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Titolo

Iron-88 (Fe) Neutron Shielding Benchmark Experiment - Deterministic Analysis in Cartesian (X,Y,Z) Geometry Using the TORT-3.2 3D Transport Code and the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Cross Section Libraries

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Sommario

Three-dimensional (3D) fixed source transport calculations in Cartesian (X,Y,Z) geometry for the Iron-88 single-material (Fe) neutron shielding benchmark experiment were performed using the TORT-3.2 discrete ordinates (S_N) transport code. The ENEA-Bologna BUGJEFF311.BOLIB (JEFF-3.1.1 data) and BUGENDF70.BOLIB (ENDF/B-VII.0 data) broad-group coupled (47 n + 20 γ) working cross section libraries in FIDO-ANISN format and the similar ORNL BUGLE-B7 (ENDF/B-VII.0 data) and BUGLE-96 (ENDF/B-VI.3 data) libraries, specifically conceived for LWR shielding and pressure vessel dosimetry applications, were alternatively used together with dosimeter cross sections, processed from the IAEA IRDF-2002 dosimetry file. The ENEA-Bologna codes ADEFTA-4.1 and BOT3P-5.3 were respectively employed for the calculation of the isotopic atomic densities and for the automatic generation of the spatial mesh grid of the geometrical model. The calculated reaction rates were compared with the corresponding experimental data, obtained using Au-197(n,γ)Au-198/Cd activation dosimeters and Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 threshold activation dosimeters. Given the total experimental uncertainties at 1σ, then the computational results presented exhibit good statistical consistency with the corresponding measurements except for the Al-27(n,α)Na-24 strongly overestimated results.

Note

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Iron-88 (Fe) Neutron Shielding Benchmark Experiment - Deterministic Analysis in Cartesian (X,Y,Z) Geometry Using the TORT-3.2 3D Transport Code and the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Cross Section Libraries

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1 - INTRODUCTION

The ENEA-Bologna Nuclear Data Group generated two broad-group coupled neutron/photon (47 n + 20 γ) working cross section libraries in FIDO-ANISN /1/ format, named BUGJEFF311.BOLIB /2/ and BUGENDF70.BOLIB /3/ and respectively based on the OECD-NEADB JEFF-3.1.1 /4/ (see also /5/) and US ENDF/B-VII.0 /6/ evaluated nuclear data libraries. The same neutron and photon energy group structure of the ORNL BUGLE-B7 /7/ (US ENDF/B-VII.0 evaluated nuclear data) and BUGLE-96 /8/ (US ENDF/B-VI.3 /9/ evaluated nuclear data) working cross section libraries was adopted by the ENEA-Bologna libraries together with the same FIDO-ANISN data format and similar data processing methodology. All these ENEA-Bologna and ORNL libraries were specifically conceived for LWR shielding and pressure vessel dosimetry applications and contain problem-dependent parameterized sets of self-shielded neutron cross sections, specifically prepared for BWR and PWR applications.
It was considered a meaningful test to validate the two ENEA-Bologna libraries and the two ORNL libraries on the Iron-88 /10/ single-material (iron) neutron shielding benchmark experiment (Winfrith, 1988, UK), included in particular in the SINBAD REACTOR /11/ /12/ international database of neutron shielding benchmark experiments, dedicated to nuclear fission reactors. In fact the previously cited experiment permits to verify the neutron deep penetration (decades of neutron flux attenuation) in the mild steel slabs of the Iron-88 shield, having a total thickness of about 67 cm. In particular it is underlined that the performance of the iron nuclear data are obviously essential for any fission reactor applications. In fact it is well known that, for example, the LWR pressure vessels and the so-called reactor internals are made of different types of steels. This implies that, in any case, the iron cross sections, and in particular those of Fe-56 with an isotopic abundance of about 92% in natural iron, play a crucial role in the accurate prediction of the EoL (End-of-Life) neutron fluence of the steel reactor components as, for example, the reactor pressure vessel.
The four cited working libraries were alternatively used in fixed source transport calculations, performed in Cartesian (X,Y,Z) geometry with the TORT-3.2 /13/ three-dimensional (3D) discrete ordinates (S_N) transport code, included in the ORNL DOORS /14/ system of deterministic transport codes. The ENEA-Bologna ADEFTA-4.1 /15/ and BOT3P-5.3 /16/ (see also /17/, /18/ and /19/) codes were respectively employed for the calculation of the isotopic atomic densities and for the automatic generation of the spatial mesh grid of the geometrical model.

The calculated dosimetric reaction rates were compared with the corresponding experimental data, obtained using neutron activation dosimeters. The neutron activation dosimeter cross sections used in the calculations were processed (see /20/) from the IAEA IRDF-2002 /21/ reactor dosimetry file. In particular, the activation cross sections for the Au-198(n,γ)Au-198 dosimeters and the threshold activation cross sections for the Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 dosimeters were involved in the present analysis of the Iron-88 experiment.
Finally, it is underlined that the results obtained using the BUGLE-96 library permitted to obtain in particular a reliable reference comparison with the results of the other similar libraries employed in the present transport calculations, based on more recent evaluated nuclear data. In fact BUGLE-96 was widely and successfully used all over the world in the previously cited applications since 1996. In particular it is specifically recommended by the American National Standard /22/ of the American Nuclear Society “Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants” (ANSI/ANS-6.1.2-1999, R2009) for LWR shielding and radiation damage applications.
Parts of the present results were already published in the references /23/ and /24/.

2 - IRON-88 EXPERIMENT

The ASPIS shielding facility of the Winfrith NESTOR reactor, the Iron-88 benchmark experimental array, the activation dosimeter measurements and the fission plate neutron source are described, taking the relative information integrally from reference /10/ and from the document of the Iron-88 benchmark experiment section of SINBAD REACTOR /11/, entitled "General Description of the Experiment".

2.1 - ASPIS Shielding Facility

The ASPIS shielding facility (see FIG. 2.1) was installed on the NESTOR reactor (presently dismantled) at Winfrith. NESTOR was a light water cooled, graphite and light water moderated reactor which operated at powers of up to 30 kW and was used as a source of neutrons for a wide range of applications. The core of the reactor, which comprised 26 MTR (Materials Test Reactor) type fuel elements, was contained within an annulus formed by two concentric aluminium vessels through which water circulated. The inner vessel was filled with graphite to form an inner reflector. The outer tank was surrounded by an external graphite reflector in the form of a block having dimensions 182 cm × 182 cm × 122 cm which contained the control plate slots adjacent to the vessel wall. Leading off each of the four faces of the external reflector was an experiment cave which could be isolated from the reactor by shutters composed of boral or combinations of neutron/gamma-ray shield materials. ASPIS was located in the NESTOR cave C. Shield components, which were in the main slabs or tanks, were mounted vertically in a mobile tank which had an internal cross-sectional area of 1.8 m × 1.9 m and a length of 3.7 m. A fission plate was located within the experimental shield array. The loaded tank was moved into the cave where thermal neutrons, leaking from the outer graphite reflector of NESTOR, were used to drive the fission plate to provide a well defined neutron source for penetration measurements. The neutron flux levels within an ASPIS shield contained contributions from sources in the fission plate and from the NESTOR core and it was essential that the NESTOR contribution was subtracted from all measured responses to arrive at the response resulting from the fission plate sources.

2.2 - Iron-88 Benchmark Experimental Array

The Iron-88 benchmark experimental array, irradiated in the ASPIS shielding facility, is shown schematically in side elevation in FIG. 2.2. The array comprised three regions; the source region containing moderator and the fission plate, the shield made from 13 mild steel plates, each of approximately 5.1 cm thickness, and a deep backing shield manufactured from mild and stainless steel. To allow dosimeter access within the shield, 6 mm spacers were placed between each slab component. In practice the depth of the air gaps varied owing to positional uncertainties of the plates and their flatness. The 6 mm gap was therefore nominal and an average gap of 7.4 mm was measured for the experiment. The axial dimensions of the experimental components are given in TAB. 2.1. The outer boundaries of the experimental region were formed by the walls and floor of the ASPIS trolley (see FIG. 2.1) and by the roof of the ASPIS cave. The floor and walls of the trolley were manufactured from 1.91 cm thick mild steel plate. The trolley base had a 25 cm high steel chassis in-filled with concrete. The structure of NESTOR surrounding the trolley comprised concrete bulk shielding blocks except on the NESTOR core side of the trolley front face where it was graphite. This graphite

extended away from the trolley to the external graphite reflector of the reactor. The compositions of the materials used in the Iron-88 experiment are given in TAB. 2.2.

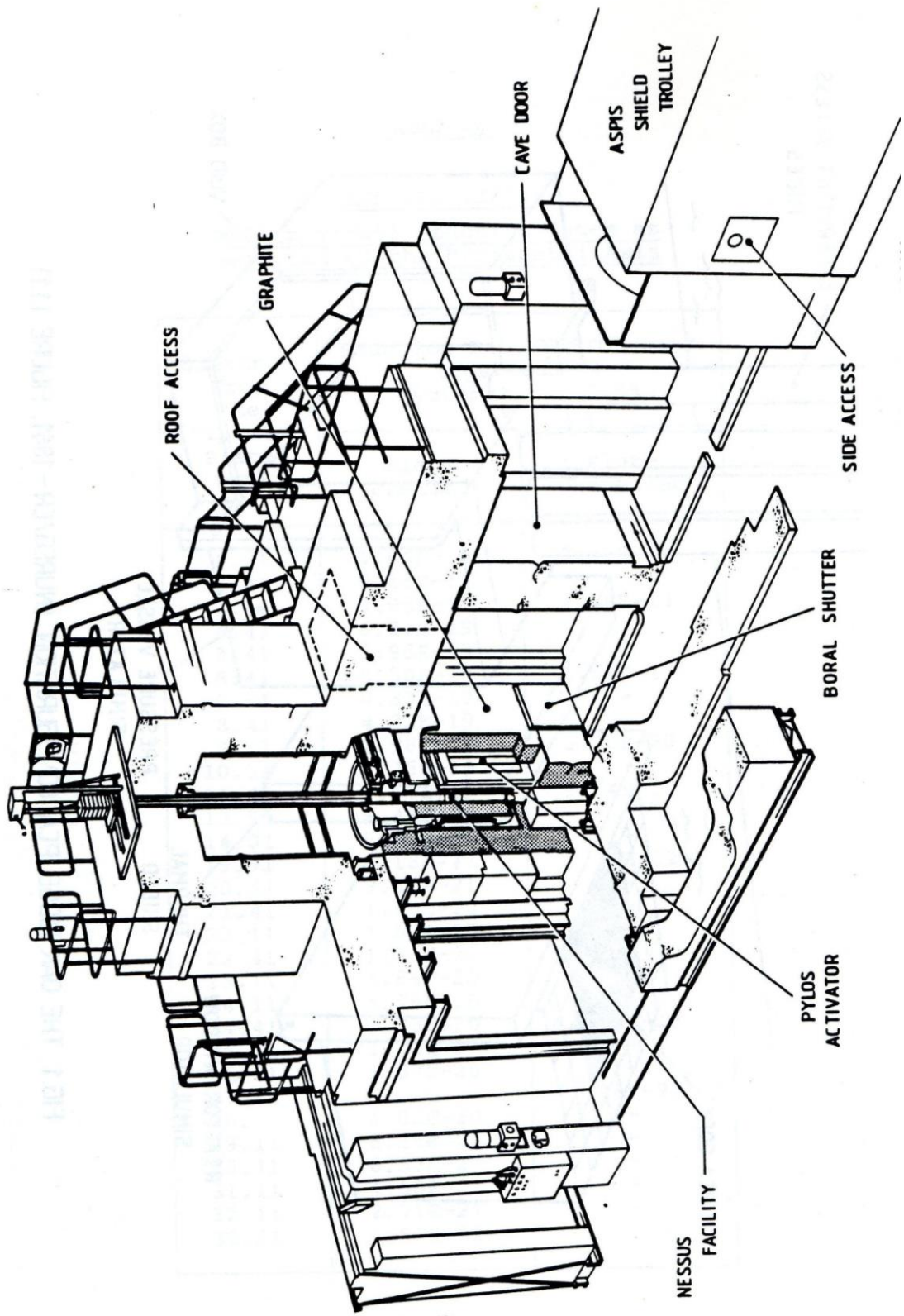
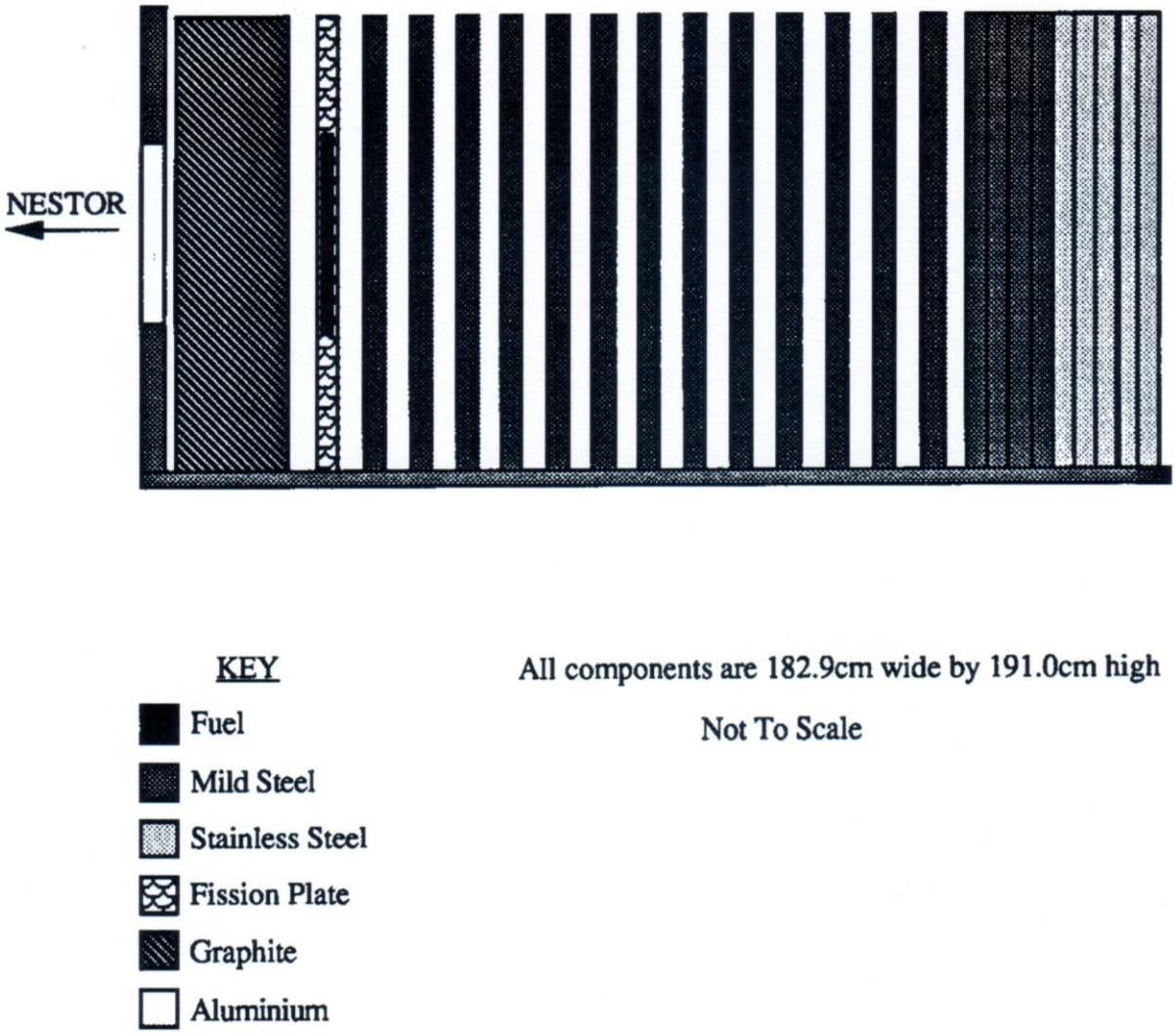


FIG. 2.1 The Shielding Facilities of the NESTOR Reactor.

FIG. 2.2

Iron-88 - Schematic Side Elevation of the Shield [a].



([a]) Figure derived from Figure 1 of reference /10/.

TAB. 2.1

Iron-88 - Shield Dimensions.

Component	Material Thickness [cm]	Coordinate at End of Region [cm]	Material Reference Number
Trollev Face	3.18	-16.62	1 & 2
Void	0.52	-16.10	-
Graphite	15.00	-1.10	3
Void	1.10	0.00	-
Fission Plate	2.90	2.90	4 & 5
Void	0.74	3.64	-
Mild Steel	5.10	8.74	6
Void	0.74	9.48	-
Mild Steel	5.12	14.60	6
Void	0.74	15.34	-
Mild Steel	5.12	20.46	6
Void	0.74	21.20	-
Mild Steel	5.10	26.30	6
Void	0.74	27.04	-
Mild Steel	5.20	32.24	6
Void	0.74	32.98	-
Mild Steel	5.15	38.13	6
Void	0.74	38.87	-
Mild Steel	5.20	44.07	6
Void	0.74	44.81	-
Mild Steel	5.20	50.01	6
Void	0.74	50.75	-
Mild Steel	5.25	56.00	6
Void	0.74	56.74	-
Mild Steel	5.18	61.92	6
Void	0.74	62.66	-
Mild Steel	5.07	67.73	6
Void	0.74	68.47	-
Mild Steel	5.12	73.59	6
Void	0.74	74.33	-
Mild Steel	5.18	79.51	6
Void	0.74	80.25	-
Mild Steel	5.10	85.35	6
Mild Steel	5.25	90.60	6
Mild Steel	5.00	95.60	6
Mild Steel	4.67	100.27	6
Stainless Steel	22.41	122.68	7
Concrete	100.00	222.68	8

Notes

1. For material compositions see TAB. 2.2.
2. The trolley face is manufactured from mild steel with a central aluminium “window” of radius equal to 56.1 cm.
3. The construction of the fission plate is shown in FIG. 2.5.
4. All slab components are 182.9 cm wide by 191.0 cm high and fill the full width and height of the ASPIS trolley.

TAB. 2.2

Iron-88 - Material Composition.

Material	Material Reference No.	Density [g × cm^{-3}]	Element/ Isotope	Weight Fraction [%]
Mild Steel	1	7.835	Fe	0.9865
			Mn	0.0109
			C	0.0022
			Si	0.0004
Aluminium	2	2.700	Al	1.0000
Graphite	3	1.650	C	1.0000
Fuel	4	3.256	Al	0.7998
			U-235	0.1864
			U-238	0.0138
Aluminium	5	2.666	Fe	0.0056
			Si	0.0015
			Al	0.9929
Mild Steel	6	7.850	Fe	0.9903
			Mn	0.0074
			C	0.0023
Stainless Steel	7	7.917	Fe	0.6695
			Mn	0.0157
			Cr	0.1677
			Ni	0.1166
			C	0.0006
			Si	0.0050
			P	0.0003
			S	0.0002
			Mo	0.0244
Concrete	8	2.242	Fe	0.0141
			Si	0.3369
			Al	0.0340
			H	0.0100
			O	0.5290
			Ca	0.0379
			K	0.0200
			Na	0.0161

2.3 - Iron-88 Benchmark Fission Plate

A schematic diagram of the fission plate is shown in FIG. 2.3. It comprises an aluminium frame which fills the height and width of the ASPIS trolley. Located within the frame are 13 separate fuel elements. A schematic view of an individual fuel element is shown in FIG. 2.4. Each element has two 12 mm thick aluminium cover plates which attach on either side of the top and bottom locating end pieces leaving a 5 mm separation in which U/Al alloy fuel strips are located. The fuel strips are 80% by weight aluminium and 20% by weight of uranium enriched to 93% having a density of 3.256 g × cm^{-3}. Each strip is nominally 30.5 mm wide and 1 mm thick and is fixed to the rear cover plate by M5 screws.

Three columns of fuel strips laid side by side fill the width of the element. There is depth for 4 fuel strips within each element leaving a 1 mm clearance gap next to the front cover plate. In the current configuration only the central two strips in each column contain U/Al alloy, the outer two are both blanks manufactured from aluminium. To approximate to a disc fission neutron source the axial fuel loading within each element has been arranged to the specification shown in FIG. 2.5 by the substitution of aluminium blanks for fuel where necessary giving 4 mm of aluminium in the unfuelled regions.

The position of the fission plate is shown in FIG. 2.6. The centre of the fuel is at a height of 889 mm from the floor of the trolley and at 889 mm from the right hand wall of the trolley when looking towards the NESTOR core. The measurements were made on this Z horizontal nuclear axis passing through the centre of the fission plate.

The approach taken to obtain the absolute power distribution within the fission plate is summarised as follows:

1. Mn-55(n,γ)Mn-56 reaction rates are measured over the front surface of the fission plate to define a thermal flux profile in X and Y.

2. The distribution of the U-235 content within the fuel is assessed.

3. 1. and 2. are combined to provide a relative fission rate profile in X and Y.

4. The relative fission profile in the Z direction through the fuel is obtained from absolute measurements of fission rate in the plate as described below.

5. The fission rate profile is normalised to absolute measurements of the fission rate per NESTOR Watt in the plate which are made by counting fission product decay rates in samples taken from the central strip of the central element at the centre, bottom and halfway between the centre and bottom of the fuel.

6. The neutron source distribution is obtained from the absolute fission rate distribution.

The manganese reaction rate measurements on the front face of the plate were input to the CRISP code /25/ to define the manganese reaction rate surface covering the plate. From this surface the average manganese reaction rate within the elements of any source mesh overlaid onto the fission plate can be defined. The fission rate profile in X and Y is taken as the

manganese reaction rate profile on the front face of the fuel plate. This has been normalised to give a plate power of 1 Watt and the resulting neutron source distribution is shown in TAB. 2.3. Constants of 3.121E+10 fissions per Watt and 2.437 neutrons per fission have been used in this derivation.

The absolute fission rate in the fuel was found to be between 5% and 16% higher in the strip nearer to NESTOR. This difference is caused by the attenuation of thermal neutrons from NESTOR through the 1 mm fuel strips. However, the attenuation of the neutrons produced by fission is small over this distance so an assumption of no Z dependence in the source strength has been made.

The absolute power in the fission plate, expressed as plate Watts per NESTOR Watt, has been determined by combining measurements of the absolute fission rate at spot values, gained by fission product decay line counting, with the fission rate profile data derived in CRISP. The analysis is rather involved and the result was an absolute plate power of 5.68E-04 Watts per NESTOR Watt. The uncertainty on the plate power is 8% at the two standard deviations (2σ) level.

TAB. 2.3

Iron-88 - Source Distribution on the Fission Plate.

0	0	0	0	0	0	2.973	2.994	2.865	0	0	0	0	0	0
0	0	0	0	0	3.173	3.496	3.537	3.404	2.975	0	0	0	0	0
0	0	0	0	3.176	3.711	4.088	4.149	4.015	3.529	2.890	0	0	0	0
0	0	0	3.186	3.500	4.092	4.514	4.587	4.446	3.925	3.240	2.886	0	0	0
0	0	3.249	3.635	3.999	4.696	5.197	5.286	5.130	4.555	3.807	3.422	3.009	0	0
0	3.150	3.575	4.003	4.412	5.202	5.770	5.870	5.699	5.080	4.282	3.873	3.431	2.970	0
3.040	3.322	3.769	4.223	4.660	5.505	6.110	6.215	6.034	5.387	4.559	4.133	3.673	3.188	2.850
3.132	3.427	3.893	4.364	4.815	5.684	6.304	6.412	6.227	5.563	4.710	4.270	3.792	3.287	2.932
3.026	3.325	3.784	4.239	4.669	5.491	6.079	6.183	6.009	5.364	4.523	4.084	3.607	3.103	2.751
0	3.136	3.574	4.001	4.400	5.157	5.701	5.802	5.643	5.031	4.221	3.795	3.331	2.843	0
0	0	3.182	3.562	3.912	4.572	5.053	5.149	5.013	4.461	3.713	3.317	2.887	0	0
0	0	0	3.004	3.299	3.855	4.267	4.357	4.247	3.766	3.101	2.748	0	0	0
0	0	0	0	2.896	3.396	3.770	3.855	3.758	3.320	2.712	0	0	0	0
0	0	0	0	0	2.745	3.072	3.150	3.067	2.685	0	0	0	0	0
0	0	0	0	0	0	2.458	2.525	2.448	0	0	0	0	0	0

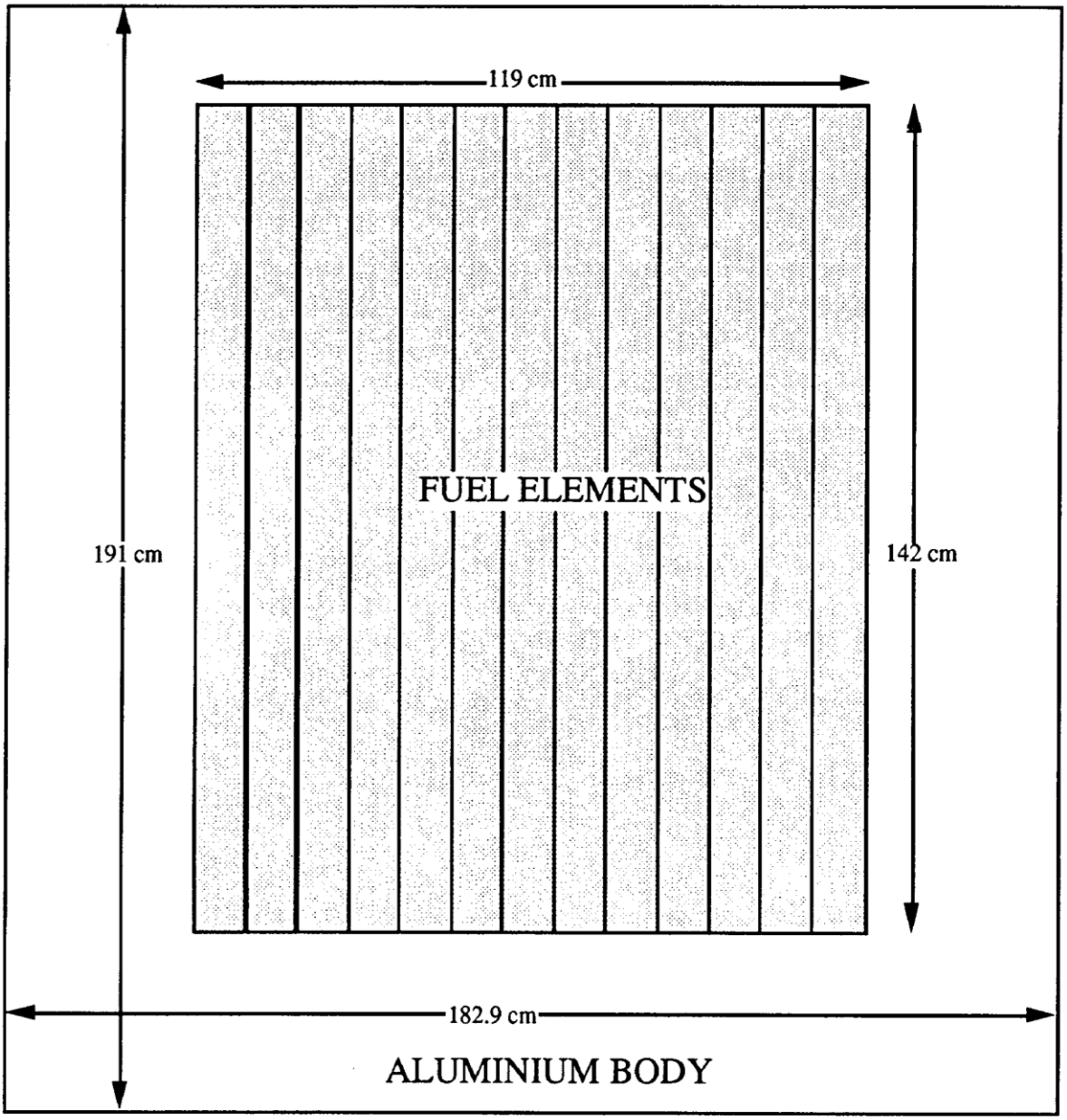
Units are neutrons × cm^{-3} × $second^{-1}$ × 1.0E+07.
The plate power for this distribution is 1 Watt.

Coordinate boundaries for source distribution.
Units are cm.

X	-52.25	-49.08	-45.92	-39.58	-36.42	-30.08	-14.25	-4.75
	4.75	14.25	30.08	36.42	39.58	45.92	49.08	52.25
Y	-51.44	-47.63	-40.64	-35.56	-31.75	-19.69	-15.88	-5.29
	5.29	15.88	19.69	31.75	35.56	40.64	47.63	51.44

FIG. 2.3

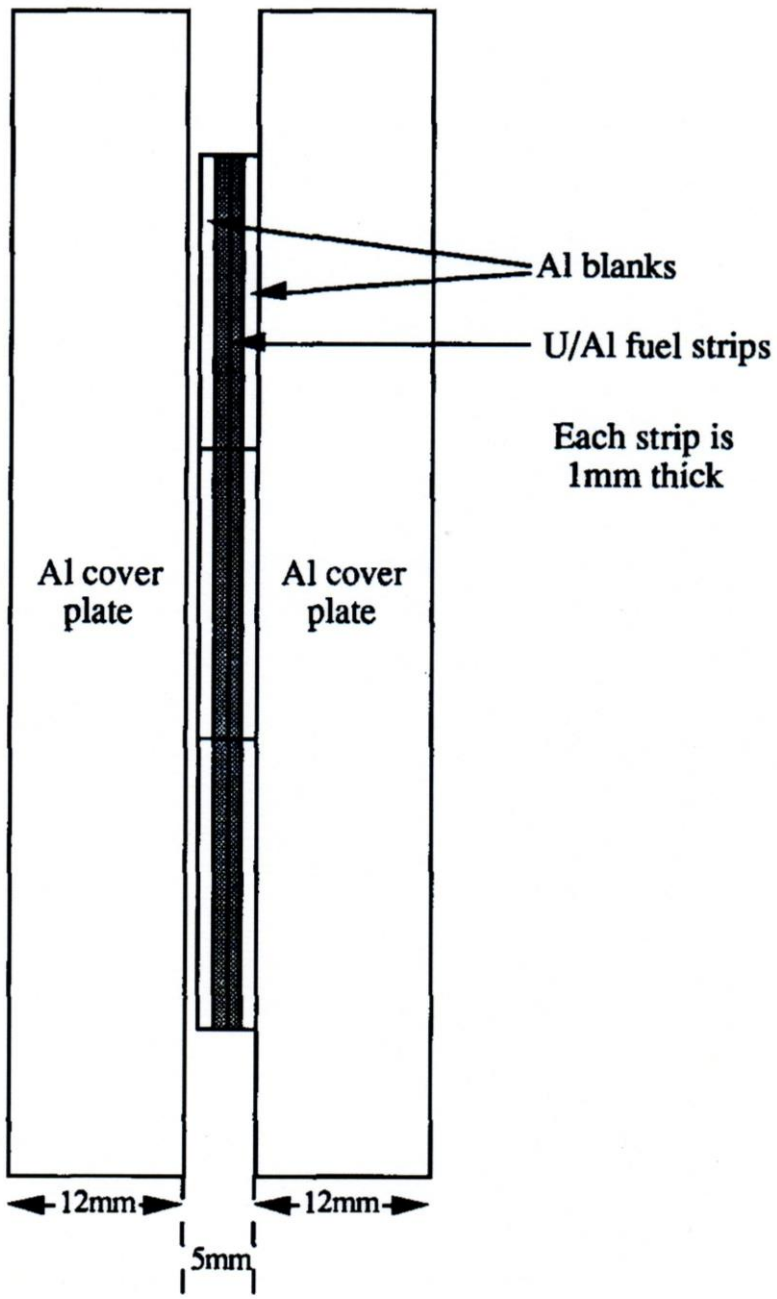
Iron-88 - Schematic Diagram of the Fission Plate [a].



([a]) Figure derived from Figure 3 of reference /10/.

FIG. 2.4

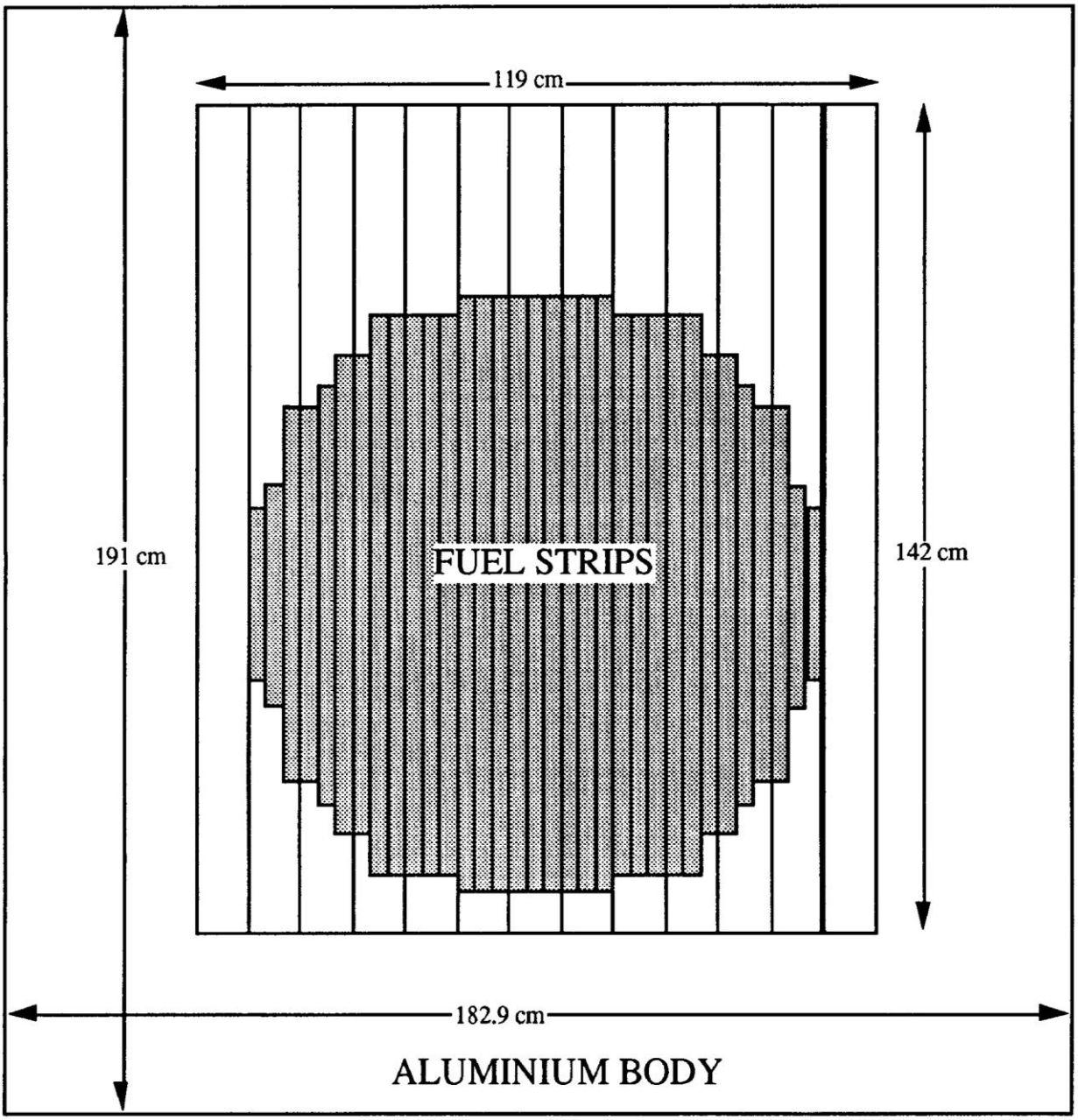
Iron-88 - Schematic Diagram of the Fuel Element of the Fission Plate [a].



([a]) Figure derived from Figure 4 of reference /10/.

FIG. 2.5

Iron-88 - Disposition of the Fuel Elements in the Fission Plate [a].



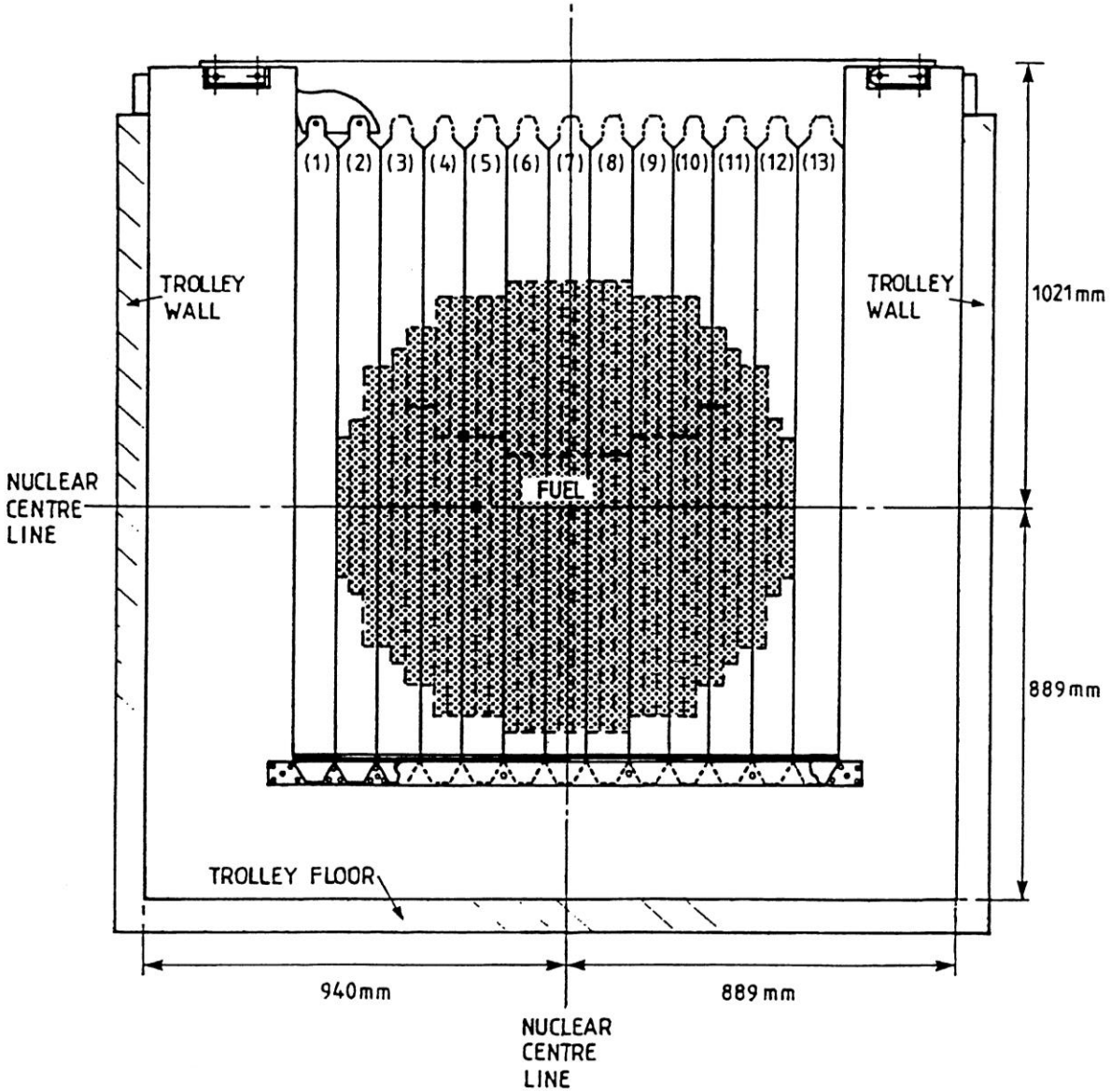
([a]) Figure derived from Figure 5 of reference /10/.

FIG. 2.6

Iron-88 - Details of the Fuel Loading Pattern in the Fission Plate when Viewed Looking towards the NESTOR Reactor Core [a].

Section Normal to the Z Horizontal Axis at the Fission Plate Centre.

Position of the Fission Plate with Respect to the ASPIS Trolley.



([a]) Figure derived from the Iron-88 benchmark experiment section of reference /11/.

2.4 - Activation Dosimeter Measurements in the Iron-88 Experiment

The neutron distribution through the experimental shield was mapped using activation foils attached to thin aluminium carriers (0.5 mm thick by 9 cm wide) located between the slab components. The dosimeter set comprised activation foils to measure the Au-197(n,γ)Au-198/Cd epi-cadmium reaction rates and the Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 threshold reaction rates. In particular the epi-cadmium activation reaction rate measurements were performed using cylindrical gold foils with a diameter of 12.7 mm, a thickness of 0.05 mm, a typical mass of 0.12 g ÷ 0.13 g and a cadmium cover thickness of 50/1000 inches, equivalent to 1.27 mm. Penetration measurements were made along the nuclear centre line, which was the horizontal axis of the system passing through the centre of the fission plate. Lateral distributions were also measured at various positions in the shields, the foils being located at intervals of 25 cm up and down from the nuclear centre line. The labelling convention for the measurement locations is given in FIG. 2.7.

A fraction of the neutrons present in the experimental array originated from leakage from the NESTOR core. To obtain a true comparison between measurement and a calculation using the fission plate source, the NESTOR core component must be subtracted from the measurement. There are two methods by which the background component can be estimated.

The best method is to repeat the measurement with the fissile content of the fission plate removed, i.e. an unfuelled measurement. This is a time consuming method as measurements have to be made twice at every point, once with the fuel and once without. The combination of low fluxes and low sensitivities of integral dosimeters can make foreground fuelled measurements difficult at deep penetration with the result that unfuelled measurements become impossible.

Background corrections of acceptable accuracy can be made for the high energy threshold reactions by a second method using the hydrogen filled proportional counters of the TNS system /26/ in integral mode. Here measurements of the neutron count-rates in the shield with the ASPIS shutter open and closed are required together with a measure of the shut-down ratio of the fission plate when the neutron shutter is closed. This technique was used for determining the background correction for the proportional counters; the correction was found to be around 2% throughout the shield and a value of 2% is recommended for the four threshold activation dosimeters at all positions in the shield.

The unfuelled technique for background correction was adopted for the gold measurements as there was a significant component of the low energy flux which did not arise from the fission plate, particularly near the fission plate itself where the fuelled to unfuelled ratio could be as low as 3.

The reaction effective threshold energies for the Rh-103(n,n'), In-115(n,n'), S-32(n,p) and Al-27(n,α) dosimeters, in a U-235 fission neutron spectrum similar to that of the Iron-88 experiment, are respectively 0.69 MeV, 1.30 MeV, 2.8 MeV and 7.30 MeV (see /27/). Nevertheless, since the effective threshold energy is not a completely satisfactory parameter for the characterization of the energy dependent cross section functions, the reported values give only a rough indication of the start of the response for the specific dosimeter.

If one wishes to characterize the dosimeter response energy range more accurately, the energy range corresponding to 90% of the response and the median energy of the response should be taken into account. The median energy is defined such that, in the specific spectrum, the responses below and above this energy value are equal. Secondly, the definition of the energy range corresponding to 90% of the total response of a dosimeter implies that 5% of the response is below the lower boundary and 5% is above the upper boundary of this energy range. A synthesis of these data for the four threshold activation dosimeters used in the Iron-88 experiment was taken from reference /27/ and it is reported in TAB. 2.4 to give more specific detailed information, addressed to obtain a more precise analysis in the comparison of the experimental and calculated dosimetric results.
In practice the experimental results coming from Rh-103(n,n'), In-115(n,n') (see /28/), S-32(n,p) and Al-27(n,α) correspond respectively to neutron fluxes above about 0.1 MeV, 1.0 MeV, 3.0 MeV and 8.0 MeV.

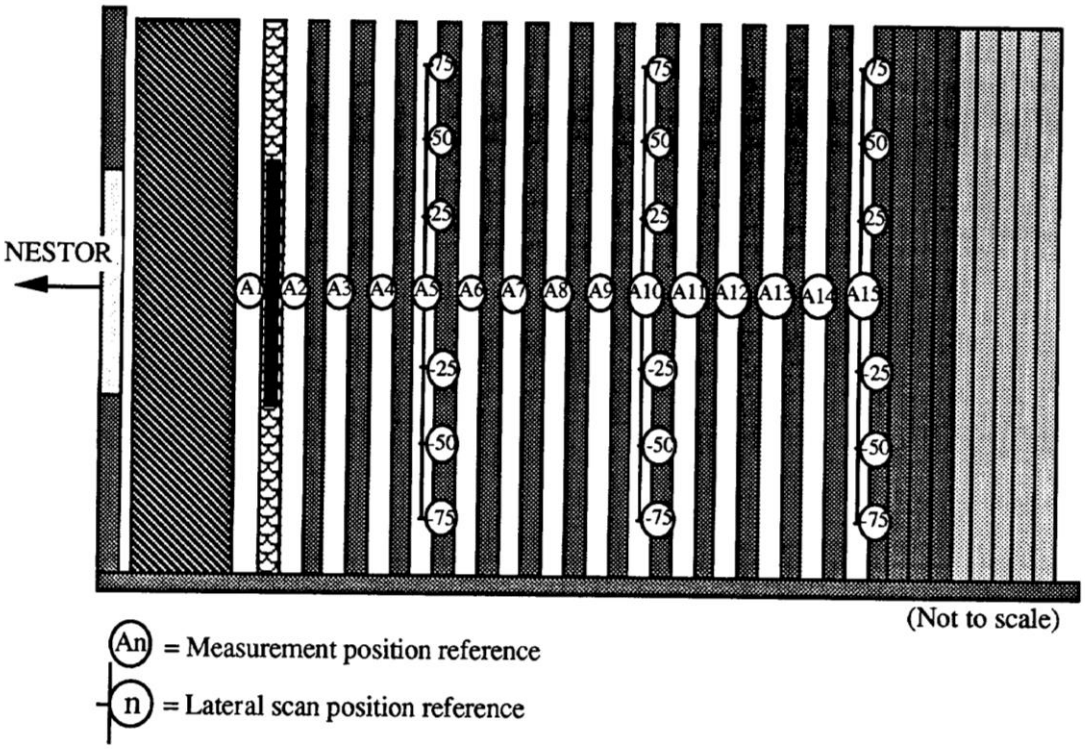
TAB. 2.4

Iron-88 - Threshold Activation Dosimeter Parameters in a U-235 Fission Neutron Spectrum.

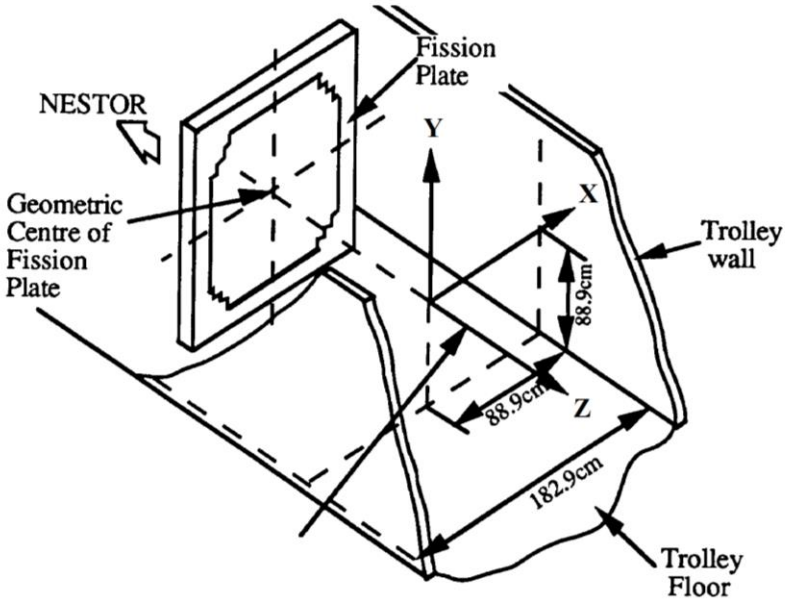
Dosimeter	Effective Threshold Energy [MeV]	90% Response Energy Range [MeV]	Median Energy [MeV]
Rh-103(n,n')	0.69	0.72 ÷ 5.8	2.3
In-115(n,n')	1.30	1.1 ÷ 5.9	2.6
S-32(n,p)	2.80	2.3 ÷ 7.3	4.0
Al-27(n,α)	7.30	6.4 ÷ 12.0	8.6

FIG. 2.7

Iron-88 - Measurement Locations [a].



Penetration measurements are located on the nuclear centre line as defined below



([a]) Figure derived from Figure 2 of reference /10/.

3 - CROSS SECTION LIBRARIES AND NUCLEAR DATA

The four working cross section libraries (BUGJEFF311.BOLIB /2/, BUGENDF70.BOLIB /3/, BUGLE-B7 /7/ and BUGLE-96 /8/) and the nuclear data (the reactor dosimetry cross sections /20/ derived from IRDF-2002 /21/ and the JEFF-3.1.1, ENDF/B-VII.0 and ENDF/B-VI.3 U-235 fission neutron spectra in the BUGLE-96 neutron energy structure) used in the present deterministic transport analysis are briefly described in this chapter. It is underlined that the ENEA-Bologna BUGJEFF311.BOLIB and BUGENDF70.BOLIB libraries and the ORNL BUGLE-B7 library adopt the same neutron (see TAB. 3.1) and photon (see TAB. 3.2) energy group structure (47 neutron groups + 20 photon groups) of the ORNL BUGLE-96 library. The cited libraries are broad-group coupled neutron/photon working cross section libraries in FIDO-ANISN /1/ format with parameterized cross section sets of problem-dependent self-shielded neutron cross sections, dedicated to LWR radiation shielding and radiation damage applications and, in particular, to the reactor pressure vessel (RPV) dosimetry analyses. At present they are the only free-released BUGLE-type libraries at OECD-NEADB and ORNL-RSICC.

3.1 - BUGJEFF311.BOLIB Cross Section Library

BUGJEFF311.BOLIB /2/ is an ENEA-Bologna broad-group (47 neutron groups + 20 photon groups) coupled neutron and photon working cross section library in FIDO-ANISN format, generated in 2011 in the same energy group structure of the ORNL BUGLE-96 /8/ similar library. It is based on the OECD-NEADB JEFF-3.1.1 /4/ /5/ evaluated nuclear data library. The BUGJEFF311.BOLIB broad-group library was obtained through problem-dependent cross section collapsing and self-shielding from the ENEA-Bologna VITJEFF311.BOLIB /29/ fine-group coupled neutron and photon pseudo-problem-independent library in AMPX format for nuclear fission applications. VITJEFF311.BOLIB adopts the same fine-group energy structure (199 neutron groups + 42 photon groups) of the ORNL VITAMIN-B6 /8/ library (mother library of BUGLE-96) and it is based on the Bondarenko /30/ (f-factor) method for the treatment of neutron resonance self-shielding and temperature effects.
BUGJEFF311.BOLIB, dedicated to LWR shielding and pressure vessel dosimetry applications, was generated using the ENEA-Bologna 2007 Revision /31/ of the ORNL SCAMPI /32/ nuclear data processing system, able to treat double precision data and freely released at OECD-NEADB and ORNL-RSICC.
The BUGJEFF311.BOLIB library was firstly freely released to OECD-NEADB and then to ORNL-RSICC, assuming respectively the designations NEA-1866 ZZ BUGJEFF311.BOLIB and DLC-254 BUGJEFF311.BOLIB. It is underlined that BUGJEFF311.BOLIB was the first BUGLE-type multi-group working library, based on OECD-NEADB JEFF nuclear data.

3.2 - BUGENDF70.BOLIB Cross Section Library

BUGENDF70.BOLIB /3/ is an ENEA-Bologna broad-group (47 neutron groups + 20 photon groups) coupled neutron and photon working cross section library in FIDO-ANISN format, generated in 2013 in the same energy group structure of the ORNL BUGLE-96 /8/ similar library. It is based on the US ENDF/B-VII.0 /6/ evaluated nuclear data library. The BUGENDF70.BOLIB broad-group library was obtained through problem-dependent cross section collapsing and self-shielding from the ENEA-Bologna VITENDF70.BOLIB /33/ fine-group coupled neutron and photon pseudo-problem-independent library in AMPX format

for nuclear fission applications. VITENDF70.BOLIB adopts the same fine-group energy structure (199 neutron groups + 42 photon groups) of the ORNL VITAMIN-B6 /8/ library (mother library of BUGLE-96) and it is based on the Bondarenko /30/ (f-factor) method for the treatment of neutron resonance self-shielding and temperature effects.
BUGENDF70.BOLIB, dedicated to LWR shielding and pressure vessel dosimetry applications, was generated using the ENEA-Bologna 2007 Revision /31/ of the ORNL SCAMPI /32/ nuclear data processing system, able to treat double precision data and freely released at OECD-NEADB and ORNL-RSICC.
The BUGENDF70.BOLIB library was firstly freely released to OECD-NEADB and then to ORNL-RSICC, assuming respectively the designations NEA-1872 ZZ BUGENDF70.BOLIB and DLC-262 BUGENDF70.BOLIB.

3.3 - BUGLE-B7 Cross Section Library

BUGLE-B7 /7/ is an ORNL broad-group (47 neutron groups + 20 photon groups) coupled neutron and photon working cross section library in FIDO-ANISN format, generated in 2011 in the same energy group structure of the ORNL BUGLE-96 /8/ similar library. It is based on the US ENDF/B-VII.0 /6/ evaluated nuclear data library. The BUGLE-B7 broad-group library was obtained through problem-dependent cross section collapsing and self-shielding from the ORNL VITAMIN-B7 /7/ fine-group coupled neutron and photon pseudo-problem-independent library in AMPX format for nuclear fission applications. VITAMIN-B7 adopts the same fine-group energy structure (199 neutron groups + 42 photon groups) of the ORNL VITAMIN-B6 /8/ library (mother library of BUGLE-96) and it is based on the Bondarenko /30/ (f-factor) method for the treatment of neutron resonance self-shielding and temperature effects.
BUGLE-B7, dedicated to LWR shielding and pressure vessel dosimetry applications, was generated through the ORNL AMPX-6-1.0 /34/ nuclear data processing system (not freely released at the time of the library generation in 2011), used also to produce the VITAMIN-B7 fine-group mother library of BUGLE-B7.
The BUGLE-B7 library was firstly freely released to ORNL-RSICC and then to OECD-NEADB, assuming respectively the designations DLC-245 VITAMIN-B7/BUGLE-B7 and DLC-0245 ZZ-VITAMINB7/BUGLEB7.

3.4 - BUGLE-96 Cross Section Library

BUGLE-96 /8/ is an ORNL broad-group (47 neutron groups + 20 photon groups) coupled neutron and photon working cross section library in FIDO-ANISN format generated in 1996. It is based on the US ENDF/B-VI.3 /9/ evaluated nuclear data library. BUGLE-96 was obtained through problem-dependent cross section collapsing and self-shielding from the ORNL VITAMIN-B6 /8/ fine-group (199 neutron groups + 42 photon groups) coupled neutron and photon pseudo-problem-independent library in AMPX format. VITAMIN-B6 was generated through the NJOY-94.15 nuclear data processing system and it is based on the Bondarenko /30/ (f-factor) method for the treatment of neutron resonance self-shielding and temperature effects. BUGLE-96, dedicated to LWR shielding and pressure vessel dosimetry applications, was generated using the version of the ORNL SCAMPI /32/ nuclear data processing system available in 1996. This library was freely released to ORNL-RSICC and then to OECD-NEADB where respectively assumed the designations DLC-0185 BUGLE-96 and DLC-0185 ZZ-BUGLE-96. It is underlined that BUGLE-96 and the fine-group mother library VITAMIN-B6, became reference standards (see /22/, ANSI/ANS-6.1.2-1999 (R2009))

as multi-group libraries recommended for shielding applications and they were successfully used all over the world.

TAB. 3.1

Neutron Group Energy and Lethargy Boundaries for the BUGLE-Type Libraries.

Group	Upper Energy [MeV]	Upper Lethargy
1	1.7332E+07	-5.4997E-01
2	1.4191E+07	-3.5002E-01
3	1.2214E+07	-2.0000E-01
4	1.0000E+07	0.
5	8.6071E+06	1.5000E-01
6	7.4082E+06	3.0000E-01
7	6.0653E+06	5.0000E-01
8	4.9659E+06	7.0000E-01
9	3.6788E+06	1.0000E-00
10	3.0119E+06	1.2000E+00
11	2.7253E+06	1.3000E+00
12	2.4660E+06	1.4000E+00
13	2.3653E+06	1.4417E+00
14	2.3457E+06	1.4500E+00
15	2.2313E+06	1.5000E+00
16	1.9205E+06	1.6500E+00
17	1.6530E+06	1.8000E+00
18	1.3534E+06	2.0000E+00
19	1.0026E+06	2.3000E+00
20	8.2085E+05	2.5000E+00
21	7.4274E+05	2.6000E+00
22	6.0810E+05	2.8000E+00
23	4.9787E+05	3.0000E+00
24	3.6883E+05	3.3000E+00
25	2.9721E+05	3.5159E+00
26	1.8316E+05	4.0000E+00
27	1.1109E+05	4.5000E+00
28	6.7379E+04	5.0000E+00
29	4.0868E+04	5.5000E+00
30	3.1828E+04	5.7500E+00
31	2.6058E+04	5.9500E+00
32	2.4176E+04	6.0250E+00
33	2.1875E+04	6.1250E+00
34	1.5034E+04	6.5000E+00
35	7.1017E+03	7.2500E+00
36	3.3546E+03	8.0000E+00
37	1.5846E+03	8.7500E+00
38	4.5400E+02	1.0000E+01
39	2.1445E+02	1.0750E+01
40	1.0130E+02	1.1500E+01
41	3.7266E+01	1.2500E+01
42	1.0677E+01	1.3750E+01
43	5.0435E+00	1.4500E+01
44	1.8554E+00	1.5500E+01
45	8.7643E-01	1.6250E+01
46	4.1399E-01	1.7000E+01
47	1.0000E-01	1.8421E+01
	1.0000E-05	2.7631E+01

TAB. 3.2

Photon Group Energy Boundaries for the BUGLE-Type Libraries.

Group	Upper Energy [MeV]
1	1.4000E+07
2	1.0000E+07
3	8.0000E+06
4	7.0000E+06
5	6.0000E+06
6	5.0000E+06
7	4.0000E+06
8	3.0000E+06
9	2.0000E+06
10	1.5000E+06
11	1.0000E+06
12	8.0000E+05
13	7.0000E+05
14	6.0000E+05
15	4.0000E+05
16	2.0000E+05
17	1.0000E+05
18	6.0000E+04
19	3.0000E+04
20	2.0000E+04
	1.0000E+04

3.5 - IRDF-2002 Dosimeter Cross Sections

The activation dosimeter cross sections for the Au-197(n,γ)Au-198 nuclear reactions (see FIGs. 3.1÷3.7 and TABs. 3.3÷3.4) and the threshold activation dosimeter cross sections for the Rh-103(n,n')Rh-103m (see FIGs. 3.8÷3.9 and TABs. 3.5÷3.9), In-115(n,n')In-115m (see FIGs. 3.10÷3.11 and TABs. 3.5÷3.9), S-32(n,p)P-32 (see FIGs. 3.12÷3.13 and TABs. 3.5÷3.9) and Al-27(n,α)Na-24 (see FIGs. 3.14÷3.17 and TABs. 3.5÷3.9) nuclear reactions, used in the present Iron-88 transport analysis, were derived (see for example /2/, /3/ and /20/) from the IAEA IRDF-2002 /21/ International Reactor Dosimetry File.

The nuclear reaction cross sections for the Au-197(n,γ)Au-198, Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 activation dosimeters were obtained in the 47-group neutron energy structure (see TAB. 3.1), typical of the BUGJEFF311.BOLIB /2/, BUGENDF70.BOLIB /3/, BUGLE-B7 /7/ and BUGLE-96 /8/ libraries.

The dosimeter cross sections for the calculations using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 libraries were obtained from IRDF-2002, through the GROUPIE module of the PREPRO /35/ nuclear data processing system. Two types of neutron weighting spectrum in the 199-group neutron energy structure, typical of the VITJEFF311.BOLIB /29/, VITENDF70.BOLIB /33/, VITAMIN-B7 /7/ and VITAMIN-B6 /8/ corresponding mother libraries, were used in GROUPIE to generate the 47-group dosimeter cross sections. In particular the same flat weighting spectrum was used to generate the corresponding 47-group activation dosimeter cross section set to be used with all the four BUGLE-type libraries whilst four 1/4 T PV weighting spectra, separately generated through the use (see for example /2/and /3/) of each VITAMIN-type mother library, were employed to produce the corresponding four 47-group activation dosimeter cross section sets to be singularly used with each corresponding BUGLE-type library.

In particular, as flat neutron weighting spectrum, the constant numerical value of unity was attributed to all the neutron groups of the 199-group flat neutron spectrum used in GROUPIE to generate five flat weighting dosimeter cross section sets (one for each of the total five types of dosimeters employed in Iron-88), obviously used by all the four BUGLE-type libraries.
On the contrary, the four 1/4 T PV neutron weighting spectra, used to generate the four dosimeter cross section sets separately employed in the calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 libraries, were obtained (see for example /2/, /3/ and /20/) through four fixed source one-dimensional transport calculations. These 1D transport analyses, using respectively the VITJEFF311.BOLIB, VITENDF70.BOLIB, VITAMIN-B7 and VITAMIN-B6 corresponding fine-group mother libraries, were conceived to describe the in-vessel and ex-vessel radial geometry of a PWR. In particular the four previously cited 1/4 T PV neutron weighting spectra were calculated in a steel zone, the reactor pressure vessel (PV) of a PWR, at a spatial position corresponding to one quarter of the thickness (T) of the reactor pressure vessel (1/4 T PV).
Concerning the two 1/4 T PV weighting dosimeter cross section sets, separately employed in the transport calculations using BUGLE-B7 and BUGLE-96, they were obtained in ENEA-Bologna for the present transport analysis with the same PREPRO calculation procedure previously cited. In this case, the two original 199-group 1/4 T PV neutron weighting spectra, calculated at ORNL in the same PV spatial position through the

VITAMIN-B7 and VITAMIN-B6 fine-group mother libraries of BUGLE-B7 and BUGLE-96 respectively, were alternatively used in GROUPIE.

The 47-group dosimeter cross sections, obtained with both the flat weighting and the 1/4 T PV weighting neutron spectra, were in general employed in all the calculations but, for the transport analysis dedicated to the Iron-88 single-material (iron) neutron shielding benchmark experiment, the dosimeter cross sections obtained with the four 1/4 T PV weighting spectra were considered more appropriate. In fact these neutron weighting spectra, obtained within a reactor PV steel region, are obviously more similar to the neutron spectrum present in the Iron-88 experimental region made of mild steel.

It is underlined that a unique flat weighting cross section set in the 47-group neutron energy structure for each specific dosimeter nuclear reaction was employed in the transport calculations using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 libraries, as already previously reported.
On the contrary, for each specific dosimeter nuclear reaction, the corresponding group numerical values of the four 1/4 T PV weighting cross section sets, respectively used to obtain the reaction rate results in the calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 libraries, are slightly different. In fact the four 1/4 T PV weighting dosimeter cross section sets, respectively used in the calculations with BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96, were obtained through GROUPIE, using separately four slightly different 199-group 1/4 T PV neutron weighting spectra. The last cited neutron spectra, previously calculated using the VITJEFF311.BOLIB, VITENDF70.BOLIB, VITAMIN-B7 and VITAMIN-B6 corresponding mother libraries, based respectively on JEFF-3.1.1 /4/, ENDF/B-VII.0 /6/, ENDF/B-VII.0 and ENDF/B-VI.3 /9/ nuclear data, are in particular slightly different since they were obtained from calculations using libraries based on different nuclear data or libraries processed with different nuclear data processing systems. For example, for the two fine-group mother libraries VITENDF70.BOLIB and VITAMIN-B7 based on ENDF/B-VII.0, the LANL NJOY-99.259 /36/ and the ORNL AMPX-6.1 /34/ data processing systems were respectively used for their generation and so slightly different 199-group 1/4 T PV neutron weighting spectra were calculated.

It is then underlined that, differently from the four threshold activation dosimeters used in the Iron-88 experiment, the Au-197(n,γ)Au-198 cross sections must be self-shielded for the neutron resonance absorption through a methodology described hereinafter.

For the Au-197(n,γ)Au-198 and Al-27(n,α)Na-24 dosimeter cross sections, characterized by the highest differences between the flat weighting and the 1/4 T PV weighting cross sections, the ratios of the 1/4 T PV weighting cross sections divided by the corresponding flat weighting cross sections used in the calculations with the BUGJEFF311.BOLIB and the BUGLE-96 libraries are reported. In particular the self-shielded cross section ratios for Au-197(n,γ)Au-198 are reported in the FIGs. 3.6 and 3.7, respectively for BUGJEFF311.BOLIB and BUGLE-96, whilst the corresponding cross section ratios for Al-27(n,α)Na-24 are respectively shown in the FIGs. 3.16 and 3.17. In particular, the self-shielded cross section ratios reproduced in the FIGs. 3.6 and 3.7 for Au-197(n,γ)Au-198 are derived respectively from the corresponding cross section data shown in the FIGs. 3.4 and 3.5 and tabulated in the TABs. 3.3 and 3.4. The cross section ratios presented in the

FIGs. 3.16 and 3.17 for Al-27(n,α)Na-24 are instead derived respectively from the corresponding cross section data represented in the FIGs. 3.14 and 3.15 and tabulated in the TABs. 3.5, 3.6 and 3.9.

