54      367    0   2.87821E-07  293.6  end
Mn-55      367    0   6.48581E-06  293.6  end
Fe-54      367    0   2.36993E-06  293.6  end
Fe-56      367    0   3.71695E-05  293.6  end
Fe-57      367    0   8.58848E-07  293.6  end
Fe-58      367    0   1.13433E-07  293.6  end
Cu-63      367    0   1.89155E-05  293.6  end
Cu-65      367    0   8.43090E-06  293.6  end
U-234     367    0   4.44742E-06  293.6  end
U-235     367    0   4.14500E-04   293.6  end

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U-236      367    0   1.77898E-06   293.6  end
U-238      367    0   2.40161E-05   293.6  end
'   total atom density =  8.00271E-02 a/b-cm
'  8.002710E-02
H-1        368    0   3.32434E-02   293.6  end
O-16       368    0   1.75562E-02   293.6  end
Mg-24      368    0   1.05686E-04   293.6  end
Mg-25      368    0   1.33797E-05   293.6  end
Mg-26      368    0   1.47310E-05   293.6  end
Al-27      368    0   2.85280E-02   293.6  end
Si-28      368    0   1.01591E-04   293.6  end
Si-29      368    0   5.14401E-06   293.6  end
Si-30      368    0   3.41465E-06   293.6  end
Ti-46      368    0   4.20262E-07   293.6  end
Ti-47      368    0   3.79000E-07   293.6  end
Ti-48      368    0   3.75536E-06   293.6  end
Ti-49      368    0   2.75590E-07   293.6  end
Ti-50      368    0   2.63873E-07   293.6  end
Cr-50      368    0   5.30517E-07   293.6  end
Cr-52      368    0   1.02189E-05   293.6  end
Cr-53      368    0   1.15860E-06   293.6  end
Cr-54      368    0   2.87821E-07   293.6  end
Mn-55      368    0   6.51903E-06   293.6  end
Fe-54      368    0   2.38905E-06   293.6  end
Fe-56      368    0   3.74693E-05   293.6  end
Fe-57      368    0   8.65776E-07   293.6  end
Fe-58      368    0   1.14348E-07   293.6  end
Cu-63      368    0   1.90262E-05   293.6  end
Cu-65      368    0   8.48022E-06   293.6  end
U-234     368    0   3.63412E-06   293.6  end
U-235     368    0   3.38700E-04   293.6  end
U-236     368    0   1.45366E-06   293.6  end
U-238     368    0   1.96242E-05   293.6  end
'   total atom density =  8.00013E-02 a/b-cm
'  8.000130E-02
H-1        369    0   3.32434E-02   293.6  end
O-16       369    0   1.73591E-02   293.6  end
Mg-24      369    0   1.05686E-04   293.6  end
Mg-25      369    0   1.33797E-05   293.6  end
Mg-26      369    0   1.47310E-05   293.6  end
Al-27      369    0   2.87722E-02   293.6  end
Si-28      369    0   1.02136E-04   293.6  end
Si-29      369    0   5.17160E-06   293.6  end
Si-30      369    0   3.43297E-06   293.6  end
Ti-46      369    0   4.20262E-07   293.6  end
Ti-47      369    0   3.79000E-07   293.6  end
Ti-48      369    0   3.75536E-06   293.6  end
Ti-49      369    0   2.75590E-07   293.6  end
Ti-50      369    0   2.63873E-07   293.6  end
Cr-50      369    0   5.30517E-07   293.6  end
Cr-52      369    0   1.02189E-05   293.6  end
Cr-53      369    0   1.15860E-06   293.6  end
Cr-54      369    0   2.87821E-07   293.6  end
Mn-55      369    0   6.54922E-06   293.6  end
Fe-54      369    0   2.40643E-06   293.6  end
Fe-56      369    0   3.77418E-05   293.6  end
Fe-57      369    0   8.72072E-07   293.6  end
Fe-58      369    0   1.15179E-07   293.6  end
Cu-63      369    0   1.91268E-05   293.6  end
Cu-65      369    0   8.52504E-06   293.6  end
U-234     369    0   2.89485E-06   293.6  end
U-235     369    0   2.69800E-04   293.6  end
U-236     369    0   1.15795E-06   293.6  end
U-238     369    0   1.56322E-05   293.6  end
'

Outer Fuel Element fueled region 7
total atom density =  8.00583E-02 a/b-cm
'  8.005830E-02
H-1        371    0   3.32434E-02   293.6  end
O-16       371    0   1.77945E-02   293.6  end
Mg-24      371    0   1.05686E-04   293.6  end
Mg-25      371    0   1.33797E-05   293.6  end
Mg-26      371    0   1.47310E-05   293.6  end
Al-27      371    0   2.82328E-02   293.6  end
Si-28      371    0   1.00933E-04   293.6  end
Si-29      371    0   5.11066E-06   293.6  end
Si-30      371    0   3.39252E-06   293.6  end
Ti-46      371    0   4.20262E-07   293.6  end
Ti-47      371    0   3.79000E-07   293.6  end
Ti-48      371    0   3.75536E-06   293.6  end
Ti-49      371    0   2.75590E-07   293.6  end

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Ti-50      371   0   2.63873E-07  293.6  end
Cr-50      371   0   5.30517E-07  293.6  end
Cr-52      371   0   1.02189E-05  293.6  end
Cr-53      371   0   1.15860E-06  293.6  end
Cr-54      371   0   2.87821E-07  293.6  end
Mn-55      371   0   6.48252E-06  293.6  end
Fe-54      371   0   2.36804E-06  293.6  end
Fe-56      371   0   3.71398E-05  293.6  end
Fe-57      371   0   8.58163E-07  293.6  end
Fe-58      371   0   1.13342E-07  293.6  end
Cu-63      371   0   1.89046E-05  293.6  end
Cu-65      371   0   8.42602E-06  293.6  end
U-234      371   0   4.52789E-06  293.6  end
U-235      371   0   4.22000E-04   293.6  end
U-236      371   0   1.81117E-06  293.6  end
U-238      371   0   2.44506E-05  293.6  end
'   total atom density =  8.00895E-02 a/b-cm
'  8.008950E-02
H-1        372   0   3.32434E-02  293.6  end
O-16       372   0   1.80329E-02  293.6  end
Mg-24       372   0   1.05686E-04  293.6  end
Mg-25       372   0   1.33797E-05  293.6  end
Mg-26       372   0   1.47310E-05  293.6  end
Al-27       372   0   2.79375E-02  293.6  end
Si-28       372   0   1.00274E-04  293.6  end
Si-29       372   0   5.07732E-06  293.6  end
Si-30       372   0   3.37038E-06  293.6  end
Ti-46       372   0   4.20262E-07  293.6  end
Ti-47       372   0   3.79000E-07  293.6  end
Ti-48       372   0   3.75536E-06  293.6  end
Ti-49       372   0   2.75590E-07  293.6  end
Ti-50       372   0   2.63873E-07  293.6  end
Cr-50       372   0   5.30517E-07  293.6  end
Cr-52       372   0   1.02189E-05  293.6  end
Cr-53       372   0   1.15860E-06  293.6  end
Cr-54       372   0   2.87821E-07  293.6  end
Mn-55       372   0   6.44602E-06  293.6  end
Fe-54       372   0   2.34704E-06  293.6  end
Fe-56       372   0   3.68104E-05  293.6  end
Fe-57       372   0   8.50550E-07  293.6  end
Fe-58       372   0   1.12337E-07  293.6  end
Cu-63       372   0   1.87830E-05  293.6  end
Cu-65       372   0   8.37182E-06  293.6  end
U-234       372   0   5.42167E-06  293.6  end
U-235       372   0   5.05300E-04   293.6  end
U-236       372   0   2.16868E-06  293.6  end
U-238       372   0   2.92770E-05  293.6  end
'   total atom density =  8.01228E-02 a/b-cm
'  8.012280E-02
H-1        373   0   3.32434E-02  293.6  end
O-16       373   0   1.82870E-02  293.6  end
Mg-24       373   0   1.05686E-04  293.6  end
Mg-25       373   0   1.33797E-05  293.6  end
Mg-26       373   0   1.47310E-05  293.6  end
Al-27       373   0   2.76228E-02  293.6  end
Si-28       373   0   9.95724E-05  293.6  end
Si-29       373   0   5.04178E-06  293.6  end
Si-30       373   0   3.34679E-06  293.6  end
Ti-46       373   0   4.20262E-07  293.6  end
Ti-47       373   0   3.79000E-07  293.6  end
Ti-48       373   0   3.75536E-06  293.6  end
Ti-49       373   0   2.75590E-07  293.6  end
Ti-50       373   0   2.63873E-07  293.6  end
Cr-50       373   0   5.30517E-07  293.6  end
Cr-52       373   0   1.02189E-05  293.6  end
Cr-53       373   0   1.15860E-06  293.6  end
Cr-54       373   0   2.87821E-07  293.6  end
Mn-55       373   0   6.40711E-06  293.6  end
Fe-54       373   0   2.32464E-06  293.6  end
Fe-56       373   0   3.64591E-05  293.6  end
Fe-57       373   0   8.42433E-07  293.6  end
Fe-58       373   0   1.11265E-07  293.6  end
Cu-63       373   0   1.86534E-05  293.6  end
Cu-65       373   0   8.31405E-06  293.6  end
U-234       373   0   6.37446E-06  293.6  end
U-235       373   0   5.94100E-04   293.6  end
U-236       373   0   2.54980E-06  293.6  end
U-238       373   0   3.44221E-05  293.6  end
'   total atom density =  8.01530E-02 a/b-cm
'  8.015300E-02
H-1        374   0   3.32434E-02  293.6  end

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O-16	374	0	1.85176E-02	293.6	end
Mg-24	374	0	1.05686E-04	293.6	end
Mg-25	374	0	1.33797E-05	293.6	end
Mg-26	374	0	1.47310E-05	293.6	end
Al-27	374	0	2.73372E-02	293.6	end
Si-28	374	0	9.89350E-05	293.6	end
Si-29	374	0	5.00951E-06	293.6	end
Si-30	374	0	3.32537E-06	293.6	end
Ti-46	374	0	4.20262E-07	293.6	end
Ti-47	374	0	3.79000E-07	293.6	end
Ti-48	374	0	3.75536E-06	293.6	end
Ti-49	374	0	2.75590E-07	293.6	end
Ti-50	374	0	2.63873E-07	293.6	end
Cr-50	374	0	5.30517E-07	293.6	end
Cr-52	374	0	1.02189E-05	293.6	end
Cr-53	374	0	1.15860E-06	293.6	end
Cr-54	374	0	2.87821E-07	293.6	end
Mn-55	374	0	6.37178E-06	293.6	end
Fe-54	374	0	2.30432E-06	293.6	end
Fe-56	374	0	3.61403E-05	293.6	end
Fe-57	374	0	8.35068E-07	293.6	end
Fe-58	374	0	1.10292E-07	293.6	end
Cu-63	374	0	1.85357E-05	293.6	end
Cu-65	374	0	8.26161E-06	293.6	end
U-234	374	0	7.23926E-06	293.6	end
U-235	374	0	6.74700E-04	293.6	end
U-236	374	0	2.89573E-06	293.6	end
U-238	374	0	3.90920E-05	293.6	end
' total atom density = 8.01437E-02 a/b-cm					
' 8.014370E-02					
H-1	375	0	3.32434E-02	293.6	end
O-16	375	0	1.84469E-02	293.6	end
Mg-24	375	0	1.05686E-04	293.6	end
Mg-25	375	0	1.33797E-05	293.6	end
Mg-26	375	0	1.47310E-05	293.6	end
Al-27	375	0	2.74247E-02	293.6	end
Si-28	375	0	9.91306E-05	293.6	end
Si-29	375	0	5.01941E-06	293.6	end
Si-30	375	0	3.33194E-06	293.6	end
Ti-46	375	0	4.20262E-07	293.6	end
Ti-47	375	0	3.79000E-07	293.6	end
Ti-48	375	0	3.75536E-06	293.6	end
Ti-49	375	0	2.75590E-07	293.6	end
Ti-50	375	0	2.63873E-07	293.6	end
Cr-50	375	0	5.30517E-07	293.6	end
Cr-52	375	0	1.02189E-05	293.6	end
Cr-53	375	0	1.15860E-06	293.6	end
Cr-54	375	0	2.87821E-07	293.6	end
Mn-55	375	0	6.38261E-06	293.6	end
Fe-54	375	0	2.31055E-06	293.6	end
Fe-56	375	0	3.62380E-05	293.6	end
Fe-57	375	0	8.37326E-07	293.6	end
Fe-58	375	0	1.10590E-07	293.6	end
Cu-63	375	0	1.85717E-05	293.6	end
Cu-65	375	0	8.27767E-06	293.6	end
U-234	375	0	6.97424E-06	293.6	end
U-235	375	0	6.50000E-04	293.6	end
U-236	375	0	2.78972E-06	293.6	end
U-238	375	0	3.76609E-05	293.6	end
' total atom density = 8.00985E-02 a/b-cm					
' 8.009850E-02					
H-1	376	0	3.32434E-02	293.6	end
O-16	376	0	1.81013E-02	293.6	end
Mg-24	376	0	1.05686E-04	293.6	end
Mg-25	376	0	1.33797E-05	293.6	end
Mg-26	376	0	1.47310E-05	293.6	end
Al-27	376	0	2.78528E-02	293.6	end
Si-28	376	0	1.00085E-04	293.6	end
Si-29	376	0	5.06774E-06	293.6	end
Si-30	376	0	3.36403E-06	293.6	end
Ti-46	376	0	4.20262E-07	293.6	end
Ti-47	376	0	3.79000E-07	293.6	end
Ti-48	376	0	3.75536E-06	293.6	end
Ti-49	376	0	2.75590E-07	293.6	end
Ti-50	376	0	2.63873E-07	293.6	end
Cr-50	376	0	5.30517E-07	293.6	end
Cr-52	376	0	1.02189E-05	293.6	end
Cr-53	376	0	1.15860E-06	293.6	end
Cr-54	376	0	2.87821E-07	293.6	end
Mn-55	376	0	6.43555E-06	293.6	end
Fe-54	376	0	2.34101E-06	293.6	end

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Fe-56      376   0   3.67158E-05   293.6   end
Fe-57      376   0   8.48365E-07   293.6   end
Fe-58      376   0   1.12048E-07   293.6   end
Cu-63      376   0   1.87481E-05   293.6   end
Cu-65      376   0   8.35629E-06   293.6   end
U-234      376   0   5.67811E-06   293.6   end
U-235      376   0   5.29200E-04   293.6   end
U-236      376   0   2.27126E-06   293.6   end
U-238      376   0   3.06618E-05   293.6   end
'   total atom density =  8.00555E-02 a/b-cm
' 8.00555E-02
H-1        377   0   3.32434E-02   293.6   end
O-16       377   0   1.77731E-02   293.6   end
Mg-24      377   0   1.05686E-04   293.6   end
Mg-25       377   0   1.33797E-05   293.6   end
Mg-26       377   0   1.47310E-05   293.6   end
Al-27       377   0   2.82593E-02   293.6   end
Si-28       377   0   1.00993E-04   293.6   end
Si-29       377   0   5.11370E-06   293.6   end
Si-30       377   0   3.39453E-06   293.6   end
Ti-46       377   0   4.20262E-07   293.6   end
Ti-47       377   0   3.79000E-07   293.6   end
Ti-48       377   0   3.75536E-06   293.6   end
Ti-49       377   0   2.75590E-07   293.6   end
Ti-50       377   0   2.63873E-07   293.6   end
Cr-50       377   0   5.30517E-07   293.6   end
Cr-52       377   0   1.02189E-05   293.6   end
Cr-53       377   0   1.15860E-06   293.6   end
Cr-54       377   0   2.87821E-07   293.6   end
Mn-55       377   0   6.48581E-06   293.6   end
Fe-54       377   0   2.36993E-06   293.6   end
Fe-56       377   0   3.71695E-05   293.6   end
Fe-57       377   0   8.58848E-07   293.6   end
Fe-58       377   0   1.13433E-07   293.6   end
Cu-63       377   0   1.89155E-05   293.6   end
Cu-65       377   0   8.43090E-06   293.6   end
U-234       377   0   4.44742E-06   293.6   end
U-235       377   0   4.14500E-04   293.6   end
U-236       377   0   1.77898E-06   293.6   end
U-238       377   0   2.40161E-05   293.6   end
'   total atom density =  8.00271E-02 a/b-cm
' 8.00271E-02
H-1        378   0   3.32434E-02   293.6   end
O-16       378   0   1.75562E-02   293.6   end
Mg-24      378   0   1.05686E-04   293.6   end
Mg-25       378   0   1.33797E-05   293.6   end
Mg-26       378   0   1.47310E-05   293.6   end
Al-27       378   0   2.85280E-02   293.6   end
Si-28       378   0   1.01591E-04   293.6   end
Si-29       378   0   5.14401E-06   293.6   end
Si-30       378   0   3.41465E-06   293.6   end
Ti-46       378   0   4.20262E-07   293.6   end
Ti-47       378   0   3.79000E-07   293.6   end
Ti-48       378   0   3.75536E-06   293.6   end
Ti-49       378   0   2.75590E-07   293.6   end
Ti-50       378   0   2.63873E-07   293.6   end
Cr-50       378   0   5.30517E-07   293.6   end
Cr-52       378   0   1.02189E-05   293.6   end
Cr-53       378   0   1.15860E-06   293.6   end
Cr-54       378   0   2.87821E-07   293.6   end
Mn-55       378   0   6.51903E-06   293.6   end
Fe-54       378   0   2.38905E-06   293.6   end
Fe-56       378   0   3.74693E-05   293.6   end
Fe-57       378   0   8.65776E-07   293.6   end
Fe-58       378   0   1.14348E-07   293.6   end
Cu-63       378   0   1.90262E-05   293.6   end
Cu-65       378   0   8.48022E-06   293.6   end
U-234       378   0   3.63412E-06   293.6   end
U-235       378   0   3.38700E-04   293.6   end
U-236       378   0   1.45366E-06   293.6   end
U-238       378   0   1.96242E-05   293.6   end
'   total atom density =  8.00013E-02 a/b-cm
' 8.00013E-02
H-1        379   0   3.32434E-02   293.6   end
O-16       379   0   1.73591E-02   293.6   end
Mg-24      379   0   1.05686E-04   293.6   end
Mg-25       379   0   1.33797E-05   293.6   end
Mg-26       379   0   1.47310E-05   293.6   end
Al-27       379   0   2.87722E-02   293.6   end
Si-28       379   0   1.02136E-04   293.6   end
Si-29       379   0   5.17160E-06   293.6   end

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Si-30	379	0	3.43297E-06	293.6	end
Ti-46	379	0	4.20262E-07	293.6	end
Ti-47	379	0	3.79000E-07	293.6	end
Ti-48	379	0	3.75536E-06	293.6	end
Ti-49	379	0	2.75590E-07	293.6	end
Ti-50	379	0	2.63873E-07	293.6	end
Cr-50	379	0	5.30517E-07	293.6	end
Cr-52	379	0	1.02189E-05	293.6	end
Cr-53	379	0	1.15860E-06	293.6	end
Cr-54	379	0	2.87821E-07	293.6	end
Mn-55	379	0	6.54922E-06	293.6	end
Fe-54	379	0	2.40643E-06	293.6	end
Fe-56	379	0	3.77418E-05	293.6	end
Fe-57	379	0	8.72072E-07	293.6	end
Fe-58	379	0	1.15179E-07	293.6	end
Cu-63	379	0	1.91268E-05	293.6	end
Cu-65	379	0	8.52504E-06	293.6	end
U-234	379	0	2.89485E-06	293.6	end
U-235	379	0	2.69800E-04	293.6	end
U-236	379	0	1.15795E-06	293.6	end
U-238	379	0	1.56322E-05	293.6	end

' Outer Fuel Element fueled region 8
' total atom density = 8.00583E-02 a/b-cm

	8.005830E-02				
H-1	381	0	3.32434E-02	293.6	end
O-16	381	0	1.77945E-02	293.6	end
Mg-24	381	0	1.05686E-04	293.6	end
Mg-25	381	0	1.33797E-05	293.6	end
Mg-26	381	0	1.47310E-05	293.6	end
Al-27	381	0	2.82328E-02	293.6	end
Si-28	381	0	1.00933E-04	293.6	end
Si-29	381	0	5.11066E-06	293.6	end
Si-30	381	0	3.39252E-06	293.6	end
Ti-46	381	0	4.20262E-07	293.6	end
Ti-47	381	0	3.79000E-07	293.6	end
Ti-48	381	0	3.75536E-06	293.6	end
Ti-49	381	0	2.75590E-07	293.6	end
Ti-50	381	0	2.63873E-07	293.6	end
Cr-50	381	0	5.30517E-07	293.6	end
Cr-52	381	0	1.02189E-05	293.6	end
Cr-53	381	0	1.15860E-06	293.6	end
Cr-54	381	0	2.87821E-07	293.6	end
Mn-55	381	0	6.48252E-06	293.6	end
Fe-54	381	0	2.36804E-06	293.6	end
Fe-56	381	0	3.71398E-05	293.6	end
Fe-57	381	0	8.58163E-07	293.6	end
Fe-58	381	0	1.13342E-07	293.6	end
Cu-63	381	0	1.89046E-05	293.6	end
Cu-65	381	0	8.42602E-06	293.6	end
U-234	381	0	4.52789E-06	293.6	end
U-235	381	0	4.22000E-04	293.6	end
U-236	381	0	1.81117E-06	293.6	end
U-238	381	0	2.44506E-05	293.6	end

' total atom density = 8.00895E-02 a/b-cm
' 8.008950E-02

H-1	382	0	3.32434E-02	293.6	end
O-16	382	0	1.80329E-02	293.6	end
Mg-24	382	0	1.05686E-04	293.6	end
Mg-25	382	0	1.33797E-05	293.6	end
Mg-26	382	0	1.47310E-05	293.6	end
Al-27	382	0	2.79375E-02	293.6	end
Si-28	382	0	1.00274E-04	293.6	end
Si-29	382	0	5.07732E-06	293.6	end
Si-30	382	0	3.37038E-06	293.6	end
Ti-46	382	0	4.20262E-07	293.6	end
Ti-47	382	0	3.79000E-07	293.6	end
Ti-48	382	0	3.75536E-06	293.6	end
Ti-49	382	0	2.75590E-07	293.6	end
Ti-50	382	0	2.63873E-07	293.6	end
Cr-50	382	0	5.30517E-07	293.6	end
Cr-52	382	0	1.02189E-05	293.6	end
Cr-53	382	0	1.15860E-06	293.6	end
Cr-54	382	0	2.87821E-07	293.6	end
Mn-55	382	0	6.44602E-06	293.6	end
Fe-54	382	0	2.34704E-06	293.6	end
Fe-56	382	0	3.68104E-05	293.6	end
Fe-57	382	0	8.50550E-07	293.6	end
Fe-58	382	0	1.12337E-07	293.6	end
Cu-63	382	0	1.87830E-05	293.6	end
Cu-65	382	0	8.37182E-06	293.6	end

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U-234      382   0   5.42167E-06  293.6  end
U-235      382   0   5.05300E-04  293.6  end
U-236      382   0   2.16868E-06  293.6  end
U-238      382   0   2.92770E-05  293.6  end
'   total atom density =  8.01228E-02 a/b-cm
' 8.012280E-02
H-1        383   0   3.32434E-02  293.6  end
O-16       383   0   1.82870E-02  293.6  end
Mg-24      383   0   1.05686E-04  293.6  end
Mg-25      383   0   1.33797E-05  293.6  end
Mg-26      383   0   1.47310E-05  293.6  end
Al-27      383   0   2.76228E-02  293.6  end
Si-28      383   0   9.95724E-05  293.6  end
Si-29      383   0   5.04178E-06  293.6  end
Si-30      383   0   3.34679E-06  293.6  end
Ti-46      383   0   4.20262E-07  293.6  end
Ti-47      383   0   3.79000E-07  293.6  end
Ti-48      383   0   3.75536E-06  293.6  end
Ti-49      383   0   2.75590E-07  293.6  end
Ti-50      383   0   2.63873E-07  293.6  end
Cr-50      383   0   5.30517E-07  293.6  end
Cr-52      383   0   1.02189E-05  293.6  end
Cr-53      383   0   1.15860E-06  293.6  end
Cr-54      383   0   2.87821E-07  293.6  end
Mn-55      383   0   6.40711E-06  293.6  end
Fe-54      383   0   2.32464E-06  293.6  end
Fe-56      383   0   3.64591E-05  293.6  end
Fe-57      383   0   8.42433E-07  293.6  end
Fe-58      383   0   1.11265E-07  293.6  end
Cu-63      383   0   1.86534E-05  293.6  end
Cu-65      383   0   8.31405E-06  293.6  end
U-234      383   0   6.37446E-06  293.6  end
U-235      383   0   5.94100E-04  293.6  end
U-236      383   0   2.54980E-06  293.6  end
U-238      383   0   3.44221E-05  293.6  end
'   total atom density =  8.01530E-02 a/b-cm
' 8.015300E-02
H-1        384   0   3.32434E-02  293.6  end
O-16       384   0   1.85176E-02  293.6  end
Mg-24      384   0   1.05686E-04  293.6  end
Mg-25      384   0   1.33797E-05  293.6  end
Mg-26      384   0   1.47310E-05  293.6  end
Al-27      384   0   2.73372E-02  293.6  end
Si-28      384   0   9.89350E-05  293.6  end
Si-29      384   0   5.00951E-06  293.6  end
Si-30      384   0   3.32537E-06  293.6  end
Ti-46      384   0   4.20262E-07  293.6  end
Ti-47      384   0   3.79000E-07  293.6  end
Ti-48      384   0   3.75536E-06  293.6  end
Ti-49      384   0   2.75590E-07  293.6  end
Ti-50      384   0   2.63873E-07  293.6  end
Cr-50      384   0   5.30517E-07  293.6  end
Cr-52      384   0   1.02189E-05  293.6  end
Cr-53      384   0   1.15860E-06  293.6  end
Cr-54      384   0   2.87821E-07  293.6  end
Mn-55      384   0   6.37178E-06  293.6  end
Fe-54      384   0   2.30432E-06  293.6  end
Fe-56      384   0   3.61403E-05  293.6  end
Fe-57      384   0   8.35068E-07  293.6  end
Fe-58      384   0   1.10292E-07  293.6  end
Cu-63      384   0   1.85357E-05  293.6  end
Cu-65      384   0   8.26161E-06  293.6  end
U-234      384   0   7.23926E-06  293.6  end
U-235      384   0   6.74700E-04  293.6  end
U-236      384   0   2.89573E-06  293.6  end
U-238      384   0   3.90920E-05  293.6  end
'   total atom density =  8.01437E-02 a/b-cm
' 8.014370E-02
H-1        385   0   3.32434E-02  293.6  end
O-16       385   0   1.84469E-02  293.6  end
Mg-24      385   0   1.05686E-04  293.6  end
Mg-25      385   0   1.33797E-05  293.6  end
Mg-26      385   0   1.47310E-05  293.6  end
Al-27      385   0   2.74247E-02  293.6  end
Si-28      385   0   9.91306E-05  293.6  end
Si-29      385   0   5.01941E-06  293.6  end
Si-30      385   0   3.33194E-06  293.6  end
Ti-46      385   0   4.20262E-07  293.6  end
Ti-47      385   0   3.79000E-07  293.6  end
Ti-48      385   0   3.75536E-06  293.6  end
Ti-49      385   0   2.75590E-07  293.6  end

