

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).

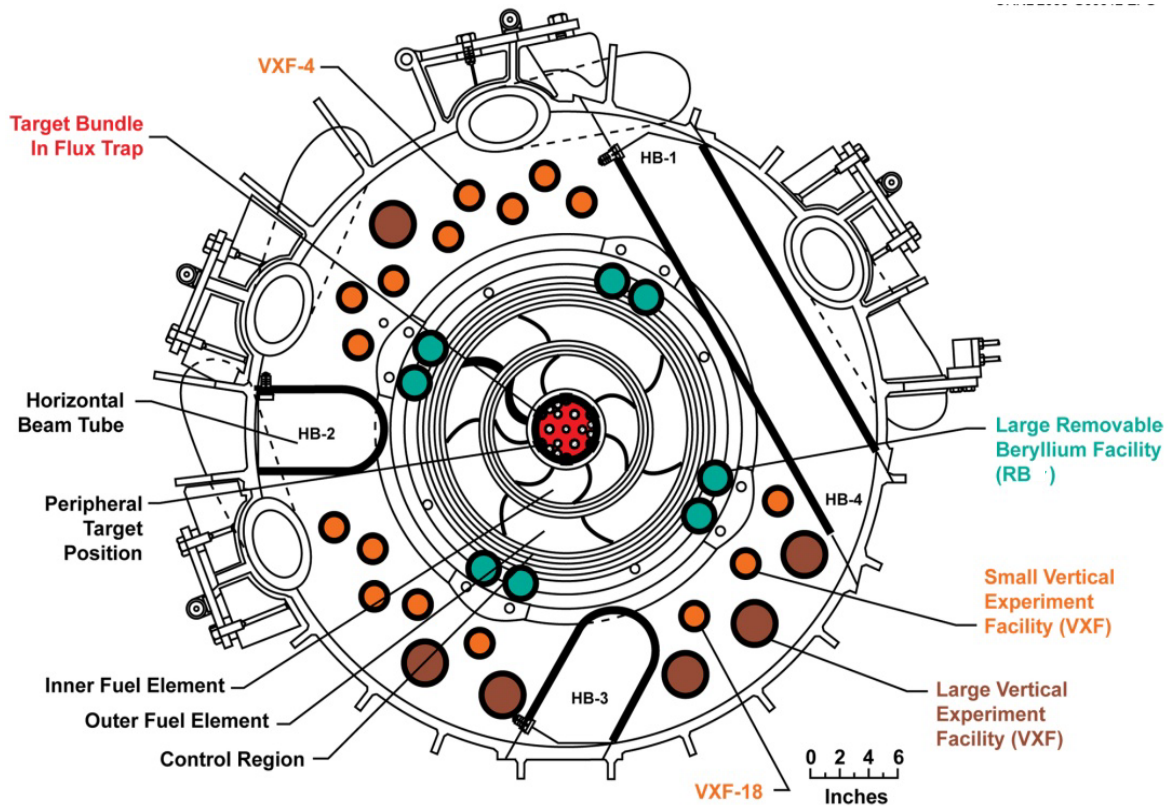


Fig. 1. HFIR schematic at core midplane (before removal of two engineering facilities).

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.

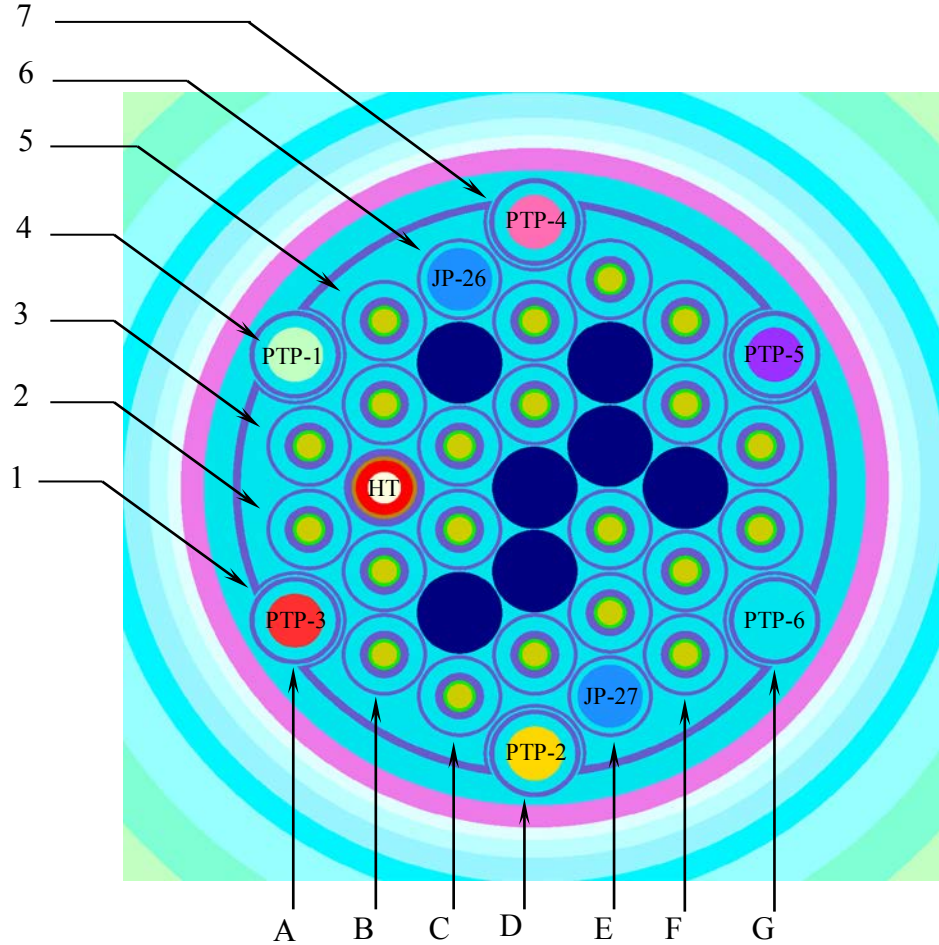


Fig. 2. Numbering scheme for the central target region (radial view) in the SCALE HFIR model.

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 containing¹ $15.18 \pm 1\%$ 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 (¼ 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

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

^b Layer 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.