The Au-197(n,γ)Au-198 flat weighting activation cross sections with appropriate self-shielding were compared in FIG. 3.1 with the corresponding cross sections without self-shielding.
Comparisons of the Au-197(n,γ)Au-198 1/4 T PV weighting cross sections with and without self-shielding are shown in FIG. 3.2 and FIG. 3.3, exclusively for the BUGJEFF311.BOLIB library and the BUGLE-96 reference library respectively. Comparisons of flat weighting vs. Au-197(n,γ)Au-198 1/4 T PV weighting neutron self-shielded cross sections are represented in FIG. 3.4 and FIG. 3.5, respectively for the cross sections used in the calculations with the BUGJEFF311.BOLIB and the BUGLE-96 libraries. With respect to the self-shielded cross sections shown in FIG. 3.4 and FIG. 3.5, the ratios of the Au-197(n,γ)Au-198 1/4 T PV weighting cross sections divided by the corresponding flat weighting cross sections are reported in FIG. 3.6 and FIG. 3.7, respectively for the self-shielded cross sections used in the calculations with the BUGJEFF311.BOLIB and the BUGLE-96 libraries.

Finally it is reported herewith in detail the methodology used to self-shield the Au-197(n,γ)Au-198 cross sections and to identify the appropriate numerical value of the cadmium cutoff energy for the Au-197(n,γ)Au-198/Cd epi-cadmium reaction rate measurements, taking into account the thickness of the cadmium cover employed together with the gold dosimeters, in the Iron-88 experiment specific conditions. The generation of the Au-197(n,γ)Au-198 self-shielded cross sections was performed through the GROUPIE module of the PREPRO nuclear data processing system using a background cross section σ_0 equal to 1695.0 barns to take into account, in particular, the neutron self-shielding in the resolved resonance energy region. The reported numerical value of the background cross section σ_0 was obtained assuming that the total background cross section for a lump with finite dimensions is given by (see /37/, pages 9-41 and 9-42) the sum of a first component, given by the background cross section depending on the dilution rate of a specific nuclide in the isotopic material mixture of the lump, plus a second component, given by an escape cross section from the lump. For the gold foils, composed by a monoisotopic material, the first component is a negligible quantity equal to 0.0 or 1.0E-06 barns, as commonly assumed in the data processing calculation procedures. The second component is calculated herewith and can be considered equivalent to the total background cross section, used to self-shield properly the gold cross sections, since the first component is negligible.
For a lump of resonance material (gold foil) embedded in a large moderating region, escapes from the lump also increase the background cross section and the Wigner rational approximation is used to obtain an effective escape cross section “sigmaescape”. This additional escape cross section is given by:

$$\text{sigmaescape} = 1/(N \times \langle \ell \rangle),$$

where the mean chord length of the lump is given by $\langle \ell \rangle = 4V/S$ where:

S = Total area of the surface of the cylindrical gold foil (lump);
V = Total volume of the cylindrical gold foil (lump);
N = Atomic density of gold.

Therefore $4V/S = 4 \times \pi r^2 h / 2\pi r^2 = 2h$, where h (0.005 cm) is the thickness (or height) of the cylindrical gold foils used in the Iron-88 experiment, expressed in cm.

So we have $4V/S = 2 \times 0.005 = 0.01$ cm = mean chord length of the cylindrical lump (<ℓ> gold foil), considering negligible the area of the lateral cylindrical surface of the gold foils.

Then we have:

sigmaescape = $S/4V \times 1/N = 1/2h \times 1/N$.
Taking into account that N(Au-197) = gold density × Avogadro constant / gold gram atomic weight, we have:

N(Au-197) = $19.3 \times 0.602214129 / 196.967 = 5.9E\text{-}02$ atoms × $barns^{-1} \times cm^{-1}$

where:

gold density = $19.3\ g \times cm^{-3}$;
Avogadro constant = $0.60221414129 \times 1.0E+24$ atoms × mol^{-1};
gold gram atomic weight = 196.967 gram-atom.

Finally we have:

sigmaescape = $1/0.01 \times 1/5.9E\text{-}02 = 100 \times 169.949 = 1695.0$ barns

The epi-cadmium reaction rate measurements with gold dosimeters were performed using gold foils inserted in cadmium covers able to absorb the thermal neutrons below a cutoff energy, depending on the cadmium cover thickness.
Taking into account that the cadmium cover thickness for the gold dosimeters employed in the Iron-88 benchmark experiment was equal to 50/1000 inches (1.27 mm), the cadmium cutoff energy for a thin 1/v neutron absorber, as a gold foil dosimeter, is about 0.73 eV, as can be deduced from reference /38/ (specifically from Figure 12.2.5 at page 276). The identification of an energy value for the effective experimental cadmium cutoff energy is necessary to decide how many neutron groups of the BUGLE-type 47-group neutron energy structure must be excluded to calculate correctly the total epi-cadmium reaction rates of the gold dosimeters in the Iron-88 benchmark experiment.

Eliminating, in particular, in the calculations with the BUGLE-type libraries, the two last neutron groups No. 46 and No. 47 of the BUGLE-type neutron energy structure (see TAB. 3.1), the effective cadmium cutoff energy is implicitly assumed at the classical 0.414 eV neutron energy, the classical upper energy threshold of the thermal neutrons. Eliminating an additional neutron group, i.e. the neutron group No. 45, the effective cadmium cutoff energy is implicitly assumed at 0.876 eV, the lower energy limit of the neutron group No. 44.
Probably the most correct choice in this case, adopted in the present work, is to eliminate from the calculations the gold dosimeter reaction rate contributions of the three previously cited lowest energy neutron groups. In fact the energy value nearer to 0.73 eV, i.e. the experimental effective cadmium cutoff energy corresponding to a cadmium cover thickness of

1.27 mm, is 0.876 eV, the lower energy limit of the neutron group No. 44 in a BUGLE-type neutron energy group structure.

FIG. 3.1

Comparison of the Au-197(n,γ)Au-198 Flat Weighting Neutron Cross Sections with and without Self-Shielding Used in the Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Self-Shielding Calculated Assuming a Background Cross Section σ_0 = 1695.0 barns.

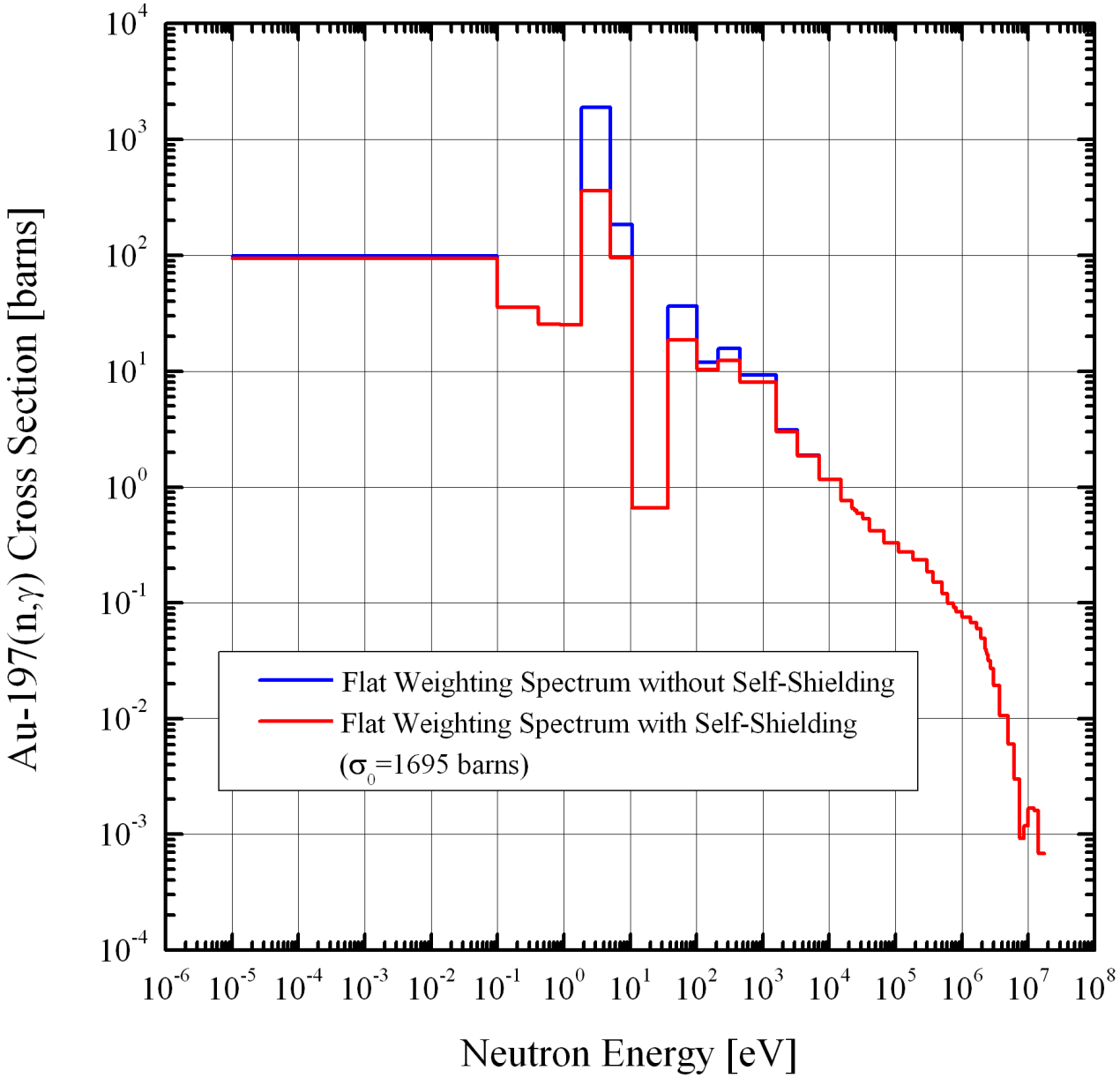


FIG. 3.2

Comparison of the Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Cross Sections
with and without Self-Shielding Used in the Calculations
with the BUGJEFF311.BOLIB Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Self-Shielding Calculated Assuming a Background Cross Section σ_0 = 1695.0 barns.

Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITJEFF311.BOLIB Library.

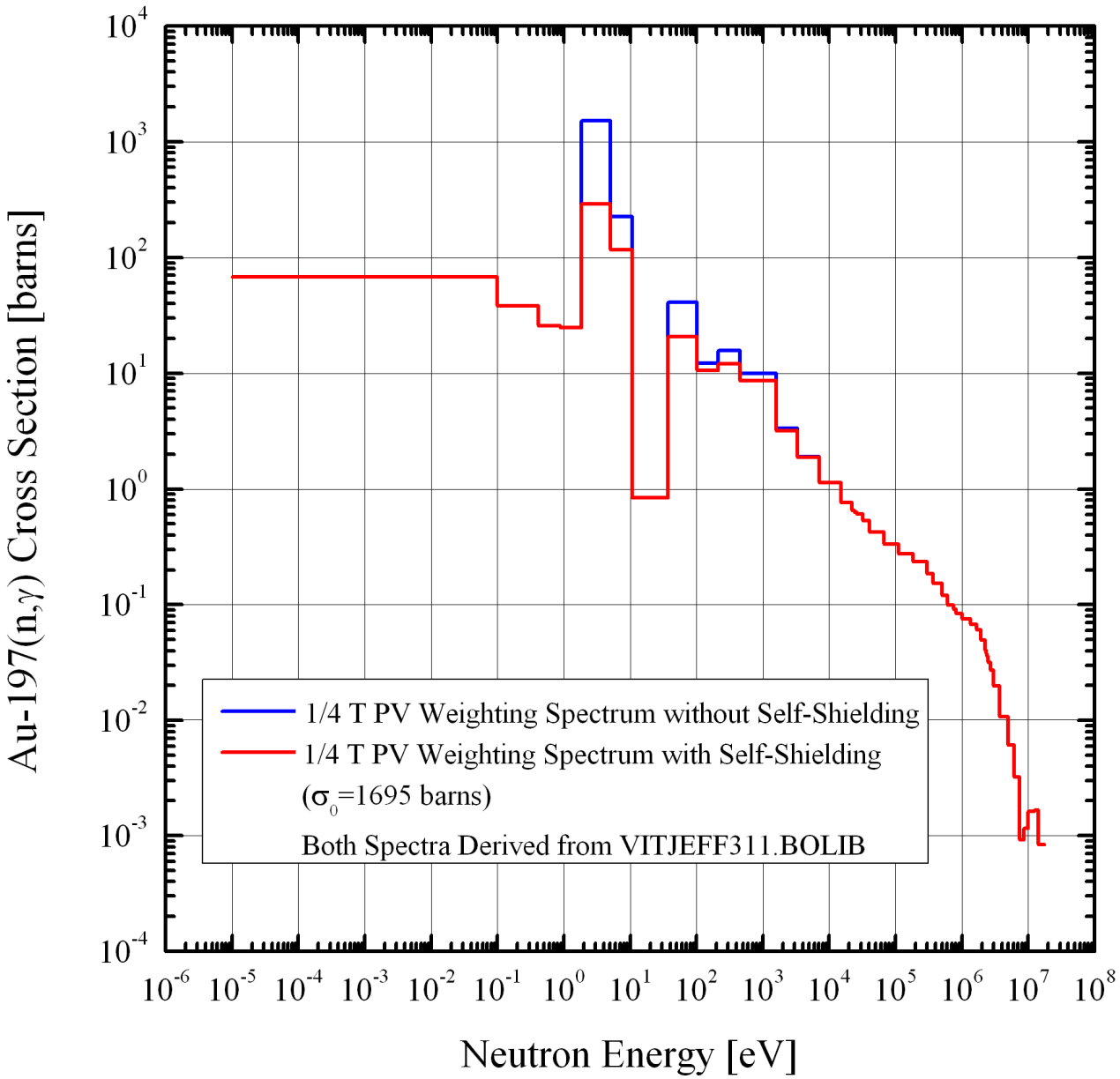


FIG. 3.3

Comparison of the Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Cross Sections
with and without Self-Shielding Used in the Calculations
with the BUGLE-96 Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Self-Shielding Calculated Assuming a Background Cross Section σ_0 = 1695.0 barns.

Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITAMIN-B6 Library.

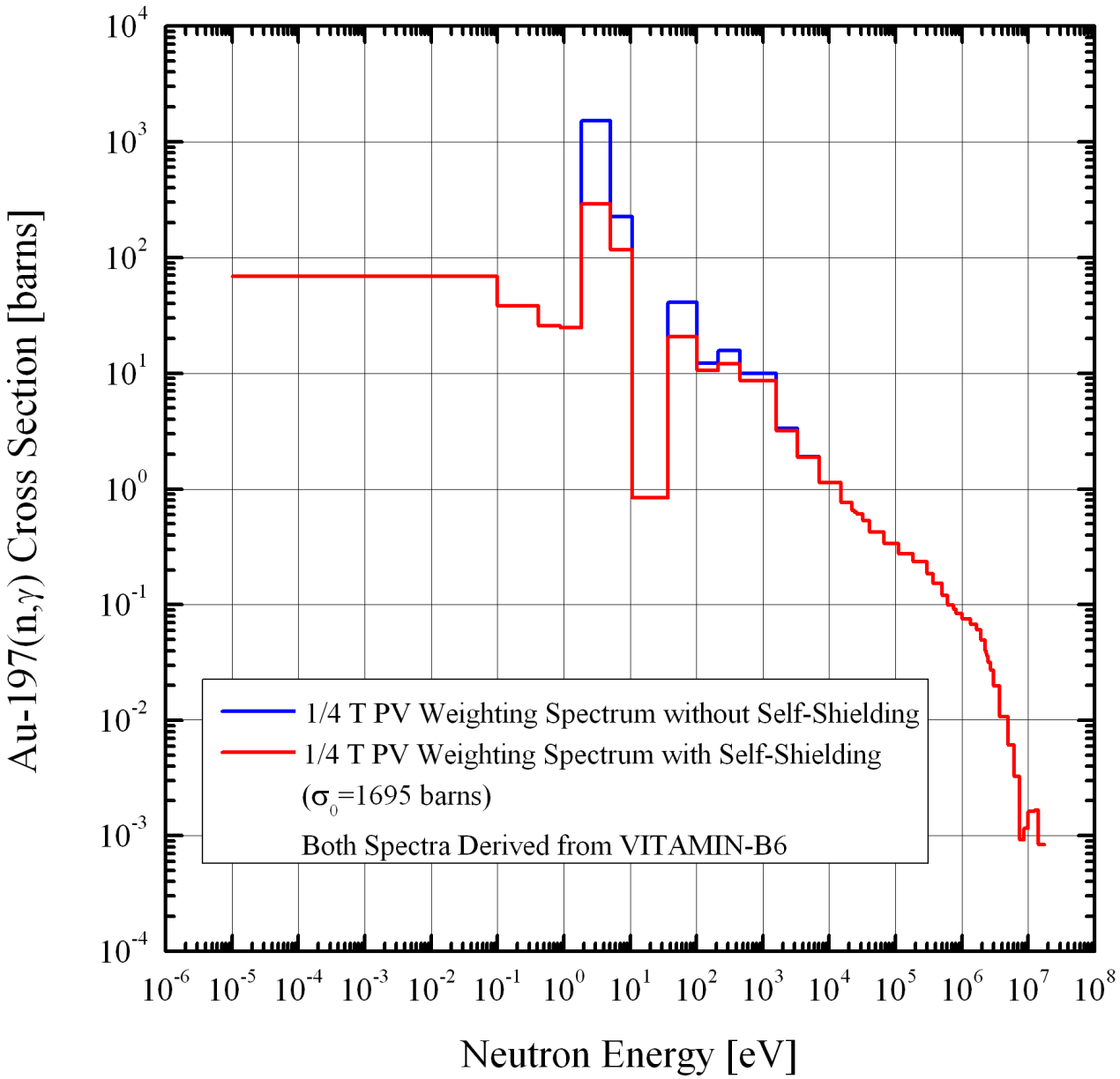


FIG. 3.4

Comparison of Au-197(n,γ)Au-198 Flat Weighting vs. 1/4 T PV Weighting Neutron Cross Sections with Self-Shielding Used in the Calculations with the BUGJEFF311.BOLIB Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Self-Shielding Calculated Assuming a Background Cross Section σ_0 = 1695.0 barns.

Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Self-Shielded Cross Sections Obtained through Data Processing Using the 199-Group Neutron Spectrum Calculated in the 1/4 T PV Position with the VITJEFF311.BOLIB Library.

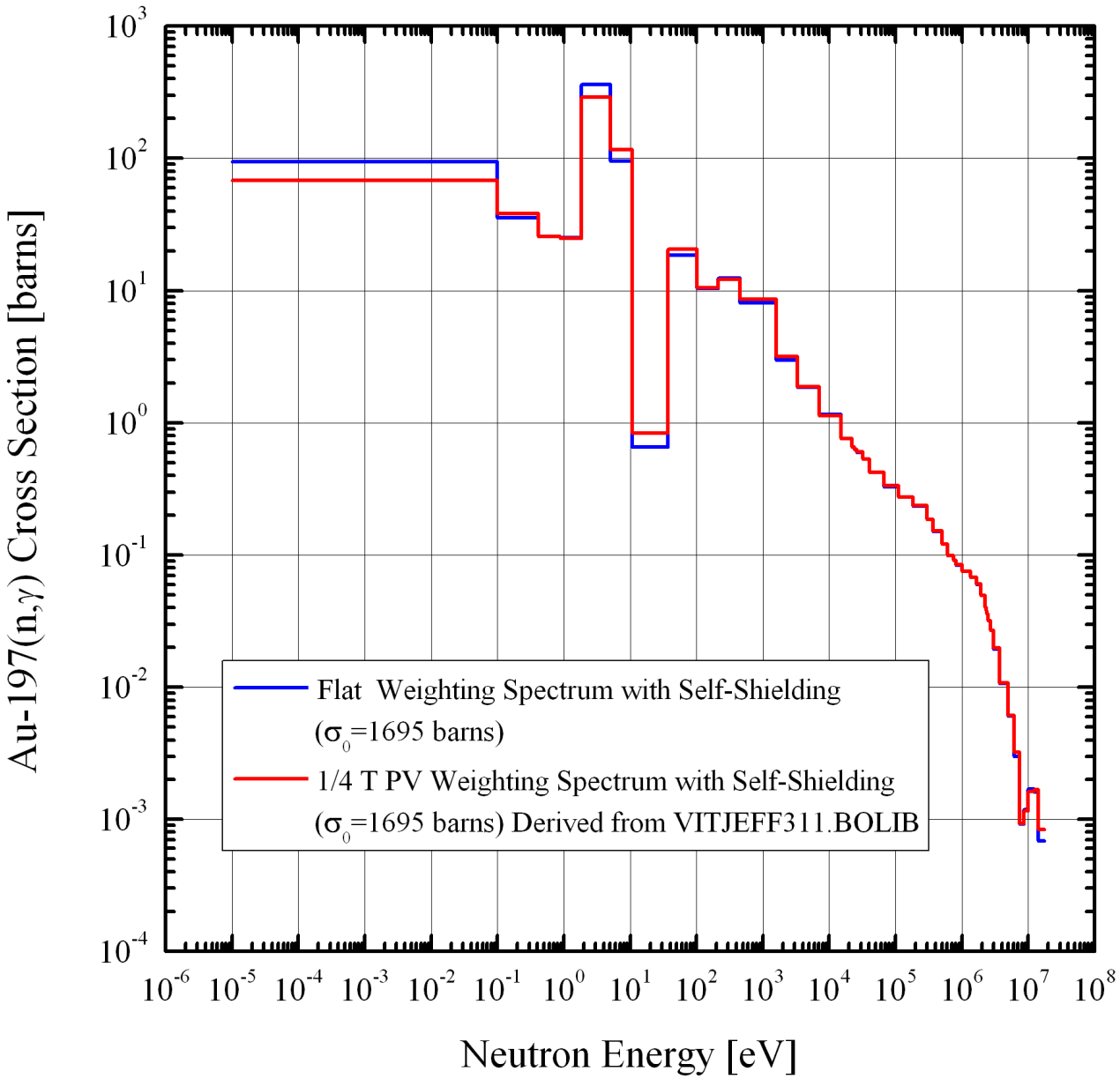


FIG. 3.5

Comparison of Au-197(n,γ)Au-198 Flat Weighting vs. 1/4 T PV Weighting Neutron Cross Sections with Self-Shielding Used in the Calculations with the BUGLE-96 Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Self-Shielding Calculated Assuming a Background Cross Section σ_0 = 1695.0 barns.

Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Self-Shielded Cross Sections Obtained through Data Processing Using the 199-Group Neutron Spectrum Calculated in the 1/4 T PV Position with the VITAMIN-B6 Library.

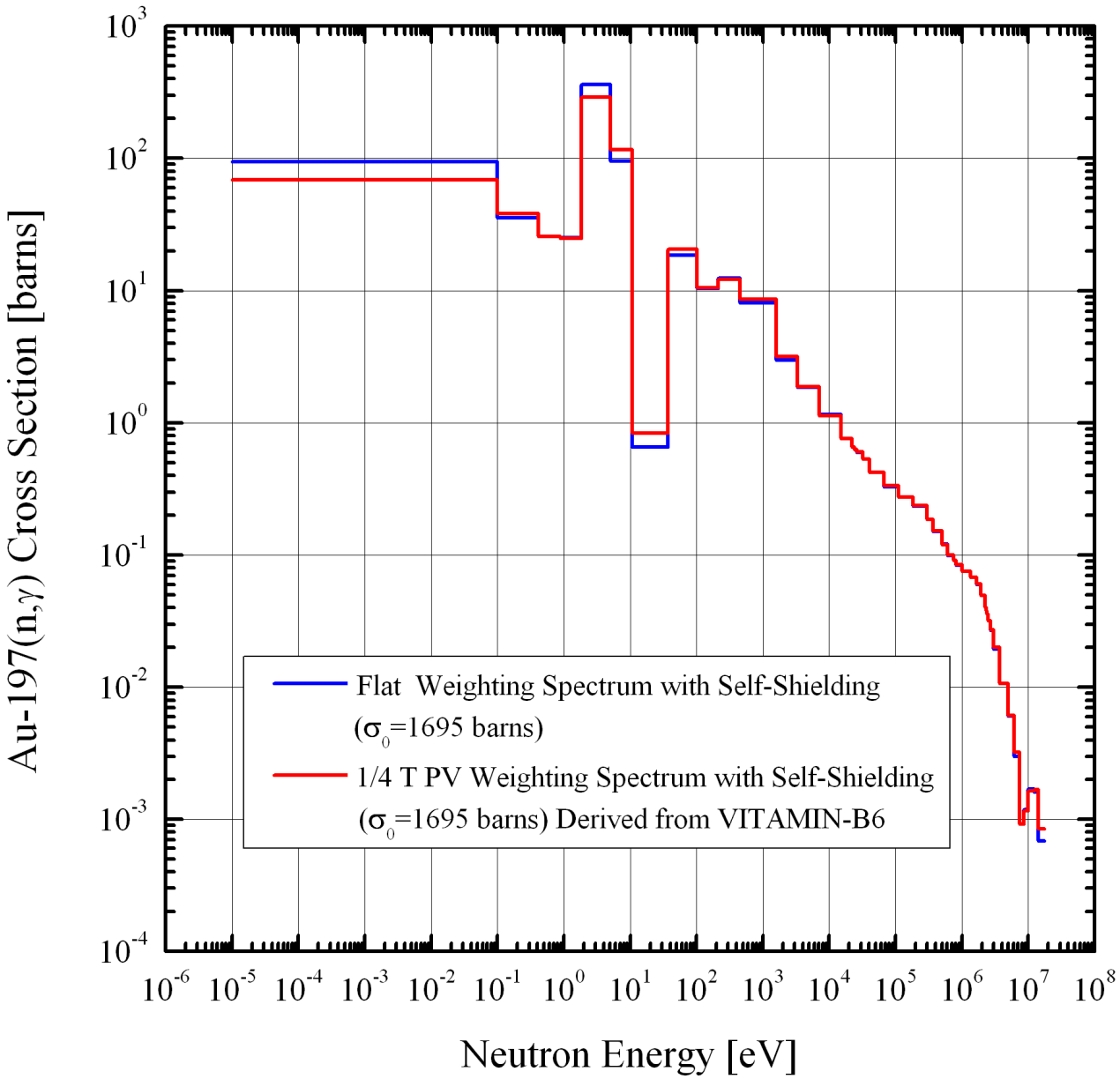


FIG. 3.6

Ratio (1/4 T PV Weighting / Flat Weighting) of the Au-197(n,γ)Au-198
Neutron Cross Sections with Self-Shielding Used in the Calculations
with the BUGJEFF311.BOLIB Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITJEFF311.BOLIB Library.

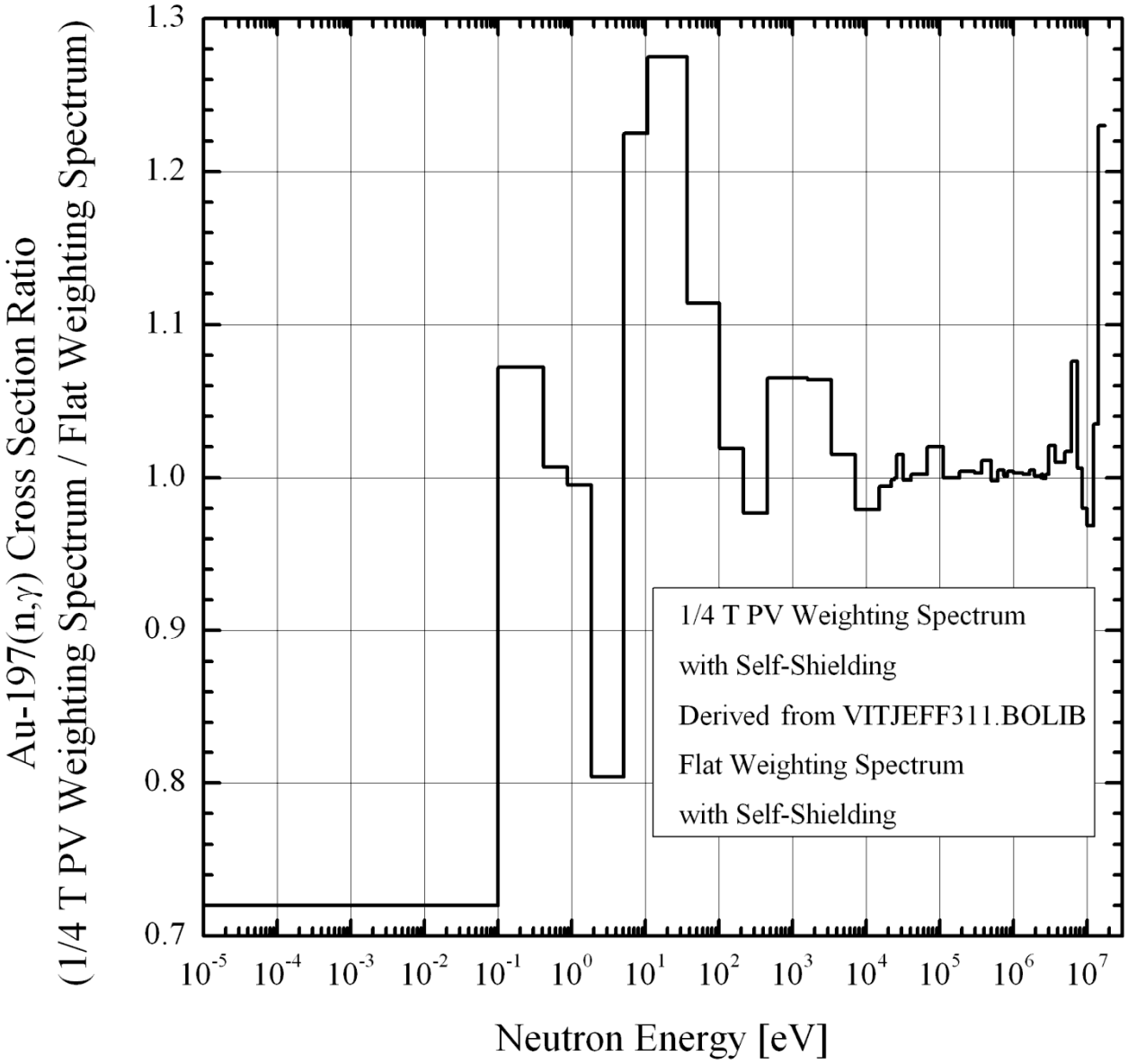


FIG. 3.7

Ratio (1/4 T PV Weighting / Flat Weighting) of the Au-197(n,γ)Au-198
Neutron Cross Sections with Self-Shielding Used in the Calculations
with the BUGLE-96 Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Cross Section Libraries.

Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Self-Shielded Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITAMIN-B6 Library.

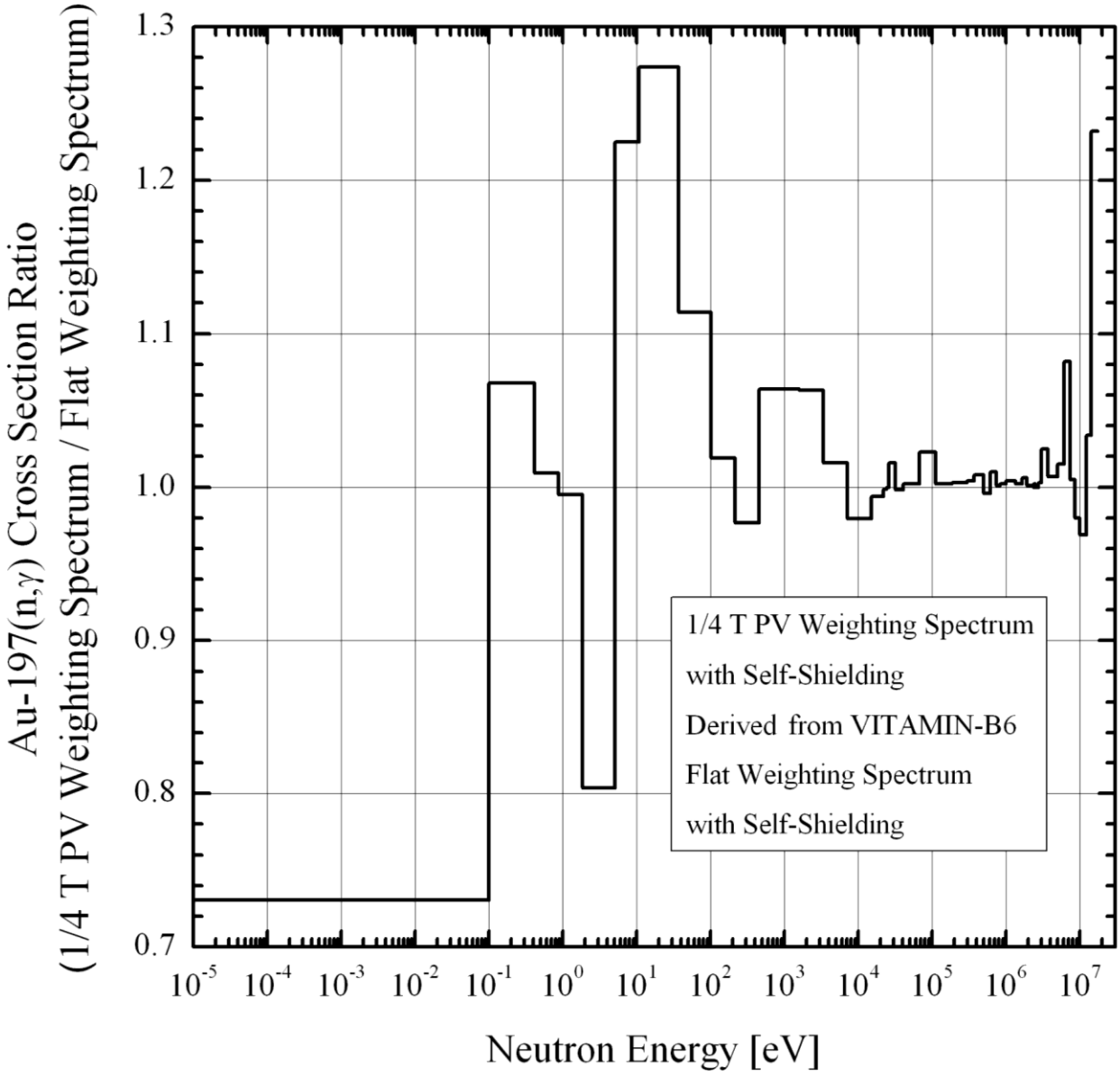


FIG. 3.8

Comparison of the IRDF-2002 Flat Weighting vs. 1/4 T PV Weighting
Rh-103(n,n')Rh-103m Dosimeter Cross Sections
Used with the BUGJEFF311.BOLIB Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Rh-103(n,n')Rh-103m 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITJEFF311.BOLIB Library.

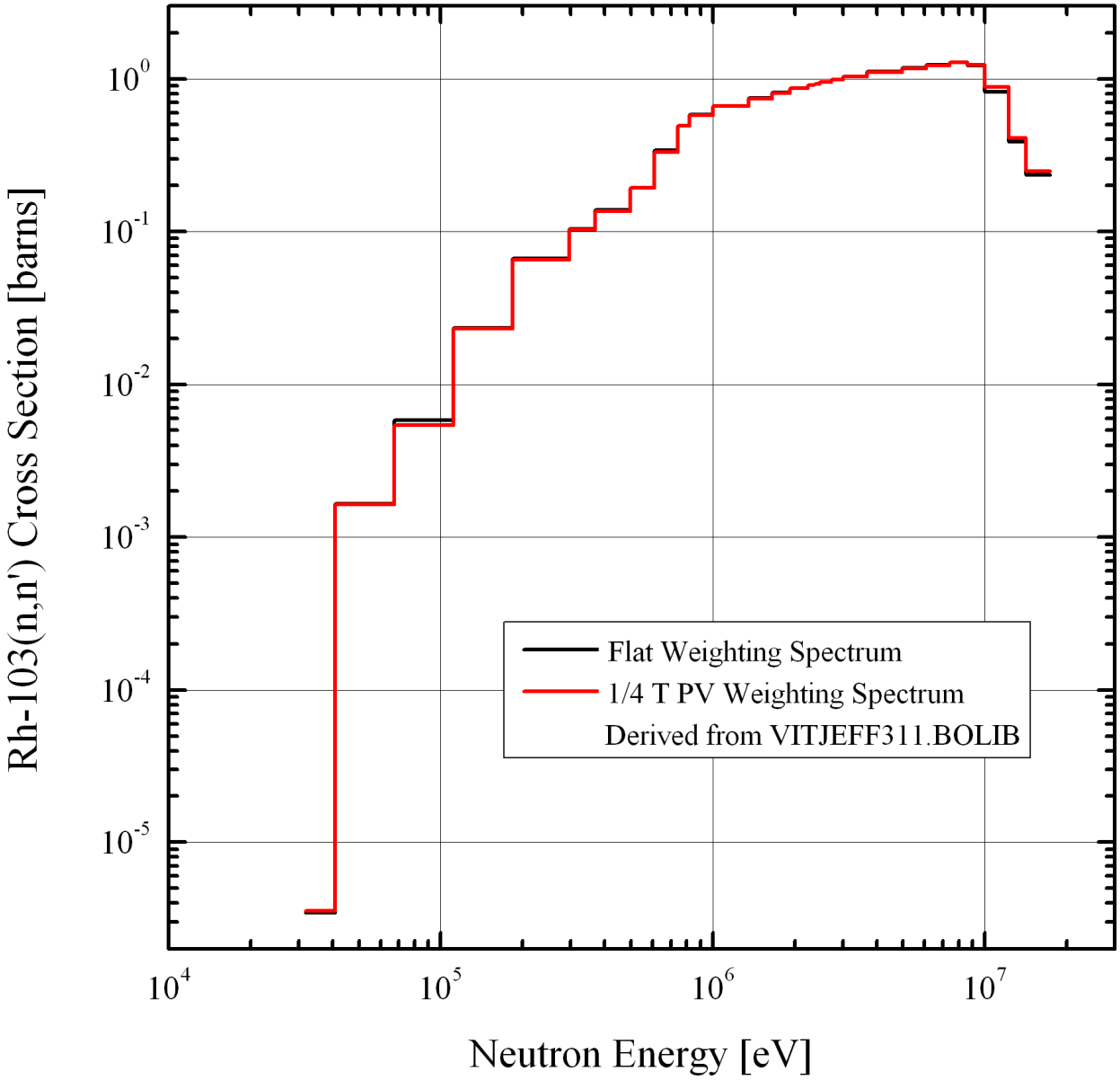


FIG. 3.9

Comparison of the IRDF-2002 Flat Weighting vs. 1/4 T PV Weighting
Rh-103(n,n')Rh-103m Dosimeter Cross Sections
Used with the BUGLE-96 library

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Rh-103(n,n')Rh-103m 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITAMIN-B6 Library.

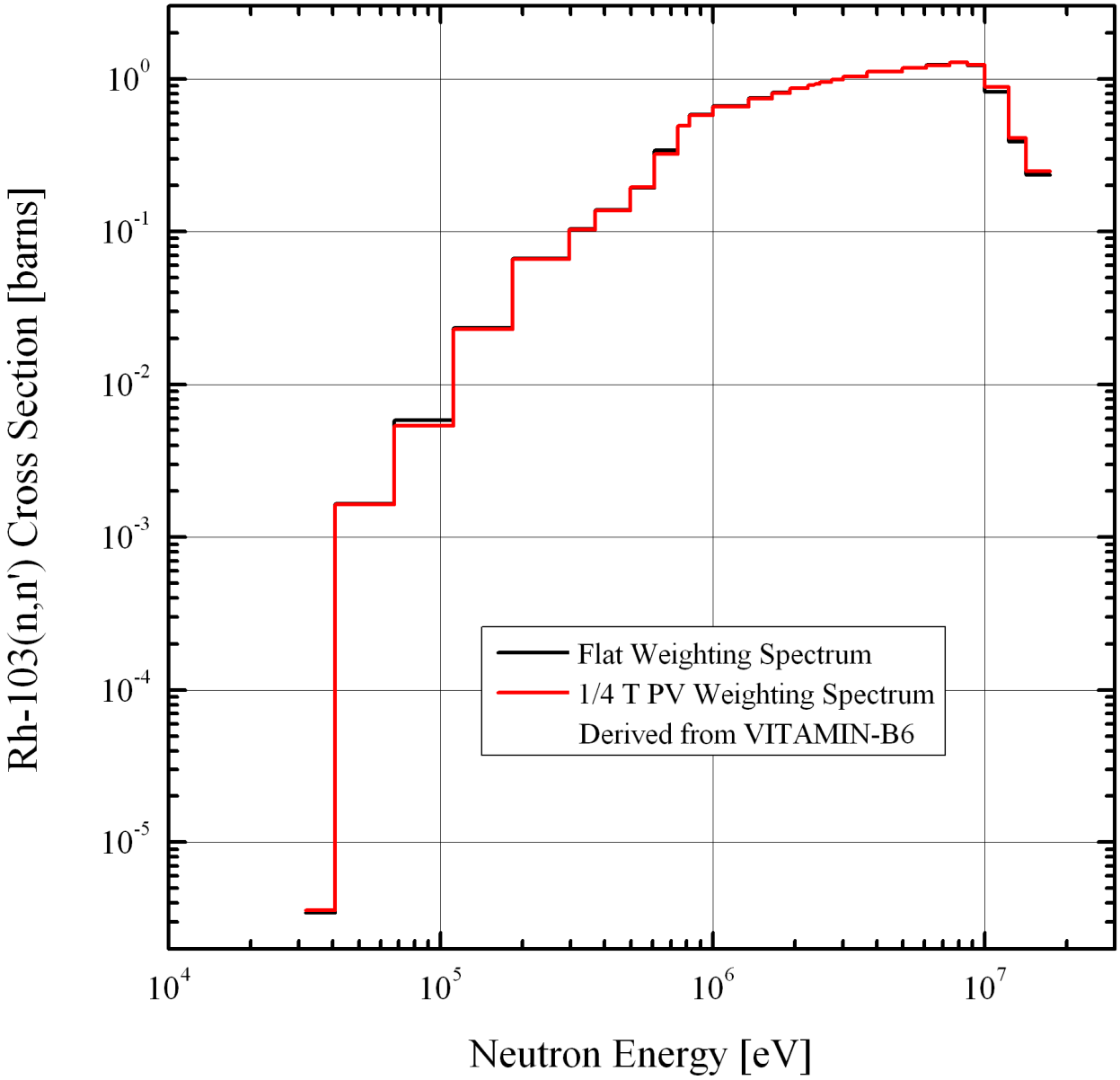


FIG. 3.10

Comparison of the IRDF-2002 Flat Weighting vs. 1/4 T PV Weighting
In-115(n,n')In-115m Dosimeter Cross Sections
Used with the BUGJEFF311.BOLIB Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

In-115(n,n')In-115m 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITJEFF311.BOLIB Library.

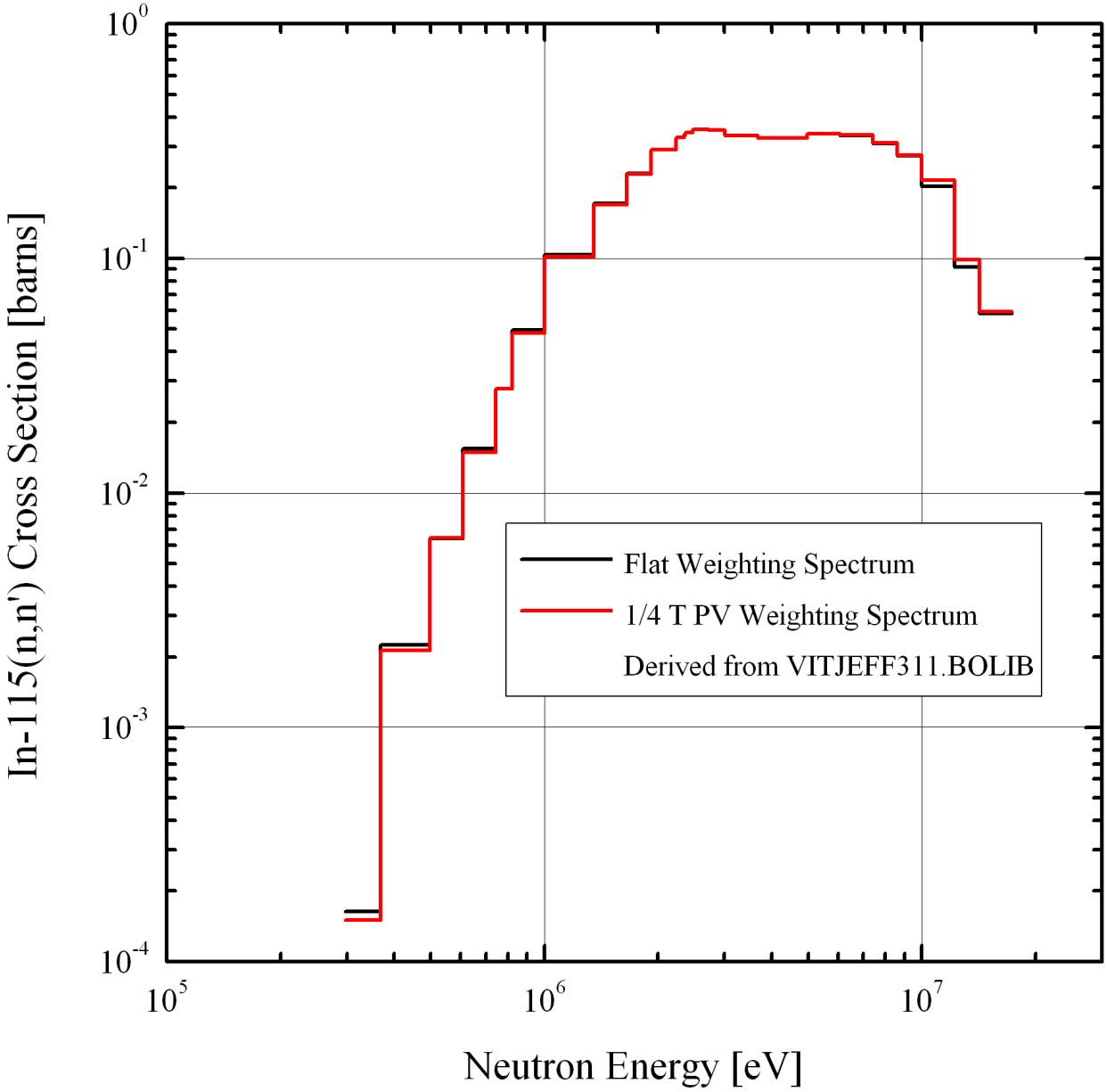


FIG. 3.11

Comparison of the IRDF-2002 Flat Weighting vs. 1/4 T PV Weighting
In-115(n,n')In-115m Dosimeter Cross Sections
Used with the BUGLE-96 Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

In-115(n,n')In-115m 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITAMIN-B6 Library.

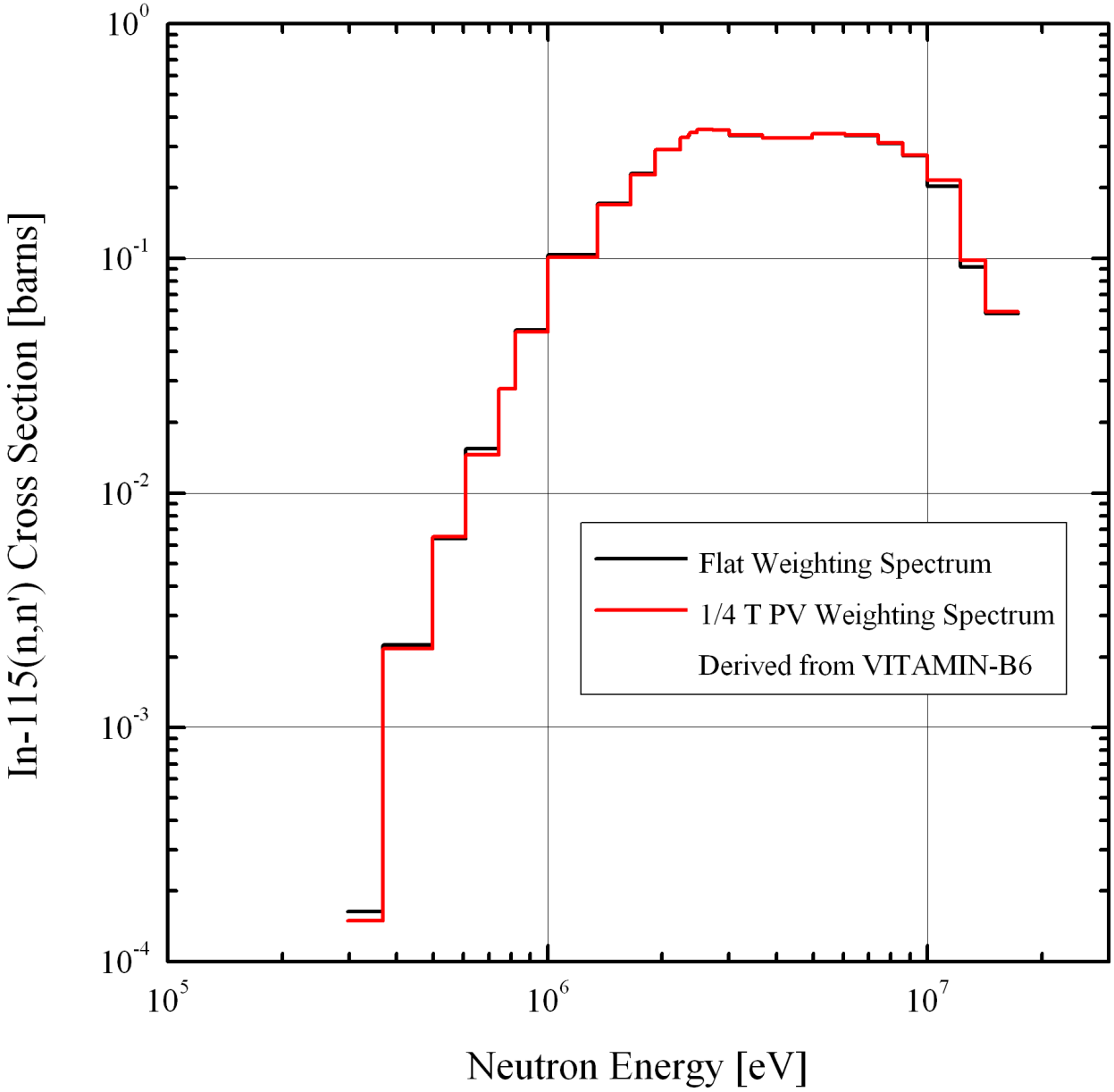


FIG. 3.12

Comparison of the IRDF-2002 Flat Weighting vs. 1/4 T PV Weighting
S-32(n,p)P-32 Dosimeter Cross Sections
Used with the BUGJEFF311.BOLIB Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

S-32(n,p)P-32 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITJEFF311.BOLIB Library.

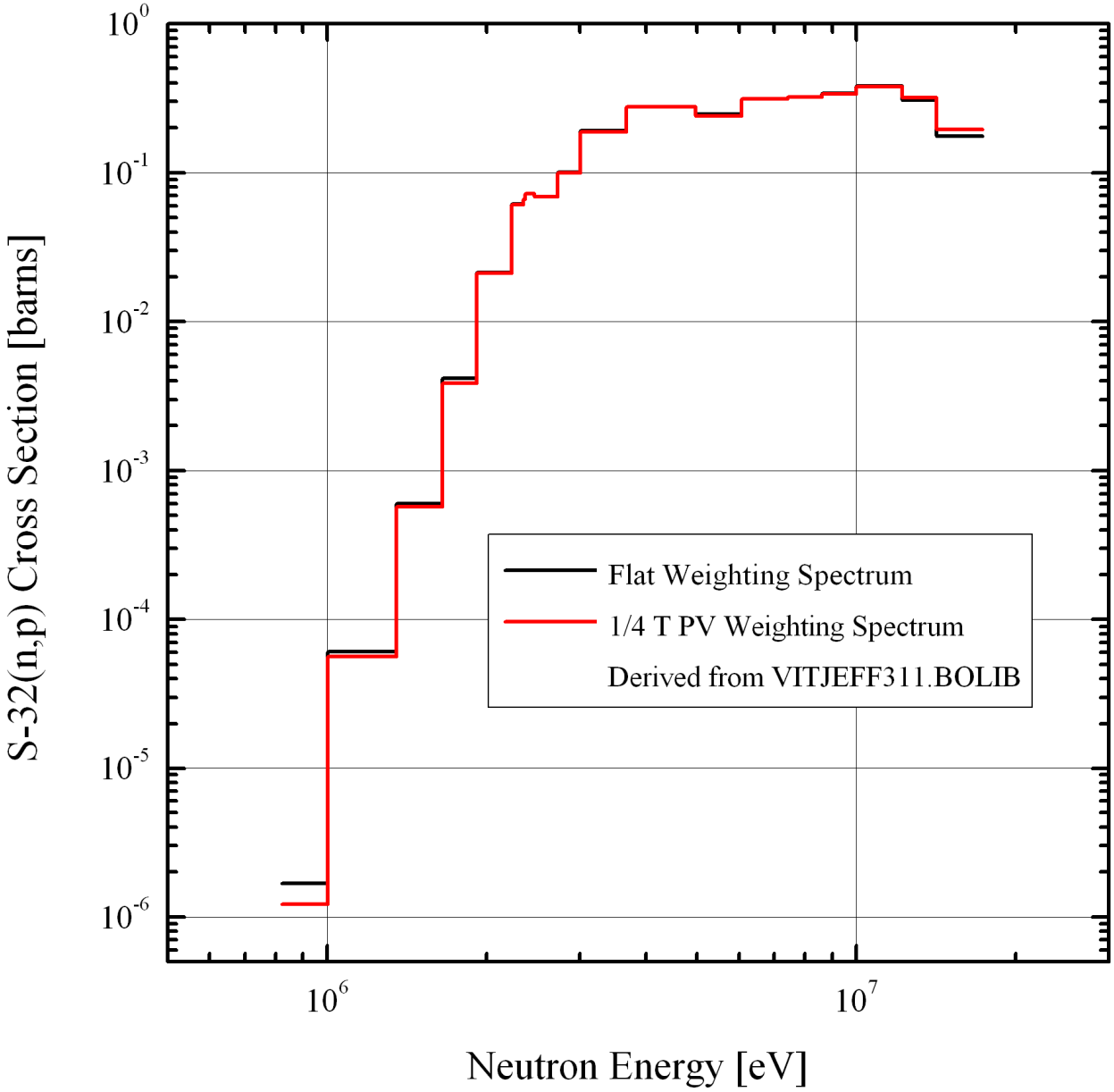


FIG. 3.13

Comparison of the IRDF-2002 Flat Weighting vs. 1/4 T PV Weighting
S-32(n,p)P-32 Dosimeter Cross Sections
Used with the BUGLE-96 Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

S-32(n,p)P-32 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITAMIN-B6 Library.

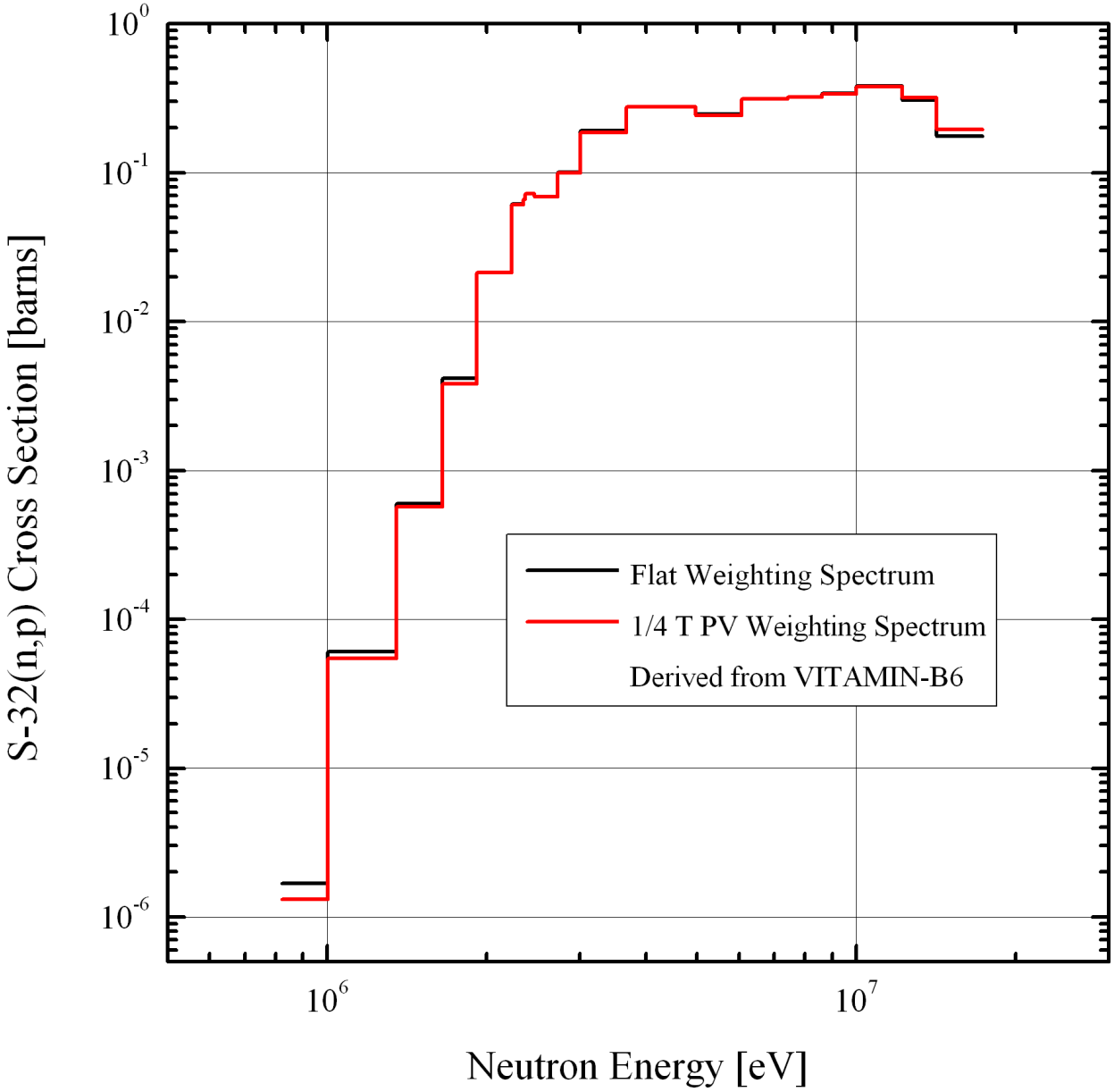


FIG. 3.14

Comparison of the IRDF-2002 Flat Weighting vs. 1/4 T PV Weighting
Al-27(n,α)Na-24 Dosimeter Cross Sections
Used with the BUGJEFF311.BOLIB Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Al-27(n,α)Na-24 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITJEFF311.BOLIB Library.

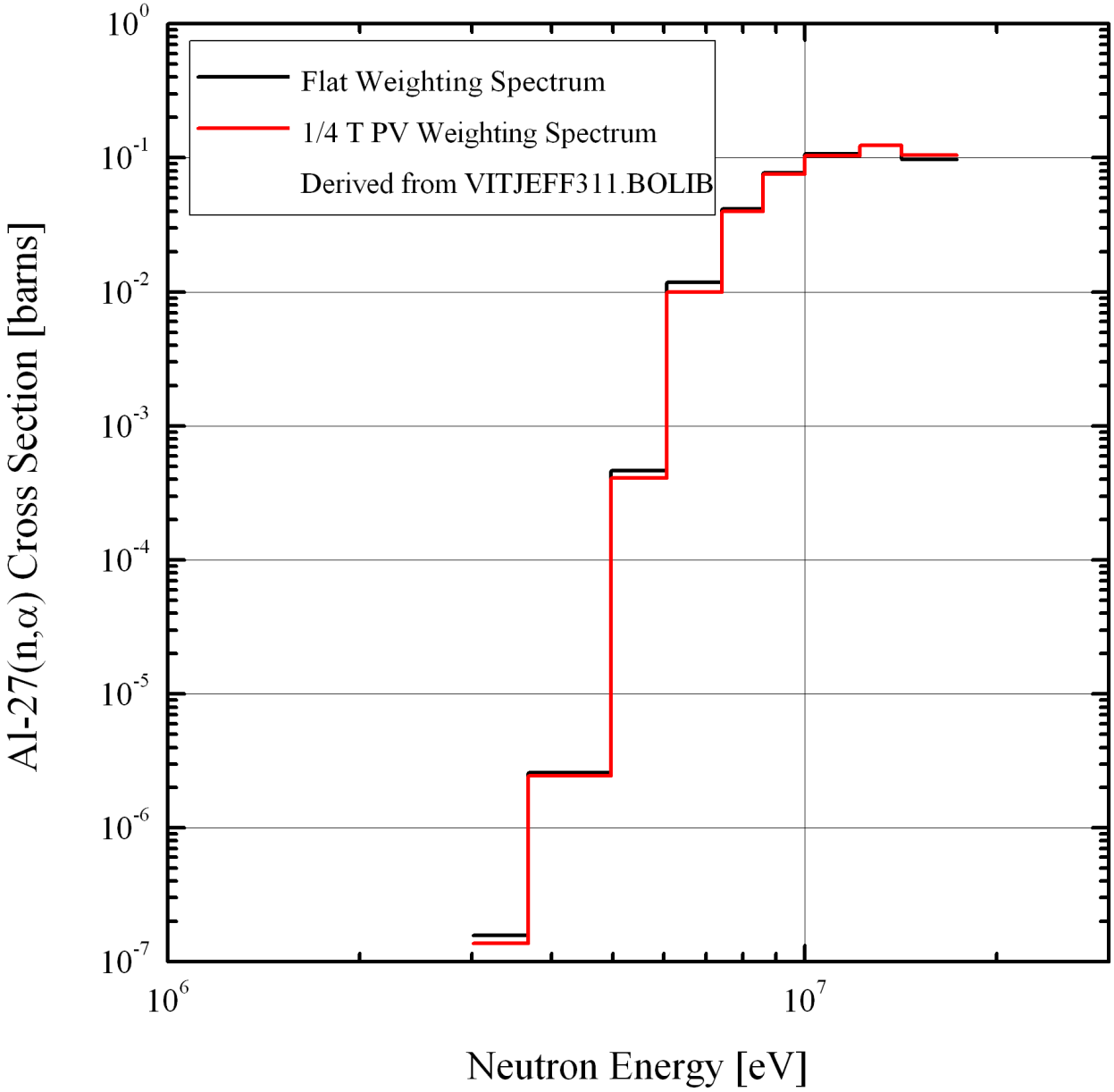


FIG. 3.15

Comparison of the IRDF-2002 Flat Weighting vs. 1/4 T PV Weighting
Al-27(n,α)Na-24 Dosimeter Cross Sections
Used with the BUGLE-96 Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Al-27(n,α)Na-24 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITAMIN-B6 Library.