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Ti-50      385    0   2.63873E-07  293.6  end
Cr-50      385    0   5.30517E-07  293.6  end
Cr-52      385    0   1.02189E-05  293.6  end
Cr-53      385    0   1.15860E-06  293.6  end
Cr-54      385    0   2.87821E-07  293.6  end
Mn-55      385    0   6.38261E-06  293.6  end
Fe-54      385    0   2.31055E-06  293.6  end
Fe-56      385    0   3.62380E-05  293.6  end
Fe-57      385    0   8.37326E-07  293.6  end
Fe-58      385    0   1.10590E-07  293.6  end
Cu-63      385    0   1.85717E-05  293.6  end
Cu-65      385    0   8.27767E-06  293.6  end
U-234      385    0   6.97424E-06  293.6  end
U-235      385    0   6.50000E-04   293.6  end
U-236      385    0   2.78972E-06  293.6  end
U-238      385    0   3.76609E-05  293.6  end
'   total atom density =  8.00985E-02 a/b-cm
'  8.009850E-02
H-1        386    0   3.32434E-02  293.6  end
O-16       386    0   1.81013E-02  293.6  end
Mg-24       386    0   1.05686E-04  293.6  end
Mg-25       386    0   1.33797E-05  293.6  end
Mg-26       386    0   1.47310E-05  293.6  end
Al-27       386    0   2.78528E-02  293.6  end
Si-28       386    0   1.00085E-04  293.6  end
Si-29       386    0   5.06774E-06  293.6  end
Si-30       386    0   3.36403E-06  293.6  end
Ti-46       386    0   4.20262E-07  293.6  end
Ti-47       386    0   3.79000E-07  293.6  end
Ti-48       386    0   3.75536E-06  293.6  end
Ti-49       386    0   2.75590E-07  293.6  end
Ti-50       386    0   2.63873E-07  293.6  end
Cr-50       386    0   5.30517E-07  293.6  end
Cr-52       386    0   1.02189E-05  293.6  end
Cr-53       386    0   1.15860E-06  293.6  end
Cr-54       386    0   2.87821E-07  293.6  end
Mn-55       386    0   6.43555E-06  293.6  end
Fe-54       386    0   2.34101E-06  293.6  end
Fe-56       386    0   3.67158E-05  293.6  end
Fe-57       386    0   8.48365E-07  293.6  end
Fe-58       386    0   1.12048E-07  293.6  end
Cu-63       386    0   1.87481E-05  293.6  end
Cu-65       386    0   8.35629E-06  293.6  end
U-234       386    0   5.67811E-06  293.6  end
U-235       386    0   5.29200E-04   293.6  end
U-236       386    0   2.27126E-06  293.6  end
U-238       386    0   3.06618E-05  293.6  end
'   total atom density =  8.00555E-02 a/b-cm
'  8.005550E-02
H-1        387    0   3.32434E-02  293.6  end
O-16       387    0   1.77731E-02  293.6  end
Mg-24       387    0   1.05686E-04  293.6  end
Mg-25       387    0   1.33797E-05  293.6  end
Mg-26       387    0   1.47310E-05  293.6  end
Al-27       387    0   2.82593E-02  293.6  end
Si-28       387    0   1.00993E-04  293.6  end
Si-29       387    0   5.11370E-06  293.6  end
Si-30       387    0   3.39453E-06  293.6  end
Ti-46       387    0   4.20262E-07  293.6  end
Ti-47       387    0   3.79000E-07  293.6  end
Ti-48       387    0   3.75536E-06  293.6  end
Ti-49       387    0   2.75590E-07  293.6  end
Ti-50       387    0   2.63873E-07  293.6  end
Cr-50       387    0   5.30517E-07  293.6  end
Cr-52       387    0   1.02189E-05  293.6  end
Cr-53       387    0   1.15860E-06  293.6  end
Cr-54       387    0   2.87821E-07  293.6  end
Mn-55       387    0   6.48581E-06  293.6  end
Fe-54       387    0   2.36993E-06  293.6  end
Fe-56       387    0   3.71695E-05  293.6  end
Fe-57       387    0   8.58848E-07  293.6  end
Fe-58       387    0   1.13433E-07  293.6  end
Cu-63       387    0   1.89155E-05  293.6  end
Cu-65       387    0   8.43090E-06  293.6  end
U-234       387    0   4.44742E-06  293.6  end
U-235       387    0   4.14500E-04   293.6  end
U-236       387    0   1.77898E-06  293.6  end
U-238       387    0   2.40161E-05  293.6  end
'   total atom density =  8.00271E-02 a/b-cm
'  8.002710E-02
H-1        388    0   3.32434E-02  293.6  end

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O-16	388	0	1.75562E-02	293.6	end
Mg-24	388	0	1.05686E-04	293.6	end
Mg-25	388	0	1.33797E-05	293.6	end
Mg-26	388	0	1.47310E-05	293.6	end
Al-27	388	0	2.85280E-02	293.6	end
Si-28	388	0	1.01591E-04	293.6	end
Si-29	388	0	5.14401E-06	293.6	end
Si-30	388	0	3.41465E-06	293.6	end
Ti-46	388	0	4.20262E-07	293.6	end
Ti-47	388	0	3.79000E-07	293.6	end
Ti-48	388	0	3.75536E-06	293.6	end
Ti-49	388	0	2.75590E-07	293.6	end
Ti-50	388	0	2.63873E-07	293.6	end
Cr-50	388	0	5.30517E-07	293.6	end
Cr-52	388	0	1.02189E-05	293.6	end
Cr-53	388	0	1.15860E-06	293.6	end
Cr-54	388	0	2.87821E-07	293.6	end
Mn-55	388	0	6.51903E-06	293.6	end
Fe-54	388	0	2.38905E-06	293.6	end
Fe-56	388	0	3.74693E-05	293.6	end
Fe-57	388	0	8.65776E-07	293.6	end
Fe-58	388	0	1.14348E-07	293.6	end
Cu-63	388	0	1.90262E-05	293.6	end
Cu-65	388	0	8.48022E-06	293.6	end
U-234	388	0	3.63412E-06	293.6	end
U-235	388	0	3.38700E-04	293.6	end
U-236	388	0	1.45366E-06	293.6	end
U-238	388	0	1.96242E-05	293.6	end

' total atom density = 8.00013E-02 a/b-cm

' 8.000130E-02

H-1	389	0	3.32434E-02	293.6	end
O-16	389	0	1.73591E-02	293.6	end
Mg-24	389	0	1.05686E-04	293.6	end
Mg-25	389	0	1.33797E-05	293.6	end
Mg-26	389	0	1.47310E-05	293.6	end
Al-27	389	0	2.87722E-02	293.6	end
Si-28	389	0	1.02136E-04	293.6	end
Si-29	389	0	5.17160E-06	293.6	end
Si-30	389	0	3.43297E-06	293.6	end
Ti-46	389	0	4.20262E-07	293.6	end
Ti-47	389	0	3.79000E-07	293.6	end
Ti-48	389	0	3.75536E-06	293.6	end
Ti-49	389	0	2.75590E-07	293.6	end
Ti-50	389	0	2.63873E-07	293.6	end
Cr-50	389	0	5.30517E-07	293.6	end
Cr-52	389	0	1.02189E-05	293.6	end
Cr-53	389	0	1.15860E-06	293.6	end
Cr-54	389	0	2.87821E-07	293.6	end
Mn-55	389	0	6.54922E-06	293.6	end
Fe-54	389	0	2.40643E-06	293.6	end
Fe-56	389	0	3.77418E-05	293.6	end
Fe-57	389	0	8.72072E-07	293.6	end
Fe-58	389	0	1.15179E-07	293.6	end
Cu-63	389	0	1.91268E-05	293.6	end
Cu-65	389	0	8.52504E-06	293.6	end
U-234	389	0	2.89485E-06	293.6	end
U-235	389	0	2.69800E-04	293.6	end
U-236	389	0	1.15795E-06	293.6	end
U-238	389	0	1.56322E-05	293.6	end

' Outer Fuel Element fueled region 9

' total atom density = 8.00583E-02 a/b-cm

' 8.005830E-02

H-1	391	0	3.32434E-02	293.6	end
O-16	391	0	1.77945E-02	293.6	end
Mg-24	391	0	1.05686E-04	293.6	end
Mg-25	391	0	1.33797E-05	293.6	end
Mg-26	391	0	1.47310E-05	293.6	end
Al-27	391	0	2.82328E-02	293.6	end
Si-28	391	0	1.00933E-04	293.6	end
Si-29	391	0	5.11066E-06	293.6	end
Si-30	391	0	3.39252E-06	293.6	end
Ti-46	391	0	4.20262E-07	293.6	end
Ti-47	391	0	3.79000E-07	293.6	end
Ti-48	391	0	3.75536E-06	293.6	end
Ti-49	391	0	2.75590E-07	293.6	end
Ti-50	391	0	2.63873E-07	293.6	end
Cr-50	391	0	5.30517E-07	293.6	end
Cr-52	391	0	1.02189E-05	293.6	end
Cr-53	391	0	1.15860E-06	293.6	end
Cr-54	391	0	2.87821E-07	293.6	end

Mn-55	391	0	6.48252E-06	293.6	end
Fe-54	391	0	2.36804E-06	293.6	end
Fe-56	391	0	3.71398E-05	293.6	end
Fe-57	391	0	8.58163E-07	293.6	end
Fe-58	391	0	1.13342E-07	293.6	end
Cu-63	391	0	1.89046E-05	293.6	end
Cu-65	391	0	8.42602E-06	293.6	end
U-234	391	0	4.52789E-06	293.6	end
U-235	391	0	4.22000E-04	293.6	end
U-236	391	0	1.81117E-06	293.6	end
U-238	391	0	2.44506E-05	293.6	end
total atom density = 8.00895E-02 a/b-cm					
8.008950E-02					
H-1	392	0	3.32434E-02	293.6	end
O-16	392	0	1.80329E-02	293.6	end
Mg-24	392	0	1.05686E-04	293.6	end
Mg-25	392	0	1.33797E-05	293.6	end
Mg-26	392	0	1.47310E-05	293.6	end
Al-27	392	0	2.79375E-02	293.6	end
Si-28	392	0	1.00274E-04	293.6	end
Si-29	392	0	5.07732E-06	293.6	end
Si-30	392	0	3.37038E-06	293.6	end
Ti-46	392	0	4.20262E-07	293.6	end
Ti-47	392	0	3.79000E-07	293.6	end
Ti-48	392	0	3.75536E-06	293.6	end
Ti-49	392	0	2.75590E-07	293.6	end
Ti-50	392	0	2.63873E-07	293.6	end
Cr-50	392	0	5.30517E-07	293.6	end
Cr-52	392	0	1.02189E-05	293.6	end
Cr-53	392	0	1.15860E-06	293.6	end
Cr-54	392	0	2.87821E-07	293.6	end
Mn-55	392	0	6.44602E-06	293.6	end
Fe-54	392	0	2.34704E-06	293.6	end
Fe-56	392	0	3.68104E-05	293.6	end
Fe-57	392	0	8.50550E-07	293.6	end
Fe-58	392	0	1.12337E-07	293.6	end
Cu-63	392	0	1.87830E-05	293.6	end
Cu-65	392	0	8.37182E-06	293.6	end
U-234	392	0	5.42167E-06	293.6	end
U-235	392	0	5.05300E-04	293.6	end
U-236	392	0	2.16868E-06	293.6	end
U-238	392	0	2.92770E-05	293.6	end
total atom density = 8.01228E-02 a/b-cm					
8.012280E-02					
H-1	393	0	3.32434E-02	293.6	end
O-16	393	0	1.82870E-02	293.6	end
Mg-24	393	0	1.05686E-04	293.6	end
Mg-25	393	0	1.33797E-05	293.6	end
Mg-26	393	0	1.47310E-05	293.6	end
Al-27	393	0	2.76228E-02	293.6	end
Si-28	393	0	9.95724E-05	293.6	end
Si-29	393	0	5.04178E-06	293.6	end
Si-30	393	0	3.34679E-06	293.6	end
Ti-46	393	0	4.20262E-07	293.6	end
Ti-47	393	0	3.79000E-07	293.6	end
Ti-48	393	0	3.75536E-06	293.6	end
Ti-49	393	0	2.75590E-07	293.6	end
Ti-50	393	0	2.63873E-07	293.6	end
Cr-50	393	0	5.30517E-07	293.6	end
Cr-52	393	0	1.02189E-05	293.6	end
Cr-53	393	0	1.15860E-06	293.6	end
Cr-54	393	0	2.87821E-07	293.6	end
Mn-55	393	0	6.40711E-06	293.6	end
Fe-54	393	0	2.32464E-06	293.6	end
Fe-56	393	0	3.64591E-05	293.6	end
Fe-57	393	0	8.42433E-07	293.6	end
Fe-58	393	0	1.11265E-07	293.6	end
Cu-63	393	0	1.86534E-05	293.6	end
Cu-65	393	0	8.31405E-06	293.6	end
U-234	393	0	6.37446E-06	293.6	end
U-235	393	0	5.94100E-04	293.6	end
U-236	393	0	2.54980E-06	293.6	end
U-238	393	0	3.44221E-05	293.6	end
total atom density = 8.01530E-02 a/b-cm					
8.015300E-02					
H-1	394	0	3.32434E-02	293.6	end
O-16	394	0	1.85176E-02	293.6	end
Mg-24	394	0	1.05686E-04	293.6	end
Mg-25	394	0	1.33797E-05	293.6	end
Mg-26	394	0	1.47310E-05	293.6	end
Al-27	394	0	2.73372E-02	293.6	end

Si-28	394	0	9.89350E-05	293.6	end
Si-29	394	0	5.00951E-06	293.6	end
Si-30	394	0	3.32537E-06	293.6	end
Ti-46	394	0	4.20262E-07	293.6	end
Ti-47	394	0	3.79000E-07	293.6	end
Ti-48	394	0	3.75536E-06	293.6	end
Ti-49	394	0	2.75590E-07	293.6	end
Ti-50	394	0	2.63873E-07	293.6	end
Cr-50	394	0	5.30517E-07	293.6	end
Cr-52	394	0	1.02189E-05	293.6	end
Cr-53	394	0	1.15860E-06	293.6	end
Cr-54	394	0	2.87821E-07	293.6	end
Mn-55	394	0	6.37178E-06	293.6	end
Fe-54	394	0	2.30432E-06	293.6	end
Fe-56	394	0	3.61403E-05	293.6	end
Fe-57	394	0	8.35068E-07	293.6	end
Fe-58	394	0	1.10292E-07	293.6	end
Cu-63	394	0	1.85357E-05	293.6	end
Cu-65	394	0	8.26161E-06	293.6	end
U-234	394	0	7.23926E-06	293.6	end
U-235	394	0	6.74700E-04	293.6	end
U-236	394	0	2.89573E-06	293.6	end
U-238	394	0	3.90920E-05	293.6	end
total atom density = 8.01437E-02 a/b-cm					
8.014370E-02					
H-1	395	0	3.32434E-02	293.6	end
O-16	395	0	1.84469E-02	293.6	end
Mg-24	395	0	1.05686E-04	293.6	end
Mg-25	395	0	1.33797E-05	293.6	end
Mg-26	395	0	1.47310E-05	293.6	end
Al-27	395	0	2.74247E-02	293.6	end
Si-28	395	0	9.91306E-05	293.6	end
Si-29	395	0	5.01941E-06	293.6	end
Si-30	395	0	3.33194E-06	293.6	end
Ti-46	395	0	4.20262E-07	293.6	end
Ti-47	395	0	3.79000E-07	293.6	end
Ti-48	395	0	3.75536E-06	293.6	end
Ti-49	395	0	2.75590E-07	293.6	end
Ti-50	395	0	2.63873E-07	293.6	end
Cr-50	395	0	5.30517E-07	293.6	end
Cr-52	395	0	1.02189E-05	293.6	end
Cr-53	395	0	1.15860E-06	293.6	end
Cr-54	395	0	2.87821E-07	293.6	end
Mn-55	395	0	6.38261E-06	293.6	end
Fe-54	395	0	2.31055E-06	293.6	end
Fe-56	395	0	3.62380E-05	293.6	end
Fe-57	395	0	8.37326E-07	293.6	end
Fe-58	395	0	1.10590E-07	293.6	end
Cu-63	395	0	1.85717E-05	293.6	end
Cu-65	395	0	8.27767E-06	293.6	end
U-234	395	0	6.97424E-06	293.6	end
U-235	395	0	6.50000E-04	293.6	end
U-236	395	0	2.78972E-06	293.6	end
U-238	395	0	3.76609E-05	293.6	end
total atom density = 8.00985E-02 a/b-cm					
8.009850E-02					
H-1	396	0	3.32434E-02	293.6	end
O-16	396	0	1.81013E-02	293.6	end
Mg-24	396	0	1.05686E-04	293.6	end
Mg-25	396	0	1.33797E-05	293.6	end
Mg-26	396	0	1.47310E-05	293.6	end
Al-27	396	0	2.78528E-02	293.6	end
Si-28	396	0	1.00085E-04	293.6	end
Si-29	396	0	5.06774E-06	293.6	end
Si-30	396	0	3.36403E-06	293.6	end
Ti-46	396	0	4.20262E-07	293.6	end
Ti-47	396	0	3.79000E-07	293.6	end
Ti-48	396	0	3.75536E-06	293.6	end
Ti-49	396	0	2.75590E-07	293.6	end
Ti-50	396	0	2.63873E-07	293.6	end
Cr-50	396	0	5.30517E-07	293.6	end
Cr-52	396	0	1.02189E-05	293.6	end
Cr-53	396	0	1.15860E-06	293.6	end
Cr-54	396	0	2.87821E-07	293.6	end
Mn-55	396	0	6.43555E-06	293.6	end
Fe-54	396	0	2.34101E-06	293.6	end
Fe-56	396	0	3.67158E-05	293.6	end
Fe-57	396	0	8.48365E-07	293.6	end
Fe-58	396	0	1.12048E-07	293.6	end
Cu-63	396	0	1.87481E-05	293.6	end
Cu-65	396	0	8.35629E-06	293.6	end

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U-234      396   0   5.67811E-06   293.6   end
U-235      396   0   5.29200E-04   293.6   end
U-236      396   0   2.27126E-06   293.6   end
U-238      396   0   3.06618E-05   293.6   end
'   total atom density =  8.00555E-02 a/b-cm
' 8.005550E-02
H-1        397   0   3.32434E-02   293.6   end
O-16       397   0   1.77731E-02   293.6   end
Mg-24      397   0   1.05686E-04   293.6   end
Mg-25      397   0   1.33797E-05   293.6   end
Mg-26      397   0   1.47310E-05   293.6   end
Al-27      397   0   2.82593E-02   293.6   end
Si-28      397   0   1.00993E-04   293.6   end
Si-29      397   0   5.11370E-06   293.6   end
Si-30      397   0   3.39453E-06   293.6   end
Ti-46       397   0   4.20262E-07   293.6   end
Ti-47       397   0   3.79000E-07   293.6   end
Ti-48       397   0   3.75536E-06   293.6   end
Ti-49       397   0   2.75590E-07   293.6   end
Ti-50       397   0   2.63873E-07   293.6   end
Cr-50       397   0   5.30517E-07   293.6   end
Cr-52       397   0   1.02189E-05   293.6   end
Cr-53       397   0   1.15860E-06   293.6   end
Cr-54       397   0   2.87821E-07   293.6   end
Mn-55       397   0   6.48581E-06   293.6   end
Fe-54       397   0   2.36993E-06   293.6   end
Fe-56       397   0   3.71695E-05   293.6   end
Fe-57       397   0   8.58848E-07   293.6   end
Fe-58       397   0   1.13433E-07   293.6   end
Cu-63       397   0   1.89155E-05   293.6   end
Cu-65       397   0   8.43090E-06   293.6   end
U-234       397   0   4.44742E-06   293.6   end
U-235       397   0   4.14500E-04   293.6   end
U-236       397   0   1.77898E-06   293.6   end
U-238       397   0   2.40161E-05   293.6   end
'   total atom density =  8.00271E-02 a/b-cm
' 8.002710E-02
H-1        398   0   3.32434E-02   293.6   end
O-16       398   0   1.75562E-02   293.6   end
Mg-24      398   0   1.05686E-04   293.6   end
Mg-25      398   0   1.33797E-05   293.6   end
Mg-26      398   0   1.47310E-05   293.6   end
Al-27      398   0   2.85280E-02   293.6   end
Si-28      398   0   1.01591E-04   293.6   end
Si-29      398   0   5.14401E-06   293.6   end
Si-30      398   0   3.41465E-06   293.6   end
Ti-46       398   0   4.20262E-07   293.6   end
Ti-47       398   0   3.79000E-07   293.6   end
Ti-48       398   0   3.75536E-06   293.6   end
Ti-49       398   0   2.75590E-07   293.6   end
Ti-50       398   0   2.63873E-07   293.6   end
Cr-50       398   0   5.30517E-07   293.6   end
Cr-52       398   0   1.02189E-05   293.6   end
Cr-53       398   0   1.15860E-06   293.6   end
Cr-54       398   0   2.87821E-07   293.6   end
Mn-55       398   0   6.51903E-06   293.6   end
Fe-54       398   0   2.38905E-06   293.6   end
Fe-56       398   0   3.74693E-05   293.6   end
Fe-57       398   0   8.65776E-07   293.6   end
Fe-58       398   0   1.14348E-07   293.6   end
Cu-63       398   0   1.90262E-05   293.6   end
Cu-65       398   0   8.48022E-06   293.6   end
U-234       398   0   3.63412E-06   293.6   end
U-235       398   0   3.38700E-04   293.6   end
U-236       398   0   1.45366E-06   293.6   end
U-238       398   0   1.96242E-05   293.6   end
'   total atom density =  8.00013E-02 a/b-cm
' 8.000130E-02
H-1        399   0   3.32434E-02   293.6   end
O-16       399   0   1.73591E-02   293.6   end
Mg-24      399   0   1.05686E-04   293.6   end
Mg-25      399   0   1.33797E-05   293.6   end
Mg-26      399   0   1.47310E-05   293.6   end
Al-27      399   0   2.87722E-02   293.6   end
Si-28      399   0   1.02136E-04   293.6   end
Si-29      399   0   5.17160E-06   293.6   end
Si-30      399   0   3.43297E-06   293.6   end
Ti-46       399   0   4.20262E-07   293.6   end
Ti-47       399   0   3.79000E-07   293.6   end
Ti-48       399   0   3.75536E-06   293.6   end
Ti-49       399   0   2.75590E-07   293.6   end

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Ti-50	399	0	2.63873E-07	293.6	end
Cr-50	399	0	5.30517E-07	293.6	end
Cr-52	399	0	1.02189E-05	293.6	end
Cr-53	399	0	1.15860E-06	293.6	end
Cr-54	399	0	2.87821E-07	293.6	end
Mn-55	399	0	6.54922E-06	293.6	end
Fe-54	399	0	2.40643E-06	293.6	end
Fe-56	399	0	3.77418E-05	293.6	end
Fe-57	399	0	8.72072E-07	293.6	end
Fe-58	399	0	1.15179E-07	293.6	end
Cu-63	399	0	1.91268E-05	293.6	end
Cu-65	399	0	8.52504E-06	293.6	end
U-234	399	0	2.89485E-06	293.6	end
U-235	399	0	2.69800E-04	293.6	end
U-236	399	0	1.15795E-06	293.6	end
U-238	399	0	1.56322E-05	293.6	end

' Outer Fuel Element fueled region 0 Central
' total atom density = 8.00583E-02 a/b-cm

8.005830E-02					
H-1	301	0	3.32434E-02	293.6	end
O-16	301	0	1.77945E-02	293.6	end
Mg-24	301	0	1.05686E-04	293.6	end
Mg-25	301	0	1.33797E-05	293.6	end
Mg-26	301	0	1.47310E-05	293.6	end
Al-27	301	0	2.82328E-02	293.6	end
Si-28	301	0	1.00933E-04	293.6	end
Si-29	301	0	5.11066E-06	293.6	end
Si-30	301	0	3.39252E-06	293.6	end
Ti-46	301	0	4.20262E-07	293.6	end
Ti-47	301	0	3.79000E-07	293.6	end
Ti-48	301	0	3.75536E-06	293.6	end
Ti-49	301	0	2.75590E-07	293.6	end
Ti-50	301	0	2.63873E-07	293.6	end
Cr-50	301	0	5.30517E-07	293.6	end
Cr-52	301	0	1.02189E-05	293.6	end
Cr-53	301	0	1.15860E-06	293.6	end
Cr-54	301	0	2.87821E-07	293.6	end
Mn-55	301	0	6.48252E-06	293.6	end
Fe-54	301	0	2.36804E-06	293.6	end
Fe-56	301	0	3.71398E-05	293.6	end
Fe-57	301	0	8.58163E-07	293.6	end
Fe-58	301	0	1.13342E-07	293.6	end
Cu-63	301	0	1.89046E-05	293.6	end
Cu-65	301	0	8.42602E-06	293.6	end
U-234	301	0	4.52789E-06	293.6	end
U-235	301	0	4.22000E-04	293.6	end
U-236	301	0	1.81117E-06	293.6	end
U-238	301	0	2.44506E-05	293.6	end

' total atom density = 8.00895E-02 a/b-cm

8.008950E-02					
H-1	302	0	3.32434E-02	293.6	end
O-16	302	0	1.80329E-02	293.6	end
Mg-24	302	0	1.05686E-04	293.6	end
Mg-25	302	0	1.33797E-05	293.6	end
Mg-26	302	0	1.47310E-05	293.6	end
Al-27	302	0	2.79375E-02	293.6	end
Si-28	302	0	1.00274E-04	293.6	end
Si-29	302	0	5.07732E-06	293.6	end
Si-30	302	0	3.37038E-06	293.6	end
Ti-46	302	0	4.20262E-07	293.6	end
Ti-47	302	0	3.79000E-07	293.6	end
Ti-48	302	0	3.75536E-06	293.6	end
Ti-49	302	0	2.75590E-07	293.6	end
Ti-50	302	0	2.63873E-07	293.6	end
Cr-50	302	0	5.30517E-07	293.6	end
Cr-52	302	0	1.02189E-05	293.6	end
Cr-53	302	0	1.15860E-06	293.6	end
Cr-54	302	0	2.87821E-07	293.6	end
Mn-55	302	0	6.44602E-06	293.6	end
Fe-54	302	0	2.34704E-06	293.6	end
Fe-56	302	0	3.68104E-05	293.6	end
Fe-57	302	0	8.50550E-07	293.6	end
Fe-58	302	0	1.12337E-07	293.6	end
Cu-63	302	0	1.87830E-05	293.6	end
Cu-65	302	0	8.37182E-06	293.6	end
U-234	302	0	5.42167E-06	293.6	end
U-235	302	0	5.05300E-04	293.6	end
U-236	302	0	2.16868E-06	293.6	end
U-238	302	0	2.92770E-05	293.6	end