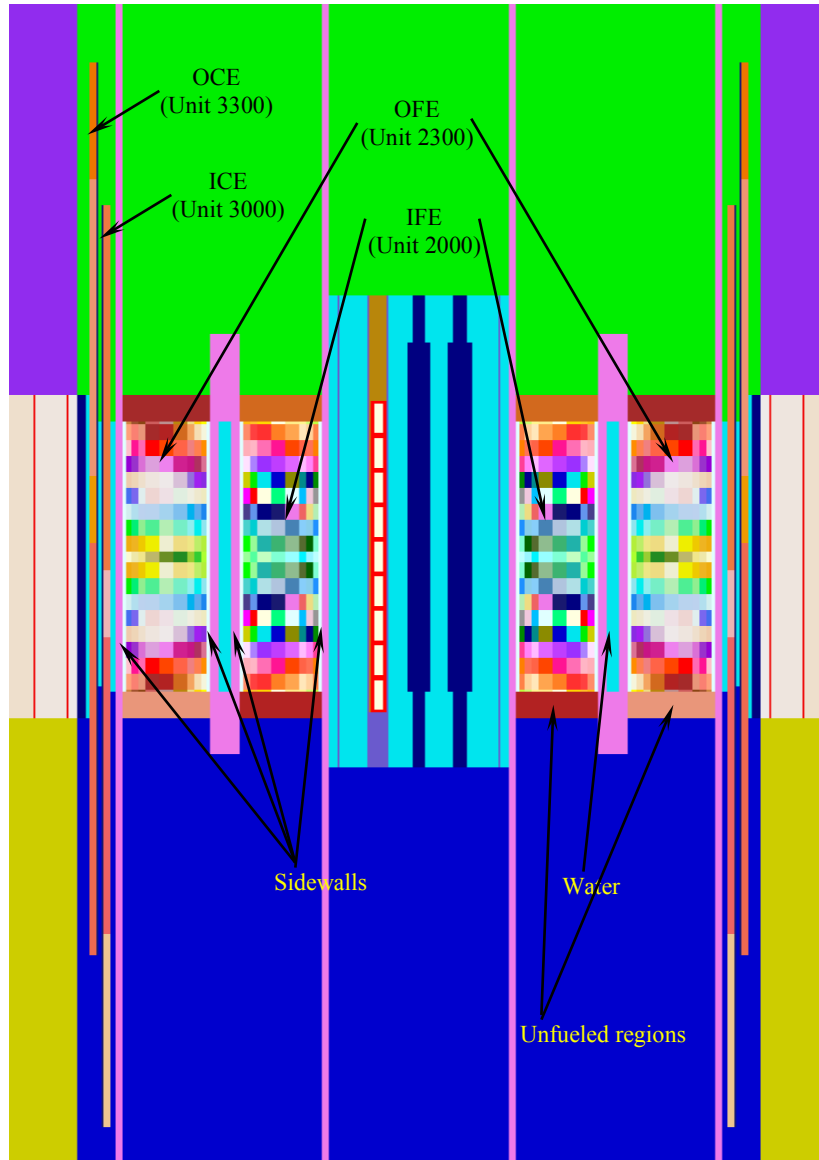


Fig. 3. Fuel and control regions (axial view) in the SCALE HFIR model.

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.

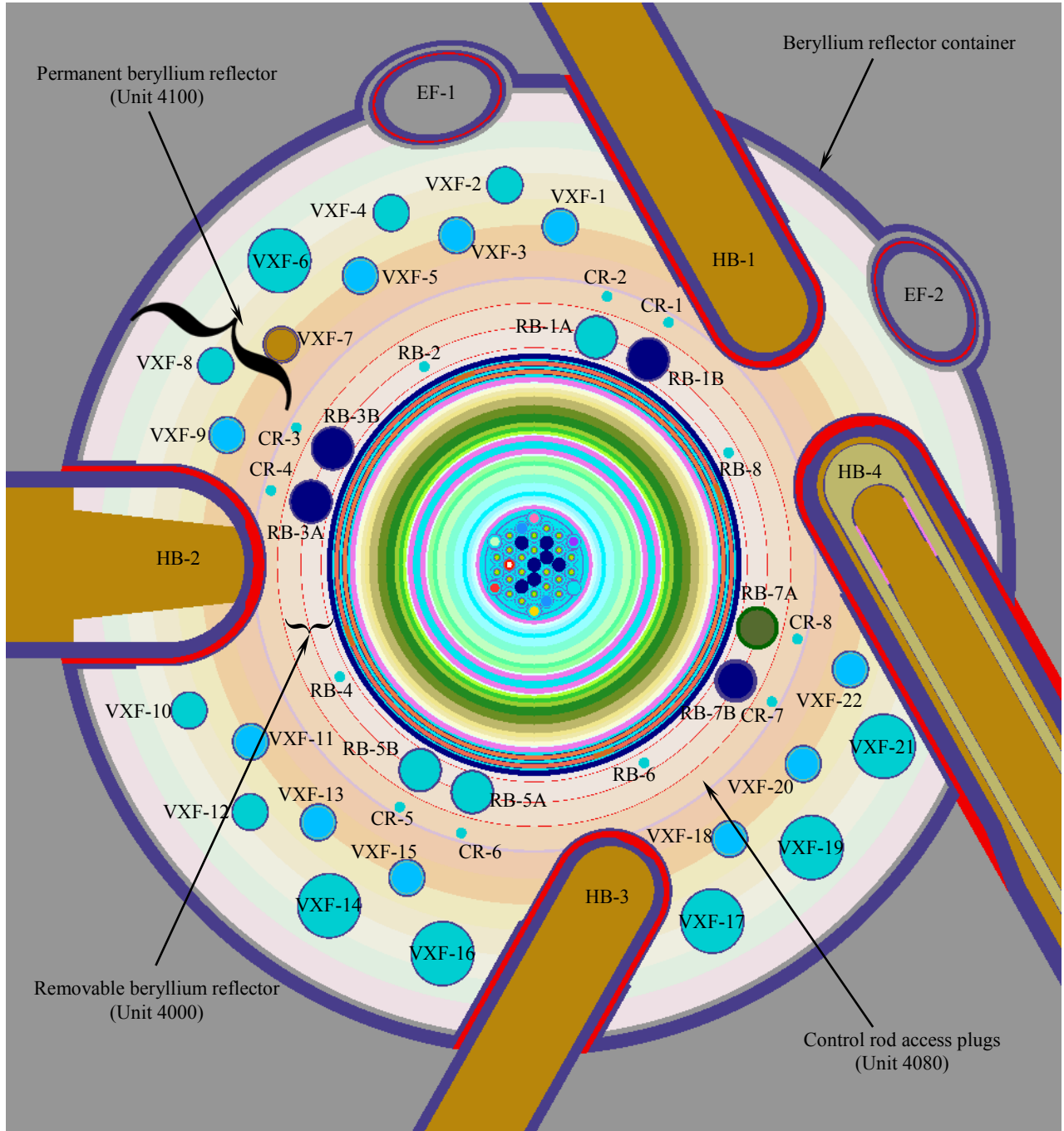


Fig. 4. Beryllium reflector at the horizontal midplane in the Scale HFIR model.

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.