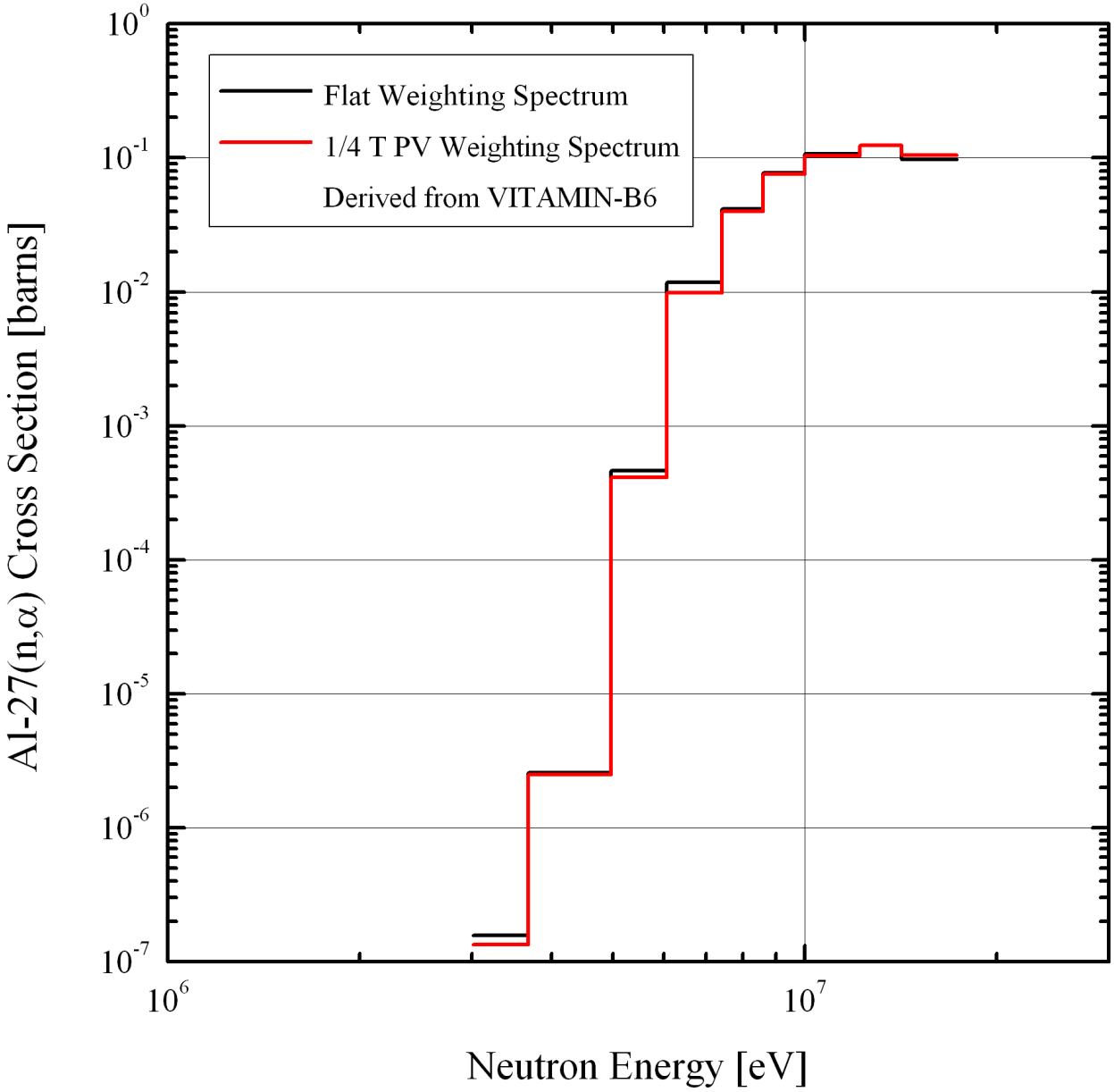


FIG. 3.16

Ratio (1/4 T PV Weighting / Flat Weighting)
of the Al-27(n,α)Na-24 Neutron Cross Sections
Used with the BUGJEFF311.BOLIB Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Al-27(n,α)Na-24 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITJEFF311.BOLIB Library.

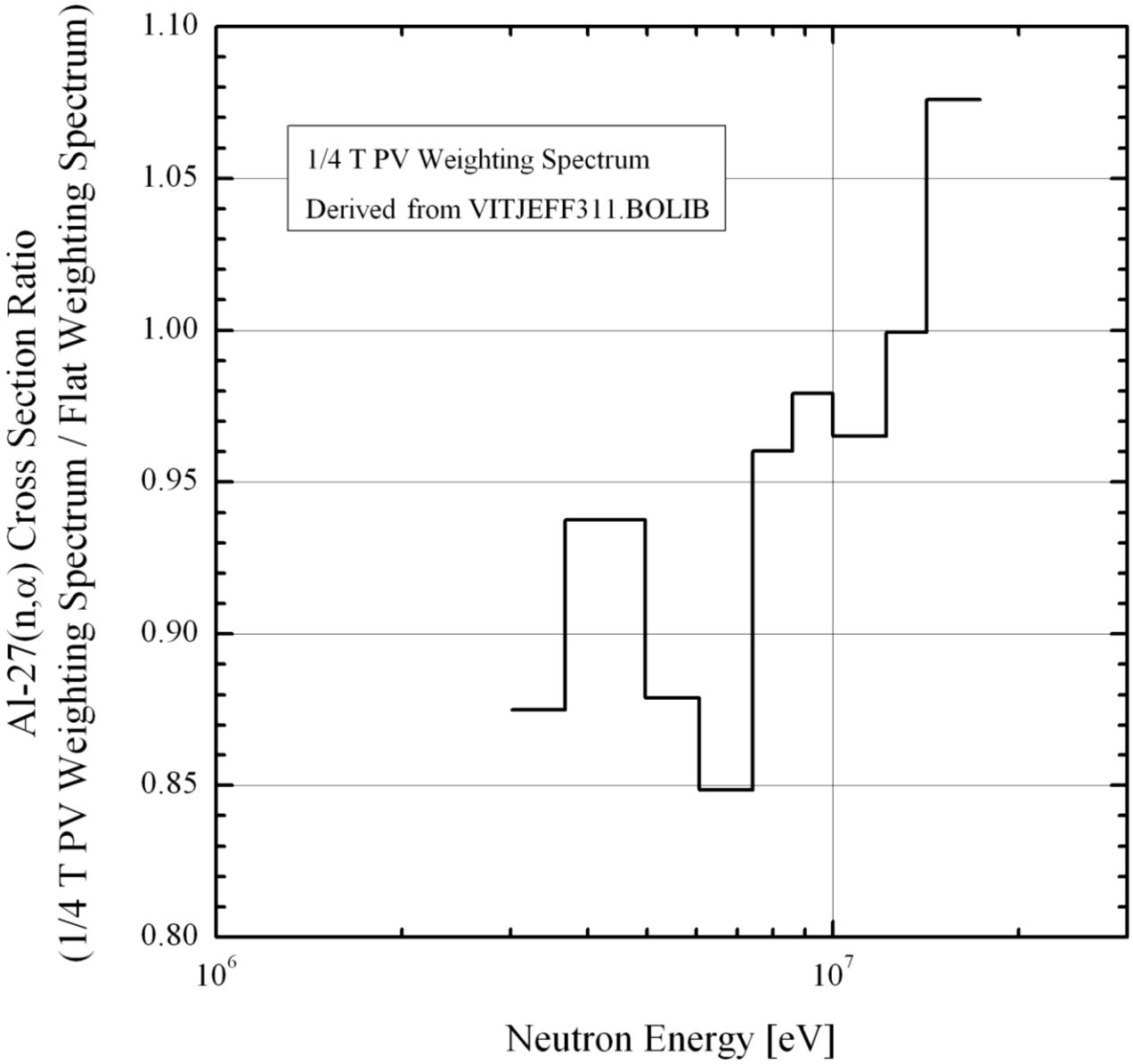
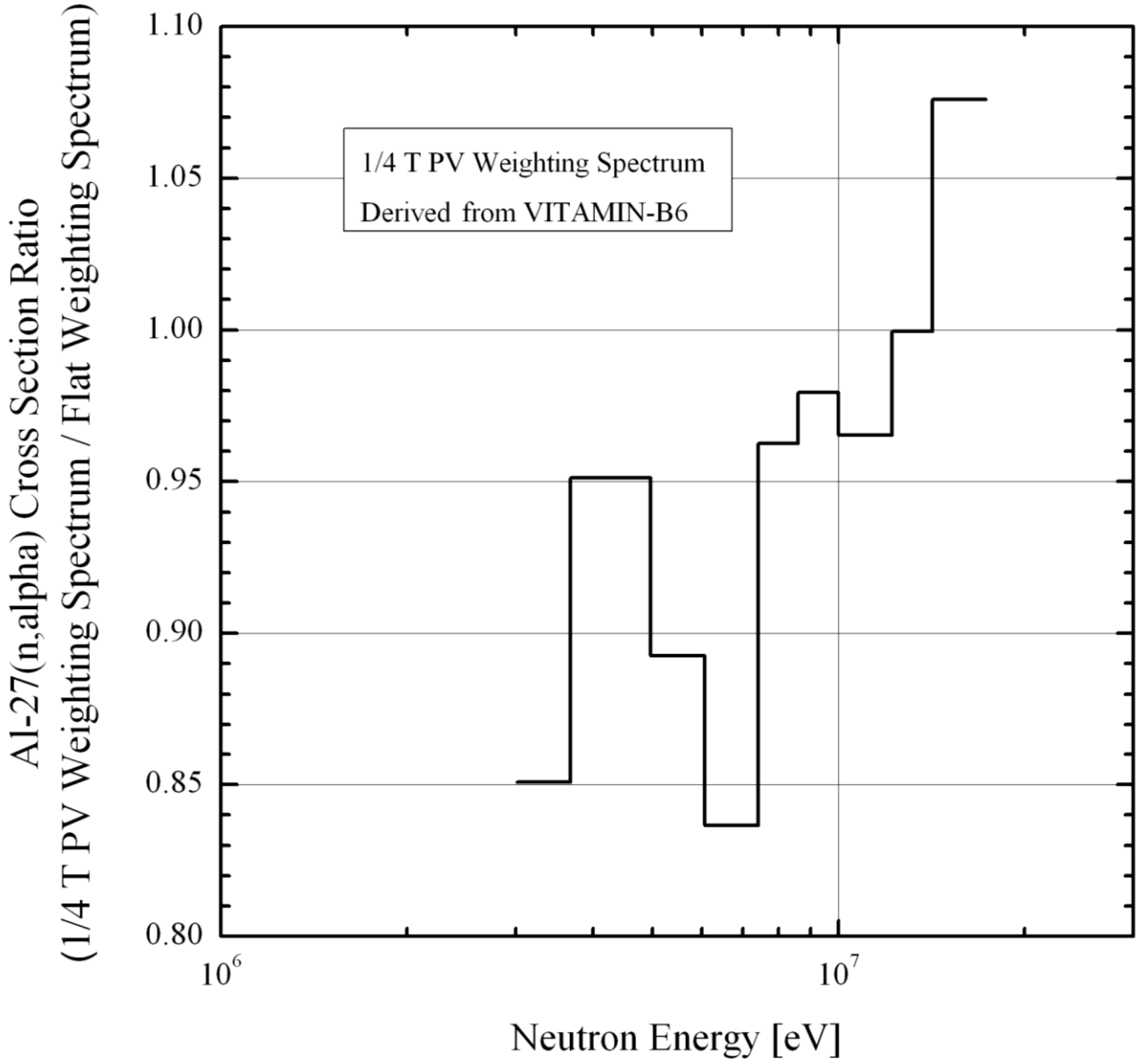


FIG. 3.17

Ratio (1/4 T PV Weighting / Flat Weighting)
of the Al-27(n,α)Na-24 Neutron Cross Sections
Used with the BUGLE-96 Library.

47-Group Neutron Energy Structure Typical of the BUGLE-Type Libraries.

Al-27(n,α)Na-24 1/4 T PV Weighting Neutron Cross Sections
Obtained through Data Processing Using the 199-Group Neutron Spectrum
Calculated in the 1/4 T PV Position with the VITAMIN-B6 Library.



TAB. 3.3

IRDF-2002 Au-197(n,γ)Au-198 Flat Weighting Neutron Dosimeter Cross Sections [barns] Used in the TORT-3.2 Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries.

The Cross Sections Were Self-Shielded Assuming a Background Cross Section σ_0 = 1695.0 barns.

Group	Upper Energy [MeV]	Au-197 (n,γ)
1	1.7332E+01	6.8138E-04
2	1.4191E+01	1.6063E-03
3	1.2214E+01	1.6769E-03
4	1.0000E+01	1.1792E-03
5	8.6071E+00	9.1672E-04
6	7.4082E+00	2.9908E-03
7	6.0653E+00	6.0619E-03
8	4.9659E+00	1.0673E-02
9	3.6788E+00	1.9494E-02
10	3.0119E+00	2.7032E-02
11	2.7253E+00	3.1752E-02
12	2.4660E+00	3.5656E-02
13	2.3653E+00	3.7624E-02
14	2.3457E+00	4.0070E-02
15	2.2313E+00	4.9391E-02
16	1.9205E+00	6.0152E-02
17	1.6530E+00	6.7842E-02
18	1.3534E+00	7.5077E-02
19	1.0026E+00	8.4031E-02
20	8.2085E-01	9.0899E-02
21	7.4274E-01	9.8907E-02
22	6.0810E-01	1.2061E-01
23	4.9787E-01	1.5148E-01
24	3.6883E-01	1.8519E-01
25	2.9721E-01	2.3553E-01
26	1.8316E-01	2.7527E-01
27	1.1109E-01	3.2852E-01
28	6.7379E-02	4.2145E-01
29	4.0868E-02	5.3159E-01
30	3.1828E-02	5.9625E-01
31	2.6058E-02	6.3013E-01
32	2.4176E-02	6.5349E-01
33	2.1875E-02	7.6339E-01
34	1.5034E-02	1.1561E+00
35	7.1017E-03	1.8461E+00
36	3.3546E-03	2.9907E+00
37	1.5846E-03	8.0657E+00
38	4.5400E-04	1.2390E+01
39	2.1445E-04	1.0332E+01
40	1.0130E-04	1.8528E+01
41	3.7266E-05	6.5715E-01
42	1.0677E-05	9.5267E+01
43	5.0435E-06	3.6192E+02
44	1.8554E-06	2.5048E+01
45	8.7643E-07	2.5505E+01
46	4.1399E-07	3.5582E+01
47	1.0000E-07	9.4230E+01
	1.0000E-11	

TAB. 3.4

IRDF-2002 Au-197(n,γ)Au-198 1/4 T PV Weighting Neutron Dosimeter Cross Sections [barns] Used in the TORT-3.2 Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries.

The Cross Sections Were Self-Shielded Assuming a Background Cross Section σ_0 = 1695.0 barns.

Group	Upper Energy [MeV]	Au-197(n,γ) BUGJEFF311.BOLIB	Au-197(n,γ) BUGENDF70.BOLIB	Au-197(n,γ) BUGLE-B7	Au-197(n,γ) BUGLE-96
1	1.7332E+01	8.3799E-04	8.3465E-04	8.3467E-04	8.3919E-04
2	1.4191E+01	1.6630E-03	1.6633E-03	1.6632E-03	1.6616E-03
3	1.2214E+01	1.6244E-03	1.6248E-03	1.6248E-03	1.6250E-03
4	1.0000E+01	1.1555E-03	1.1551E-03	1.1551E-03	1.1556E-03
5	8.6071E+00	9.2183E-04	9.2211E-04	9.2202E-04	9.2147E-04
6	7.4082E+00	3.2177E-03	3.2299E-03	3.2297E-03	3.2356E-03
7	6.0653E+00	6.1638E-03	6.1612E-03	6.1632E-03	6.1508E-03
8	4.9659E+00	1.0778E-02	1.0768E-02	1.0773E-02	1.0751E-02
9	3.6788E+00	1.9894E-02	1.9964E-02	1.9964E-02	1.9986E-02
10	3.0119E+00	2.7081E-02	2.7109E-02	2.7108E-02	2.7108E-02
11	2.7253E+00	3.1738E-02	3.1753E-02	3.1751E-02	3.1751E-02
12	2.4660E+00	3.5740E-02	3.5716E-02	3.5718E-02	3.5716E-02
13	2.3653E+00	3.7624E-02	3.7624E-02	3.7624E-02	3.7624E-02
14	2.3457E+00	4.0129E-02	4.0110E-02	4.0112E-02	4.0106E-02
15	2.2313E+00	4.9455E-02	4.9426E-02	4.9418E-02	4.9422E-02
16	1.9205E+00	6.0480E-02	6.0528E-02	6.0528E-02	6.0532E-02
17	1.6530E+00	6.7970E-02	6.7956E-02	6.7951E-02	6.7955E-02
18	1.3534E+00	7.5320E-02	7.5386E-02	7.5396E-02	7.5395E-02
19	1.0026E+00	8.4390E-02	8.4235E-02	8.4230E-02	8.4227E-02
20	8.2085E-01	9.0962E-02	9.0947E-02	9.0943E-02	9.0945E-02
21	7.4274E-01	9.9387E-02	9.9769E-02	9.9846E-02	9.9849E-02
22	6.0810E-01	1.2037E-01	1.2016E-01	1.2009E-01	1.2010E-01
23	4.9787E-01	1.5320E-01	1.5300E-01	1.5274E-01	1.5274E-01
24	3.6883E-01	1.8579E-01	1.8581E-01	1.8589E-01	1.8589E-01
25	2.9721E-01	2.3642E-01	2.3623E-01	2.3622E-01	2.3630E-01
26	1.8316E-01	2.7531E-01	2.7556E-01	2.7570E-01	2.7571E-01
27	1.1109E-01	3.3518E-01	3.3608E-01	3.3595E-01	3.3596E-01
28	6.7379E-02	4.2224E-01	4.2233E-01	4.2222E-01	4.2224E-01
29	4.0868E-02	5.3069E-01	5.3060E-01	5.3060E-01	5.3060E-01
30	3.1828E-02	6.0536E-01	6.0556E-01	6.0555E-01	6.0555E-01
31	2.6058E-02	6.3008E-01	6.3011E-01	6.3015E-01	6.3015E-01
32	2.4176E-02	6.5264E-01	6.5271E-01	6.5269E-01	6.5269E-01
33	2.1875E-02	7.5910E-01	7.5889E-01	7.5886E-01	7.5881E-01
34	1.5034E-02	1.1317E+00	1.1324E+00	1.1326E+00	1.1323E+00
35	7.1017E-03	1.8736E+00	1.8761E+00	1.8761E+00	1.8760E+00
36	3.3546E-03	3.1830E+00	3.1791E+00	3.1787E+00	3.1792E+00
37	1.5846E-03	8.5877E+00	8.5846E+00	8.5835E+00	8.5832E+00
38	4.5400E-04	1.2102E+01	1.2102E+01	1.2102E+01	1.2102E+01
39	2.1445E-04	1.0530E+01	1.0530E+01	1.0532E+01	1.0530E+01
40	1.0130E-04	2.0634E+01	2.0632E+01	2.0635E+01	2.0632E+01
41	3.7266E-05	8.3767E-01	8.3750E-01	8.3772E-01	8.3730E-01
42	1.0677E-05	1.1673E+02	1.1670E+02	1.1664E+02	1.1666E+02
43	5.0435E-06	2.9092E+02	2.9102E+02	2.9157E+02	2.9075E+02
44	1.8554E-06	2.4922E+01	2.4922E+01	2.4930E+01	2.4925E+01
45	8.7643E-07	2.5685E+01	2.5684E+01	2.5694E+01	2.5727E+01
46	4.1399E-07	3.8156E+01	3.8169E+01	3.8151E+01	3.8000E+01
47	1.0000E-07	6.7837E+01	6.7849E+01	6.7693E+01	6.8829E+01
	1.0000E-11				

TAB. 3.5

IRDF-2002 Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 Flat Weighting Neutron Dosimeter Cross Sections [barns] Used in the TORT-3.2 Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries.

Group	Upper Energy [MeV]	Rh-103 (n,n')	In-115 (n,n')	S-32 (n,p)	Al-27 (n,α)
1	1.7332E+01	2.3466E-01	5.8133E-02	1.7639E-01	9.7222E-02
2	1.4191E+01	3.8742E-01	9.1680E-02	3.0787E-01	1.2398E-01
3	1.2214E+01	8.1816E-01	2.0239E-01	3.8051E-01	1.0678E-01
4	1.0000E+01	1.2190E+00	2.7381E-01	3.3979E-01	7.7279E-02
5	8.6071E+00	1.2753E+00	3.0859E-01	3.2202E-01	4.1475E-02
6	7.4082E+00	1.2305E+00	3.3417E-01	3.1380E-01	1.1792E-02
7	6.0653E+00	1.1732E+00	3.3897E-01	2.4629E-01	4.6528E-04
8	4.9659E+00	1.1091E+00	3.2538E-01	2.7592E-01	2.6020E-06
9	3.6788E+00	1.0370E+00	3.3341E-01	1.9108E-01	1.5730E-07
10	3.0119E+00	9.8735E-01	3.5259E-01	1.0053E-01	0.
11	2.7253E+00	9.5185E-01	3.5385E-01	6.8686E-02	0.
12	2.4660E+00	9.2536E-01	3.4311E-01	7.2417E-02	0.
13	2.3653E+00	9.1570E-01	3.3654E-01	6.6472E-02	0.
14	2.3457E+00	9.0494E-01	3.2759E-01	6.1245E-02	0.
15	2.2313E+00	8.6764E-01	2.9012E-01	2.1377E-02	0.
16	1.9205E+00	8.0955E-01	2.3022E-01	4.1502E-03	0.
17	1.6530E+00	7.4452E-01	1.7096E-01	5.9998E-04	0.
18	1.3534E+00	6.6193E-01	1.0336E-01	6.0917E-05	0.
19	1.0026E+00	5.8044E-01	4.9401E-02	1.6785E-06	0.
20	8.2085E-01	4.9269E-01	2.7891E-02	0.	0.
21	7.4274E-01	3.3867E-01	1.5489E-02	0.	0.
22	6.0810E-01	1.9319E-01	6.3893E-03	0.	0.
23	4.9787E-01	1.3801E-01	2.2558E-03	0.	0.
24	3.6883E-01	1.0374E-01	1.6310E-04	0.	0.
25	2.9721E-01	6.6383E-02	0.	0.	0.
26	1.8316E-01	2.3291E-02	0.	0.	0.
27	1.1109E-01	5.8219E-03	0.	0.	0.
28	6.7379E-02	1.6581E-03	0.	0.	0.
29	4.0868E-02	3.4572E-06	0.	0.	0.
30	3.1828E-02	0.	0.	0.	0.
31	2.6058E-02	0.	0.	0.	0.
32	2.4176E-02	0.	0.	0.	0.
33	2.1875E-02	0.	0.	0.	0.
34	1.5034E-02	0.	0.	0.	0.
35	7.1017E-03	0.	0.	0.	0.
36	3.3546E-03	0.	0.	0.	0.
37	1.5846E-03	0.	0.	0.	0.
38	4.5400E-04	0.	0.	0.	0.
39	2.1445E-04	0.	0.	0.	0.
40	1.0130E-04	0.	0.	0.	0.
41	3.7266E-05	0.	0.	0.	0.
42	1.0677E-05	0.	0.	0.	0.
43	5.0435E-06	0.	0.	0.	0.
44	1.8554E-06	0.	0.	0.	0.
45	8.7643E-07	0.	0.	0.	0.
46	4.1399E-07	0.	0.	0.	0.
47	1.0000E-07	0.	0.	0.	0.
	1.0000E-11				

TAB. 3.6

IRDF-2002 Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24
1/4 T PV Weighting Neutron Dosimeter Cross Sections [barns]
Used in the TORT-3.2 Calculations with the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	Rh-103 (n,n')	In-115 (n,n')	S-32 (n,p)	Al-27 (n,α)
1	1.7332E+01	2.4762E-01	5.9192E-02	1.9546E-01	1.0459E-01
2	1.4191E+01	4.0937E-01	9.8480E-02	3.1934E-01	1.2390E-01
3	1.2214E+01	8.8683E-01	2.1539E-01	3.7876E-01	1.0305E-01
4	1.0000E+01	1.2278E+00	2.7598E-01	3.3761E-01	7.5681E-02
5	8.6071E+00	1.2744E+00	3.1011E-01	3.2276E-01	3.9827E-02
6	7.4082E+00	1.2262E+00	3.3546E-01	3.1147E-01	1.0004E-02
7	6.0653E+00	1.1713E+00	3.3869E-01	2.4085E-01	4.0899E-04
8	4.9659E+00	1.1079E+00	3.2516E-01	2.7606E-01	2.4394E-06
9	3.6788E+00	1.0344E+00	3.3444E-01	1.8725E-01	1.3764E-07
10	3.0119E+00	9.8700E-01	3.5268E-01	1.0010E-01	0.
11	2.7253E+00	9.5196E-01	3.5387E-01	6.8656E-02	0.
12	2.4660E+00	9.2492E-01	3.4283E-01	7.2333E-02	0.
13	2.3653E+00	9.1570E-01	3.3654E-01	6.6472E-02	0.
14	2.3457E+00	9.0468E-01	3.2736E-01	6.1061E-02	0.
15	2.2313E+00	8.6739E-01	2.8986E-01	2.1176E-02	0.
16	1.9205E+00	8.0741E-01	2.2810E-01	3.8470E-03	0.
17	1.6530E+00	7.4261E-01	1.6934E-01	5.7068E-04	0.
18	1.3534E+00	6.5961E-01	1.0148E-01	5.6340E-05	0.
19	1.0026E+00	5.7702E-01	4.7963E-02	1.2101E-06	0.
20	8.2085E-01	4.9153E-01	2.7746E-02	0.	0.
21	7.4274E-01	3.2977E-01	1.4938E-02	0.	0.
22	6.0810E-01	1.9398E-01	6.4499E-03	0.	0.
23	4.9787E-01	1.3615E-01	2.1316E-03	0.	0.
24	3.6883E-01	1.0322E-01	1.5017E-04	0.	0.
25	2.9721E-01	6.5599E-02	0.	0.	0.
26	1.8316E-01	2.3237E-02	0.	0.	0.
27	1.1109E-01	5.3946E-03	0.	0.	0.
28	6.7379E-02	1.6350E-03	0.	0.	0.
29	4.0868E-02	3.5663E-06	0.	0.	0.
30	3.1828E-02	0.	0.	0.	0.
31	2.6058E-02	0.	0.	0.	0.
32	2.4176E-02	0.	0.	0.	0.
33	2.1875E-02	0.	0.	0.	0.
34	1.5034E-02	0.	0.	0.	0.
35	7.1017E-03	0.	0.	0.	0.
36	3.3546E-03	0.	0.	0.	0.
37	1.5846E-03	0.	0.	0.	0.
38	4.5400E-04	0.	0.	0.	0.
39	2.1445E-04	0.	0.	0.	0.
40	1.0130E-04	0.	0.	0.	0.
41	3.7266E-05	0.	0.	0.	0.
42	1.0677E-05	0.	0.	0.	0.
43	5.0435E-06	0.	0.	0.	0.
44	1.8554E-06	0.	0.	0.	0.
45	8.7643E-07	0.	0.	0.	0.
46	4.1399E-07	0.	0.	0.	0.
47	1.0000E-07	0.	0.	0.	0.
	1.0000E-11				

TAB. 3.7

IRDF-2002 Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24
1/4 T PV Weighting Neutron Dosimeter Cross Sections [barns]
Used in the TORT-3.2 Calculations with the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	Rh-103 (n,n')	In-115 (n,n')	S-32 (n,p)	Al-27 (n,α)
1	1.7332E+01	2.4736E-01	5.9174E-02	1.9504E-01	1.0443E-01
2	1.4191E+01	4.0943E-01	9.8495E-02	3.1939E-01	1.2391E-01
3	1.2214E+01	8.8628E-01	2.1529E-01	3.7877E-01	1.0308E-01
4	1.0000E+01	1.2280E+00	2.7602E-01	3.3756E-01	7.5654E-02
5	8.6071E+00	1.2743E+00	3.1014E-01	3.2279E-01	3.9795E-02
6	7.4082E+00	1.2259E+00	3.3553E-01	3.1134E-01	9.9044E-03
7	6.0653E+00	1.1713E+00	3.3870E-01	2.4087E-01	4.0980E-04
8	4.9659E+00	1.1080E+00	3.2519E-01	2.7597E-01	2.4639E-06
9	3.6788E+00	1.0340E+00	3.3463E-01	1.8679E-01	1.3485E-07
10	3.0119E+00	9.8681E-01	3.5274E-01	9.9856E-02	0.
11	2.7253E+00	9.5184E-01	3.5384E-01	6.8690E-02	0.
12	2.4660E+00	9.2505E-01	3.4291E-01	7.2357E-02	0.
13	2.3653E+00	9.1570E-01	3.3654E-01	6.6472E-02	0.
14	2.3457E+00	9.0476E-01	3.2744E-01	6.1120E-02	0.
15	2.2313E+00	8.6750E-01	2.8997E-01	2.1288E-02	0.
16	1.9205E+00	8.0709E-01	2.2780E-01	3.8128E-03	0.
17	1.6530E+00	7.4285E-01	1.6955E-01	5.7288E-04	0.
18	1.3534E+00	6.5898E-01	1.0098E-01	5.5136E-05	0.
19	1.0026E+00	5.7853E-01	4.8555E-02	1.3091E-06	0.
20	8.2085E-01	4.9180E-01	2.7780E-02	0.	0.
21	7.4274E-01	3.2413E-01	1.4595E-02	0.	0.
22	6.0810E-01	1.9458E-01	6.4916E-03	0.	0.
23	4.9787E-01	1.3637E-01	2.1464E-03	0.	0.
24	3.6883E-01	1.0321E-01	1.5024E-04	0.	0.
25	2.9721E-01	6.5947E-02	0.	0.	0.
26	1.8316E-01	2.3120E-02	0.	0.	0.
27	1.1109E-01	5.3290E-03	0.	0.	0.
28	6.7379E-02	1.6314E-03	0.	0.	0.
29	4.0868E-02	3.5772E-06	0.	0.	0.
30	3.1828E-02	0.	0.	0.	0.
31	2.6058E-02	0.	0.	0.	0.
32	2.4176E-02	0.	0.	0.	0.
33	2.1875E-02	0.	0.	0.	0.
34	1.5034E-02	0.	0.	0.	0.
35	7.1017E-03	0.	0.	0.	0.
36	3.3546E-03	0.	0.	0.	0.
37	1.5846E-03	0.	0.	0.	0.
38	4.5400E-04	0.	0.	0.	0.
39	2.1445E-04	0.	0.	0.	0.
40	1.0130E-04	0.	0.	0.	0.
41	3.7266E-05	0.	0.	0.	0.
42	1.0677E-05	0.	0.	0.	0.
43	5.0435E-06	0.	0.	0.	0.
44	1.8554E-06	0.	0.	0.	0.
45	8.7643E-07	0.	0.	0.	0.
46	4.1399E-07	0.	0.	0.	0.
47	1.0000E-07	0.	0.	0.	0.
	1.0000E-11				

TAB. 3.8

IRDF-2002 Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24
1/4 T PV Weighting Neutron Dosimeter Cross Sections [barns]
Used in the TORT-3.2 Calculations with the BUGLE-B7 Library.

Group	Upper Energy [MeV]	Rh-103 (n,n')	In-115 (n,n')	S-32 (n,p)	Al-27 (n,α)
1	1.7332E+01	2.4736E-01	5.9174E-02	1.9505E-01	1.0443E-01
2	1.4191E+01	4.0941E-01	9.8489E-02	3.1938E-01	1.2391E-01
3	1.2214E+01	8.8634E-01	2.1530E-01	3.7877E-01	1.0308E-01
4	1.0000E+01	1.2280E+00	2.7603E-01	3.3756E-01	7.5651E-02
5	8.6071E+00	1.2743E+00	3.1013E-01	3.2278E-01	3.9809E-02
6	7.4082E+00	1.2260E+00	3.3553E-01	3.1134E-01	9.9059E-03
7	6.0653E+00	1.1713E+00	3.3869E-01	2.4087E-01	4.0921E-04
8	4.9659E+00	1.1079E+00	3.2518E-01	2.7593E-01	2.4602E-06
9	3.6788E+00	1.0340E+00	3.3463E-01	1.8679E-01	1.3486E-07
10	3.0119E+00	9.8681E-01	3.5274E-01	9.9856E-02	0.
11	2.7253E+00	9.5186E-01	3.5385E-01	6.8685E-02	0.
12	2.4660E+00	9.2504E-01	3.4290E-01	7.2355E-02	0.
13	2.3653E+00	9.1570E-01	3.3654E-01	6.6472E-02	0.
14	2.3457E+00	9.0475E-01	3.2743E-01	6.1113E-02	0.
15	2.2313E+00	8.6753E-01	2.9001E-01	2.1310E-02	0.
16	1.9205E+00	8.0709E-01	2.2779E-01	3.8115E-03	0.
17	1.6530E+00	7.4292E-01	1.6961E-01	5.7404E-04	0.
18	1.3534E+00	6.5889E-01	1.0091E-01	5.5072E-05	0.
19	1.0026E+00	5.7858E-01	4.8572E-02	1.3126E-06	0.
20	8.2085E-01	4.9188E-01	2.7790E-02	0.	0.
21	7.4274E-01	3.2311E-01	1.4534E-02	0.	0.
22	6.0810E-01	1.9478E-01	6.5064E-03	0.	0.
23	4.9787E-01	1.3666E-01	2.1655E-03	0.	0.
24	3.6883E-01	1.0314E-01	1.4951E-04	0.	0.
25	2.9721E-01	6.5980E-02	0.	0.	0.
26	1.8316E-01	2.3024E-02	0.	0.	0.
27	1.1109E-01	5.3402E-03	0.	0.	0.
28	6.7379E-02	1.6344E-03	0.	0.	0.
29	4.0868E-02	3.5772E-06	0.	0.	0.
30	3.1828E-02	0.	0.	0.	0.
31	2.6058E-02	0.	0.	0.	0.
32	2.4176E-02	0.	0.	0.	0.
33	2.1875E-02	0.	0.	0.	0.
34	1.5034E-02	0.	0.	0.	0.
35	7.1017E-03	0.	0.	0.	0.
36	3.3546E-03	0.	0.	0.	0.
37	1.5846E-03	0.	0.	0.	0.
38	4.5400E-04	0.	0.	0.	0.
39	2.1445E-04	0.	0.	0.	0.
40	1.0130E-04	0.	0.	0.	0.
41	3.7266E-05	0.	0.	0.	0.
42	1.0677E-05	0.	0.	0.	0.
43	5.0435E-06	0.	0.	0.	0.
44	1.8554E-06	0.	0.	0.	0.
45	8.7643E-07	0.	0.	0.	0.
46	4.1399E-07	0.	0.	0.	0.
47	1.0000E-07	0.	0.	0.	0.
	1.0000E-11				

TAB. 3.9

IRDF-2002 Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24
1/4 T PV Weighting Neutron Dosimeter Cross Sections [barns]
Used in the TORT-3.2 Calculations with the BUGLE-96 Library.

Group	Upper Energy [MeV]	Rh-103 (n,n')	In-115 (n,n')	S-32 (n,p)	Al-27 (n,α)
1	1.7332E+01	2.4772E-01	5.9202E-02	1.9559E-01	1.0463E-01
2	1.4191E+01	4.0865E-01	9.8250E-02	3.1902E-01	1.2392E-01
3	1.2214E+01	8.8555E-01	2.1510E-01	3.7870E-01	1.0309E-01
4	1.0000E+01	1.2278E+00	2.7598E-01	3.3761E-01	7.5687E-02
5	8.6071E+00	1.2744E+00	3.1003E-01	3.2271E-01	3.9922E-02
6	7.4082E+00	1.2258E+00	3.3556E-01	3.1129E-01	9.8648E-03
7	6.0653E+00	1.1715E+00	3.3873E-01	2.4137E-01	4.1534E-04
8	4.9659E+00	1.1082E+00	3.2521E-01	2.7623E-01	2.4751E-06
9	3.6788E+00	1.0339E+00	3.3469E-01	1.8660E-01	1.3384E-07
10	3.0119E+00	9.8682E-01	3.5273E-01	9.9863E-02	0.
11	2.7253E+00	9.5186E-01	3.5385E-01	6.8684E-02	0.
12	2.4660E+00	9.2505E-01	3.4291E-01	7.2357E-02	0.
13	2.3653E+00	9.1570E-01	3.3654E-01	6.6472E-02	0.
14	2.3457E+00	9.0478E-01	3.2745E-01	6.1132E-02	0.
15	2.2313E+00	8.6752E-01	2.8999E-01	2.1297E-02	0.
16	1.9205E+00	8.0707E-01	2.2777E-01	3.8088E-03	0.
17	1.6530E+00	7.4286E-01	1.6956E-01	5.7312E-04	0.
18	1.3534E+00	6.5890E-01	1.0091E-01	5.5073E-05	0.
19	1.0026E+00	5.7861E-01	4.8582E-02	1.3126E-06	0.
20	8.2085E-01	4.9185E-01	2.7786E-02	0.	0.
21	7.4274E-01	3.2307E-01	1.4531E-02	0.	0.
22	6.0810E-01	1.9477E-01	6.5054E-03	0.	0.
23	4.9787E-01	1.3666E-01	2.1654E-03	0.	0.
24	3.6883E-01	1.0314E-01	1.4947E-04	0.	0.
25	2.9721E-01	6.5891E-02	0.	0.	0.
26	1.8316E-01	2.3016E-02	0.	0.	0.
27	1.1109E-01	5.3395E-03	0.	0.	0.
28	6.7379E-02	1.6339E-03	0.	0.	0.
29	4.0868E-02	3.5776E-06	0.	0.	0.
30	3.1828E-02	0.	0.	0.	0.
31	2.6058E-02	0.	0.	0.	0.
32	2.4176E-02	0.	0.	0.	0.
33	2.1875E-02	0.	0.	0.	0.
34	1.5034E-02	0.	0.	0.	0.
35	7.1017E-03	0.	0.	0.	0.
36	3.3546E-03	0.	0.	0.	0.
37	1.5846E-03	0.	0.	0.	0.
38	4.5400E-04	0.	0.	0.	0.
39	2.1445E-04	0.	0.	0.	0.
40	1.0130E-04	0.	0.	0.	0.
41	3.7266E-05	0.	0.	0.	0.
42	1.0677E-05	0.	0.	0.	0.
43	5.0435E-06	0.	0.	0.	0.
44	1.8554E-06	0.	0.	0.	0.
45	8.7643E-07	0.	0.	0.	0.
46	4.1399E-07	0.	0.	0.	0.
47	1.0000E-07	0.	0.	0.	0.
	1.0000E-11				

3.6 - U-235 Fission Neutron Spectra

The U-235 fission neutron spectra (χ) used to obtain the Iron-88 neutron source in the fixed source transport calculations (see Chapter 4) are reported in TAB. 3.10.
It is underlined that, whereas the U-235 fission spectrum data included in the packages of the ORNL BUGLE-B7 /7/ and BUGLE-96 /8/ libraries refer only to prompt neutrons. The U-235 fission spectrum data, contained respectively in the packages of the ENEA-Bologna BUGJEFF311.BOLIB /2/ and BUGENDF70.BOLIB /3/ similar libraries, are instead total fission spectra, i.e. they include the contributions of both prompt and delayed neutrons. This option was made available through the use of the ENEA-Bologna 2007 Revision /31/ of the ORNL SCAMPI /32/ nuclear data processing system, freely released at OECD-NEADB and ORNL-RSICC.
Graphical representations of the U-235 total fission neutron spectra (χ) for the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 libraries are reported in FIG. 3.18. An enlargement of the cited fission spectra, in the 1.0E+00 eV ÷ 1.0E+04 eV energy range where the differences in the χ group values are higher, is represented in FIG. 3.19.

TAB. 3.10

Total or Prompt U-235 Fission Neutron Spectra (χ) Used in the TORT-3.2 Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries.

Group	Upper Energy [MeV]	Total χ(U-235) BUGJEFF311.BOLIB	Total χ(U-235) BUGENDF70.BOLIB	Prompt χ(U-235) BUGLE-B7	Prompt χ(U-235) BUGLE-96
1	1.7332E+01	4.9847E-05	4.9839E-05	4.8822E-05	5.0179E-05
2	1.4191E+01	2.0032E-04	2.0031E-04	2.0162E-04	2.0166E-04
3	1.2214E+01	1.1384E-03	1.1384E-03	1.1459E-03	1.1460E-03
4	1.0000E+01	2.5055E-03	2.5055E-03	2.5220E-03	2.5222E-03
5	8.6071E+00	5.6193E-03	5.6195E-03	5.6564E-03	5.6568E-03
6	7.4082E+00	1.6040E-02	1.6041E-02	1.6146E-02	1.6147E-02
7	6.0653E+00	3.0508E-02	3.0511E-02	3.0711E-02	3.0712E-02
8	4.9659E+00	7.9978E-02	7.9986E-02	8.0511E-02	8.0512E-02
9	3.6788E+00	7.6252E-02	7.6258E-02	7.6758E-02	7.6758E-02
10	3.0119E+00	4.3722E-02	4.3728E-02	4.4010E-02	4.4010E-02
11	2.7253E+00	4.6381E-02	4.6388E-02	4.6685E-02	4.6685E-02
12	2.4660E+00	1.9899E-02	1.9903E-02	2.0029E-02	2.0028E-02
13	2.3653E+00	4.0004E-03	4.0013E-03	4.0263E-03	4.0262E-03
14	2.3457E+00	2.4188E-02	2.4193E-02	2.4344E-02	2.4344E-02
15	2.2313E+00	7.3086E-02	7.3105E-02	7.3548E-02	7.3547E-02
16	1.9205E+00	7.1516E-02	7.1538E-02	7.1947E-02	7.1946E-02
17	1.6530E+00	8.9032E-02	8.9083E-02	8.9497E-02	8.9495E-02
18	1.3534E+00	1.1467E-01	1.1474E-01	1.1503E-01	1.1503E-01
19	1.0026E+00	6.2706E-02	6.2734E-02	6.2687E-02	6.2685E-02
20	8.2085E-01	2.7337E-02	2.7329E-02	2.7240E-02	2.7239E-02
21	7.4274E-01	4.7125E-02	4.7130E-02	4.6852E-02	4.6851E-02
22	6.0810E-01	3.8049E-02	3.8038E-02	3.7617E-02	3.7615E-02
23	4.9787E-01	4.2477E-02	4.2436E-02	4.1772E-02	4.1771E-02
24	3.6883E-01	2.1827E-02	2.1807E-02	2.1390E-02	2.1390E-02
25	2.9721E-01	3.0837E-02	3.0779E-02	3.0048E-02	3.0048E-02
26	1.8316E-01	1.5950E-02	1.5922E-02	1.5408E-02	1.5408E-02
27	1.1109E-01	7.7421E-03	7.7147E-03	7.4253E-03	7.4251E-03
28	6.7379E-02	3.7043E-03	3.6943E-03	3.5462E-03	3.5461E-03
29	4.0868E-02	1.0482E-03	1.0459E-03	9.9809E-04	9.9806E-04
30	3.1828E-02	6.0737E-04	6.0374E-04	5.6978E-04	5.6977E-04
31	2.6058E-02	1.8654E-04	1.8501E-04	1.7337E-04	1.7337E-04
32	2.4176E-02	2.1922E-04	2.1735E-04	2.0306E-04	2.0305E-04
33	2.1875E-02	5.9716E-04	5.8781E-04	5.4039E-04	5.4037E-04
34	1.5034E-02	5.3875E-04	5.3054E-04	4.8421E-04	4.8419E-04
35	7.1017E-03	1.7068E-04	1.7033E-04	1.5747E-04	1.5746E-04
36	3.3546E-03	5.7556E-05	5.7386E-05	5.1157E-05	5.1156E-05
37	1.5846E-03	2.4994E-05	2.4884E-05	1.4763E-05	2.0827E-05
38	4.5400E-04	3.4437E-06	3.4200E-06	0.	2.5484E-06
39	2.1445E-04	1.2527E-06	1.2414E-06	0.	8.2729E-07
40	1.0130E-04	5.5078E-07	5.4440E-07	0.	3.0900E-07
41	3.7266E-05	1.7589E-07	1.7323E-07	0.	5.9997E-08
42	1.0677E-05	2.2718E-08	2.9006E-08	0.	5.4050E-12
43	5.0435E-06	1.2140E-08	1.3842E-08	0.	0.
44	1.8554E-06	3.7279E-09	3.8754E-09	0.	0.
45	8.7643E-07	1.7610E-09	1.7694E-09	0.	0.
46	4.1399E-07	1.1957E-09	1.1790E-09	0.	0.
47	1.0000E-07	3.8080E-10	3.7167E-10	0.	0.
	1.0000E-11				

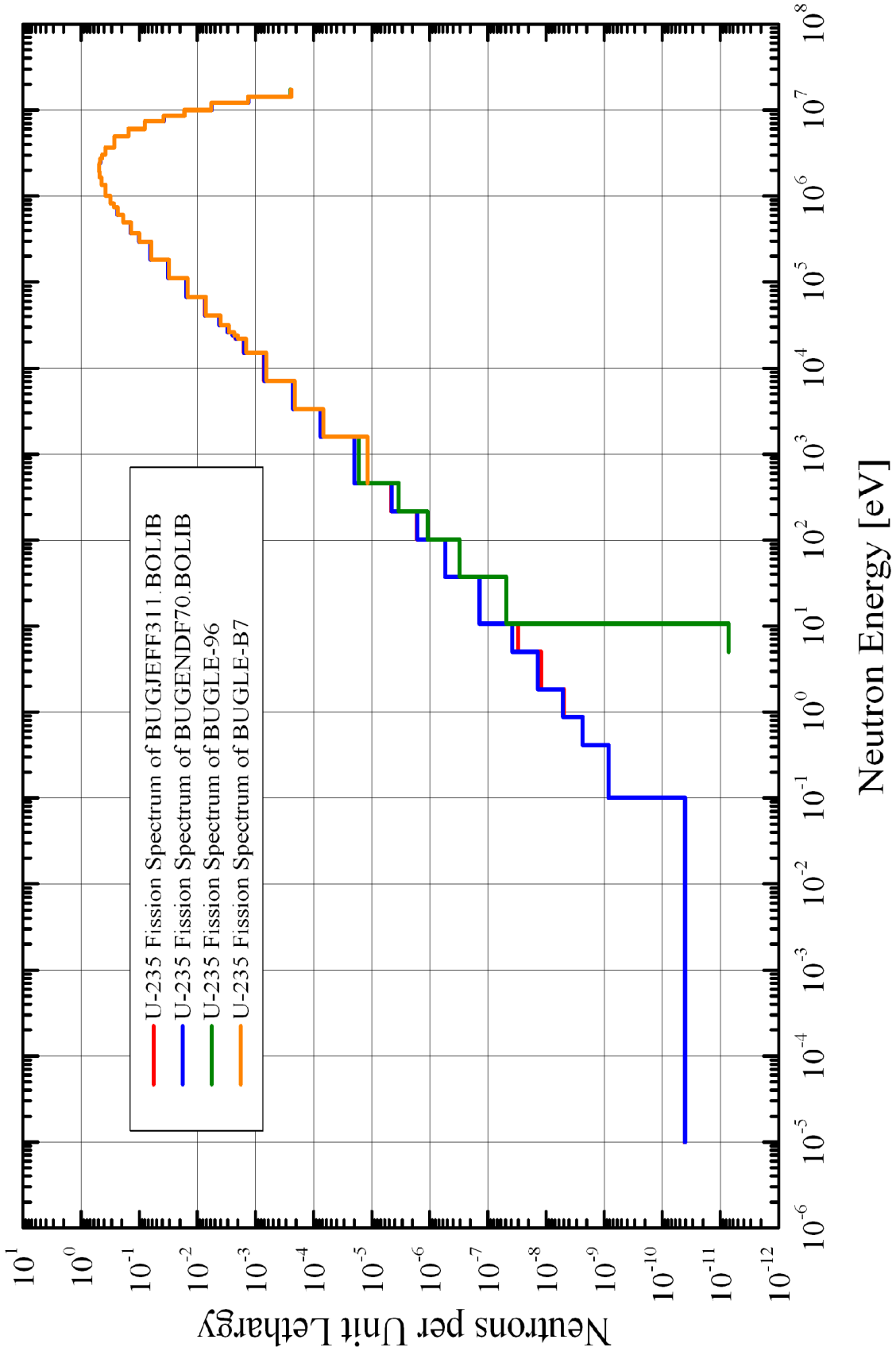


FIG. 3.18 BUGLE-Type 47-Group Neutron Structure Representation of the U-235 Total (Prompt + Delayed) Fission Neutron Spectra of the BUGJEFF311.BOLIB and BUGENDF70.BOLIB Libraries in Comparison with the U-235 Prompt Fission Neutron Spectra of the BUGLE-96 and BUGLE-B7 Libraries. Spectra Averaged on Incident Neutron Energies and Normalized to 1 Neutron per Fission.

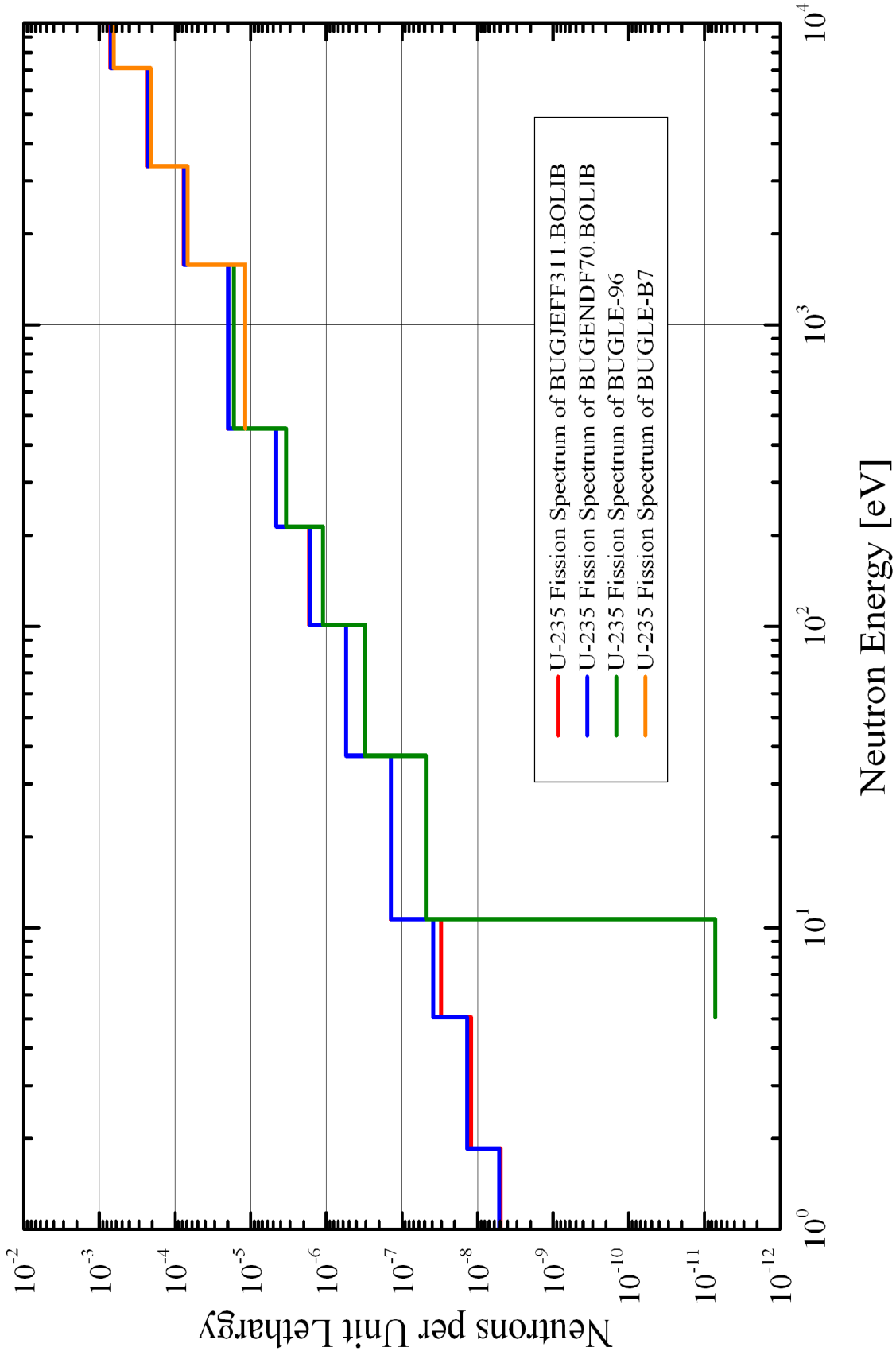


FIG. 3.19 Partial Detail of the BUGLE-Type 47-Group Neutron Structure Representation of the U-235 Total (Prompt + Delayed) Fission Neutron Spectra of the BUGJEFF311.BOLIB and BUGENDF70.BOLIB Libraries in Comparison with the U-235 Prompt Fission Neutron Spectra of the BUGLE-96 and BUGLE-B7 Libraries. Spectra Averaged on Incident Neutron Energies and Normalized to 1 Neutron per Fission.

4.0 - TRANSPORT CALCULATIONS

4.1 - Transport Calculation General Features

Fixed source transport calculations in Cartesian geometry were performed for the Iron-88 neutron shielding benchmark experiment using the ORNL TORT-3.2 /13/ three-dimensional discrete ordinates (S_N) code, included in the ORNL DOORS-3.2 /14/ system of deterministic transport codes. The whole Iron-88 experimental array (see 2.2 and /10/) was reproduced with the TORT-3.2 code using the realistic inhomogeneous fission neutron source (see 2.3, TAB. 2.3 and FIG. 4.1) emitted by the fission plate.

The TORT-3.2 code was used on a personal computer (CPU: INTEL PENTIUM D 3.40 GHz, 3.10 GB of RAM) under Linux openSUSE 10.2 (i586) operating system with FORTRAN-77 compiler g77, version 3.3.5-38.

The ENEA-Bologna ADEFTA-4.1 /15/ program was employed (see APPENDIX A) in the calculation of the atomic densities of the isotopes and natural elements involved in the compositional models of the Iron-88 benchmark experiment, on the basis of the atomic abundances reported in the BNL-NNDC database /40/, included in ADEFTA. The Iron-88 atomic densities were calculated using the material densities and the element/isotope weight fractions reported in the Table 2 of reference /10/ (see TAB. 2.2).

The automatic generation of the spatial mesh grid and the graphical verification of the Iron-88 benchmark experiment geometrical model for TORT-3.2 were performed (see APPENDIX B) through the ENEA-Bologna BOT3P-5.3 /16/ (see also /17/, /18/ and /19/) pre/post-processor system.

The reference system adopted in the present calculations has its origin on the Z horizontal axis passing through the centre of the fission plate (see FIGs. 2.6 and 2.7) and normal to it. It is underlined that the centre of the fission plate is not aligned with the centre of the trolley face. In fact the centre of the trolley face is shifted by -2.55 cm in the X horizontal axis direction and by +6.6 cm in the Y vertical axis direction.

The whole Iron-88 three-dimensional experimental array was reproduced in the (X,Y,Z) Cartesian geometry and adopted in all the calculations in order to assure an appropriate detailed description (see FIG. 4.1) of the spatial inhomogeneity of the neutron source (see TAB. 2.3) emitted by the fission plate. In particular it was described a parallelepiped geometry with a 69X×86Y×278Z fine spatial mesh grid, being Z the horizontal nuclear axis (see FIG. 2.7) where the dosimetric measurement positions were located. Volumetric meshes with sides always inferior to 1.0 cm were described along the Z axis, in correspondence of the steel slab measurement region, to obtain the best calculated result accuracy. Volumetric meshes with sides always inferior to 0.25 cm were used in the measurement positions along the Z axis, i.e. in the 0.74 cm air gaps between each mild steel slab component.

The horizontal section (at the vertical axis position Y = 0.0 cm) of the Iron-88 compositional and geometrical model, reproduced in all the TORT-3.2 (X,Y,Z) calculations, is reported in FIG. 4.2 together with the dosimeter locations (×). A detail of the FIG. 4.2 is reproduced in the FIG. 4.3, representing an enlargement of the compositional and geometrical model in the

measurement region, where it is possible to see better the 0.74 cm thick air gaps between the various mild steel slab components and the related dosimeter measurement locations.

The mild steel floor, the roof and the trolley lateral walls with 1.91 cm thickness (see 2.2) were simulated in the TORT calculations since they were originally represented in the input data of the Monte Carlo MCBEND /39/ code calculation example, reported in the Iron-88 benchmark experiment section of reference /11/.

The adopted calculation model includes a 1.0 m long graphite region (see FIG. 4.2) to represent the region of the NESTOR reactor behind the trolley face and the fission plate (i.e. towards the NESTOR reactor from the fission plate), not contained in TAB. 2.1 and FIG. 2.7, where only the steel slab measurement region in front of the fission plate is indicated up to the end of the trolley. As confirmed in the original Iron-88 report (see /10/, page 4), the realistic presence of this graphite zone permit to obtain more accurate calculated results for the Au-197(n,γ)Au-198/Cd epi-cadmium reaction rates, particularly in the first five measurement positions (see FIG. 2.7, measurement positions A2÷A6). Concerning this, it was decided to introduce the previously cited additional graphite region in all the calculations (producing in particular more accurate gold reaction rate results) to compare all the reaction rate results in a consistent way.

The BUGJEFF311.BOLIB /2/, BUGENDF70.BOLIB /3/, BUGLE-B7 /7/ and BUGLE-96 /8/ working cross section libraries were alternatively used in the transport calculations with TORT-3.2 (see APPENDIX C), considering BUGLE-96 as a well tested reference library.

The calculations of the epi-cadmium reaction rates for the Au-197(n,γ)Au-198/Cd activation dosimeters were performed (see more detail in 3.5 and TABs. C2÷C5 of APPENDIX C) using the cross sections of the first 44 neutron groups (see TAB. 3.1) of the BUGLE-type libraries. This implicitly assumes that the 0.876 eV lower energy limit of the group No. 44 of the BUGLE-type library energy structure is the nearest energy boundary value to the 0.73 eV experimental cadmium cutoff energy for the gold dosimeters employed in the Iron-88 benchmark experiment. In particular, as already mentioned, this latter cutoff energy value depends (see /38/) on the thickness (1.27 mm) of the cadmium cover containing the cited dosimeters (see 2.4, 3.5 and Table 3 of reference /10/).
Moreover the epi-cadmium reaction rates for the Au-197(n,γ)Au-198/Cd activation dosimeters were also calculated (see APPENDIX C, TAB. C1), exclusively with the BUGJEFF311.BOLIB library, using the cross sections of the first 45 groups. This implicitly assumes the 0.414 eV lower energy limit of the group No. 45 as the cadmium cutoff energy for the calculation of the gold dosimeter total reaction rates, at the classical upper threshold of the thermal neutron energy. This was performed in order to quantify, in a consistent way, the differences in the calculated total epi-cadmium reaction rates of the gold dosimeters, assuming two different cadmium cutoff energies, i.e. 0.876 eV for the 44-group calculation and 0.414 eV for the 45-group calculation.

All the calculated reaction rates for the Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 threshold activation dosimeters were obtained taking into account only the first 29 neutron groups (see TAB. 3.1) of the four BUGLE-type libraries employed, above 3.1828E+04 eV, since all the neutron threshold energies of the four cited dosimeters are above this neutron energy value.

It is underlined that it was not possible to use the same set of atomic densities in all the calculations with the four BUGLE-type previously cited libraries. In fact the BUGJEFF311.BOLIB and BUGENDF70.BOLIB libraries include all the needed processed cross sections for all the isotopes of each natural element involved in the Iron-88 compositional model whereas, on the contrary, this possibility is not always assured for the BUGLE-B7 and BUGLE-96 libraries. Several processed cross sections needed in the description of the Iron-88 compositional model are in fact available, in BUGLE-B7 and BUGLE-96, only as natural element cross section files. In particular the common set of atomic densities used in the calculations with the BUGJEFF311.BOLIB and BUGENDF70.BOLIB libraries is reported in TAB. 4.1 whilst different sets of atomic densities, shown in the TAB. 4.2 and TAB. 4.3, were respectively used in the calculations with the BUGLE-B7 and BUGLE-96 libraries. The last two sets of atomic densities are different because some elements (Ca, K and Si) of the mixture of nuclides of the material "concrete" are specifically available in BUGLE-B7 (see TAB. 4.2) as cross section data files of their component isotopes whilst the cited elements in BUGLE-96 are available (see TAB. 4.3) only as natural element cross section data files.

Both infinite dilution and self-shielded neutron cross sections were selected. Appropriate self-shielded neutron cross sections from the four BUGLE-type library packages were used when available. In particular it is underlined that the mild steel and stainless steel regions of Iron-88 are characterized by atomic densities quite similar to those used to calculate the background cross sections, employed in the self-shielding of the neutron cross sections of the four cited BUGLE-type libraries. Group-organized files of macroscopic cross sections, requested by TORT-3.2 and derived from the four cited BUGLE-type working libraries in FIDO-ANISN format, were prepared through the ORNL GIP (see /14/) program, specifically dedicated to the discrete ordinates transport codes (ANISN-ORNL, DORT, TORT) of the DOORS system. The ENEA-Bologna ADEFTA-4.1 program was used not only to calculate the atomic densities for the Iron-88 compositional model but also to handle them properly in order to automatically prepare the macroscopic cross section sets, for the material mixtures of elements/isotopes, in the format required by GIP.

Fixed source transport calculations with one source (outer) iteration and 60 inner iterations were performed using fully symmetrical discrete ordinates directional quadrature sets for the flux solution. The P_3-S_8 approximation was adopted, as a standard, in all the calculations using alternatively the four cited BUGLE-type libraries. P_N corresponds to the order of the expansion in Legendre polynomials of the scattering cross section matrix and S_N represents the order of the flux angular discretization. It is underlined that the P_3-S_8 approximation is the most widely used option in the fixed source calculations dedicated to LWR safety analyses.

The theta-weighted difference approximation was selected for the flux extrapolation model.
The same numerical value (1.0E-03), for the point-wise flux convergence criterion, was employed in all the calculations.

The vacuum boundary condition was selected at the left, right, inside, outside, bottom and top geometrical boundaries.

The calculated reaction rates were obtained in all the experimental dosimeter positions in the 0.74 cm air gaps (see FIGs. 2.7, 4.2 and 4.3), between each mild steel slab component.

It is pointed out that, in order to calculate with appropriate accuracy the neutron fluxes above 0.1 MeV, 1.0 MeV, 3.0 MeV and 8.0 MeV with the four BUGLE-type libraries, the neutron flux contributions of the groups No. 27, No. 19, No. 10 and No. 5 were respectively corrected by multiplying the cited group fluxes by specific constants. In particular the following numerical factors, reported herewith, take into account that the lower energy limits of the cited neutron groups do not correspond exactly to the 0.1 MeV, 1.0 MeV, 3.0 MeV and 8.0 MeV neutron energies respectively (see TAB. B1 and pages 161÷162 of reference /2/; see TAB. B1 and pages 167÷168 of reference /3/; see TAB. 3.14 and page 66 of reference /8/).

Neutron Flux > 0.1 MeV

Group No. 27 Factor = 2.1034E-01 = $\ln(E_0/E_g)/\ln(E_{g+1}/E_g)$ where:

E_0 = 0.1 [MeV];
E_g = 1.1109E-01 [MeV] (Upper energy limit group No. 27);
E_{g+1} = 6.7379E-02 [MeV] (Lower energy limit group No. 27).

Neutron Flux > 1.0 MeV

Group No. 19 Factor = 1.3000E-02 = $\ln(E_0/E_g)/\ln(E_{g+1}/E_g)$ where:

E_0 = 1.0 [MeV];
E_g = 1.0026 [MeV] (Upper energy limit group No. 19);
E_{g+1} = 0.82085 [MeV] (Lower energy limit group No. 19).

Neutron Flux > 3.0 MeV

Group No. 10 Factor = 3.959E-02 = $\ln(E_0/E_g)/\ln(E_{g+1}/E_g)$ where:

E_0 = 3.0 [MeV];
E_g = 3.0119 [MeV] (Upper energy limit group No. 10);
E_{g+1} = 2.7253 [MeV] (Lower energy limit group No. 10).

Neutron Flux > 8.0 MeV

Group No. 5 Factor = 4.8764E-01 = $\ln(E_0/E_g)/\ln(E_{g+1}/E_g)$ where:

E_0 = 8.0 [MeV];
E_g = 8.6071 [MeV] (Upper energy limit group No. 5);
E_{g+1} = 7.4082 [MeV] (Lower energy limit group No. 5).

Finally, the input data files of the ADEFTA-4.1, BOT3P-5.3 and TORT-3.2 codes, involved in the present Iron-88 analysis, are reported in the Appendixes A, B and C listed herewith.

APPENDIX A Input Data of ADEFTA-4.1 - Generation of the Compositional Models Used in the Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries;

APPENDIX B Input Data of BOT3P-5.3 - Generation of the Geometrical Model Used in the Inhomogeneous Fission Neutron Source Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries;

APPENDIX C Input Data of TORT-3.2 - Inhomogeneous Fission Neutron Source P_3-S_8 Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries.

FIG. 4.1

Iron-88 - Vertical Section of the Fission Plate Neutron Source Distribution
Described in the TORT-3.2 (X,Y,X) Calculations.

Vertical Section at Z = 1.5 cm.
69X×86Y×278Z Spatial Meshes.