' total atom density = 8.01228E-02 a/b-cm

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' 8.012280E-02
H-1      303  0  3.32434E-02  293.6  end
O-16     303  0  1.82870E-02  293.6  end
Mg-24    303  0  1.05686E-04  293.6  end
Mg-25    303  0  1.33797E-05  293.6  end
Mg-26    303  0  1.47310E-05  293.6  end
Al-27    303  0  2.76228E-02  293.6  end
Si-28    303  0  9.95724E-05  293.6  end
Si-29    303  0  5.04178E-06  293.6  end
Si-30    303  0  3.34679E-06  293.6  end
Ti-46    303  0  4.20262E-07  293.6  end
Ti-47    303  0  3.79000E-07  293.6  end
Ti-48    303  0  3.75536E-06  293.6  end
Ti-49    303  0  2.75590E-07  293.6  end
Ti-50    303  0  2.63873E-07  293.6  end
Cr-50    303  0  5.30517E-07  293.6  end
Cr-52    303  0  1.02189E-05  293.6  end
Cr-53    303  0  1.15860E-06  293.6  end
Cr-54    303  0  2.87821E-07  293.6  end
Mn-55    303  0  6.40711E-06  293.6  end
Fe-54    303  0  2.32464E-06  293.6  end
Fe-56    303  0  3.64591E-05  293.6  end
Fe-57    303  0  8.42433E-07  293.6  end
Fe-58    303  0  1.11265E-07  293.6  end
Cu-63    303  0  1.86534E-05  293.6  end
Cu-65    303  0  8.31405E-06  293.6  end
U-234   303  0  6.37446E-06  293.6  end
U-235   303  0  5.94100E-04  293.6  end
U-236   303  0  2.54980E-06  293.6  end
U-238   303  0  3.44221E-05  293.6  end
' total atom density =  8.01530E-02 a/b-cm
' 8.015300E-02
H-1      304  0  3.32434E-02  293.6  end
O-16     304  0  1.85176E-02  293.6  end
Mg-24    304  0  1.05686E-04  293.6  end
Mg-25    304  0  1.33797E-05  293.6  end
Mg-26    304  0  1.47310E-05  293.6  end
Al-27    304  0  2.73372E-02  293.6  end
Si-28    304  0  9.89350E-05  293.6  end
Si-29    304  0  5.00951E-06  293.6  end
Si-30    304  0  3.32537E-06  293.6  end
Ti-46    304  0  4.20262E-07  293.6  end
Ti-47    304  0  3.79000E-07  293.6  end
Ti-48    304  0  3.75536E-06  293.6  end
Ti-49    304  0  2.75590E-07  293.6  end
Ti-50    304  0  2.63873E-07  293.6  end
Cr-50    304  0  5.30517E-07  293.6  end
Cr-52    304  0  1.02189E-05  293.6  end
Cr-53    304  0  1.15860E-06  293.6  end
Cr-54    304  0  2.87821E-07  293.6  end
Mn-55    304  0  6.37178E-06  293.6  end
Fe-54    304  0  2.30432E-06  293.6  end
Fe-56    304  0  3.61403E-05  293.6  end
Fe-57    304  0  8.35068E-07  293.6  end
Fe-58    304  0  1.10292E-07  293.6  end
Cu-63    304  0  1.85357E-05  293.6  end
Cu-65    304  0  8.26161E-06  293.6  end
U-234   304  0  7.23926E-06  293.6  end
U-235   304  0  6.74700E-04  293.6  end
U-236   304  0  2.89573E-06  293.6  end
U-238   304  0  3.90920E-05  293.6  end
' total atom density =  8.01437E-02 a/b-cm
' 8.014370E-02
H-1      305  0  3.32434E-02  293.6  end
O-16     305  0  1.84469E-02  293.6  end
Mg-24    305  0  1.05686E-04  293.6  end
Mg-25    305  0  1.33797E-05  293.6  end
Mg-26    305  0  1.47310E-05  293.6  end
Al-27    305  0  2.74247E-02  293.6  end
Si-28    305  0  9.91306E-05  293.6  end
Si-29    305  0  5.01941E-06  293.6  end
Si-30    305  0  3.33194E-06  293.6  end
Ti-46    305  0  4.20262E-07  293.6  end
Ti-47    305  0  3.79000E-07  293.6  end
Ti-48    305  0  3.75536E-06  293.6  end
Ti-49    305  0  2.75590E-07  293.6  end
Ti-50    305  0  2.63873E-07  293.6  end
Cr-50    305  0  5.30517E-07  293.6  end
Cr-52    305  0  1.02189E-05  293.6  end
Cr-53    305  0  1.15860E-06  293.6  end
Cr-54    305  0  2.87821E-07  293.6  end

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Mn-55      305   0   6.38261E-06  293.6  end
Fe-54      305   0   2.31055E-06  293.6  end
Fe-56      305   0   3.62380E-05  293.6  end
Fe-57      305   0   8.37326E-07  293.6  end
Fe-58      305   0   1.10590E-07  293.6  end
Cu-63      305   0   1.85717E-05  293.6  end
Cu-65      305   0   8.27767E-06  293.6  end
U-234     305   0   6.97424E-06  293.6  end
U-235     305   0   6.50000E-04   293.6  end
U-236     305   0   2.78972E-06  293.6  end
U-238     305   0   3.76609E-05  293.6  end
'   total atom density =  8.00985E-02 a/b-cm
'  8.009850E-02
H-1        306   0   3.32434E-02  293.6  end
O-16       306   0   1.81013E-02  293.6  end
Mg-24      306   0   1.05686E-04   293.6  end
Mg-25      306   0   1.33797E-05  293.6  end
Mg-26      306   0   1.47310E-05  293.6  end
Al-27      306   0   2.78528E-02  293.6  end
Si-28      306   0   1.00085E-04   293.6  end
Si-29      306   0   5.06774E-06   293.6  end
Si-30      306   0   3.36403E-06  293.6  end
Ti-46      306   0   4.20262E-07  293.6  end
Ti-47      306   0   3.79000E-07  293.6  end
Ti-48      306   0   3.75536E-06   293.6  end
Ti-49      306   0   2.75590E-07  293.6  end
Ti-50      306   0   2.63873E-07  293.6  end
Cr-50      306   0   5.30517E-07  293.6  end
Cr-52      306   0   1.02189E-05  293.6  end
Cr-53      306   0   1.15860E-06  293.6  end
Cr-54      306   0   2.87821E-07  293.6  end
Mn-55      306   0   6.43555E-06  293.6  end
Fe-54      306   0   2.34101E-06  293.6  end
Fe-56      306   0   3.67158E-05  293.6  end
Fe-57      306   0   8.48365E-07  293.6  end
Fe-58      306   0   1.12048E-07  293.6  end
Cu-63      306   0   1.87481E-05  293.6  end
Cu-65      306   0   8.35629E-06  293.6  end
U-234     306   0   5.67811E-06  293.6  end
U-235     306   0   5.29200E-04   293.6  end
U-236     306   0   2.27126E-06  293.6  end
U-238     306   0   3.06618E-05  293.6  end
'   total atom density =  8.00555E-02 a/b-cm
'  8.005550E-02
H-1        307   0   3.32434E-02  293.6  end
O-16       307   0   1.77731E-02  293.6  end
Mg-24      307   0   1.05686E-04   293.6  end
Mg-25      307   0   1.33797E-05  293.6  end
Mg-26      307   0   1.47310E-05  293.6  end
Al-27      307   0   2.82593E-02  293.6  end
Si-28      307   0   1.00993E-04  293.6  end
Si-29      307   0   5.11370E-06  293.6  end
Si-30      307   0   3.39453E-06  293.6  end
Ti-46      307   0   4.20262E-07  293.6  end
Ti-47      307   0   3.79000E-07  293.6  end
Ti-48      307   0   3.75536E-06  293.6  end
Ti-49      307   0   2.75590E-07  293.6  end
Ti-50      307   0   2.63873E-07  293.6  end
Cr-50      307   0   5.30517E-07  293.6  end
Cr-52      307   0   1.02189E-05  293.6  end
Cr-53      307   0   1.15860E-06  293.6  end
Cr-54      307   0   2.87821E-07  293.6  end
Mn-55      307   0   6.48581E-06  293.6  end
Fe-54      307   0   2.36993E-06  293.6  end
Fe-56      307   0   3.71695E-05  293.6  end
Fe-57      307   0   8.58848E-07  293.6  end
Fe-58      307   0   1.13433E-07  293.6  end
Cu-63      307   0   1.89155E-05  293.6  end
Cu-65      307   0   8.43090E-06  293.6  end
U-234     307   0   4.44742E-06  293.6  end
U-235     307   0   4.14500E-04   293.6  end
U-236     307   0   1.77898E-06  293.6  end
U-238     307   0   2.40161E-05  293.6  end
'   total atom density =  8.00271E-02 a/b-cm
'  8.002710E-02
H-1        308   0   3.32434E-02  293.6  end
O-16       308   0   1.75562E-02  293.6  end
Mg-24      308   0   1.05686E-04   293.6  end
Mg-25      308   0   1.33797E-05  293.6  end
Mg-26      308   0   1.47310E-05  293.6  end
Al-27      308   0   2.85280E-02  293.6  end

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Si-28      308   0   1.01591E-04  293.6  end
Si-29      308   0   5.14401E-06  293.6  end
Si-30      308   0   3.41465E-06  293.6  end
Ti-46      308   0   4.20262E-07  293.6  end
Ti-47      308   0   3.79000E-07  293.6  end
Ti-48      308   0   3.75536E-06  293.6  end
Ti-49      308   0   2.75590E-07  293.6  end
Ti-50      308   0   2.63873E-07  293.6  end
Cr-50      308   0   5.30517E-07  293.6  end
Cr-52      308   0   1.02189E-05  293.6  end
Cr-53      308   0   1.15860E-06  293.6  end
Cr-54      308   0   2.87821E-07  293.6  end
Mn-55      308   0   6.51903E-06  293.6  end
Fe-54      308   0   2.38905E-06  293.6  end
Fe-56      308   0   3.74693E-05  293.6  end
Fe-57      308   0   8.65776E-07  293.6  end
Fe-58      308   0   1.14348E-07  293.6  end
Cu-63      308   0   1.90262E-05  293.6  end
Cu-65      308   0   8.48022E-06  293.6  end
U-234     308   0   3.63412E-06  293.6  end
U-235     308   0   3.38700E-04   293.6  end
U-236     308   0   1.45366E-06  293.6  end
U-238     308   0   1.96242E-05  293.6  end
'   total atom density =  8.00013E-02 a/b-cm
' 8.000130E-02
H-1        309   0   3.32434E-02  293.6  end
O-16       309   0   1.73591E-02  293.6  end
Mg-24      309   0   1.05686E-04  293.6  end
Mg-25      309   0   1.33797E-05  293.6  end
Mg-26      309   0   1.47310E-05  293.6  end
Al-27      309   0   2.87722E-02  293.6  end
Si-28      309   0   1.02136E-04  293.6  end
Si-29      309   0   5.17160E-06  293.6  end
Si-30      309   0   3.43297E-06  293.6  end
Ti-46      309   0   4.20262E-07  293.6  end
Ti-47      309   0   3.79000E-07  293.6  end
Ti-48      309   0   3.75536E-06  293.6  end
Ti-49      309   0   2.75590E-07  293.6  end
Ti-50      309   0   2.63873E-07  293.6  end
Cr-50      309   0   5.30517E-07  293.6  end
Cr-52      309   0   1.02189E-05  293.6  end
Cr-53      309   0   1.15860E-06  293.6  end
Cr-54      309   0   2.87821E-07  293.6  end
Mn-55      309   0   6.54922E-06  293.6  end
Fe-54      309   0   2.40643E-06  293.6  end
Fe-56      309   0   3.77418E-05  293.6  end
Fe-57      309   0   8.72072E-07  293.6  end
Fe-58      309   0   1.15179E-07  293.6  end
Cu-63      309   0   1.91268E-05  293.6  end
Cu-65      309   0   8.52504E-06  293.6  end
U-234     309   0   2.89485E-06  293.6  end
U-235     309   0   2.69800E-04   293.6  end
U-236     309   0   1.15795E-06  293.6  end
U-238     309   0   1.56322E-05  293.6  end
'
'
'
'
'
'
'
'
Region IV Control Element Material Descriptions
-----

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```

Aluminum clad of control elements
Al-27      21    0   5.85482E-02  293.6  end
H-1        21    0   3.45716E-04  293.6  end
Mg-24      21    0   5.28432E-04  293.6  end
Mg-25      21    0   6.68986E-05  293.6  end
Mg-26      21    0   7.36554E-05  293.6  end
Si-28      21    0   3.20373E-04  293.6  end
Si-29      21    0   1.62219E-05  293.6  end
Si-30      21    0   1.07683E-05  293.6  end
Ti-46      21    0   2.10131E-06  293.6  end
Ti-47      21    0   1.89500E-06  293.6  end
Ti-48      21    0   1.87768E-05  293.6  end
Ti-49      21    0   1.37795E-06  293.6  end
Ti-50      21    0   1.31937E-06  293.6  end
Cr-50      21    0   2.65258E-06  293.6  end
Cr-52      21    0   5.10942E-05  293.6  end
Cr-53      21    0   5.79300E-06  293.6  end
Cr-54      21    0   1.43910E-06  293.6  end

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Mn-55      21   0  2.21974E-05  293.6  end
Fe-54      21   0  5.96144E-06  293.6  end
Fe-56      21   0  9.34978E-05  293.6  end
Fe-57      21   0  2.16039E-06  293.6  end
Fe-58      21   0  2.85334E-07  293.6  end
Cu-63      21   0  6.04931E-05  293.6  end
Cu-65      21   0  2.69626E-05  293.6  end
'
'    Inner Control Element
'
'    Inner control element--Gray Ta-Al/H2O region
' The total number density on MCNP material cards ( 5.85987E-02)
' is not the same as on cell cards ( 5.88250E-02)
Ta-181     400   0  1.42950E-02  293.6  end
Al-27      400   0  3.36997E-02  293.6  end
H-1        400   0  2.83089E-03  293.6  end
O-16       400   0  1.40541E-03  293.6  end
Ta-182     400   0  3.39607E-05  293.6  end
W-182      400   0  2.85398E-04  293.6  end
W-183      400   0  4.63182E-03  293.6  end
W-184      400   0  1.64131E-03  293.6  end
W-186      400   0  1.54595E-06  293.6  end
'
'    Inner control element--black EuO-Al region
Eu-151     401   0  2.69002E-03  293.6  end
Eu-153     401   0  4.47203E-03  293.6  end
Al-27      401   0  3.93803E-02  293.6  end
O-16       401   0  1.31201E-02  293.6  end
Eu-152     401   0  6.75405E-04  293.6  end
Eu-154     401   0  2.61202E-04  293.6  end
Eu-155     401   0  2.44802E-05  293.6  end
Sm-152     401   0  1.71301E-04  293.6  end
Gd-152     401   0  3.84303E-04  293.6  end
Gd-154     401   0  4.22003E-05  293.6  end
Gd-155     401   0  3.59803E-06  293.6  end
Gd-156     401   0  7.06105E-06  293.6  end
'
'    Inner control element--upper Al/H2O region
H-1        402   0  3.26363E-03  293.6  end
O-16       402   0  1.63181E-03  293.6  end
Al-27      402   0  5.72948E-02  293.6  end
'
'    Inner control element--lower Al/H2O region
H-1        403   0  3.19976E-03  293.6  end
O-16       403   0  1.59988E-03  293.6  end
Al-27      403   0  5.73525E-02  293.6  end
'
'    Outer Control Element
'
'    Outer control element--Gray Ta-Al/H2O region
Ta-181     411   0  1.79700E-02  293.6  end
Al-27      411   0  3.22700E-02  293.6  end
H-1        411   0  2.77400E-03  293.6  end
O-16       411   0  1.39300E-03  293.6  end
Ta-182     411   0  2.83800E-05  293.6  end
W-182      411   0  1.19700E-04  293.6  end
W-183      411   0  1.77700E-03  293.6  end
W-184      411   0  1.44900E-04  293.6  end
W-186      411   0  1.74200E-08  293.6  end
'
'    Outer control element--black EuO-Al region
Eu-151     410   0  3.58098E-03  293.6  end
Eu-153     410   0  4.28997E-03  293.6  end
Al-27      410   0  3.78298E-02  293.6  end
O-16       410   0  1.25999E-02  293.6  end
Eu-152     410   0  2.68998E-04  293.6  end
Eu-154     410   0  8.15595E-05  293.6  end
Eu-155     410   0  2.47898E-06  293.6  end
Sm-152     410   0  4.87897E-05  293.6  end
Gd-152     410   0  1.16999E-04  293.6  end
Gd-154     410   0  5.18597E-06  293.6  end
Gd-155     410   0  2.14399E-07  293.6  end
Gd-156     410   0  1.53199E-07  293.6  end
'
'    Outer control element--upper Al/H2O region
H-1        412   0  3.01443E-03  293.6  end
O-16       412   0  1.50722E-03  293.6  end
Al-27      412   0  5.75198E-02  293.6  end
'
'    Outer control element--lower Al/H2O region
H-1        413   0  3.19012E-03  293.6  end
O-16       413   0  1.59506E-03  293.6  end
Al-27      413   0  5.73611E-02  293.6  end
'
'

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Region V Removable Reflector Material Descriptions
-----
Water above removable reflector region --Density= 0.9794 g/cm^3
H-1      4    0   6.59947E-02   293.6   end
O-16     4    0   3.29974E-02   293.6   end
Water gaps in removable reflector region   --Avg. Density= 0.98465 g/cm^3
H-1      5    0   6.63485E-02   293.6   end
O-16     5    0   3.31742E-02   293.6   end
Water below removable reflector region --Density= 0.9899 g/cm^3
H-1      6    0   6.67020E-02   293.6   end
O-16     6    0   3.33510E-02   293.6   end

Aluminum clad of removable refl. reg.
Al-27    22   0   5.85482E-02   293.6   end
H-1      22   0   3.45716E-04   293.6   end
Mg-24    22   0   5.28432E-04   293.6   end
Mg-25    22   0   6.68986E-05   293.6   end
Mg-26    22   0   7.36554E-05   293.6   end
Si-28    22   0   3.20373E-04   293.6   end
Si-29    22   0   1.62219E-05   293.6   end
Si-30    22   0   1.07683E-05   293.6   end
Ti-46    22   0   2.10131E-06   293.6   end
Ti-47    22   0   1.89500E-06   293.6   end
Ti-48    22   0   1.87768E-05   293.6   end
Ti-49    22   0   1.37795E-06   293.6   end
Ti-50    22   0   1.31937E-06   293.6   end
Cr-50    22   0   2.65258E-06   293.6   end
Cr-52    22   0   5.10942E-05   293.6   end
Cr-53    22   0   5.79300E-06   293.6   end
Cr-54    22   0   1.43910E-06   293.6   end
Mn-55    22   0   2.21974E-05   293.6   end
Fe-54    22   0   5.96144E-06   293.6   end
Fe-56    22   0   9.34978E-05   293.6   end
Fe-57    22   0   2.16039E-06   293.6   end
Fe-58    22   0   2.85334E-07   293.6   end
Cu-63    22   0   6.04931E-05   293.6   end
Cu-65    22   0   2.69626E-05   293.6   end

Aluminum liners in Be reflectors also outside Be reflector container
Al-27    24   0   5.85482E-02   293.6   end
H-1      24   0   3.45716E-04   293.6   end
Mg-24    24   0   5.28432E-04   293.6   end
Mg-25    24   0   6.68986E-05   293.6   end
Mg-26    24   0   7.36554E-05   293.6   end
Si-28    24   0   3.20373E-04   293.6   end
Si-29    24   0   1.62219E-05   293.6   end
Si-30    24   0   1.07683E-05   293.6   end
Ti-46    24   0   2.10131E-06   293.6   end
Ti-47    24   0   1.89500E-06   293.6   end
Ti-48    24   0   1.87768E-05   293.6   end
Ti-49    24   0   1.37795E-06   293.6   end
Ti-50    24   0   1.31937E-06   293.6   end
Cr-50    24   0   2.65258E-06   293.6   end
Cr-52    24   0   5.10942E-05   293.6   end
Cr-53    24   0   5.79300E-06   293.6   end
Cr-54    24   0   1.43910E-06   293.6   end
Mn-55    24   0   2.21974E-05   293.6   end
Fe-54    24   0   5.96144E-06   293.6   end
Fe-56    24   0   9.34978E-05   293.6   end
Fe-57    24   0   2.16039E-06   293.6   end
Fe-58    24   0   2.85334E-07   293.6   end
Cu-63    24   0   6.04931E-05   293.6   end
Cu-65    24   0   2.69626E-05   293.6   end

Beryllium plugs
Bebound   33   0   1.23606E-01   293.6   end
H-1      33   0   6.73828E-07   293.6   end
O-16     33   0   3.36914E-07   293.6   end

Eu Liner in RB-7A
The number densities for this material on MCNP material cards were manually
verified for consistency with density on cell cards ( 7.68237E+00)
Fe-54    38   0   3.45417E-03   293.6   end
Fe-56    38   0   5.41745E-02   293.6   end
Fe-57    38   0   1.25177E-03   293.6   end
Fe-58    38   0   1.65328E-04   293.6   end
Eu-151   38   0   3.61102E-03   293.6   end

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Eu-153      38   0   3.94184E-03   293.6   end
O-16       38   0   1.13293E-02   293.6   end
'
'      Eu in RB-7A
' The number densities for this material on MCNP material cards were manually
' verified for consistency with density on cell cards ( 4.66136E+00)
Fe-54      39   0   2.83677E-03   293.6   end
Fe-56      39   0   4.44912E-02   293.6   end
Fe-57      39   0   1.02803E-03   293.6   end
Fe-58      39   0   1.35777E-04   293.6   end
B-10       39   0   8.93840E-05   293.6   end
Eu-151     39   0   1.59355E-04   293.6   end
Eu-153     39   0   1.73955E-04   293.6   end
O-16       39   0   4.99965E-04   293.6   end
Al-27      39   0   1.46655E-03   293.6   end
'
'      Beryllium removable reflector
'      At the start of cycle 400, a new removable beryllium reflector was placed in the reactor
'      No Li-6, or He-3 present (100% Be - H2O gaps are explicitly modelled)
'
'      Removable reflector Rgn 1 material
Bebound    101   0   1.23607E-01   293.6   end
'      Removable reflector Rgn 2 material
Bebound    102   0   1.23607E-01   293.6   end
'      Removable reflector Rgn 3 material
Bebound    103   0   1.23607E-01   293.6   end
'semi-permanent refl. reg
Bebound    104   0   1.23607E-01   293.6   end
Li-6       104   0   3.14455E-07   293.6   end
He-3       104   0   9.25938E-09   293.6   end
'
'
'      Region VI Permanent Reflector Material
-----
'
'      Water in Irradiation Facilities - Density= 0.98465 g/cc
H-1        9   0   6.63485E-02   293.6   end
O-16      9   0   3.31742E-02   293.6   end
'
'      Beryllium permanent reflector(with he-3 and li-6)
Bebound    105   0   1.21134E-01   293.6   end
H-1        105   0   1.34765E-03   293.6   end
O-16      105   0   6.73824E-04   293.6   end
Li-6       105   0   1.74119E-07   293.6   end
He-3       105   0   5.11966E-09   293.6   end
Bebound    106   0   1.21134E-01   293.6   end
H-1        106   0   1.34765E-03   293.6   end
O-16      106   0   6.73825E-04   293.6   end
Li-6       106   0   1.08524E-07   293.6   end
He-3       106   0   4.29664E-09   293.6   end
Bebound    107   0   1.21134E-01   293.6   end
H-1        107   0   1.34765E-03   293.6   end
O-16      107   0   6.73825E-04   293.6   end
Li-6       107   0   7.10575E-08   293.6   end
He-3       107   0   2.07746E-09   293.6   end
Bebound    108   0   1.21134E-01   293.6   end
H-1        108   0   1.34765E-03   293.6   end
O-16      108   0   6.73825E-04   293.6   end
Li-6       108   0   4.80662E-08   293.6   end
He-3       108   0   1.39910E-09   293.6   end
Bebound    109   0   1.21134E-01   293.6   end
H-1        109   0   1.34765E-03   293.6   end
O-16      109   0   6.73825E-04   293.6   end
Li-6       109   0   3.32030E-08   293.6   end
He-3       109   0   9.59627E-10   293.6   end
Bebound    110   0   1.21134E-01   293.6   end
H-1        110   0   1.34765E-03   293.6   end
O-16      110   0   6.73825E-04   293.6   end
Li-6       110   0   2.46751E-08   293.6   end
He-3       110   0   7.06335E-10   293.6   end
Bebound    111   0   1.21135E-01   293.6   end
H-1        111   0   1.34765E-03   293.6   end
O-16      111   0   6.73825E-04   293.6   end
Li-6       111   0   1.84488E-08   293.6   end
He-3       111   0   5.19304E-10   293.6   end
'
'      H-Tube material          Total =  6.03240E-02
' The total number density on MCNP material cards ( 6.03240E-02)
' is not the same as on cell cards ( 6.02423E-02)
Al-27      520   0   5.99811E-02   293.6   end
Si-28      520   0   1.33801E-04   293.6   end

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Si-29      520    0   6.77497E-06  293.6  end
Si-30      520    0   4.49730E-06  293.6  end
Mn-55      520    0   7.41649E-06  293.6  end
Fe-54      520    0   4.26815E-06  293.6  end
Fe-56      520    0   6.69406E-05  293.6  end
Fe-57      520    0   1.54675E-06  293.6  end
Fe-58      520    0   2.04288E-07  293.6  end
Cu-63      520    0   2.47065E-05  293.6  end
Cu-65      520    0   1.10121E-05  293.6  end
H-Tube clad
Al-27      521    0   6.02423E-02  293.6  end
Water Reflector --Density= 0.9899 g/cm^3
H-1         7     0   6.67020E-02  293.6  end
O-16        7     0   3.33510E-02  293.6  end
H2O Pool   --Density= 1.0000 g/cm^3
H-1         8     0   6.73827E-02  293.6  end
O-16        8     0   3.36913E-02  293.6  end
Pressure Vessel Stainless steel liner - SCALE SS304 (69.5 w/o Fe, 19.0 w/o Cr,
9.5 w/o Ni, 2.0 w/o Mn)
also used for ss liners in vxfs
Fe-54      40    0   3.47221E-03  293.6  end
Fe-56      40    0   5.44574E-02  293.6  end
Fe-57      40    0   1.25831E-03  293.6  end
Fe-58      40    0   1.66191E-04  293.6  end
Cr-50      40    0   7.58122E-04  293.6  end
Cr-52      40    0   1.46030E-02  293.6  end
Cr-53      40    0   1.65567E-03  293.6  end
Cr-54      40    0   4.11303E-04  293.6  end
Ni-58      40    0   5.25498E-03  293.6  end
Ni-60      40    0   2.02388E-03  293.6  end
Ni-61      40    0   8.79947E-05  293.6  end
Ni-62      40    0   2.80194E-04  293.6  end
Ni-64      40    0   7.17851E-05  293.6  end
Mn-55      40    0   1.73629E-03  293.6  end
Carbon steel PV -- SCALE Carbon Steel (99.0 w/o Fe, 1.0 w/o C)
The number densities for this material on MCNP material cards were manually
verified for consistency with density on cell cards ( 8.16000E+00)
Fe-54      50    0   5.09626E-03  293.6  end
Fe-56      50    0   7.99285E-02  293.6  end
Fe-57      50    0   1.84685E-03  293.6  end
Fe-58      50    0   2.43924E-04  293.6  end
C          50    0   4.09148E-03  293.6  end
Air Void in reflector components
H-1         60    0   1.00000E-15  293.6  end
O-16        60    0   1.00000E-15  293.6  end
Barytes concrete at 3.09725 g/cc (used for biological shield); shown below are atoms/(barn*cm) by nuclide
The number densities for this material on MCNP material cards were manually
verified for consistency with density on cell cards ( 3.09725E+00)
H-1         62    0   1.67197E-02  293.6  end
B-10        62    0   3.35986E-04  293.6  end
B-11        62    0   1.36065E-03  293.6  end
O-16        62    0   4.17247E-02  293.6  end
Na-23        62    0   3.17585E-04  293.6  end
Mg-24        62    0   1.21699E-04  293.6  end
Mg-25        62    0   1.54068E-05  293.6  end
Mg-26        62    0   1.69629E-05  293.6  end
Al-27        62    0   7.49354E-04  293.6  end
Si-28        62    0   1.15586E-03  293.6  end
Si-29        62    0   5.85260E-05  293.6  end
Si-30        62    0   3.88503E-05  293.6  end
S-32         62    0   5.37200E-03  293.6  end
Ti-46         62    0   1.09628E-05  293.6  end
Ti-47         62    0   9.88646E-06  293.6  end
Ti-48         62    0   9.79610E-05  293.6  end
Ti-49         62    0   7.18895E-06  293.6  end
Ti-50         62    0   6.88332E-06  293.6  end
Mn-55        62    0   1.70380E-04  293.6  end
Fe-54         62    0   4.00028E-05  293.6  end
Fe-56         62    0   6.27394E-04  293.6  end
Fe-57         62    0   1.44967E-05  293.6  end
Fe-58         62    0   1.91466E-06  293.6  end
Ba-138        62    0   5.36503E-03  293.6  end
Ca-40         62    0   3.15581E-03  293.6  end
Ca-42         62    0   2.10301E-05  293.6  end
Ca-43         62    0   4.36227E-06  293.6  end