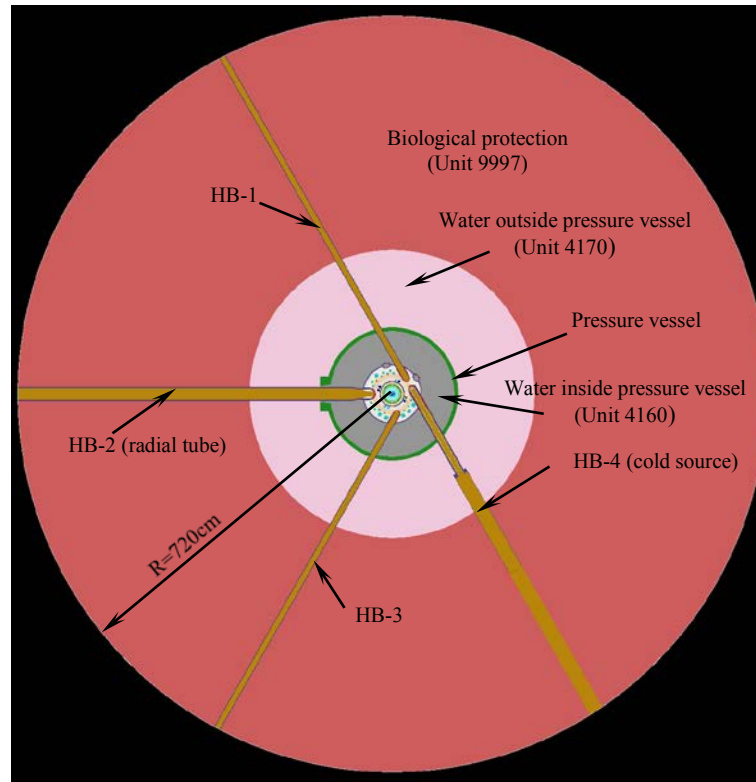


Fig. 5. Main outer core components of the SCALE HFIR model.

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).

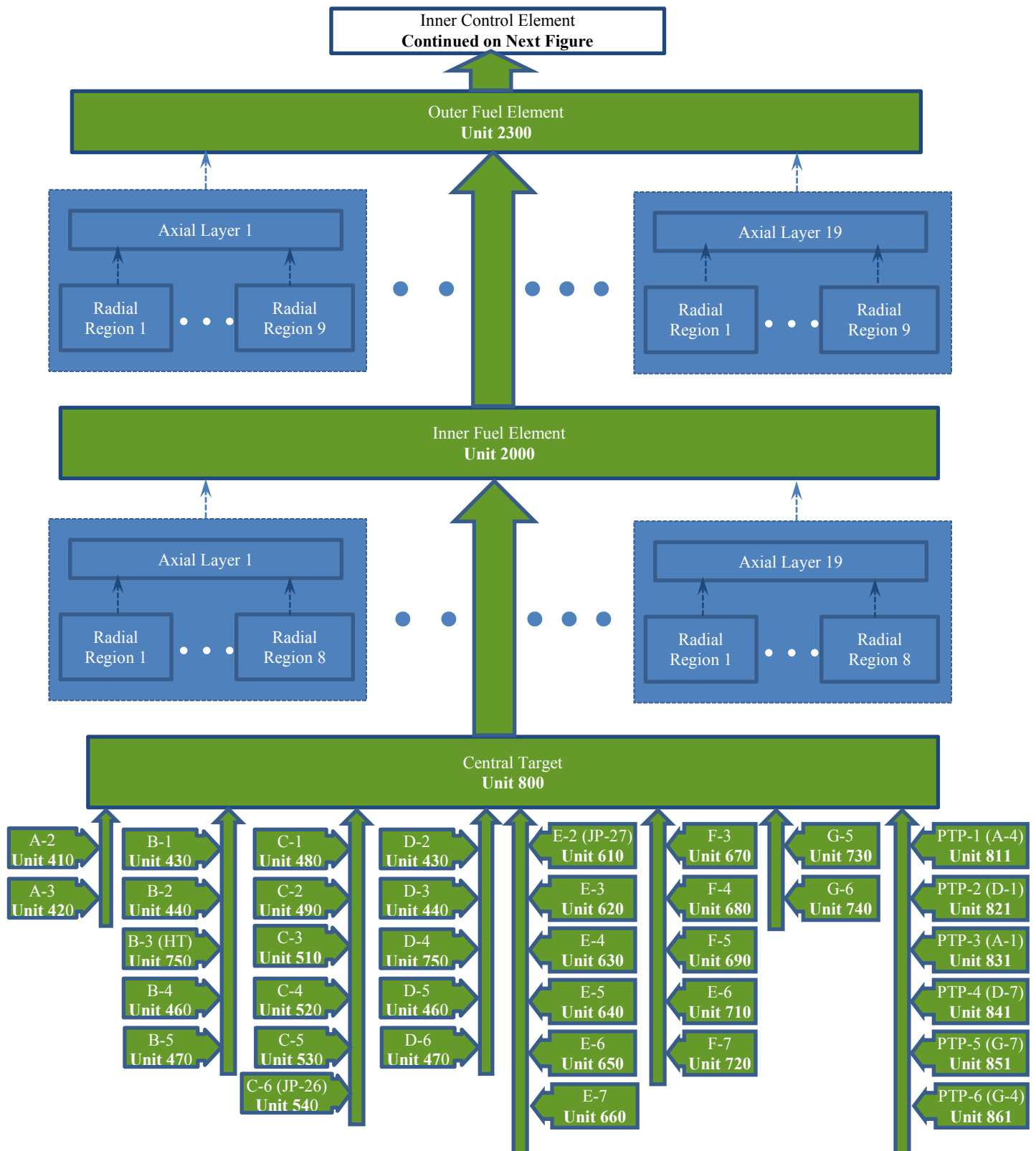


Fig. 6. Flowchart of the HFIR Scale model (fuel and central target regions).