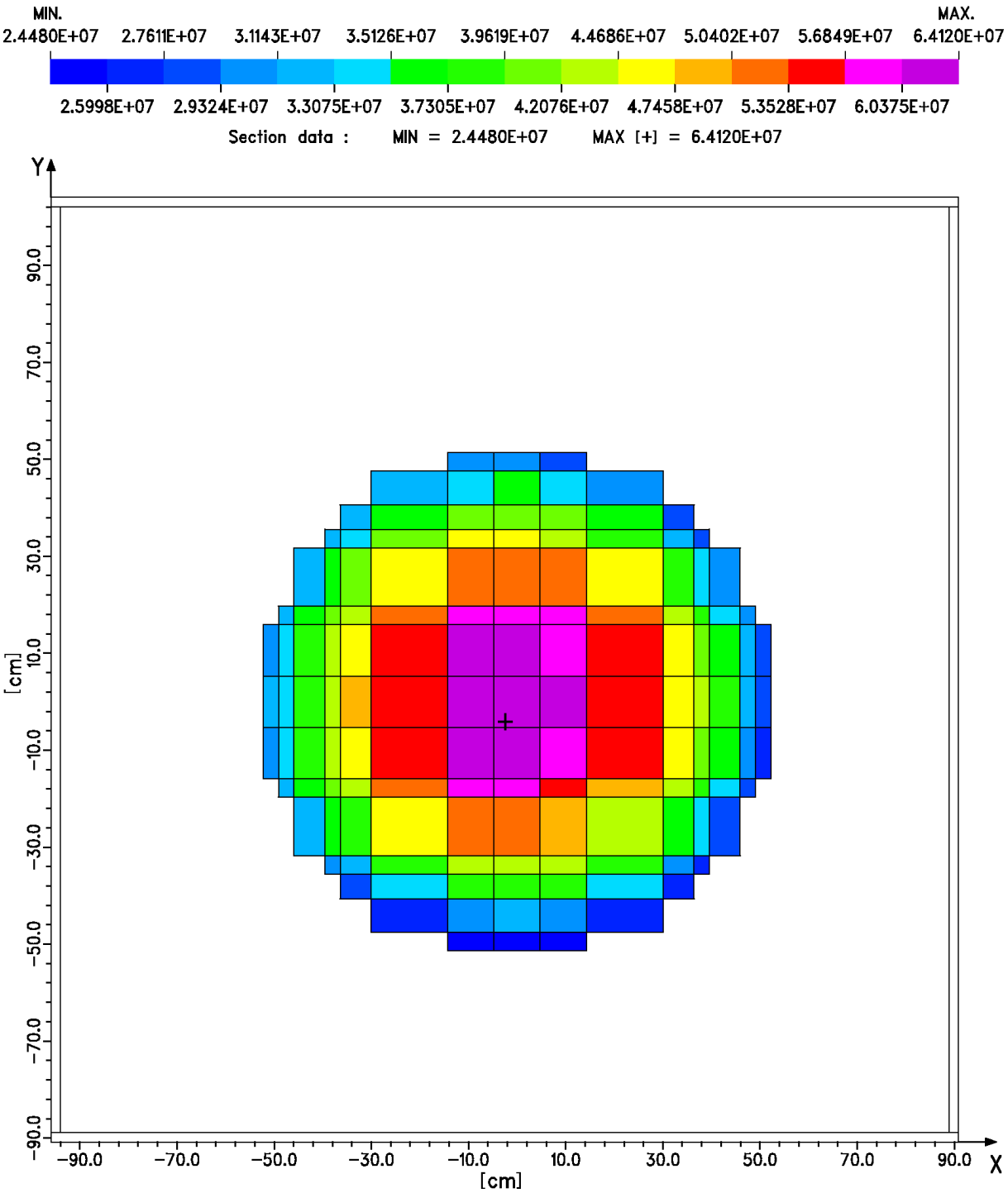


FIG. 4.2

Iron-88 - Compositional and Geometrical Model in the TORT-3.2 (X,Y,Z) Calculations.

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 69X×86Y×278Z Spatial Meshes.

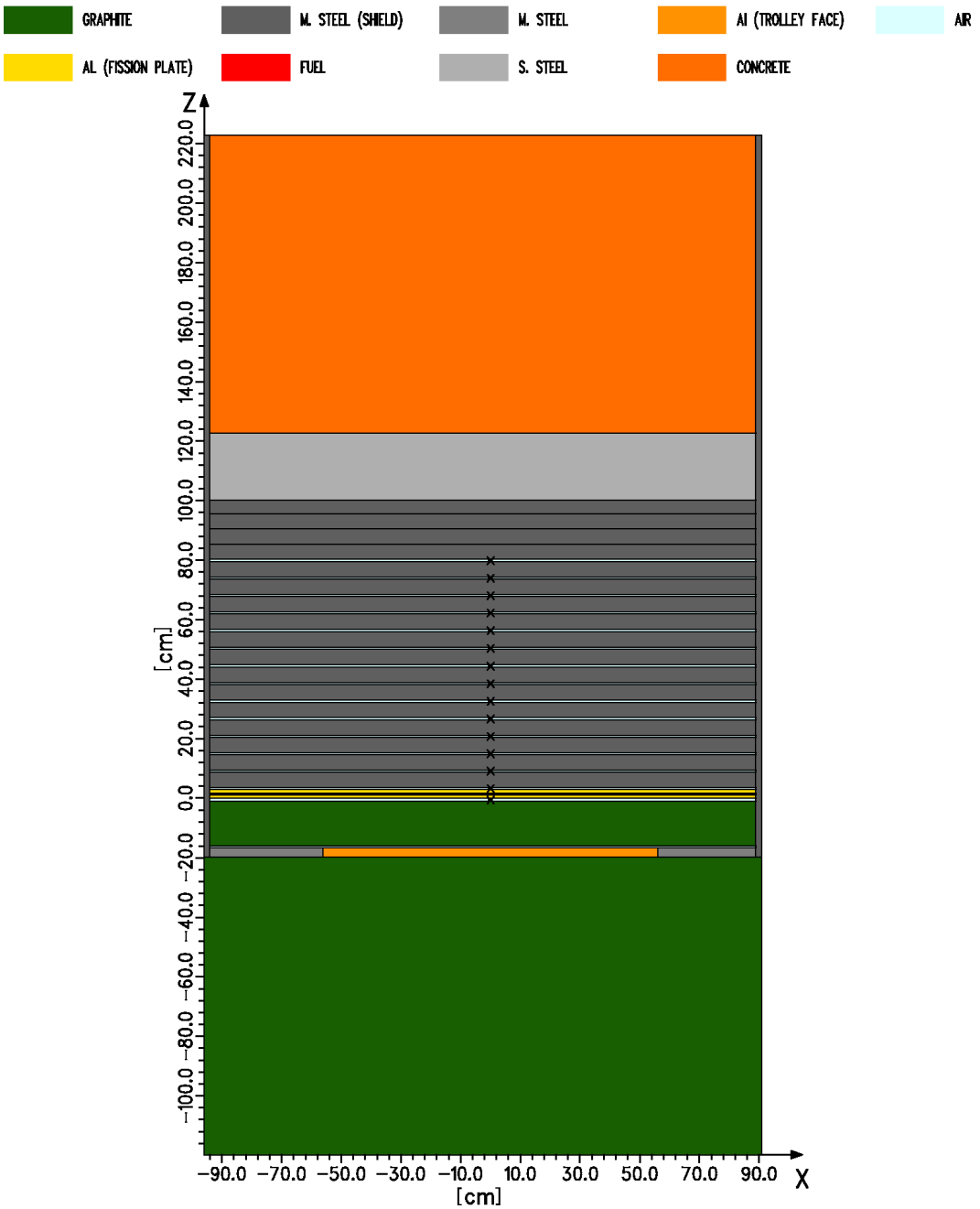
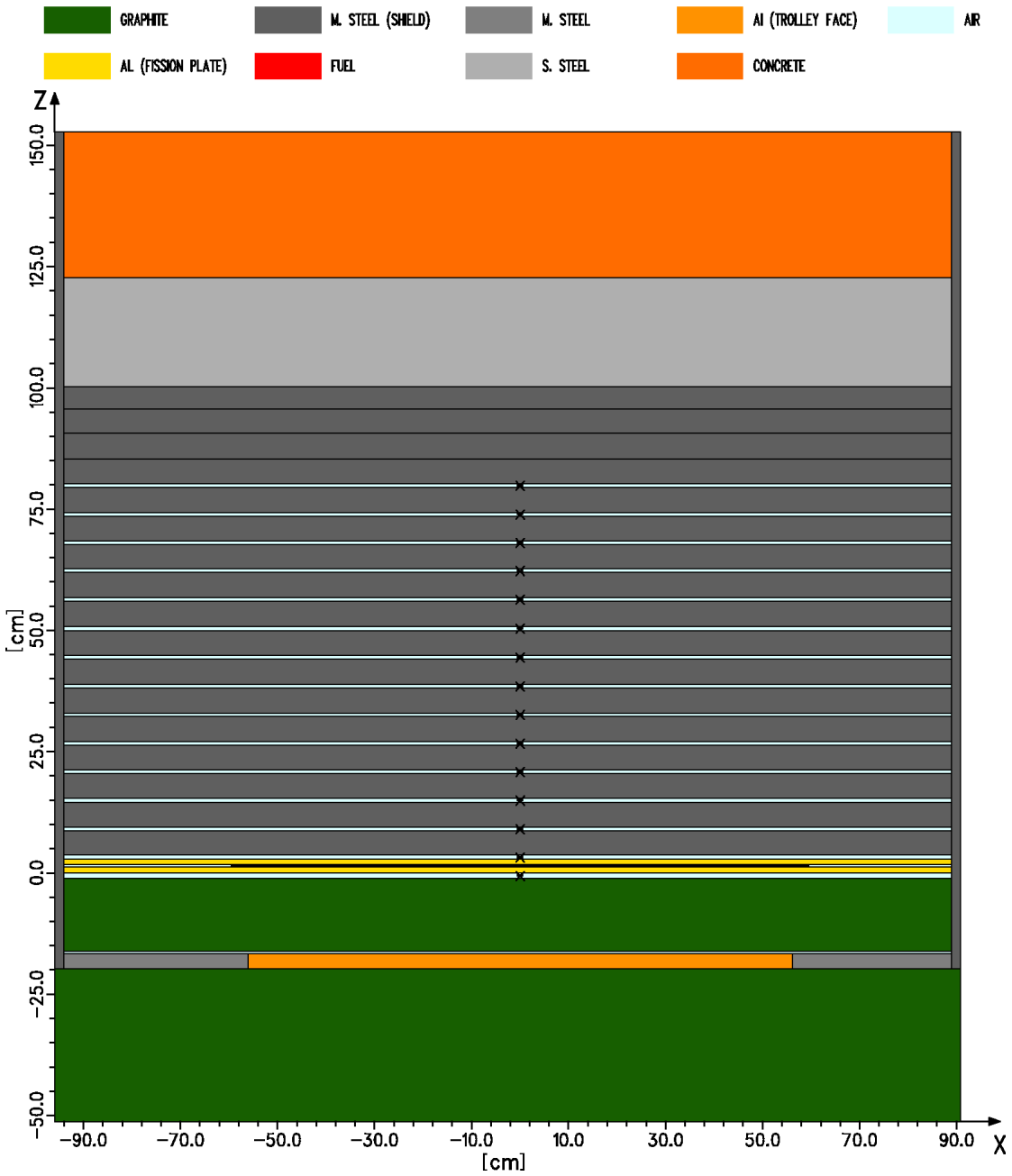


FIG. 4.3

Iron-88 - Compositional and Geometrical Model in the TORT-3.2 (X,Y,Z) Calculations.

Enlargement of the Measurement Region, Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 69X×86Y×278Z Spatial Meshes.



TAB. 4.1

Iron-88 - Atomic Densities Used in the TORT-3.2 Calculations
with the BUGJEFF311.BOLIB and BUGENDF70.BOLIB Libraries.

Material	Material Density [g × cm^{-3}]	Element/ Isotope	Isotopic Abundance [%]	Atomic Density [atoms × barn^{-1} × cm^{-1}]
Mild Steel in Trolley Face	7.835	C-nat[a]	1.	8.64238E-04
		Si-28	0.92230	6.19784E-05
		Si-29	0.04683	3.14697E-06
		Si-30	0.03087	2.07446E-06
		Mn-55	1.	9.36145E-04
		Fe-54	0.05845	4.87178E-03
		Fe-56	0.91754	7.64765E-02
		Fe-57	0.02119	1.76618E-03
		Fe-58	0.00282	2.35046E-04
Aluminium in Trolley Face	2.700	Al-27	1.	6.02626E-02
Graphite	1.650	C-nat	1.	8.27286E-02
Fuel[b]	3.256	Al-27	1.	5.81233E-02
		U-235	0.93	1.55501E-03
		U-238	0.07	1.13670E-04
Aluminium in Fission Plate	2.666	Al-27	1	5.90813E-02
		Si-28	0.92230	7.90847E-05
		Si-29	0.04683	4.01555E-06
		Si-30	0.03087	2.64702E-06
		Fe-54	0.05845	9.41022E-06
		Fe-56	0.91754	1.47720E-04
		Fe-57	0.02119	3.41151E-06
		Fe-58	0.00282	4.54009E-07
Mild Steel in Shield	7.850	C-nat	1.	9.05252E-04
		Mn-55	1.	6.36765E-04
		Fe-54	0.05845	4.89990E-03
		Fe-56	0.91754	7.69180E-02
		Fe-57	0.02119	1.77637E-03
		Fe-58	0.00282	2.36403E-04
Air	1.205E-03[c]	N-14	0.99634	3.95960E-05
		N-15	0.00366	1.45454E-07
		O-16	1.	1.05642E-05

([a]) Extension "-nat" refers to natural elements.
([b]) Uranium enriched to 93 w% in U-235.
([c]) Air density at the temperature of 20.0 °C taken from "Air Properties" in www.engineeringtoolbox.com.

4.1 Continued

Iron-88 - Atomic Densities Used in the TORT-3.2 Calculations
with the BUGJEFF311.BOLIB and BUGENDF70.BOLIB Libraries.

Material	Material Density [g × cm^{-3}]	Element/ Isotope	Isotopic Abundance [%]	Atomic Density [atoms × barn^{-1} × cm^{-1}]
Stainless Steel	7.917	C-nat	1.	2.38168E-04
		Si-28	0.92230	7.82837E-04
		Si-29	0.04683	3.97487E-05
		Si-30	0.03087	2.62021E-05
		P-31	1.	4.61784E-05
		S-32	0.95020	2.82570E-05
		S-33	0.00750	2.23034E-07
		S-34	0.04210	1.25197E-06
		S-36	0.00020	5.94758E-09
		Cr-50	0.04345	6.68135E-04
		Cr-52	0.83789	1.28843E-02
		Cr-53	0.09501	1.46098E-03
		Cr-54	0.02365	3.63668E-04
		Mn-55	1.	1.36250E-03
		Fe-54	0.05845	3.34089E-03
		Fe-56	0.91754	5.24448E-02
		Fe-57	0.02119	1.21118E-03
		Fe-58	0.00282	1.61186E-04
		Ni-58	0.68077	6.44795E-03
		Ni-60	0.26223	2.48372E-03
		Ni-61	0.01140	1.07976E-04
		Ni-62	0.03634	3.44196E-04
		Ni-64	0.00926	8.77066E-05
		Mo-92	0.14840	1.79944E-04
		Mo-94	0.09250	1.12162E-04
		Mo-95	0.15920	1.93040E-04
		Mo-96	0.16680	2.02255E-04
		Mo-97	0.09550	1.15799E-04
		Mo-98	0.24130	2.92591E-04
		Mo-100	0.09630	1.16770E-04
Concrete	2.242	H-1	1.	1.34221E-02
		O-16	1.	4.47309E-02
		Na-23	1.	9.47430E-04
		Al-27	1.	1.70478E-03
		Si-28	0.92230	1.49675E-02
		Si-29	0.04683	7.59976E-04
		Si-30	0.03087	5.00971E-04
		K-39	0.932581	6.45379E-04
		K-40	0.000117	8.09681E-08
		K-41	0.067302	4.65753E-05
		Ca-40	0.96941	1.24021E-03
		Ca-42	0.00647	8.27739E-06
		Ca-43	0.00135	1.72712E-06
		Ca-44	0.02086	2.66872E-05
		Ca-46	0.00004	5.11740E-08
		Ca-48	0.00187	2.39238E-06
		Fe-54	0.05845	1.99653E-05
		Fe-56	0.91754	3.13412E-04
		Fe-57	0.02119	7.23806E-06
		Fe-58	0.00282	9.63253E-07

TAB. 4.2

Iron-88 - Atomic Densities Used in the TORT-3.2 Calculations
with the BUGLE-B7 Library.

Material	Material Density [g × cm^{-3}]	Element/ Isotope	Isotopic Abundance [%]	Atomic Density [atoms × barn^{-1} × cm^{-1}]
Mild Steel in Trolley Face	7.835	C-nat[a]	1.	8.64238E-04
		Si-nat	1.	6.71998E-05
		Mn-55	1.	9.36145E-04
		Fe-54	0.05845	4.87178E-03
		Fe-56	0.91754	7.64765E-02
		Fe-57	0.02119	1.76618E-03
		Fe-58	0.00282	2.35046E-04
Aluminium in Trolley Face	2.700	Al-27	1.	6.02626E-02
Graphite	1.650	C-nat	1.	8.27286E-02
Fuel[b]	3.256	Al-27	1.	5.81233E-02
		U-235	0.93	1.55501E-03
		U-238	0.07	1.13670E-04
Aluminium in Fission Plate	2.666	Al-27	1.	5.90813E-02
		Si-nat	1.	8.57473E-05
		Fe-54	0.05845	9.41022E-06
		Fe-56	0.91754	1.47720E-04
		Fe-57	0.02119	3.41151E-06
		Fe-58	0.00282	4.54009E-07
Mild Steel in Shield	7.850	C-nat	1.	9.05252E-04
		Mn-55	1.	6.36765E-04
		Fe-54	0.05845	4.89990E-03
		Fe-56	0.91754	7.69180E-02
		Fe-57	0.02119	1.77637E-03
		Fe-58	0.00282	2.36403E-04
Air	1.205E-03[c]	N-14	0.99634	3.95960E-05
		N-15	0.00366	1.45454E-07
		O-16	1.	1.05642E-05

([a]) Extension "-nat" refers to natural elements.
([b]) Uranium enriched to 93 w% in U-235.
([c]) Air density at the temperature of 20.0 °C taken from "Air Properties" in www.engineeringtoolbox.com.

TAB. 4.2 Continued

Iron-88 - Atomic Densities Used in the TORT-3.2 Calculations
with the BUGLE-B7 Library.

Material	Material Density [g × cm^{-3}]	Element/ Isotope	Isotopic Abundance [%]	Atomic Density [atoms × barn^{-1} × cm^{-1}]
Stainless Steel	7.917	C-nat	1.	2.38168E-04
		Si-nat	1.	8.48788E-04
		P-31	1.	4.61784E-05
		S-nat	1.	2.97379E-05
		Cr-50	0.04345	6.68135E-04
		Cr-52	0.83789	1.28843E-02
		Cr-53	0.09501	1.46098E-03
		Cr-54	0.02365	3.63668E-04
		Mn-55	1.	1.36250E-03
		Fe-54	0.05845	3.34089E-03
		Fe-56	0.91754	5.24448E-02
		Fe-57	0.02119	1.21118E-03
		Fe-58	0.00282	1.61186E-04
		Ni-58	0.68077	6.44795E-03
		Ni-60	0.26223	2.48372E-03
		Ni-61	0.01140	1.07976E-04
		Ni-62	0.03634	3.44196E-04
		Ni-64	0.00926	8.77066E-05
		Mo-nat	1.	1.21256E-03
Concrete	2.242	H-1	1.	1.34221E-02
		O-16	1.	4.47309E-02
		Na-23	1.	9.47430E-04
		Al-27	1.	1.70478E-03
		Si-28	0.92230	1.49675E-02
		Si-29	0.04683	7.59976E-04
		Si-30	0.03087	5.00971E-04
		K-39	0.932581	6.45379E-04
		K-40	0.000117	8.09681E-08
		K-41	0.067302	4.65753E-05
		Ca-40	0.96941	1.24021E-03
		Ca-42	0.00647	8.27739E-06
		Ca-43	0.00135	1.72712E-06
		Ca-44	0.02086	2.66872E-05
		Ca-46	0.00004	5.11740E-08
		Ca-48	0.00187	2.39238E-06
		Fe-54	0.05845	1.99653E-05
		Fe-56	0.91754	3.13412E-04
		Fe-57	0.02119	7.23806E-06
		Fe-58	0.00282	9.63253E-07

TAB. 4.3

Iron-88 - Atomic Densities Used in the TORT-3.2 Calculations
with the BUGLE-96 Library.

Material	Material Density [g × cm^{-3}]	Element/ Isotope	Isotopic Abundance [%]	Atomic Density [atoms × barn^{-1} × cm^{-1}]
Mild Steel in Trolley Face	7.835	C-nat[a]	1.	8.64238E-04
		Si-nat	1.	6.71998E-05
		Mn-55	1.	9.36145E-04
		Fe-54	0.05845	4.87178E-03
		Fe-56	0.91754	7.64765E-02
		Fe-57	0.02119	1.76618E-03
		Fe-58	0.00282	2.35046E-04
Aluminium in Trolley Face	2.700	Al-27	1.	6.02626E-02
Graphite	1.650	C-nat	1.	8.27286E-02
Fuel[b]	3.256	Al-27	1.	5.81233E-02
		U-235	0.93	1.55501E-03
		U-238	0.07	1.13670E-04
Aluminium in Fission Plate	2.666	Al-27	1.	5.90813E-02
		Si-nat	1.	8.57473E-05
		Fe-54	0.05845	9.41022E-06
		Fe-56	0.91754	1.47720E-04
		Fe-57	0.02119	3.41151E-06
		Fe-58	0.00282	4.54009E-07
Mild Steel in Shield	7.850	C-nat	1.	9.05252E-04
		Mn-55	1.	6.36765E-04
		Fe-54	0.05845	4.89990E-03
		Fe-56	0.91754	7.69180E-02
		Fe-57	0.02119	1.77637E-03
		Fe-58	0.00282	2.36403E-04
Air	1.205E-03[c]	N-14	0.99634	3.95960E-05
		N-15	0.00366	1.45454E-07
		O-16	1.	1.05642E-05

([a]) Extension "-nat" refers to natural elements.
([b]) Uranium enriched to 93 w% in U-235.
([c]) Air density at the temperature of 20.0 °C taken from "Air Properties" in www.engineeringtoolbox.com.

TAB. 4.3 Continued

Iron-88 - Atomic Densities Used in the TORT-3.2 Calculations
with the BUGLE-96 Library.

Material	Material Density [g × cm^{-3}]	Element/ Isotope	Isotopic Abundance [%]	Atomic Density [atoms × barn^{-1} × cm^{-1}]
Stainless Steel	7.917	C-nat	1.	2.38168E-04
		Si-nat	1.	8.48788E-04
		P-31	1.	4.61784E-05
		S-nat	1.	2.97379E-05
		Cr-50	0.04345	6.68135E-04
		Cr-52	0.83789	1.28843E-02
		Cr-53	0.09501	1.46098E-03
		Cr-54	0.02365	3.63668E-04
		Mn-55	1.	1.36250E-03
		Fe-54	0.05845	3.34089E-03
		Fe-56	0.91754	5.24448E-02
		Fe-57	0.02119	1.21118E-03
		Fe-58	0.00282	1.61186E-04
		Ni-58	0.68077	6.44795E-03
		Ni-60	0.26223	2.48372E-03
		Ni-61	0.01140	1.07976E-04
		Ni-62	0.03634	3.44196E-04
		Ni-64	0.00926	8.77066E-05
		Mo-nat	1.	1.21256E-03
Concrete	2.242	H-1	1.	1.34221E-02
		O-16	1.	4.47309E-02
		Na-23	1.	9.47430E-04
		Al-27	1.	1.70478E-03
		Si-nat	1.	1.62284E-02
		K-nat	1.	6.92035E-04
		Ca-nat	1.	1.27935E-03
		Fe-54	0.05845	1.99653E-05
		Fe-56	0.91754	3.13412E-04
		Fe-57	0.02119	7.23806E-06
		Fe-58	0.00282	9.63253E-07

4.2 - Neutron Source Normalization

With respect to the fission neutron source normalization, the following approach was adopted. Taking into account that the fission plate neutron source is given in units of neutrons $\times$ cm^{-3} $\times$ $second^{-1}$ $\times$ 1.0E+07 (see TAB. 2.3), corresponding to 1 Watt of fission plate power, the "xnf" normalization factor in TORT-3.2 is given by:

$$xnf = 5.68E\text{-}04 \times 3.0E\text{+}04 \times 1.0E\text{-}24 = 1.704E\text{-}25$$

where

5.68E-04 (see /10/) are the fission plate Watts per NESTOR reactor Watt,

3.0E+04 Watts (see /10/) is the NESTOR reactor power and

1.0E-24 is a conversion factor taking into account that the atomic densities introduced in TORT-3.2 were expressed in atoms $\times$ $barn^{-1}$ $\times$ cm^{-1}.

5 - DISCUSSION OF THE RESULTS

The Iron-88 epi-cadmium reaction rates for the Au-197(n,γ)Au-198/Cd activation dosimeters and the reaction rates for the Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 threshold activation dosimeters (see 2.4), calculated using alternatively the BUGJEFF311.BOLIB /2/, BUGENDF70.BOLIB /3/, BUGLE-B7 /7/ and BUGLE-96 /8/ libraries, were compared with the corresponding experimental results.

The experimental dosimetric results were obtained in Iron-88 using the five types of previously cited activation dosimeters located (see 2.4, FIG. 2.7 and TABs. 5.1÷5.6) in fourteen measurement positions (A2÷A15). In particular the Au-197(n,γ)Au-198/Cd and S-32(n,p)P-32 dosimeters were positioned in all the fourteen measurement positions located in the air gaps, between the mild steel slab components, the Rh-103(n,n')Rh-103m dosimeters in thirteen positions, the In-115(n,n')In-115m dosimeters in ten positions and, finally, the Al-27(n,α)Na-24 dosimeters only in four positions.

The calculated reaction rate results obtained with flat weighting and 1/4 T PV weighting dosimeter cross sections are respectively reported in TABs. 5.1 and 5.2 for Au-197(n,γ)Au-198/Cd, in TAB. 5.3 for Rh-103(n,n')Rh-103m, in TAB. 5.4 for In-115(n,n')In-115m, in TAB. 5.5 for S-32(n,p)P-32 and in TAB. 5.6 for Al-27(n,α)Na-24. In the previously cited tables, the calculated (C) reaction rate results are compared with the corresponding experimental (E) reaction rate results through the C/E reaction rate ratios.
The total experimental uncertainties for the five types of activation dosimeters, at the specific measurement positions and at the confidence level of one standard deviation (1σ), were taken from the "General Description of the Experiment" document, included in the Iron-88 benchmark experiment section of the SINBAD REACTOR /11/ database and were correspondingly reported on the previously cited TABs. 5.1÷5.6.

The experimental reaction rates for all the five activation dosimeters were respectively taken from the reference /10/ and, in particular, from the Table 8 for the sulphur dosimeters, from the Table 9 for the indium dosimeters, from the Table 10 for the rhodium dosimeters, from the Table 11 for the gold dosimeters and, finally, from the Table 12 for the aluminium dosimeters. It is underlined that the experimental results for the gold dosimeters, presented in the Table 11 of reference /10/, take into account a correction for the NESTOR core neutron leakage background whilst, on the contrary, the "as measured" experimental reaction rates for the other four threshold activation dosimeters, reported in the previously cited tables of reference /10/, contain a contribution from the NESTOR core neutron leakage background (see 2.4). Consequently, since the calculated (C) reaction rates refer only to the neutrons produced in the fission plate, the "as measured" experimental (E) reaction rate values in the C/E ratios, reported in the TABs. 5.3÷5.6 of the present work, were reduced by 2%. This to eliminate the NESTOR reactor background component from the experimental reaction rates of the four threshold activation dosimeters in all the measurement positions, as recommended at page 2 of reference /10/.

The TAB. 5.1 shows the differences of the calculated epi-cadmium reaction rates for the gold dosimeters, obtained through transport calculations with the BUGJEFF311.BOLIB library, using (see Chapter 4) the cross sections of the first 44 or, alternatively, the first 45 neutron groups of the BUGLE-type neutron energy structure (see TAB. 3.1). In other words it was

intended in this way to verify the impact of two different cadmium cutoff energies, i.e. 0.876 eV with the 44-group calculation and 0.414 eV with the 45-group calculation, on the corresponding total reaction rates calculated in each measurement position.
Taking into account the experimental cadmium cutoff energy of 0.73 eV (see 3.5), corresponding to the cadmium cover thickness of 1.27 mm, used for the gold dosimeters employed in the Iron-88 benchmark experiment, it was decided to assume the 44-group calculation (corresponding to a cadmium cutoff energy of 0.876 eV) as the most appropriate reference choice. This was specifically supposed (see TAB. 5.2÷5.6) not only for the calculations with the BUGJEFF311.BOLIB library but also for those with the other three BUGLE-type libraries (BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96) used.
In this way it was obtained, in particular, better agreement with the experimental epi-cadmium reaction rates of the gold dosimeters. On the other hand it was verified and it is underlined that, summing up alternatively the reaction rate contributions of the first 44 or 45 neutron energy groups (see TAB. 3.1) in the Iron-88 calculations using the BUGJEFF311.BOLIB library, the gold dosimeter total reaction rate difference between the two calculations, in each measurement position, is limited to few percents (see TAB. 5.1).

Each of the FIGs. 5.1÷5.10 shows the intercomparisons of the C/E reaction rate ratio results, obtained through the calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 libraries, using alternatively flat weighting or 1/4 T PV weighting dosimeter cross sections. In particular the FIGs. 5.1 and 5.2 for the gold dosimeters, respectively reporting C/E results obtained through flat weighting and 1/4 T PV weighting dosimeter cross sections, correspond to TAB. 5.2. In a similar way, the FIGs. 5.3 and 5.4 for the rhodium dosimeters refer to TAB. 5.3, the FIGs. 5.5 and 5.6 for the indium dosimeters to TAB. 5.4, the FIGs. 5.7 and 5.8 for the sulphur dosimeters to TAB. 5.5 and, finally, the FIGs. 5.9 and 5.10 for the aluminium dosimeters to TAB. 5.6.

Comparisons of the C/E reaction rate ratio results, obtained using alternatively the flat weighting and the 1/4 T PV weighting dosimeter cross sections, are reported in the FIGs. 5.11÷5.30 for each of the four corresponding BUGLE-type libraries (BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96) and for each of the five types of activation dosimeters (Au-197(n,γ)Au-198/Cd, Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24) used in the Iron-88 benchmark experiment. In particular the FIGs. 5.11÷5.14 refer to the Au-197(n,γ)Au-198/Cd C/E reaction rate ratios and, similarly, the FIGs. 5.15÷5.18 to the Rh-103(n,n')Rh-103m C/E ratios, the FIGs. 5.19÷5.22 to the In-115(n,n')In-115m C/E ratios, the FIGs. 5.23÷5.26 to the S-32(n,p)P-32 C/E ratios and, finally, the FIGs. 5.27÷5.30 to the Al-27(n,α)Na-24 C/E ratios.

Gold Dosimeter Results

The Au-197(n,γ)Au-198/Cd C/E (Calculated/Experimental) epi-cadmium reaction rate ratios, obtained using the four BUGLE-type libraries, are completely represented in TAB. 5.2 whilst the C/E ratios, obtained from calculated reaction rates using 1/4 T PV weighting and flat weighting dosimeter cross sections, are respectively shown in FIG. 5.1 and FIG. 5.2.
The Au-197(n,γ)Au-198/Cd calculated reaction rates using 1/4 T PV weighting dosimeter cross sections, corresponding to the Iron-88 epi-cadmium reaction rate measurements with gold dosimeters, present deviations (see TAB. 5.2 and FIG. 5.1) from the corresponding experimental results contained within ±15% and a systematic trend to overestimate the

experimental results. When flat weighting dosimeter cross sections are employed, the deviations (see TAB. 5.2 and FIG. 5.2) of the calculated epi-cadmium reaction rates are within an increased ±25%. Meaningful differences between the C/E results, obtained with flat weighting dosimeter cross sections and those calculated with 1/4 T PV weighting dosimeter cross sections, are found. In fact, with flat weighting dosimeter cross sections, the deviations from the corresponding experimental results are systematically overestimated, between about 6% and 10%, with respect to the corresponding results obtained with 1/4 T PV weighting dosimeter cross sections which permit to have calculated results significantly more in agreement with the corresponding experimental results. The FIGs. 3.6 and 3.7, referring to the Au-197(n,γ)Au-198 neutron cross sections, respectively used in the calculations with the BUGJEFF311.BOLIB and BUGLE-96 libraries, show, for example, group cross section ratios which permit in particular to appreciate the differences between the flat weighting and the 1/4 T PV weighting self-shielded neutron cross sections.
As previously mentioned (see in particular 3.5), the neutron cross sections for the Au-197(n,γ)Au-198 dosimeters were properly self-shielded through the GROUPIE module of the PREPRO /35/ nuclear data processing system, using a background cross section equal to 1695.0 barns. The experimental effective cadmium cutoff energy was assumed to be about 0.73 eV, taking into account the thickness of 0.127 cm of the cadmium cover for the gold dosimeters. The gold calculated reaction rates obtained with the cross sections of the first 44 neutron energy groups (i.e. assuming implicitly a cadmium cutoff energy of 0.876 eV, the nearest energy value in the BUGLE-type neutron energy group structure to the 0.73 eV value previously cited) of the four BUGLE-type libraries gave reduced results by about 1%÷2% with respect to the corresponding results obtained with the first 45 groups (i.e. assuming implicitly a cadmium cutoff energy of 0.414 eV, at the classical thermal neutron energy upper threshold).

Rhodium Dosimeter Results

The Rh-103(n,n')Rh-103m C/E (Calculated/Experimental) reaction rate ratios using the four BUGLE-type libraries are completely represented in TAB. 5.3 whilst the C/E ratios obtained from calculated reaction rates using the 1/4 T PV weighting and the flat weighting dosimeter cross sections are respectively shown in FIG. 5.3 and FIG. 5.4.
The Rh-103(n,n')Rh-103m calculated reaction rates present deviations (see TAB. 5.3 and FIGs. 5.3 and 5.4), from the corresponding experimental results contained within ±20% and are characterized by a trend to overestimation, independently of the use of the flat weighting or the 1/4 T PV weighting dosimeter cross sections. Increasing the neutron penetration depth, the calculated results coming from the ENEA-Bologna libraries (BUGJEFF311.BOLIB and BUGENDF70.BOLIB) tend to overestimate those obtained from the ORNL libraries (BUGLE-B7 and BUGLE-96). It is noted in particular that, in the C/E results obtained with BUGENDF70.BOLIB, the deviations from the corresponding BUGLE-B7 values reach about 15% of overestimation at about 60.0 cm of neutron penetration depth in the Iron-88 steel shield. This was found despite the fact that both libraries are based on the same ENDF/B-VII.0 evaluated data but, it is underlined, they were not generated through the same nuclear data processing system. In fact the LANL NJOY-99.259 /36/ and the ENEA-Bologna 2007 Revision /31/ of ORNL SCAMPI /32/ systems were used to generate BUGENDF70.BOLIB whilst the ORNL AMPX-6.1 /34/ system was employed to produce BUGLE-B7.

Indium Dosimeter Results

The In-115(n,n')In-115m C/E (Calculated/Experimental) reaction rate ratios using the four BUGLE-type libraries are completely represented in TAB. 5.4 whilst the C/E ratios obtained from calculated reaction rates using the 1/4 T PV weighting and the flat weighting dosimeter cross sections are respectively shown in FIG. 5.5 and FIG. 5.6.
The In-115(n,n')In-115m calculated reaction rates show deviations (see TAB. 5.4 and FIGs. 5.5 and 5.6), from the corresponding experimental results, contained within ±15%÷20% and present a trend to underestimation with increasing neutron penetration depth, independently of the use of the flat weighting or the 1/4 T PV weighting dosimeter cross sections. Also in this case, as in the case of the rhodium results, the calculated results coming from the ENEA-Bologna libraries (BUGJEFF311.BOLIB and BUGENDF70.BOLIB) tend to overestimate those obtained from the ORNL libraries (BUGLE-B7 and BUGLE-96), increasing the neutron penetration depth. It is noted in particular that, in the C/E results obtained with BUGENDF70.BOLIB, the deviations from the corresponding BUGLE-B7 values reach about 5%÷10% of overestimation at about 45.0 cm of neutron penetration depth in the Iron-88 steel shield.

Sulphur Dosimeter Results

The In-115(n,n')In-115m C/E (Calculated/Experimental) reaction rate ratios using the four BUGLE-type libraries are completely represented in TAB. 5.5 whilst the C/E ratios obtained from calculated reaction rates using the 1/4 T PV weighting and the flat weighting dosimeter cross sections are respectively shown in FIG. 5.7 and FIG. 5.8.
Concerning the S-32(n,p)P-32 calculated reaction rates, the results obtained with the flat weighting and the 1/4 T PV weighting dosimeter cross sections give deviations (see TAB. 5.5 and FIGs. 5.7 and 5.8), from the corresponding experimental results, within ±15%÷20% and show a systematic trend to underestimation. It is noted that the BUGJEFF311.BOLIB library gives results apparently less underestimated (of about 5%÷10%) with respect to the corresponding results obtained through the other three BUGLE-type libraries used.

Aluminium Dosimeter Results

Finally the Al-27(n,α)Na-24 C/E (Calculated/Experimental) reaction rate ratios using the four BUGLE-type libraries are completely represented in TAB. 5.6 whilst the C/E ratios obtained from calculated reaction rates using the 1/4 T PV weighting and the flat weighting dosimeter cross sections are respectively shown in FIG. 5.9 and FIG. 5.10.
The Al-27(n,α)Na-24 calculated reaction rates, obtained with the 1/4 T PV weighting dosimeter cross sections, overestimate systematically (see TAB. 5.6 and FIG. 5.9) the corresponding experimental results up to +30%. It is underlined that only for these threshold activation dosimeters, with the highest effective threshold energy of 7.30 MeV, there are meaningful differences between the results obtained with the flat weighting dosimeter cross sections and those calculated with the 1/4 T PV weighting dosimeter cross sections.
In fact, with the flat weighting dosimeter cross sections, the deviations from the corresponding experimental results are systematically overestimated (see TAB. 5.6 and FIG. 5.10) by about 8%, with respect to the corresponding results obtained with the 1/4 T PV weighting dosimeter cross sections. The FIGs. 3.16 and 3.17, referring to the Al-27(n,α)Na-24 neutron cross sections, respectively used in the calculations with the BUGJEFF311.BOLIB

and BUGLE-96 libraries, show for example group cross section ratios which permit, in particular, to appreciate the differences between the flat weighting and the 1/4 T PV weighting dosimeter cross sections.

The absolute values of the experimental and calculated reaction rates for the Au-197(n,γ)Au-198/Cd, Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 activation dosimeters are respectively shown in the FIGs. 5.31÷5.35 where subjective trend lines, for the experimental reaction rates, are represented. These trend lines connect, in particular, all the experimental reaction rates for the cited dosimeters and the experimental reaction rates are compared with the corresponding calculated reaction rates, obtained using the BUGJEFF311.BOLIB library.

The spatial distributions of the neutron fluxes above different neutron energy thresholds, the spatial distributions of the dosimeter reaction rates and examples of representative calculated neutron spectra in different measurement positions, obtained using the BUGJEFF311.BOLIB library and the TORT-3.2 code in P_3-S_8 approximation, are respectively reported in the FIGs. 5.36÷5.40 for the neutron fluxes, in the FIGs. 5.41÷5.45 for the dosimeter reaction rates and in the FIGs. 5.46÷5.47 for the calculated neutron spectra.
The spatial distributions of the neutron fluxes for neutron energies above 0.414 eV, 0.1 MeV, 1.0 MeV, 3.0 MeV and 8.0 MeV are respectively presented in the FIGs. 5.36÷5.40, in the Iron-88 horizontal section at Y = 0.0 cm (see FIG. 4.2).
The spatial distributions of the reaction rates for the Au-197(n,γ)Au-198/Cd, Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24 activation dosimeters are shown respectively in the FIGs. 5.41÷5.45, in the Iron-88 horizontal section at Y = 0.0 cm (see FIG. 4.2).
It is underlined that, in practice, the reaction rate results coming from the Au-197(n,γ)Au-198/Cd dosimeters correspond to neutron fluxes above about 0.414 eV (see 3.5), the results coming from the Rh-103(n,n')Rh-103m dosimeters correspond to neutron fluxes above about 0.1 MeV, the results coming from the In-115(n,n')In-115m dosimeters to neutron fluxes above about 1.0 MeV, the results coming from the S-32(n,p)P-32 dosimeters to neutron fluxes above about 3.0 MeV and, finally, the results coming from the Al-27(n,α)Na-24 dosimeters to neutron fluxes above about 8.0 MeV (see also 3.5, TAB. 2.4 and TABs. 3.4÷3.9).

A comparison of the calculated neutron spectra above 0.414 eV, at various Iron-88 measurement positions (A2, A4, A8, A12 and A15), is shown in FIG. 5.46. An enlargement of the previous figure is reported in FIG. 5.47 for neutron energies above 0.1 MeV. The different black and red colours for the histograms reproduced in the previously cited figures are here alternatively used only to distinguish better the different spectral trends.

The neutron spectra calculated with the four BUGLE-type libraries in the fourteeen (A2÷A15) measurement positions (see FIG. 2.7) are reported in the Appendixes D (see TABs. D1÷D14), E (see TABs. E1÷E14), F (see TABs. F1÷F14) and G (see TABs. G1÷G14), referring respectively to the calculations using the four libraries BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96.

All the calculated results reported in the previously cited figures and tables are corresponding to the NESTOR reactor maximum power of 30 kW and were obtained using the four libraries

BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 together with the TORT-3.2 code in P_3-S_8 approximation, using a inhomogeneous neutron source.

Finally, the following conclusive statements can be formulated on the Iron-88 calculated results, obtained in the present analysis.

1. The 1/4 T PV weighting dosimeter cross section files, obtained using neutron weighting spectra calculated in the steel of a PWR pressure vessel, permit to obtain reaction rate results, with the four BUGLE-type libraries, in general more adherent to the corresponding experimental results than those obtained through the use of the flat weighting dosimeter cross section files.

2. The impact of the 1/4 T PV weighting dosimeter cross section files in the present transport calculations is in particular meaningful for the Au-197(n,γ)Au-198/Cd and Al-27(n,α)Na-24) calculated reaction rate results, obtained through the four BUGLE-type libraries.

3. The 1/4 T PV weighting dosimeter cross section files, used together with the four BUGLE-type libraries, give calculated reaction rate results, for the Al-27(n,α)Na-24 dosimeters, always excessively overestimated with respect to the corresponding experimental results, increasing the neutron penetration depth in the mild steel slabs of the Iron-88 experiment shield.

4. The calculated reaction rate results for the gold, rhodium, indium and sulphur dosimeters, obtained using the 1/4 T PV weighting dosimeter cross section files together with the four BUGLE-type libraries, are contained within a confidence level of the total experimental uncertainty equal to ±3σ (99.7% probability that the measurement result is between ±3 standard deviations). This corresponds to deviations of ±15%÷20% from the experimental reaction rates. On the contrary, the calculated results of the aluminium dosimeters with the highest effective threshold energy (7.30 MeV) and a minor part of the results of the Rh-103(n,n')Rh-103m and In-115(n,n')In-115m dosimeters with the lowest effective threshold energies (0.69 MeV and 1.30 MeV respectively) are not contained within the previously cited confidence level.

5. The neutron cross sections for the Au-197(n,γ)Au-198 dosimeters were properly self-shielded using a background cross section equal to 1695.0 barns. The cadmium cutoff energy for the experimental epi-cadmium reaction rates of the Au-197(n,γ)Au-198/Cd dosimeters was assumed to be about 0.73 eV, taking into account the thickness of 0.127 cm of the cadmium cover for the cited dosimeters, used in the Iron-88 experiment.

6. The BUGENDF70.BOLIB and BUGLE-B7 libraries are based on the same ENDF/B-VII.0 evaluated nuclear data. Despite this fact, the cited libraries give meaningful discrepancies in the calculated reaction rate results, above about 20.0 cm of neutron penetration depth in the mild steel slabs of the Iron-88 experiment shield. This fact is evident for the calculated reaction rates of the Au-197(n,γ)Au-198/Cd dosimeters and, in particular, for those of the Rh-103(n,n')Rh-103m and In-115(n,n')In-115m threshold dosimeters with the lowest effective threshold energies

(0.69 MeV and 1.30 MeV respectively). The C/E results obtained using BUGENDF70.BOLIB overestimate those obtained from BUGLE-B7, increasing the neutron penetration depth. It would be important to establish if these different calculated results, approximately obtained in the neutron energy range 1.0 MeV÷6.0 MeV, (corresponding approximately to the 90% response energy ranges, typical of the cited rhodium and indium threshold activation dosimeters) are due to possible different nuclear data processing approaches in the code systems used to generate the cited libraries. In particular the LANL NJOY-99.259 /36/ and the ENEA-Bologna 2007 Revision /31/ of ORNL SCAMPI /32/ were the data processing systems used to generate BUGENDF70.BOLIB whilst the ORNL AMPX-6.1 /34/ system was employed to produce BUGLE-B7.

TAB. 5.1

Iron-88 - Comparison of the Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rate Ratios (Calculated/Experimental) in 44-Group and 45-Group Calculations.

P_3-S_8 Calculations Using the BUGJEFF311.BOLIB Library with Flat Weighting and 1/4 T PV Weighting Dosimeter Cross Sections.

Au-197(n,γ) Flat Weighting

Position	Shield Thickness [cm]	Experiment RR[a,b] (E)	Total Error (1σ) [%]	44-Group Calculation RR[a] (C)	C/E	45-Group Calculation RR[a] (C)	C/E
A2	0.00	1.05E-14	4.2	1.31370E-14	1.25	1.34822E-14	1.28
A3	5.10	6.24E-15	4.2	7.55178E-15	1.21	7.65235E-15	1.23
A4	10.22	4.19E-15	4.2	4.89977E-15	1.17	4.94665E-15	1.18
A5	15.34	2.97E-15	4.2	3.40712E-15	1.15	3.43609E-15	1.16
A6	20.44	2.19E-15	4.2	2.51225E-15	1.15	2.53259E-15	1.16
A7	25.64	1.70E-15	4.2	1.93419E-15	1.14	1.94938E-15	1.15
A8	30.79	1.35E-15	4.2	1.54726E-15	1.15	1.55917E-15	1.15
A9	35.99	1.11E-15	4.2	1.26321E-15	1.14	1.27282E-15	1.15
A10	41.19	9.10E-16	4.2	1.04319E-15	1.15	1.05108E-15	1.16
A11	46.44	7.67E-16	4.2	8.63161E-16	1.13	8.69683E-16	1.13
A12	51.62	6.55E-16	4.2	7.15482E-16	1.09	7.20898E-16	1.10
A13	56.69	5.44E-16	4.2	5.94104E-16	1.09	5.98616E-16	1.10
A14	61.81	4.62E-16	4.2	4.91605E-16	1.06	4.95355E-16	1.07
A15	66.99	3.99E-16	4.2	4.06232E-16	1.02	4.09343E-16	1.03

[a] RR = Reaction Rates in units of reactions per second per atom at the NESTOR reactor maximum power (30 kW).
[b] The reported RR were already corrected for the NESTOR reactor background component. These data were used to obtain the C/E ratios.

Au-197(n,γ) 1/4 T PV Weighting

Position	Shield Thickness [cm]	Experiment RR[a,b] (E)	Total Error (1σ) [%]	44-Group Calculation RR[a] (C)	C/E	45-Group Calculation RR[a] (C)	C/E
A2	0.00	1.05E-14	4.2	1.19920E-14	1.14	1.23396E-14	1.18
A3	5.10	6.24E-15	4.2	7.01968E-15	1.12	7.12096E-15	1.14
A4	10.22	4.19E-15	4.2	4.58651E-15	1.09	4.63372E-15	1.11
A5	15.34	2.97E-15	4.2	3.19971E-15	1.08	3.22889E-15	1.09
A6	20.44	2.19E-15	4.2	2.36461E-15	1.08	2.38509E-15	1.09
A7	25.64	1.70E-15	4.2	1.82371E-15	1.07	1.83901E-15	1.08
A8	30.79	1.35E-15	4.2	1.46064E-15	1.08	1.47263E-15	1.09
A9	35.99	1.11E-15	4.2	1.19334E-15	1.08	1.20302E-15	1.08
A10	41.19	9.10E-16	4.2	9.85801E-16	1.08	9.93749E-16	1.09
A11	46.44	7.67E-16	4.2	8.15704E-16	1.06	8.22273E-16	1.07
A12	51.62	6.55E-16	4.2	6.76052E-16	1.03	6.81506E-16	1.04
A13	56.69	5.44E-16	4.2	5.61227E-16	1.03	5.65771E-16	1.04
A14	61.81	4.62E-16	4.2	4.64256E-16	1.00	4.68032E-16	1.01
A15	66.99	3.99E-16	4.2	3.83510E-16	0.96	3.86643E-16	0.97

[a] RR = Reaction Rates in units of reactions per second per atom at the NESTOR reactor maximum power (30 kW).
[b] The reported RR were already corrected for the NESTOR reactor background component. These data were used to obtain the C/E ratios.

TAB. 5.2

Iron-88 - Summary of Experimental (E) and Calculated (C)
Au-197(n,γ)Au-198/Cd Reaction Rates along the Horizontal Z Axis.

Au-197(n,γ) Flat Weighting

Position	Shield Thickness	Exp.RR as Measured	Total Error (1σ) [%]	BUGJEFF311 Calculated RR (C)	C/E	BUGENDF70 Calculated RR (C)	C/E	BUGLE-B7 Calculated RR (C)	C/E	BUGLE-96 Calculated RR (C)	C/E
A2	0.00	1.05e-14	4.2	1.31370E-14	1.25	1.31579E-14	1.25	1.30290E-14	1.24	1.28366E-14	1.22
A3	5.10	6.24e-15	4.2	7.55178E-15	1.21	7.56852E-15	1.21	7.30149E-15	1.17	7.24905E-15	1.16
A4	10.22	4.19e-15	4.2	4.89977E-15	1.17	4.92160E-15	1.17	4.75543E-15	1.13	4.72741E-15	1.13
A5	15.34	2.97e-15	4.2	3.40712E-15	1.15	3.43472E-15	1.16	3.33956E-15	1.12	3.31582E-15	1.12
A6	20.44	2.19e-15	4.2	2.51225E-15	1.15	2.54202E-15	1.16	2.48494E-15	1.13	2.46337E-15	1.12
A7	25.64	1.70e-15	4.2	1.93419E-15	1.14	1.96135E-15	1.15	1.92411E-15	1.13	1.90554E-15	1.12
A8	30.79	1.35e-15	4.2	1.54726E-15	1.15	1.56846E-15	1.16	1.54111E-15	1.14	1.52590E-15	1.13
A9	35.99	1.11e-15	4.2	1.26321E-15	1.14	1.27717E-15	1.15	1.25476E-15	1.13	1.24277E-15	1.12
A10	41.19	9.10e-16	4.2	1.04319E-15	1.15	1.05032E-15	1.15	1.03028E-15	1.13	1.02108E-15	1.12
A11	46.44	7.67e-16	4.2	8.63161E-16	1.13	8.64650E-16	1.13	8.45773E-16	1.10	8.38866E-16	1.09
A12	51.62	6.55e-16	4.2	7.15482E-16	1.09	7.12850E-16	1.09	6.94630E-16	1.06	6.89519E-16	1.05
A13	56.69	5.44e-16	4.2	5.94104E-16	1.09	5.88693E-16	1.08	5.70999E-16	1.05	5.67253E-16	1.04
A14	61.81	4.62e-16	4.2	4.91605E-16	1.06	4.84388E-16	1.05	4.67257E-16	1.01	4.64550E-16	1.01
A15	66.99	3.99e-16	4.2	4.06232E-16	1.02	3.97932E-16	1.00	3.81426E-16	0.96	3.79452E-16	0.95

Au-197(n,γ) 1/4 T PV Weighting

A2	0.00	1.05e-14	4.2	1.19920E-14	1.14	1.20122E-14	1.14	1.19244E-14	1.14	1.17502E-14	1.12
A3	5.10	6.24e-15	4.2	7.01968E-15	1.12	7.03660E-15	1.13	6.82979E-15	1.09	6.77962E-15	1.09
A4	10.22	4.19e-15	4.2	4.58651E-15	1.09	4.60824E-15	1.10	4.48302E-15	1.07	4.45462E-15	1.06
A5	15.34	2.97e-15	4.2	3.19971E-15	1.08	3.22688E-15	1.09	3.15877E-15	1.06	3.13459E-15	1.06
A6	20.44	2.19e-15	4.2	2.36461E-15	1.08	2.39368E-15	1.09	2.35545E-15	1.08	2.33373E-15	1.07
A7	25.64	1.70e-15	4.2	1.82371E-15	1.07	1.85008E-15	1.09	1.82674E-15	1.07	1.80817E-15	1.06
A8	30.79	1.35e-15	4.2	1.46064E-15	1.08	1.48115E-15	1.10	1.46462E-15	1.08	1.44946E-15	1.07
A9	35.99	1.11e-15	4.2	1.19334E-15	1.08	1.20684E-15	1.09	1.19316E-15	1.07	1.18122E-15	1.06
A10	41.19	9.10e-16	4.2	9.85801E-16	1.08	9.92752E-16	1.09	9.79927E-16	1.08	9.70733E-16	1.07
A11	46.44	7.67e-16	4.2	8.15704E-16	1.06	8.17271E-16	1.07	8.04426E-16	1.05	7.97499E-16	1.04
A12	51.62	6.55e-16	4.2	6.76052E-16	1.03	6.73694E-16	1.03	6.60566E-16	1.01	6.55411E-16	1.00
A13	56.69	5.44e-16	4.2	5.61227E-16	1.03	5.56225E-16	1.02	5.42864E-16	1.00	5.39060E-16	0.99
A14	61.81	4.62e-16	4.2	4.64256E-16	1.00	4.57534E-16	0.99	4.44097E-16	0.96	4.41326E-16	0.96
A15	66.99	3.99e-16	4.2	3.83510E-16	0.96	3.75754E-16	0.94	3.62408E-16	0.91	3.60374E-16	0.90

[a] RR = Reaction Rates in units of reactions per second per atom at at the NESTOR reactor maximum power (30 kW).

TAB. 5.3

Iron-88 - Summary of Experimental (E) and Calculated (C)
Rh-103(n,n')Rh-103m Reaction Rates along the Horizontal Z Axis.

Rh-103(n,n') Flat Weighting

Position	Shield Thickness	Exp.RR[a] as Measured	Total Error (1σ) [%]	Exp.RR[b] without Background (E)	BUGJEFF311 Calculated RR[a] (C)	C/E	BUGENDF70 Calculated RR[a] (C)	C/E	BUGLE-B7 Calculated RR[a] (C)	C/E	BUGLE-96 Calculated RR[a] (C)	C/E
A2	0.00	3.35e-16	5.1	3.28e-16	3.41199E-16	1.04	3.40121E-16	1.04	3.42534E-16	1.04	3.42557E-16	1.04
A3	5.10	1.42e-16	5.2	1.39e-16	1.51048E-16	1.09	1.50022E-16	1.08	1.50299E-16	1.08	1.50418E-16	1.08
A4	10.22	7.78e-17	5.1	7.62e-17	8.67446E-17	1.14	8.60041E-17	1.13	8.56448E-17	1.12	8.57925E-17	1.13
A5	15.34	4.70e-17	5.1	4.61e-17	5.27454E-17	1.15	5.23286E-17	1.14	5.16871E-17	1.12	5.18274E-17	1.13
A6	20.44	2.86e-17	5.2	2.80e-17	3.32293E-17	1.19	3.30412E-17	1.18	3.23181E-17	1.15	3.24350E-17	1.16
A7	25.64	1.82e-17	5.1	1.78e-17	2.12624E-17	1.19	2.12203E-17	1.19	2.05195E-17	1.15	2.06105E-17	1.16
A8	30.79	1.20e-17	5.1	1.18e-17	1.39110E-17	1.18	1.39499E-17	1.19	1.33213E-17	1.13	1.33898E-17	1.14
A9	35.99	7.97e-18	5.2	7.81e-18	9.19199E-18	1.18	9.27230E-18	1.19	8.73366E-18	1.12	8.78436E-18	1.12
A10	41.19	5.48e-18	5.2	5.37e-18	6.13836E-18	1.14	6.23477E-18	1.16	5.78692E-18	1.08	5.82415E-18	1.08
A11	46.44	3.84e-18	5.2	3.76e-18	4.11695E-18	1.09	4.21457E-18	1.12	3.85083E-18	1.02	3.87805E-18	1.03
A12	51.62	2.68e-18	5.1	2.63e-18	2.79268E-18	1.06	2.88333E-18	1.10	2.59190E-18	0.99	2.61189E-18	0.99
A13	56.69	1.89e-18	5.2	1.85e-18	1.91887E-18	1.04	1.99902E-18	1.08	1.76728E-18	0.95	1.78207E-18	0.96
A14	61.81	1.34e-18	5.1	1.31e-18	1.31927E-18	1.00	1.38764E-18	1.06	1.20547E-18	0.92	1.21640E-18	0.93
A15	66.99	-	-	-	-	-	-	-	-	-	-	-

Rh-103(n,n') 1/4 T PV Weighting

A2	0.00	3.35e-16	5.1	3.28e-16	3.39769E-16	1.03	3.38420E-16	1.03	3.40789E-16	1.04	3.40801E-16	1.04
A3	5.10	1.42e-16	5.2	1.39e-16	1.50094E-16	1.08	1.48832E-16	1.07	1.49080E-16	1.07	1.49189E-16	1.07
A4	10.22	7.78e-17	5.1	7.62e-17	8.60847E-17	1.13	8.51696E-17	1.12	8.47952E-17	1.11	8.49348E-17	1.11
A5	15.34	4.70e-17	5.1	4.61e-17	5.22917E-17	1.14	5.17516E-17	1.12	5.11048E-17	1.11	5.12387E-17	1.11
A6	20.44	2.86e-17	5.2	2.80e-17	3.29190E-17	1.17	3.26458E-17	1.16	3.19235E-17	1.14	3.20352E-17	1.14
A7	25.64	1.82e-17	5.1	1.78e-17	2.10526E-17	1.18	2.09532E-17	1.17	2.02561E-17	1.14	2.03431E-17	1.14
A8	30.79	1.20e-17	5.1	1.18e-17	1.37688E-17	1.17	1.37695E-17	1.17	1.31456E-17	1.12	1.32111E-17	1.12
A9	35.99	7.97e-18	5.2	7.81e-18	9.09603E-18	1.16	9.15107E-18	1.17	8.61715E-18	1.10	8.66558E-18	1.11
A10	41.19	5.48e-18	5.2	5.37e-18	6.07355E-18	1.13	6.15330E-18	1.15	5.70966E-18	1.06	5.74520E-18	1.07
A11	46.44	3.84e-18	5.2	3.76e-18	4.07328E-18	1.08	4.15995E-18	1.11	3.79972E-18	1.01	3.82570E-18	1.02
A12	51.62	2.68e-18	5.1	2.63e-18	2.76304E-18	1.05	2.84644E-18	1.08	2.55785E-18	0.97	2.57692E-18	0.98
A13	56.69	1.89e-18	5.2	1.85e-18	1.89855E-18	1.03	1.97383E-18	1.07	1.74432E-18	0.94	1.75843E-18	0.95
A14	61.81	1.34e-18	5.1	1.31e-18	1.30534E-18	0.99	1.37043E-18	1.04	1.19000E-18	0.91	1.20043E-18	0.91
A15	66.99	-	-	-	-	-	-	-	-	-	-	-

[a] RR = Reaction Rates in units of reactions per second per atom at at the NESTOR reactor maximum power (30 kW).
[b] RR Background are the experimental reaction rates reduced by 2% to eliminate the NESTOR reactor background component. These data are used to obtain the C/E ratios.

TAB. 5.4

Iron-88 - Summary of Experimental (E) and Calculated (C)

In-115(n,n')In-115m Reaction Rates along the Horizontal Z Axis.

In-115(n,n') Flat Weighting

Position	Shield Thickness	Exp.RR[a] as Measured	Total Error (1σ) [%]	Exp.RR[b] without Background (E)	BUGJEFF311 Calculated RR[a] (C)	C/E	BUGENDF70 Calculated RR[a] (C)	C/E	BUGLE-B7 Calculated RR[a] (C)	C/E	BUGLE-96 Calculated RR[a] (C)	C/E
A2	0.00	7.02e-17	4.5	6.88e-17	7.14086E-17	1.04	7.11809E-17	1.03	7.17280E-17	1.04	7.16735E-17	1.04
A3	5.10	2.40e-17	4.5	2.35e-17	2.29334E-17	0.98	2.27177E-17	0.97	2.27744E-17	0.97	2.27955E-17	0.97
A4	10.22	1.06e-17	4.5	1.04e-17	1.02797E-17	0.99	1.01557E-17	0.98	1.01212E-17	0.97	1.01480E-17	0.98
A5	15.34	5.14e-18	4.5	5.04e-18	4.89867E-18	0.97	4.84374E-18	0.96	4.78923E-18	0.95	4.81096E-18	0.96
A6	20.44	2.53e-18	4.5	2.48e-18	2.43093E-18	0.98	2.41141E-18	0.97	2.36091E-18	0.95	2.37602E-18	0.96
A7	25.64	1.32e-18	4.5	1.29e-18	1.22860E-18	0.95	1.22493E-18	0.95	1.18483E-18	0.92	1.19449E-18	0.92
A8	30.79	7.21e-19	4.5	7.07e-19	6.43030E-19	0.91	6.45063E-19	0.91	6.15302E-19	0.87	6.21232E-19	0.88
A9	35.99	3.93e-19	4.6	3.85e-19	3.43868E-19	0.89	3.47412E-19	0.90	3.26133E-19	0.85	3.29666E-19	0.86
A10	41.19	2.21e-19	4.6	2.17e-19	1.88646E-19	0.87	1.92081E-19	0.89	1.77159E-19	0.82	1.79232E-19	0.83
A11	46.44	1.28e-19	4.7	1.25e-19	1.05389E-19	0.84	1.08237E-19	0.86	9.79179E-20	0.78	9.91212E-20	0.79
A12	51.62	-	-	-	-	-	-	-	-	-	-	-
A13	56.69	-	-	-	-	-	-	-	-	-	-	-
A14	61.81	-	-	-	-	-	-	-	-	-	-	-
A15	66.99	-	-	-	-	-	-	-	-	-	-	-

In-115(n,n') 1/4 T PV Weighting

A2	0.00	7.02e-17	4.5	6.88e-17	7.10287E-17	1.03	7.07819E-17	1.03	7.13233E-17	1.04	7.12678E-17	1.04
A3	5.10	2.40e-17	4.5	2.35e-17	2.27344E-17	0.97	2.25031E-17	0.96	2.25579E-17	0.96	2.25781E-17	0.96
A4	10.22	1.06e-17	4.5	1.04e-17	1.01674E-17	0.98	1.00329E-17	0.97	9.99830E-18	0.96	1.00244E-17	0.96
A5	15.34	5.14e-18	4.5	5.04e-18	4.83468E-18	0.96	4.77272E-18	0.95	4.71885E-18	0.94	4.74014E-18	0.94
A6	20.44	2.53e-18	4.5	2.48e-18	2.39414E-18	0.97	2.36994E-18	0.96	2.32034E-18	0.94	2.33515E-18	0.94
A7	25.64	1.32e-18	4.5	1.29e-18	1.20749E-18	0.93	1.20074E-18	0.93	1.16152E-18	0.90	1.17099E-18	0.91
A8	30.79	7.21e-19	4.5	7.07e-19	6.30750E-19	0.89	6.30740E-19	0.89	6.01738E-19	0.85	6.07546E-19	0.86
A9	35.99	3.93e-19	4.6	3.85e-19	3.36688E-19	0.87	3.38886E-19	0.88	3.18212E-19	0.83	3.21668E-19	0.84
A10	41.19	2.21e-19	4.6	2.17e-19	1.84406E-19	0.85	1.86953E-19	0.86	1.72493E-19	0.80	1.74518E-19	0.81
A11	46.44	1.28e-19	4.7	1.25e-19	1.02874E-19	0.82	1.05137E-19	0.84	9.51592E-20	0.76	9.63328E-20	0.77
A12	51.62	-	-	-	-	-	-	-	-	-	-	-
A13	56.69	-	-	-	-	-	-	-	-	-	-	-
A14	61.81	-	-	-	-	-	-	-	-	-	-	-
A15	66.99	-	-	-	-	-	-	-	-	-	-	-

[a] RR = Reaction Rates in units of reactions per second per atom at at the NESTOR reactor maximum power (30 kW).

[b] RR Background are the experimental reaction rates reduced by 2% to eliminate the NESTOR reactor background component. These data are used to obtain the C/E ratios.

TAB. 5.5

Iron-88 - Summary of Experimental (E) and Calculated (C)
S-32(n,p)P-32 Reaction Rates along the Horizontal Z Axis.