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Ca-44      62    0   6.80384E-05   293.6   end
Ca-46      62    0   1.30217E-07   293.6   end
Ca-48      62    0   6.05509E-06   293.6   end
' real concentration for ba-138 = 3.8787e-3 atoms/(barn*cm); it is available;
' other nuclide concentrations for which there is no mcnp xsect data:
' ba-134=1.3037e-4; ba-135=3.5557e-4; ba-136=4.2364e-4; ba-137=6.0575e-4
' total number density for all barium nuclides in barytes concrete: 5.394030e-3
' total number density for all nuclides in barytes concrete: 7.801382e-2
' while this barytes concrete (for ANS project) was 3.09725 g/cc, it can
' sometimes be made as dense as 3.5 g/cc; see book by Schaffer
'
' Replace with 1014.51c and parah.96t
' Liquid H at 20 deg.K, 15 bar pressure; Total = 0.04372 atoms/(b*cm) = 0.0726 g/cc (revised as per Trevor Lucas, 5-
3-96)
' The number densities for this material on MCNP material cards were manually
' verified for consistency with density on cell cards ( 7.26000E-02)
H-1      560    0   8.10550E-04   293.6   end
' mt560   hpara.60t
' There is a total of 264 materials in this problem
'
end comp

read parm
cfx=yes gen=11 nsk=1 npg=10000 tba=100 htm=no plt=yes flx=yes fdn=yes
end parm

read geometry
'

-----
Region 1 cell Cards
-----

Target site A-2 (shrouded Al dummy)
unit 410
cylinder 410  0.24765  25.4    -25.4
cylinder 411  0.31623  25.4    -25.4
cylinder 412  0.47625  49.2125 -39.6875
cylinder 413  0.755015 40.3225 -25.40100
cylinder 1413 0.755015 49.2125 -39.6875
cylinder 414  0.83058  40.3225 -25.40100
cylinder 415  0.83500  49.2125 -39.6875
media   512    1     410
media   511    1     411    -410
media   25     1     412    -411
media   25     1     414    -413
media   2      1     1413   -412
media   2      1     415    -1413   -414
boundary 415
' end unit 410
'

Target site A-3 (shrouded Al dummy)
unit 420
cylinder 420  0.24765  25.4    -25.4
cylinder 421  0.31623  25.4    -25.4
cylinder 422  0.47625  49.2125 -39.6875
cylinder 423  0.755015 40.3225 -25.40100
cylinder 1423 0.755015 49.2125 -39.6875
cylinder 424  0.83058  40.3225 -25.40100
cylinder 425  0.83500  49.2125 -39.6875
media   512    1     420
media   511    1     421    -420
media   25     1     422    -421
media   25     1     424    -423
media   2      1     1423   -422
media   2      1     425    -1423   -424
boundary 425
' end unit 420
'

Target site B-1 (shrouded Al dummy)
unit 430
cylinder 430  0.24765  25.4    -25.4
cylinder 431  0.31623  25.4    -25.4
cylinder 432  0.47625  49.2125 -39.6875
cylinder 433  0.755015 40.3225 -25.40100
cylinder 1433 0.755015 49.2125 -39.6875
cylinder 434  0.83058  40.3225 -25.40100
cylinder 435  0.83500  49.2125 -39.6875
media   512    1     430
media   511    1     431    -430
media   25     1     432    -431

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media      25     1     434    -433
media      2     1    1433    -432
media      2     1     435   -1433    -434
boundary   435
' end unit 430
'
' Target site B-2 (shrouded Al dummy)
unit 440
cylinder  440  0.24765   25.4    -25.4
cylinder  441  0.31623   25.4    -25.4
cylinder  442  0.47625   49.2125  -39.6875
cylinder  443  0.755015  40.3225  -25.40100
cylinder  1443 0.755015  49.2125  -39.6875
cylinder  444  0.83058   40.3225  -25.40100
cylinder  445  0.83500   49.2125  -39.6875
media     512     1     440
media     511     1     441    -440
media     25     1     442    -441
media     25     1     444    -443
media     2     1    1443    -442
media     2     1     445   -1443    -444
boundary   445
' end unit 440
'
' Target site B-3 (HT tube)
unit 750
cylinder  750  0.32385   28.80800  23.251795
cylinder  751  0.32385   22.300565  16.744315
cylinder  752  0.32385   15.793085  10.236835
cylinder  753  0.32385   9.285605   3.729355
cylinder  754  0.32385   2.778125  -2.778125
cylinder  755  0.32385   -3.729355  -9.285605
cylinder  756  0.32385   -10.236835 -15.793085
cylinder  757  0.32385   -16.744315 -22.300565
cylinder  758  0.32385   -23.251795 -28.808000
'
cylinder  760  0.55499   29.28366   22.77618
cylinder  761  0.55499   29.28366   16.26870
cylinder  762  0.55499   29.28366   9.76122
cylinder  763  0.55499   29.28366   3.25374
cylinder  764  0.55499   29.28366  -3.25374
cylinder  765  0.55499   29.28366  -9.76122
cylinder  766  0.55499   29.28366 -16.26870
cylinder  767  0.55499   29.28366 -22.77618
cylinder  768  0.55499   29.28366 -29.28366
'
cylinder  452  0.63500   29.28366  -29.28366
cylinder  453  0.787400  29.28366  -29.28366
cylinder  454  0.83500   29.28366  -29.28366
'
cylinder  455  0.787400  29.28366  -39.6875
cylinder  456  0.83500   29.28366  -39.6875
'
cylinder  446  0.55499   49.2125  -29.28366
cylinder  447  0.63500   49.2125  -29.28366
cylinder  448  0.787400  49.2125  -39.6875
cylinder  449  0.83500   49.2125  -39.6875
'
media     520     1     750
media     520     1     751
media     520     1     752
media     520     1     753
media     520     1     754
media     520     1     755
media     520     1     756
media     520     1     757
media     520     1     758
media     521     1     760    -750
media     521     1     761    -751    -760
media     521     1     762    -752    -761
media     521     1     763    -753    -762
media     521     1     764    -754    -763
media     521     1     765    -755    -764
media     521     1     766    -756    -765
media     521     1     767    -757    -766
media     521     1     768    -758    -767
media     60      1     452    -768
media     25      1     453    -452
media     2      1     454    -453
media     25      1     455    -453
media     2      1     456   -455    -454

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media      60      1      446     -768
media      60      1      447     -446     -452
media      25      1      448     -447     -455
media      2      1      449     -448     -456
boundary   449
' end unit 750
'
' Target site B-4 (shrouded Al dummy)
unit 460
cylinder   460  0.24765   25.4    -25.4
cylinder   461  0.31623   25.4    -25.4
cylinder   462  0.47625   49.2125  -39.6875
cylinder   463  0.755015  40.3225  -25.40100
cylinder  1463  0.755015  49.2125  -39.6875
cylinder   464  0.83058   40.3225  -25.40100
cylinder   465  0.83500   49.2125  -39.6875
media      512      1      460
media      511      1      461     -460
media      25      1      462     -461
media      25      1      464     -463
media      2      1      1463     -462
media      2      1      465     -1463     -464
boundary   465
' end unit 460
'
' Target site B-5 (shrouded Al dummy)
unit 470
cylinder   470  0.24765   25.4    -25.4
cylinder   471  0.31623   25.4    -25.4
cylinder   472  0.47625   49.2125  -39.6875
cylinder   473  0.755015  40.3225  -25.40100
cylinder  1473  0.755015  49.2125  -39.6875
cylinder   474  0.83058   40.3225  -25.40100
cylinder   475  0.83500   49.2125  -39.6875
media      512      1      470
media      511      1      471     -470
media      25      1      472     -471
media      25      1      474     -473
media      2      1      1473     -472
media      2      1      475     -1473     -474
boundary   475
' end unit 470
'
' Target site C-1 (shrouded Al dummy)
unit 480
cylinder   480  0.24765   25.4    -25.4
cylinder   481  0.31623   25.4    -25.4
cylinder   482  0.47625   49.2125  -39.6875
cylinder   483  0.755015  40.3225  -25.40100
cylinder  1483  0.755015  49.2125  -39.6875
cylinder   484  0.83058   40.3225  -25.40100
cylinder   485  0.83500   49.2125  -39.6875
media      512      1      480
media      511      1      481     -480
media      25      1      482     -481
media      25      1      484     -483
media      2      1      1483     -482
media      2      1      485     -1483     -484
boundary   485
' end unit 480
'
' Target site C-2 (solid Al dummy)
unit 490
cylinder   492  0.47625   49.2125  -39.6875
cylinder   494  0.83058   40.3225  -25.40100
cylinder   495  0.83500   49.2125  -39.6875
media      530      1      492
media      530      1      494     -492
media      2      1      495     -492     -494
boundary   495
' end unit 490
'
' Target site C-3 (shrouded Al dummy)
unit 510
cylinder   510  0.24765   25.4    -25.4
cylinder   511  0.31623   25.4    -25.4
cylinder   512  0.47625   49.2125  -39.6875
cylinder   513  0.755015  40.3225  -25.40100
cylinder  1513  0.755015  49.2125  -39.6875
cylinder   514  0.83058   40.3225  -25.40100
cylinder   515  0.83500   49.2125  -39.6875

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media      512      1      510
media      511      1      511     -510
media      25       1      512     -511
media      25       1      514     -513
media      2       1     1513     -512
media      2       1      515     -1513     -514
boundary    515
' end unit 510
'
' Target site C-4 (shrouded Al dummy)
unit 520
cylinder   520  0.24765   25.4     -25.4
cylinder   521  0.31623   25.4     -25.4
cylinder   522  0.47625   49.2125   -39.6875
cylinder   523  0.755015  40.3225   -25.40100
cylinder   1523 0.755015  49.2125   -39.6875
cylinder   524  0.83058   40.3225   -25.40100
cylinder   525  0.83500   49.2125   -39.6875
media      512      1      520
media      511      1      521     -520
media      25       1      522     -521
media      25       1      524     -523
media      2       1     1523     -522
media      2       1      525     -1523     -524
boundary    525
' end unit 520
'
' Target site C-5 (solid Al dummy)
unit 530
cylinder   532  0.47625   49.2125   -39.6875
cylinder   534  0.83058   40.3225   -25.40100
cylinder   535  0.83500   49.2125   -39.6875
media      530      1      532
media      530      1      534     -532
media      2       1      535     -532     -534
boundary    535
' end unit 530
'
' Target site C-6 JP-26 (solid SST-304)
' Jp-26 & Jp-27 solid SST targets in Al holders , (dimensions communication w/ Randy Hobbs 8/9/2004)
unit 540
cylinder   542  0.635     25.4     -25.4
cylinder   1542 0.635     49.2125   -39.6875
cylinder   543  0.75565   40.3225   -25.40100
cylinder   1543 0.75565   49.2125   -39.6875
cylinder   544  0.83058   40.3225   -25.40100
cylinder   545  0.83500   49.2125   -39.6875
media      535      1      542
media      25       1     1542     -542
media      25       1      544     -543
media      2       1     1543     -1542
media      2       1      545     -1543     -544
boundary    545
' end unit 540
'
' Target site D-2 (shrouded Al dummy)
unit 550
cylinder   550  0.24765   25.4     -25.4
cylinder   551  0.31623   25.4     -25.4
cylinder   552  0.47625   49.2125   -39.6875
cylinder   553  0.755015  40.3225   -25.40100
cylinder   1553 0.755015  49.2125   -39.6875
cylinder   554  0.83058   40.3225   -25.40100
cylinder   555  0.83500   49.2125   -39.6875
media      512      1      550
media      511      1      551     -550
media      25       1      552     -551
media      25       1      554     -553
media      2       1     1553     -552
media      2       1      555     -1553     -554
boundary    555
' end unit 550
'
' Target site D-3 (solid Al dummy)
unit 560
cylinder   562  0.47625   49.2125   -39.6875
cylinder   564  0.83058   40.3225   -25.40100
cylinder   565  0.83500   49.2125   -39.6875
media      530      1      562
media      530      1      564     -562
media      2       1      565     -562     -564

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boundary      565
' end unit 560
'
'     Target site D-4  (solid Al dummy)
unit 570
cylinder    572  0.47625   49.2125    0.100
cylinder    578  0.47625   -0.100   -39.6875
cylinder    579  0.47625    0.100   -0.100
cylinder    574  0.83058   40.3225   -25.40100
cylinder    575  0.83500   49.2125   -39.6875
media       530      1    572
media       530      1    578
media       530      1    579
media       530      1    574   -572   -578   -579
media       2        1    575   -572   -578   -579   -574
boundary    575
' end unit 570
'
'     Target site D-5  (shrouded Al dummy)
unit 580
cylinder    580  0.24765   25.4    -25.4
cylinder    581  0.31623   25.4    -25.4
cylinder    582  0.47625   49.2125   -39.6875
cylinder    583  0.755015  40.3225   -25.40100
cylinder   1583  0.755015  49.2125   -39.6875
cylinder    584  0.83058   40.3225   -25.40100
cylinder    585  0.83500   49.2125   -39.6875
media       512      1    580
media       511      1    581   -580
media       25       1    582   -581
media       25       1    584   -583
media       2        1   1583   -582
media       2        1    585   -1583   -584
boundary    585
' end unit 580
'
'     Target site D-6  (shrouded Al dummy)
unit 590
cylinder    590  0.24765   25.4    -25.4
cylinder    591  0.31623   25.4    -25.4
cylinder    592  0.47625   49.2125   -39.6875
cylinder    593  0.755015  40.3225   -25.40100
cylinder   1593  0.755015  49.2125   -39.6875
cylinder    594  0.83058   40.3225   -25.40100
cylinder    595  0.83500   49.2125   -39.6875
media       512      1    590
media       511      1    591   -590
media       25       1    592   -591
media       25       1    594   -593
media       2        1   1593   -592
media       2        1    595   -1593   -594
boundary    595
' end unit 590
'
'     Target site E-2  (JP-27 SST-304 targets)
' Jp-26 & Jp-27 solid SST targets in Al holders , (dimensions communication w/ Randy Hobbs 8/9/2004)
unit 610
cylinder    612  0.635    25.4    -25.4
cylinder   1612  0.635   49.2125   -39.6875
cylinder    613  0.75565  40.3225   -25.40100
cylinder   1613  0.75565  49.2125   -39.6875
cylinder    614  0.83058  40.3225   -25.40100
cylinder   1614  0.83058  49.2125   -39.6875
media       535      1    612
media       25       1   1612   -612
media       25       1    614   -613
media       2        1   1613   -1612
media       2        1    615   -1613   -614
boundary    615
' end unit 610
'
'     Target site E-3  (shrouded Al dummy)
unit 620
cylinder    620  0.24765   25.4    -25.4
cylinder    621  0.31623   25.4    -25.4
cylinder    622  0.47625   49.2125   -39.6875
cylinder    623  0.755015  40.3225   -25.40100
cylinder   1623  0.755015  49.2125   -39.6875
cylinder    624  0.83058   40.3225   -25.40100
cylinder    625  0.83500   49.2125   -39.6875
media       512      1    620

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media      511      1      621     -620
media      25       1      622     -621
media      25       1      624     -623
media      2       1      1623    -622
media      2       1      625    -1623     -624
boundary   625
' end unit 620
'
' Target site E-4 (shrouded Al dummy)
unit 630
cylinder   630  0.24765   25.4     -25.4
cylinder   631  0.31623   25.4     -25.4
cylinder   632  0.47625   49.2125   -39.6875
cylinder   633  0.755015  40.3225   -25.40100
cylinder   1633 0.755015  49.2125   -39.6875
cylinder   634  0.83058   40.3225   -25.40100
cylinder   635  0.83500   49.2125   -39.6875
media      512      1      630
media      511      1      631     -630
media      25       1      632     -631
media      25       1      634     -633
media      2       1      1633    -632
media      2       1      635    -1633     -634
boundary   635
' end unit 630
'
' Target site E-5 (solid Al dummy)
unit 640
cylinder   642  0.47625   49.2125   0.100
cylinder   648  0.47625   -0.100    -39.6875
cylinder   649  0.47625   0.100     -0.100
cylinder   644  0.83058   40.3225   -25.40100
cylinder   645  0.83500   49.2125   -39.6875
media      530      1      642
media      530      1      648
media      530      1      649
media      530      1      644     -642     -648     -649
media      2       1      645     -642     -648     -649     -644
boundary   645
' end unit 640
'
' Target site E-6 (solid Al dummy)
unit 650
cylinder   652  0.47625   49.2125   -39.6875
cylinder   654  0.83058   40.3225   -25.40100
cylinder   655  0.83500   49.2125   -39.6875
media      530      1      652
media      530      1      654     -652
media      2       1      655     -652     -654
boundary   655
' end unit 650
'
' Target site E-7 (shrouded Al dummy)
unit 660
cylinder   660  0.24765   25.4     -25.4
cylinder   661  0.31623   25.4     -25.4
cylinder   662  0.47625   49.2125   -39.6875
cylinder   663  0.755015  40.3225   -25.40100
cylinder   1663 0.755015  49.2125   -39.6875
cylinder   664  0.83058   40.3225   -25.40100
cylinder   665  0.83500   49.2125   -39.6875
media      512      1      660
media      511      1      661     -660
media      25       1      662     -661
media      25       1      664     -663
media      2       1      1663    -662
media      2       1      665    -1663     -664
boundary   665
' end unit 660
'
' Target site F-3 (shrouded Al dummy)
unit 670
cylinder   670  0.24765   25.4     -25.4
cylinder   671  0.31623   25.4     -25.4
cylinder   672  0.47625   49.2125   -39.6875
cylinder   673  0.755015  40.3225   -25.40100
cylinder   1673 0.755015  49.2125   -39.6875
cylinder   674  0.83058   40.3225   -25.40100
cylinder   675  0.83500   49.2125   -39.6875
media      512      1      670
media      511      1      671     -670

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media      25     1     672    -671
media      25     1     674    -673
media      2     1    1673    -672
media      2     1     675   -1673    -674
boundary   675
' end unit 670
'
' Target site F-4  ((shrouded Al dummy)
unit 680
cylinder   680  0.24765   25.4    -25.4
cylinder   681  0.31623   25.4    -25.4
cylinder   682  0.47625  49.2125  -39.6875
cylinder   683  0.755015  40.3225  -25.40100
cylinder  1683  0.755015  49.2125  -39.6875
cylinder   684  0.83058   40.3225  -25.40100
cylinder   685  0.83500   49.2125  -39.6875
media      512     1     680
media      511     1     681    -680
media      25     1     682    -681
media      25     1     684    -683
media      2     1    1683    -682
media      2     1     685   -1683    -684
boundary   685
' end unit 680
'
' Target site F-5  (solid Al dummy)
unit 690
cylinder   692  0.47625   49.2125  -39.6875
cylinder   694  0.83058   40.3225  -25.40100
cylinder   695  0.83500   49.2125  -39.6875
media      530     1     692
media      530     1     694    -692
media      2     1     695    -692    -694
boundary   695
' end unit 690
'
' Target site F-6  (shrouded Al dummy)
unit 710
cylinder   710  0.24765   -0.100   -25.4
cylinder   718  0.24765   25.4     0.100
cylinder   719  0.24765   0.100   -0.100
cylinder   711  0.31623   25.4    -25.4
cylinder   712  0.47625  49.2125  -39.6875
cylinder   713  0.755015  40.3225  -25.40100
cylinder  1713  0.755015  49.2125  -39.6875
cylinder   714  0.83058   40.3225  -25.40100
cylinder   715  0.83500   49.2125  -39.6875
media      512     1     710
media      512     1     718
media      512     1     719
media      511     1     711   -710    -718    -719
media      25     1     712   -711
media      25     1     714   -713
media      2     1    1713   -712
media      2     1     715   -1713   -714
boundary   715
' end unit 710
'
' Target site F-7  (shrouded Al dummy)
unit 720
cylinder   720  0.24765   25.4    -25.4
cylinder   721  0.31623   25.4    -25.4
cylinder   722  0.47625  49.2125  -39.6875
cylinder   723  0.755015  40.3225  -25.40100
cylinder  1723  0.755015  49.2125  -39.6875
cylinder   724  0.83058   40.3225  -25.40100
cylinder   725  0.83500   49.2125  -39.6875
media      512     1     720
media      511     1     721   -720
media      25     1     722   -721
media      25     1     724   -723
media      2     1    1723   -722
media      2     1     725   -1723   -724
boundary   725
' end unit 720
'
' Target site G-5  (shrouded Al dummy)
unit 730
cylinder   730  0.24765   25.4    -25.4
cylinder   731  0.31623   25.4    -25.4
cylinder   732  0.47625  49.2125  -39.6875

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cylinder    733  0.755015  40.3225   -25.40100
cylinder   1733  0.755015  49.2125   -39.6875
cylinder    734  0.83058   40.3225   -25.40100
cylinder    735  0.83500   49.2125   -39.6875
media      512     1       730
media      511     1       731   -730
media      25      1       732   -731
media      25      1       734   -733
media      2       1      1733   -732
media      2       1       735   -1733   -734
boundary   735
' end unit 730
'
' Target site G-6 (solid Al dummy)
unit 740
cylinder    740  0.24765   25.4      -25.4
cylinder    741  0.31623   25.4      -25.4
cylinder    742  0.47625   49.2125   -39.6875
cylinder    743  0.755015  40.3225   -25.40100
cylinder   1743  0.755015  49.2125   -39.6875
cylinder    744  0.83058   40.3225   -25.40100
cylinder    745  0.83500   49.2125   -39.6875
media      512     1       740
media      511     1       741   -740
media      25      1       742   -741
media      25      1       744   -743
media      2       1      1743   -742
media      2       1       745   -1743   -744
boundary   745
' end unit 740
'
'
'
' **** PTP Experimental Loading ***
'
' Target site PTP-1 (A-4)
'
unit 811
cylinder    811  0.548640  -18.469660  -25.0
cylinder    812  0.548640  -11.939320  -25.0
cylinder    813  0.548640  -5.408980  -25.0
cylinder    814  0.548640   1.121360  -25.0
cylinder    815  0.548640   7.651700  -25.0
cylinder    816  0.548640  14.182040  -25.0
cylinder    817  0.548640  20.712380  -25.0
cylinder    920  0.548640   27.861895  -25.0
cylinder    921  0.548640   27.861895  -34.60623
cylinder    922  0.7874    27.861895  -34.60623
cylinder    923  0.8890    27.861895  -31.74873
cylinder    924  0.8890    27.861895  -34.60623
media      711     1       811
media      712     1       812   -811
media      713     1       813   -812
media      714     1       814   -813
media      715     1       815   -814
media      716     1       816   -815
media      717     1       817   -816
media      25      1       920   -817
media      25      1       921   -920
media      2       1       922   -921
media      25      1       923   -922
media      2       1       924   -923   -922
boundary   924
' end unit 811
'
' Target site PTP-2 (D-1)
'
unit 821
cylinder    821  0.548640  -18.469660  -25.0
cylinder    822  0.548640  -11.939320  -25.0
cylinder    823  0.548640  -5.408980  -25.0
cylinder    824  0.548640   1.121360  -25.0
cylinder    825  0.548640   7.651700  -25.0
cylinder    826  0.548640  14.182040  -25.0
cylinder    827  0.548640  20.712380  -25.0
cylinder    940  0.548640   27.861895  -25.0
cylinder    941  0.548640   27.861895  -34.60623
cylinder    942  0.7874    27.861895  -34.60623

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cylinder 943 0.8890    27.861895 -31.74873
cylinder 944 0.8890    27.861895 -34.60623

media    721    1    821
media    722    1    822    -821
media    723    1    823    -822
media    724    1    824    -823
media    725    1    825    -824
media    726    1    826    -825
media    727    1    827    -826
media    25    1    940    -827
media    25    1    941    -940
media    2     1    942    -941
media    25    1    943    -942
media    2     1    944    -943    -942
boundary  944
' end unit 821

' Target site PTP-3 (A-1)

unit 831
cylinder 831 0.548640 -18.469660 -25.0
cylinder 832 0.548640 -11.939320 -25.0
cylinder 833 0.548640 -5.408980 -25.0
cylinder 834 0.548640  1.121360 -25.0
cylinder 835 0.548640  7.651700 -25.0
cylinder 836 0.548640 14.182040 -25.0
cylinder 837 0.548640 20.712380 -25.0

cylinder 930 0.548640  27.861895 -25.0
cylinder 931 0.548640  27.861895 -34.60623
cylinder 932 0.7874   27.861895 -34.60623
cylinder 933 0.8890   27.861895 -31.74873
cylinder 934 0.8890   27.861895 -34.60623

media    731    1    831
media    732    1    832    -831
media    733    1    833    -832
media    734    1    834    -833
media    735    1    835    -834
media    736    1    836    -835
media    737    1    837    -836
media    25    1    930    -837
media    25    1    931    -930
media    2     1    932    -931
media    25    1    933    -932
media    2     1    934    -933    -932
boundary  934
' end unit 831

' Target site PTP-4 (D-7)

unit 841
cylinder 841 0.548640 -18.469660 -25.0
cylinder 842 0.548640 -11.939320 -25.0
cylinder 843 0.548640 -5.408980 -25.0
cylinder 844 0.548640  1.121360 -25.0
cylinder 845 0.548640  7.651700 -25.0
cylinder 846 0.548640 14.182040 -25.0
cylinder 847 0.548640 20.712380 -25.0

cylinder 910 0.548640  27.861895 -25.0
cylinder 911 0.548640  27.861895 -34.60623
cylinder 912 0.7874   27.861895 -34.60623
cylinder 913 0.8890   27.861895 -31.74873
cylinder 914 0.8890   27.861895 -34.60623

media    741    1    841
media    742    1    842    -841
media    743    1    843    -842
media    744    1    844    -843
media    745    1    845    -844
media    746    1    846    -845
media    747    1    847    -846
media    25    1    910    -847
media    25    1    911    -910
media    2     1    912    -911
media    25    1    913    -912
media    2     1    914    -913    -912
boundary  914
' end unit 841