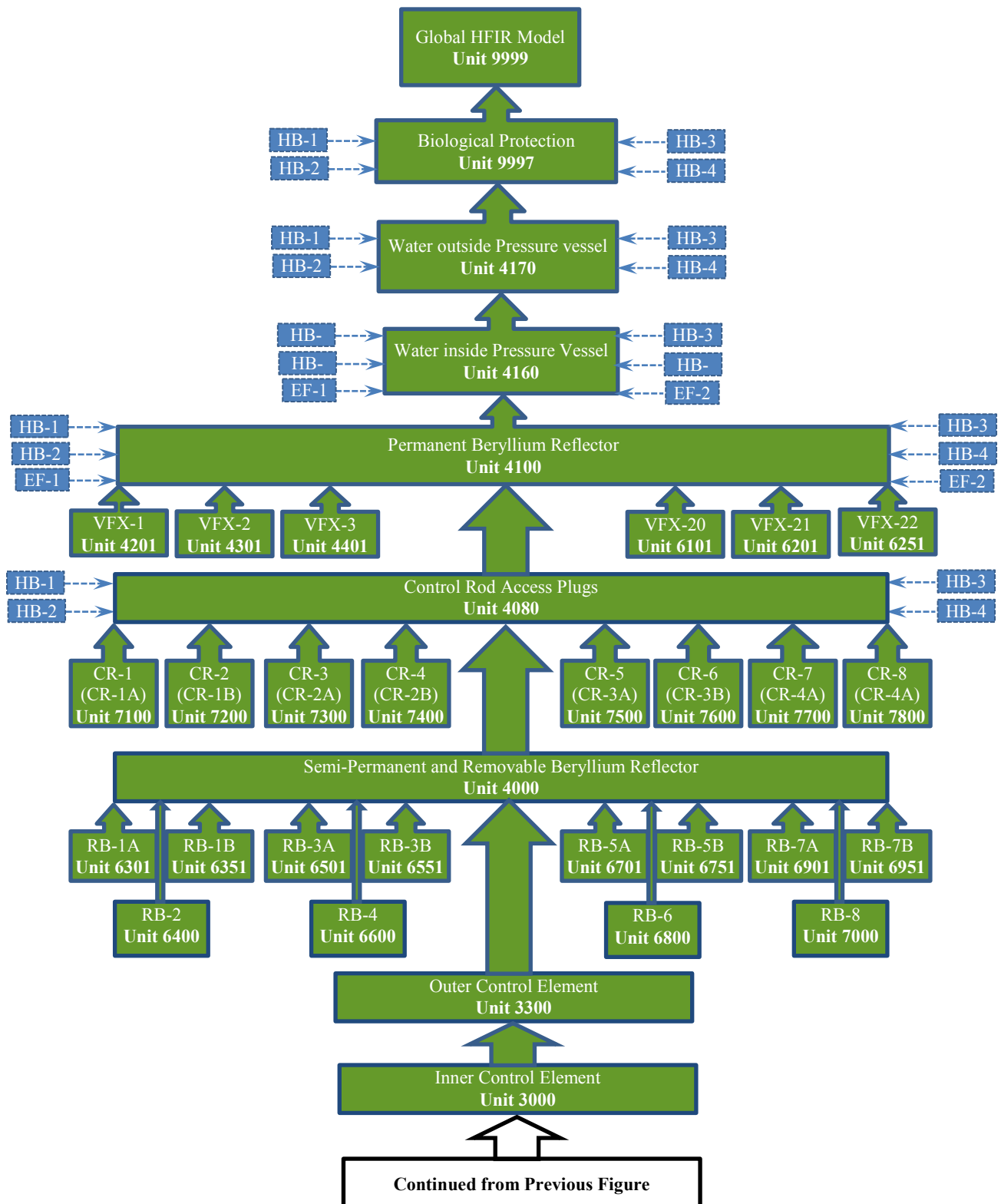


Fig. 7. Flowchart of the HFIR Scale model (outside the fuel region).

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 2*ar* or 3*ar* 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.

CE library can be
changed easily

```
1 =ceas26
2 HFIR model, Dan Ilas, May-June 2011
3 ce_v7
4 read comp
5
6
7 (3) Material Descriptions
8
9
10 Region 1 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= 156F or 69C
16 - Density= 0.9794 g/cm3
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
23 This is a SCALE only material:
24 It is the same as material 1, but corresponds to a density of 1.00000E+00 on cell cards
25 H-1 100 0 6.68484E-02 293.6 end
26 O-16 100 0 3.34293E-02 293.6 end
27
28 Water in core region - Avg. Density= 0.98465 g/cm3
29 H-1 2 0 6.63485E-02 293.6 end
30 O-16 2 0 3.31742E-02 293.6 end
31
32 Water above core region - Inlet Pressure= 3.33 MPa or 468 psi
33 - Inlet Temperature= 120F or 49C
34 - Density= 0.9899 g/cm3
35 H-1 3 0 6.67020E-02 293.6 end
36 O-16 3 0 3.33101E-02 293.6 end
37
38 Aluminum in target basket area
39 Al-27 25 0 8.85482E-04 293.6 end
40 H-1 25 0 3.45716E-04 293.6 end
41 Hg-24 25 0 5.26432E-04 293.6 end
42 Hg-25 25 0 6.68986E-05 293.6 end
43 Hg-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 1.87768E-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
```

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.

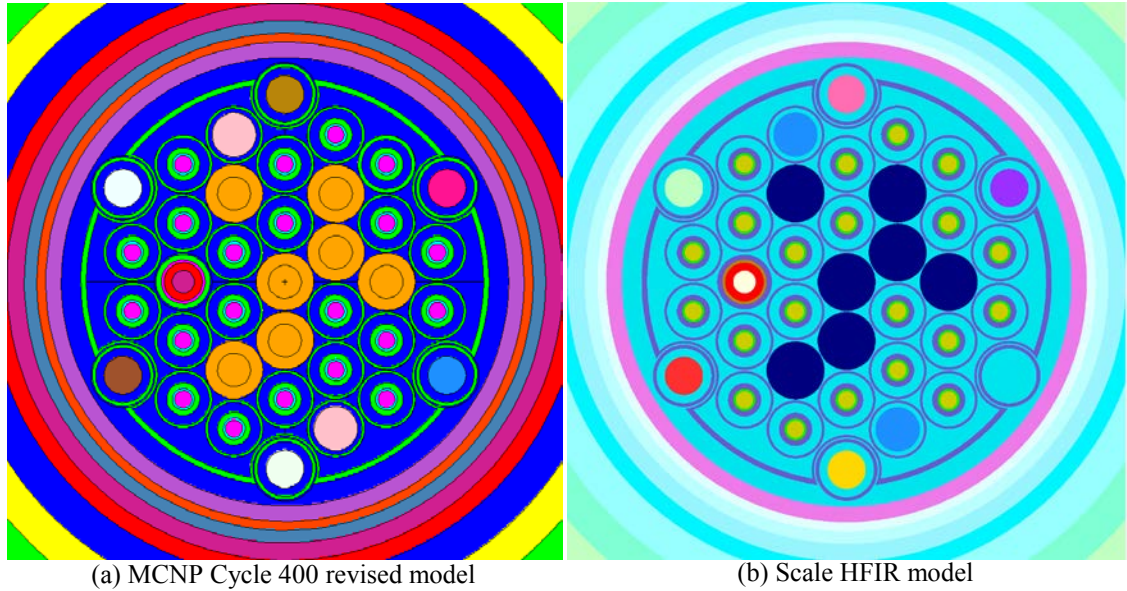


Fig. 9. Comparison of the central target region layouts.

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.