S-32(n,p) Flat Weighting

Position	Shield Thickness	Exp.RR[a] as Measured	Total Error (1σ) [%]	Exp.RR[b] without Background (E)	BUGJEFF311 Calculated RR[a] (C)	C/E	BUGENDF70 Calculated RR[a] (C)	C/E	BUGLE-B7 Calculated RR[a] (C)	C/E	BUGLE-96 Calculated RR[a] (C)	C/E
A2	0.00	2.02e-17	6.5	1.98e-17	1.83350E-17	0.93	1.82973E-17	0.92	1.84237E-17	0.93	1.84186E-17	0.93
A3	5.10	4.29e-18	6.5	4.20e-18	3.76077E-18	0.89	3.67727E-18	0.87	3.69631E-18	0.88	3.69912E-18	0.88
A4	10.22	1.40e-18	6.5	1.37e-18	1.27846E-18	0.93	1.23186E-18	0.90	1.23614E-18	0.90	1.23850E-18	0.90
A5	15.34	5.12e-19	6.5	5.02e-19	4.65139E-19	0.93	4.42910E-19	0.88	4.43594E-19	0.88	4.45024E-19	0.89
A6	20.44	1.91e-19	6.5	1.87e-19	1.75044E-19	0.94	1.65044E-19	0.88	1.64948E-19	0.88	1.65719E-19	0.89
A7	25.64	7.13e-20	6.5	6.99e-20	6.55015E-20	0.94	6.12290E-20	0.88	6.10476E-20	0.87	6.14303E-20	0.88
A8	30.79	2.70e-20	6.6	2.65e-20	2.48524E-20	0.94	2.30572E-20	0.87	2.29310E-20	0.87	2.31127E-20	0.87
A9	35.99	1.03e-20	6.5	1.01e-20	9.37129E-21	0.93	8.63734E-21	0.86	8.56661E-21	0.85	8.64947E-21	0.86
A10	41.19	3.93e-21	6.5	3.85e-21	3.53114E-21	0.92	3.23569E-21	0.84	3.19991E-21	0.83	3.23661E-21	0.84
A11	46.44	1.49e-21	6.5	1.46e-21	1.32094E-21	0.90	1.20458E-21	0.82	1.18752E-21	0.81	1.20337E-21	0.82
A12	51.62	5.73e-22	6.5	5.62e-22	5.01227E-22	0.89	4.55356E-22	0.81	4.47406E-22	0.80	4.54241E-22	0.81
A13	56.69	2.27e-22	6.9	2.22e-22	1.94253E-22	0.87	1.76006E-22	0.79	1.72320E-22	0.77	1.75289E-22	0.79
A14	61.81	8.53e-23	8.6	8.36e-23	7.47202E-23	0.89	6.75995E-23	0.81	6.59252E-23	0.79	6.71957E-23	0.80
A15	66.99	3.50e-23	21.	3.43e-23	2.84783E-23	0.83	2.57586E-23	0.75	2.50109E-23	0.73	2.55468E-23	0.74

S-32(n,p) 1/4 T PV Weighting

A2	0.00	2.02e-17	6.5	1.98e-17	1.81803E-17	0.92	1.81319E-17	0.92	1.82568E-17	0.92	1.82577E-17	0.92
A3	5.10	4.29e-18	6.5	4.20e-18	3.72754E-18	0.89	3.64344E-18	0.87	3.66230E-18	0.87	3.66602E-18	0.87
A4	10.22	1.40e-18	6.5	1.37e-18	1.26678E-18	0.92	1.22033E-18	0.89	1.22458E-18	0.89	1.22720E-18	0.89
A5	15.34	5.12e-19	6.5	5.02e-19	4.60752E-19	0.92	4.38679E-19	0.87	4.39369E-19	0.88	4.40875E-19	0.88
A6	20.44	1.91e-19	6.5	1.87e-19	1.73340E-19	0.93	1.63430E-19	0.87	1.63342E-19	0.87	1.64136E-19	0.88
A7	25.64	7.13e-20	6.5	6.99e-20	6.48429E-20	0.93	6.06133E-20	0.87	6.04378E-20	0.86	6.08268E-20	0.87
A8	30.79	2.70e-20	6.6	2.65e-20	2.45938E-20	0.93	2.28179E-20	0.86	2.26951E-20	0.86	2.28783E-20	0.86
A9	35.99	1.03e-20	6.5	1.01e-20	9.27021E-21	0.92	8.54436E-21	0.85	8.47551E-21	0.84	8.55853E-21	0.85
A10	41.19	3.93e-21	6.5	3.85e-21	3.49153E-21	0.91	3.19937E-21	0.83	3.16457E-21	0.82	3.20116E-21	0.83
A11	46.44	1.49e-21	6.5	1.46e-21	1.30549E-21	0.89	1.19040E-21	0.82	1.17382E-21	0.80	1.18957E-21	0.81
A12	51.62	5.73e-22	6.5	5.62e-22	4.95091E-22	0.88	4.49706E-22	0.80	4.41993E-22	0.79	4.48761E-22	0.80
A13	56.69	2.27e-22	6.9	2.22e-22	1.91757E-22	0.86	1.73692E-22	0.78	1.70124E-22	0.76	1.73054E-22	0.78
A14	61.81	8.53e-23	8.6	8.36e-23	7.37082E-23	0.88	6.66514E-23	0.80	6.50345E-23	0.78	6.62849E-23	0.79
A15	66.99	3.50e-23	21.	3.43e-23	2.80691E-23	0.82	2.53701E-23	0.74	2.46502E-23	0.72	2.51759E-23	0.73

[a] RR = Reaction Rates in units of reactions per second per atom at at the NESTOR reactor maximum power (30 kW).
[b] RR Background are the experimental reaction rates reduced by 2% to eliminate the NESTOR reactor background component. These data are used to obtain the C/E ratios.

TAB. 5.6

Iron-88 - Summary of Experimental (E) and Calculated (C)
Al-27(n,α)Na-24 Reaction Rates along the Horizontal Z Axis.

Al-27(n,α) Flat Weighting

Position	Shield Thickness	Exp.RR[a] as Measured	Total Error (1σ) [%]	Exp.RR[b] without Background (E)	BUGJEFF311 Calculated RR[a] (C)	C/E	BUGENDF70 Calculated RR[a] (C)	C/E	BUGLE-B7 Calculated RR[a] (C)	C/E	BUGLE-96 Calculated RR[a] (C)	C/E
A2	0.00	-	-	-	-	-	-	-	-	-	-	-
A3	5.10	2.23e-20	4.7	2.19e-20	2.88764E-20	1.32	2.90774E-20	1.33	2.92646E-20	1.34	2.92791E-20	1.34
A4	10.22	-	-	-	-	-	-	-	-	-	-	-
A5	15.34	2.55e-21	4.7	2.50e-21	3.27462E-21	1.31	3.33560E-21	1.33	3.35805E-21	1.34	3.35944E-21	1.34
A6	20.44	9.56e-22	4.7	9.37e-22	1.24020E-21	1.32	1.26953E-21	1.36	1.27832E-21	1.36	1.27875E-21	1.36
A7	25.64	3.56e-22	4.7	3.49e-22	4.75763E-22	1.36	4.88797E-22	1.40	4.92297E-22	1.41	4.92409E-22	1.41
A8	30.79	-	-	-	-	-	-	-	-	-	-	-
A9	35.99	-	-	-	-	-	-	-	-	-	-	-
A10	41.19	-	-	-	-	-	-	-	-	-	-	-
A11	46.44	-	-	-	-	-	-	-	-	-	-	-
A12	51.62	-	-	-	-	-	-	-	-	-	-	-
A13	56.69	-	-	-	-	-	-	-	-	-	-	-
A14	61.81	-	-	-	-	-	-	-	-	-	-	-
A15	66.99	-	-	-	-	-	-	-	-	-	-	-

Al-27(n,α) 1/4 T PV Weighting

A2	0.00	-	-	-	-	-	-	-	-	-	-	-
A3	5.10	2.23e-20	4.7	2.19e-20	2.71286E-20	1.24	2.72480E-20	1.25	2.74256E-20	1.25	2.74531E-20	1.26
A4	10.22	-	-	-	-	-	-	-	-	-	-	-
A5	15.34	2.55e-21	4.7	2.50e-21	3.08380E-21	1.23	3.13304E-21	1.25	3.15439E-21	1.26	3.15751E-21	1.26
A6	20.44	9.56e-22	4.7	9.37e-22	1.16965E-21	1.25	1.19420E-21	1.27	1.20257E-21	1.28	1.20371E-21	1.28
A7	25.64	3.56e-22	4.7	3.49e-22	4.49460E-22	1.29	4.60584E-22	1.32	4.63919E-22	1.33	4.64320E-22	1.33
A8	30.79	-	-	-	-	-	-	-	-	-	-	-
A9	35.99	-	-	-	-	-	-	-	-	-	-	-
A10	41.19	-	-	-	-	-	-	-	-	-	-	-
A11	46.44	-	-	-	-	-	-	-	-	-	-	-
A12	51.62	-	-	-	-	-	-	-	-	-	-	-
A13	56.69	-	-	-	-	-	-	-	-	-	-	-
A14	61.81	-	-	-	-	-	-	-	-	-	-	-
A15	66.99	-	-	-	-	-	-	-	-	-	-	-

[a] RR = Reaction Rates in units of reactions per second per atom at the NESTOR reactor maximum power (30 kW).
[b] RR Background are the experimental reaction rates reduced by 2% to eliminate the NESTOR reactor background component. These data are used to obtain the C/E ratios.

FIG. 5.1

Iron-88 - Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with 1/4 T PV Weighting Dosimeter Cross Sections.

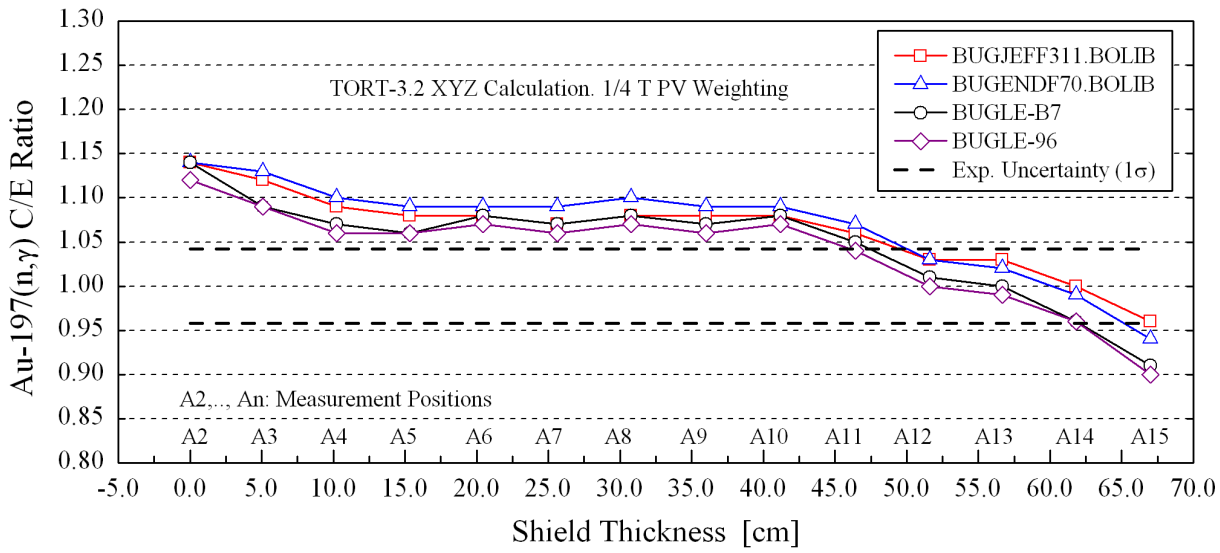


FIG. 5.2

Iron-88 - Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with Flat Weighting Dosimeter Cross Sections.

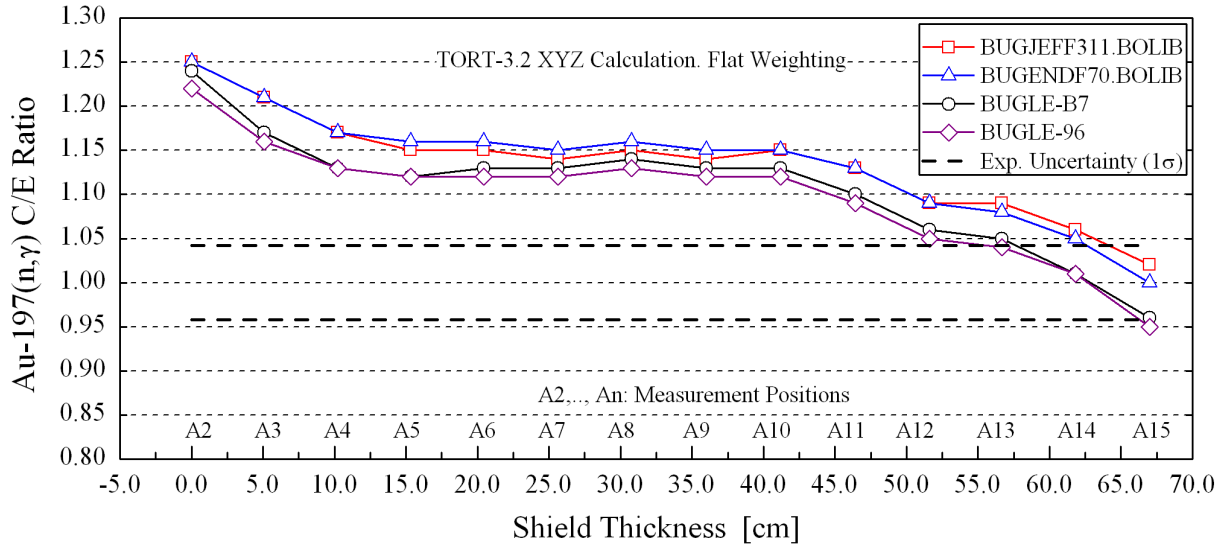


FIG. 5.3

Iron-88 - Rh-103(n,n')Rh-103m Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with 1/4 T PV Weighting Dosimeter Cross Sections.

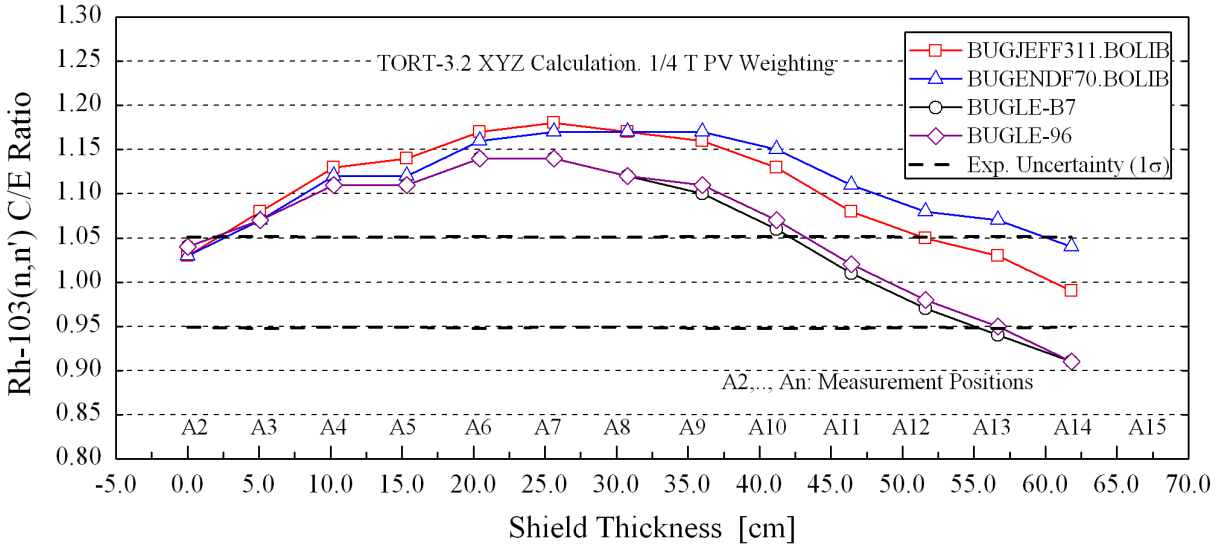


FIG. 5.4

Iron-88 - Rh-103(n,n')Rh-103m Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with Flat Weighting Dosimeter Cross Sections.

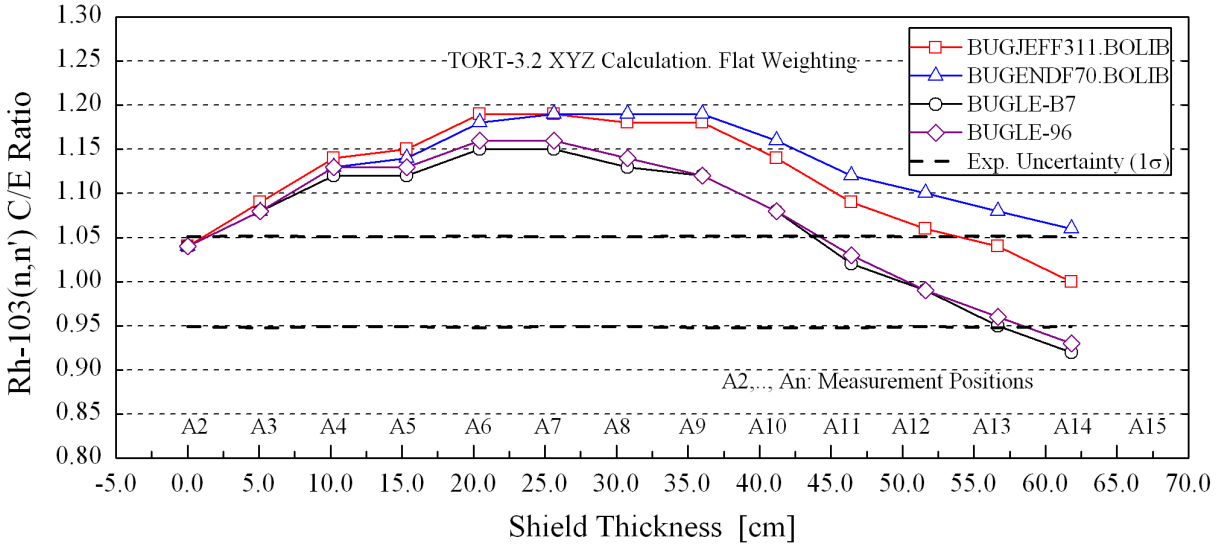


FIG. 5.5

Iron-88 - In-115(n,n')In-115m Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with 1/4 T PV Weighting Dosimeter Cross Sections.

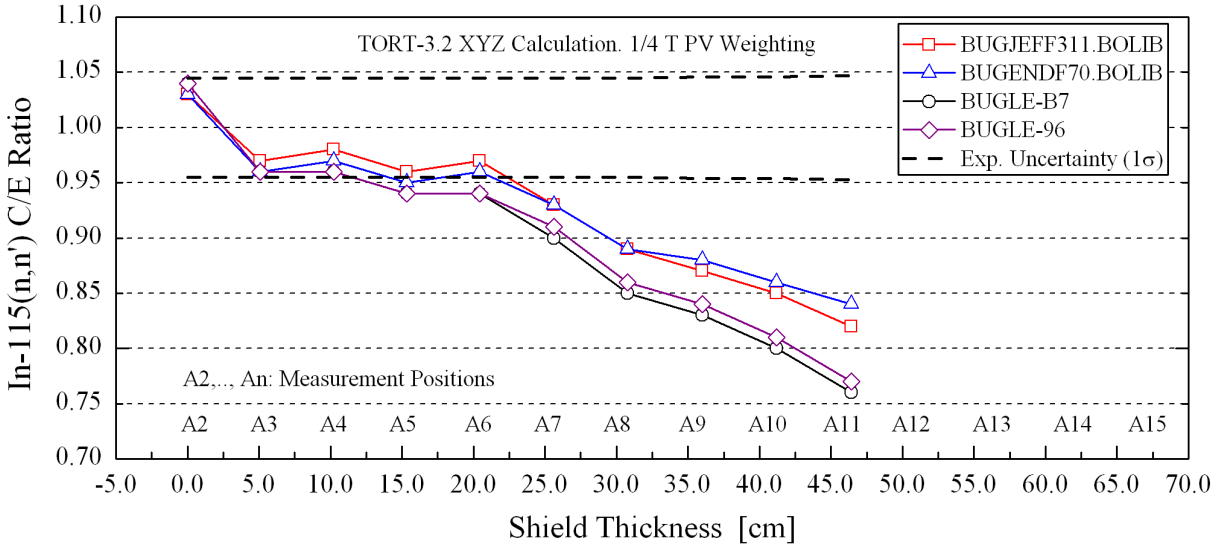


FIG. 5.6

Iron-88 - In-115(n,n')In-115m Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with Flat Weighting Dosimeter Cross Sections.

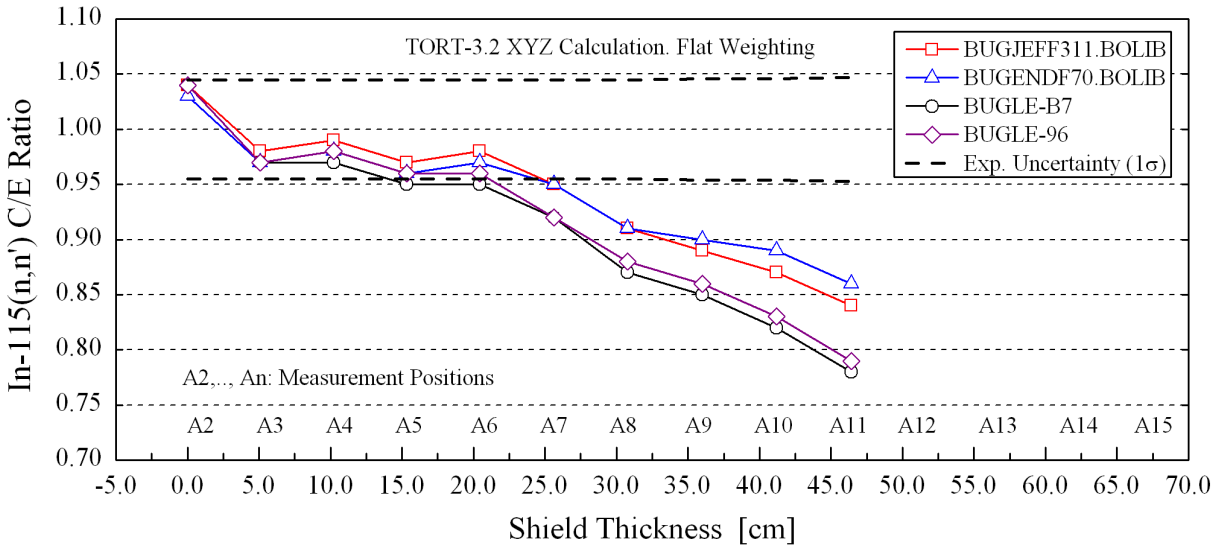


FIG. 5.7

Iron-88 - S-32(n,p)P-32 Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with 1/4 T PV Weighting Dosimeter Cross Sections.

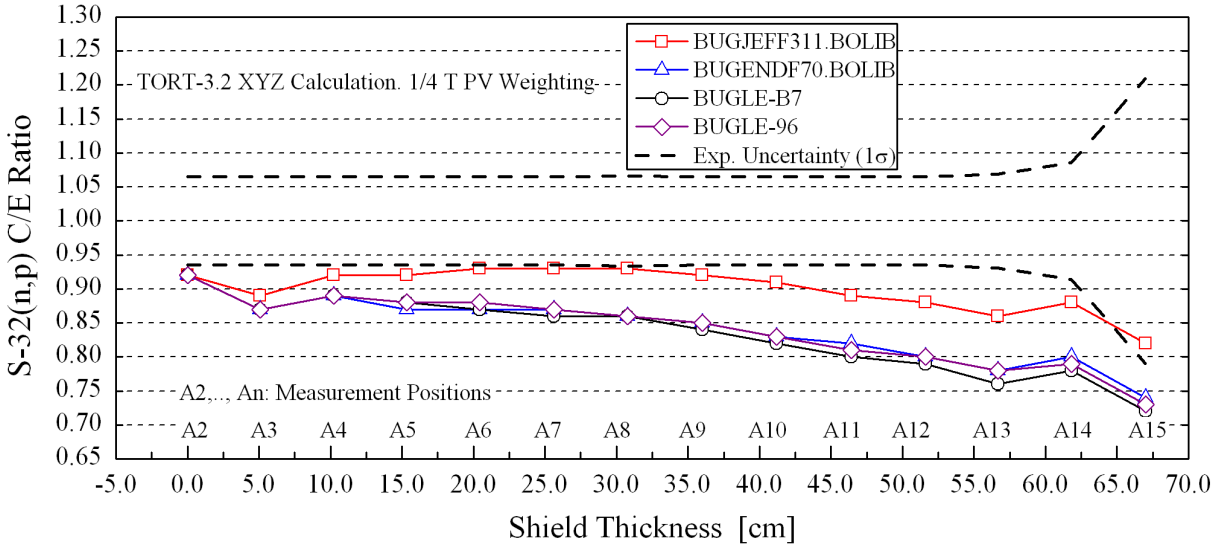


FIG. 5.8

Iron-88 - S-32(n,p)P-32 Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with Flat Weighting Dosimeter Cross Sections.

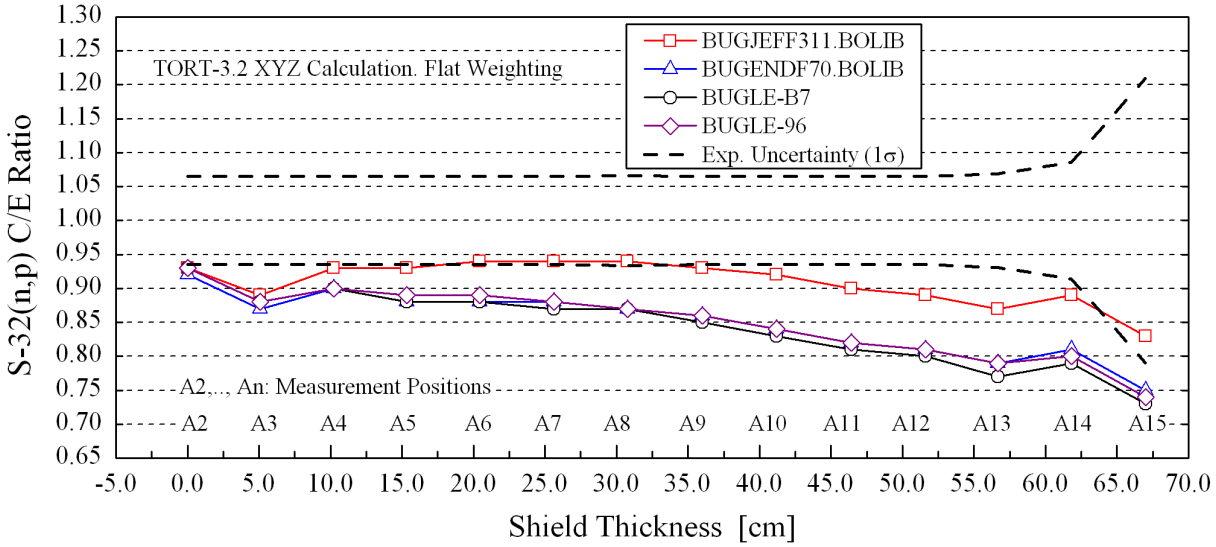


FIG. 5.9

Iron-88 - Al-27(n,α)Na-24 Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with 1/4 T PV Weighting Dosimeter Cross Sections.

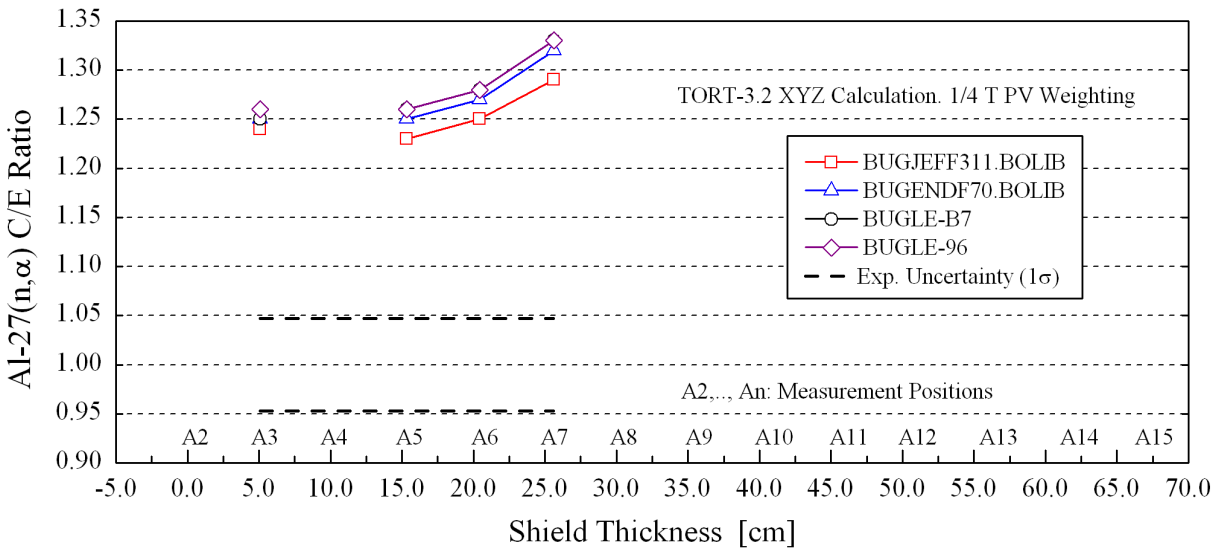


FIG. 5.10

Iron-88 - Al-27(n,α)Na-24 Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB, BUGENDF70.BOLIB, BUGLE-B7 and BUGLE-96 Libraries with Flat Weighting Dosimeter Cross Sections.

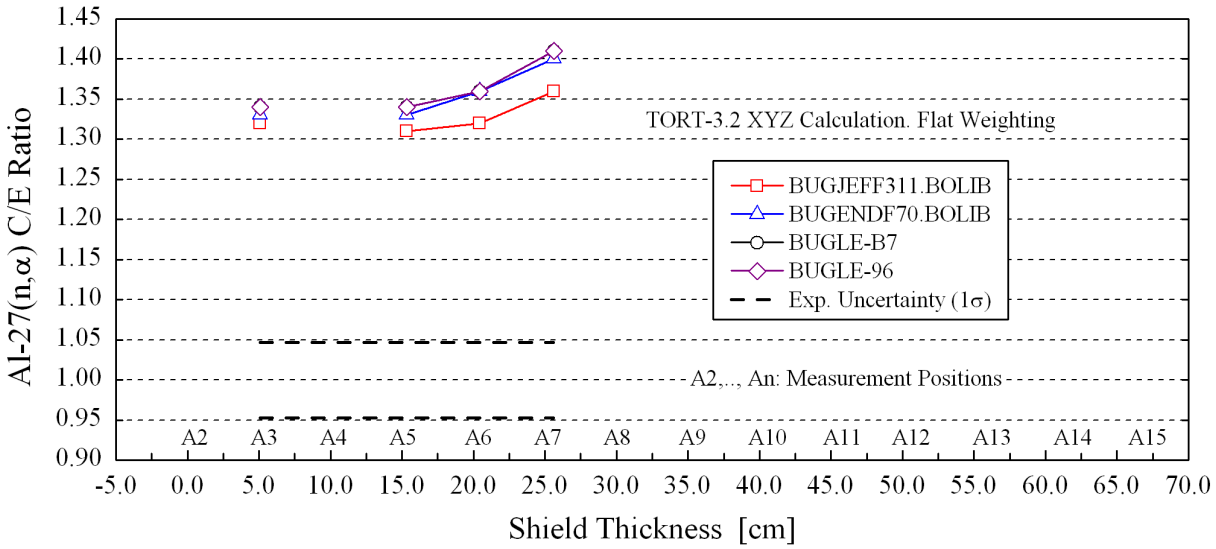


FIG. 5.11

Iron-88 - Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGJEFF311.BOLIB Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

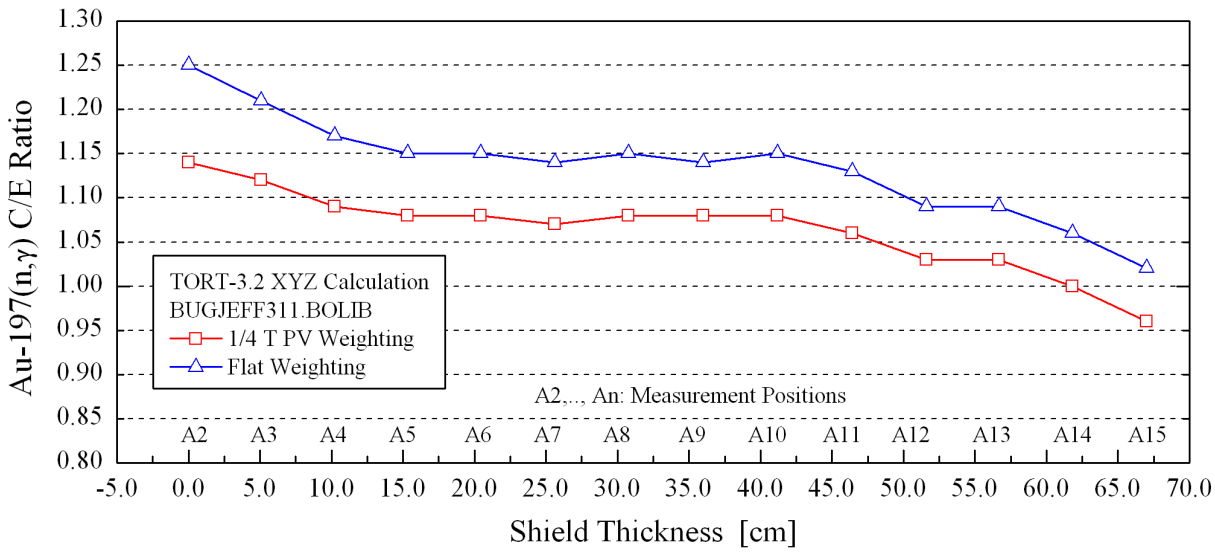


FIG. 5.12

Iron-88 - Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGENDF70.BOLIB Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

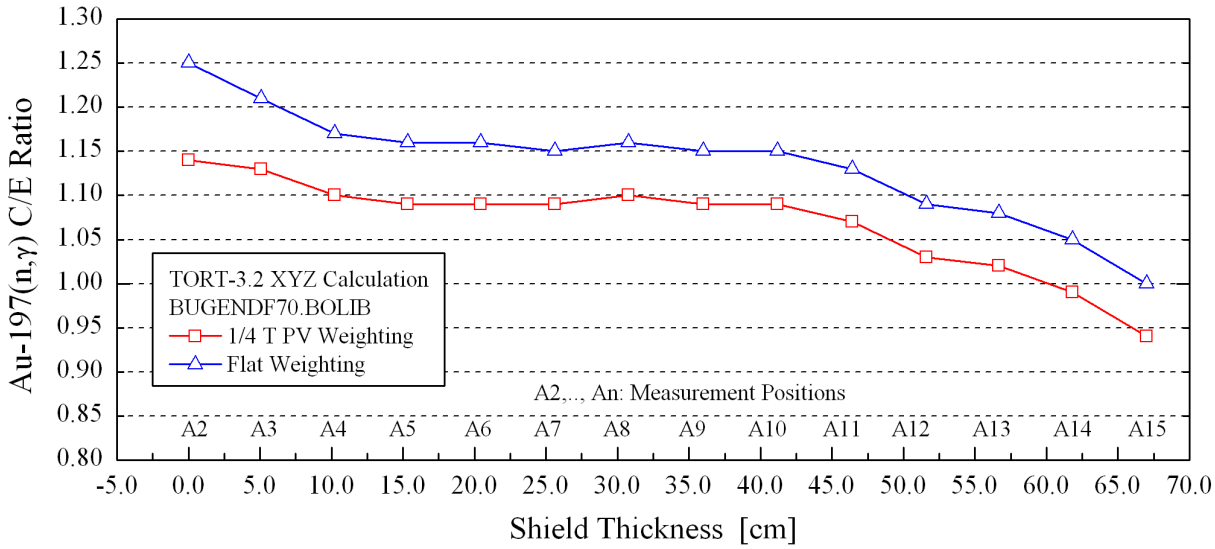


FIG. 5.13

Iron-88 - Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-B7 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

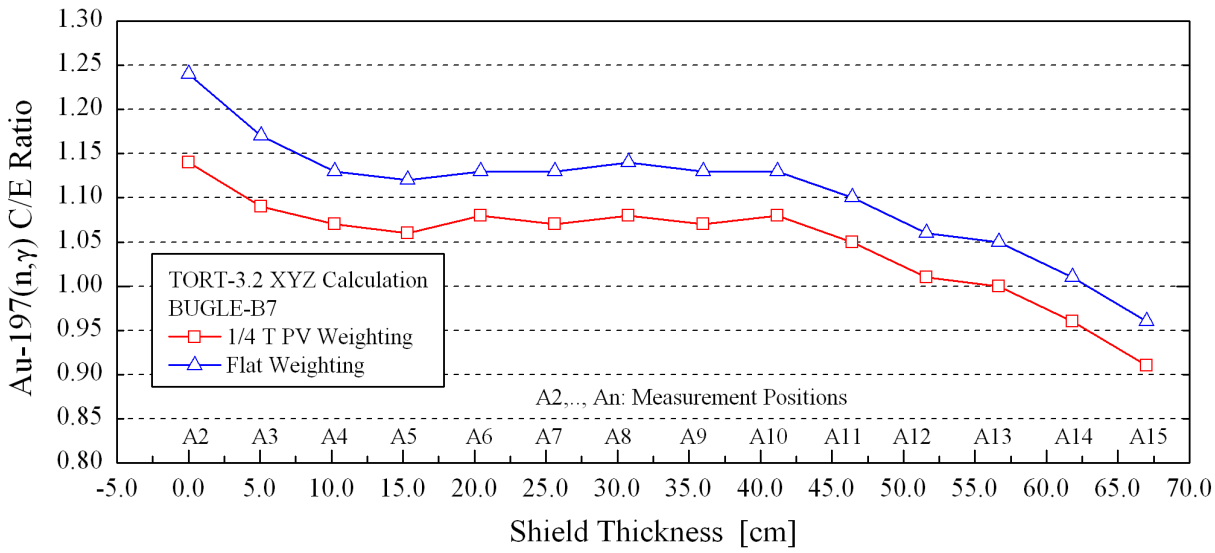


FIG. 5.14

Iron-88 - Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-96 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

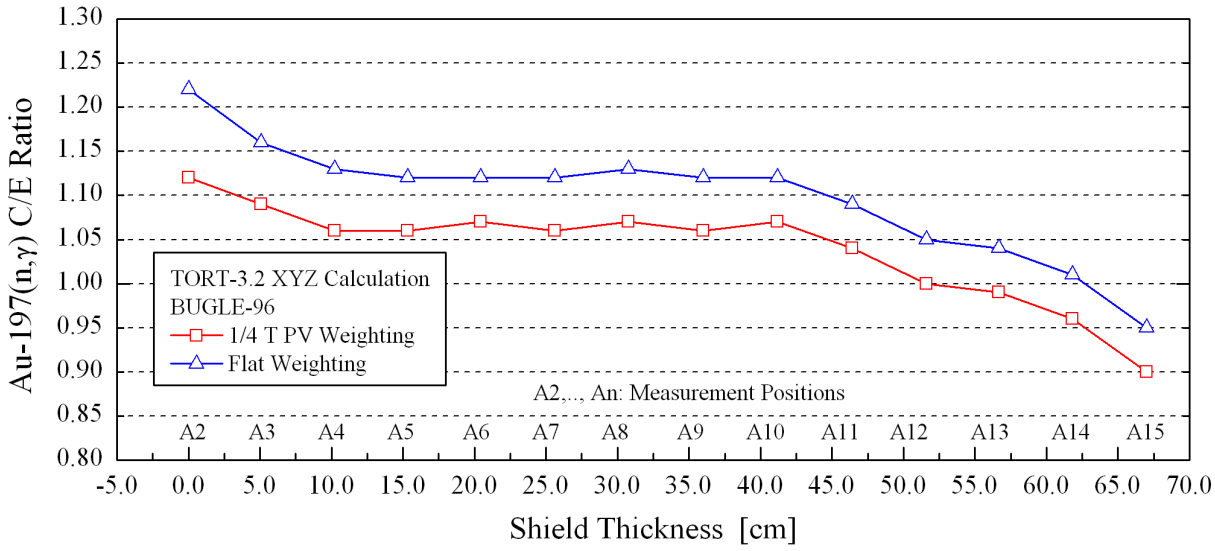


FIG. 5.15

Iron-88 - Rh-103(n,n')Rh-103m Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB Library and Dosimeter Cross Sections with Flat Weighting and 1/4 T PV Weighting.

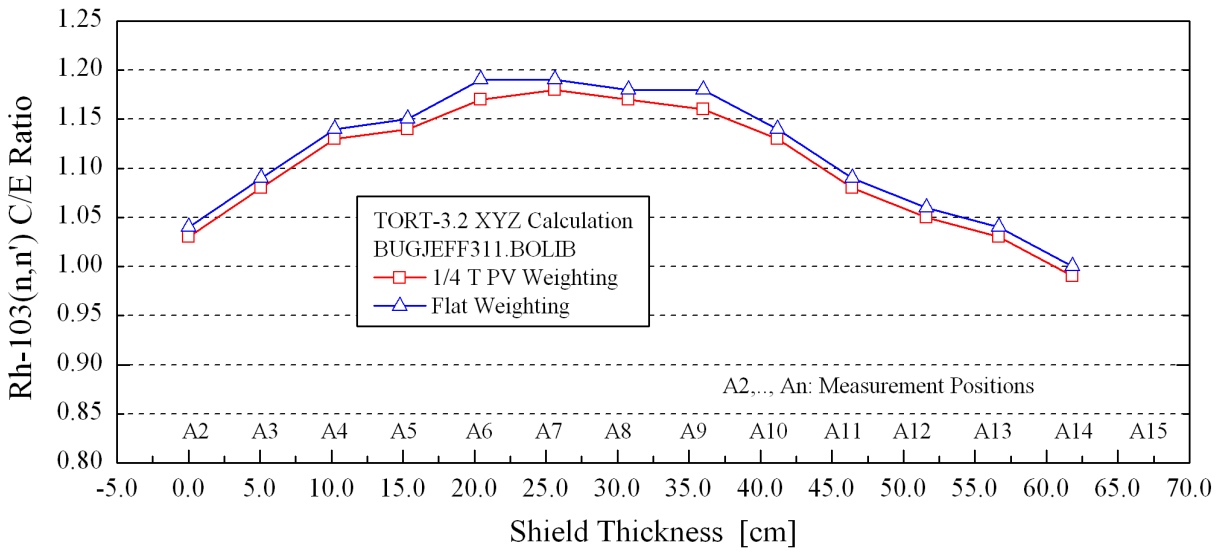


FIG. 5.16

Iron-88 - Rh-103(n,n')Rh-103m Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGENDF70.BOLIB Library and Dosimeter Cross Sections with Flat Weighting and 1/4 T PV Weighting.

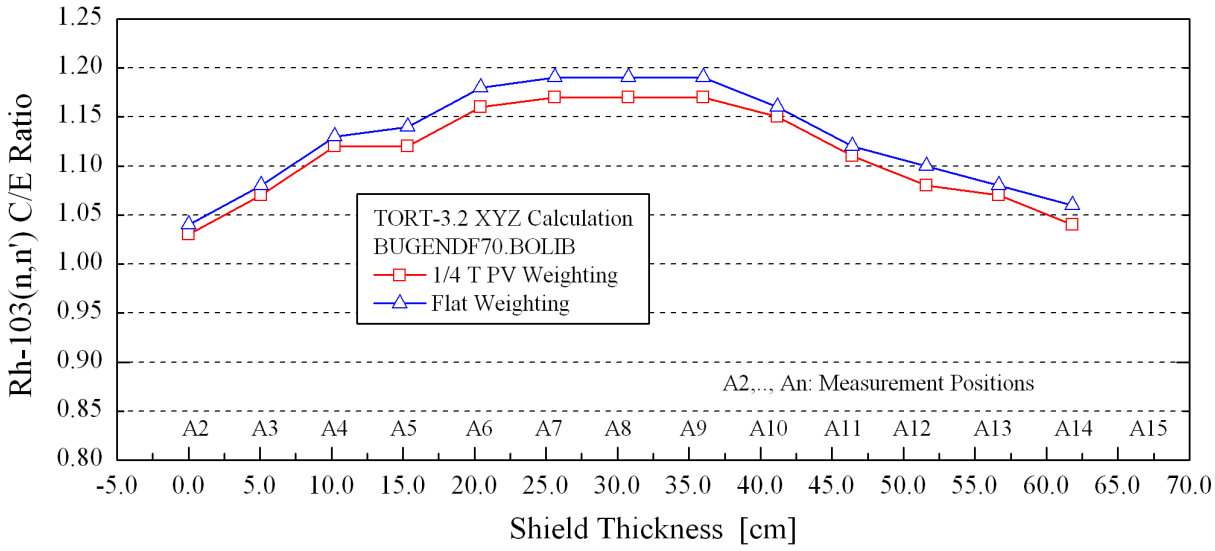


FIG. 5.17

Iron-88 - Rh-103(n,n')Rh-103m Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-B7 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

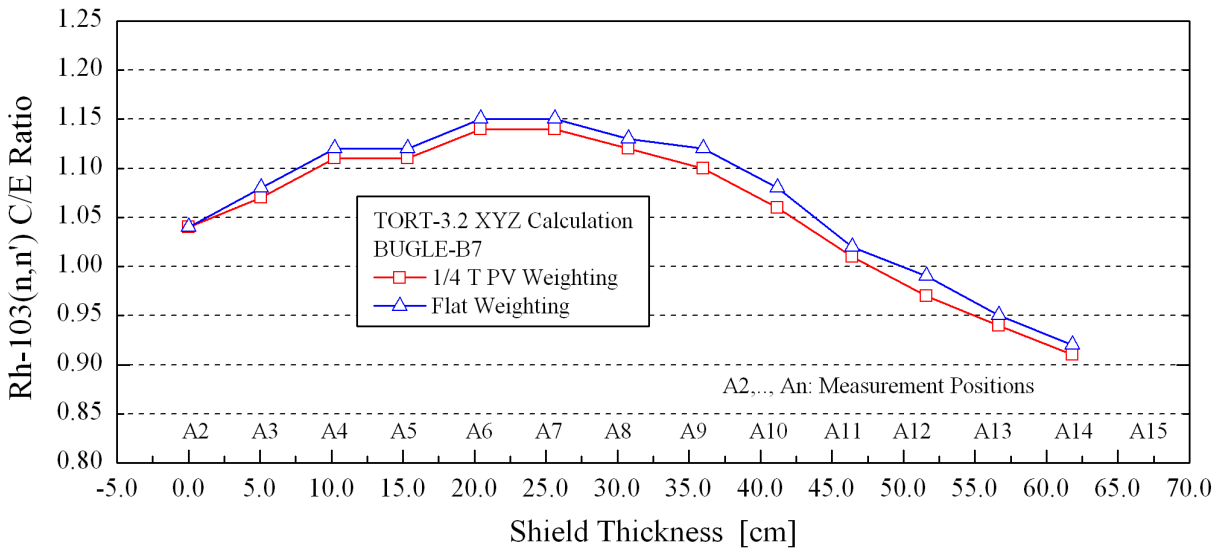


FIG. 5.18

Iron-88 - Rh-103(n,n')Rh-103m Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-96 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

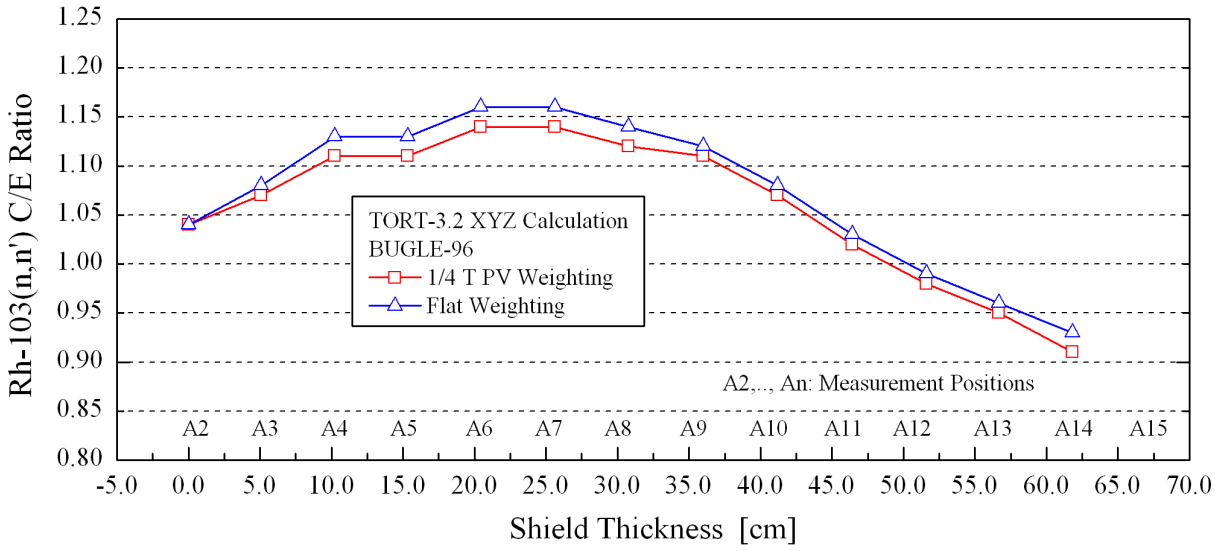


FIG. 5.19

Iron-88 - In-115(n,n')In-115m Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGJEFF311.BOLIB Library and Dosimeter Cross Sections with Flat Weighting and 1/4 T PV Weighting.

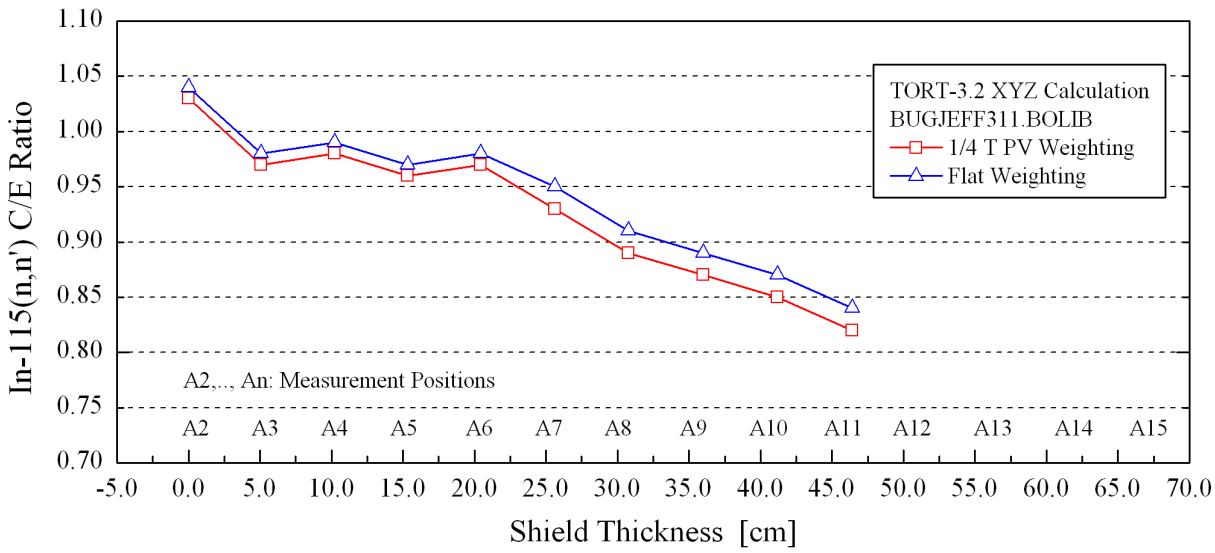


FIG.5.20

Iron-88 - In-115(n,n')In-115m Reaction Rate Ratios (Calculated/Experimental) Calculated Using the BUGENDF70.BOLIB Library and Dosimeter Cross Sections with Flat Weighting and 1/4 T PV Weighting.

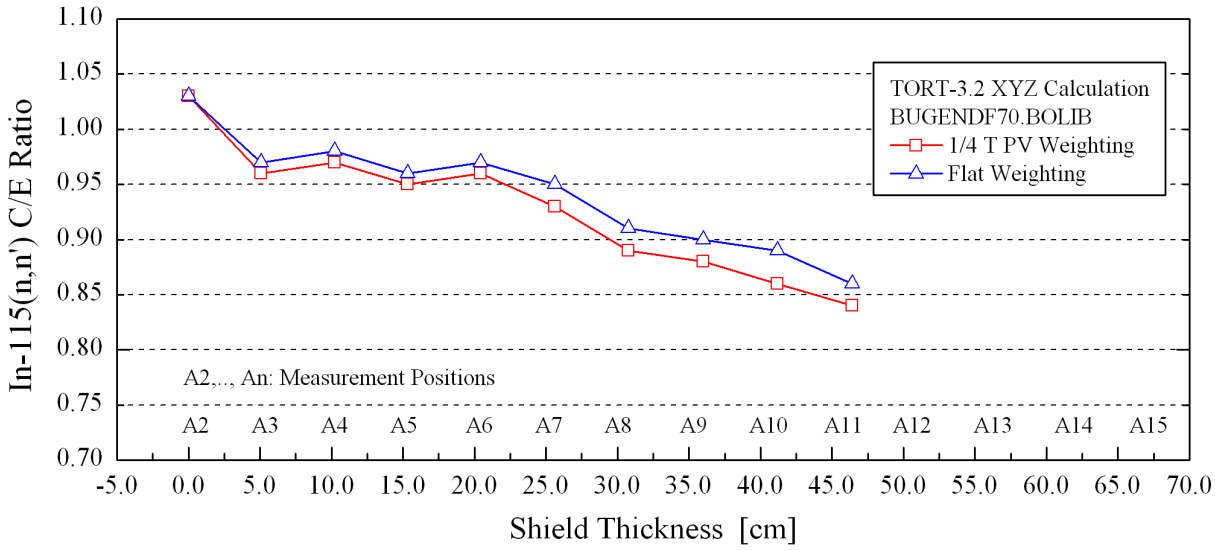


FIG. 5.21

Iron-88 - In-115(n,n')In-115m Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-B7 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

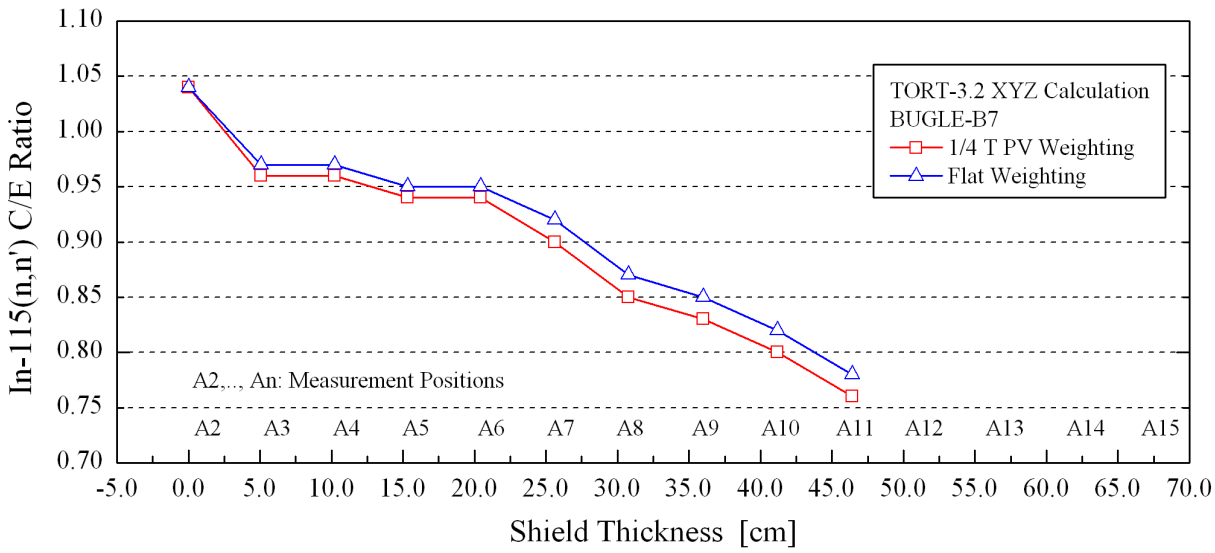


FIG. 5.22

Iron-88 - In-115(n,n')In-115m Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-96 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

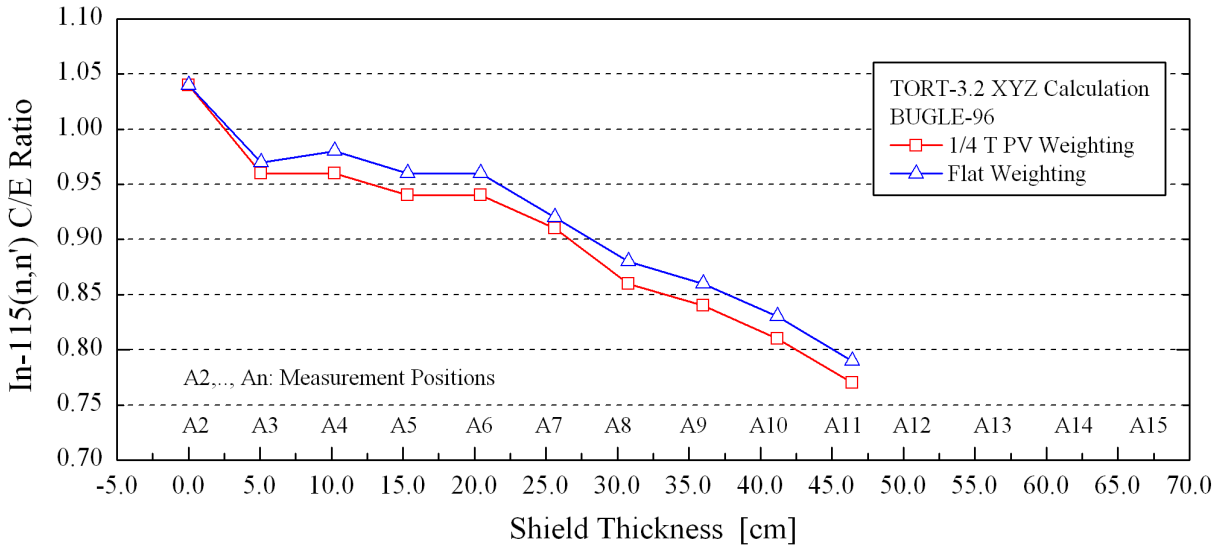


FIG. 5.23

Iron-88 - S-32(n,p)P-32 Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGJEFF311.BOLIB Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

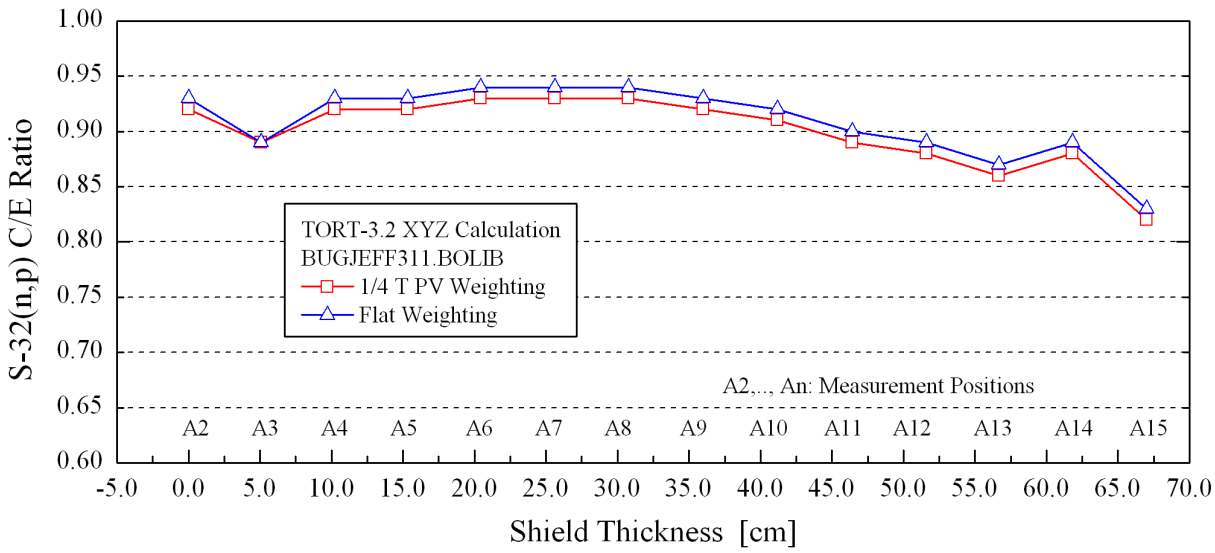


FIG. 5.24

Iron-88 - S-32(n,p)P-32 Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGENDF70.BOLIB Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

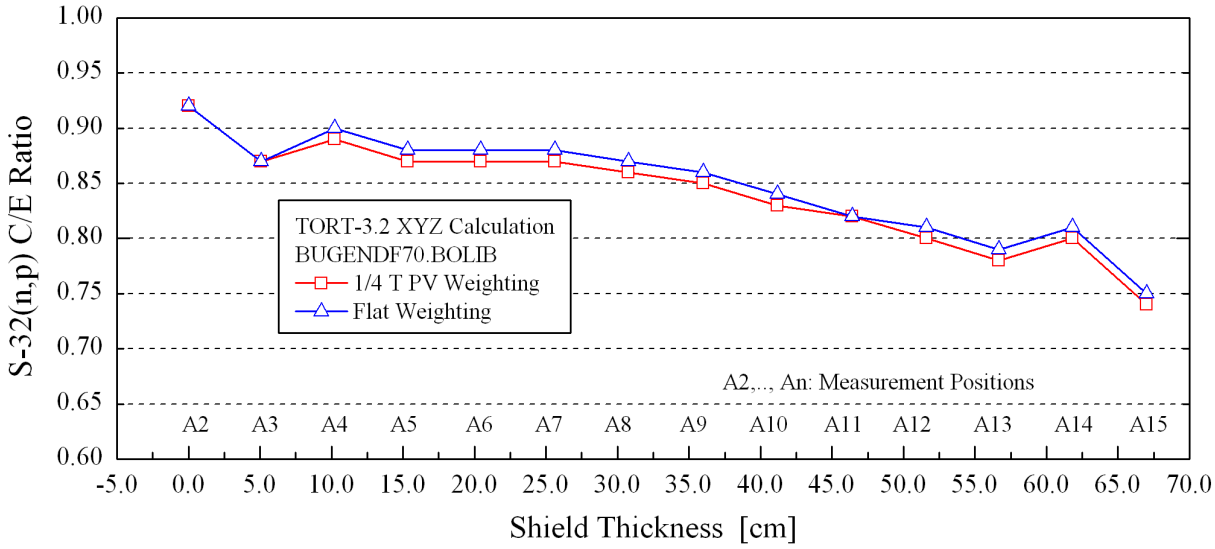


FIG. 5.25

Iron-88 - S-32(n,p)P-32 Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-B7 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

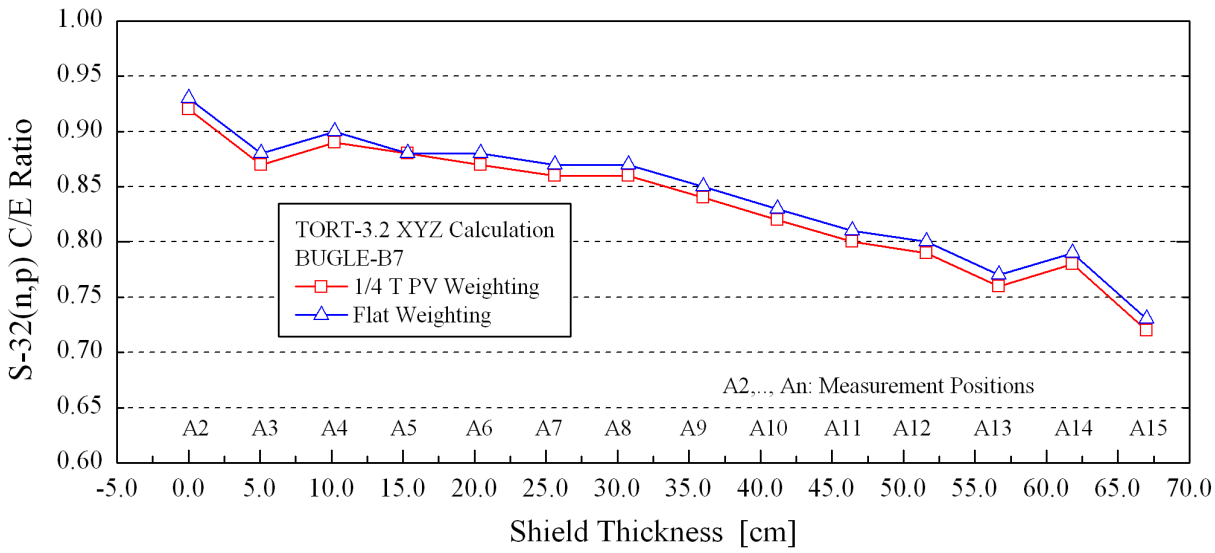


FIG. 5.26

Iron-88 - S-32(n,p)P-32 Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-96 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