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' Target site PTP-5 (G-7)

unit 851
cylinder 851 0.548640 -18.469660 -25.0
cylinder 852 0.548640 -11.939320 -25.0
cylinder 853 0.548640 -5.408980 -25.0
cylinder 854 0.548640 1.121360 -25.0
cylinder 855 0.548640 7.651700 -25.0
cylinder 856 0.548640 14.182040 -25.0
cylinder 857 0.548640 20.712380 -25.0

cylinder 900 0.548640 27.861895 -25.0
cylinder 901 0.548640 27.861895 -34.60623
cylinder 902 0.7874 27.861895 -34.60623
cylinder 903 0.8890 27.861895 -31.74873
cylinder 904 0.8890 27.861895 -34.60623

media 751 1 851
media 752 1 852 -851
media 753 1 853 -852
media 754 1 854 -853
media 755 1 855 -854
media 756 1 856 -855
media 757 1 857 -856
media 25 1 900 -857
media 25 1 901 -900
media 2 1 902 -901
media 25 1 903 -902
media 2 1 904 -903 -902
boundary 904

end unit 851

Target site PTP-6 (G-4 Al dummy )

unit 861
cylinder 861 0.548640 -18.469660 -25.0
cylinder 862 0.548640 -11.939320 -25.0
cylinder 863 0.548640 -5.408980 -25.0
cylinder 864 0.548640 1.121360 -25.0
cylinder 865 0.548640 7.651700 -25.0
cylinder 866 0.548640 14.182040 -25.0
cylinder 867 0.548640 20.712380 -25.0

cylinder 950 0.548640 27.861895 -25.0
cylinder 951 0.548640 27.861895 -34.60623
cylinder 952 0.7874 27.861895 -34.60623
cylinder 953 0.8890 27.861895 -31.74873
cylinder 954 0.8890 27.861895 -34.60623

media 761 1 861
media 762 1 862 -861
media 763 1 863 -862
media 764 1 864 -863
media 765 1 865 -864
media 766 1 866 -865
media 767 1 867 -866
media 25 1 950 -867
media 25 1 951 -950
media 2 1 952 -951
media 25 1 953 -952
media 2 1 954 -953 -952
boundary 954

end unit 861

Target basket and water above and below target area

unit 800
cylinder 800 5.71500 49.2125 -39.6875
hole 410 origin x=-4.388400 y=-0.844550
hole 420 origin x=-4.388400 y=0.844550
hole 430 origin x=-2.925600 y=-3.378200
hole 440 origin x=-2.925600 y=-1.689100
hole 750 origin x=-2.925600 y=0.000000
hole 460 origin x=-2.925600 y=1.689100
hole 470 origin x=-2.925600 y=3.378200
hole 480 origin x=-1.462800 y=-4.222750
hole 490 origin x=-1.462800 y=-2.533650
hole 510 origin x=-1.462800 y=-0.844550
hole 520 origin x=-1.462800 y=0.844550
hole 530 origin x=-1.462800 y=2.533650

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hole      540  origin x=-1.462800  y=4.222750
hole      550  origin x=0.000000  y=-3.378200
hole      560  origin x=0.000000  y=-1.689100
hole      570  origin x=0.000000  y=0.000000
hole      580  origin x=0.000000  y=1.689100
hole      590  origin x=0.000000  y=3.378200
hole      610  origin x=1.462800  y=-4.222750
hole      620  origin x=1.462800  y=-2.533650
hole      630  origin x=1.462800  y=-0.844550
hole      640  origin x=1.462800  y=0.844550
hole      650  origin x=1.462800  y=2.533650
hole      660  origin x=1.462800  y=4.222750
hole      670  origin x=2.925600  y=-3.378200
hole      680  origin x=2.925600  y=-1.689100
hole      690  origin x=2.925600  y=0.000000
hole      710  origin x=2.925600  y=1.689100
hole      720  origin x=2.925600  y=3.378200
hole      730  origin x=4.388400  y=-0.844550
hole      740  origin x=4.388400  y=0.844550

cylinder   926  0.92964   49.2125   -39.6875  origin x=-4.661173  y=2.691130
cylinder   927  1.00076   49.2125   -39.6875  origin x=-4.661173  y=2.691130
cylinder   946  0.92964   49.2125   -39.6875  origin x=0.000000  y=-5.382260
cylinder   947  1.00076   49.2125   -39.6875  origin x=0.000000  y=-5.382260
cylinder   936  0.92964   49.2125   -39.6875  origin x=-4.661173  y=-2.691130
cylinder   937  1.00076   49.2125   -39.6875  origin x=-4.661173  y=-2.691130
cylinder   916  0.92964   49.2125   -39.6875  origin x=0.000000  y=5.382260
cylinder   917  1.00076   49.2125   -39.6875  origin x=0.000000  y=5.382260
cylinder   906  0.92964   49.2125   -39.6875  origin x=4.661173  y=2.691130
cylinder   907  1.00076   49.2125   -39.6875  origin x=4.661173  y=2.691130
cylinder   956  0.92964   49.2125   -39.6875  origin x=4.661173  y=-2.691130
cylinder   957  1.00076   49.2125   -39.6875  origin x=4.661173  y=-2.691130

cylinder   804  5.87375   49.2125   -39.6875

hole       811  origin x=-4.661173  y=2.691130
hole       821  origin x=0.000000  y=-5.382260
hole       831  origin x=-4.661173  y=-2.691130
hole       841  origin x=0.000000  y=5.382260
hole       851  origin x=4.661173  y=2.691130
hole       861  origin x=4.661173  y=-2.691130

cylinder   805  6.4350    49.2125   -39.6875
cylinder   1001  6.4350    149.99   -39.6875
cylinder   1002  6.4350    149.99   -149.9899
cylinder   2000  6.8830    149.99   -149.9899

media      2     1     800    -907    -917    -927    -937    -947    -957
media      25    1     804    -800    -907    -917    -927    -937    -947    -957
media      25    1     804    907    -906
media      25    1     804    917    -916
media      25    1     804    927    -926
media      25    1     804    937    -936
media      25    1     804    947    -946
media      25    1     804    957    -956

media      2     1     804    906
media      2     1     804    916
media      2     1     804    926
media      2     1     804    936
media      2     1     804    946
media      2     1     804    956
media      2     1     805   -804
media      3     1     1001   -805
media      1     1     1002   -1001
media     20     1     2000   -1002
boundary   2000
end unit 800

-----
Region II
-----
INNER FUEL ELEMENT REGION
-----

' The inner fuel element (IFE) consists of 171 fuel plates arranged in an involutes shape. Each plate contains 15.18g +-1% of U-235
' The IFE fueled area is modeled by Homogenizing the Uranium, Aluminum and water, in 8 radial fueled regions that reflect the

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' different U-235 concentrations in each fuel plate. The IFE is divided into 56 cells, 8 radial fueled regions and 7 axial
fueled layers
'
' -----
'      IFE Cell Cards
' -----
'
unit 2000
cylinder 2000 6.88302 149.9901 -149.9901
hole     800
media    20      1    2000
'
'      inner unfuelled region
cylinder 2100 7.14      25.4      -25.4
media    200      1    2100    -2000
'
'      Top - Axial Layer 1 (25.4 - 25.0 cm)
cylinder 2101 7.5       25.4       25.0
cylinder 2102 8.0       25.4       25.0
cylinder 2103 8.5       25.4       25.0
cylinder 2104 9.5       25.4       25.0
cylinder 2105 10.5      25.4       25.0
cylinder 2106 11.5      25.4       25.0
cylinder 2107 12.0      25.4       25.0
cylinder 2108 12.60     25.4       25.0
media    211      1    2101    -2100
media    212      1    2102    -2101
media    213      1    2103    -2102
media    214      1    2104    -2103
media    215      1    2105    -2104
media    216      1    2106    -2105
media    217      1    2107    -2106
media    218      1    2108    -2107
'
'      Top - Axial Layer 2 (25.0 - 22.0 cm)
cylinder 2111 7.5       25.4       22.0
cylinder 2112 8.0       25.4       22.0
cylinder 2113 8.5       25.4       22.0
cylinder 2114 9.5       25.4       22.0
cylinder 2115 10.5      25.4       22.0
cylinder 2116 11.5      25.4       22.0
cylinder 2117 12.0      25.4       22.0
cylinder 2118 12.60     25.4       22.0
media    221      1    2111    -2100
media    222      1    2112    -2111
media    223      1    2113    -2112
media    224      1    2114    -2113
media    225      1    2115    -2114
media    226      1    2116    -2115
media    227      1    2117    -2116
media    228      1    2118    -2117
'
'      Top - Axial Layer 3 (22.0 - 19.0 cm)
cylinder 2121 7.5       25.4       19.0
cylinder 2122 8.0       25.4       19.0
cylinder 2123 8.5       25.4       19.0
cylinder 2124 9.5       25.4       19.0
cylinder 2125 10.5      25.4       19.0
cylinder 2126 11.5      25.4       19.0
cylinder 2127 12.0      25.4       19.0
cylinder 2128 12.60     25.4       19.0
media    231      1    2121    -2100
media    232      1    2122    -2121
media    233      1    2123    -2122
media    234      1    2124    -2123
media    235      1    2125    -2124
media    236      1    2126    -2125
media    237      1    2127    -2126
media    238      1    2128    -2127
'
'      Top - Axial Layer 4 (19.0 - 16.0 cm)
cylinder 2131 7.5       25.4       16.0
cylinder 2132 8.0       25.4       16.0
cylinder 2133 8.5       25.4       16.0
cylinder 2134 9.5       25.4       16.0
cylinder 2135 10.5      25.4       16.0
cylinder 2136 11.5      25.4       16.0
cylinder 2137 12.0      25.4       16.0
cylinder 2138 12.60     25.4       16.0
media    241      1    2131    -2100
media    242      1    2132    -2131

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media      243      1    2133   -2132   -2128
media      244      1    2134   -2133   -2128
media      245      1    2135   -2134   -2128
media      246      1    2136   -2135   -2128
media      247      1    2137   -2136   -2128
media      248      1    2138   -2137   -2128
'
'   Top - Axial Layer 5 (16.0 - 13.0 cm)
cylinder  2141    7.5    25.4    13.0
cylinder  2142    8.0    25.4    13.0
cylinder  2143    8.5    25.4    13.0
cylinder  2144    9.5    25.4    13.0
cylinder  2145   10.5    25.4    13.0
cylinder  2146   11.5    25.4    13.0
cylinder  2147   12.0    25.4    13.0
cylinder  2148  12.60    25.4    13.0
media     251      1    2141   -2100   -2138
media     252      1    2142   -2141   -2138
media     253      1    2143   -2142   -2138
media     254      1    2144   -2143   -2138
media     255      1    2145   -2144   -2138
media     256      1    2146   -2145   -2138
media     257      1    2147   -2146   -2138
media     258      1    2148   -2147   -2138
'
'   Top - Axial Layer 6 (13.0 - 10.0 cm)
cylinder  2151    7.5    25.4    10.0
cylinder  2152    8.0    25.4    10.0
cylinder  2153    8.5    25.4    10.0
cylinder  2154    9.5    25.4    10.0
cylinder  2155   10.5    25.4    10.0
cylinder  2156   11.5    25.4    10.0
cylinder  2157   12.0    25.4    10.0
cylinder  2158  12.60    25.4    10.0
media     261      1    2151   -2100   -2148
media     262      1    2152   -2151   -2148
media     263      1    2153   -2152   -2148
media     264      1    2154   -2153   -2148
media     265      1    2155   -2154   -2148
media     266      1    2156   -2155   -2148
media     267      1    2157   -2156   -2148
media     268      1    2158   -2157   -2148
'
'   Top - Axial Layer 7 (10.0 - 7.0 cm)
cylinder  2161    7.5    25.4    7.0
cylinder  2162    8.0    25.4    7.0
cylinder  2163    8.5    25.4    7.0
cylinder  2164    9.5    25.4    7.0
cylinder  2165   10.5    25.4    7.0
cylinder  2166   11.5    25.4    7.0
cylinder  2167   12.0    25.4    7.0
cylinder  2168  12.60    25.4    7.0
media     271      1    2161   -2100   -2158
media     272      1    2162   -2161   -2158
media     273      1    2163   -2162   -2158
media     274      1    2164   -2163   -2158
media     275      1    2165   -2164   -2158
media     276      1    2166   -2165   -2158
media     277      1    2167   -2166   -2158
media     278      1    2168   -2167   -2158
'
'   Top - Axial Layer 8 (7.0 - 4.0 cm)
cylinder  2171    7.5    25.4    4.0
cylinder  2172    8.0    25.4    4.0
cylinder  2173    8.5    25.4    4.0
cylinder  2174    9.5    25.4    4.0
cylinder  2175   10.5    25.4    4.0
cylinder  2176   11.5    25.4    4.0
cylinder  2177   12.0    25.4    4.0
cylinder  2178  12.60    25.4    4.0
media     281      1    2171   -2100   -2168
media     282      1    2172   -2171   -2168
media     283      1    2173   -2172   -2168
media     284      1    2174   -2173   -2168
media     285      1    2175   -2174   -2168
media     286      1    2176   -2175   -2168
media     287      1    2177   -2176   -2168
media     288      1    2178   -2177   -2168
'
'   Top - Axial Layer 9 (4.0 - 1.0 cm)
cylinder  2181    7.5    25.4    1.0

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cylinder	2182	8.0	25.4	1.0
cylinder	2183	8.5	25.4	1.0
cylinder	2184	9.5	25.4	1.0
cylinder	2185	10.5	25.4	1.0
cylinder	2186	11.5	25.4	1.0
cylinder	2187	12.0	25.4	1.0
cylinder	2188	12.60	25.4	1.0
media	291	1	2181	-2100
media	292	1	2182	-2181
media	293	1	2183	-2182
media	294	1	2184	-2183
media	295	1	2185	-2184
media	296	1	2186	-2185
media	297	1	2187	-2186
media	298	1	2188	-2187
Top - Axial Layer 10 (+1.0 - -1.0 cm)				
cylinder	2191	7.5	25.4	-1.0
cylinder	2192	8.0	25.4	-1.0
cylinder	2193	8.5	25.4	-1.0
cylinder	2194	9.5	25.4	-1.0
cylinder	2195	10.5	25.4	-1.0
cylinder	2196	11.5	25.4	-1.0
cylinder	2197	12.0	25.4	-1.0
cylinder	2198	12.60	25.4	-1.0
media	201	1	2191	-2100
media	202	1	2192	-2191
media	203	1	2193	-2192
media	204	1	2194	-2193
media	205	1	2195	-2194
media	206	1	2196	-2195
media	207	1	2197	-2196
media	208	1	2198	-2197
Top - Axial Layer 11 (-1.0 - -4.0 cm)				
cylinder	2201	7.5	25.4	-4.0
cylinder	2202	8.0	25.4	-4.0
cylinder	2203	8.5	25.4	-4.0
cylinder	2204	9.5	25.4	-4.0
cylinder	2205	10.5	25.4	-4.0
cylinder	2206	11.5	25.4	-4.0
cylinder	2207	12.0	25.4	-4.0
cylinder	2208	12.60	25.4	-4.0
media	291	1	2201	-2100
media	292	1	2202	-2201
media	293	1	2203	-2202
media	294	1	2204	-2203
media	295	1	2205	-2204
media	296	1	2206	-2205
media	297	1	2207	-2206
media	298	1	2208	-2207
Top - Axial Layer 12 (-4.0 - 7.0 cm)				
cylinder	2211	7.5	25.4	-7.0
cylinder	2212	8.0	25.4	-7.0
cylinder	2213	8.5	25.4	-7.0
cylinder	2214	9.5	25.4	-7.0
cylinder	2215	10.5	25.4	-7.0
cylinder	2216	11.5	25.4	-7.0
cylinder	2217	12.0	25.4	-7.0
cylinder	2218	12.60	25.4	-7.0
media	281	1	2211	-2100
media	282	1	2212	-2211
media	283	1	2213	-2212
media	284	1	2214	-2213
media	285	1	2215	-2214
media	286	1	2216	-2215
media	287	1	2217	-2216
media	288	1	2218	-2217
Top - Axial Layer 13 (-7.0 - -10.0 cm)				
cylinder	2221	7.5	25.4	-10.0
cylinder	2222	8.0	25.4	-10.0
cylinder	2223	8.5	25.4	-10.0
cylinder	2224	9.5	25.4	-10.0
cylinder	2225	10.5	25.4	-10.0
cylinder	2226	11.5	25.4	-10.0
cylinder	2227	12.0	25.4	-10.0
cylinder	2228	12.60	25.4	-10.0
media	271	1	2221	-2100
media	272	1	2222	-2221

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media      273      1    2223   -2222   -2218
media      274      1    2224   -2223   -2218
media      275      1    2225   -2224   -2218
media      276      1    2226   -2225   -2218
media      277      1    2227   -2226   -2218
media      278      1    2228   -2227   -2218
'
'   Top - Axial Layer 14  (-10.0  -  -13.0 cm)
cylinder  2231  7.5    25.4   -13.0
cylinder  2232  8.0    25.4   -13.0
cylinder  2233  8.5    25.4   -13.0
cylinder  2234  9.5    25.4   -13.0
cylinder  2235 10.5    25.4   -13.0
cylinder  2236 11.5    25.4   -13.0
cylinder  2237 12.0    25.4   -13.0
cylinder  2238 12.60   25.4   -13.0
media     261      1    2231   -2100   -2228
media     262      1    2232   -2231   -2228
media     263      1    2233   -2232   -2228
media     264      1    2234   -2233   -2228
media     265      1    2235   -2234   -2228
media     266      1    2236   -2235   -2228
media     267      1    2237   -2236   -2228
media     268      1    2238   -2237   -2228
'
'   Top - Axial Layer 15  (-13.0  -  -16.0 cm)
cylinder  2241  7.5    25.4   -16.0
cylinder  2242  8.0    25.4   -16.0
cylinder  2243  8.5    25.4   -16.0
cylinder  2244  9.5    25.4   -16.0
cylinder  2245 10.5    25.4   -16.0
cylinder  2246 11.5    25.4   -16.0
cylinder  2247 12.0    25.4   -16.0
cylinder  2248 12.60   25.4   -16.0
media     251      1    2241   -2100   -2238
media     252      1    2242   -2241   -2238
media     253      1    2243   -2242   -2238
media     254      1    2244   -2243   -2238
media     255      1    2245   -2244   -2238
media     256      1    2246   -2245   -2238
media     257      1    2247   -2246   -2238
media     258      1    2248   -2247   -2238
'
'   Top - Axial Layer 16  (-16.0  -  -19.0 cm)
cylinder  2251  7.5    25.4   -19.0
cylinder  2252  8.0    25.4   -19.0
cylinder  2253  8.5    25.4   -19.0
cylinder  2254  9.5    25.4   -19.0
cylinder  2255 10.5    25.4   -19.0
cylinder  2256 11.5    25.4   -19.0
cylinder  2257 12.0    25.4   -19.0
cylinder  2258 12.60   25.4   -19.0
media     241      1    2251   -2100   -2248
media     242      1    2252   -2251   -2248
media     243      1    2253   -2252   -2248
media     244      1    2254   -2253   -2248
media     245      1    2255   -2254   -2248
media     246      1    2256   -2255   -2248
media     247      1    2257   -2256   -2248
media     248      1    2258   -2257   -2248
'
'   Top - Axial Layer 17  (-19.0  -  -22.0 cm)
cylinder  2261  7.5    25.4   -22.0
cylinder  2262  8.0    25.4   -22.0
cylinder  2263  8.5    25.4   -22.0
cylinder  2264  9.5    25.4   -22.0
cylinder  2265 10.5    25.4   -22.0
cylinder  2266 11.5    25.4   -22.0
cylinder  2267 12.0    25.4   -22.0
cylinder  2268 12.60   25.4   -22.0
media     231      1    2261   -2100   -2258
media     232      1    2262   -2261   -2258
media     233      1    2263   -2262   -2258
media     234      1    2264   -2263   -2258
media     235      1    2265   -2264   -2258
media     236      1    2266   -2265   -2258
media     237      1    2267   -2266   -2258
media     238      1    2268   -2267   -2258
'
'   Top - Axial Layer 18  (-22.0  -  -25.0 cm)
cylinder  2271  7.5    25.4   -25.0

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cylinder 2272 8.0      25.4      -25.0
cylinder 2273 8.5      25.4      -25.0
cylinder 2274 9.5      25.4      -25.0
cylinder 2275 10.5     25.4      -25.0
cylinder 2276 11.5     25.4      -25.0
cylinder 2277 12.0      25.4      -25.0
cylinder 2278 12.60     25.4      -25.0
media    221   1      2271  -2100  -2268
media    222   1      2272  -2271  -2268
media    223   1      2273  -2272  -2268
media    224   1      2274  -2273  -2268
media    225   1      2275  -2274  -2268
media    226   1      2276  -2275  -2268
media    227   1      2277  -2276  -2268
media    228   1      2278  -2277  -2268
'      Top - Axial Layer 19 (-25.0 - -25.4 cm)
cylinder 2281 7.5      25.4      -25.4
cylinder 2282 8.0      25.4      -25.4
cylinder 2283 8.5      25.4      -25.4
cylinder 2284 9.5      25.4      -25.4
cylinder 2285 10.5     25.4      -25.4
cylinder 2286 11.5     25.4      -25.4
cylinder 2287 12.0      25.4      -25.4
cylinder 2288 12.60     25.4      -25.4
media    211   1      2281  -2100  -2278
media    212   1      2282  -2281  -2278
media    213   1      2283  -2282  -2278
media    214   1      2284  -2283  -2278
media    215   1      2285  -2284  -2278
media    216   1      2286  -2285  -2278
media    217   1      2287  -2286  -2278
media    218   1      2288  -2287  -2278
'      inner unfuelled region
cylinder 2199 12.82700   25.4      -25.4
media    200   1      2199  -2288
'      IFE unfuelled - upper region
cylinder 2600 12.82700   30.48     -25.4
media    70    1      2600  -2199  -2000
'      water above IFE upper region
cylinder 2601 12.82700   149.9902   -25.4
media    3     1      2601  -2600  -2000
'      IFE unfuelled - lower region
cylinder 2602 12.82700   149.9902   -30.48
media    71    1      2602  -2601  -2000
'      water below IFE upper region
cylinder 2603 12.82700   149.9902  -149.9902
media    1     1      2603  -2602  -2000
'      IFE outer sidewall
cylinder 2200 13.44930   25.4      -25.4
media    20    1      2200  -2603
'      water between fuel elements--active fuel region
cylinder 2624 14.28740   25.4      -25.4
media    2     1      2624  -2200
'      IFE outer sidewall lower extension
cylinder 2620 14.28740   25.4      -37.1475
media    20    1      2620  -2603  -2624
'      water below IFE outer sidewall lower extension
cylinder 2622 14.28740   25.4      -149.9902
media    1     1      2622  -2603  -2620
'      IFE outer sidewall upper extension
cylinder 2630 14.28740   41.91     -149.9902
media    20    1      2630  -2603  -2622
'      water above IFE outer sidewall outer extension
cylinder 2632 14.28740   149.9902  -149.9902
media    3     1      2632  -2603  -2630
boundary 2632
'      end unit 2000
'
'
'
----- Region III -----
'      OUTER FUEL ELEMENT (OFE)
-----
'      The outer fuel element is region-3

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' The outer fuel element (OFE) consists of 369 fuel plates arranged in an involutes shape. Each plate contains 18.44g +-1%
of U-235
' The IFE fueled area is modeled by by Homogenizing the Uranium, Aluminum and water, in 9 radial fueled regions that
reflect the
' different U-235 concentrations in each fuel plate. The OFE is divided into 63 cells, 9 radial fueled regions and 7 axial
fueled layers
'
'
-----  

' OEF Cell Cards  

-----  

'
unit 2300
cylinder 2632 14.28750 149.9902 -149.9902
hole 2000
media 1 1 2632
'
' OFE inner sidewall
cylinder 2300 14.91869 25.4 -25.4
media 20 1 2300 -2632
'
' OFE inner sidewall lower extension
cylinder 2621 14.91869 25.4 -37.1475
media 20 1 2621 -2300 -2632
'
' water below OFE inner sidewall lower extension
cylinder 2623 14.91869 25.4 -149.9902
media 1 1 2623 -2621 -2632
'
' OFE inner sidewall upper extension
cylinder 2631 14.91869 41.91 -149.9902
media 20 1 2631 -2623 -2632
'
' water below OFE inner sidewall lower extension
cylinder 2633 14.91869 149.9902 -149.9902
media 3 1 2633 -2631 -2632
'
' outer unfueled region
cylinder 2400 15.12951 25.4 -25.4
media 200 1 2400 -2300
'
' Top - Axial Layer 1 (25.4 - 25.0 cm)
cylinder 2401 15.5 25.4 25.0
cylinder 2402 16.0 25.4 25.0
cylinder 2403 16.5 25.4 25.0
cylinder 2404 17.5 25.4 25.0
cylinder 2405 18.5 25.4 25.0
cylinder 2406 19.5 25.4 25.0
cylinder 2407 20.0 25.4 25.0
cylinder 2408 20.5 25.4 25.0
cylinder 2409 20.978 25.4 25.0
media 311 1 2401 -2400
media 312 1 2402 -2401
media 313 1 2403 -2402
media 314 1 2404 -2403
media 315 1 2405 -2404
media 316 1 2406 -2405
media 317 1 2407 -2406
media 318 1 2408 -2407
media 319 1 2409 -2408
'
' Top - Axial Layer 2 (25.0 - 22.0 cm)
cylinder 2411 15.5 25.4 22.0
cylinder 2412 16.0 25.4 22.0
cylinder 2413 16.5 25.4 22.0
cylinder 2414 17.5 25.4 22.0
cylinder 2415 18.5 25.4 22.0
cylinder 2416 19.5 25.4 22.0
cylinder 2417 20.0 25.4 22.0
cylinder 2418 20.5 25.4 22.0
cylinder 2419 20.978 25.4 22.0
media 321 1 2411 -2400 -2409
media 322 1 2412 -2411 -2409
media 323 1 2413 -2412 -2409
media 324 1 2414 -2413 -2409
media 325 1 2415 -2414 -2409
media 326 1 2416 -2415 -2409
media 327 1 2417 -2416 -2409
media 328 1 2418 -2417 -2409
media 329 1 2419 -2418 -2409

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'   Top - Axial Layer 3    (22.0 - 19.0 cm)
cylinder 2421 15.5      25.4      19.0
cylinder 2422 16.0      25.4      19.0
cylinder 2423 16.5      25.4      19.0
cylinder 2424 17.5      25.4      19.0
cylinder 2425 18.5      25.4      19.0
cylinder 2426 19.5      25.4      19.0
cylinder 2427 20.0      25.4      19.0
cylinder 2428 20.5      25.4      19.0
cylinder 2429 20.978     25.4      19.0
media    331   1   2421  -2400  -2419
media    332   1   2422  -2421  -2419
media    333   1   2423  -2422  -2419
media    334   1   2424  -2423  -2419
media    335   1   2425  -2424  -2419
media    336   1   2426  -2425  -2419
media    337   1   2427  -2426  -2419
media    338   1   2428  -2427  -2419
media    339   1   2429  -2428  -2419

'   Top - Axial Layer 4    (19.0 - 16.0 cm)
cylinder 2431 15.5      25.4      16.0
cylinder 2432 16.0      25.4      16.0
cylinder 2433 16.5      25.4      16.0
cylinder 2434 17.5      25.4      16.0
cylinder 2435 18.5      25.4      16.0
cylinder 2436 19.5      25.4      16.0
cylinder 2437 20.0      25.4      16.0
cylinder 2438 20.5      25.4      16.0
cylinder 2439 20.978     25.4      16.0
media    341   1   2431  -2400  -2429
media    342   1   2432  -2431  -2429
media    343   1   2433  -2432  -2429
media    344   1   2434  -2433  -2429
media    345   1   2435  -2434  -2429
media    346   1   2436  -2435  -2429
media    347   1   2437  -2436  -2429
media    348   1   2438  -2437  -2429
media    349   1   2439  -2438  -2429

'   Top - Axial Layer 5    (16.0 - 13.0 cm)
cylinder 2441 15.5      25.4      13.0
cylinder 2442 16.0      25.4      13.0
cylinder 2443 16.5      25.4      13.0
cylinder 2444 17.5      25.4      13.0
cylinder 2445 18.5      25.4      13.0
cylinder 2446 19.5      25.4      13.0
cylinder 2447 20.0      25.4      13.0
cylinder 2448 20.5      25.4      13.0
cylinder 2449 20.978     25.4      13.0
media    351   1   2441  -2400  -2439
media    352   1   2442  -2441  -2439
media    353   1   2443  -2442  -2439
media    354   1   2444  -2443  -2439
media    355   1   2445  -2444  -2439
media    356   1   2446  -2445  -2439
media    357   1   2447  -2446  -2439
media    358   1   2448  -2447  -2439
media    359   1   2449  -2448  -2439