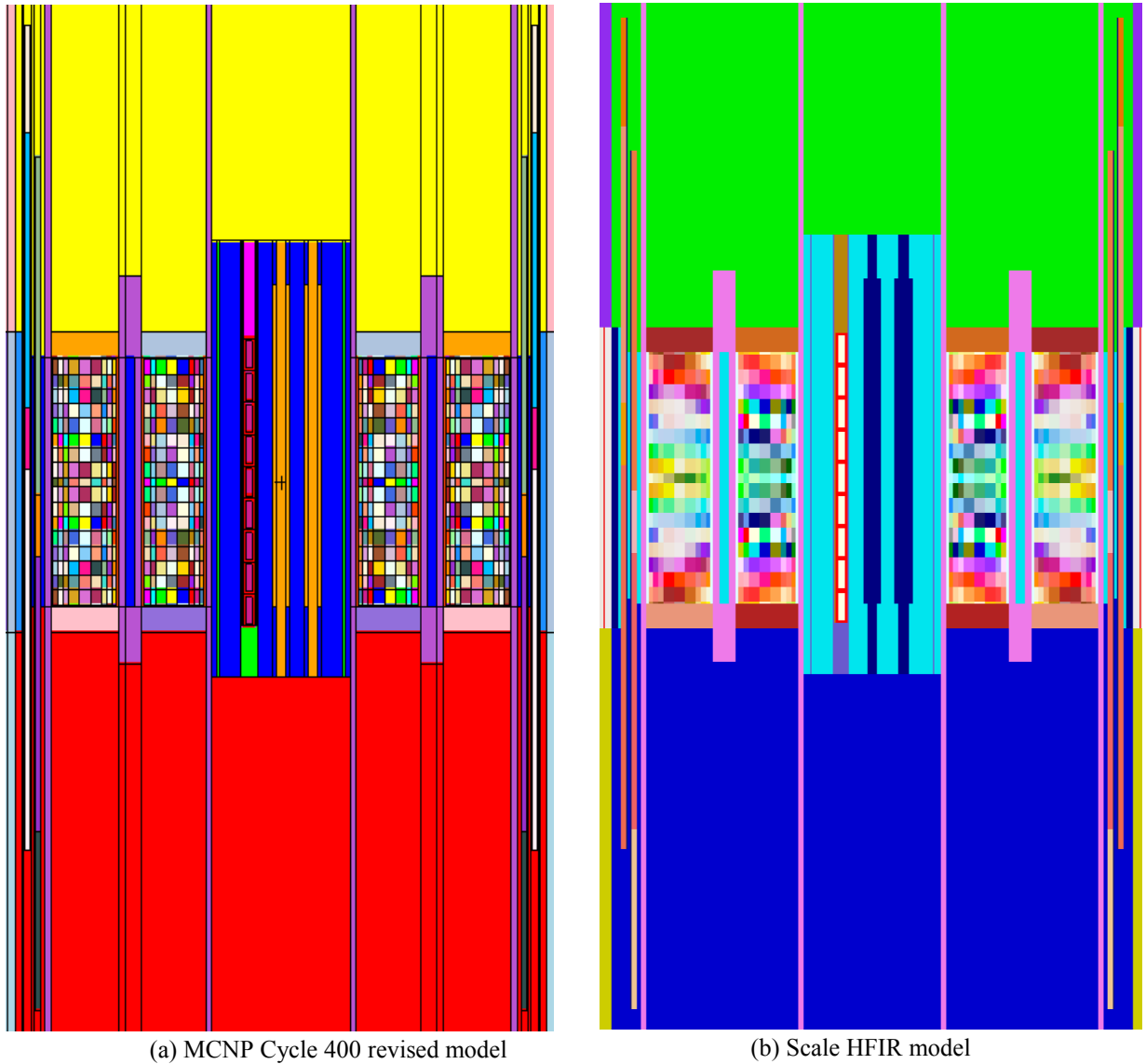


Fig. 10. Comparison of the fuel and control regions.

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.

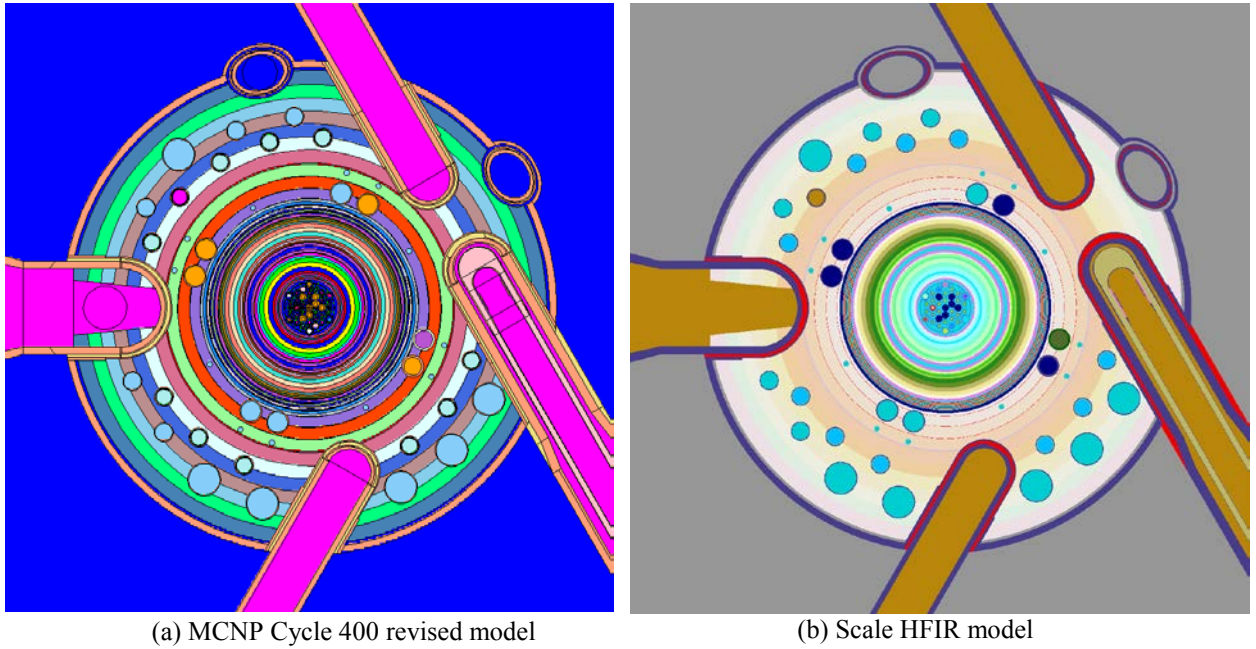


Fig. 11. Beryllium reflector regions with irradiation facilities, horizontal tubes, and engineering facilities.

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.