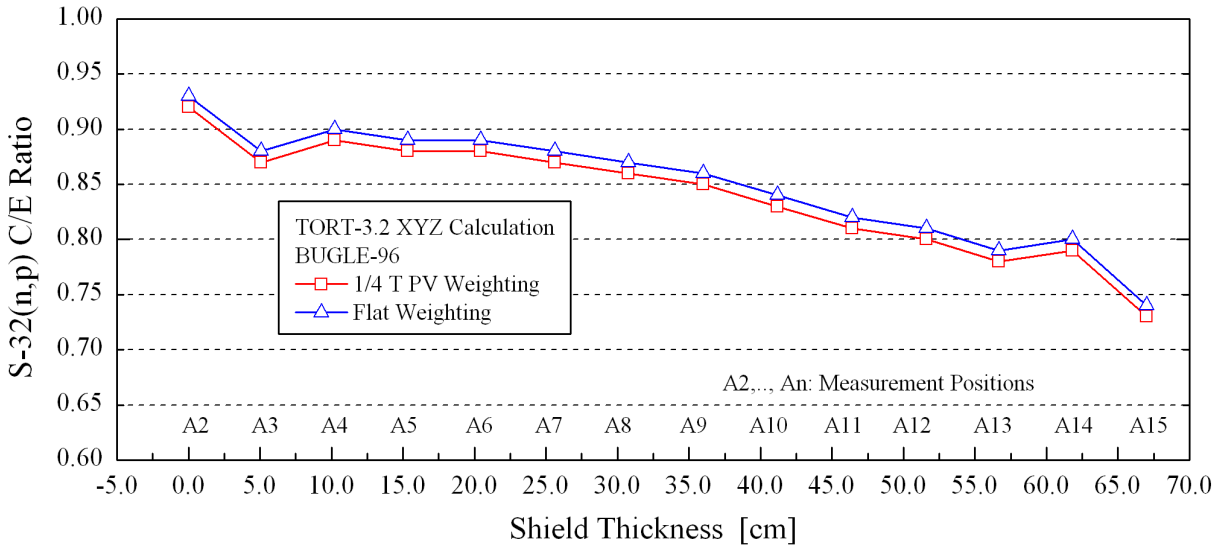


FIG. 5.27

Iron-88 - Al-27(n,α)Na-24 Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGJEFF311.BOLIB Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

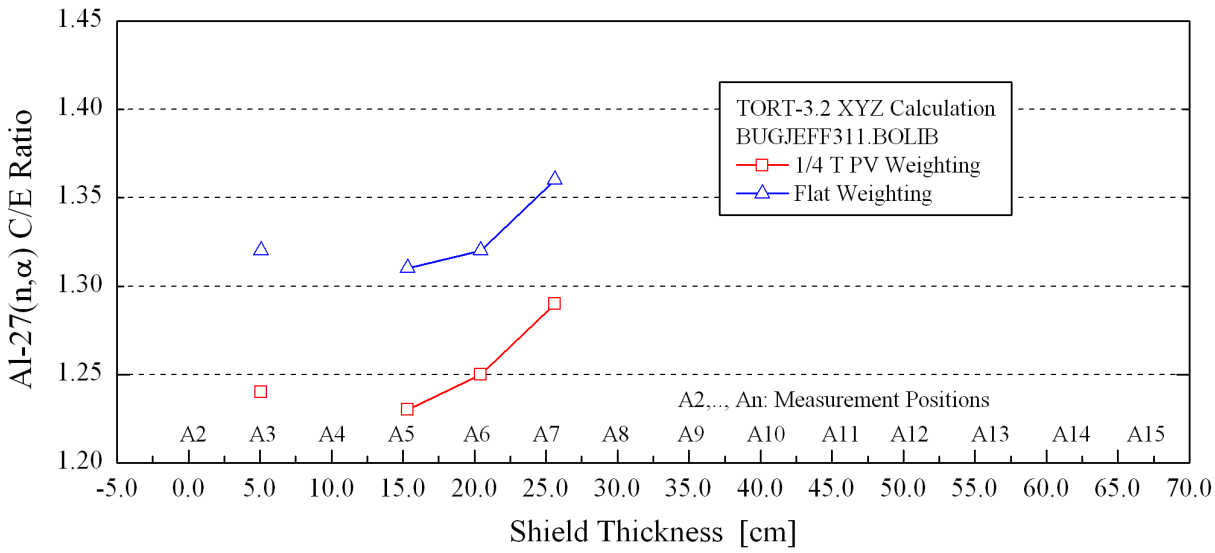


FIG. 5.28

Iron-88 - Al-27(n,α)Na-24 Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGENDF70.BOLIB Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

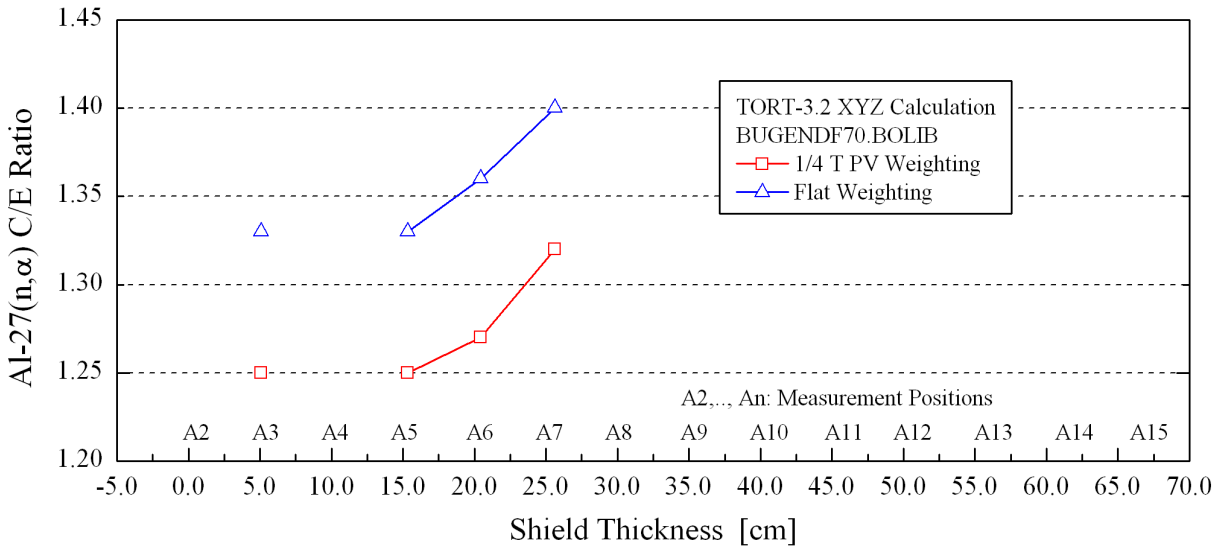


FIG. 5.29

Iron-88 - Al-27(n,α)Na-24 Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-B7 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

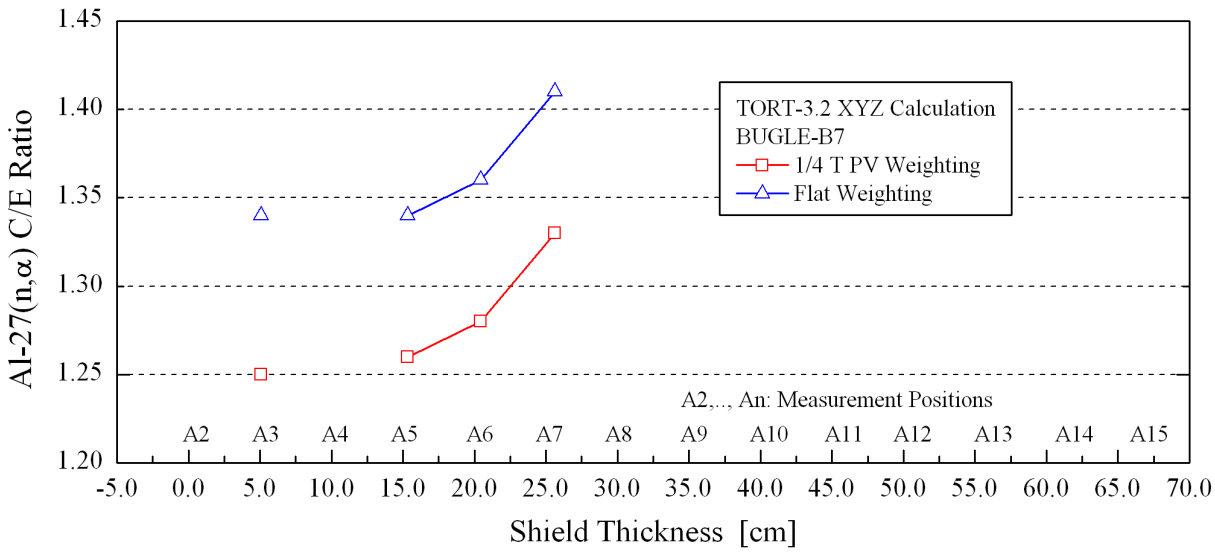


FIG. 5.30

Iron-88 - Al-27(n,α)Na-24 Reaction Rate Ratios (Calculated/Experimental)
Calculated Using the BUGLE-96 Library and Dosimeter Cross Sections
with Flat Weighting and 1/4 T PV Weighting.

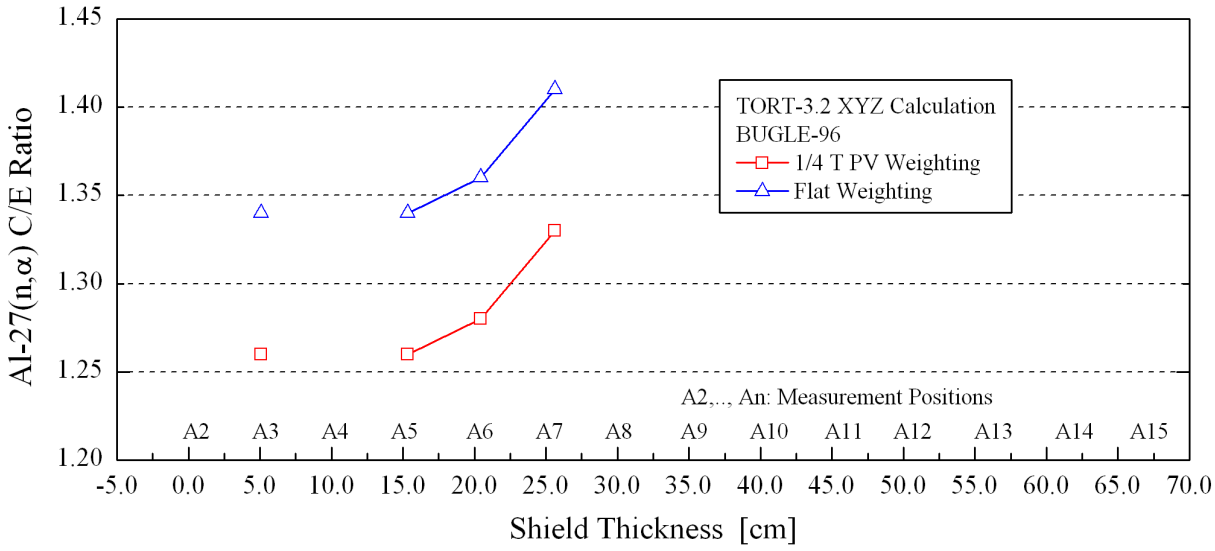


FIG. 5.31

Iron-88 - Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW)
on the Z Horizontal Axis.
[reactions × s^{-1} × $atom^{-1}$]

Comparison of Experimental and Calculated Reaction Rates.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

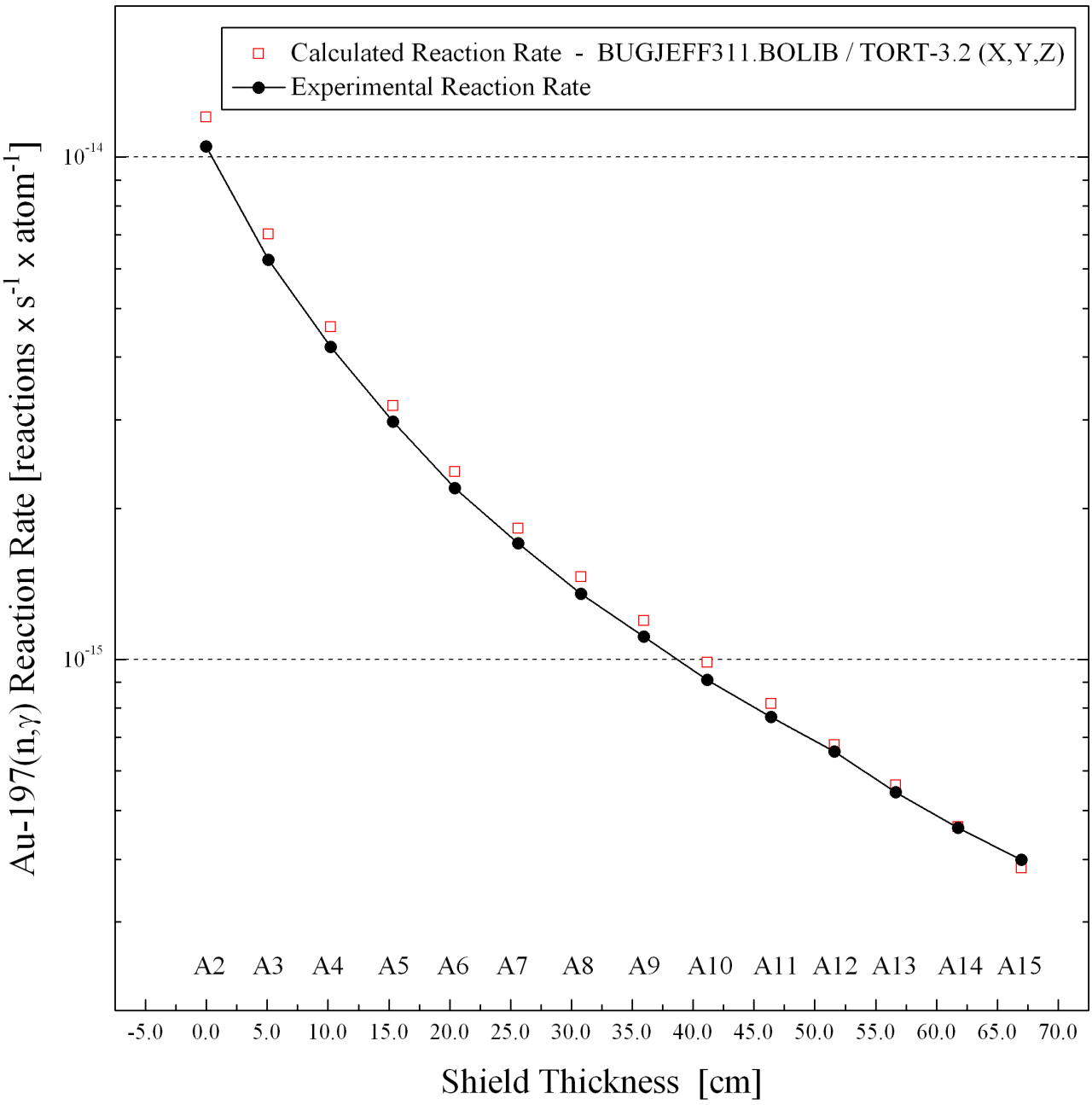


FIG. 5.32

Iron-88 - Rh-103(n,n')Rh-103m Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW)
on the Z Horizontal Axis.
[reactions × s^{-1} × $atom^{-1}$]

Comparison of Experimental and Calculated Reaction Rates.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

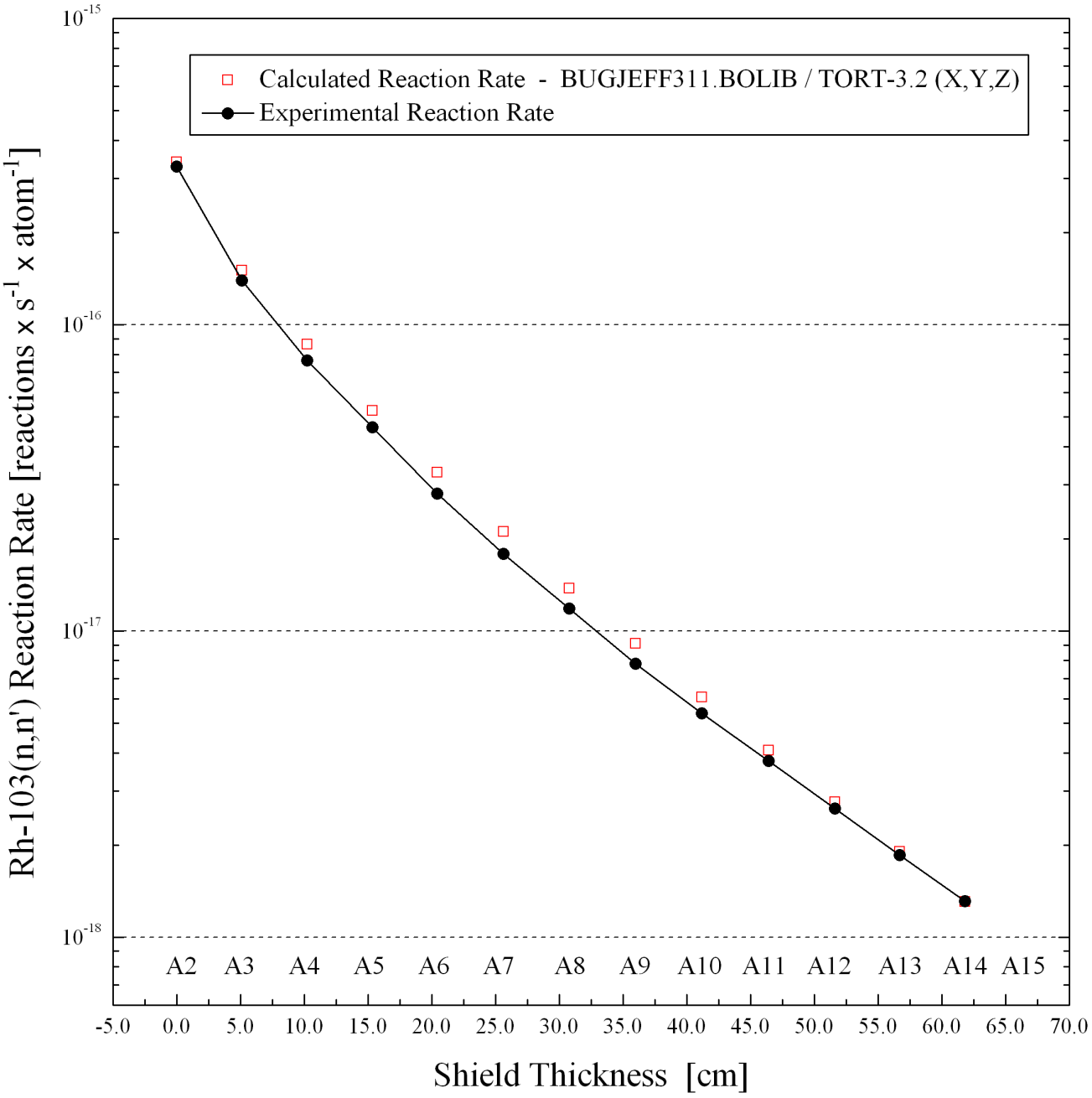


FIG. 5.33

Iron-88 - In-115(n,n')In-115m Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW)
on the Z Horizontal Axis.
[reactions × s^{-1} × $atom^{-1}$]

Comparison of Experimental and Calculated Reaction Rates.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

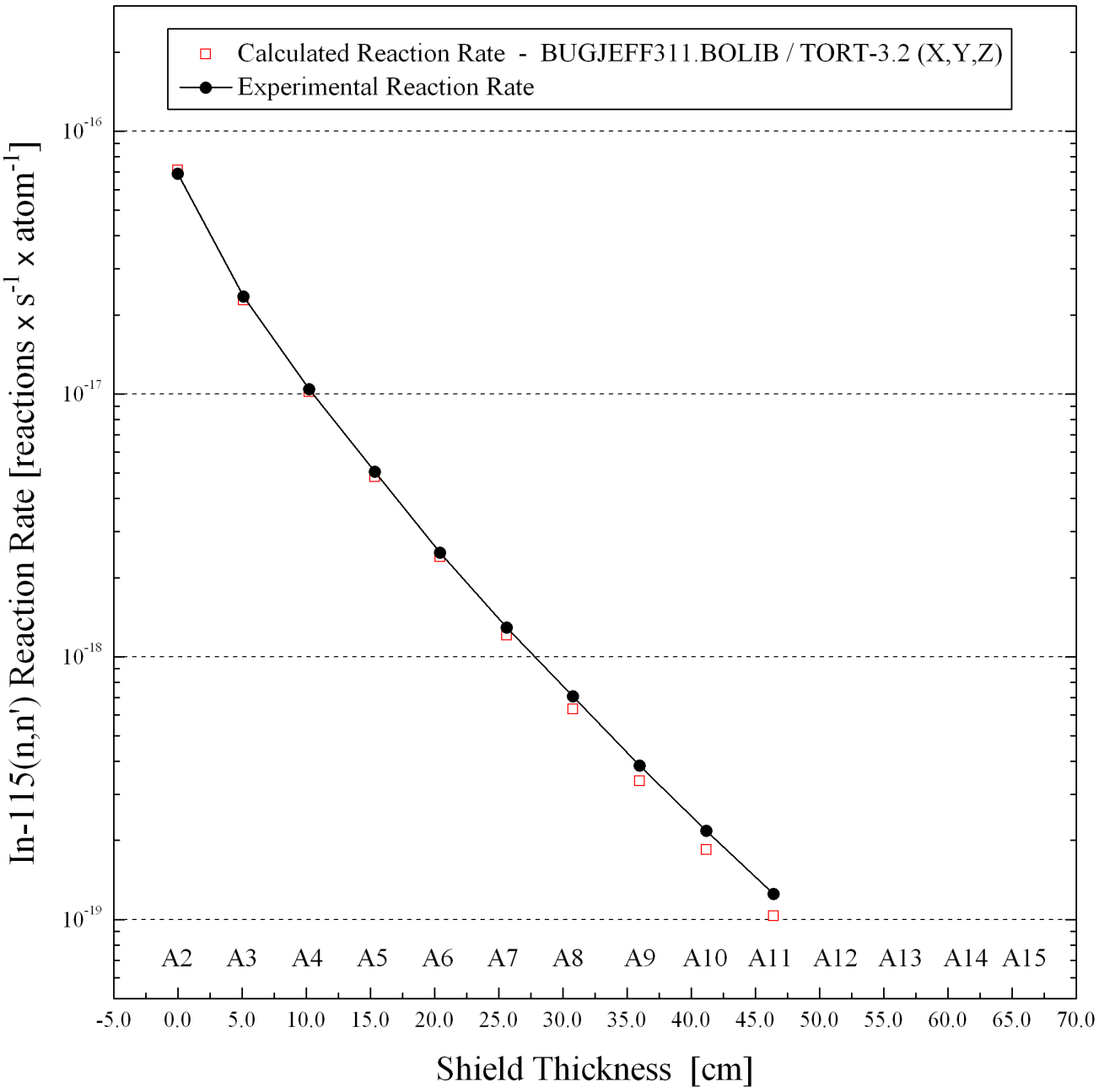


FIG. 5.34

Iron-88 - S-32(n,p)P-32 Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW)
on the Z Horizontal Axis.
[reactions × s^{-1} × $atom^{-1}$]

Comparison of Experimental and Calculated Reaction Rates.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

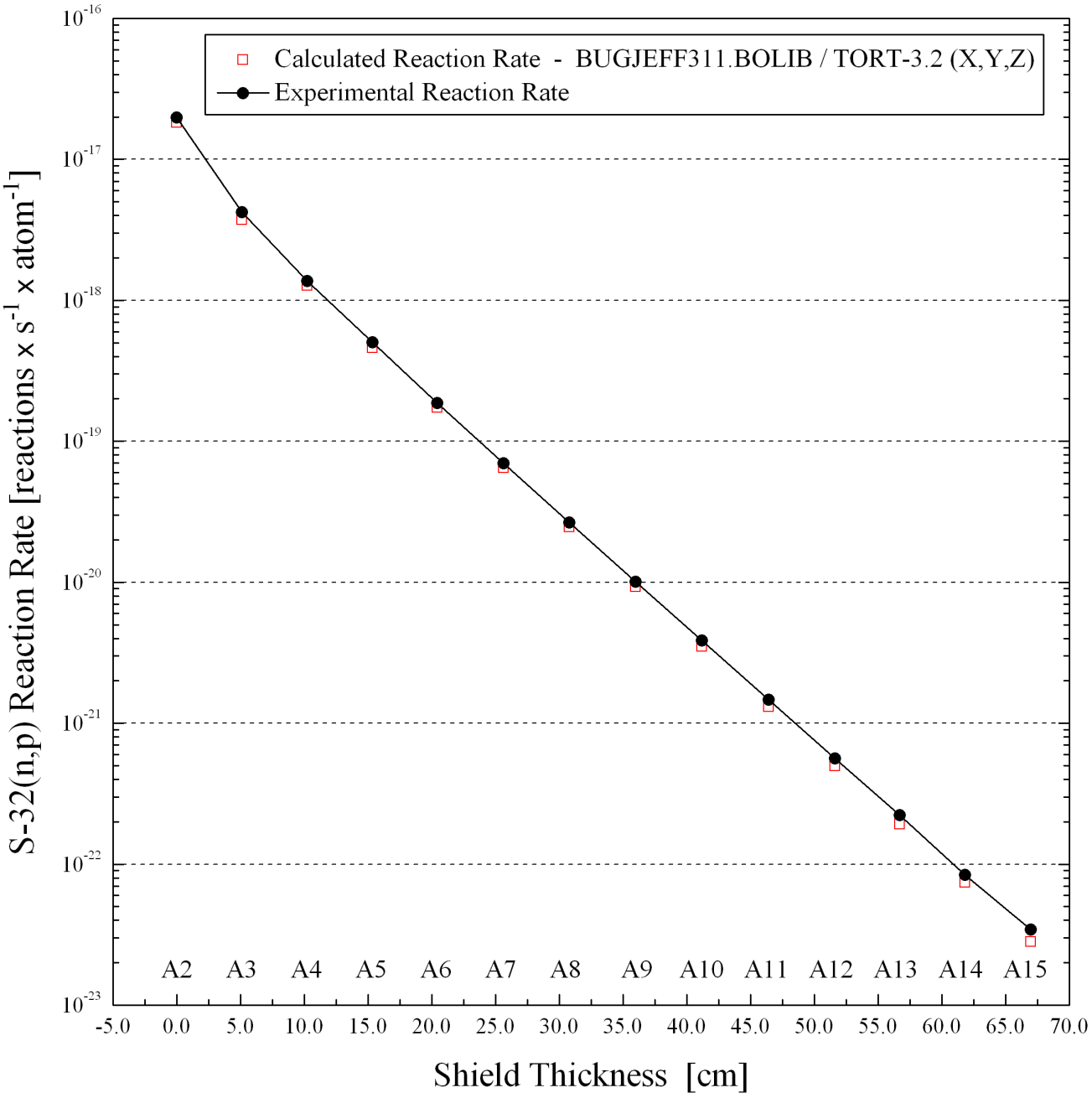


FIG. 5.35

Iron-88 - Al-27(n,α)Na-24 Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW)
on the Z Horizontal Axis.
[reactions × s^{-1} × $atom^{-1}$]

Comparison of Experimental and Calculated Reaction Rates.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

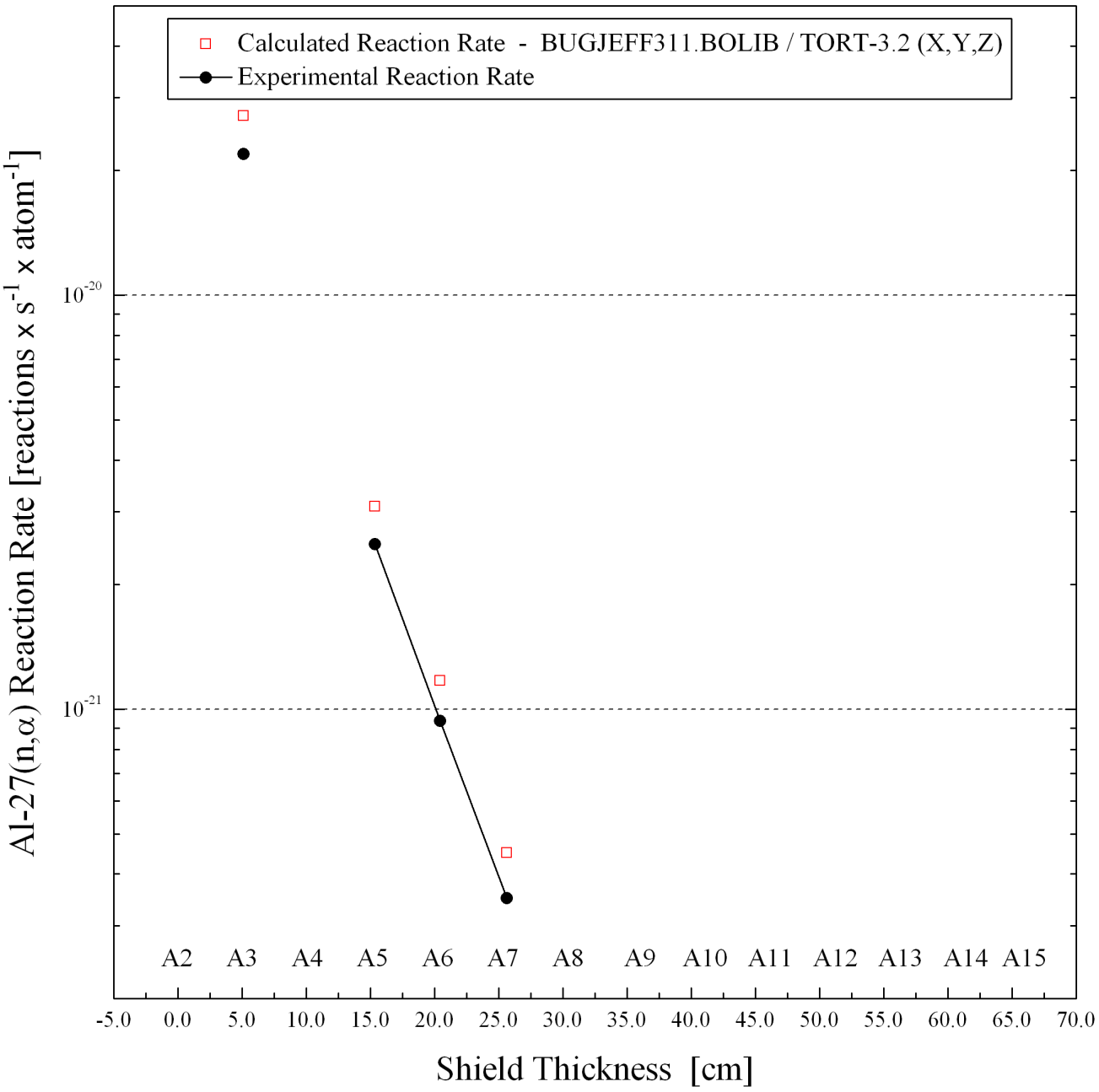


FIG. 5.36

Iron-88 - Spatial Distribution of the Neutron Fluxes at the NESTOR Reactor Maximum Power (30 kW) for Neutron Energy > 0.414 eV.
[neutrons × barn^{-1} × s^{-1}]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library.

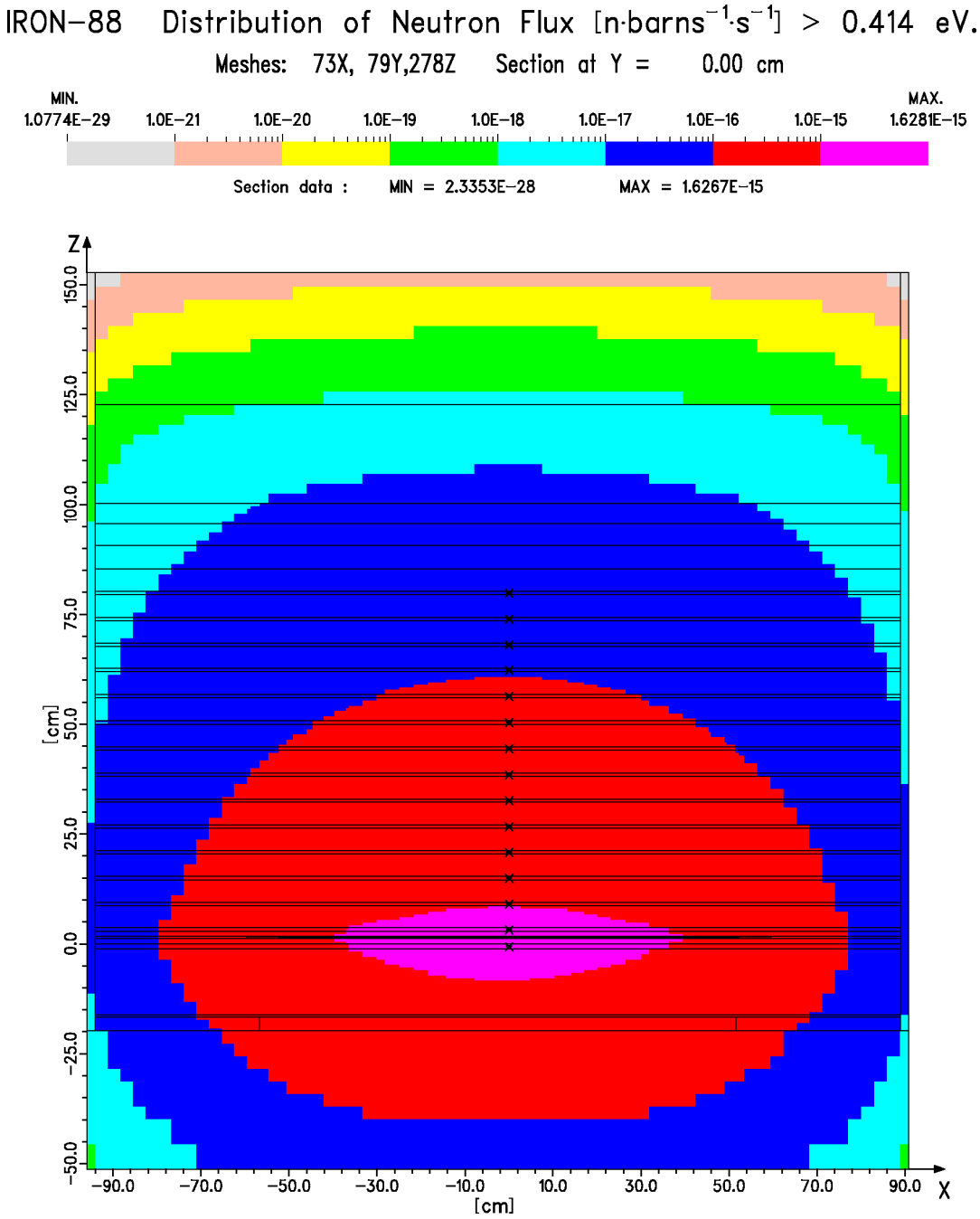


FIG. 5.37

Iron-88 - Spatial Distribution of the Neutron Fluxes at the NESTOR Reactor Maximum Power (30 kW) for Neutron Energy > 0.1 MeV.
[neutrons × $barn^{-1}$ × s^{-1}]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library.

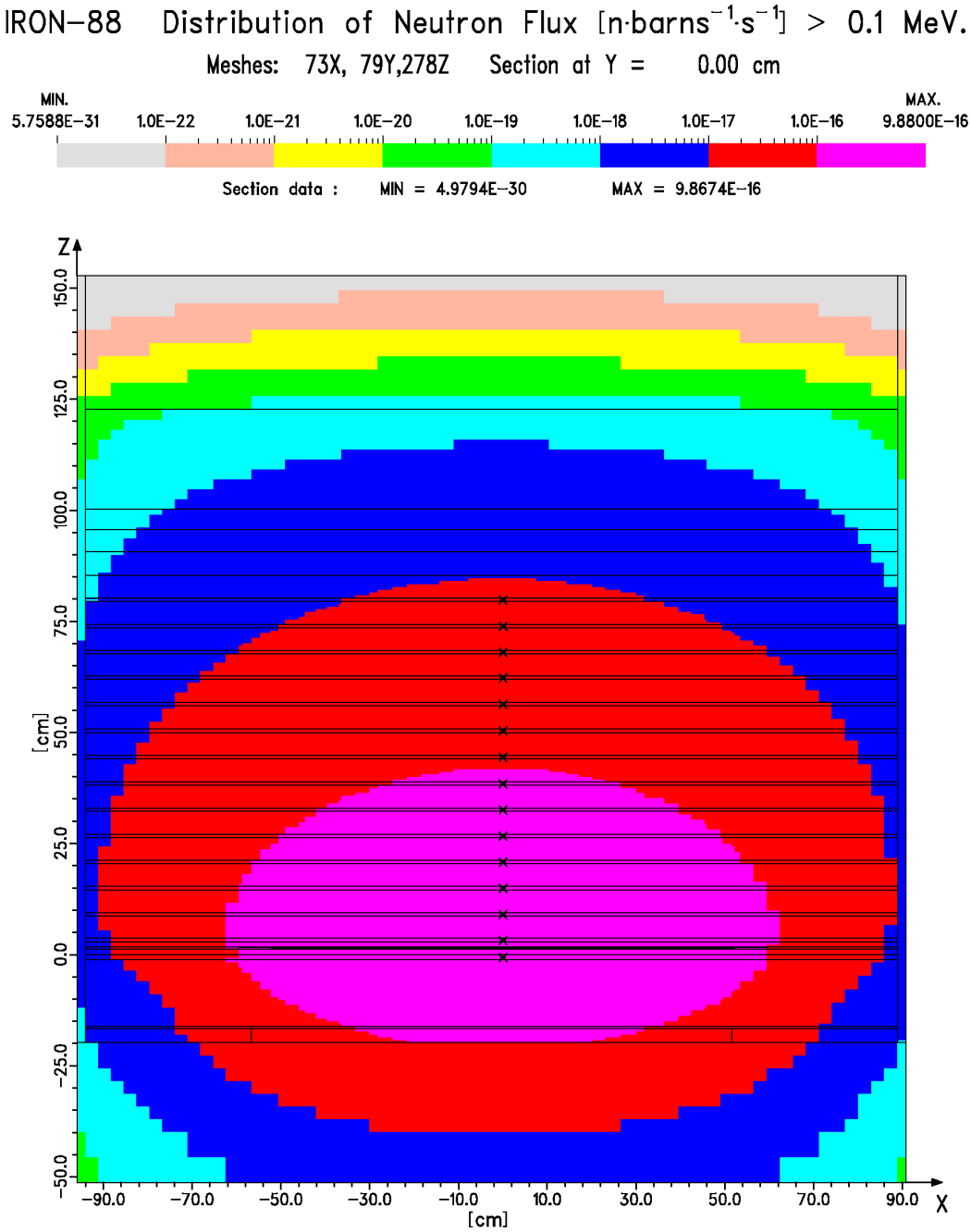


FIG. 5.38

Iron-88 - Spatial Distribution of the Neutron Fluxes at the NESTOR Reactor Maximum Power (30 kW) for Neutron Energy > 1.0 MeV.
[neutrons × barn^{-1} × s^{-1}]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library.

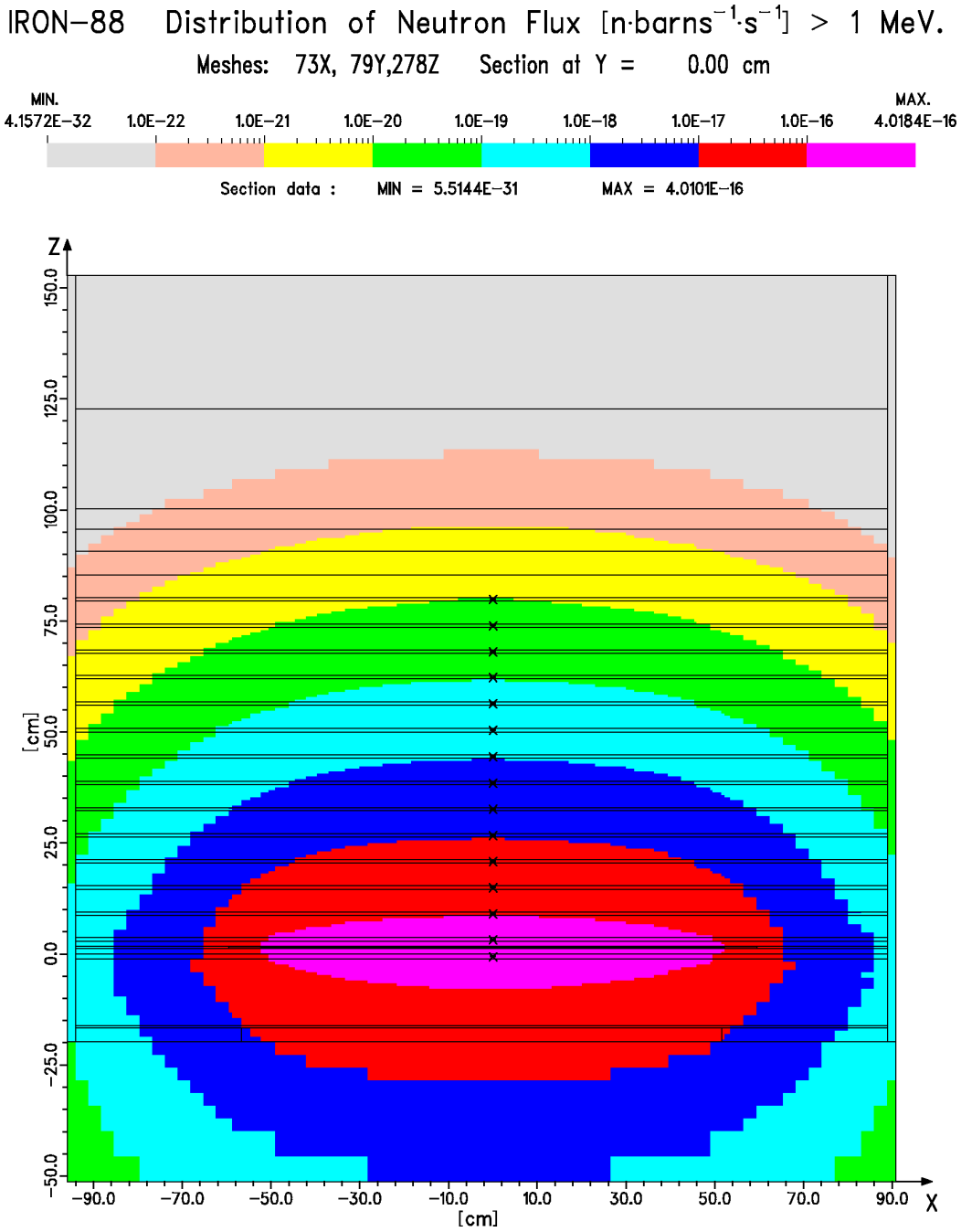


FIG. 5.39

Iron-88 - Spatial Distribution of the Neutron Fluxes at the NESTOR Reactor Maximum Power (30 kW) for Neutron Energy > 3.0 MeV.
[neutrons × barn^{-1} × s^{-1}]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library.

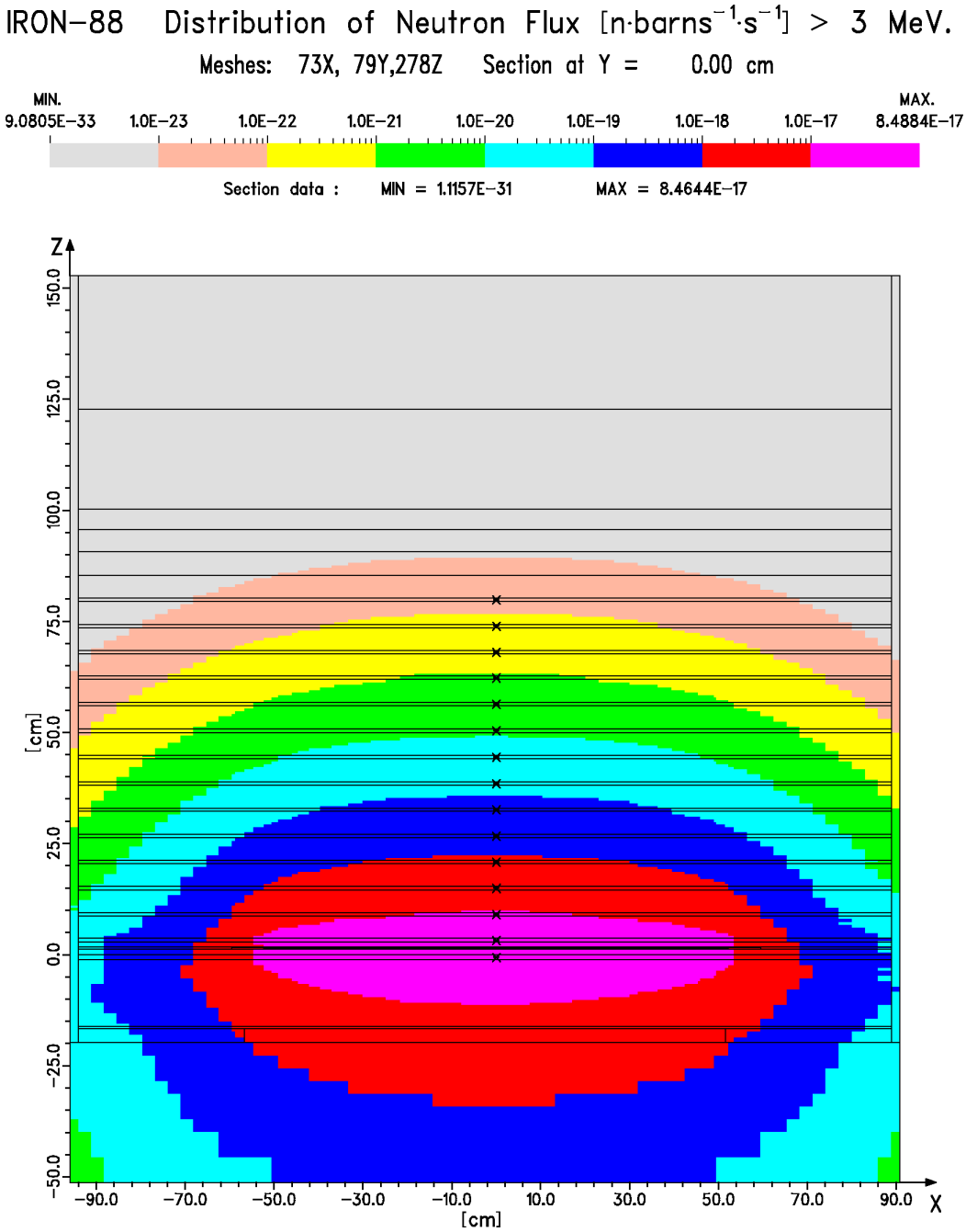


FIG. 5.40

Iron-88 - Spatial Distribution of the Neutron Fluxes at the NESTOR Reactor Maximum Power (30 kW) for Neutron Energy > 8.0 MeV.
[neutrons × barn^{-1} × s^{-1}]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library.

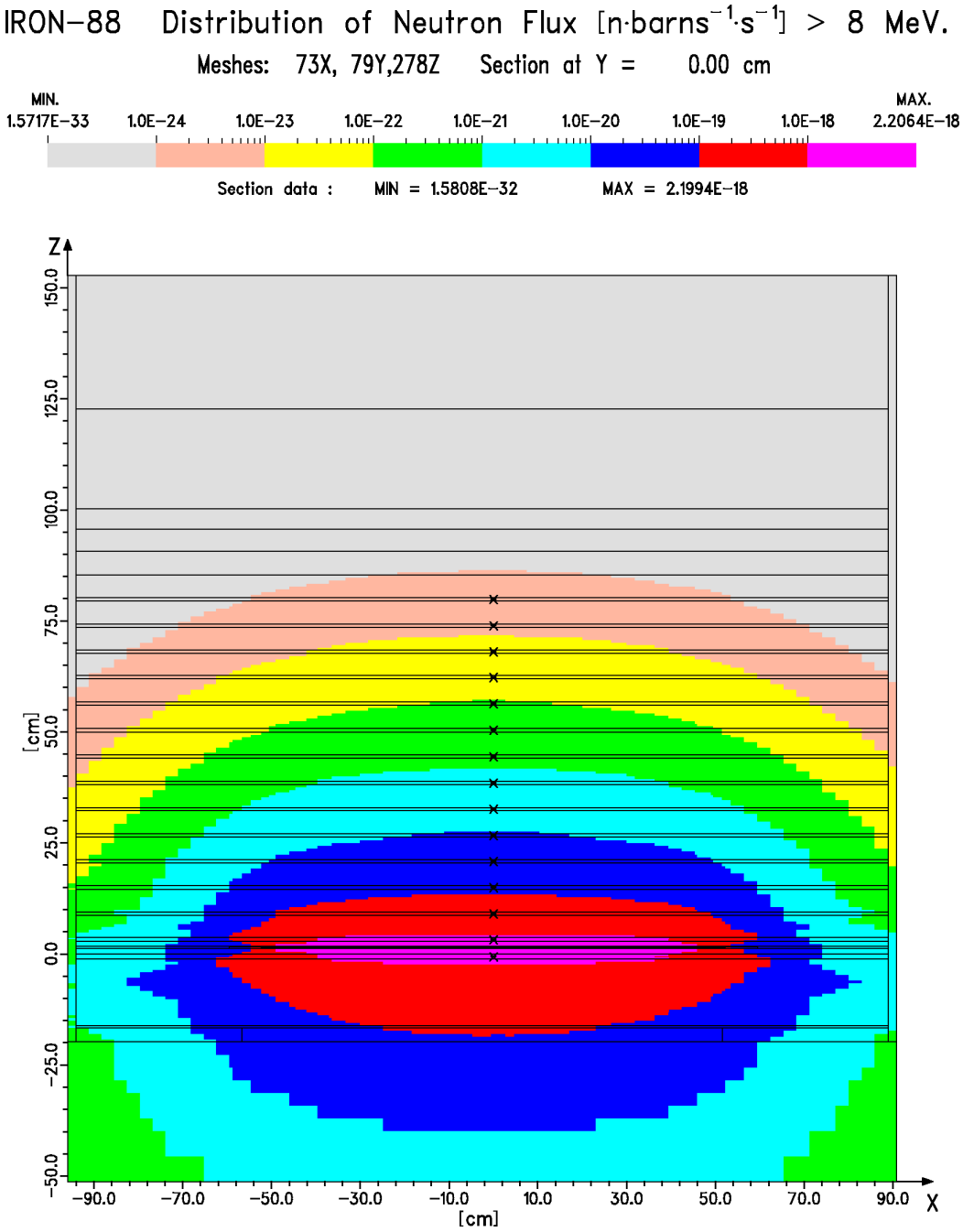


FIG. 5.41

Iron-88 - Spatial Distribution of the Au-197(n,γ)Au-198/Cd epi-Cadmium Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW).
[reactions × s^{-1} × $atom^{-1}$]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

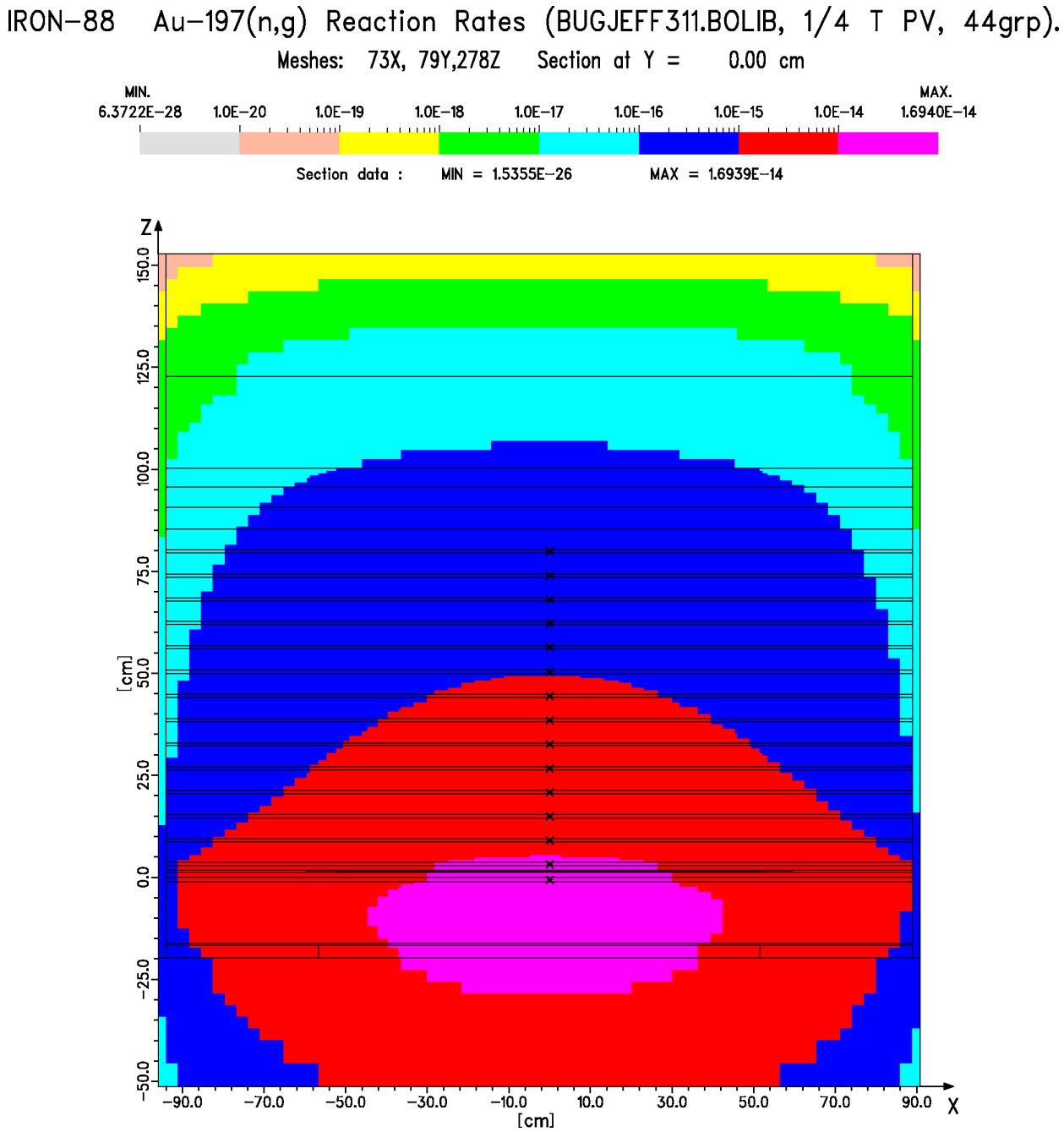


FIG. 5.42

Iron-88 - Spatial Distribution of the Rh-103(n,n')Rh-103m Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW).
[reactions × s^{-1} × $atom^{-1}$]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

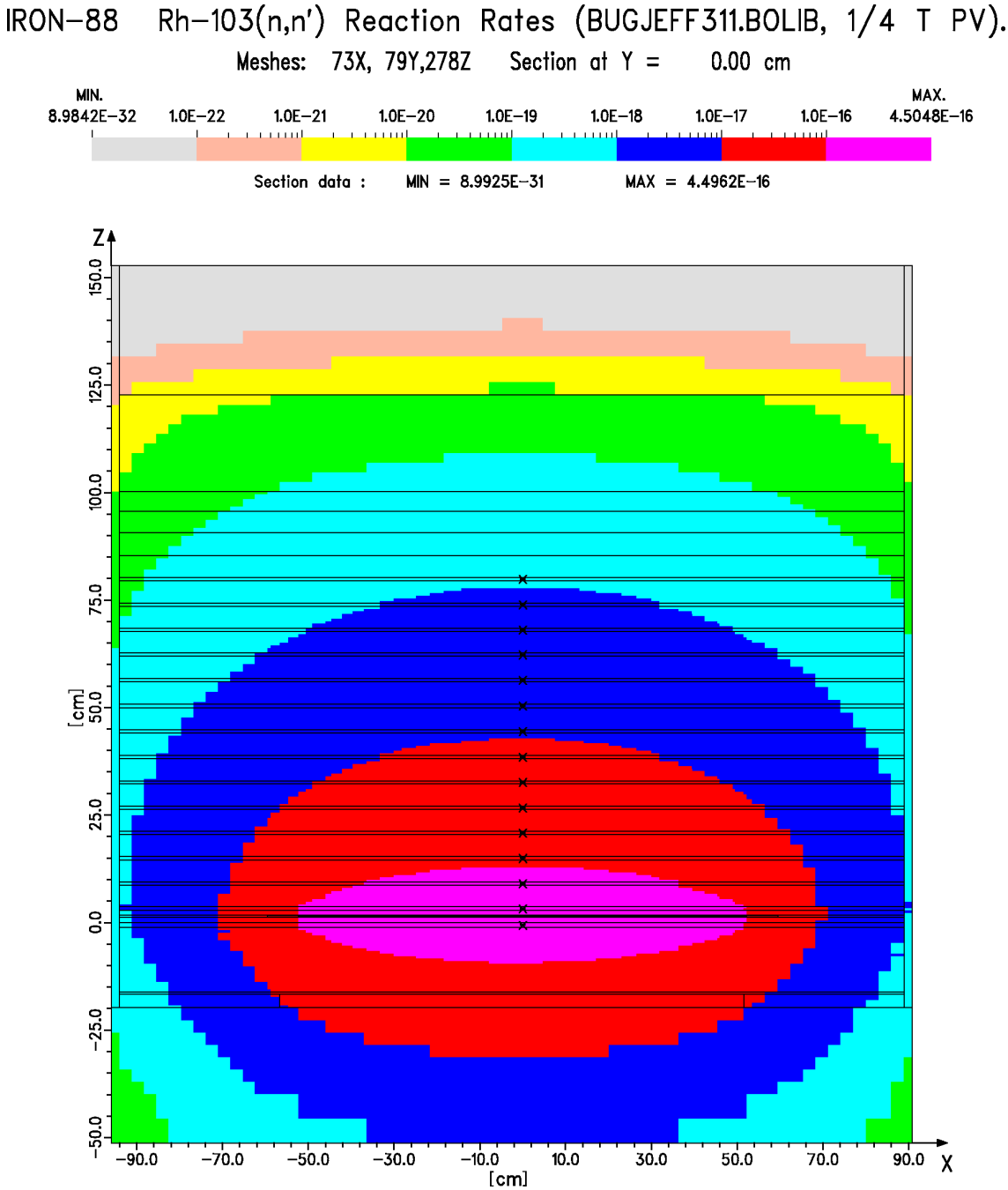


FIG. 5.43

Iron-88 - Spatial Distribution of the In-115(n,n')In-115m Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW).
[reactions × s^{-1} × $atom^{-1}$]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

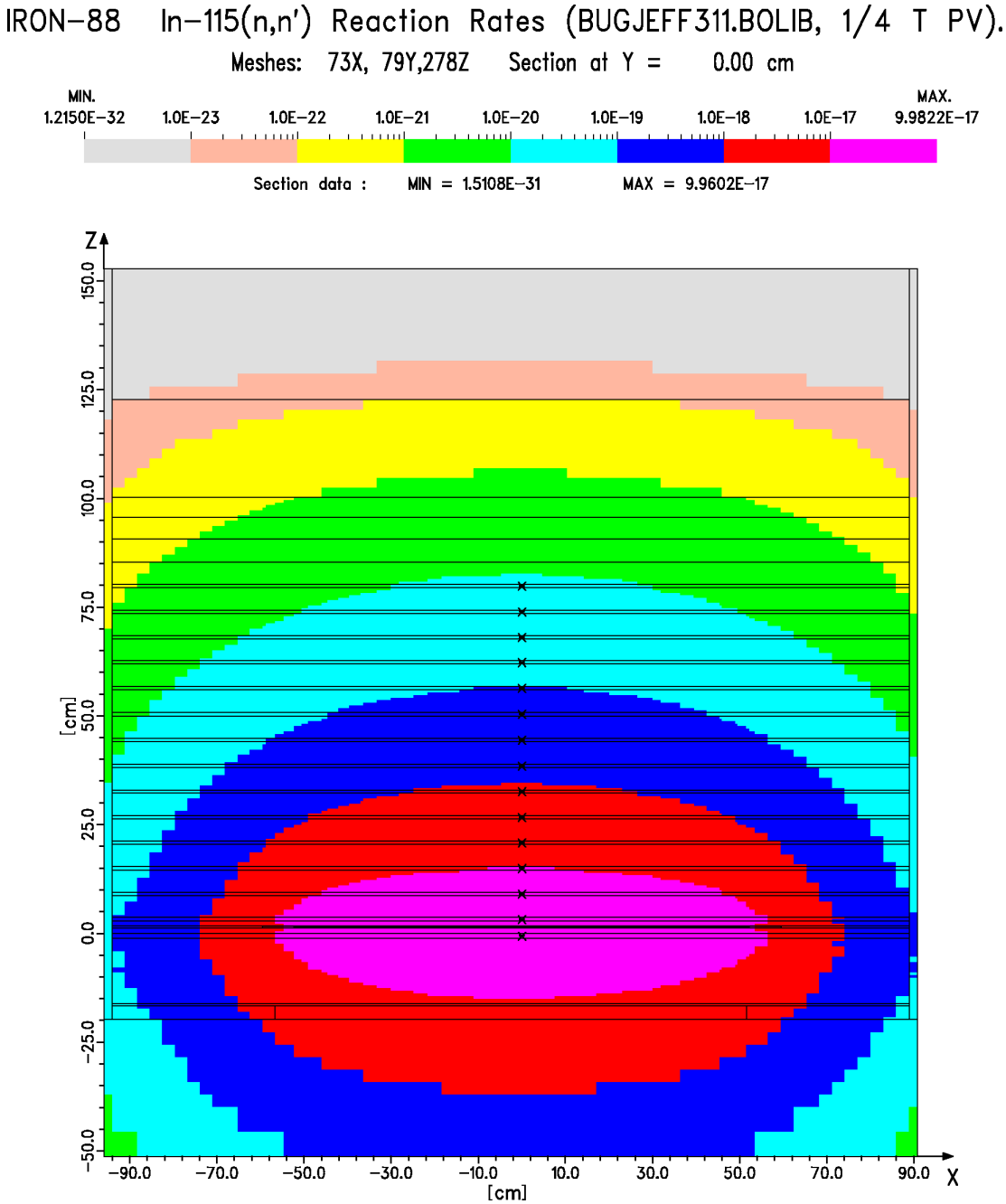


FIG. 5.44

Iron-88 - Spatial Distribution of the S-32(n,p)P-32 Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW).
[reactions × s^{-1} × $atom^{-1}$]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

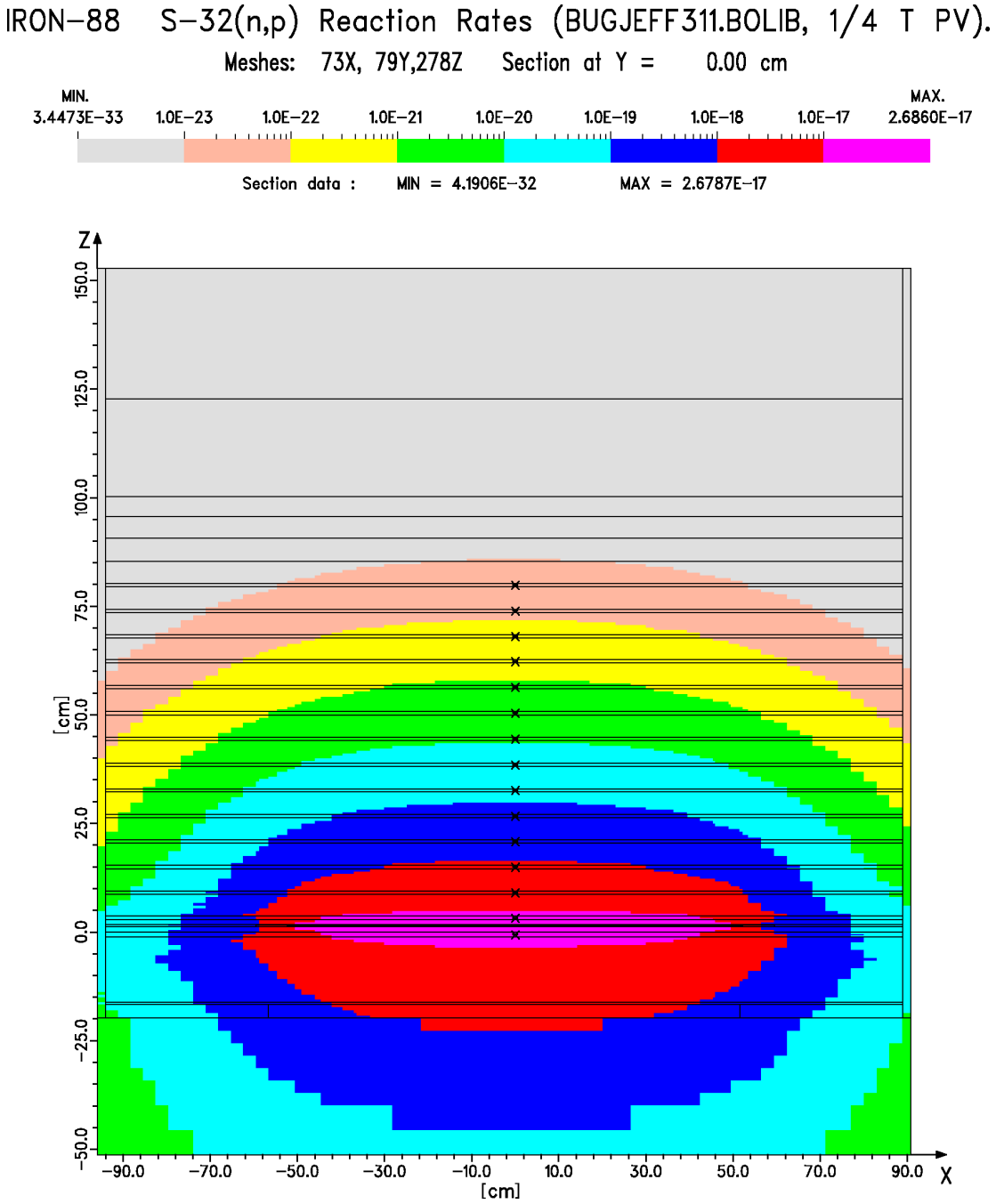


FIG. 5.45

Iron-88 - Spatial Distribution of the Al-27(n,α)Na-24 Reaction Rates
at the NESTOR Reactor Maximum Power (30 kW).
[reactions × s^{-1} × $atom^{-1}$]

Horizontal Section at Y = 0.0 cm.
Dosimeter Locations "×", 73X×79Y×278Z Spatial Meshes.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library
and 1/4 T PV Weighting Dosimeter Cross Sections.