'   Top - Axial Layer 6    (13.0 - 10.0 cm)
cylinder 2451 15.5      25.4      10.0
cylinder 2452 16.0      25.4      10.0
cylinder 2453 16.5      25.4      10.0
cylinder 2454 17.5      25.4      10.0
cylinder 2455 18.5      25.4      10.0
cylinder 2456 19.5      25.4      10.0
cylinder 2457 20.0      25.4      10.0
cylinder 2458 20.5      25.4      10.0
cylinder 2459 20.978     25.4      10.0
media    361   1   2451  -2400  -2449
media    362   1   2452  -2451  -2449
media    363   1   2453  -2452  -2449
media    364   1   2454  -2453  -2449
media    365   1   2455  -2454  -2449
media    366   1   2456  -2455  -2449
media    367   1   2457  -2456  -2449
media    368   1   2458  -2457  -2449
media    369   1   2459  -2458  -2449

```

```

'   Top - Axial Layer 7    (10.0 - 7.0 cm)
cylinder 2461 15.5      25.4      7.0
cylinder 2462 16.0      25.4      7.0
cylinder 2463 16.5      25.4      7.0
cylinder 2464 17.5      25.4      7.0
cylinder 2465 18.5      25.4      7.0
cylinder 2466 19.5      25.4      7.0
cylinder 2467 20.0      25.4      7.0
cylinder 2468 20.5      25.4      7.0
cylinder 2469 20.978     25.4      7.0
media    371   1   2461  -2400  -2459
media    372   1   2462  -2461  -2459
media    373   1   2463  -2462  -2459
media    374   1   2464  -2463  -2459
media    375   1   2465  -2464  -2459
media    376   1   2466  -2465  -2459
media    377   1   2467  -2466  -2459
media    378   1   2468  -2467  -2459
media    379   1   2469  -2468  -2459
'
'   Top - Axial Layer 8    (7.0 - 4.0 cm)
cylinder 2471 15.5      25.4      4.0
cylinder 2472 16.0      25.4      4.0
cylinder 2473 16.5      25.4      4.0
cylinder 2474 17.5      25.4      4.0
cylinder 2475 18.5      25.4      4.0
cylinder 2476 19.5      25.4      4.0
cylinder 2477 20.0      25.4      4.0
cylinder 2478 20.5      25.4      4.0
cylinder 2479 20.978     25.4      4.0
media    381   1   2471  -2400  -2469
media    382   1   2472  -2471  -2469
media    383   1   2473  -2472  -2469
media    384   1   2474  -2473  -2469
media    385   1   2475  -2474  -2469
media    386   1   2476  -2475  -2469
media    387   1   2477  -2476  -2469
media    388   1   2478  -2477  -2469
media    389   1   2479  -2478  -2469
'
'   Top - Axial Layer 9    (4.0 - 1.0 cm)
cylinder 2481 15.5      25.4      1.0
cylinder 2482 16.0      25.4      1.0
cylinder 2483 16.5      25.4      1.0
cylinder 2484 17.5      25.4      1.0
cylinder 2485 18.5      25.4      1.0
cylinder 2486 19.5      25.4      1.0
cylinder 2487 20.0      25.4      1.0
cylinder 2488 20.5      25.4      1.0
cylinder 2489 20.978     25.4      1.0
media    391   1   2481  -2400  -2479
media    392   1   2482  -2481  -2479
media    393   1   2483  -2482  -2479
media    394   1   2484  -2483  -2479
media    395   1   2485  -2484  -2479
media    396   1   2486  -2485  -2479
media    397   1   2487  -2486  -2479
media    398   1   2488  -2487  -2479
media    399   1   2489  -2488  -2479
'
'   Top - Axial Layer 10   (1.0 - 1.0 cm)
cylinder 2491 15.5      25.4      -1.0
cylinder 2492 16.0      25.4      -1.0
cylinder 2493 16.5      25.4      -1.0
cylinder 2494 17.5      25.4      -1.0
cylinder 2495 18.5      25.4      -1.0
cylinder 2496 19.5      25.4      -1.0
cylinder 2497 20.0      25.4      -1.0
cylinder 2498 20.5      25.4      -1.0
cylinder 2499 20.978     25.4      -1.0
media    301   1   2491  -2400  -2489
media    302   1   2492  -2491  -2489
media    303   1   2493  -2492  -2489
media    304   1   2494  -2493  -2489
media    305   1   2495  -2494  -2489
media    306   1   2496  -2495  -2489
media    307   1   2497  -2496  -2489
media    308   1   2498  -2497  -2489
media    309   1   2499  -2498  -2489
'
'   Top - Axial Layer 11   (-1.0 - -4.0 cm)

```

cylinder	2501	15.5	25.4	-4.0
cylinder	2502	16.0	25.4	-4.0
cylinder	2503	16.5	25.4	-4.0
cylinder	2504	17.5	25.4	-4.0
cylinder	2505	18.5	25.4	-4.0
cylinder	2506	19.5	25.4	-4.0
cylinder	2507	20.0	25.4	-4.0
cylinder	2508	20.5	25.4	-4.0
cylinder	2509	20.978	25.4	-4.0
media	391	1	2501	-2400
media	392	1	2502	-2501
media	393	1	2503	-2502
media	394	1	2504	-2503
media	395	1	2505	-2504
media	396	1	2506	-2505
media	397	1	2507	-2506
media	398	1	2508	-2507
media	399	1	2509	-2508
Top - Axial Layer 12 (-4.0 - -7.0 cm)				
cylinder	2511	15.5	25.4	-7.0
cylinder	2512	16.0	25.4	-7.0
cylinder	2513	16.5	25.4	-7.0
cylinder	2514	17.5	25.4	-7.0
cylinder	2515	18.5	25.4	-7.0
cylinder	2516	19.5	25.4	-7.0
cylinder	2517	20.0	25.4	-7.0
cylinder	2518	20.5	25.4	-7.0
cylinder	2519	20.978	25.4	-7.0
media	381	1	2511	-2400
media	382	1	2512	-2511
media	383	1	2513	-2512
media	384	1	2514	-2513
media	385	1	2515	-2514
media	386	1	2516	-2515
media	387	1	2517	-2516
media	388	1	2518	-2517
media	389	1	2519	-2518
Top - Axial Layer 13 (-7.0 - -10.0 cm)				
cylinder	2521	15.5	25.4	-10.0
cylinder	2522	16.0	25.4	-10.0
cylinder	2523	16.5	25.4	-10.0
cylinder	2524	17.5	25.4	-10.0
cylinder	2525	18.5	25.4	-10.0
cylinder	2526	19.5	25.4	-10.0
cylinder	2527	20.0	25.4	-10.0
cylinder	2528	20.5	25.4	-10.0
cylinder	2529	20.978	25.4	-10.0
media	371	1	2521	-2400
media	372	1	2522	-2521
media	373	1	2523	-2522
media	374	1	2524	-2523
media	375	1	2525	-2524
media	376	1	2526	-2525
media	377	1	2527	-2526
media	378	1	2528	-2527
media	379	1	2529	-2528
Top - Axial Layer 14 (-10.0 - -13.0 cm)				
cylinder	2531	15.5	25.4	-13.0
cylinder	2532	16.0	25.4	-13.0
cylinder	2533	16.5	25.4	-13.0
cylinder	2534	17.5	25.4	-13.0
cylinder	2535	18.5	25.4	-13.0
cylinder	2536	19.5	25.4	-13.0
cylinder	2537	20.0	25.4	-13.0
cylinder	2538	20.5	25.4	-13.0
cylinder	2539	20.978	25.4	-13.0
media	361	1	2531	-2400
media	362	1	2532	-2531
media	363	1	2533	-2532
media	364	1	2534	-2533
media	365	1	2535	-2534
media	366	1	2536	-2535
media	367	1	2537	-2536
media	368	1	2538	-2537
media	369	1	2539	-2538
Top - Axial Layer 15 (-13.0 - -16.0 cm)				
cylinder	2541	15.5	25.4	-16.0

cylinder	2542	16.0	25.4	-16.0
cylinder	2543	16.5	25.4	-16.0
cylinder	2544	17.5	25.4	-16.0
cylinder	2545	18.5	25.4	-16.0
cylinder	2546	19.5	25.4	-16.0
cylinder	2547	20.0	25.4	-16.0
cylinder	2548	20.5	25.4	-16.0
cylinder	2549	20.978	25.4	-16.0
media	351	1	2541	-2400
media	352	1	2542	-2541
media	353	1	2543	-2542
media	354	1	2544	-2543
media	355	1	2545	-2544
media	356	1	2546	-2545
media	357	1	2547	-2546
media	358	1	2548	-2547
media	359	1	2549	-2548
 ' Top - Axial Layer 16 (-16.0 - 19.0 cm)				
cylinder	2551	15.5	25.4	-19.0
cylinder	2552	16.0	25.4	-19.0
cylinder	2553	16.5	25.4	-19.0
cylinder	2554	17.5	25.4	-19.0
cylinder	2555	18.5	25.4	-19.0
cylinder	2556	19.5	25.4	-19.0
cylinder	2557	20.0	25.4	-19.0
cylinder	2558	20.5	25.4	-19.0
cylinder	2559	20.978	25.4	-19.0
media	341	1	2551	-2400
media	342	1	2552	-2551
media	343	1	2553	-2552
media	344	1	2554	-2553
media	345	1	2555	-2554
media	346	1	2556	-2555
media	347	1	2557	-2556
media	348	1	2558	-2557
media	349	1	2559	-2558
 ' Top - Axial Layer 17 (-19.0 - 22.0 cm)				
cylinder	2561	15.5	25.4	-22.0
cylinder	2562	16.0	25.4	-22.0
cylinder	2563	16.5	25.4	-22.0
cylinder	2564	17.5	25.4	-22.0
cylinder	2565	18.5	25.4	-22.0
cylinder	2566	19.5	25.4	-22.0
cylinder	2567	20.0	25.4	-22.0
cylinder	2568	20.5	25.4	-22.0
cylinder	2569	20.978	25.4	-22.0
media	331	1	2561	-2400
media	332	1	2562	-2561
media	333	1	2563	-2562
media	334	1	2564	-2563
media	335	1	2565	-2564
media	336	1	2566	-2565
media	337	1	2567	-2566
media	338	1	2568	-2567
media	339	1	2569	-2568
 ' Top - Axial Layer 18 (-22.0 - 25.0 cm)				
cylinder	2571	15.5	25.4	-25.0
cylinder	2572	16.0	25.4	-25.0
cylinder	2573	16.5	25.4	-25.0
cylinder	2574	17.5	25.4	-25.0
cylinder	2575	18.5	25.4	-25.0
cylinder	2576	19.5	25.4	-25.0
cylinder	2577	20.0	25.4	-25.0
cylinder	2578	20.5	25.4	-25.0
cylinder	2579	20.978	25.4	-25.0
media	321	1	2571	-2400
media	322	1	2572	-2571
media	323	1	2573	-2572
media	324	1	2574	-2573
media	325	1	2575	-2574
media	326	1	2576	-2575
media	327	1	2577	-2576
media	328	1	2578	-2577
media	329	1	2579	-2578
 ' Top - Axial Layer 19 (-25.0 - 25.4 cm)				
cylinder	2581	15.5	25.4	-25.4
cylinder	2582	16.0	25.4	-25.4

```

cylinder 2583 16.5      25.4      -25.4
cylinder 2584 17.5      25.4      -25.4
cylinder 2585 18.5      25.4      -25.4
cylinder 2586 19.5      25.4      -25.4
cylinder 2587 20.0      25.4      -25.4
cylinder 2588 20.5      25.4      -25.4
cylinder 2589 20.978    25.4      -25.4
media    311   1   2581   -2400   -2579
media    312   1   2582   -2581   -2579
media    313   1   2583   -2582   -2579
media    314   1   2584   -2583   -2579
media    315   1   2585   -2584   -2579
media    316   1   2586   -2585   -2579
media    317   1   2587   -2586   -2579
media    318   1   2588   -2587   -2579
media    319   1   2589   -2588   -2579

'   outer unfuelled region
cylinder 2619 21.13026  25.4      -25.4
media    200   1   2619   -2589

'   OFE unfuelled - upper region
cylinder 2610 21.13026  30.48     -25.4
media    72    1   2610   -2619   -2633

'   water above OFE upper region
cylinder 2611 21.13026  149.9902   -25.4
media    3     1   2611   -2610   -2633

'   OFE unfuelled - lower region
cylinder 2612 21.13026  149.9902   -30.48
media    73    1   2612   -2611   -2633

'   water below IFE upper region
cylinder 2613 21.13026  149.9902   -149.9902
media    1     1   2613   -2612   -2633

'   OFE outer sidewall
cylinder 2500 21.7474    149.9902   -149.9902
media    20    1   2500   -2613
boundary 2500
end unit 2300

```

----- Region IV -----

CONTROL ELEMENTS REGION (CR)

```

The control element is region-4
The control element region (CR) consists of 2 thin-walled (0.25 in) concentric cylindrical control elements.
The inner cylinder is used for both shim and regulation. This rod moves upward to insert poison.
The outer control cylinder is divided into 4 quadrants, and is used for shim and safety.
Each control rod contains three longitudinal (Axial) regions. A black region containing Europium (Eu203),
a gray region containing tantalum, and a white region containing Aluminum, all clad with Aluminum,
making it an Aluminum plate containing a black and gray cores.
Control elements position is set using surface transformation cards (see CR surfaces)

```

----- Control Element Cell Cards -----

Inner control element

```

unit 3000
'   OFE outer sidewall
cylinder 2400 21.7475    149.9903   -149.9903
hole     2300
media    20    1   2400

'   water between OFE outer sidewall and inner CR--active region
cylinder 3000 22.02434   25.4      -25.4
media    2     1   3000   -2400

'   water between OFE outer sidewall and inner CR--above active region
cylinder 3001 22.02434   149.9903   -25.4
media    3     1   3001   -3000   -2400

'   water between OFE outer sidewall and inner CR--below active region

```

```

cylinder 3002 22.02434 149.9903 -149.9903
media 1 1 3002 -3001 -2400
' Inner control element
cylinder 3005 22.659340 149.9903 -149.9903

' Inner element--Upper H2O (assume to top of model)
cylinder 3100 22.659340 449.9903 111.91875 origin x=0. y=0. z=-45.720
media 3 1 3100 3005 -3002

' Inner element--Lower H2O (assume to bottom of model)
cylinder 3101 22.659340 -61.75375 -449.9903 origin x=0. y=0. z=-45.720
media 1 1 3101 3005 -3002

' Inner element--Inner clad
cylinder 3110 22.103715 111.91875 -61.75375 origin x=0. y=0. z=-45.720
media 21 1 3110 -3002
' Inner element--Upper white region
cylinder 3111 22.579965 111.91875 43.18 origin x=0. y=0. z=-45.720
media 402 1 3111 -3110

plane 700 ypl=1.0 con=1.27 rotate al=20.60990454
plane 701 ypl=1.0 con=-1.27 rotate al=20.60990454
plane 702 xpl=1.0 con=1.27 rotate al=20.60990454
plane 703 xpl=1.0 con=-1.27 rotate al=20.60990454

' Inner element--Al gap region 1
cylinder 3112 22.579965 43.18 -25.40 origin x=0. y=0. z=-45.720
media 21 1 3112 -3110 700 -701
' Inner element--Al gap region 2
cylinder 3113 22.579965 43.18 -25.40 origin x=0. y=0. z=-45.720
media 21 1 3113 -3110 702 -703

' Inner element--Gray region--Quad 1
cylinder 3114 22.579965 43.18 30.48 origin x=0. y=0. z=-45.720
media 400 1 3114 -3110 -700 -702
' --Quad 2
media 400 1 3114 -3110 -700 703
' --Quad 3
media 400 1 3114 -3110 701 703
' --Quad 4
media 400 1 3114 -3110 701 -702

' Inner element--Black region--Quad 1
cylinder 3115 22.579965 43.18 -25.40 origin x=0. y=0. z=-45.720
media 401 1 3115 -3110 -700 -702 -3114
' --Quad 2
media 401 1 3115 -3110 -700 703 -3114
' --Quad 3
media 401 1 3115 -3110 701 703 -3114
' --Quad 4
media 401 1 3115 -3110 701 -702 -3114

' Inner element--Lower white region
cylinder 3122 22.579965 -25.40 -61.75375 origin x=0. y=0. z=-45.720
media 403 1 3122 -3110
' Inner element--Outer clad
cylinder 3123 22.659340 111.91875 -61.75375 origin x=0. y=0. z=-45.720
media 21 1 3123 -3111 -3115 -3122

' Water between control elements

' water between inner CR and outer CR--active region
cylinder 3200 22.9869 25.4 -24.4
media 2 1 3200 -3005
' water between inner CR and outer CR--above active region
cylinder 3201 22.9869 149.9903 -24.4
media 3 1 3201 -3200 -3005
' water between inner CR and outer CR--below active region
cylinder 3202 22.9869 149.9903 -149.9903
media 1 1 3202 -3201 -3005
boundary 3202
end unit 3000

' Outer control element
-----

unit 3300
' water between inner CR and outer CR
cylinder 3202 22.987 149.9904 -149.9904
hole 3000
media 2 1 3202

```

```

' Outer control element
cylinder 3205 23.622    149.9904   -149.9904

' Outer element--Upper H2O (assume to top of model)
cylinder 3300 23.622    449.9904   47.3075      origin x=0. y=0. z=45.720
media     3       1       3300     3205     -3202

' Outer element--Lower H2O (assume to bottom of model)
cylinder 3301 23.622    -120.80875 -449.9904      origin x=0. y=0. z=45.720
media     1       1       3301     3205     -3202

plane     700        ypl=1.0    con=1.27      rotate al=20.60990454
plane     701        ypl=1.0    con=-1.27     rotate al=20.60990454
plane     702        xpl=1.0    con=1.27      rotate al=20.60990454
plane     703        xpl=1.0    con=-1.27     rotate al=20.60990454

' Outer element--Total Water gap 1 (50% h2o,50% al)
cylinder 3302 23.622    47.3075   -120.80875      origin x=0. y=0. z=45.720
media     70       1       3302     -3202     700      -701

' Outer element--Total Water gap 2 (50% h2o,50% al)
media     70       1       3302     -3202     702      -703

' Outer element--Inner clad-Quad 1
cylinder 3304 23.066375  47.3075   -120.80875      origin x=0. y=0. z=45.720
media     21       1       3304     -3202     -700      -702
                           -Quad 2
media     21       1       3304     -3202     -700      703
                           -Quad 3
media     21       1       3304     -3202     701      703
                           -Quad 4
media     21       1       3304     -3202     701      -702

' Outer element--Upper white region-Quad 1
cylinder 3308 23.542625  47.3075   25.40        origin x=0. y=0. z=45.720
media     412      1       3308     -3304     -700      -702
                           -Quad 2
media     412      1       3308     -3304     -700      703
                           -Quad 3
media     412      1       3308     -3304     701      703
                           -Quad 4
media     412      1       3308     -3304     701      -702

' Outer element--Black region-Quad 1
cylinder 3312 23.542625  47.3075   -30.48      origin x=0. y=0. z=45.720
media     410      1       3312     -3304     -3308     -700      -702
                           -Quad 2
media     410      1       3312     -3304     -3308     -700      703
                           -Quad 3
media     410      1       3312     -3304     -3308     701      703
                           -Quad 4
media     410      1       3312     -3304     -3308     701      -702

' Outer element--Gray region-Quad 1
cylinder 3313 23.542625  47.3075   -43.18      origin x=0. y=0. z=45.720
media     411      1       3313     -3304     -3312     -700      -702
                           -Quad 2
media     411      1       3313     -3304     -3312     -700      703
                           -Quad 3
media     411      1       3313     -3304     -3312     701      703
                           -Quad 4
media     411      1       3313     -3304     -3312     701      -702

' Outer element--Lower white region-Quad 1
cylinder 3320 23.542625  47.3075   -120.80875      origin x=0. y=0. z=45.720
media     413      1       3320     -3304     -3313     -700      -702
                           -Quad 2
media     413      1       3320     -3304     -3313     -700      703
                           -Quad 3
media     413      1       3320     -3304     -3313     701      703
                           -Quad 4
media     413      1       3320     -3304     -3313     701      -702

' Outer element--Outer clad-Quad 1
cylinder 3324 23.622    47.3075   -120.80875      origin x=0. y=0. z=45.720
media     21      1       3324     -3320     -700      -702
                           -Quad 2
media     21      1       3324     -3320     -700      703
                           -Quad 3
media     21      1       3324     -3320      701      703

```

```

'           -Quad 4
media      21      1    3324   -3320      701     -702
'
' Water between OCE and removable Be reflector
'
' water just outside outer CR--core region
cylinder  4000 23.8124    30.48    -30.48
media      2      1    4000   -3205
'
' water just outside outer CR--above core region
cylinder  4001 23.8124  149.9904   -30.48
media      3      1    4001   -4000   -3205
'
' water just outside outer CR--below core region
cylinder  4002 23.8124  149.9904  -149.9904
media      1      1    4002   -4001   -3205
boundary   4002
' end unit 3300
'

'
'
----- Region V -----
'
' REMOVABLE REFLECTOR REGION
-----


' The removable reflector is region-5
' The Beryllium reflector region is divided into 2 radial regions, the inner most is removable and can be replaced periodically.
' The Beryllium reflector is 24 cm in height
' The inner (Removable) reflector dimensions are OD = 23.756 in ID = 18.872 in Height = 24 cm
' The reflector region has 20 vertical experiment facilities as follow:
' Large removable beryllium (RB) .....8
' Small removable beryllium (RB) .....4
' Control-rod access plug facilities (CR) ...8
'

----- Removable Reflector Irradiation Facilities -----
'

' RB-1A
unit 6301
cylinder  6301  2.32918    30.48    -30.48    origin x=7.296944  y=26.311930
media      33      1    6301
boundary   6301
' end unit 6301
'

' RB-1B
unit 6351
cylinder  6351  2.32918    30.48    -30.48    origin x=13.445625  y=23.765063
media      530     1    6351
boundary   6351
' end unit 6351
'

' RB-2
unit 6400
cylinder  6400  0.63500    30.48    -30.48
media      33      1    6400
boundary   6400
' end unit 6400
'

' RB-3A
unit 6501
cylinder  6501  2.32918    30.48    -30.48    origin x=-26.311929  y=7.296944
media      530     1    6501
boundary   6501
' end unit 6501
'

' RB-3B
unit 6551
cylinder  6551  2.32918    30.48    -30.48    origin x=-23.765062  y=13.445625
media      530     1    6551
boundary   6551
' end unit 6551
'

' RB-4
unit 6600
cylinder  6600  0.63500    30.48    -30.48
media      33      1    6600
boundary   6600
' end unit 6600
'

```

```

' RB-5A
unit 6701
cylinder 6701 2.32918 30.48 -30.48 origin x=-7.296944 y=-26.311929
media 33 1 6701
boundary 6701
' end unit 6701
'
' RB-5B
unit 6751
cylinder 6751 2.32918 30.48 -30.48 origin x=-13.445625 y=-23.765062
media 33 1 6751
boundary 6751
' end unit 6751
'
' RB-6
unit 6800
cylinder 6800 0.63500 30.48 -30.48
media 33 1 6800
boundary 6800
' end unit 6800
'
' RB-7A (RB - 7J)
unit 6901
cylinder 6901 2.049 30.48 -30.48 origin x=26.311929 y=-7.296944
media 39 1 6901
boundary 6901
' end unit 6901
'
' RB-7B
unit 6951
cylinder 6951 2.049 30.48 -30.48 origin x=23.765062 y=-13.445625
media 530 1 6951
boundary 6951
' end unit 6951
'
' RB-8
unit 7000
cylinder 7000 0.63500 30.48 -30.48
media 33 1 7000
boundary 7000
' end unit 7000
'

' Removable Reflector
-----


unit 4000
' water just outside outer CR
cylinder 4002 23.8125 149.9905 -149.9905
hole 3300
media 2 1 4002
'

' Al clad of removable refl. reg. 1--core region
cylinder 4010 24.4475 30.48 -30.48
media 22 1 4010 -4002
' water--above al clad
cylinder 4011 24.4475 149.9905 -30.48
media 3 1 4011 -4010 -4002
' water--below al clad
cylinder 4012 24.4475 149.9905 -149.9905
media 1 1 4012 -4011 -4002

' Removable Reflector Irradiation Facilities (odd numbers)

' RB-1A
cylinder 6300 2.59080 30.48 -30.48 origin x=7.296944 y=26.311930
hole 6301
media 24 1 6300
' RB-1B
cylinder 6350 2.59080 30.48 -30.48 origin x=13.445625 y=23.765063
hole 6351
media 24 1 6350
' RB-3A
cylinder 6500 2.59080 30.48 -30.48 origin x=-26.311929 y=7.296944
hole 6501
media 24 1 6500
' RB-3B
cylinder 6550 2.59080 30.48 -30.48 origin x=-23.765062 y=13.445625
hole 6551
media 24 1 6550
' RB-5A

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cylinder 6700 2.59080 30.48 -30.48 origin x=-7.296944 y=-26.311929
hole 6701
media 24 1 6700
' RB-5B
cylinder 6750 2.59080 30.48 -30.48 origin x=-13.445625 y=-23.765062
hole 6751
media 24 1 6750
' RB-7A (RB - 7J)
cylinder 6900 2.54 30.48 -30.48 origin x=26.311929 y=-7.296944
hole 6901
media 38 1 6900
' RB-7B
cylinder 6950 2.54 30.48 -30.48 origin x=23.765062 y=-13.445625
hole 6951
media 24 1 6950

' Removable Be Reflector Reg. 1
-----
' removable refl. reg. 1--core region
cylinder 4020 25.0825 30.48 -30.48
media 101 1 4020 -4012 -6300 -6350 -6500 -6550
-6700 -6750 -6900 -6950
' water--above removable refl. reg. 1
cylinder 4021 25.0825 149.9905 -30.48
media 6 1 4021 -4020 -4012
' water--below removable refl. reg. 1
cylinder 4022 25.0825 149.9905 -149.9905
media 4 1 4022 -4021 -4012

' water region--core region
cylinder 4030 25.15108 30.48 -30.48
media 5 1 4030 -4022 -6300 -6350 -6500 -6550
-6700 -6750 -6900 -6950
' water region--above core region
cylinder 4031 25.15108 149.9905 -30.48
media 6 1 4031 -4030 -4022
' water region--below core region
cylinder 4032 25.15108 149.9905 -149.9905
media 4 1 4032 -4031 -4022

' Removable Be Reflector Reg. 2
-----
' removable refl. reg. 2--core region
cylinder 4040 27.46375 30.48 -30.48
' Removable Reflector Irradiation Facilities (even numbers)
hole 6400 origin x=-12.970338 y=22.924995
hole 6600 origin x=-22.924995 y=-12.970338
hole 6800 origin x=12.970338 y=-22.924995
hole 7000 origin x=22.924995 y=12.970388
media 102 1 4040 -4032 -6300 -6350 -6500 -6550
-6700 -6750 -6900 -6950
' water--above removable refl. reg. 2
cylinder 4041 27.46375 149.9905 -30.48
media 6 1 4041 -4040 -4032
' water--below removable refl. reg. 2
cylinder 4042 27.46375 149.9905 -149.9905
media 4 1 4042 -4041 -4032

' water region--core region
cylinder 4050 27.53233 30.48 -30.48
media 5 1 4050 -4042 -6300 -6350 -6500 -6550
-6700 -6750 -6900 -6950
' water region--above core region
cylinder 4051 27.53233 149.9905 -30.48
media 6 1 4051 -4050 -4042
' water region--below core region
cylinder 4052 27.53233 149.9905 -149.9905
media 4 1 4052 -4051 -4042