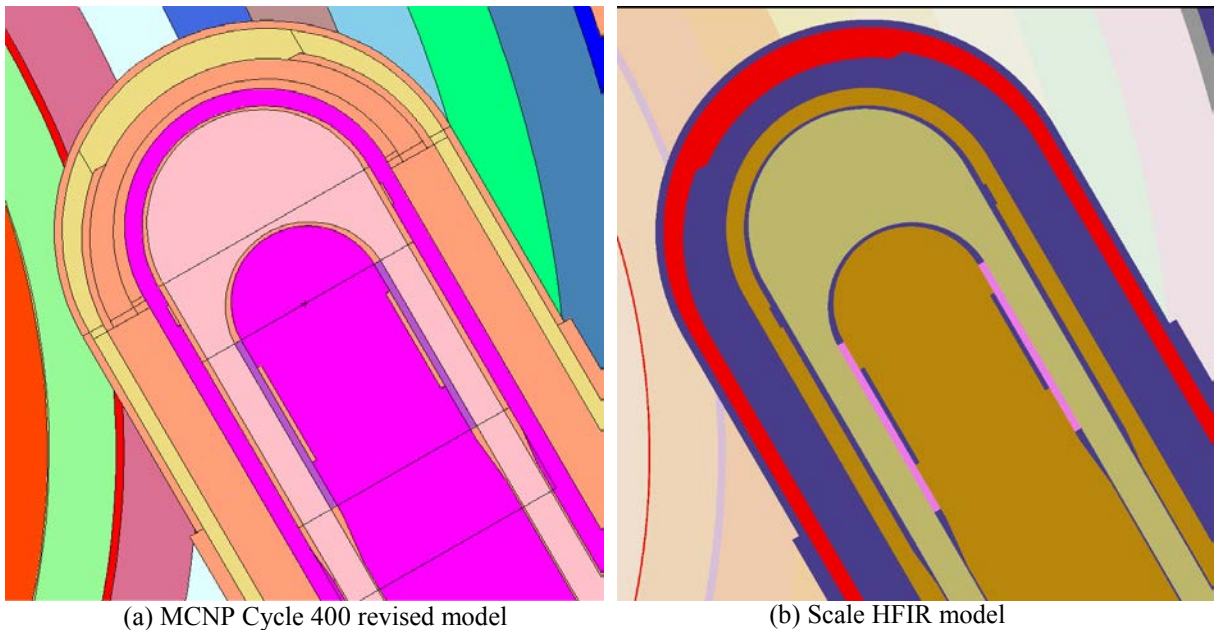


Fig. 12. Comparison of the HT-4 tip (cold source tube) models.

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.

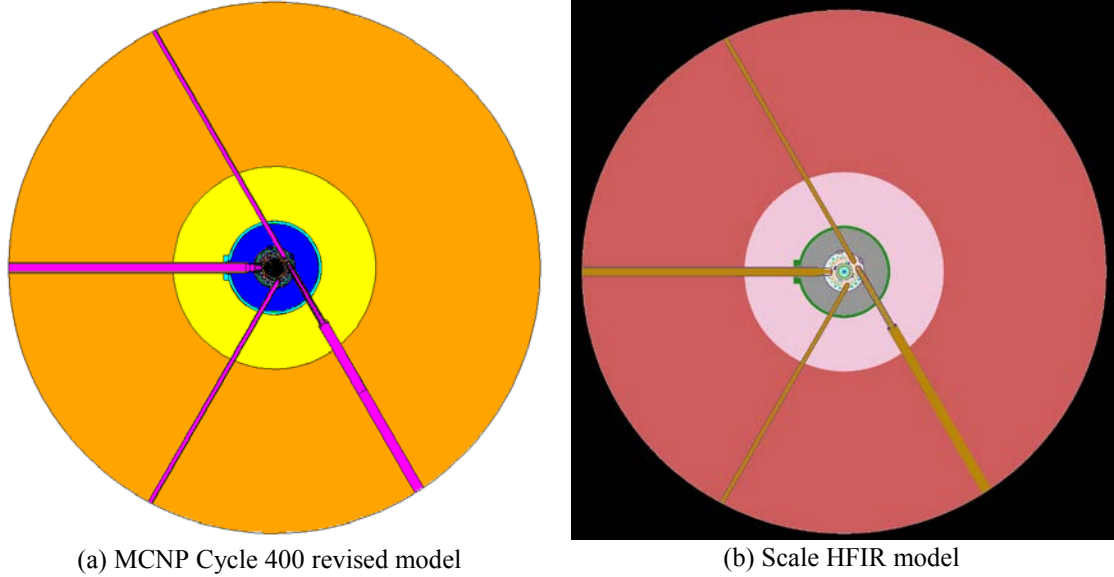


Fig. 13. Comparison of the HFIR outer regions.

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, $\bar{\nu}$. 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)	$\bar{\nu}$
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 $\nu\Sigma_f$ 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 $\nu\Sigma_f$ 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 $\nu\Sigma_f$ 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.

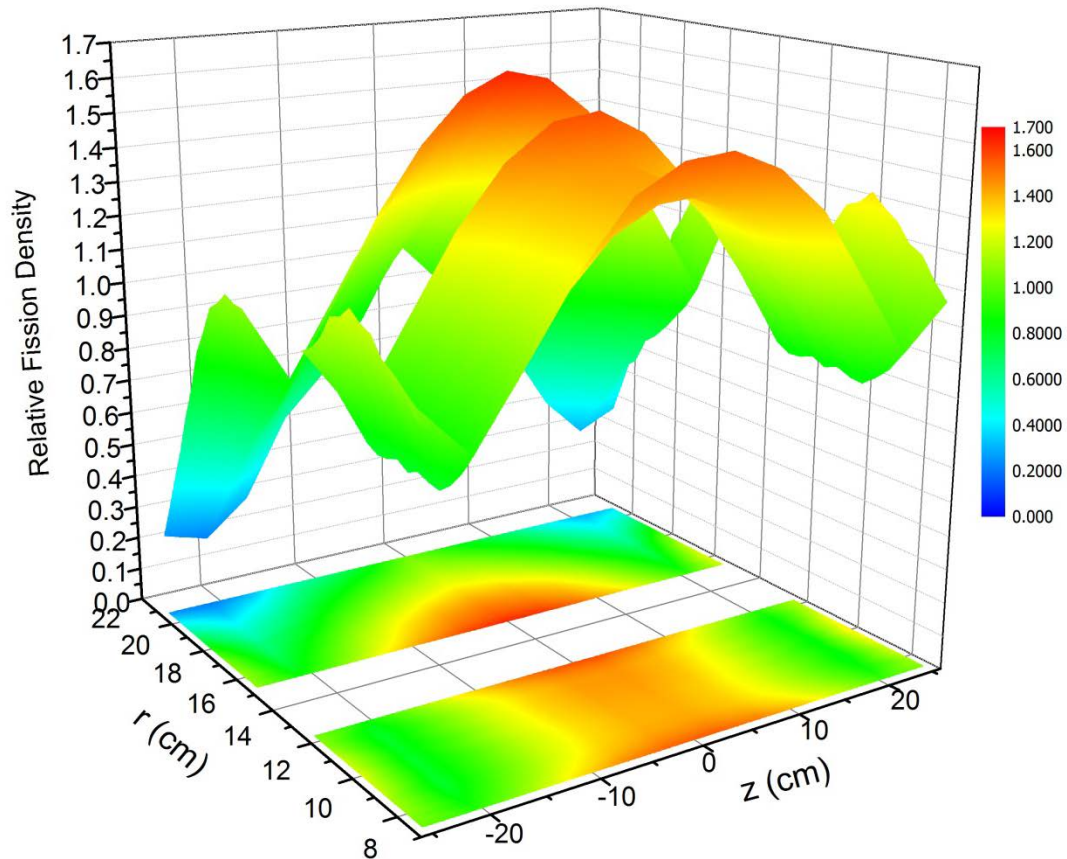


Fig. 14. Relative $\nu\Sigma_f$ reaction rate density distributions in IFE and OFE of HFIR.