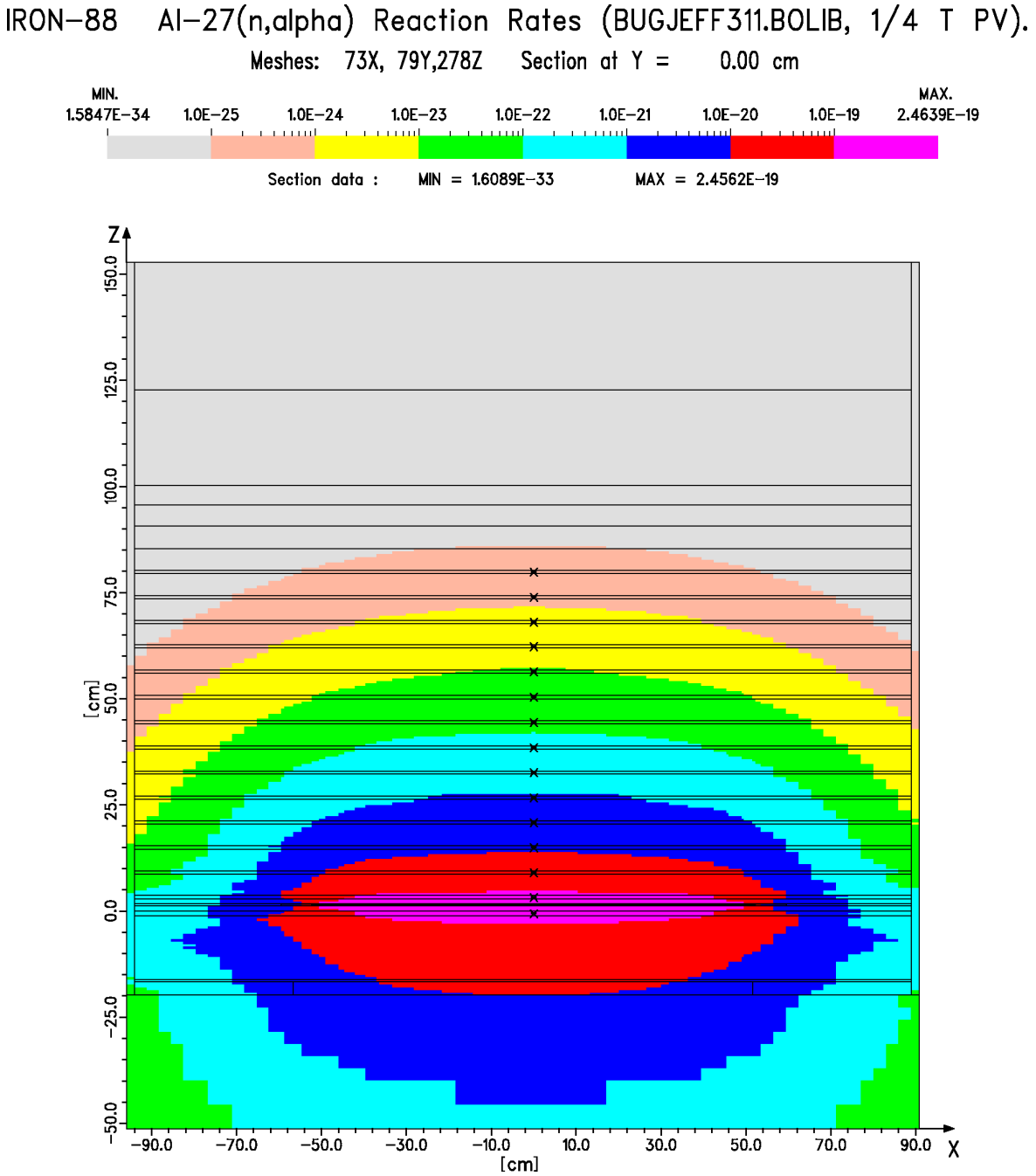


FIG. 5.46

Iron-88 - Calculated Neutron Spectra in Mild Steel at the A2, A4, A8, A12 and A15 Measurement Positions for Neutron Energy > 0.414 eV.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library.

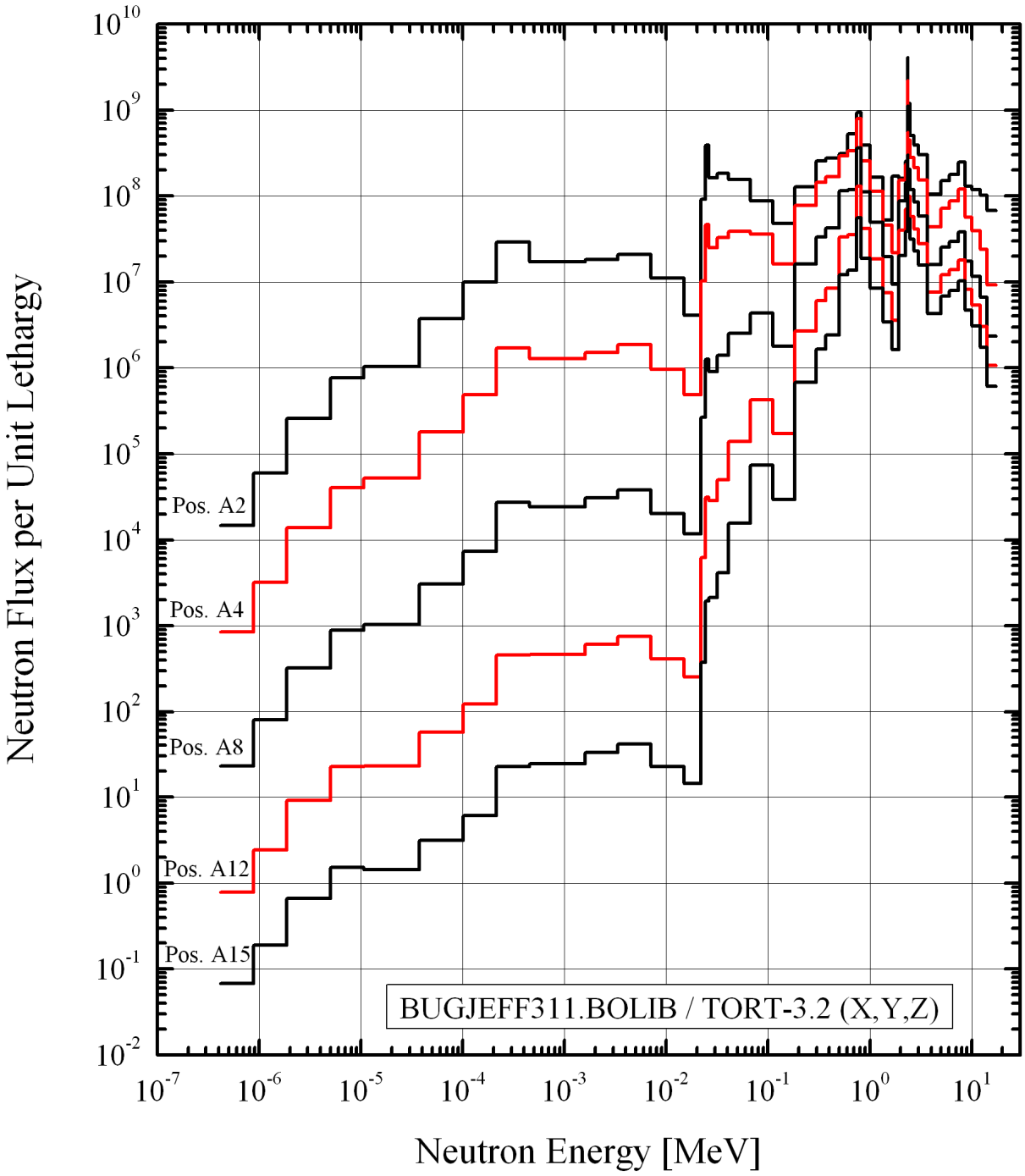
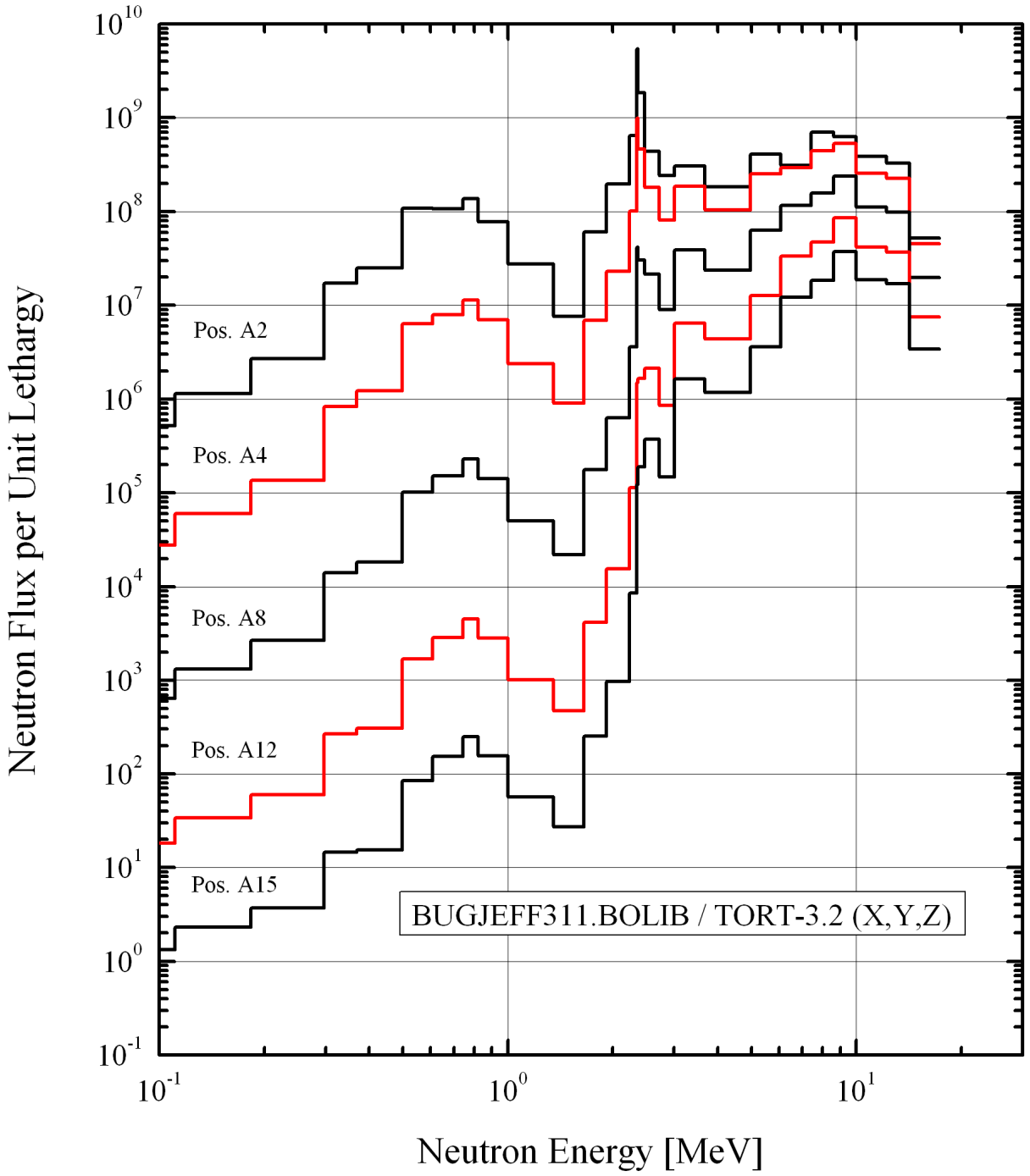


FIG. 5.47

Iron-88 - Calculated Neutron Spectra in Mild Steel at the A2, A4, A8, A12 and A15 Measurement Positions for Neutron Energy > 0.1 MeV.

P_3-S_8 Calculation Using the BUGJEFF311.BOLIB Library.



6 - CONCLUSION

Four broad-group coupled (47 n + 20 γ) working cross section libraries in FIDO-ANISN format, specifically conceived for LWR shielding and pressure vessel dosimetry applications, were validated on the Iron-88 single-material (iron) neutron shielding benchmark experiment, included in the SINBAD REACTOR international database. Two ENEA-Bologna (BUGJEFF311.BOLIB and BUGENDF70.BOLIB) libraries and two ORNL (BUGLE-B7 and BUGLE-96) libraries, freely-released at OECD-NEADB and ORNL-RSICC, were tested on the Iron-88 experiment through three-dimensional fixed source transport calculations in Cartesian (X,Y,Z) geometry, using the ORNL TORT-3.2 discrete ordinates (S_N) code. The ENEA BOT3P-5.3 pre/post-processor ancillary system for multi-dimensional deterministic codes was used to obtain the automatic spatial mesh generation and the graphical verification of the compositional and geometrical models.

The calculated reaction rates for the five activation dosimeters Au-197(n,γ)Au-198/Cd, Rh-103(n,n')Rh-103m, In-115(n,n')In-115m, S-32(n,p)P-32 and Al-27(n,α)Na-24) used in the Iron-88 experiment were obtained through the corresponding dosimeter cross section sets, derived from the IAEA IRDF-2002 dosimetry file, and were compared with the corresponding experimental results. Two types of dosimeter cross section weighting were employed using the following spectra: constant flat neutron spectrum and 1/4 T PV neutron spectrum, calculated at one quarter depth (1/4 T) in the steel of a PWR pressure vessel (PV).

The 1/4 T PV weighting dosimeter cross section files permit to obtain calculated reaction rate results with the four libraries more adherent, in general, to the corresponding experimental results than those obtained through the use of the flat weighting dosimeter cross section files. In particular the impact of the 1/4 T PV weighting dosimeter cross section files is meaningful for the Au-197(n,γ)Au-198/Cd and Al-27(n,α)Na-24 calculated reaction rate results, obtained through the four BUGLE-type libraries.

Taking into account the total experimental uncertainties at the confidence level of one standard deviation (1σ) of the Au-197(n,γ)Au-198/Cd, Rh-103(n,n')Rh-103m, In-115(n,n')In-115m and S-32(n,p)P-32 dosimeters, the corresponding calculated reaction rate results presented in this work exhibit good statistical consistency with the corresponding measurements. In particular all the calculated reaction rate results obtained using the 1/4 T PV weighting dosimeter cross sections are contained within a confidence level of the total experimental uncertainty of ±3σ (99.7% of probability that the measurement result is between ±3 standard deviations), corresponding to deviations of ±15%÷20% from the corresponding experimental results. On the contrary, the reaction rate results of the Al-27(n,α)Na-24 dosimeters with the highest effective threshold energy (7.30 MeV) and a minor part of the corresponding results of the Rh-103(n,n')Rh-103m and In-115(n,n')In-115m dosimeters with the lowest effective threshold energies (0.69 MeV and 1.30 MeV respectively) are not included in the previously cited uncertainty confidence level. In particular, the calculated results with all the BUGLE-type libraries give reaction rate results, for the Al-27(n,α)Na-24 dosimeters, systematically and excessively overestimated (from +20% up to about +30%) with respect to the corresponding experimental results.

The two libraries BUGENDF70.BOLIB and BUGLE-B7, based on ENDF/B-VII.0 evaluated nuclear data, give meaningful discrepancies in some calculated reaction rate results above

about 20.0 cm of neutron penetration depth in the mild steel slabs of the Iron-88 experiment shield. This fact is evident for the Au-197(n,γ)Au-198/Cd dosimeters and, in particular, for the Rh-103(n,n')Rh-103m and In-115(n,n')In-115m threshold dosimeters with the lowest effective threshold energies (0.69 MeV and 1.30 MeV respectively). In particular, the results obtained using BUGENDF70.BOLIB overestimate those obtained from BUGLE-B7, increasing the neutron penetration depth in the mild steel slabs of the Iron-88 experiment shield. Taking into account the 90% response energy ranges, typical of the previously cited threshold activation dosimeters, the mentioned result discrepancies approximately occur in the neutron energy range 1.0 MeV ÷ 6.0 MeV.

Further effort on the sensitivity and uncertainty analysis should be performed.

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APPENDIX A

Input Data of ADEFTA-4.1 - Generation of the Compositional Models
Used in the Calculations with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB,
BUGLE-B7 and BUGLE-96 Libraries

TAB. A1

ADEFTA Input for the BUGJEFF311.BOLIB Library Calculations.

```
/ ADEFTA (Version 4.1) Input for WINFRITH Iron-88 (BUGJEFF311.BOLIB)
 gip 3
mat 101 7.835 1.000 1.000  Mild Steel in Trolley Face (mix 1)
   0.9865      Fe-Csteel
   0.0109      Mn-Csteel
   0.0022      C-nat-Csteel
   0.0004      Si
end
/
mat 102 2.700 1.000 1.000 Aluminium in Trolley Face (mix 2)
    1.0000     Al
end
/
mat 103 1.650  1.000 1.000 Graphite (mix 3)
    1.00       C-nat-Graphite
end
/
mat 104 3.256  1.000 1.000 Fuel (mix 4)
    0.7998     Al
    0.1864     U235
    0.0138     U238
end
/
mat 105 2.666 1.000 1.000 Aluminium in Fission Plate (mix 5)
    0.0056     Fe
    0.0015     Si
    0.9929     Al
end
/
mat 106 7.850 1.000 1.000  Mild Steel in Shield (mix 6)
   0.9903      Fe-Csteel
   0.0074      Mn-Csteel
   0.0023      C-nat-Csteel
end
/
mat 107 7.917 1.000 1.000  Stainless Steel (mix 7)
   0.6695      Fe-Ststeel
   0.0157      Mn-Ststeel
   0.1677      Cr-Ststeel
   0.1166      Ni-Ststeel
   0.0006      C-nat-Ststeel
   0.0050      Si
   0.0003      P
   0.0002      S
   0.0244      Mo
end
/
mat 108 2.242 1.000 0.9980  Concrete (mix 8)
   0.0141      Fe-Con04
   0.3369      Si-Con04
   0.0340      Al-Con04
   0.0100      H-H2OCon04
   0.5290      O-Con04
   0.0379      Ca-Con04
   0.0200      K-Con04
   0.0161      Na-Con04
end
/
mat 109 1.205e-03 1. 1.000 Air  (mix 9)
1. formula
      1.58 N
      0.42 O
   end-formula
end
/
```

TAB. A1 Continued

ADEFTA Input for the BUGJEFF311.BOLIB Library Calculations.

```
/
/ TORT Mixtures
/
mix 1  Mild steel in Trolley Face
      101  1.0
        end
mix 2  Aluminium in Trolley Face
      102  1.0
        end
mix 3  Graphite
      103  1.0
        end
mix 4  Fuel
      104  1.0
        end
mix 5  Aluminium in Fission Plate
      105  1.0
        end
mix 6  Mild Steel in Shield
      106  1.0
        end
mix 7  Stainless Steel
      107  1.0
        end
mix 8  Concrete
      108  1.0
        end
mix 9  Air
      109  1.0
        end
```

TAB. A2

ADEFTA Input for the BUGENDF70.BOLIB Library Calculations.

```
/ ADEFTA (Version 4.1) Input for WINFRITH Iron-88 (BUGENDF70.BOLIB)
 gip 3
mat 101 7.835 1.000 1.000  Mild Steel in Trolley Face (mix 1)
   0.9865      Fe-Csteel
   0.0109      Mn-Csteel
   0.0022      C-nat-Csteel
   0.0004      Si
end
/
mat 102 2.700 1.000 1.000 Aluminium in Trolley Face (mix 2)
    1.0000     Al
end
/
mat 103 1.650  1.000 1.000 Graphite (mix 3)
    1.00       C-nat-Graphite
end
/
mat 104 3.256  1.000 1.000 Fuel (mix 4)
    0.7998     Al
    0.1864     U235
    0.0138     U238
end
/
mat 105 2.666 1.000 1.000 Aluminium in Fission Plate (mix 5)
    0.0056     Fe
    0.0015     Si
    0.9929     Al
end
/
mat 106 7.850 1.000 1.000  Mild Steel in Shield (mix 6)
   0.9903      Fe-Csteel
   0.0074      Mn-Csteel
   0.0023      C-nat-Csteel
end
/
mat 107 7.917 1.000 1.000  Stainless Steel (mix 7)
   0.6695      Fe-Ststeel
   0.0157      Mn-Ststeel
   0.1677      Cr-Ststeel
   0.1166      Ni-Ststeel
   0.0006      C-nat-Ststeel
   0.0050      Si
   0.0003      P
   0.0002      S
   0.0244      Mo
end
/
mat 108 2.242 1.000 0.9980  Concrete (mix 8)
   0.0141      Fe-Con04
   0.3369      Si-Con04
   0.0340      Al-Con04
   0.0100      H-H2OCon04
   0.5290      O-Con04
   0.0379      Ca-Con04
   0.0200      K-Con04
   0.0161      Na-Con04
end
/
mat 109 1.205e-03 1. 1.000 Air  (mix 9)
1. formula
      1.58 N
      0.42 O
   end-formula
end
/
```

TAB. A2 Continued

ADEFTA Input for the BUGENDF70.BOLIB Library Calculations.

```
/
/ TORT Mixtures
/
mix 1  Mild steel in Trolley Face
      101  1.0
        end
mix 2  Aluminium in Trolley Face
      102  1.0
        end
mix 3  Graphite
      103  1.0
        end
mix 4  Fuel
      104  1.0
        end
mix 5  Aluminium in Fission Plate
      105  1.0
        end
mix 6  Mild Steel in Shield
      106  1.0
        end
mix 7  Stainless Steel
      107  1.0
        end
mix 8  Concrete
      108  1.0
        end
mix 9  Air
      109  1.0
        end
```

TAB. A3

ADEFTA Input for the BUGLE-B7 Library Calculations.

```
/ ADEFTA (Version 4.1) Input for WINFRITH Iron-88 (BUGLE-B7)
 gip 3
mat 101 7.835 1.000 1.000  Mild Steel in Trolley Face (mix 1)
   0.9865      Fe-Csteel
   0.0109      Mn-Csteel
   0.0022      C-nat-Csteel
   0.0004      Si-nat
end
/
mat 102 2.700 1.000 1.000 Aluminium in Trolley Face (mix 2)
    1.0000     Al
end
/
mat 103 1.650  1.000 1.000 Graphite (mix 3)
    1.00       C-nat-Graphite
end
/
mat 104 3.256  1.000 1.000 Fuel (mix 4)
    0.7998     Al
    0.1864     U235
    0.0138     U238
end
/
mat 105 2.666 1.000 1.000 Aluminium in Fission Plate (mix 5)
    0.0056     Fe
    0.0015     Si-nat
    0.9929     Al
end
/
mat 106 7.850 1.000 1.000  Mild Steel in Shield (mix 6)
   0.9903      Fe-Csteel
   0.0074      Mn-Csteel
   0.0023      C-nat-Csteel
end
/
mat 107 7.917 1.000 1.000  Stainless Steel (mix 7)
   0.6695      Fe-Ststeel
   0.0157      Mn-Ststeel
   0.1677      Cr-Ststeel
   0.1166      Ni-Ststeel
   0.0006      C-nat-Ststeel
   0.0050      Si-nat
   0.0003      P
   0.0002      S-nat
   0.0244      Mo-nat
end
/
mat 108 2.242 1.000 0.9980  Concrete (mix 8)
   0.0141      Fe-Con04
   0.3369      Si-Con04
   0.0340      Al-Con04
   0.0100      H-H2OCon04
   0.5290      O-Con04
   0.0379      Ca-Con04
   0.0200      K-Con04
   0.0161      Na-Con04
end
/
mat 109 1.205e-03 1. 1.000 Air  (mix 9)
1. formula
      1.58 N
      0.42 O
   end-formula
end
/
```

TAB. A3 Continued

ADEFTA Input for the BUGLE-B7 Library Calculations.

```
/
/ TORT Mixtures
/
mix 1  Mild steel in Trolley Face
      101  1.0
        end
mix 2  Aluminium in Trolley Face
      102  1.0
        end
mix 3  Graphite
      103  1.0
        end
mix 4  Fuel
      104  1.0
        end
mix 5  Aluminium in Fission Plate
      105  1.0
        end
mix 6  Mild Steel in Shield
      106  1.0
        end
mix 7  Stainless Steel
      107  1.0
        end
mix 8  Concrete
      108  1.0
        end
mix 9  Air
      109  1.0
        end
```

TAB. A4

ADEFTA Input for the BUGLE-96 Library Calculations.

```
/ ADEFTA (Version 4.1) Input for WINFRITH Iron-88 (BUGLE-96)
 gip 3
mat 101 7.835 1.000 1.000  Mild Steel in Trolley Face (mix 1)
   0.9865      Fe-Csteel
   0.0109      Mn-Csteel
   0.0022      C-nat-Csteel
   0.0004      Si-nat
end
/
mat 102 2.700 1.000 1.000 Aluminium in Trolley Face (mix 2)
    1.0000     Al
end
/
mat 103 1.650  1.000 1.000 Graphite (mix 3)
    1.00       C-nat-Graphite
end
/
mat 104 3.256  1.000 1.000 Fuel (mix 4)
    0.7998     Al
    0.1864     U235
    0.0138     U238
end
/
mat 105 2.666 1.000 1.000 Aluminium in Fission Plate (mix 5)
    0.0056     Fe
    0.0015     Si-nat
    0.9929     Al
end
/
mat 106 7.850 1.000 1.000  Mild Steel in Shield (mix 6)
   0.9903      Fe-Csteel
   0.0074      Mn-Csteel
   0.0023      C-nat-Csteel
end
/
mat 107 7.917 1.000 1.000  Stainless Steel (mix 7)
   0.6695      Fe-Ststeel
   0.0157      Mn-Ststeel
   0.1677      Cr-Ststeel
   0.1166      Ni-Ststeel
   0.0006      C-nat-Ststeel
   0.0050      Si-nat
   0.0003      P
   0.0002      S-nat
   0.0244      Mo-nat
end
/
mat 108 2.242 1.000 0.9980  Concrete (mix 8)
   0.0141      Fe-Con04
   0.3369      Si-nat-Con04
   0.0340      Al-Con04
   0.0100      H-H2OCon04
   0.5290      O-Con04
   0.0379      Ca-nat-Con04
   0.0200      K-nat-Con04
   0.0161      Na-Con04
end
/
mat 109 1.205e-03 1. 1.000 Air  (mix 9)
1. formula
      1.58 N
      0.42 O
   end-formula
end
/
/
```

TAB. A4 Continued

ADEFTA Input for the BUGLE-96 Library Calculations.

```
/ TORT Mixtures
/
mix 1  Mild steel in Trolley Face
      101  1.0
        end
mix 2  Aluminium in Trolley Face
      102  1.0
        end
mix 3  Graphite
      103  1.0
        end
mix 4  Fuel
      104  1.0
        end
mix 5  Aluminium in Fission Plate
      105  1.0
        end
mix 6  Mild Steel in Shield
      106  1.0
        end
mix 7  Stainless Steel
      107  1.0
        end
mix 8  Concrete
      108  1.0
        end
mix 9  Air
      109  1.0
        end
```

APPENDIX B

Input Data of BOT3P-5.3 - Generation of the Geometrical Model
Used in the Inhomogeneous Fission Neutron Source Calculations
with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB,
BUGLE-B7 and BUGLE-96 Libraries

TAB. B1

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
Iron-88 X-Y-Z Model. (model with trolley roof)
1  3.0  3.0  1.5 0.001 0.001 0.001
0
-95.91 90.81   -90.81  104.01   -119.80 222.68
0
0
8
-119.80  -79.80   6.
 -79.80  -39.80   4.
 -39.80  -19.80   2.
 -19.80  100.27   0.40
 100.27  122.68   1.45
 122.68  152.68   2.
 152.68  182.68   4.
 182.68  222.68   6.
0
33
1
190
/ 33 dosimeter positions (nuclear center line + lateral scan positions).
/ 15 positions are on the "nuclear center line", the Z axis
/ passing through the center of the fission plate.
/ All the dosimeter positions are supposed at the center
/ of the voids between two consecutive steel plates of the shield.
/
/ position   1:
  1    0.    0.    -0.55    0.   1.0   0.30
/ position   2:
  1    0.    0.     3.27    0.   1.0   0.24
/ position   3:
  1    0.    0.     9.11    0.   1.0   0.24
/ position   4:
  1    0.    0.    14.97    0.   1.0   0.24
/ position   5:
  1    0.    0.    20.83    0.   1.0   0.24
/ position   6:
  1    0.    0.    26.67    0.   1.0   0.24
/ position   7:
  1    0.    0.    32.61    0.   1.0   0.24
/ position   8:
  1    0.    0.    38.50    0.   1.0   0.24
/ position   9:
  1    0.    0.    44.44    0.   1.0   0.24
/ position  10:
  1    0.    0.    50.38    0.   1.0   0.24
/ position  11:
  1    0.    0.    56.37    0.   1.0   0.24
/ position  12:
  1    0.    0.    62.29    0.   1.0   0.24
/ position  13:
  1    0.    0.    68.10    0.   1.0   0.24
/ position  14:
  1    0.    0.    73.96    0.   1.0   0.24
/ position  15:
  1    0.    0.    79.88    0.   1.0   0.24
/ 3 are above position 5 at y=+25,+50,+75 [cm]
  1    0.   25.00  20.83    0.   1.0   0.24
  1    0.   50.00  20.83    0.   1.0   0.24
  1    0.   75.00  20.83    0.   1.0   0.24
/ 3 are below position 5 at y=+25,+50,+75 [cm]
  1    0.  -25.00  20.83    0.   1.0   0.24
  1    0.  -50.00  20.83    0.   1.0   0.24
  1    0.  -75.00  20.83    0.   1.0   0.24
/ 3 are above position 10 at y=+25,+50,+75 [cm]
  1    0.   25.00  50.38    0.   1.0   0.24
  1    0.   50.00  50.38    0.   1.0   0.24
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
  1    0.   75.00  50.38    0.   1.0   0.24
/ 3 are below position 10 at y=+25,+50,+75 [cm]
  1    0.  -25.00  50.38    0.   1.0   0.24
  1    0.  -50.00  50.38    0.   1.0   0.24
  1    0.  -75.00  50.38    0.   1.0   0.24
/ 3 are above position 15 at y=+25,+50,+75 [cm]
  1    0.   25.00  79.88    0.   1.0   0.24
  1    0.   50.00  79.88    0.   1.0   0.24
  1    0.   75.00  79.88    0.   1.0   0.24
/ 3 are below position 15 at y=+25,+50,+75 [cm]
  1    0.  -25.00  79.88    0.   1.0   0.24
  1    0.  -50.00  79.88    0.   1.0   0.24
  1    0.  -75.00  79.88    0.   1.0   0.24
0
0
begin zone
190
/
/
/ trolley
/
/ trolley bottom
1001
0. 0. 0. 0. 0. 0.
1  -95.91 90.81   -90.81 -88.90   -19.80 222.68
/ trolley top
1002
0. 0. 0. 0. 0. 0.
1  -95.91 90.81   102.10  104.01  -19.80 222.68
/ trolley sides
1003
0. 0. 0. 0. 0. 0.
1  -95.91 -94.00   -88.90  102.10   -19.80 222.68
1004
0. 0. 0. 0. 0. 0.
1   88.90  90.81   -88.90  102.10   -19.80 222.68
/
/
/ extra body in front of trolley (m.1 of graphite)
1100
0. 0. 0. 0. 0. 0.
1  -95.91 90.81   -90.81 104.01   -119.80 -19.80
/
/
/ aluminium/steel shield
/
/ mild steel (2001-2002)
/ aluminium 2002
2001
0. 0. 0. 0. 0. 0.
1  -94.00 88.90  -88.90  102.10   -19.80  -16.62
2002
-2.55 6.6 -19.80 0. 0. 0.
10 56.1 0. 3.18 8 3
/
/
/ gap between aluminium/steel shield AND graphite (void)
/
3000
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  -16.62 -16.10
/
/
/ graphite
/
4000
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  -16.10 -1.10
/
/
/ gap between graphite and fission plate (void)
/
3001
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  -1.10  0.
/
/
/ fission plate
/
/ left Al cover plate
5001
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  0. 1.2
/
/ right Al cover plate
5002
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  1.7 2.9
/
/ left void
5003
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  1.20 1.30
/
/ complete void window includes Al blanks and U/Al fuel strips
5004
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  1.30 1.70
/
/ left Al blank
5005
0. 0. 0. 0. 0. 0.
1  -59.50 59.50   -71.00 71.00  1.30 1.60
/
/ right Al blank
5006
0. 0. 0. 0. 0. 0.
1  -59.50 59.50   -71.00 71.00  1.60 1.70
/
/ U/Al fuel strips used to define neutron source
 9001
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75 -51.44 -47.63  1.40 1.60
 9002
0. 0. 0. 0. 0. 0.
1   -4.75   4.75 -51.44 -47.63  1.40 1.60
 9003
0. 0. 0. 0. 0. 0.
1    4.75  14.25 -51.44 -47.63  1.40 1.60
 9004
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25 -47.63 -40.64  1.40 1.60
 9005
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75 -47.63 -40.64  1.40 1.60
 9006
0. 0. 0. 0. 0. 0.
1   -4.75   4.75 -47.63 -40.64  1.40 1.60
 9007
0. 0. 0. 0. 0. 0.
1    4.75  14.25 -47.63 -40.64  1.40 1.60
 9008
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
0. 0. 0. 0. 0. 0.
1   14.25  30.08 -47.63 -40.64  1.40 1.60
 9009
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08 -40.64 -35.56  1.40 1.60
 9010
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25 -40.64 -35.56  1.40 1.60
 9011
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75 -40.64 -35.56  1.40 1.60
 9012
0. 0. 0. 0. 0. 0.
1   -4.75   4.75 -40.64 -35.56  1.40 1.60
 9013
0. 0. 0. 0. 0. 0.
1    4.75  14.25 -40.64 -35.56  1.40 1.60
 9014
0. 0. 0. 0. 0. 0.
1   14.25  30.08 -40.64 -35.56  1.40 1.60
 9015
0. 0. 0. 0. 0. 0.
1   30.08  36.42 -40.64 -35.56  1.40 1.60
 9016
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42 -35.56 -31.75  1.40 1.60
 9017
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08 -35.56 -31.75  1.40 1.60
 9018
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25 -35.56 -31.75  1.40 1.60
 9019
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75 -35.56 -31.75  1.40 1.60
 9020
0. 0. 0. 0. 0. 0.
1   -4.75   4.75 -35.56 -31.75  1.40 1.60
 9021
0. 0. 0. 0. 0. 0.
1    4.75  14.25 -35.56 -31.75  1.40 1.60
 9022
0. 0. 0. 0. 0. 0.
1   14.25  30.08 -35.56 -31.75  1.40 1.60
 9023
0. 0. 0. 0. 0. 0.
1   30.08  36.42 -35.56 -31.75  1.40 1.60
 9024
0. 0. 0. 0. 0. 0.
1   36.42  39.58 -35.56 -31.75  1.40 1.60
 9025
0. 0. 0. 0. 0. 0.
1  -45.92 -39.58 -31.75 -19.69  1.40 1.60
 9026
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42 -31.75 -19.69  1.40 1.60
 9027
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08 -31.75 -19.69  1.40 1.60
 9028
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25 -31.75 -19.69  1.40 1.60
 9029
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75 -31.75 -19.69  1.40 1.60
 9030
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
0. 0. 0. 0. 0. 0.
1   -4.75   4.75 -31.75 -19.69  1.40 1.60
 9031
0. 0. 0. 0. 0. 0.
1    4.75  14.25 -31.75 -19.69  1.40 1.60
 9032
0. 0. 0. 0. 0. 0.
1   14.25  30.08 -31.75 -19.69  1.40 1.60
 9033
0. 0. 0. 0. 0. 0.
1   30.08  36.42 -31.75 -19.69  1.40 1.60
 9034
0. 0. 0. 0. 0. 0.
1   36.42  39.58 -31.75 -19.69  1.40 1.60
 9035
0. 0. 0. 0. 0. 0.
1   39.58  45.92 -31.75 -19.69  1.40 1.60
 9036
0. 0. 0. 0. 0. 0.
1  -49.08 -45.92 -19.69 -15.88  1.40 1.60
 9037
0. 0. 0. 0. 0. 0.
1  -45.92 -39.58 -19.69 -15.88  1.40 1.60
 9038
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42 -19.69 -15.88  1.40 1.60
 9039
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08 -19.69 -15.88  1.40 1.60
 9040
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25 -19.69 -15.88  1.40 1.60
 9041
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75 -19.69 -15.88  1.40 1.60
 9042
0. 0. 0. 0. 0. 0.
1   -4.75   4.75 -19.69 -15.88  1.40 1.60
 9043
0. 0. 0. 0. 0. 0.
1    4.75  14.25 -19.69 -15.88  1.40 1.60
 9044
0. 0. 0. 0. 0. 0.
1   14.25  30.08 -19.69 -15.88  1.40 1.60
 9045
0. 0. 0. 0. 0. 0.
1   30.08  36.42 -19.69 -15.88  1.40 1.60
 9046
0. 0. 0. 0. 0. 0.
1   36.42  39.58 -19.69 -15.88  1.40 1.60
 9047
0. 0. 0. 0. 0. 0.
1   39.58  45.92 -19.69 -15.88  1.40 1.60
 9048
0. 0. 0. 0. 0. 0.
1   45.92  49.08 -19.69 -15.88  1.40 1.60
 9049
0. 0. 0. 0. 0. 0.
1  -52.25 -49.08 -15.88  -5.29  1.40 1.60
 9050
0. 0. 0. 0. 0. 0.
1  -49.08 -45.92 -15.88  -5.29  1.40 1.60
 9051
0. 0. 0. 0. 0. 0.
1  -45.92 -39.58 -15.88  -5.29  1.40 1.60
 9052
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42 -15.88  -5.29  1.40 1.60
 9053
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08 -15.88  -5.29  1.40 1.60
 9054
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25 -15.88  -5.29  1.40 1.60
 9055
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75 -15.88  -5.29  1.40 1.60
 9056
0. 0. 0. 0. 0. 0.
1   -4.75   4.75 -15.88  -5.29  1.40 1.60
 9057
0. 0. 0. 0. 0. 0.
1    4.75  14.25 -15.88  -5.29  1.40 1.60
 9058
0. 0. 0. 0. 0. 0.
1   14.25  30.08 -15.88  -5.29  1.40 1.60
 9059
0. 0. 0. 0. 0. 0.
1   30.08  36.42 -15.88  -5.29  1.40 1.60
 9060
0. 0. 0. 0. 0. 0.
1   36.42  39.58 -15.88  -5.29  1.40 1.60
 9061
0. 0. 0. 0. 0. 0.
1   39.58  45.92 -15.88  -5.29  1.40 1.60
 9062
0. 0. 0. 0. 0. 0.
1   45.92  49.08 -15.88  -5.29  1.40 1.60
 9063
0. 0. 0. 0. 0. 0.
1   49.08  52.25 -15.88  -5.29  1.40 1.60
 9064
0. 0. 0. 0. 0. 0.
1  -52.25 -49.08  -5.29   5.29  1.40 1.60
 9065
0. 0. 0. 0. 0. 0.
1  -49.08 -45.92  -5.29   5.29  1.40 1.60
 9066
0. 0. 0. 0. 0. 0.
1  -45.92 -39.58  -5.29   5.29  1.40 1.60
 9067
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42  -5.29   5.29  1.40 1.60
 9068
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08  -5.29   5.29  1.40 1.60
 9069
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25  -5.29   5.29  1.40 1.60
 9070
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75  -5.29   5.29  1.40 1.60
 9071
0. 0. 0. 0. 0. 0.
1   -4.75   4.75  -5.29   5.29  1.40 1.60
 9072
0. 0. 0. 0. 0. 0.
1    4.75  14.25  -5.29   5.29  1.40 1.60
 9073
0. 0. 0. 0. 0. 0.
1   14.25  30.08  -5.29   5.29  1.40 1.60
 9074
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
0. 0. 0. 0. 0. 0.
1   30.08  36.42  -5.29   5.29  1.40 1.60
 9075
0. 0. 0. 0. 0. 0.
1   36.42  39.58  -5.29   5.29  1.40 1.60
 9076
0. 0. 0. 0. 0. 0.
1   39.58  45.92  -5.29   5.29  1.40 1.60
 9077
0. 0. 0. 0. 0. 0.
1   45.92  49.08  -5.29   5.29  1.40 1.60
 9078
0. 0. 0. 0. 0. 0.
1   49.08  52.25  -5.29   5.29  1.40 1.60
 9079
0. 0. 0. 0. 0. 0.
1  -52.25 -49.08   5.29  15.88  1.40 1.60
 9080
0. 0. 0. 0. 0. 0.
1  -49.08 -45.92   5.29  15.88  1.40 1.60
 9081
0. 0. 0. 0. 0. 0.
1  -45.92 -39.58   5.29  15.88  1.40 1.60
 9082
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42   5.29  15.88  1.40 1.60
 9083
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08   5.29  15.88  1.40 1.60
 9084
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25   5.29  15.88  1.40 1.60
 9085
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75   5.29  15.88  1.40 1.60
 9086
0. 0. 0. 0. 0. 0.
1   -4.75   4.75   5.29  15.88  1.40 1.60
 9087
0. 0. 0. 0. 0. 0.
1    4.75  14.25   5.29  15.88  1.40 1.60
 9088
0. 0. 0. 0. 0. 0.
1   14.25  30.08   5.29  15.88  1.40 1.60
 9089
0. 0. 0. 0. 0. 0.
1   30.08  36.42   5.29  15.88  1.40 1.60
 9090
0. 0. 0. 0. 0. 0.
1   36.42  39.58   5.29  15.88  1.40 1.60
 9091
0. 0. 0. 0. 0. 0.
1   39.58  45.92   5.29  15.88  1.40 1.60
 9092
0. 0. 0. 0. 0. 0.
1   45.92  49.08   5.29  15.88  1.40 1.60
 9093
0. 0. 0. 0. 0. 0.
1   49.08  52.25   5.29  15.88  1.40 1.60
 9094
0. 0. 0. 0. 0. 0.
1  -49.08 -45.92  15.88  19.69  1.40 1.60
 9095
0. 0. 0. 0. 0. 0.
1  -45.92 -39.58  15.88  19.69  1.40 1.60
 9096
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42  15.88  19.69  1.40 1.60
 9097
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08  15.88  19.69  1.40 1.60
 9098
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25  15.88  19.69  1.40 1.60
 9099
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75  15.88  19.69  1.40 1.60
 9100
0. 0. 0. 0. 0. 0.
1   -4.75   4.75  15.88  19.69  1.40 1.60
 9101
0. 0. 0. 0. 0. 0.
1    4.75  14.25  15.88  19.69  1.40 1.60
 9102
0. 0. 0. 0. 0. 0.
1   14.25  30.08  15.88  19.69  1.40 1.60
 9103
0. 0. 0. 0. 0. 0.
1   30.08  36.42  15.88  19.69  1.40 1.60
 9104
0. 0. 0. 0. 0. 0.
1   36.42  39.58  15.88  19.69  1.40 1.60
 9105
0. 0. 0. 0. 0. 0.
1   39.58  45.92  15.88  19.69  1.40 1.60
 9106
0. 0. 0. 0. 0. 0.
1   45.92  49.08  15.88  19.69  1.40 1.60
 9107
0. 0. 0. 0. 0. 0.
1  -45.92 -39.58  19.69  31.75  1.40 1.60
 9108
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42  19.69  31.75  1.40 1.60
 9109
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08  19.69  31.75  1.40 1.60
 9110
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25  19.69  31.75  1.40 1.60
 9111
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75  19.69  31.75  1.40 1.60
 9112
0. 0. 0. 0. 0. 0.
1   -4.75   4.75  19.69  31.75  1.40 1.60
 9113
0. 0. 0. 0. 0. 0.
1    4.75  14.25  19.69  31.75  1.40 1.60
 9114
0. 0. 0. 0. 0. 0.
1   14.25  30.08  19.69  31.75  1.40 1.60
 9115
0. 0. 0. 0. 0. 0.
1   30.08  36.42  19.69  31.75  1.40 1.60
 9116
0. 0. 0. 0. 0. 0.
1   36.42  39.58  19.69  31.75  1.40 1.60
 9117
0. 0. 0. 0. 0. 0.
1   39.58  45.92  19.69  31.75  1.40 1.60
 9118
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
0. 0. 0. 0. 0. 0.
1  -39.58 -36.42  31.75  35.56  1.40 1.60
 9119
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08  31.75  35.56  1.40 1.60
 9120
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25  31.75  35.56  1.40 1.60
 9121
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75  31.75  35.56  1.40 1.60
 9122
0. 0. 0. 0. 0. 0.
1   -4.75   4.75  31.75  35.56  1.40 1.60
 9123
0. 0. 0. 0. 0. 0.
1    4.75  14.25  31.75  35.56  1.40 1.60
 9124
0. 0. 0. 0. 0. 0.
1   14.25  30.08  31.75  35.56  1.40 1.60
 9125
0. 0. 0. 0. 0. 0.
1   30.08  36.42  31.75  35.56  1.40 1.60
 9126
0. 0. 0. 0. 0. 0.
1   36.42  39.58  31.75  35.56  1.40 1.60
 9127
0. 0. 0. 0. 0. 0.
1  -36.42 -30.08  35.56  40.64  1.40 1.60
 9128
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25  35.56  40.64  1.40 1.60
 9129
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75  35.56  40.64  1.40 1.60
 9130
0. 0. 0. 0. 0. 0.
1   -4.75   4.75  35.56  40.64  1.40 1.60
 9131
0. 0. 0. 0. 0. 0.
1    4.75  14.25  35.56  40.64  1.40 1.60
 9132
0. 0. 0. 0. 0. 0.
1   14.25  30.08  35.56  40.64  1.40 1.60
 9133
0. 0. 0. 0. 0. 0.
1   30.08  36.42  35.56  40.64  1.40 1.60
 9134
0. 0. 0. 0. 0. 0.
1  -30.08 -14.25  40.64  47.63  1.40 1.60
 9135
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75  40.64  47.63  1.40 1.60
 9136
0. 0. 0. 0. 0. 0.
1   -4.75   4.75  40.64  47.63  1.40 1.60
 9137
0. 0. 0. 0. 0. 0.
1    4.75  14.25  40.64  47.63  1.40 1.60
 9138
0. 0. 0. 0. 0. 0.
1   14.25  30.08  40.64  47.63  1.40 1.60
 9139
0. 0. 0. 0. 0. 0.
1  -14.25  -4.75  47.63  51.44  1.40 1.60
 9140
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
0. 0. 0. 0. 0. 0.
1   -4.75   4.75  47.63  51.44  1.40 1.60
 9141
0. 0. 0. 0. 0. 0.
1    4.75  14.25  47.63  51.44  1.40 1.60
/
/ shield and gaps
/
/  A2 gap
3002
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  2.90 3.64
/
/  shield  1
7001
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  3.64 8.74
/
/  A3 gap
3003
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  8.74 9.48
/
/  shield  2
7002
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  9.48 14.60
/
/  A4 gap
3004
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  14.60 15.34
/
/  shield  3
7003
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  15.34 20.46
/
/  A5 gap
3005
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  20.46 21.20
/
/  shield  4
7004
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  21.20 26.30
/
/  A6 gap
3006
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  26.30 27.04
/
/  shield  5
7005
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  27.04 32.24
/
/  A7 gap
3007
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  32.24 32.98
/
/  shield  6
7006
0. 0. 0. 0. 0. 0.
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
1  -94.00 88.90   -88.90 102.10  32.98 38.13
/
/  A8 gap
3008
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  38.13 38.87
/
/  shield  7
7007
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  38.87 44.07
/
/  A9 gap
3009
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  44.07 44.81
/
/  shield  8
7008
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  44.81 50.01
/
/ A10 gap
3010
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  50.01 50.75
/
/  shield  9
7009
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  50.75 56.00
/
/ A11 gap
3011
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  56.00 56.74
/
/  shield 10
7010
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  56.74 61.92
/
/ A12 gap
3012
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  61.92 62.66
/
/  shield 11
7011
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  62.66 67.73
/
/ A13 gap
3013
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  67.73 68.47
/
/  shield 12
7012
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  68.47 73.59
/
/ A14 gap
3014
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  73.59 74.33
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
/
/  shield 13
7013
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  74.33 79.51
/
/ A15 gap
3015
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  79.51 80.25
/
/
/ steel at back (4 mild steel shields)
/
7021
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  80.25  85.35
7022
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  85.35  90.60
7023
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  90.60  95.60
7024
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  95.60 100.27
/
/
/ stainless steel at back
/
7031
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  100.27  122.68
/
/
/ concrete
/
8001
0. 0. 0. 0. 0. 0.
1  -94.00 88.90   -88.90 102.10  122.68  222.68
/
/
/ material zone summary:
/
/ Fuel (mat 4):                       1 -> 141
/ Void (air, mat 9):                142 -> 159
/ Al (trolley face, mat 2):         160
/ Al (fission plate, mat 5):        161 -> 164
/ Graphite (mat 3):                 165
/ Shield (mild steel, mat 6):       166 -> 182
/ SS-Shield (s-steel, mat 7):       183
/ Concrete (mat 8):                 184
/ Trolley face (mild steel, mat 1): 185
/ Trolley (mild steel, mat 6):      186 -> 189
/ Extra body (graphite, mat 3):     190
/
zona   1  2.458E+07 4 1. 18
 9001
zona   2  2.525E+07 4 1. 18
 9002
zona   3  2.448E+07 4 1. 18
 9003
zona   4  2.745E+07 4 1. 18
 9004
zona   5  3.072E+07 4 1. 18
 9005
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
zona   6  3.150E+07 4 1. 18
 9006
zona   7  3.067E+07 4 1. 18
 9007
zona   8  2.685E+07 4 1. 18
 9008
zona   9  2.896E+07 4 1. 18
 9009
zona  10  3.396E+07 4 1. 18
 9010
zona  11  3.770E+07 4 1. 18
 9011
zona  12  3.855E+07 4 1. 18
 9012
zona  13  3.758E+07 4 1. 18
 9013
zona  14  3.320E+07 4 1. 18
 9014
zona  15  2.712E+07 4 1. 18
 9015
zona  16  3.004E+07 4 1. 18
 9016
zona  17  3.299E+07 4 1. 18
 9017
zona  18  3.855E+07 4 1. 18
 9018
zona  19  4.267E+07 4 1. 18
 9019
zona  20  4.357E+07 4 1. 18
 9020
zona  21  4.247E+07 4 1. 18
 9021
zona  22  3.766E+07 4 1. 18
 9022
zona  23  3.101E+07 4 1. 18
 9023
zona  24  2.748E+07 4 1. 18
 9024
zona  25  3.182E+07 4 1. 18
 9025
zona  26  3.562E+07 4 1. 18
 9026
zona  27  3.912E+07 4 1. 18
 9027
zona  28  4.572E+07 4 1. 18
 9028
zona  29  5.053E+07 4 1. 18
 9029
zona  30  5.149E+07 4 1. 18
 9030
zona  31  5.013E+07 4 1. 18
 9031
zona  32  4.461E+07 4 1. 18
 9032
zona  33  3.713E+07 4 1. 18
 9033
zona  34  3.317E+07 4 1. 18
 9034
zona  35  2.887E+07 4 1. 18
 9035
zona  36  3.136E+07 4 1. 18
 9036
zona  37  3.574E+07 4 1. 18
 9037
zona  38  4.001E+07 4 1. 18
 9038
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
zona  39  4.400E+07 4 1. 18
 9039
zona  40  5.157E+07 4 1. 18
 9040
zona  41  5.701E+07 4 1. 18
 9041
zona  42  5.802E+07 4 1. 18
 9042
zona  43  5.643E+07 4 1. 18
 9043
zona  44  5.031E+07 4 1. 18
 9044
zona  45  4.221E+07 4 1. 18
 9045
zona  46  3.795E+07 4 1. 18
 9046
zona  47  3.331E+07 4 1. 18
 9047
zona  48  2.843E+07 4 1. 18
 9048
zona  49  3.026E+07 4 1. 18
 9049
zona  50  3.325E+07 4 1. 18
 9050
zona  51  3.784E+07 4 1. 18
 9051
zona  52  4.239E+07 4 1. 18
 9052
zona  53  4.669E+07 4 1. 18
 9053
zona  54  5.491E+07 4 1. 18
 9054
zona  55  6.079E+07 4 1. 18
 9055
zona  56  6.183E+07 4 1. 18
 9056
zona  57  6.009E+07 4 1. 18
 9057
zona  58  5.364E+07 4 1. 18
 9058
zona  59  4.523E+07 4 1. 18
 9059
zona  60  4.084E+07 4 1. 18
 9060
zona  61  3.607E+07 4 1. 18
 9061
zona  62  3.103E+07 4 1. 18
 9062
zona  63  2.751E+07 4 1. 18
 9063
zona  64  3.132E+07 4 1. 18
 9064
zona  65  3.427E+07 4 1. 18
 9065
zona  66  3.893E+07 4 1. 18
 9066
zona  67  4.364E+07 4 1. 18
 9067
zona  68  4.815E+07 4 1. 18
 9068
zona  69  5.684E+07 4 1. 18
 9069
zona  70  6.304E+07 4 1. 18
 9070
zona  71  6.412E+07 4 1. 18
 9071
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
zona  72  6.227E+07 4 1. 18
 9072
zona  73  5.563E+07 4 1. 18
 9073
zona  74  4.710E+07 4 1. 18
 9074
zona  75  4.270E+07 4 1. 18
 9075
zona  76  3.792E+07 4 1. 18
 9076
zona  77  3.287E+07 4 1. 18
 9077
zona  78  2.932E+07 4 1. 18
 9078
zona  79  3.040E+07 4 1. 18
 9079
zona  80  3.322E+07 4 1. 18
 9080
zona  81  3.769E+07 4 1. 18
 9081
zona  82  4.223E+07 4 1. 18
 9082
zona  83  4.660E+07 4 1. 18
 9083
zona  84  5.505E+07 4 1. 18
 9084
zona  85  6.110E+07 4 1. 18
 9085
zona  86  6.215E+07 4 1. 18
 9086
zona  87  6.034E+07 4 1. 18
 9087
zona  88  5.387E+07 4 1. 18
 9088
zona  89  4.559E+07 4 1. 18
 9089
zona  90  4.133E+07 4 1. 18
 9090
zona  91  3.673E+07 4 1. 18
 9091
zona  92  3.188E+07 4 1. 18
 9092
zona  93  2.850E+07 4 1. 18
 9093
zona  94  3.150E+07 4 1. 18
 9094
zona  95  3.575E+07 4 1. 18
 9095
zona  96  4.003E+07 4 1. 18
 9096
zona  97  4.412E+07 4 1. 18
 9097
zona  98  5.202E+07 4 1. 18
 9098
zona  99  5.770E+07 4 1. 18
 9099
zona 100  5.870E+07 4 1. 18
 9100
zona 101  5.699E+07 4 1. 18
 9101
zona 102  5.080E+07 4 1. 18
 9102
zona 103  4.282E+07 4 1. 18
 9103
zona 104  3.873E+07 4 1. 18
 9104
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
zona 105  3.431E+07 4 1. 18
 9105
zona 106  2.970E+07 4 1. 18
 9106
zona 107  3.249E+07 4 1. 18
 9107
zona 108  3.635E+07 4 1. 18
 9108
zona 109  3.999E+07 4 1. 18
 9109
zona 110  4.696E+07 4 1. 18
 9110
zona 111  5.197E+07 4 1. 18
 9111
zona 112  5.286E+07 4 1. 18
 9112
zona 113  5.130E+07 4 1. 18
 9113
zona 114  4.555E+07 4 1. 18
 9114
zona 115  3.807E+07 4 1. 18
 9115
zona 116  3.422E+07 4 1. 18
 9116
zona 117  3.009E+07 4 1. 18
 9117
zona 118  3.186E+07 4 1. 18
 9118
zona 119  3.500E+07 4 1. 18
 9119
zona 120  4.092E+07 4 1. 18
 9120
zona 121  4.514E+07 4 1. 18
 9121
zona 122  4.587E+07 4 1. 18
 9122
zona 123  4.446E+07 4 1. 18
 9123
zona 124  3.925E+07 4 1. 18
 9124
zona 125  3.240E+07 4 1. 18
 9125
zona 126  2.886E+07 4 1. 18
 9126
zona 127  3.176E+07 4 1. 18
 9127
zona 128  3.711E+07 4 1. 18
 9128
zona 129  4.088E+07 4 1. 18
 9129
zona 130  4.149E+07 4 1. 18
 9130
zona 131  4.015E+07 4 1. 18
 9131
zona 132  3.529E+07 4 1. 18
 9132
zona 133  2.890E+07 4 1. 18
 9133
zona 134  3.173E+07 4 1. 18
 9134
zona 135  3.496E+07 4 1. 18
 9135
zona 136  3.537E+07 4 1. 18
 9136
zona 137  3.404E+07 4 1. 18
 9137
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
zona 138  2.975E+07 4 1. 18
 9138
zona 139  2.973E+07 4 1. 18
 9139
zona 140  2.994E+07 4 1. 18
 9140
zona 141  2.865E+07 4 1. 18
 9141
/
/
/ GAP between ALUMINIUM/STEEL SHIELD and GRAPHITE (VOID)
zona 142  0.  9  1.  1
 3000
/
/ GAP A1
zona 143  0.  9  1.  1
 3001
/
/ GAP A2
zona 144  0.  9  1.  1
 3002
/
/ GAP A3
zona 145  0.  9  1.  1
 3003
/
/ GAP A4
zona 146  0.  9  1.  1
 3004
/
/ GAP A5
zona 147  0.  9  1.  1
 3005
/
/ GAP A6
zona 148 0.  9  1.  1
 3006
/
/ GAP A7
zona 149 0.  9  1.  1
 3007
/
/ GAP A8
zona 150 0.  9  1.  1
 3008
/
/ GAP A9
zona 151 0.  9  1.  1
 3009
/
/ GAP A10
zona 152 0.  9  1.  1
 3010
/
/ GAP A11
zona 153 0.  9  1.  1
 3011
/
/ GAP A12
zona 154 0.  9  1.  1
 3012
/
/ GAP A13
zona 155 0.  9  1.  1
 3013
/
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
/ GAP A14
zona 156 0.  9  1.  1
 3014
/
/ GAP A15
zona 157 0.  9  1.  1
 3015
/
/ LEFT VOID in FISSION PLATE
zona 158 0.  9  1.  1
 5003
/
/ VOID around Al BLANKS and U/Al FUEL STRIPS
zona 159 0.  9  1.  1
 5004 -5005 -5006
/
/
/ Aluminium ZONES: Al in TROLLEY FACE and in FISSION PLATE
/
/ Al in trolley face
zona 160 0.  2  1.  2
 2002
/
/ left Al cover plate
zona 161 0.  5  1.  2
5001
/
/ right Al cover plate
zona 162 0.  5  1.  2
5002
/
/ left Al blank
zona 163 0.  5  1.  2
5005
/
/ right Al blank
zona 164 0.  5  1.  2
5006
/
/ GRAPHITE
zona 165 0.  3  1.  2
4000
/
/
/ shield (mild steel, mat. 6) (shields 1 -> 13, zones: 166->178)
zona 166 0.  6  1.  2
7001
zona 167 0.  6  1.  2
7002
zona 168 0.  6  1.  2
7003
zona 169 0.  6  1.  2
7004
zona 170 0.  6  1.  2
7005
zona 171 0.  6  1.  2
7006
zona 172 0.  6  1.  2
7007
zona 173 0.  6  1.  2
7008
zona 174 0.  6  1.  2
7009
zona 175 0.  6  1.  2
7010
zona 176 0.  6  1.  2
```

TAB. B1 Continued

BOT3P-5.3 Input - GGTM Module Input for the Inhomogeneous Neutron Source Calculations.