' Removable Be Reflector Reg. 3
-----
' removable refl. reg. 3--core region
cylinder 4060 30.25267 30.48 -30.48
media 103 1 4060 -4052 -6300 -6350 -6500 -6550
-6700 -6750 -6900 -6950
' water--above removable refl. reg. 2
cylinder 4061 30.25267 149.9905 -30.48
media 6 1 4061 -4060 -4052

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```

'   water--below removable refl. reg. 2
cylinder  4062 30.25267  149.9905 -149.9905
media      4       1    4062    -4061    -4052
'
'   water region--core region
cylinder  4070 30.32125  30.48     -30.48
media      5       1    4070    -4062    -6300
                           -6700    -6350    -6500    -6550
                           -6750    -6900    -6950
'
'   water region--above core region
cylinder  4071 30.32125  149.9905 -30.48
media      6       1    4071    -4070    -4062
'
'   water region--below core region
cylinder  4072 30.32125  149.9905 -149.9905
media      4       1    4072    -4071    -4062
'
boundary   4072
end unit  4000
'

-----
' RB Control Rod Access Plugs
-----

'   CR-1 or CR-1A (Control Rod Access Plug 1)
unit 7100
cylinder  7100 0.63500   30.48     -30.48
media     33      1    7100
boundary   7100
end unit  7100
'

'   CR-2 or CR-1B
unit 7200
cylinder  7200 0.63500   30.48     -30.48
media     33      1    7200
boundary   7200
end unit  7200
'

'   CR-3 or CR-2A
unit 7300
cylinder  7300 0.63500   30.48     -30.48
media     33      1    7300
boundary   7300
end unit  7300
'

'   CR-4 or CR-2B
unit 7400
cylinder  7400 0.63500   30.48     -30.48
media     33      1    7400
boundary   7400
end unit  7400
'

'   CR-5 or CR-3A
unit 7500
cylinder  7500 0.63500   30.48     -30.48
media     33      1    7500
boundary   7500
end unit  7500
'

'   CR-6 or CR-3B
unit 7600
cylinder  7600 0.63500   30.48     -30.48
media     33      1    7600
boundary   7600
end unit  7600
'

'   CR-7 or CR-4A
unit 7700
cylinder  7700 0.63500   30.48     -30.48
media     33      1    7700
boundary   7700
end unit  7700
'

'   CR-8 or CR-4B
unit 7800
cylinder  7800 0.63500   30.48     -30.48
media     33      1    7800
boundary   7800
end unit  7800
'

'
'   Semi-permanent Be Reflector Region

```

```

unit 4080
cylinder 4072 30.32125 149.9906 -149.9906
hole 4000
media 4 1 4072

' HB-1
sphere 8864 7.3025 chord +z=0.0 origin x=27.09160 y=29.78398 rotate a1=30 a2=90
sphere 8865 6.985 chord +z=0.0 origin x=27.09160 y=29.78398 rotate a1=30 a2=90
media 24 1 4090 8864 -8865
media 5 1 4090 8865

' HB-2 (Radial Tube)
sphere 7915 11.7475 chord +z=0.0 origin x=-43.28142 y=0.0 rotate a1=90 a2=90
sphere 7914 11.43 chord +z=0.0 origin x=-43.28142 y=0.0 rotate a1=90 a2=90
sphere 7913 10.795 chord +z=0.0 origin x=-43.57606 y=0.0 rotate a1=90 a2=90
sphere 7911 10.45464 chord +z=0.0 origin x=-43.57606 y=0.0 rotate a1=90 a2=90
media 24 1 4090 7915 -7914
media 5 1 4090 7914 -7913
media 5 1 4090 7913 -7911
media 24 1 4090 7911

' HB-3
sphere 8015 7.3025 chord +z=0.0 origin x=8.98085 y=-37.78472 rotate a1=150 a2=90
sphere 8014 6.985 chord +z=0.0 origin x=8.98085 y=-37.78472 rotate a1=150 a2=90
sphere 8013 6.35 chord +z=0.0 origin x=8.92243 y=-37.88590 rotate a1=150 a2=90
sphere 8011 6.02996 chord +z=0.0 origin x=8.92243 y=-37.88590 rotate a1=150 a2=90
plane 8021 zpl=1.0 con=-5.83438 origin x=8.92243 y=-37.88590 rotate a1=150 a2=90
media 24 1 4090 8015 -8014
media 5 1 4090 8014 -8013
media 5 1 4090 8013 8021 -8011
media 24 1 4090 8013 -8021 -8011
media 24 1 4090 8011

' HB-4 (Cold Source)
sphere 8830 8.5725 chord +z=0.0 origin x=39.09437 y=8.99457 rotate a1=210 a2=90
sphere 8831 8.255 chord +z=0.0 origin x=39.09437 y=8.99457 rotate a1=210 a2=90
sphere 8832 7.62 chord +z=0.0 origin x=39.25439 y=8.71740 rotate a1=210 a2=90
media 24 1 4090 8830 -8831
media 5 1 4090 8831 -8832
media 24 1 4090 8832
cylinder 8822 8.5725 0.0 -193.04 origin x=39.09437 y=8.99457 rotate a1=210 a2=90
cylinder 8823 8.255 0.0 -193.04 origin x=39.09437 y=8.99457 rotate a1=210 a2=90
cylinder 8814 7.62 0.0 -193.04 origin x=39.25439 y=8.71740 rotate a1=210 a2=90
media 24 1 4090 8822 -8823 -8830
media 5 1 4090 8823 -8814 -8831 -8832
media 24 1 4090 8814 -8832

' Semi-permanent region with CR positions
cylinder 4080 33.02 30.48 -30.48
hole 7100 origin x=15.859584 y=28.031720
hole 7200 origin x=8.607000 y=31.035839
hole 7300 origin x=-28.031720 y=15.859584
hole 7400 origin x=-31.035839 y=8.606999
hole 7500 origin x=-15.859584 y=-28.031720
hole 7600 origin x=-8.607000 y=-31.035839
hole 7700 origin x=28.031720 y=-15.859580
hole 7800 origin x=31.035839 y=-8.607000
media 104 1 4080 -4072 -8864 -7915 -8015 -8822 -8830

' water--above semi-permanent refl. reg.
cylinder 4081 33.02 149.9905 -30.48
media 6 1 4081 -4080 -4072

' water--below semi-permanent refl. reg.
cylinder 4082 33.02 149.9906 -149.9906
media 4 1 4082 -4081 -4072

' water gap
cylinder 4090 33.3375 30.48 -30.48
media 100 1 4090 -4082 -8864 -7915 -8015 -8822 -8830

' water region--above core region
cylinder 4091 33.3375 149.9906 -30.48
media 6 1 4091 -4090 -4082

' water region--below core region
cylinder 4092 33.3375 149.9906 -149.9906
media 4 1 4092 -4091 -4082
boundary 4092
end unit 4080

Region VI
PERMANENT REFLECTOR REGION

```

```

' The permanent is region-6
' The Beryllium reflector region is devided into 2 radial regions, the outer most is permanent .
' The outer (Permanent) reflector dimensions are OD = 43.0 Height = 24 cm
' The reflector region has 4 engineering facilities and 22 vertical experiment facilities as follow
'     Large VXF      6
'     Inner small VXF   11
'     outer small VXF    5
many parts of this region is modeled by Pepplo

-----
' Permanent Be Reflector
-----

-----
' VXF - located in outer reflector
-----

'   VXF-1  (Small Vertical Experiment Facility) (water filled, ss liner)
unit 4201
cylinder 4201 2.01168   30.48    -30.48  origin x=3.076479  y=39.090375
cylinder 4202 1.90240   30.48    -30.48  origin x=3.076479  y=39.090375
cylinder 4203 1.77800   30.48    -30.48  origin x=3.076479  y=39.090375
media    9      1    4201    -4202
media    40     1    4202    -4203
media    9      1    4203
boundary 4201
' end unit 4201

'   VXF-2  (Small Vertical Experiment Facility)
unit 4301
cylinder 4301 2.01168   30.48    -30.48  origin x=-3.456418  y=43.917957
media    33     1    4301
boundary 4301
' end unit 4301

'   VXF-3  (Small Vertical Experiment Facility) (water filled, ss liner)
unit 4401
cylinder 4401 2.01168   30.48    -30.48  origin x=-9.153685  y=38.127840
cylinder 4402 1.90240   30.48    -30.48  origin x=-9.153685  y=38.127840
cylinder 4403 1.77800   30.48    -30.48  origin x=-9.153685  y=38.127840
media    9      1    4401    -4402
media    40     1    4402    -4403
media    9      1    4403
boundary 4401
' end unit 4401

'   VXF-4  (Small Vertical Experiment Facility)
unit 4501
cylinder 4501 2.01168   30.48    -30.48  origin x=-16.858640  y=40.700367
media    33     1    4501
boundary 4501
' end unit 4501

'   VXF-5  (Small Vertical Experiment Facility) (water filled, ss liner)
unit 4601
cylinder 4601 2.01168   30.48    -30.48  origin x=-20.487822  y=33.433087
cylinder 4602 1.90240   30.48    -30.48  origin x=-20.487822  y=33.433087
cylinder 4603 1.77800   30.48    -30.48  origin x=-20.487822  y=33.433087
media    9      1    4601    -4602
media    40     1    4602    -4603
media    9      1    4603
boundary 4601
' end unit 4601

'   VXF-6  (Large Vertical Experiment Facility)
unit 4701
cylinder 4701 3.59918   30.48    -30.48  origin x=-30.054027  y=35.188744
media    33     1    4701
boundary 4701
' end unit 4701

'   VXF-7  (Small Vertical Experiment Facility--Vertical Irradiation Facility)
unit 4801
cylinder 4801 2.01168   149.9906   -30.48  origin x=-29.816468  y=25.465670
cylinder 4802 1.90240   149.9906   -30.48  origin x=-29.816468  y=25.465670
cylinder 4803 1.77800   149.9906   -30.48  origin x=-29.816468  y=25.465670
sphere   4809 1.7          4801    -4802
media    60     1    4801    -4802
media    24     1    4802    -4803
media    60     1    4803    -4809

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media      60      1    4809
boundary   4801
' end unit 4801
'
'   VXF-8   (Small Vertical Experiment Facility)
unit 4901
cylinder  4901  2.01168   30.48    -30.48  origin x=-37.562005 y=23.018026
media      33      1    4901
boundary   4901
' end unit 4901
'
'   VXF-9   (Small Vertical Experiment Facility) (water filled, ss liner)
unit 5001
cylinder  5001  2.01168   30.48    -30.48  origin x=-36.226471 y=15.005496
cylinder  5002  1.90240   30.48    -30.48  origin x=-36.226471 y=15.005496
cylinder  5003  1.77800   30.48    -30.48  origin x=-36.226471 y=15.005496
media      9       1    5001    -5002
media      40      1    5002    -5003
media      9       1    5003
boundary   5001
' end unit 5001
'
'   VXF-10  (Small Vertical Experiment Facility)
unit 5101
cylinder  5101  2.01168   30.48    -30.48  origin x=-40.700368 y=-16.858644
media      33      1    5101
boundary   5101
' end unit 5101
'
'   VXF-11  (Small Vertical Experiment Facility) (water filled, ss liner)
unit 5201
cylinder  5201  2.01168   30.48    -30.48  origin x=-33.433087 y=-20.487822
cylinder  5202  1.90240   30.48    -30.48  origin x=-33.433087 y=-20.487822
cylinder  5203  1.77800   30.48    -30.48  origin x=-33.433087 y=-20.487822
media      9       1    5201    -5202
media      40      1    5202    -5203
media      9       1    5203
boundary   5201
' end unit 5201
'
'   VXF-12  (Small Vertical Experiment Facility)
unit 5301
cylinder  5301  2.01168   30.48    -30.48  origin x=-33.498742 y=-28.610628
media      33      1    5301
boundary   5301
' end unit 5301
'
'   VXF-13  (Small Vertical Experiment Facility) (water filled, ss liner)
unit 5401
cylinder  5401  2.01168   30.48    -30.48  origin x=-25.465670 y=-29.816468
cylinder  5402  1.90240   30.48    -30.48  origin x=-25.465670 y=-29.816468
cylinder  5403  1.77800   30.48    -30.48  origin x=-25.465670 y=-29.816468
media      9       1    5401    -5402
media      40      1    5402    -5403
media      9       1    5403
boundary   5401
' end unit 5401
'
'   VXF-14  (Large Vertical Experiment Facility)
unit 5501
cylinder  5501  3.59918   30.48    -30.48  origin x=-24.179279 y=-39.456998
media      33      1    5501
boundary   5501
' end unit 5501
'
'   VXF-15  (Small Vertical Experiment Facility) (water filled, ss liner)
unit 5601
cylinder  5601  2.01168   30.48    -30.48  origin x=-15.005496 y=-36.226471
cylinder  5602  1.90240   30.48    -30.48  origin x=-15.005496 y=-36.226471
cylinder  5603  1.77800   30.48    -30.48  origin x=-15.005496 y=-36.226471
media      9       1    5601    -5602
media      40      1    5602    -5603
media      9       1    5603
boundary   5601
' end unit 5601
'
'   VXF-16  (Large Vertical Experiment Facility)
unit 5701
cylinder  5701  3.59918   30.48    -30.48  origin x=-10.802978 y=-44.997643
media      33      1    5701
boundary   5701

```

```

' end unit 5701
'
'   VXF-17  (Large Vertical Experiment Facility)
unit 5801
cylinder  5801  3.59918    30.48     -30.48   origin x=21.008982  y=-41.232450
media      33      1      5801
boundary   5801
' end unit 5801
'
'   VXF-18  (Small Vertical Experiment Facility)  (water filled, ss liner)
unit 5901
cylinder  5901  2.01168    30.48     -30.48   origin x=23.047795  y=-31.722568
cylinder  5902  1.90240    30.48     -30.48   origin x=23.047795  y=-31.722568
cylinder  5903  1.77800    30.48     -30.48   origin x=23.047795  y=-31.722568
media      9      1      5901    -5902
media      40      1      5902    -5903
media      9      1      5903
boundary   5901
' end unit 5901
'
'   VXF-19  (Large Vertical Experiment Facility)
unit 6001
cylinder  6001  3.59918    30.48     -30.48   origin x=32.722257  y=-32.722257
media      33      1      6001
boundary   6001
' end unit 6001
'
'   VXF-20  (Small Vertical Experiment Facility)  (water filled, ss liner)
unit 6101
cylinder  6101  2.01168    30.48     -30.48   origin x=31.722568  y=-23.047794
cylinder  6102  1.90240    30.48     -30.48   origin x=31.722568  y=-23.047794
cylinder  6103  1.77800    30.48     -30.48   origin x=31.722568  y=-23.047794
media      9      1      6101    -6102
media      40      1      6102    -6103
media      9      1      6103
boundary   6101
' end unit 6101
'
'   VXF-21  (Large Vertical Experiment Facility)
unit 6201
cylinder  6201  3.59918    30.48     -30.48   origin x=41.232450  y=-21.008982
media      33      1      6201
boundary   6201
' end unit 6201
'
'   VXF-22  (Small Vertical Experiment Facility)  (water filled, ss liner)
unit 6251
cylinder  6251  2.01168    30.48     -30.48   origin x=37.292115  y=-12.116943
cylinder  6252  1.90240    30.48     -30.48   origin x=37.292115  y=-12.116943
cylinder  6253  1.77800    30.48     -30.48   origin x=37.292115  y=-12.116943
media      9      1      6251    -6252
media      40      1      6252    -6253
media      9      1      6253
boundary   6251
' end unit 6251
'
unit 4100
' Permanent reflector
cylinder  4092 33.3375     149.9907   -149.9907
hole       4080
media      1      1      4092
'
' VXF - located in outer reflector
'
'   VXF-1  (Small Vertical Experiment Facility)  (water filled, ss liner)
cylinder  4200  2.22250    30.48     -30.48   origin x=3.076479   y=39.090375
hole       4201
media      24      1      4200
'   VXF-2  (Small Vertical Experiment Facility)
cylinder  4300  2.22250    30.48     -30.48   origin x=-3.456418  y=43.917957
hole       4301
media      24      1      4300
'   VXF-3  (Small Vertical Experiment Facility)  (water filled, ss liner)
cylinder  4400  2.22250    30.48     -30.48   origin x=-9.153685  y=38.127840
hole       4401
media      24      1      4400
'   VXF-4  (Small Vertical Experiment Facility)
cylinder  4500  2.22250    30.48     -30.48   origin x=-16.858640  y=40.700367
hole       4501
media      24      1      4500
'   VXF-5  (Small Vertical Experiment Facility)  (water filled, ss liner)

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```

cylinder 4600 2.22250 30.48 -30.48 origin x=-20.487822 y=33.433087
hole      4601
media     24    1   4600
'   VXF-6 (Large Vertical Experiment Facility)
cylinder 4700 3.81000 30.48 -30.48 origin x=-30.054027 y=35.188744
hole      4701
media     24    1   4700
'   VXF-7 (Small Vertical Experiment Facility--Vertical Irradiation Facility)
cylinder 4800 2.22250 149.9907 -30.48 origin x=-29.816468 y=25.465670
hole      4801
media     24    1   4800
'   VXF-8 (Small Vertical Experiment Facility)
cylinder 4900 2.22250 30.48 -30.48 origin x=-37.562005 y=23.018026
hole      4901
media     24    1   4900
'   VXF-9 (Small Vertical Experiment Facility) (water filled, ss liner)
cylinder 5000 2.22250 30.48 -30.48 origin x=-36.226471 y=15.005496
hole      5001
media     24    1   5000
'   VXF-10 (Small Vertical Experiment Facility)
cylinder 5100 2.22250 30.48 -30.48 origin x=-40.700368 y=-16.858644
hole      5101
media     24    1   5100
'   VXF-11 (Small Vertical Experiment Facility) (water filled, ss liner)
cylinder 5200 2.22250 30.48 -30.48 origin x=-33.433087 y=-20.487822
hole      5201
media     24    1   5200
'   VXF-12 (Small Vertical Experiment Facility)
cylinder 5300 2.22250 30.48 -30.48 origin x=-33.498742 y=-28.610628
hole      5301
media     24    1   5300
'   VXF-13 (Small Vertical Experiment Facility) (water filled, ss liner)
cylinder 5400 2.22250 30.48 -30.48 origin x=-25.465670 y=-29.816468
hole      5401
media     24    1   5400
'   VXF-14 (Large Vertical Experiment Facility)
cylinder 5500 3.81000 30.48 -30.48 origin x=-24.179279 y=-39.456998
hole      5501
media     24    1   5500
'   VXF-15 (Small Vertical Experiment Facility) (water filled, ss liner)
cylinder 5600 2.22250 30.48 -30.48 origin x=-15.005496 y=-36.226471
hole      5601
media     24    1   5600
'   VXF-16 (Large Vertical Experiment Facility)
cylinder 5700 3.81000 30.48 -30.48 origin x=-10.802978 y=-44.997643
hole      5701
media     24    1   5700
'   VXF-17 (Large Vertical Experiment Facility)
cylinder 5800 3.81000 30.48 -30.48 origin x=21.008982 y=-41.232450
hole      5801
media     24    1   5800
'   VXF-18 (Small Vertical Experiment Facility) (water filled, ss liner)
cylinder 5900 2.22250 30.48 -30.48 origin x=23.047795 y=-31.722568
hole      5901
media     24    1   5900
'   VXF-19 (Large Vertical Experiment Facility)
cylinder 6000 3.81000 30.48 -30.48 origin x=32.722257 y=-32.722257
hole      6001
media     24    1   6000
'   VXF-20 (Small Vertical Experiment Facility) (water filled, ss liner)
cylinder 6100 2.22250 30.48 -30.48 origin x=31.722568 y=-23.047794
hole      6101
media     24    1   6100
'   VXF-21 (Large Vertical Experiment Facility)
cylinder 6200 3.81000 30.48 -30.48 origin x=41.232450 y=-21.008982
hole      6201
media     24    1   6200
'   VXF-22 (Small Vertical Experiment Facility) (water filled, ss liner)
cylinder 6250 2.22250 30.48 -30.48 origin x=37.292115 y=-12.116943
hole      6251
media     24    1   6250
'   HB-1
sphere   8864 7.3025 chord +z=0.0 origin x=27.09160 y=29.78398 rotate a1=30 a2=90
sphere   8865 6.985  chord +z=0.0 origin x=27.09160 y=29.78398 rotate a1=30 a2=90
sphere   8883 6.35   chord +z=0.0 origin x=27.05350 y=29.84997 rotate a1=30 a2=90
sphere   8881 6.02996 chord +z=0.0 origin x=27.05350 y=29.84997 rotate a1=30 a2=90
sphere   8880 5.08   chord +z=0.0 origin x=27.19193 y=29.61020 rotate a1=30 a2=90
plane   8850      zpl=1.0 con=-5.83438 origin x=27.05350 y=29.84997 rotate a1=30 a2=90
media    24    1   -4092  8864  -8865
media    5     1   -4092  8865  -8883
media    5     1   -4092  8883  8850  -8881

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media      24     1   -4092    8883   -8850   -8881
media      24     1   -4092    8881   -8880   -8870
media      60     1    8880
cylinder   8861   7.62      -7.04088  -193.04      origin x=27.09160  y=29.78398  rotate a1=30  a2=90
cylinder   8862   7.3025     0.0       -193.04      origin x=27.09160  y=29.78398  rotate a1=30  a2=90
cylinder   8863   6.985      0.0       -193.04      origin x=27.09160  y=29.78398  rotate a1=30  a2=90
cylinder   8875   6.35       0.0       -193.04      origin x=27.05350  y=29.84997  rotate a1=30  a2=90
cylinder   8870   5.08       0.0       -193.04      origin x=27.19193  y=29.61020  rotate a1=30  a2=90
media      24     1   4120     8861   -8862
media      24     1   4120     8862   -8863   -8864
media      5      1   4120     8863   -8875   -8883   -8865
media      24     1   4120     8875   -8870   -8883
media      60     1   4120     8870   -8880
` HB-2 (Radial Tube)
sphere    7915  11.7475      chord +z=0.0      origin x=-43.28142  y=0.0      rotate a1=90  a2=90
sphere    7914  11.43       chord +z=0.0      origin x=-43.28142  y=0.0      rotate a1=90  a2=90
sphere    7913  10.795      chord +z=0.0      origin x=-43.57606  y=0.0      rotate a1=90  a2=90
sphere    7911  10.45464     chord +z=0.0      origin x=-43.57606  y=0.0      rotate a1=90  a2=90
sphere    7910  8.95604      chord +z=0.0      origin x=-43.14426  y=0.0      rotate a1=90  a2=90
plane     7953      zpl=1.0      con=-9.56564      origin x=-43.57606  y=0.0      rotate a1=90  a2=90
plane     7920      xpl=1.0      ypl=9.550703    con=-6.341945
plane     7921      xpl=1.0      ypl=-9.550703   con=-6.341945
media      24     1   -4092    7915   -7914
media      5      1   -4092    7914   -7913
media      5      1   -4092    7913   -7953   -7911
media      24     1   -4092    7913   -7953   -7911
media      24     1   -4092    7911   -7910   -7900
media      60     1        7910   -7920   -7921
media      105    1        7910   -7920   9001
media      105    1        7910   -7921   9001
media      106    1        7910   -7920   -9001   9002
media      106    1        7910   -7921   -9001   9002
media      107    1        7910   -7920   -9002   9003
media      107    1        7910   -7921   -9002   9003
media      108    1        7910   -7920   -9003
media      108    1        7910   -7921   -9003
cylinder   7905  12.065      -3.70784   -193.04      origin x=-43.28142  y=0.0      rotate a1=90  a2=90
cylinder   7906  11.7475     0.0       -193.04      origin x=-43.28142  y=0.0      rotate a1=90  a2=90
cylinder   7904  11.43       0.0       -193.04      origin x=-43.28142  y=0.0      rotate a1=90  a2=90
cylinder   7903  10.795      0.0       -193.04      origin x=-43.57606  y=0.0      rotate a1=90  a2=90
cylinder   7900  8.95604      0.0       -193.04      origin x=-43.14426  y=0.0      rotate a1=90  a2=90
plane     7924      zpl=1.0      con=10.72896     origin x=-43.57606  y=0.0      rotate a1=90  a2=90
media      24     1   4120     7905   -7906
media      24     1   4120     7906   -7904   -7915
media      5      1   4120     7904   -7903   -7913   -7914
media      24     1   4120     7903   -7900   -7913
media      60     1   7924     7900   -7920   -7921   -7910
media      60     1   4120     7900   -7924
media      108    1        7900   -7920   9004
media      108    1        7900   -7921   9004
media      109    1        7900   -7920   -9004   9005
media      109    1        7900   -7921   -9004   9005
media      110    1        7900   -7920   -9005   9006
media      110    1        7900   -7921   -9005   9006
media      111    1        7900   -7920   -9006   7924
media      111    1        7900   -7921   -9006   7924
` HB-3
sphere    8015  7.3025      chord +z=0.0      origin x=8.98085   y=-37.78472  rotate a1=150  a2=90
sphere    8014  6.985       chord +z=0.0      origin x=8.98085   y=-37.78472  rotate a1=150  a2=90
sphere    8013  6.35        chord +z=0.0      origin x=8.92243   y=-37.88590  rotate a1=150  a2=90
sphere    8011  6.02996     chord +z=0.0      origin x=8.92243   y=-37.88590  rotate a1=150  a2=90
sphere    8010  5.08        chord +z=0.0      origin x=9.06086   y=-37.64613  rotate a1=150  a2=90
plane     8021      zpl=1.0      con=-5.83438     origin x=8.92243   y=-37.88590  rotate a1=150  a2=90
media      24     1   -4092    8015   -8014
media      5      1   -4092    8014   -8013
media      5      1   -4092    8013   -8021   -8011
media      24     1   -4092    8013   -8021   -8011
media      24     1   -4092    8011   -8010   -8000
media      60     1        8010
cylinder   8005   7.62      -8.20166  -193.04      origin x=8.98085   y=-37.78472  rotate a1=150  a2=90
cylinder   8006   7.3025     0.0       -193.04      origin x=8.98085   y=-37.78472  rotate a1=150  a2=90
cylinder   8004   6.985      0.0       -193.04      origin x=8.98085   y=-37.78472  rotate a1=150  a2=90
cylinder   8003   6.35       0.0       -193.04      origin x=8.92243   y=-37.88590  rotate a1=150  a2=90
cylinder   8000   5.08       0.0       -193.04      origin x=9.06086   y=-37.64613  rotate a1=150  a2=90
media      24     1   4120     8005   -8006
media      24     1   4120     8006   -8004   -8015
media      5      1   4120     8004   -8003   -8013   -8014
media      24     1   4120     8003   -8000   -8013
media      60     1   4120     8000   -8010
` HB-4 (Cold Source)
sphere    8830  8.5725      chord +z=0.0      origin x=39.09437  y=8.99457   rotate a1=210  a2=90