To verify that the relative $\nu\Sigma_f$ 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 $\nu\Sigma_f$ 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.

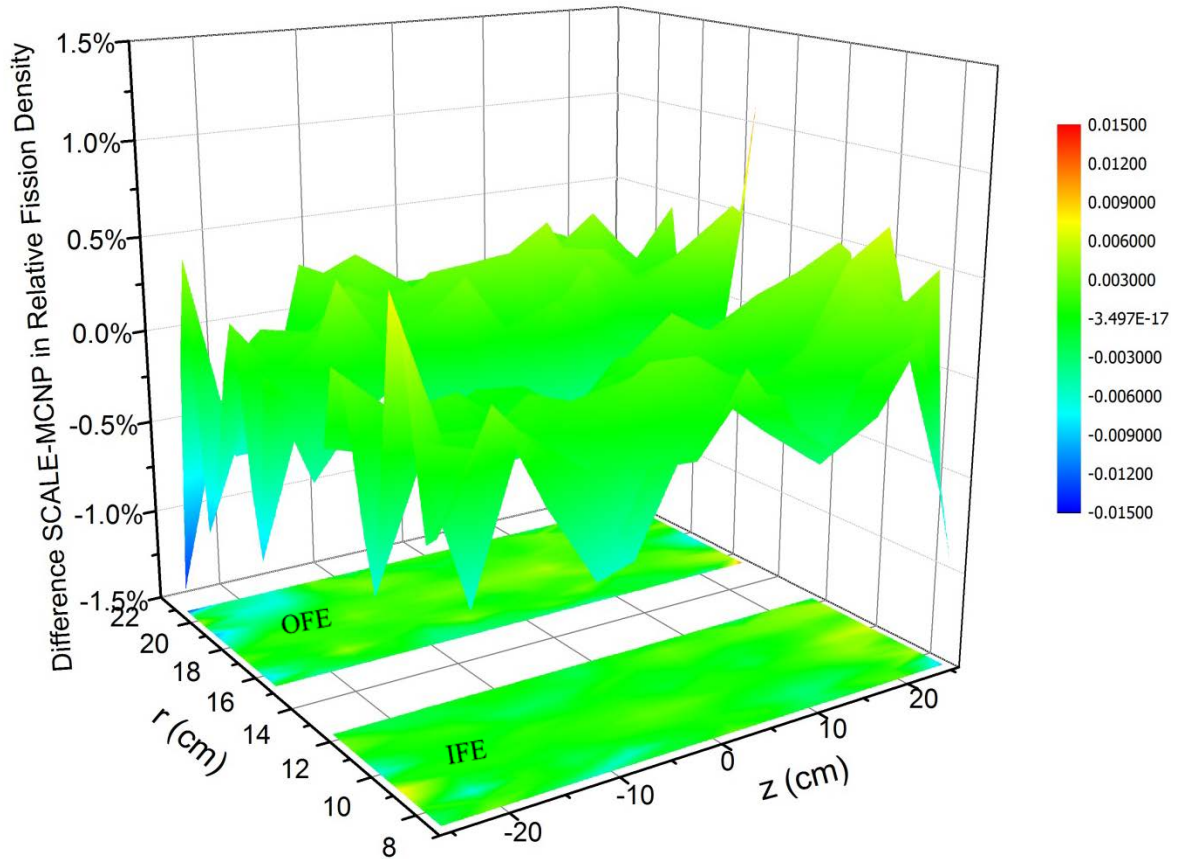


Fig. 15. Comparison of relative $\nu\Sigma_f$ reaction rate density distribution predicted by the SCALE HFIR model and relative fission density distribution predicted by the MCNP Cycle 400 revised model.

Table 5. Relative $\nu\Sigma_f$ 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

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

^b r=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

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

where $\bar{\nu}$ 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 $\bar{\nu}$ 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 $\sim 5\%$ 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 (sl) 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 (sl) 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 (sl) 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

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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 (sl) 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=5.98973-2
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=8.16415-2
'
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= 4.31234-2
' 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 L03-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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'      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					
' 8.008800E-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	6.57731E-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
'    8.008800E-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
'    8.009370E-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
'    8.009930E-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

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

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'
'      Inner fuel element--fueled Axial region 8
'      total atom density = 8.00804E-02 a/b-cm
'      8.008040E-02

```

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					
' 8.008800E-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					
' 8.009370E-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					
' 8.008390E-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					
' 8.008800E-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
'      8.005550E-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
'      8.002710E-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
'      8.000130E-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
' 8.005550E-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
' 8.002710E-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
' 8.000130E-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

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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

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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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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
'
'
'

```

```

'
'
'
'      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 -28.80800
'
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      615  0.83500  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

```

```

'
'      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   A1 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

```

' 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    -2108
media     222    1    2112    -2111    -2108
media     223    1    2113    -2112    -2108
media     224    1    2114    -2113    -2108
media     225    1    2115    -2114    -2108
media     226    1    2116    -2115    -2108
media     227    1    2117    -2116    -2108
media     228    1    2118    -2117    -2108
'
' 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    -2118
media     232    1    2122    -2121    -2118
media     233    1    2123    -2122    -2118
media     234    1    2124    -2123    -2118
media     235    1    2125    -2124    -2118
media     236    1    2126    -2125    -2118
media     237    1    2127    -2126    -2118
media     238    1    2128    -2127    -2118
'
' 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    -2128
media     242    1    2132    -2131    -2128
```

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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