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sphere 8831 8.255 chord +z=0.0 origin x=39.09437 y=8.99457 rotate a1=210 a2=90
 sphere 8832 7.62 chord +z=0.0 origin x=39.25439 y=8.71740 rotate a1=210 a2=90
 sphere 8833 7.30250 chord +z=0.0 origin x=39.25439 y=8.71740 rotate a1=210 a2=90
 sphere 8835 5.63245 chord +z=0.0 origin x=38.99277 y=9.17054 rotate a1=210 a2=90
 sphere 8602 4.92125 chord +z=0.0 origin x=38.99277 y=9.17054 rotate a1=210 a2=90
 sphere 8601 4.67360 chord +z=0.0 origin x=38.93054 y=9.27833 rotate a1=210 a2=90
 plane 8841 zpl=1.0 con=-5.9309 origin x=39.25439 y=8.71740 rotate a1=210 a2=90
 media 24 1 -4092 8830 -8831
 media 5 1 -4092 8831 -8832
 media 5 1 8832 8841 -8833
 media 24 1 -4092 8832 -8841 -8833
 media 24 1 -4092 8833 -8835 -8817
 media 60 1 8835 -8602
 media 24 1 8602 -8601 -8603
 media 560 1 8601
 media 560 1 8602 -8601 8603

 cylinder 8800 8.89 -9.2075 -193.04 origin x=39.09437 y=8.99457 rotate a1=210 a2=90
 cylinder 8822 8.5725 0.0 -193.04 origin x=39.09437 y=8.99457 rotate a1=210 a2=90
 cylinder 8823 8.255 0.0 -193.04 origin x=39.09437 y=8.99457 rotate a1=210 a2=90
 cylinder 8814 7.62 0.0 -193.04 origin x=39.25439 y=8.71740 rotate a1=210 a2=90
 cylinder 8817 5.63245 0.0 -193.04 origin x=38.99277 y=9.17054 rotate a1=210 a2=90
 cylinder 8604 4.92125 0.0 -193.04 origin x=38.99277 y=9.17054 rotate a1=210 a2=90
 cylinder 8603 4.67360 0.0 -193.04 origin x=38.93054 y=9.27833 rotate a1=210 a2=90
 cylinder 86254 5.02031 0.0 -0.9398 origin x=39.41314 y=8.44244 rotate a1=210 a2=90
 media 24 1 4120 8800 -8822
 media 24 1 -4092 4120 8822 -8823 -8830
 media 5 1 -4092 4120 8823 -8814 -8831 -8832
 media 24 1 -4092 4120 8814 -8817 -8832
 media 60 1 8553 -8616 8817 -8604 -8835 -86254
 media 24 1 8553 -8616 -8618 8604 -8603 -8602
 media 60 1 8553 8616 8604 -8603
 media 60 1 8553 8618 8604 -8603
 media 24 1 86254 -8604
 media 560 1 8626 8603 -8602 -8606
 media 560 1 8553 -8626 -8615 -8617 8603 -8612
 media 24 1 8553 -8626 8615 -8616 8603 -8612
 media 24 1 8553 -8626 8616 -8618 8603 -8612
 media 60 1 8553 -8626 8618 8603 -8612
 media 60 1 -8553 8629 8817 -8604
 media 60 1 -8553 8629 8604 -86221 -86241
 media 60 1 -8629 4120 8817 -8622 -8624

 ----Cold source
 ellipsoid 8605 3.103880 4.8514245 3.103880 origin x=40.76188 y=6.10636 rotate a1=210 a2=90
 ellipsoid 8606 3.403600 5.1528462 3.403600 origin x=40.83554 y=5.97877 rotate a1=210 a2=90
 sphere 8607 3.97764 origin x=40.76188 y=6.10636 rotate a1=210 a2=90
 sphere 8608 4.27736 origin x=40.83554 y=5.97877 rotate a1=210 a2=90
 plane 8626 zpl=1.0 origin x=40.76188 y=6.10636 rotate a1=210 a2=90
 media 60 1 8626 8605 8607
 media 24 1 8626 8606 8608 -8605 8607
 media 24 1 8626 8606 8608 -8607
 media 560 1 8626 8606 -8608 8603

 ecyylinder 8611 3.103880 4.8514245 1. -99.0 origin x=40.76188 y=6.10636 rotate a1=210 a2=90
 ecyylinder 8612 3.403600 5.1528462 1. -99.0 origin x=40.83554 y=5.97877 rotate a1=210 a2=90
 cylinder 8609 3.97764 1. -99.0 origin x=40.76188 y=6.10636 rotate a1=210 a2=90
 cylinder 8610 4.27736 1. -99.0 origin x=40.83554 y=5.97877 rotate a1=210 a2=90
 cylinder 8627 2.2225 99.0 -99.0 origin x=42.51829 y=3.06416 rotate a1=120 a2=90
 cylinder 86271 7.12216 99.0 -99.0 origin x=29.56403 y=17.06880 rotate a1=210 a2=90
 cylinder 86272 7.12216 99.0 -99.0 origin x=36.86705 y=21.28520 rotate a1=210 a2=90
 plane 8553 zpl=1.0 origin x=44.64554 y=-0.62034 rotate a1=210 a2=90
 plane 8615 xpl=0.5 zpl=0.8660254 con=-11.97937 origin x=33.21554 y=19.177 rotate a1=300
 plane 8616 xpl=0.5 zpl=0.8660254 con=-12.27909 origin x=33.21554 y=19.177 rotate a1=300
 plane 8617 xpl=0.5 zpl=-0.8660254 con=-11.97937 origin x=33.21554 y=19.177 rotate a1=300
 plane 8618 xpl=0.5 zpl=-0.8660254 con=-12.27909 origin x=33.21554 y=19.177 rotate a1=300
 plane 8629 zpl=1.0 origin x=45.91554 y=-2.82005 rotate a1=210 a2=90
 cylinder 8621 0.635 99.0 -99.0 origin x=36.71307 y=21.19630 rotate a1=210 a2=90
 cylinder 8622 0.71501 99.0 -99.0 origin x=36.71307 y=21.19630 rotate a1=210 a2=90
 cone 86221 1.0807 3.5 0.70456 -0.1 origin x=49.41307 y=-0.80075 rotate a1=210 a2=90
 cylinder 8623 0.635 99.0 -99.0 origin x=29.71801 y=17.15770 rotate a1=210 a2=90
 cylinder 8624 0.71501 99.0 -99.0 origin x=29.71801 y=17.15770 rotate a1=210 a2=90
 cone 86241 1.0807 3.5 0.70456 -0.1 origin x=42.41801 y=-4.83935 rotate a1=210 a2=90
 media 60 1 8553 -8626 8611 8609 -8627
 media 60 1 8553 -8626 8611 8609 8627 86271 86272
 media 20 1 8553 -8626 -8616 -8618 8612 8610 -8611 8609
 media 60 1 8553 -8626 8616 8618 8612 8610 -8611 8609
 media 20 1 8553 -8626 -8616 -8618 8612 8610 -8609
 media 60 1 8553 -8626 8616 8618 8612 8610 -8609
 media 60 1 8553 -8626 8618 8612 8610 -8609

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media      560      1    8553   -8626   -8615      -8617      8612   -8610   8603
media      24       1    8553   -8626   8615   -8616      8612   -8610   8603
media      24       1    8553   -8626           8617   -8618      8612   -8610   8603
media      60       1    8553   -8626           8616           8618      8612   -8610   8603
media      60       1    8553   -8626           8618           8612   -8610   8603
media      24       1           8611   8627   -86271
media      24       1           8611   8627   -86272
media      24       1    -8553   8629   8604   86221   -8611   -8621
media      60       1    -8553   8629   8604   86221   8611   -8621
media      24       1   -8629   4120   8622   -8621
media      560      1   -8553   4120   8621
media      24       1   -8553   8629   8604   86241   -8611   -8623
media      60       1   -8553   8629   8604   86241   8611   -8623
media      24       1   -8629   4120   8624   -8623
media      560      1   -8553   4120   8623

'----- Engineering Facilities (Slant tubes) -----
plane     101          zpl=1.0    con=-30.48
plane     201          zpl=1.0    con=30.48
'-----EF-1-----
cylinder  8210  4.1834      99.0   -99.0  origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
cylinder  8211  4.8819      99.0   -99.0  origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
cylinder  8212  5.08       99.0   -99.0  origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
cylinder  8213  5.3975      99.0   -99.0  origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
cylinder  8214  5.87375     99.0   -99.0  origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
media      7       1    4120   -101    201    8210
media      24      1    4120   -101    201    8211   -8210
media      5       1    4120   -101    201    8212   -8211
media      24      1    4120   -101    201    8213   -8212
media      7       1    4120   -101    201    8214   -8213
'-----EF-2-----
cylinder  8230  4.1834      99.0   -99.0  origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
cylinder  8231  4.8819      99.0   -99.0  origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
cylinder  8232  5.08       99.0   -99.0  origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
cylinder  8233  5.3975      99.0   -99.0  origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
cylinder  8234  5.87375     99.0   -99.0  origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
media      7       1    4120   -101    201    8230
media      24      1    4120   -101    201    8231   -8230
media      5       1    4120   -101    201    8232   -8231
media      24      1    4120   -101    201    8233   -8232
media      7       1    4120   -101    201    8234   -8233
'-----First ring of permanent reflector-----
cylinder  9001 36.3375      30.48   -30.48
media     105      1    9001   -4092
                           -8861   -8862   -8864
                           -7915
                           -8006   -8015
                           -8822   -8830   -8800
                           -4200   -4400   -4600   -4800   -5000   -5200   -5400   -5600   -5900
                           -6100   -6250
'-----Second ring of permanent reflector-----
cylinder  9002 39.3375      30.48   -30.48
media     106      1    9002   -9001
                           -8861   -8862   -8864
                           -7915
                           -8006   -8015
                           -8822   -8830   -8800
                           -4200   -4400   -4600   -4800   -5000   -5200   -5400   -5600   -5900
                           -6100   -6250
'-----Third ring of permanent reflector-----
cylinder  9003 42.3375      30.48   -30.48
media     107      1    9003   -9002
                           -8861   -8862   -8864
                           -7915
                           -8005   -8006   -8015
                           -8822   -8830   -8800
                           -4200   -4400   -4600   -4800   -5000   -5200   -5400   -5600   -5900
                           -6100   -6250
'-----Fourth ring of permanent reflector-----
cylinder  9004 45.3375      30.48   -30.48
media     108      1    9004   -9003
                           -8861   -8862   -8864
                           -7906   -7915
                           -8005   -8006   -8015
                           -8822   -8830   -8800
                           -4300   -4500   -4900   -5100   -5300   -5500   -5700   -5800
                           -6000   -6200
'-----Fifth ring of permanent reflector-----
cylinder  9005 48.3375      30.48   -30.48
media     109      1    9005   -9004
                           -8861   -8862   -8864

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          -7905   -7906
          -8005   -8006
          -8822   -8830   -8800
          -4300   -4500   -4900   -5100   -5300   -4700   -5500   -5700   -5800
          -6000   -6200

' Sixth ring of permanent reflector
cylinder 9006 51.3375    30.48   -30.48
media     110      1    9006   -9005
          -8861   -8862
          -7905   -7906
          -8005   -8006
          -8822   -8830   -8800
          -4700   -5500   -5700   -5800   -6000   -6200
          -8214   -8234

' Seventh ring of permanent reflector
cylinder 9007 54.61    30.48   -30.48
media     111      1    9007   -9006
          -8861
          -7905
          -8005
          -8822   -8800
          -8214   -8234

' water region--above core region
cylinder 4104 54.61    149.9907  -30.48
media      6      1    4104   -9007   -4092   -4800
' water region--below core region
cylinder 4105 54.61    149.9907  -149.9907
media      4      1    4105   -4104   -4092

' Bit of water
cylinder 4110 55.245   149.9907  -149.9907
media      7      1    4110   -4105
          -8861
          -7905
          -8005
          -8800
          -8214   -8234

' Reflector Container
cylinder 4120 56.8325   149.9907  -149.9907
media     24      1    4120   -4110   -101     201
          -8861
          -7905
          -8005
          -8800
          -8214   -8234
media     24      1    4120   -4110     101
media     24      1    4120   -4110   -201
boundary  4120
' end unit 4100

unit 4160
' water just outside outer reflector container
cylinder 4130 119.38    149.9908  -149.9908
hole      4100

' HB-1
cylinder 8875  6.35      0.0     -193.04   origin x=27.05350  y=29.84997  rotate a1=30  a2=90
cylinder 8870  5.08      0.0     -193.04   origin x=27.19193  y=29.61020  rotate a1=30  a2=90
media     24      1    4160    8875   -8870
media     60      1    4160    8870

' HB-2 (Radial Tube)
cylinder 7903 10.795     0.0     -22.22774  origin x=-43.57606  y=0.0      rotate a1=90  a2=90
cylinder 7900 8.95604     0.0     -22.22774  origin x=-43.57606  y=0.0      rotate a1=90  a2=90
media     24      1    4160    7903   -7900
media     60      1    4160    7900
cone     7934 10.795     -22.22774  13.96365  -34.0533   origin x=-43.57606  y=0.0      rotate a1=90  a2=90
cone     7933 8.95604     -22.22774  11.49350  -34.0533   origin x=-43.57606  y=0.0      rotate a1=90  a2=90
media     24      1    4160    7934   -7933
media     60      1    4160    7933
cylinder 7936 13.96365   -34.0533  -193.04   origin x=-43.57606  y=0.0      rotate a1=90  a2=90
cylinder 7935 11.49350   -34.0533  -193.04   origin x=-43.57606  y=0.0      rotate a1=90  a2=90
media     24      1    4160    7936   -7935
media     60      1    4160    7935
cone     7937 15.062      0.0     17.872     20.0      origin x=-138.43   y=0.0      rotate a1=90  a2=90
media     7      1    -4130    7937   -7936
cylinder 7939 33.17875   0.0     17.87     origin x=-138.43   y=0.0      rotate a1=90  a2=90
media     50      1    4160   -4150    7939   -7937

' HB-3
cylinder 8003  6.35      0.0     -293.04   origin x=8.92243   y=-37.88590  rotate a1=150 a2=90
cylinder 8000  5.08      0.0     -293.04   origin x=9.06086   y=-37.64613  rotate a1=150 a2=90
media     24      1    4160    8003   -8000
media     60      1    4160    8000

' HB-4 (Cold Source)

```

cylinder 8800 8.89 29.0 -99.0 origin x=59.88554 y=-27.01680 rotate a1=210 a2=90
 cylinder 8814 7.62 29.0 -99.0 origin x=59.88554 y=-27.01680 rotate a1=210 a2=90
 cylinder 8817 5.63245 29.0 -99.0 origin x=59.88554 y=-27.01680 rotate a1=210 a2=90
 plane 8845 zpl=1.0 origin x=59.88554 y=-27.01680 rotate a1=210 a2=90
 cone 8807 7.6183 7.63 8.9067 -0.1 origin x=63.69554 y=-33.61591 rotate a1=210 a2=90
 cone 8810 5.6310 7.63 6.7325 -0.1 origin x=63.69554 y=-33.61591 rotate a1=210 a2=90
 plane 8846 zpl=1.0 origin x=63.69554 y=-33.61591 rotate a1=210 a2=90
 cylinder 8803 6.71830 29.0 -99.0 origin x=63.69554 y=-33.61591 rotate a1=210 a2=90
 media 5 1 8845 8800 -8814
 media 24 1 8845 8814 -8817
 media 60 1 8845 8817 -8622 -8624
 media 5 1 -8845 8846 8800 -8807
 media 24 1 -8845 8846 8800 8807 -8810
 media 60 1 -8845 8846 8810 -8622 -8624
 media 24 1 -8846 4160 8800 -8803
 media 60 1 -8846 4160 8803 -8622 -8624

 cylinder 8621 0.635 0.0 -199.0 origin x=36.71307 y=21.19630 rotate a1=210 a2=90
 cylinder 8622 0.71501 0.0 -199.0 origin x=36.71307 y=21.19630 rotate a1=210 a2=90
 cylinder 8623 0.635 0.0 -199.0 origin x=29.71801 y=17.15770 rotate a1=210 a2=90
 cylinder 8624 0.71501 0.0 -199.0 origin x=29.71801 y=17.15770 rotate a1=210 a2=90
 media 24 1 4160 8622 -8621
 media 560 1 4160 8621
 media 24 1 4160 8624 -8623
 media 560 1 4160 8623

Engineering Facilities (Slant tubes)

plane 101 zpl=1.0 con=-30.48
 plane 201 zpl=1.0 con=30.48

EF-1

cylinder 8210 4.1834 99.0 -99.0 origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
 cylinder 8211 4.8819 99.0 -99.0 origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
 cylinder 8212 5.08 99.0 -99.0 origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
 cylinder 8213 5.3975 99.0 -99.0 origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
 cylinder 8214 5.87375 99.0 -99.0 origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
 cylinder 8215 6.50875 99.0 -99.0 origin x=46.110552 y=30.427406 rotate a1=33.42 a2=-49 a3=90
 media 7 1 4130 -101 201 8210
 media 24 1 4130 -101 201 8211 -8210
 media 5 1 4130 -101 201 8212 -8211
 media 24 1 4130 -101 201 8213 -8212
 media 7 1 4130 -101 201 8214 -8213
 media 24 1 4130 -101 201 8215 -8214

EF-2

cylinder 8230 4.1834 99.0 -99.0 origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
 cylinder 8231 4.8819 99.0 -99.0 origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
 cylinder 8232 5.08 99.0 -99.0 origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
 cylinder 8233 5.3975 99.0 -99.0 origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
 cylinder 8234 5.87375 99.0 -99.0 origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
 cylinder 8235 6.50875 99.0 -99.0 origin x=-11.410619 y=54.053749 rotate a1=101.92 a2=-49 a3=90
 media 7 1 4130 -101 201 8230
 media 24 1 4130 -101 201 8231 -8230
 media 5 1 4130 -101 201 8232 -8231
 media 24 1 4130 -101 201 8233 -8232
 media 7 1 4130 -101 201 8234 -8233
 media 24 1 4130 -101 201 8235 -8234

media 7 1 4130 -101 201
 -8875
 -7903 -7934 -7936
 -8003
 -8800
 -8215 -8235

media 7 1 4130 101
 media 7 1 4130 -201

Pressure vessel

cylinder 4140 119.6975 149.9908 -149.9908
 media 40 1 4140 -4130
 -8875
 -7937
 -8003
 -8800

cylinder 4150 127.0 149.9908 -149.9908
 media 50 1 4150 -4140
 -8875
 -7937
 -8003
 -8800

cylinder 4160 127.254 149.9908 -149.9908
 media 40 1 4160 -4150
 -8875

```

-7939
-8003
-8800
boundary 4160
' end unit 4160
'
unit 4170
' water just outside pressure vessel
cylinder 4170 274.32    149.9909   -149.9909
hole     4160
' HB-1
cylinder 8875  6.35      0.0       -293.04   origin x=27.05350  y=29.84997  rotate a1=30  a2=90
cylinder 8870  5.08      0.0       -293.04   origin x=27.19193  y=29.61020  rotate a1=30  a2=90
media    24    1        4170    8875    -8870
media    60    1        4170    8870
' HB-2 (Radial Tube)
cylinder 7936 13.96365  -34.0533  -293.04   origin x=-43.57606  y=0.0      rotate a1=90  a2=90
cylinder 7935 11.49350  -34.0533  -293.04   origin x=-43.57606  y=0.0      rotate a1=90  a2=90
media    24    1        4170    7936    -7935
media    60    1        4170    7935
cone     7937 15.062     0.0       17.872   20.0       origin x=-138.43  y=0.0      rotate a1=90  a2=90
media    7     1        7937    7939    -7936
cylinder 7939 33.17875  0.0       17.87   origin x=-138.43  y=0.0      rotate a1=90  a2=90
media    50    1        7939    -7937   -7936
' HB-3
cylinder 8003  6.35      0.0       -293.04   origin x=8.92243   y=-37.88590  rotate a1=150 a2=90
cylinder 8000  5.08      0.0       -293.04   origin x=9.06086   y=-37.64613  rotate a1=150 a2=90
media    24    1        4170    8003    -8000
media    60    1        4170    8000
' HB-4 (Cold Source)
cylinder 8800  8.89      99.0      0.0      origin x=132.27554 y=-152.39995 rotate a1=210 a2=90
cylinder 8803  6.71830   99.0      0.0      origin x=132.27554 y=-152.39995 rotate a1=210 a2=90
cylinder 8910 13.97      5.3975   -99.0    origin x=132.27554 y=-152.39995 rotate a1=210 a2=90
cylinder 8911 13.335    0.0       -99.0    origin x=132.27554 y=-152.39995 rotate a1=210 a2=90
cylinder 8912 12.7       0.0       -2.54    origin x=132.27554 y=-152.39995 rotate a1=210 a2=90
cylinder 8902  6.71830   0.0       -2.54    origin x=132.27554 y=-152.39995 rotate a1=210 a2=90
cylinder 8903  6.71830   0.0       -0.3175   origin x=132.27554 y=-152.39995 rotate a1=210 a2=90
media    24    1        8800    -8803
media    60    1        8803    -8622   -8624
media    24    1        8910    -8800   -8911
media    60    1        8911    -8912
media    24    1        8912    -8902
media    60    1        8902    -8903
media    24    1        8903
'
cylinder 8621  0.635     0.0       -299.0   origin x=36.71307  y=21.19630  rotate a1=210 a2=90
cylinder 8622  0.71501   0.0       -299.0   origin x=36.71307  y=21.19630  rotate a1=210 a2=90
cylinder 8623  0.635     0.0       -299.0   origin x=29.71801  y=17.15770  rotate a1=210 a2=90
cylinder 8624  0.71501   0.0       -299.0   origin x=29.71801  y=17.15770  rotate a1=210 a2=90
media    24    1        8803    8622   -8621
media    560   1        8803    8621
media    24    1        8803    8624   -8623
media    560   1        8803    8623
'
media    8     1        4170
                   -8875
                   -7936   -7939
                   -8003
                   -8800   -8910
boundary 4170
' end unit 4170
'
unit 9997
' biological shielding
cylinder 4018 720.0     149.991   -149.991
hole     4170
' HB-1
cylinder 8875  6.35      0.0       -750.0   origin x=27.05350  y=29.84997  rotate a1=30  a2=90
cylinder 8870  5.08      0.0       -750.0   origin x=27.19193  y=29.61020  rotate a1=30  a2=90
media    24    1        4018    8875    -8870
media    60    1        4018    8870
' HB-2 (Radial Tube)
cylinder 7936 13.96365  0.0       -750.0   origin x=-43.57606  y=0.0      rotate a1=90  a2=90
cylinder 7935 11.49350  0.0       -750.0   origin x=-43.57606  y=0.0      rotate a1=90  a2=90
media    24    1        4018    7936    -7935
media    60    1        4018    7935
' HB-3
cylinder 8003  6.35      0.0       -750.0   origin x=8.92243   y=-37.88590  rotate a1=150 a2=90
cylinder 8000  5.08      0.0       -750.0   origin x=9.06086   y=-37.64613  rotate a1=150 a2=90
media    24    1        4018    8003    -8000
media    60    1        4018    8000

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'   HB-4 (Cold Source)
cylinder 8910 13.97      0.0     -211.7725    origin x=132.27554  y=-152.39995 rotate a1=210 a2=90
cylinder 8911 13.335     0.0     -211.455     origin x=132.27554  y=-152.39995 rotate a1=210 a2=90
cylinder 8912 13.97      0.0     -750.0      origin x=132.27554  y=-152.39995 rotate a1=210 a2=90
media      60      1     4018      8911
media      24      1     4018      8910     -8911
media      60      1     4018      8912     -8910
'
media      62      1     4018
               -8875
               -7936
               -8003
               -8912
boundary    4018
' end unit 9997
'

global unit 9999
cylinder 9999 721.0      150.0     -150.0
hole      9997
media      0      1     9999
boundary    9999

end geometry

read boun all=vacuum end boun

read plot
ttl='003.Core Cross Section at z=0 cm (Full Model)'
  TYP=XY
  XUL=-750.0 YUL=750.0 ZUL=0.
  XLR=750.0  YLR=-750.0 ZLR=0.
  NAX=1280 end
ttl='Target Basket Cross Section at z=0 cm'
  TYP=XY
  XUL=-8.0  YUL=8.0  ZUL=0.
  XLR=8.0   YLR=-8.0  ZLR=0.
  NAX=1280 end
ttl='Core Cross Section at z=+50 cm'
  TYP=XY
  XUL=-80.0 YUL=80.0  ZUL=+50.
  XLR=80.0  YLR=-80.0 ZLR=+50.
  NAX=1280 end
ttl='Core Cross Section at z=+35 cm'
  TYP=XY
  XUL=-80.0 YUL=80.0  ZUL=+35.
  XLR=80.0  YLR=-80.0 ZLR=+35.
  NAX=1280 end
ttl='Core Cross Section at z=+5 cm'
  TYP=XY
  XUL=-80.0 YUL=80.0  ZUL=+5.
  XLR=80.0  YLR=-80.0 ZLR=+5.
  NAX=1280 end
ttl='Core Cross Section at z=0 cm'
  TYP=XY
  XUL=-80.0 YUL=80.0  ZUL=0.
  XLR=80.0  YLR=-80.0 ZLR=0.
  NAX=1280 end
ttl='HB-1 Tip Cross Section at z=0 cm'
  TYP=XY
  XUL=19.0  YUL=38.0  ZUL=0.
  XLR=35.0  YLR=22.0  ZLR=0.
  NAX=1280 end
ttl='HB-2 Tip Cross Section at z=0 cm'
  TYP=XY
  XUL=-59.5 YUL=14.5  ZUL=0.
  XLR=-30.5 YLR=-14.5 ZLR=0.
  NAX=1280 end
ttl='HB-3 Tip Cross Section at z=0 cm'
  TYP=XY
  XUL=0.5   YUL=-29.5 ZUL=0.
  XLR=16.5  YLR=-45.5 ZLR=0.
  NAX=1280 end
ttl='HB-4 Tip Cross Section at z=0 cm'
  TYP=XY
  XUL=29.0  YUL=18.0  ZUL=0.
  XLR=53.0  YLR=-6.0  ZLR=0.
  NAX=1280 end
ttl='Core Cross Section at z=0 cm'
  TYP=XY
  XUL=-200.0 YUL=200.0 ZUL=0.

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```

XLR=200.0 YLR=-200.0 ZLR=0.
NAX=1280 end
ttl='Core Cross Section at z=-5 cm'
TYP=XY
XUL=-80.0 YUL=80.0 ZUL=-5.
XLR=80.0 YLR=-80.0 ZLR=-5.
NAX=1280 end
ttl='Core Cross Section at z=-35 cm'
TYP=XY
XUL=-80.0 YUL=80.0 ZUL=-35.
XLR=80.0 YLR=-80.0 ZLR=-35.
NAX=1280 end
ttl='Core Cross Section at z=-50 cm'
TYP=XY
XUL=-80.0 YUL=80.0 ZUL=-50.
XLR=80.0 YLR=-80.0 ZLR=-50.
NAX=1280 end
ttl='Vertical View of the HFIR Core, y=0 cm'
TYP=XZ
XUL=-80.0 YUL=0. ZUL=151.
XLR=80.0 YLR=0. ZLR=-151.
UAX=1.0 WDN=-1.0 NAX=1280 end
ttl='Vertical View of the HFIR Core, y=7.296944 cm'
TYP=XZ
XUL=-80.0 YUL=7.296944 ZUL=151.
XLR=80.0 YLR=7.296944 ZLR=-151.
UAX=1.0 WDN=-1.0 NAX=1280 end
ttl='Vertical View of the HFIR Core, y=13.445625 cm'
TYP=XZ
XUL=-80.0 YUL=13.445625 ZUL=151.
XLR=80.0 YLR=13.445625 ZLR=-151.
UAX=1.0 WDN=-1.0 NAX=1280 end
ttl='Vertical View of the HFIR Core, y=23.765063 cm'
TYP=XZ
XUL=-80.0 YUL=23.765063 ZUL=151.
XLR=80.0 YLR=23.765063 ZLR=-151.
UAX=1.0 WDN=-1.0 NAX=1280 end
ttl='Vertical View of the HFIR Core, y=26.311930 cm'
TYP=XZ
XUL=-80.0 YUL=26.311930 ZUL=151.
XLR=80.0 YLR=26.311930 ZLR=-151.
UAX=1.0 WDN=-1.0 NAX=1280 end
end plot

end data
end

```


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