```

```

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 -2178
media    292      1    2182 -2181 -2178
media    293      1    2183 -2182 -2178
media    294      1    2184 -2183 -2178
media    295      1    2185 -2184 -2178
media    296      1    2186 -2185 -2178
media    297      1    2187 -2186 -2178
media    298      1    2188 -2187 -2178
'
      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 -2188
media    202      1    2192 -2191 -2188
media    203      1    2193 -2192 -2188
media    204      1    2194 -2193 -2188
media    205      1    2195 -2194 -2188
media    206      1    2196 -2195 -2188
media    207      1    2197 -2196 -2188
media    208      1    2198 -2197 -2188
'
      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 -2198
media    292      1    2202 -2201 -2198
media    293      1    2203 -2202 -2198
media    294      1    2204 -2203 -2198
media    295      1    2205 -2204 -2198
media    296      1    2206 -2205 -2198
media    297      1    2207 -2206 -2198
media    298      1    2208 -2207 -2198
'
      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 -2208
media    282      1    2212 -2211 -2208
media    283      1    2213 -2212 -2208
media    284      1    2214 -2213 -2208
media    285      1    2215 -2214 -2208
media    286      1    2216 -2215 -2208
media    287      1    2217 -2216 -2208
media    288      1    2218 -2217 -2208
'
      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 -2218
media    272      1    2222 -2221 -2218

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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

```

```

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

```


' 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

 ' OFE 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
'

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'      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)

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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    -2499
media    392      1    2502    -2501    -2499
media    393      1    2503    -2502    -2499
media    394      1    2504    -2503    -2499
media    395      1    2505    -2504    -2499
media    396      1    2506    -2505    -2499
media    397      1    2507    -2506    -2499
media    398      1    2508    -2507    -2499
media    399      1    2509    -2508    -2499
'
      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    -2509
media    382      1    2512    -2511    -2509
media    383      1    2513    -2512    -2509
media    384      1    2514    -2513    -2509
media    385      1    2515    -2514    -2509
media    386      1    2516    -2515    -2509
media    387      1    2517    -2516    -2509
media    388      1    2518    -2517    -2509
media    389      1    2519    -2518    -2509
'
      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    -2519
media    372      1    2522    -2521    -2519
media    373      1    2523    -2522    -2519
media    374      1    2524    -2523    -2519
media    375      1    2525    -2524    -2519
media    376      1    2526    -2525    -2519
media    377      1    2527    -2526    -2519
media    378      1    2528    -2527    -2519
media    379      1    2529    -2528    -2519
'
      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    -2529
media    362      1    2532    -2531    -2529
media    363      1    2533    -2532    -2529
media    364      1    2534    -2533    -2529
media    365      1    2535    -2534    -2529
media    366      1    2536    -2535    -2529
media    367      1    2537    -2536    -2529
media    368      1    2538    -2537    -2529
media    369      1    2539    -2538    -2529
'
      Top - Axial Layer 15      (-13.0 - -16.0 cm)
cylinder 2541 15.5      25.4      -16.0

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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    -2539
media    352      1      2542     -2541    -2539
media    353      1      2543     -2542    -2539
media    354      1      2544     -2543    -2539
media    355      1      2545     -2544    -2539
media    356      1      2546     -2545    -2539
media    357      1      2547     -2546    -2539
media    358      1      2548     -2547    -2539
media    359      1      2549     -2548    -2539
'
'      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    -2549
media    342      1      2552     -2551    -2549
media    343      1      2553     -2552    -2549
media    344      1      2554     -2553    -2549
media    345      1      2555     -2554    -2549
media    346      1      2556     -2555    -2549
media    347      1      2557     -2556    -2549
media    348      1      2558     -2557    -2549
media    349      1      2559     -2558    -2549
'
'      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    -2559
media    332      1      2562     -2561    -2559
media    333      1      2563     -2562    -2559
media    334      1      2564     -2563    -2559
media    335      1      2565     -2564    -2559
media    336      1      2566     -2565    -2559
media    337      1      2567     -2566    -2559
media    338      1      2568     -2567    -2559
media    339      1      2569     -2568    -2559
'
'      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    -2569
media    322      1      2572     -2571    -2569
media    323      1      2573     -2572    -2569
media    324      1      2574     -2573    -2569
media    325      1      2575     -2574    -2569
media    326      1      2576     -2575    -2569
media    327      1      2577     -2576    -2569
media    328      1      2578     -2577    -2569
media    329      1      2579     -2578    -2569
'
'      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 OFE 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 (Eu2O3),
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 a1=20.60990454
plane 701 ypl=1.0 con=-1.27 rotate a1=20.60990454
plane 702 xpl=1.0 con=1.27 rotate a1=20.60990454
plane 703 xpl=1.0 con=-1.27 rotate a1=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
'
'      media      21      1      3304      -3202      -700      703
'      -Quad 2
'      media      21      1      3304      -3202      701      703
'      -Quad 3
'      media      21      1      3304      -3202      701      -702
'      -Quad 4
'
'      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
'
'      media      412      1      3308      -3304      -700      703
'      -Quad 2
'      media      412      1      3308      -3304      701      703
'      -Quad 3
'      media      412      1      3308      -3304      701      -702
'      -Quad 4
'
'      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
'
'      media      410      1      3312      -3304      -3308      -700      703
'      -Quad 2
'      media      410      1      3312      -3304      -3308      701      703
'      -Quad 3
'      media      410      1      3312      -3304      -3308      701      -702
'      -Quad 4
'
'      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
'
'      media      411      1      3313      -3304      -3312      -700      703
'      -Quad 2
'      media      411      1      3313      -3304      -3312      701      703
'      -Quad 3
'      media      411      1      3313      -3304      -3312      701      -702
'      -Quad 4
'
'      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
'
'      media      413      1      3320      -3304      -3313      -700      703
'      -Quad 2
'      media      413      1      3320      -3304      -3313      701      703
'      -Quad 3
'      media      413      1      3320      -3304      -3313      701      -702
'      -Quad 4
'
'      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
'
'      media      21      1      3324      -3320      -700      703
'      -Quad 2
'      media      21      1      3324      -3320      701      703
'      -Quad 3

```



```

'
'               -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 removabel reflector is region-5
'   The Beryllium reflector region is devided 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
'

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```

'      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   -6350   -6500   -6550
                                           -6700   -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

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```

'-----
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 divided 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 origin x=-29.816468 y=25.465670
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

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' 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	-3.7084	-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

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	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		8617	-8618	8603	-8612
media	60	1	8553	-8626		8616		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		
,									
ecylinder	8611	3.103880	4.8514245	1. -99.0	origin x=40.76188	y=6.10636	rotate	a1=210	a2=90
ecylinder	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	86271	86272	
media	20	1	8553	-8626		-8616	-8618	8612	8610
media	60	1	8553	-8626		8616		8612	8610
media	60	1	8553	-8626			8618	8612	8610
media	20	1	8553	-8626		-8616	-8618	8612	8610
media	60	1	8553	-8626		8616		8612	8610
media	60	1	8553	-8626			8618	8612	8610
media	60	1	8553	-8626				8612	8610
media	60	1	8553	-8626					-8609
media	60	1	8553	-8626					-8609
media	60	1	8553	-8626					-8609

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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 -8862
-7905 -7906
-8005 -8006
-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)

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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

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-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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