```
7011
zona 177 0.  6  1.  2
7012
zona 178 0.  6  1.  2
7013
/
/ steel at back (mild steel, mat. 6, zones: 179->182)
zona 179 0.  6  1.  2
7021
zona 180 0.  6  1.  2
7022
zona 181 0.  6  1.  2
7023
zona 182 0.  6  1.  2
7024
/
/ SS-Shield (s-steel, mat 7, zone:  183)
zona 183 0.  7  1.  2
7031
/
/ Concrete (mat 8, zone:  184)
zona 184 0.  8  1.  2
8001
/
/ Trolley face (mild steel, mat 1, zone 185)
zona 185 0.  1  1.  2
2001 -2002
/
/ Trolley (mild steel, mat 6, zones: 186 -> 189)
zona 186 0.  6  1.  2
1001
zona 187 0.  6  1.  2
1002
zona 188 0.  6  1.  2
1003
zona 189 0.  6  1.  2
1004
/
/ Extra body in front of trolley (graphite, mat 3, zone: 190)
zona 190 0.  3  1.  2
1100
/
/
core no
```

APPENDIX C

Input Data of TORT-3.2 - Inhomogeneous Fission Neutron Source P_3-S_8 Calculations
with the BUGJEFF311.BOLIB, BUGENDF70.BOLIB,
BUGLE-B7 and BUGLE-96 Libraries

TAB. C1

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
=tort
WINFRITH Iron-88, X-Y-Z Model.
/ 45 Neutron Energy Groups, Inhomogeneous Neutron Fission Source,
/ TORT-3.2, S8 Full Symmetric Quadrature Sets,
/ P3 Cross Sections from BUGJEFF311.BOLIB Library.
61$$ / input/output file logical unit numbers
/ ntflx  ntfog  ntsig  ntbsi  ntdsi  ntrso   ntnpr  ntscl
    0       0      8     0     -3       0      0      1  e
62$$ / procedure control integers
/ nsrmx  nfxmx  icsprt ifxprt modep  nkeyfx iepsbz  nresp ktype nsctt
    1     -60      0     0      0     -33     11     -15    0     -1
/ iadj  negfix  nsclmx nbfacc mode    nbuf  locobj lcmobj minblk maxblk
    0      -1     50     0      0       0   100000    0     0      0 e
63$$ / geometry control integers
/  im    jm    km   ibl    ibr   ibi   ibo   ibb   ibt  ingeom
   73    79   278     0     0     0     0     0     0     0
/  izm  inreg  mm  mmesh  spare  nism  njsm  spare
   223    0    96   317     0     1     1     0     e
64$$ / cross section control integers
/  igm  ncrx  nsctm  iht  ihm   iups  neut
    45    9     3     3    70     e
66** / procedure control reals
/  epp
  1.0e-3 e
67** / problem control reals
/  xnf
  17.040e-24 e
t
t
81** / w / quadrature weights
0 2r151235-7 0 4r113425-7 0 113425-7 11574-6 2r113425-7 11574-6 113425-7
0 151235-7 2r113425-7 2r151235-7 2r113425-7 151235-7
  3q  24
82** / emu / first-direction cosines
-30861-5 -21822-5 21822-5 -61721-5 -57735-5 -21822-5 21822-5 57735-5
-8165-4 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 -9759-4
-95119-5 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 95119-5
  3q  24
83** / eta / last-direction cosines
3r-95119-5 5r-7868-4 7r-57735-5 9r-21822-5
   q  24 g  48
84** / rcmb /x coarse mesh boundaries number
   -95.91 90.81 f999
85** / thcmb /y coarse mesh boundaries number
  -90.81  104.01 f999
86** / zcmb /z coarse mesh boundaries
  -119.80 222.68 f999
t
2** / x fine mesh boundaries
 -9.591000e+01 -9.400000e+01 -9.112500e+01 -8.825000e+01 -8.537500e+01
 -8.250000e+01 -7.962500e+01 -7.675000e+01 -7.387500e+01 -7.100000e+01
 -6.812500e+01 -6.525000e+01 -6.237500e+01 -5.950000e+01 -5.865000e+01
 -5.667043e+01 -5.459061e+01 -5.225000e+01 -5.051089e+01 -4.908000e+01
 -4.592000e+01 -4.458808e+01 -4.208404e+01 -3.958000e+01 -3.704976e+01
 -3.642000e+01 -3.325000e+01 -3.008000e+01 -2.818563e+01 -2.490253e+01
 -2.161944e+01 -1.833634e+01 -1.425000e+01 -1.106520e+01 -7.880396e+00
 -4.750000e+00 -5.000000e-01  5.000000e-01  2.780396e+00  4.750000e+00
  7.578781e+00  1.040756e+01  1.323634e+01  1.425000e+01  1.719521e+01
  2.014042e+01  2.308563e+01  2.658282e+01  3.008000e+01  3.194976e+01
  3.642000e+01  3.948808e+01  3.958000e+01  4.249545e+01  4.541090e+01
  4.592000e+01  4.908000e+01  4.949061e+01  5.157042e+01  5.225000e+01
  5.355000e+01  5.652500e+01  5.950000e+01  6.244000e+01  6.538000e+01
  6.832000e+01  7.126000e+01  7.420000e+01  7.714001e+01  8.008001e+01
  8.302001e+01  8.596001e+01  8.890000e+01  9.081000e+01
3** / y fine mesh boundaries
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
 -9.081000e+01 -8.890000e+01 -8.555000e+01 -8.220000e+01 -7.885001e+01
 -7.550000e+01 -7.450000e+01 -7.100000e+01 -6.820571e+01 -6.541142e+01
 -6.261714e+01 -5.982285e+01 -5.702857e+01 -5.423428e+01 -5.144000e+01
 -5.050000e+01 -4.950000e+01 -4.763000e+01 -4.752042e+01 -4.544061e+01
 -4.136090e+01 -4.064000e+01 -3.810000e+01 -3.556000e+01 -3.543808e+01
 -3.175000e+01 -2.789976e+01 -2.550000e+01 -2.450000e+01 -2.209500e+01
 -1.969000e+01 -1.903563e+01 -1.588000e+01 -1.253317e+01 -9.186345e+00
 -5.290000e+00 -2.895000e+00 -5.000000e-01  5.000000e-01  1.269603e+00
  5.290000e+00  8.610198e+00  1.193040e+01  1.588000e+01  1.969000e+01
  2.238634e+01  2.450000e+01  2.550000e+01  2.862500e+01  3.175000e+01
  3.223563e+01  3.556000e+01  3.810000e+01  4.064000e+01  4.109976e+01
  4.436488e+01  4.763000e+01  4.863808e+01  4.950000e+01  5.050000e+01
  5.144000e+01  5.456090e+01  5.864061e+01  6.072042e+01  6.270000e+01
  6.546667e+01  6.823334e+01  7.100000e+01  7.450000e+01  7.550000e+01
  7.845556e+01  8.141112e+01  8.436668e+01  8.732224e+01  9.027779e+01
  9.323335e+01  9.618891e+01  9.914447e+01  1.021000e+02  1.040100e+02
4** / z fine mesh boundaries
 -1.198000e+02 -1.098000e+02 -9.980000e+01 -8.980000e+01 -7.980000e+01
 -7.408572e+01 -6.837143e+01 -6.265714e+01 -5.694286e+01 -5.122857e+01
 -4.551428e+01 -3.980000e+01 -3.694286e+01 -3.408571e+01 -3.122857e+01
 -2.837143e+01 -2.551428e+01 -2.265714e+01 -1.980000e+01 -1.916400e+01
 -1.852800e+01 -1.789200e+01 -1.725600e+01 -1.662000e+01 -1.610000e+01
 -1.550000e+01 -1.490000e+01 -1.430000e+01 -1.370000e+01 -1.310000e+01
 -1.250000e+01 -1.190000e+01 -1.130000e+01 -1.070000e+01 -1.010000e+01
 -9.499996e+00 -8.899996e+00 -8.299995e+00 -7.699996e+00 -7.099996e+00
 -6.499996e+00 -5.899996e+00 -5.299996e+00 -4.699996e+00 -4.099996e+00
 -3.499996e+00 -2.899996e+00 -2.299996e+00 -1.699996e+00 -1.100000e+00
 -7.000000e-01 -4.000000e-01  0.000000e+00  6.000000e-01  1.200000e+00
  1.300000e+00  1.400000e+00  1.600000e+00  1.700000e+00  2.300000e+00
  2.900000e+00  3.150000e+00  3.390000e+00  3.640000e+00  4.277500e+00
  4.915000e+00  5.552500e+00  6.190000e+00  6.827499e+00  7.464999e+00
  8.102499e+00  8.740000e+00  8.990000e+00  9.230000e+00  9.480000e+00
  1.004889e+01  1.061778e+01  1.118667e+01  1.175555e+01  1.232444e+01
  1.289333e+01  1.346222e+01  1.403111e+01  1.460000e+01  1.485000e+01
  1.509000e+01  1.534000e+01  1.590889e+01  1.647778e+01  1.704667e+01
  1.761556e+01  1.818445e+01  1.875334e+01  1.932223e+01  1.989112e+01
  2.046000e+01  2.071000e+01  2.095000e+01  2.120000e+01  2.183750e+01
  2.247500e+01  2.311250e+01  2.375000e+01  2.438750e+01  2.502501e+01
  2.566251e+01  2.630000e+01  2.655000e+01  2.679000e+01  2.704000e+01
  2.761778e+01  2.819556e+01  2.877333e+01  2.935111e+01  2.992889e+01
  3.050667e+01  3.108445e+01  3.166222e+01  3.224000e+01  3.249000e+01
  3.273000e+01  3.298000e+01  3.355222e+01  3.412445e+01  3.469667e+01
  3.526889e+01  3.584112e+01  3.641334e+01  3.698557e+01  3.755779e+01
  3.813000e+01  3.838000e+01  3.862000e+01  3.887000e+01  3.944778e+01
  4.002555e+01  4.060333e+01  4.118111e+01  4.175889e+01  4.233667e+01
  4.291444e+01  4.349222e+01  4.407000e+01  4.432000e+01  4.456000e+01
  4.481000e+01  4.538778e+01  4.596556e+01  4.654333e+01  4.712111e+01
  4.769889e+01  4.827667e+01  4.885445e+01  4.943222e+01  5.001000e+01
  5.026000e+01  5.050000e+01  5.075000e+01  5.133333e+01  5.191666e+01
  5.250000e+01  5.308333e+01  5.366666e+01  5.424999e+01  5.483332e+01
  5.541666e+01  5.600000e+01  5.625000e+01  5.649000e+01  5.674000e+01
  5.731556e+01  5.789111e+01  5.846666e+01  5.904222e+01  5.961777e+01
  6.019333e+01  6.076888e+01  6.134443e+01  6.192000e+01  6.217000e+01
  6.241000e+01  6.266000e+01  6.329375e+01  6.392750e+01  6.456125e+01
  6.519500e+01  6.582875e+01  6.646250e+01  6.709625e+01  6.773000e+01
  6.798000e+01  6.822000e+01  6.847000e+01  6.903889e+01  6.960777e+01
  7.017666e+01  7.074554e+01  7.131443e+01  7.188332e+01  7.245220e+01
  7.302109e+01  7.359000e+01  7.384000e+01  7.408000e+01  7.433000e+01
  7.490556e+01  7.548111e+01  7.605666e+01  7.663222e+01  7.720777e+01
  7.778333e+01  7.835888e+01  7.893443e+01  7.951000e+01  7.975999e+01
  8.000000e+01  8.025000e+01  8.088750e+01  8.152499e+01  8.216249e+01
  8.279999e+01  8.343748e+01  8.407498e+01  8.471248e+01  8.535000e+01
  8.593333e+01  8.651667e+01  8.710001e+01  8.768334e+01  8.826668e+01
  8.885001e+01  8.943335e+01  9.001669e+01  9.060000e+01  9.122500e+01
  9.185000e+01  9.247500e+01  9.310000e+01  9.372500e+01  9.435000e+01
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
  9.497500e+01  9.560000e+01  9.618375e+01  9.676749e+01  9.735124e+01
  9.793499e+01  9.851874e+01  9.910249e+01  9.968623e+01  1.002700e+02
  1.025110e+02  1.047520e+02  1.069930e+02  1.092340e+02  1.114750e+02
  1.137160e+02  1.159570e+02  1.181980e+02  1.204390e+02  1.226800e+02
  1.256800e+02  1.286800e+02  1.316800e+02  1.346800e+02  1.376800e+02
  1.406800e+02  1.436800e+02  1.466800e+02  1.496800e+02  1.526800e+02
  1.586800e+02  1.646800e+02  1.706800e+02  1.766800e+02  1.826800e+02
  1.926800e+02  2.026800e+02  2.126800e+02  2.226800e+02
6** / chs / fixed source energy spectrum
/CHI U_235 from JEFF-3.1.1
 4.98472e-05 2.00324e-04 1.13842e-03 2.50547e-03 5.61927e-03 1.60397e-02
 3.05081e-02 7.99783e-02 7.62523e-02 4.37217e-02 4.63810e-02 1.98992e-02
 4.00037e-03 2.41880e-02 7.30858e-02 7.15157e-02 8.90320e-02 1.14673e-01
 6.27061e-02 2.73374e-02 4.71250e-02 3.80487e-02 4.24774e-02 2.18273e-02
 3.08367e-02 1.59502e-02 7.74215e-03 3.70433e-03 1.04823e-03 6.07374e-04
 1.86537e-04 2.19216e-04 5.97163e-04 5.38754e-04 1.70683e-04 5.75558e-05
 2.49940e-05 3.44369e-06 1.25266e-06 5.50785e-07 1.75888e-07 2.27175e-08
 1.21404e-08 3.72794e-09 1.76098e-09 /1.19568e-09 3.80803e-10
7** /material density by zone
    223r1.0000e+00
8$$ / zone number by body
 190 186 188 187 185 142 165 143 161 158 159 162 144 166 145 167 146
 168 147 169 148 170 149 171 150 172 151 173 152 174 153 175 154 176
 155 177 156 178 157 179 180 181 182 183 184 159 163 164 159 185 160
 2r185 160 2r185 160 185 2r163 49 64 79 163 185 160 185 2r163 36 50 65
 80 94 3r163 25 37 51 66 81 95 107 163 185 160 185 2r163 16 26 38 52 67
 82 96 108 118 163 185 160 185 2r163 9 17 27 39 53 68 83 97 109 119 127
 3r163 4 10 18 28 40 54 69 84 98 110 120 128 134 163 185 160 2r185 160
 185 2r163 1 5 11 19 29 41 55 70 85 99 111 121 129 135 139 163 185 160
 185 2 6 12 20 30 42 56 71 86 100 112 122 130 136 140 185 160 185 3 7
 13 21 31 43 57 72 87 101 113 123 131 137 141 185 160 185 2r163 8 14 22
 32 44 58 73 88 102 114 124 132 138 163 185 160 185 2r163 15 23 33 45
 59 74 89 103 115 125 133 163 185 160 185 2r163 24 34 46 60 75 90 104
 116 126 163 185 160 185 2r163 35 47 61 76 91 105 117 163 185 160 185
 2r163 48 62 77 92 106 3r163 63 78 93 163 185 160 2r185 160 185 163 185
 159 189 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205
 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222
 223
9$$  /material number by material zone
 141r4 18r9 2 4r5 3 17r6 7 8 1 4r6 3 33r9
14** / body left boundaries
     4r-9.591000e+01    41r-9.400000e+01     4r-5.950000e+01
     3r-5.865000e+01     3r-5.667043e+01     3r-5.459061e+01
     6r-5.225000e+01     3r-5.051089e+01     8r-4.908000e+01
    10r-4.592000e+01     3r-4.458808e+01    12r-3.958000e+01
     3r-3.704976e+01    14r-3.642000e+01    16r-3.008000e+01
     3r-2.818563e+01     3r-1.833634e+01    18r-1.425000e+01
     3r-7.880396e+00    15r-4.750000e+00      3r2.780396e+00
     15r4.750000e+00      3r1.323634e+01     16r1.425000e+01
      3r2.308563e+01     14r3.008000e+01      3r3.194976e+01
     12r3.642000e+01      3r3.948808e+01     10r3.958000e+01
      3r4.541090e+01      8r4.592000e+01      6r4.908000e+01
      3r4.949061e+01      3r5.157042e+01        5.225000e+01
        5.355000e+01        5.950000e+01        8.890000e+01
    33r-5.000000e-01
15** / body right boundaries
      2r9.081000e+01       -9.400000e+01        9.081000e+01
      -5.865000e+01      5r8.890000e+01       -5.950000e+01
     34r8.890000e+01        5.950000e+01       -5.225000e+01
      2r5.950000e+01     3r-5.667043e+01     3r-5.459061e+01
     3r-5.051089e+01     6r-4.908000e+01     3r-4.458808e+01
     8r-4.592000e+01    10r-3.958000e+01     3r-3.704976e+01
    12r-3.642000e+01     3r-2.818563e+01    14r-3.008000e+01
    16r-1.425000e+01     3r-1.833634e+01     3r-7.880396e+00
      2r1.425000e+01    15r-4.750000e+00        1.425000e+01
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
        3r2.780396e+00     15r4.750000e+00      3r1.323634e+01
       15r1.425000e+01      3r2.308563e+01     16r3.008000e+01
        3r3.194976e+01     14r3.642000e+01      3r3.948808e+01
       12r3.958000e+01      3r4.541090e+01     10r4.592000e+01
        3r4.949061e+01      8r4.908000e+01      6r5.225000e+01
        3r5.157042e+01      3r5.355000e+01        5.950000e+01
        2r8.890000e+01        9.081000e+01     33r5.000000e-01
16** / body inside boundaries
       2r-9.081000e+01       -8.890000e+01        1.021000e+02
      42r-8.890000e+01     2r-7.100000e+01        7.100000e+01
         -8.890000e+01        1.269603e+00        1.193040e+01
         -8.890000e+01       -9.186345e+00        2.238634e+01
         -8.890000e+01       -1.903563e+01        3.223563e+01
         -7.100000e+01     2r-1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01       -8.890000e+01
         -2.789976e+01        4.109976e+01       -7.100000e+01
       2r-1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
         -7.100000e+01     2r-3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
         -8.890000e+01       -3.543808e+01        4.863808e+01
         -7.100000e+01     2r-3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01       -8.890000e+01
         -4.136090e+01        5.456090e+01       -7.100000e+01
       2r-4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
         -7.100000e+01     2r-4.763000e+01       -4.064000e+01
         -3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        4.064000e+01        4.763000e+01
         -8.890000e+01       -4.544061e+01        5.864061e+01
         -8.890000e+01       -4.752042e+01        6.072042e+01
         -7.100000e+01     2r-5.144000e+01       -4.763000e+01
         -4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          4.763000e+01        5.144000e+01       -8.890000e+01
         -4.950000e+01        6.270000e+01       -5.144000e+01
         -4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.752042e+01        6.072042e+01       -5.144000e+01
         -4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.544061e+01        5.864061e+01       -7.100000e+01
       2r-4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.136090e+01        5.456090e+01       -7.100000e+01
       2r-4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
         -8.890000e+01       -3.543808e+01        4.863808e+01
         -7.100000e+01     2r-3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01       -8.890000e+01
         -2.789976e+01        4.109976e+01       -7.100000e+01
       2r-3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01       -8.890000e+01
         -1.903563e+01        3.223563e+01       -7.100000e+01
       2r-1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
         -7.100000e+01     2r-1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01       -8.890000e+01
         -9.186345e+00        2.238634e+01       -8.890000e+01
          1.269603e+00        1.193040e+01       -7.100000e+01
       3r-8.890000e+01    15r-5.000000e-01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01
17** / body outside boundaries
          1.040100e+02       -8.890000e+01        1.021000e+02
          1.040100e+02     41r1.021000e+02       -7.100000e+01
        2r7.100000e+01        1.021000e+02        1.269603e+00
          1.193040e+01        1.021000e+02       -9.186345e+00
          2.238634e+01        1.021000e+02       -1.903563e+01
          3.223563e+01        1.021000e+02       -1.588000e+01
          1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        7.100000e+01       -2.789976e+01
          4.109976e+01        1.021000e+02       -1.969000e+01
          1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          7.100000e+01       -3.175000e+01        3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        7.100000e+01       -3.543808e+01
          4.863808e+01        1.021000e+02       -3.556000e+01
          3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        7.100000e+01       -4.136090e+01
          5.456090e+01        1.021000e+02       -4.064000e+01
          4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          7.100000e+01       -4.763000e+01        4.763000e+01
         -4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          4.763000e+01        7.100000e+01       -4.544061e+01
          5.864061e+01        1.021000e+02       -4.752042e+01
          6.072042e+01        1.021000e+02       -5.144000e+01
          5.144000e+01       -4.763000e+01       -4.064000e+01
         -3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        4.064000e+01        4.763000e+01
          5.144000e+01        7.100000e+01       -4.950000e+01
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
         6.270000e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.752042e+01
         6.072042e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.544061e+01
         5.864061e+01        1.021000e+02       -4.763000e+01
         4.763000e+01       -4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        4.763000e+01        7.100000e+01
        -4.136090e+01        5.456090e+01        1.021000e+02
        -4.064000e+01        4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        7.100000e+01       -3.543808e+01
         4.863808e+01        1.021000e+02       -3.556000e+01
         3.556000e+01       -3.175000e+01       -1.969000e+01
        -1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        1.969000e+01        3.175000e+01
         3.556000e+01        7.100000e+01       -2.789976e+01
         4.109976e+01        1.021000e+02       -3.175000e+01
         3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        7.100000e+01
        -1.903563e+01        3.223563e+01        1.021000e+02
        -1.969000e+01        1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        7.100000e+01       -1.588000e+01
         1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        7.100000e+01       -9.186345e+00
         2.238634e+01        1.021000e+02        1.269603e+00
         1.193040e+01        1.021000e+02        7.100000e+01
       3r1.021000e+02     15r5.000000e-01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01
18** / body bottom boundaries
        -1.198000e+02     4r-1.980000e+01       -1.662000e+01
        -1.610000e+01       -1.100000e+00        0.000000e+00
         1.200000e+00        1.300000e+00        1.700000e+00
         2.900000e+00        3.640000e+00        8.740000e+00
         9.480000e+00        1.460000e+01        1.534000e+01
         2.046000e+01        2.120000e+01        2.630000e+01
         2.704000e+01        3.224000e+01        3.298000e+01
         3.813000e+01        3.887000e+01        4.407000e+01
         4.481000e+01        5.001000e+01        5.075000e+01
         5.600000e+01        5.674000e+01        6.192000e+01
         6.266000e+01        6.773000e+01        6.847000e+01
         7.359000e+01        7.433000e+01        7.951000e+01
         8.025000e+01        8.535000e+01        9.060000e+01
         9.560000e+01        1.002700e+02        1.226800e+02
       2r1.300000e+00        1.600000e+00        1.300000e+00
      9r-1.980000e+01      2r1.300000e+00      3r1.400000e+00
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        5r1.400000e+00      3r1.300000e+00      7r1.400000e+00
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        9r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00     11r1.400000e+00      3r1.300000e+00
       13r1.400000e+00         1.300000e+00     6r-1.980000e+01
        2r1.300000e+00     15r1.400000e+00         1.300000e+00
       3r-1.980000e+01     15r1.400000e+00     3r-1.980000e+01
       15r1.400000e+00     3r-1.980000e+01      2r1.300000e+00
       13r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00     11r1.400000e+00         1.300000e+00
       3r-1.980000e+01      2r1.300000e+00      9r1.400000e+00
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        7r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00      5r1.400000e+00      3r1.300000e+00
        3r1.400000e+00         1.300000e+00     6r-1.980000e+01
          1.300000e+00        -1.980000e+01         1.300000e+00
         -1.980000e+01        -7.000000e-01         3.150000e+00
          8.990000e+00         1.485000e+01         2.071000e+01
          2.655000e+01         3.249000e+01         3.838000e+01
          4.432000e+01         5.026000e+01         5.625000e+01
          6.217000e+01         6.798000e+01         7.384000e+01
          7.975999e+01      6r2.071000e+01      6r5.026000e+01
        6r7.975999e+01
19** / body top boundaries
         -1.980000e+01      3r2.226800e+02        -1.662000e+01
         -1.610000e+01        -1.100000e+00         0.000000e+00
          1.200000e+00         1.300000e+00         1.700000e+00
          2.900000e+00         3.640000e+00         8.740000e+00
          9.480000e+00         1.460000e+01         1.534000e+01
          2.046000e+01         2.120000e+01         2.630000e+01
          2.704000e+01         3.224000e+01         3.298000e+01
          3.813000e+01         3.887000e+01         4.407000e+01
          4.481000e+01         5.001000e+01         5.075000e+01
          5.600000e+01         5.674000e+01         6.192000e+01
          6.266000e+01         6.773000e+01         6.847000e+01
          7.359000e+01         7.433000e+01         7.951000e+01
          8.025000e+01         8.535000e+01         9.060000e+01
          9.560000e+01         1.002700e+02         1.226800e+02
          2.226800e+02         1.700000e+00         1.600000e+00
        2r1.700000e+00     9r-1.662000e+01         1.600000e+00
          1.400000e+00      4r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00      7r1.600000e+00
          1.400000e+00      8r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00     10r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
       13r1.600000e+00         1.400000e+00     14r1.600000e+00
       6r-1.662000e+01         1.600000e+00         1.400000e+00
       16r1.600000e+00     3r-1.662000e+01     15r1.600000e+00
       3r-1.662000e+01     15r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00     14r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
       12r1.600000e+00     3r-1.662000e+01         1.600000e+00
          1.400000e+00     10r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00      8r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
        7r1.600000e+00         1.400000e+00      4r1.600000e+00
       6r-1.662000e+01         1.600000e+00        -1.662000e+01
          1.700000e+00         2.226800e+02        -4.000000e-01
          3.390000e+00         9.230000e+00         1.509000e+01
          2.095000e+01         2.679000e+01         3.273000e+01
          3.862000e+01         4.456000e+01         5.050000e+01
          5.649000e+01         6.241000e+01         6.822000e+01
          7.408000e+01         8.000000e+01      6r2.095000e+01
        6r5.050000e+01      6r8.000000e+01
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
21$$ / itmbg / iteration limit by group
       45r60
22** / i key flux locations
     33r0.0000e+00
23** / j key flux locations
     15r0.0000e+00        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01        2.5000e+01
        5.0000e+01        7.5000e+01       -2.5000e+01       -5.0000e+01
       -7.5000e+01        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01
24** / k key flux locations
       -5.5000e-01        3.2700e+00        9.1100e+00        1.4970e+01
        2.0830e+01        2.6670e+01        3.2610e+01        3.8500e+01
        4.4440e+01        5.0380e+01        5.6370e+01        6.2290e+01
        6.8100e+01        7.3960e+01        7.9880e+01      6r2.0830e+01
      6r5.0380e+01      6r7.9880e+01
27** /group response by group
/   16-S_32    MT=103 (n,p)     FLAT WEIGHTING   (IRDF-2002)
 1.7639e-01 3.0787e-01 3.8051e-01 3.3979e-01 3.2202e-01 3.1380e-01
 2.4629e-01 2.7592e-01 1.9108e-01 1.0053e-01 6.8686e-02 7.2417e-02
 6.6472e-02 6.1245e-02 2.1377e-02 4.1502e-03 5.9998e-04 6.0917e-05
 1.6785e-06 26z /2z
/
/   49-In_115  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 5.8133e-02 9.1680e-02 2.0239e-01 2.7381e-01 3.0859e-01 3.3417e-01
 3.3897e-01 3.2538e-01 3.3341e-01 3.5259e-01 3.5385e-01 3.4311e-01
 3.3654e-01 3.2759e-01 2.9012e-01 2.3022e-01 1.7096e-01 1.0336e-01
 4.9401e-02 2.7891e-02 1.5489e-02 6.3893e-03 2.2558e-03 1.6310e-04
 21z /2z
/
/   45-Rh_103  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 2.3466e-01 3.8742e-01 8.1816e-01 1.2190e+00 1.2753e+00 1.2305e+00
 1.1732e+00 1.1091e+00 1.0370e+00 9.8735e-01 9.5185e-01 9.2536e-01
 9.1570e-01 9.0494e-01 8.6764e-01 8.0955e-01 7.4452e-01 6.6193e-01
 5.8044e-01 4.9269e-01 3.3867e-01 1.9319e-01 1.3801e-01 1.0374e-01
 6.6383e-02 2.3291e-02 5.8219e-03 1.6581e-03 3.4572e-06 16z /2z
/
/   79-Au_197  MT=102 (n,gamma) FLAT WEIGHTING   (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 6.8138e-04 1.6063e-03 1.6769e-03 1.1792e-03 9.1672e-04 2.9908e-03
 6.0619e-03 1.0673e-02 1.9494e-02 2.7032e-02 3.1752e-02 3.5656e-02
 3.7624e-02 4.0070e-02 4.9391e-02 6.0152e-02 6.7842e-02 7.5077e-02
 8.4031e-02 9.0899e-02 9.8907e-02 1.2061e-01 1.5148e-01 1.8519e-01
 2.3553e-01 2.7527e-01 3.2852e-01 4.2145e-01 5.3159e-01 5.9625e-01
 6.3013e-01 6.5349e-01 7.6339e-01 1.1561e+00 1.8461e+00 2.9907e+00
 8.0657e+00 1.2390e+01 1.0332e+01 1.8528e+01 6.5715e-01 9.5267e+01
 3.6192e+02 2.5048e+01 2.5505e+01 /3.5582e+01 9.4230e+01
/
/   13-Al_27   MT=107 (n,alpha) FLAT WEIGHTING   (IRDF-2002)
 9.7222e-02 1.2398e-01 1.0678e-01 7.7279e-02 4.1475e-02 1.1792e-02
 4.6528e-04 2.6020e-06 1.5730e-07 36z /2z
/
/   16-S_32    MT=103 (n,p)     1/4 T PV WEIGHTING  (IRDF-2002)
 1.9546e-01 3.1934e-01 3.7876e-01 3.3761e-01 3.2276e-01 3.1147e-01
 2.4085e-01 2.7606e-01 1.8725e-01 1.0010e-01 6.8656e-02 7.2333e-02
 6.6472e-02 6.1061e-02 2.1176e-02 3.8470e-03 5.7068e-04 5.6340e-05
 1.2101e-06 26z /2z
/
/   49-In_115  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 5.9192e-02 9.8480e-02 2.1539e-01 2.7598e-01 3.1011e-01 3.3546e-01
 3.3869e-01 3.2516e-01 3.3444e-01 3.5268e-01 3.5387e-01 3.4283e-01
 3.3654e-01 3.2736e-01 2.8986e-01 2.2810e-01 1.6934e-01 1.0148e-01
 4.7963e-02 2.7746e-02 1.4938e-02 6.4499e-03 2.1316e-03 1.5017e-04
 21z /2z
/
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
/   45-Rh_103  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 2.4762e-01 4.0937e-01 8.8683e-01 1.2278e+00 1.2744e+00 1.2262e+00
 1.1713e+00 1.1079e+00 1.0344e+00 9.8700e-01 9.5196e-01 9.2492e-01
 9.1570e-01 9.0468e-01 8.6739e-01 8.0741e-01 7.4261e-01 6.5961e-01
 5.7702e-01 4.9153e-01 3.2977e-01 1.9398e-01 1.3615e-01 1.0322e-01
 6.5599e-02 2.3237e-02 5.3946e-03 1.6350e-03 3.5663e-06 16z /2z
/
/   79-Au_197  MT=102 (n,gamma) 1/4 T PV WEIGHTING  (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 8.3799e-04 1.6630e-03 1.6244e-03 1.1555e-03 9.2183e-04 3.2177e-03
 6.1638e-03 1.0778e-02 1.9894e-02 2.7081e-02 3.1738e-02 3.5740e-02
 3.7624e-02 4.0129e-02 4.9455e-02 6.0480e-02 6.7970e-02 7.5320e-02
 8.4390e-02 9.0962e-02 9.9387e-02 1.2037e-01 1.5320e-01 1.8579e-01
 2.3642e-01 2.7531e-01 3.3518e-01 4.2224e-01 5.3069e-01 6.0536e-01
 6.3008e-01 6.5264e-01 7.5910e-01 1.1317e+00 1.8736e+00 3.1830e+00
 8.5877e+00 1.2102e+01 1.0530e+01 2.0634e+01 8.3767e-01 1.1673e+02
 2.9092e+02 2.4922e+01 2.5685e+01 /3.8156e+01 6.7837e+01
/
/   13-Al_27   MT=107 (n,alpha) 1/4 T PV WEIGHTING  (IRDF-2002)
 1.0459e-01 1.2390e-01 1.0305e-01 7.5681e-02 3.9827e-02 1.0004e-02
 4.0899e-04 2.4394e-06 1.3764e-07 36z /2z
/
/ E > 8.0 MeV Neutron Flux
      4r1. 4.8764e-01 40z /2z
/
/ E > 3.0 MeV Neutron Flux
      9r1. 3.9728e-02 35z /2z
/
/ E > 1.0 MeV Neutron Flux
     18r1.  1.3000e-02  26z /2z
/
/ E > 0.1 MeV Neutron Flux
     26r1.  2.1034e-01  18z /2z
/
/ E > 0.41399 eV Neutron Flux
     45r1. /2z
t
95** / shapg / source shape by group
/CHI U_235 from JEFF-3.1.1
 4.98472e-05 2.00324e-04 1.13842e-03 2.50547e-03 5.61927e-03 1.60397e-02
 3.05081e-02 7.99783e-02 7.62523e-02 4.37217e-02 4.63810e-02 1.98992e-02
 4.00037e-03 2.41880e-02 7.30858e-02 7.15157e-02 8.90320e-02 1.14673e-01
 6.27061e-02 2.73374e-02 4.71250e-02 3.80487e-02 4.24774e-02 2.18273e-02
 3.08367e-02 1.59502e-02 7.74215e-03 3.70433e-03 1.04823e-03 6.07374e-04
 1.86537e-04 2.19216e-04 5.97163e-04 5.38754e-04 1.70683e-04 5.75558e-05
 2.49940e-05 3.44369e-06 1.25266e-06 5.50785e-07 1.75888e-07 2.27175e-08
 1.21404e-08 3.72794e-09 1.76098e-09 /1.19568e-09 3.80803e-10
96** / distributed source distribution
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
1054r0.0000e+00     3r2.4580e+07     4r2.5250e+07     4r2.4480e+07
  62r0.0000e+00     3r2.4580e+07     4r2.5250e+07     4r2.4480e+07
  62r0.0000e+00     3r2.4580e+07     4r2.5250e+07     4r2.4480e+07
  57r0.0000e+00     5r2.7450e+07     3r3.0720e+07     4r3.1500e+07
   4r3.0670e+07     5r2.6850e+07    52r0.0000e+00     5r2.7450e+07
   3r3.0720e+07     4r3.1500e+07     4r3.0670e+07     5r2.6850e+07
  52r0.0000e+00     5r2.7450e+07     3r3.0720e+07     4r3.1500e+07
   4r3.0670e+07     5r2.6850e+07    52r0.0000e+00     5r2.7450e+07
   3r3.0720e+07     4r3.1500e+07     4r3.0670e+07     5r2.6850e+07
  50r0.0000e+00     2r2.8960e+07     5r3.3960e+07     3r3.7700e+07
   4r3.8550e+07     4r3.7580e+07     5r3.3200e+07     2r2.7120e+07
  48r0.0000e+00     2r2.8960e+07     5r3.3960e+07     3r3.7700e+07
   4r3.8550e+07     4r3.7580e+07     5r3.3200e+07     2r2.7120e+07
  46r0.0000e+00     2r3.0040e+07     2r3.2990e+07     5r3.8550e+07
   3r4.2670e+07     4r4.3570e+07     4r4.2470e+07     5r3.7660e+07
   2r3.1010e+07     2r2.7480e+07    44r0.0000e+00     2r3.0040e+07
   2r3.2990e+07     5r3.8550e+07     3r4.2670e+07     4r4.3570e+07
   4r4.2470e+07     5r3.7660e+07     2r3.1010e+07     2r2.7480e+07
  41r0.0000e+00     3r3.1820e+07     2r3.5620e+07     2r3.9120e+07
   5r4.5720e+07     3r5.0530e+07     4r5.1490e+07     4r5.0130e+07
   5r4.4610e+07     2r3.7130e+07     2r3.3170e+07     3r2.8870e+07
  38r0.0000e+00     3r3.1820e+07     2r3.5620e+07     2r3.9120e+07
   5r4.5720e+07     3r5.0530e+07     4r5.1490e+07     4r5.0130e+07
   5r4.4610e+07     2r3.7130e+07     2r3.3170e+07     3r2.8870e+07
  38r0.0000e+00     3r3.1820e+07     2r3.5620e+07     2r3.9120e+07
   5r4.5720e+07     3r5.0530e+07     4r5.1490e+07     4r5.0130e+07
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
37r0.0000e+00        3.1360e+07      3r3.5740e+07      2r4.0010e+07
 2r4.4000e+07      5r5.1570e+07      3r5.7010e+07      4r5.8020e+07
 4r5.6430e+07      5r5.0310e+07      2r4.2210e+07      2r3.7950e+07
 3r3.3310e+07        2.8430e+07     36r0.0000e+00        3.1360e+07
 3r3.5740e+07      2r4.0010e+07      2r4.4000e+07      5r5.1570e+07
 3r5.7010e+07      4r5.8020e+07      4r5.6430e+07      5r5.0310e+07
 2r4.2210e+07      2r3.7950e+07      3r3.3310e+07        2.8430e+07
34r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
33r0.0000e+00        3.1500e+07      3r3.5750e+07      2r4.0030e+07
 2r4.4120e+07      5r5.2020e+07      3r5.7700e+07      4r5.8700e+07
 4r5.6990e+07      5r5.0800e+07      2r4.2820e+07      2r3.8730e+07
 3r3.4310e+07        2.9700e+07     37r0.0000e+00      3r3.2490e+07
 2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
 4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
 2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     41r0.0000e+00      2r3.1860e+07
      2r3.5000e+07      5r4.0920e+07      3r4.5140e+07      4r4.5870e+07
      4r4.4460e+07      5r3.9250e+07      2r3.2400e+07      2r2.8860e+07
     44r0.0000e+00      2r3.1860e+07      2r3.5000e+07      5r4.0920e+07
      3r4.5140e+07      4r4.5870e+07      4r4.4460e+07      5r3.9250e+07
      2r3.2400e+07      2r2.8860e+07     46r0.0000e+00      2r3.1760e+07
      5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
      5r3.5290e+07      2r2.8900e+07     48r0.0000e+00      2r3.1760e+07
      5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
      5r3.5290e+07      2r2.8900e+07     50r0.0000e+00      5r3.1730e+07
      3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
     52r0.0000e+00      5r3.1730e+07      3r3.4960e+07      4r3.5370e+07
      4r3.4040e+07      5r2.9750e+07     52r0.0000e+00      5r3.1730e+07
      3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
     57r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
   1417r0.0000e+00
   5767r0.0000e+00
   f0.
/zone     1 volume= 7.2390e+00  source= 1.7793e+08 density= 1.0000e+00 mat.    4
/zone     2 volume= 7.2390e+00  source= 1.8278e+08 density= 1.0000e+00 mat.    4
/zone     3 volume= 7.2390e+00  source= 1.7721e+08 density= 1.0000e+00 mat.    4
/zone     4 volume= 2.2130e+01  source= 6.0748e+08 density= 1.0000e+00 mat.    4
/zone     5 volume= 1.3281e+01  source= 4.0799e+08 density= 1.0000e+00 mat.    4
/zone     6 volume= 1.3281e+01  source= 4.1835e+08 density= 1.0000e+00 mat.    4
/zone     7 volume= 1.3281e+01  source= 4.0733e+08 density= 1.0000e+00 mat.    4
/zone     8 volume= 2.2130e+01  source= 5.9420e+08 density= 1.0000e+00 mat.    4
/zone     9 volume= 6.4414e+00  source= 1.8654e+08 density= 1.0000e+00 mat.    4
/zone    10 volume= 1.6083e+01  source= 5.4619e+08 density= 1.0000e+00 mat.    4
/zone    11 volume= 9.6520e+00  source= 3.6388e+08 density= 1.0000e+00 mat.    4
/zone    12 volume= 9.6520e+00  source= 3.7208e+08 density= 1.0000e+00 mat.    4
/zone    13 volume= 9.6520e+00  source= 3.6272e+08 density= 1.0000e+00 mat.    4
/zone    14 volume= 1.6083e+01  source= 5.3396e+08 density= 1.0000e+00 mat.    4
/zone    15 volume= 6.4414e+00  source= 1.7469e+08 density= 1.0000e+00 mat.    4
/zone    16 volume= 2.4079e+00  source= 7.2334e+07 density= 1.0000e+00 mat.    4
/zone    17 volume= 4.8311e+00  source= 1.5938e+08 density= 1.0000e+00 mat.    4
/zone    18 volume= 1.2062e+01  source= 4.6501e+08 density= 1.0000e+00 mat.    4
/zone    19 volume= 7.2390e+00  source= 3.0889e+08 density= 1.0000e+00 mat.    4
/zone    20 volume= 7.2390e+00  source= 3.1540e+08 density= 1.0000e+00 mat.    4
/zone    21 volume= 7.2390e+00  source= 3.0744e+08 density= 1.0000e+00 mat.    4
/zone    22 volume= 1.2062e+01  source= 4.5427e+08 density= 1.0000e+00 mat.    4
/zone    23 volume= 4.8311e+00  source= 1.4981e+08 density= 1.0000e+00 mat.    4
/zone    24 volume= 2.4079e+00  source= 6.6170e+07 density= 1.0000e+00 mat.    4
/zone    25 volume= 1.5292e+01  source= 4.8659e+08 density= 1.0000e+00 mat.    4
/zone    26 volume= 7.6219e+00  source= 2.7149e+08 density= 1.0000e+00 mat.    4
/zone    27 volume= 1.5292e+01  source= 5.9823e+08 density= 1.0000e+00 mat.    4
/zone    28 volume= 3.8182e+01  source= 1.7457e+09 density= 1.0000e+00 mat.    4
/zone    29 volume= 2.2914e+01  source= 1.1578e+09 density= 1.0000e+00 mat.    4
/zone    30 volume= 2.2914e+01  source= 1.1798e+09 density= 1.0000e+00 mat.    4
/zone    31 volume= 2.2914e+01  source= 1.1487e+09 density= 1.0000e+00 mat.    4
/zone    32 volume= 3.8182e+01  source= 1.7033e+09 density= 1.0000e+00 mat.    4
/zone    33 volume= 1.5292e+01  source= 5.6779e+08 density= 1.0000e+00 mat.    4
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
/zone    34 volume= 7.6219e+00  source= 2.5282e+08 density= 1.0000e+00 mat.    4
/zone    35 volume= 1.5292e+01  source= 4.4148e+08 density= 1.0000e+00 mat.    4
/zone    36 volume= 2.4079e+00  source= 7.5512e+07 density= 1.0000e+00 mat.    4
/zone    37 volume= 4.8311e+00  source= 1.7266e+08 density= 1.0000e+00 mat.    4
/zone    38 volume= 2.4079e+00  source= 9.6341e+07 density= 1.0000e+00 mat.    4
/zone    39 volume= 4.8311e+00  source= 2.1257e+08 density= 1.0000e+00 mat.    4
/zone    40 volume= 1.2062e+01  source= 6.2206e+08 density= 1.0000e+00 mat.    4
/zone    41 volume= 7.2390e+00  source= 4.1270e+08 density= 1.0000e+00 mat.    4
/zone    42 volume= 7.2390e+00  source= 4.2001e+08 density= 1.0000e+00 mat.    4
/zone    43 volume= 7.2390e+00  source= 4.0850e+08 density= 1.0000e+00 mat.    4
/zone    44 volume= 1.2062e+01  source= 6.0686e+08 density= 1.0000e+00 mat.    4
/zone    45 volume= 4.8311e+00  source= 2.0392e+08 density= 1.0000e+00 mat.    4
/zone    46 volume= 2.4079e+00  source= 9.1381e+07 density= 1.0000e+00 mat.    4
/zone    47 volume= 4.8311e+00  source= 1.6092e+08 density= 1.0000e+00 mat.    4
/zone    48 volume= 2.4079e+00  source= 6.8457e+07 density= 1.0000e+00 mat.    4
/zone    49 volume= 6.7141e+00  source= 2.0317e+08 density= 1.0000e+00 mat.    4
/zone    50 volume= 6.6929e+00  source= 2.2254e+08 density= 1.0000e+00 mat.    4
/zone    51 volume= 1.3428e+01  source= 5.0812e+08 density= 1.0000e+00 mat.    4
/zone    52 volume= 6.6929e+00  source= 2.8371e+08 density= 1.0000e+00 mat.    4
/zone    53 volume= 1.3428e+01  source= 6.2696e+08 density= 1.0000e+00 mat.    4
/zone    54 volume= 3.3528e+01  source= 1.8410e+09 density= 1.0000e+00 mat.    4
/zone    55 volume= 2.0121e+01  source= 1.2232e+09 density= 1.0000e+00 mat.    4
/zone    56 volume= 2.0121e+01  source= 1.2441e+09 density= 1.0000e+00 mat.    4
/zone    57 volume= 2.0121e+01  source= 1.2091e+09 density= 1.0000e+00 mat.    4
/zone    58 volume= 3.3528e+01  source= 1.7984e+09 density= 1.0000e+00 mat.    4
/zone    59 volume= 1.3428e+01  source= 6.0735e+08 density= 1.0000e+00 mat.    4
/zone    60 volume= 6.6929e+00  source= 2.7334e+08 density= 1.0000e+00 mat.    4
/zone    61 volume= 1.3428e+01  source= 4.8435e+08 density= 1.0000e+00 mat.    4
/zone    62 volume= 6.6929e+00  source= 2.0768e+08 density= 1.0000e+00 mat.    4
/zone    63 volume= 6.7141e+00  source= 1.8470e+08 density= 1.0000e+00 mat.    4
/zone    64 volume= 6.7077e+00  source= 2.1009e+08 density= 1.0000e+00 mat.    4
/zone    65 volume= 6.6866e+00  source= 2.2915e+08 density= 1.0000e+00 mat.    4
/zone    66 volume= 1.3415e+01  source= 5.2226e+08 density= 1.0000e+00 mat.    4
/zone    67 volume= 6.6866e+00  source= 2.9180e+08 density= 1.0000e+00 mat.    4
/zone    68 volume= 1.3415e+01  source= 6.4595e+08 density= 1.0000e+00 mat.    4
/zone    69 volume= 3.3496e+01  source= 1.9039e+09 density= 1.0000e+00 mat.    4
/zone    70 volume= 2.0102e+01  source= 1.2672e+09 density= 1.0000e+00 mat.    4
/zone    71 volume= 2.0102e+01  source= 1.2889e+09 density= 1.0000e+00 mat.    4
/zone    72 volume= 2.0102e+01  source= 1.2518e+09 density= 1.0000e+00 mat.    4
/zone    73 volume= 3.3496e+01  source= 1.8634e+09 density= 1.0000e+00 mat.    4
/zone    74 volume= 1.3415e+01  source= 6.3187e+08 density= 1.0000e+00 mat.    4
/zone    75 volume= 6.6866e+00  source= 2.8552e+08 density= 1.0000e+00 mat.    4
/zone    76 volume= 1.3415e+01  source= 5.0871e+08 density= 1.0000e+00 mat.    4
/zone    77 volume= 6.6866e+00  source= 2.1979e+08 density= 1.0000e+00 mat.    4
/zone    78 volume= 6.7077e+00  source= 1.9667e+08 density= 1.0000e+00 mat.    4
/zone    79 volume= 6.7141e+00  source= 2.0411e+08 density= 1.0000e+00 mat.    4
/zone    80 volume= 6.6929e+00  source= 2.2234e+08 density= 1.0000e+00 mat.    4
/zone    81 volume= 1.3428e+01  source= 5.0611e+08 density= 1.0000e+00 mat.    4
/zone    82 volume= 6.6929e+00  source= 2.8264e+08 density= 1.0000e+00 mat.    4
/zone    83 volume= 1.3428e+01  source= 6.2575e+08 density= 1.0000e+00 mat.    4
/zone    84 volume= 3.3528e+01  source= 1.8457e+09 density= 1.0000e+00 mat.    4
/zone    85 volume= 2.0121e+01  source= 1.2294e+09 density= 1.0000e+00 mat.    4
/zone    86 volume= 2.0121e+01  source= 1.2505e+09 density= 1.0000e+00 mat.    4
/zone    87 volume= 2.0121e+01  source= 1.2141e+09 density= 1.0000e+00 mat.    4
/zone    88 volume= 3.3528e+01  source= 1.8062e+09 density= 1.0000e+00 mat.    4
/zone    89 volume= 1.3428e+01  source= 6.1219e+08 density= 1.0000e+00 mat.    4
/zone    90 volume= 6.6929e+00  source= 2.7662e+08 density= 1.0000e+00 mat.    4
/zone    91 volume= 1.3428e+01  source= 4.9321e+08 density= 1.0000e+00 mat.    4
/zone    92 volume= 6.6929e+00  source= 2.1337e+08 density= 1.0000e+00 mat.    4
/zone    93 volume= 6.7141e+00  source= 1.9135e+08 density= 1.0000e+00 mat.    4
/zone    94 volume= 2.4079e+00  source= 7.5850e+07 density= 1.0000e+00 mat.    4
/zone    95 volume= 4.8311e+00  source= 1.7271e+08 density= 1.0000e+00 mat.    4
/zone    96 volume= 2.4079e+00  source= 9.6389e+07 density= 1.0000e+00 mat.    4
/zone    97 volume= 4.8311e+00  source= 2.1315e+08 density= 1.0000e+00 mat.    4
/zone    98 volume= 1.2062e+01  source= 6.2749e+08 density= 1.0000e+00 mat.    4
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
/zone     99 volume= 7.2390e+00  source= 4.1769e+08 density= 1.0000e+00 mat.    4
/zone    100 volume= 7.2390e+00  source= 4.2493e+08 density= 1.0000e+00 mat.    4
/zone    101 volume= 7.2390e+00  source= 4.1255e+08 density= 1.0000e+00 mat.    4
/zone    102 volume= 1.2062e+01  source= 6.1277e+08 density= 1.0000e+00 mat.    4
/zone    103 volume= 4.8311e+00  source= 2.0687e+08 density= 1.0000e+00 mat.    4
/zone    104 volume= 2.4079e+00  source= 9.3259e+07 density= 1.0000e+00 mat.    4
/zone    105 volume= 4.8311e+00  source= 1.6575e+08 density= 1.0000e+00 mat.    4
/zone    106 volume= 2.4079e+00  source= 7.1515e+07 density= 1.0000e+00 mat.    4
/zone    107 volume= 1.5292e+01  source= 4.9684e+08 density= 1.0000e+00 mat.    4
/zone    108 volume= 7.6219e+00  source= 2.7706e+08 density= 1.0000e+00 mat.    4
/zone    109 volume= 1.5292e+01  source= 6.1153e+08 density= 1.0000e+00 mat.    4
/zone    110 volume= 3.8182e+01  source= 1.7930e+09 density= 1.0000e+00 mat.    4
/zone    111 volume= 2.2914e+01  source= 1.1908e+09 density= 1.0000e+00 mat.    4
/zone    112 volume= 2.2914e+01  source= 1.2112e+09 density= 1.0000e+00 mat.    4
/zone    113 volume= 2.2914e+01  source= 1.1755e+09 density= 1.0000e+00 mat.    4
/zone    114 volume= 3.8182e+01  source= 1.7392e+09 density= 1.0000e+00 mat.    4
/zone    115 volume= 1.5292e+01  source= 5.8217e+08 density= 1.0000e+00 mat.    4
/zone    116 volume= 7.6219e+00  source= 2.6082e+08 density= 1.0000e+00 mat.    4
/zone    117 volume= 1.5292e+01  source= 4.6014e+08 density= 1.0000e+00 mat.    4
/zone    118 volume= 2.4079e+00  source= 7.6716e+07 density= 1.0000e+00 mat.    4
/zone    119 volume= 4.8311e+00  source= 1.6909e+08 density= 1.0000e+00 mat.    4
/zone    120 volume= 1.2062e+01  source= 4.9360e+08 density= 1.0000e+00 mat.    4
/zone    121 volume= 7.2390e+00  source= 3.2677e+08 density= 1.0000e+00 mat.    4
/zone    122 volume= 7.2390e+00  source= 3.3205e+08 density= 1.0000e+00 mat.    4
/zone    123 volume= 7.2390e+00  source= 3.2185e+08 density= 1.0000e+00 mat.    4
/zone    124 volume= 1.2062e+01  source= 4.7345e+08 density= 1.0000e+00 mat.    4
/zone    125 volume= 4.8311e+00  source= 1.5653e+08 density= 1.0000e+00 mat.    4
/zone    126 volume= 2.4079e+00  source= 6.9493e+07 density= 1.0000e+00 mat.    4
/zone    127 volume= 6.4414e+00  source= 2.0458e+08 density= 1.0000e+00 mat.    4
/zone    128 volume= 1.6083e+01  source= 5.9685e+08 density= 1.0000e+00 mat.    4
/zone    129 volume= 9.6520e+00  source= 3.9457e+08 density= 1.0000e+00 mat.    4
/zone    130 volume= 9.6520e+00  source= 4.0046e+08 density= 1.0000e+00 mat.    4
/zone    131 volume= 9.6520e+00  source= 3.8753e+08 density= 1.0000e+00 mat.    4
/zone    132 volume= 1.6083e+01  source= 5.6758e+08 density= 1.0000e+00 mat.    4
/zone    133 volume= 6.4414e+00  source= 1.8616e+08 density= 1.0000e+00 mat.    4
/zone    134 volume= 2.2130e+01  source= 7.0220e+08 density= 1.0000e+00 mat.    4
/zone    135 volume= 1.3281e+01  source= 4.6430e+08 density= 1.0000e+00 mat.    4
/zone    136 volume= 1.3281e+01  source= 4.6975e+08 density= 1.0000e+00 mat.    4
/zone    137 volume= 1.3281e+01  source= 4.5209e+08 density= 1.0000e+00 mat.    4
/zone    138 volume= 2.2130e+01  source= 6.5838e+08 density= 1.0000e+00 mat.    4
/zone    139 volume= 7.2390e+00  source= 2.1522e+08 density= 1.0000e+00 mat.    4
/zone    140 volume= 7.2390e+00  source= 2.1674e+08 density= 1.0000e+00 mat.    4
/zone    141 volume= 7.2390e+00  source= 2.0740e+08 density= 1.0000e+00 mat.    4
/zone    142 volume= 1.8166e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    143 volume= 3.8427e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    144 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    145 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    146 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    147 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    148 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    149 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    150 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    151 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    152 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    153 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    154 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    155 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    156 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    157 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    158 volume= 3.4934e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    159 volume= 7.2144e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    160 volume= 3.1441e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    2
/zone    161 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    162 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    163 volume= 3.3327e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
/zone   164 volume= 1.6898e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone   165 volume= 5.2401e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone   166 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   167 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   168 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   169 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   170 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   171 volume= 1.7991e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   172 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   173 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   174 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   175 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   176 volume= 1.7711e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   177 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   178 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   179 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   180 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   181 volume= 1.7467e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   182 volume= 1.6314e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   183 volume= 7.8287e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    7
/zone   184 volume= 3.4934e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    8
/zone   185 volume= 7.9648e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    1
/zone   186 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   187 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   188 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   189 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   190 volume= 3.6377e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone   191 volume= 3.0000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   192 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   193 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   194 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   195 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   196 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   197 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   198 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   199 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   200 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   201 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   202 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   203 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   204 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   205 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   206 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   207 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   208 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   209 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   210 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   211 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   212 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   213 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   214 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   215 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   216 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   217 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   218 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   219 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   220 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   221 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   222 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   223 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/     Total volume= 1.2458e+07  source= 7.6059e+10
/
/ mat.    1 volume= 7.9648e+04  source= 0.0000e+00
/ mat.    2 volume= 3.1441e+04  source= 0.0000e+00
/ mat.    3 volume= 4.1617e+06  source= 0.0000e+00
```

TAB. C1 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (45-Group Calculation).

```
/ mat.    4 volume= 1.7367e+03  source= 7.6059e+10
/ mat.    5 volume= 8.8864e+04  source= 0.0000e+00
/ mat.    6 volume= 3.3895e+06  source= 0.0000e+00
/ mat.    7 volume= 7.8287e+05  source= 0.0000e+00
/ mat.    8 volume= 3.4934e+06  source= 0.0000e+00
/ mat.    9 volume= 4.2922e+05  source= 0.0000e+00
/     Total volume= 1.2458e+07  source= 7.6059e+10
t
=end
```

TAB. C2

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
=tort
WINFRITH Iron-88, X-Y-Z Model.
/ 44 Neutron Energy Groups, Inhomogeneous Neutron Fission Source,
/ TORT-3.2, S8 Full Symmetric Quadrature Sets,
/ P3 Cross Sections from BUGJEFF311.BOLIB Library.
61$$ / input/output file logical unit numbers
/ ntflx  ntfog  ntsig  ntbsi  ntdsi  ntrso   ntnpr  ntscl
    0       0      8     0     -3       0      0      1  e
62$$ / procedure control integers
/ nsrmx  nfxmx  icsprt ifxprt modep  nkeyfx iepsbz  nresp ktype nsctt
    1     -60      0     0      0     -33     11     -15    0     -1
/ iadj  negfix  nsclmx nbfacc mode    nbuf  locobj lcmobj minblk maxblk
    0      -1     50     0      0       0   100000    0     0      0 e
63$$ / geometry control integers
/  im    jm    km   ibl    ibr   ibi   ibo   ibb   ibt  ingeom
   73    79   278     0     0     0     0     0     0     0
/  izm  inreg  mm  mmesh  spare  nism  njsm  spare
   223    0    96   317     0     1     1     0     e
64$$ / cross section control integers
/  igm  ncrx  nsctm  iht  ihm   iups  neut
    44    9     3     3    70     e
66** / procedure control reals
/  epp
  1.0e-3 e
67** / problem control reals
/  xnf
  17.040e-24 e
t
t
81** / w / quadrature weights
0 2r151235-7 0 4r113425-7 0 113425-7 11574-6 2r113425-7 11574-6 113425-7
0 151235-7 2r113425-7 2r151235-7 2r113425-7 151235-7
  3q  24
82** / emu / first-direction cosines
-30861-5 -21822-5 21822-5 -61721-5 -57735-5 -21822-5 21822-5 57735-5
-8165-4 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 -9759-4
-95119-5 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 95119-5
  3q  24
83** / eta / last-direction cosines
3r-95119-5 5r-7868-4 7r-57735-5 9r-21822-5
   q  24 g  48
84** / rcmb /x coarse mesh boundaries number
   -95.91 90.81 f999
85** / thcmb /y coarse mesh boundaries number
  -90.81  104.01 f999
86** / zcmb /z coarse mesh boundaries
  -119.80 222.68 f999
t
2** / x fine mesh boundaries
 -9.591000e+01 -9.400000e+01 -9.112500e+01 -8.825000e+01 -8.537500e+01
 -8.250000e+01 -7.962500e+01 -7.675000e+01 -7.387500e+01 -7.100000e+01
 -6.812500e+01 -6.525000e+01 -6.237500e+01 -5.950000e+01 -5.865000e+01
 -5.667043e+01 -5.459061e+01 -5.225000e+01 -5.051089e+01 -4.908000e+01
 -4.592000e+01 -4.458808e+01 -4.208404e+01 -3.958000e+01 -3.704976e+01
 -3.642000e+01 -3.325000e+01 -3.008000e+01 -2.818563e+01 -2.490253e+01
 -2.161944e+01 -1.833634e+01 -1.425000e+01 -1.106520e+01 -7.880396e+00
 -4.750000e+00 -5.000000e-01  5.000000e-01  2.780396e+00  4.750000e+00
  7.578781e+00  1.040756e+01  1.323634e+01  1.425000e+01  1.719521e+01
  2.014042e+01  2.308563e+01  2.658282e+01  3.008000e+01  3.194976e+01
  3.642000e+01  3.948808e+01  3.958000e+01  4.249545e+01  4.541090e+01
  4.592000e+01  4.908000e+01  4.949061e+01  5.157042e+01  5.225000e+01
  5.355000e+01  5.652500e+01  5.950000e+01  6.244000e+01  6.538000e+01
  6.832000e+01  7.126000e+01  7.420000e+01  7.714001e+01  8.008001e+01
  8.302001e+01  8.596001e+01  8.890000e+01  9.081000e+01
3** / y fine mesh boundaries
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
 -9.081000e+01 -8.890000e+01 -8.555000e+01 -8.220000e+01 -7.885001e+01
 -7.550000e+01 -7.450000e+01 -7.100000e+01 -6.820571e+01 -6.541142e+01
 -6.261714e+01 -5.982285e+01 -5.702857e+01 -5.423428e+01 -5.144000e+01
 -5.050000e+01 -4.950000e+01 -4.763000e+01 -4.752042e+01 -4.544061e+01
 -4.136090e+01 -4.064000e+01 -3.810000e+01 -3.556000e+01 -3.543808e+01
 -3.175000e+01 -2.789976e+01 -2.550000e+01 -2.450000e+01 -2.209500e+01
 -1.969000e+01 -1.903563e+01 -1.588000e+01 -1.253317e+01 -9.186345e+00
 -5.290000e+00 -2.895000e+00 -5.000000e-01  5.000000e-01  1.269603e+00
  5.290000e+00  8.610198e+00  1.193040e+01  1.588000e+01  1.969000e+01
  2.238634e+01  2.450000e+01  2.550000e+01  2.862500e+01  3.175000e+01
  3.223563e+01  3.556000e+01  3.810000e+01  4.064000e+01  4.109976e+01
  4.436488e+01  4.763000e+01  4.863808e+01  4.950000e+01  5.050000e+01
  5.144000e+01  5.456090e+01  5.864061e+01  6.072042e+01  6.270000e+01
  6.546667e+01  6.823334e+01  7.100000e+01  7.450000e+01  7.550000e+01
  7.845556e+01  8.141112e+01  8.436668e+01  8.732224e+01  9.027779e+01
  9.323335e+01  9.618891e+01  9.914447e+01  1.021000e+02  1.040100e+02
4** / z fine mesh boundaries
 -1.198000e+02 -1.098000e+02 -9.980000e+01 -8.980000e+01 -7.980000e+01
 -7.408572e+01 -6.837143e+01 -6.265714e+01 -5.694286e+01 -5.122857e+01
 -4.551428e+01 -3.980000e+01 -3.694286e+01 -3.408571e+01 -3.122857e+01
 -2.837143e+01 -2.551428e+01 -2.265714e+01 -1.980000e+01 -1.916400e+01
 -1.852800e+01 -1.789200e+01 -1.725600e+01 -1.662000e+01 -1.610000e+01
 -1.550000e+01 -1.490000e+01 -1.430000e+01 -1.370000e+01 -1.310000e+01
 -1.250000e+01 -1.190000e+01 -1.130000e+01 -1.070000e+01 -1.010000e+01
 -9.499996e+00 -8.899996e+00 -8.299995e+00 -7.699996e+00 -7.099996e+00
 -6.499996e+00 -5.899996e+00 -5.299996e+00 -4.699996e+00 -4.099996e+00
 -3.499996e+00 -2.899996e+00 -2.299996e+00 -1.699996e+00 -1.100000e+00
 -7.000000e-01 -4.000000e-01  0.000000e+00  6.000000e-01  1.200000e+00
  1.300000e+00  1.400000e+00  1.600000e+00  1.700000e+00  2.300000e+00
  2.900000e+00  3.150000e+00  3.390000e+00  3.640000e+00  4.277500e+00
  4.915000e+00  5.552500e+00  6.190000e+00  6.827499e+00  7.464999e+00
  8.102499e+00  8.740000e+00  8.990000e+00  9.230000e+00  9.480000e+00
  1.004889e+01  1.061778e+01  1.118667e+01  1.175555e+01  1.232444e+01
  1.289333e+01  1.346222e+01  1.403111e+01  1.460000e+01  1.485000e+01
  1.509000e+01  1.534000e+01  1.590889e+01  1.647778e+01  1.704667e+01
  1.761556e+01  1.818445e+01  1.875334e+01  1.932223e+01  1.989112e+01
  2.046000e+01  2.071000e+01  2.095000e+01  2.120000e+01  2.183750e+01
  2.247500e+01  2.311250e+01  2.375000e+01  2.438750e+01  2.502501e+01
  2.566251e+01  2.630000e+01  2.655000e+01  2.679000e+01  2.704000e+01
  2.761778e+01  2.819556e+01  2.877333e+01  2.935111e+01  2.992889e+01
  3.050667e+01  3.108445e+01  3.166222e+01  3.224000e+01  3.249000e+01
  3.273000e+01  3.298000e+01  3.355222e+01  3.412445e+01  3.469667e+01
  3.526889e+01  3.584112e+01  3.641334e+01  3.698557e+01  3.755779e+01
  3.813000e+01  3.838000e+01  3.862000e+01  3.887000e+01  3.944778e+01
  4.002555e+01  4.060333e+01  4.118111e+01  4.175889e+01  4.233667e+01
  4.291444e+01  4.349222e+01  4.407000e+01  4.432000e+01  4.456000e+01
  4.481000e+01  4.538778e+01  4.596556e+01  4.654333e+01  4.712111e+01
  4.769889e+01  4.827667e+01  4.885445e+01  4.943222e+01  5.001000e+01
  5.026000e+01  5.050000e+01  5.075000e+01  5.133333e+01  5.191666e+01
  5.250000e+01  5.308333e+01  5.366666e+01  5.424999e+01  5.483332e+01
  5.541666e+01  5.600000e+01  5.625000e+01  5.649000e+01  5.674000e+01
  5.731556e+01  5.789111e+01  5.846666e+01  5.904222e+01  5.961777e+01
  6.019333e+01  6.076888e+01  6.134443e+01  6.192000e+01  6.217000e+01
  6.241000e+01  6.266000e+01  6.329375e+01  6.392750e+01  6.456125e+01
  6.519500e+01  6.582875e+01  6.646250e+01  6.709625e+01  6.773000e+01
  6.798000e+01  6.822000e+01  6.847000e+01  6.903889e+01  6.960777e+01
  7.017666e+01  7.074554e+01  7.131443e+01  7.188332e+01  7.245220e+01
  7.302109e+01  7.359000e+01  7.384000e+01  7.408000e+01  7.433000e+01
  7.490556e+01  7.548111e+01  7.605666e+01  7.663222e+01  7.720777e+01
  7.778333e+01  7.835888e+01  7.893443e+01  7.951000e+01  7.975999e+01
  8.000000e+01  8.025000e+01  8.088750e+01  8.152499e+01  8.216249e+01
  8.279999e+01  8.343748e+01  8.407498e+01  8.471248e+01  8.535000e+01
  8.593333e+01  8.651667e+01  8.710001e+01  8.768334e+01  8.826668e+01
  8.885001e+01  8.943335e+01  9.001669e+01  9.060000e+01  9.122500e+01
  9.185000e+01  9.247500e+01  9.310000e+01  9.372500e+01  9.435000e+01
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
  9.497500e+01  9.560000e+01  9.618375e+01  9.676749e+01  9.735124e+01
  9.793499e+01  9.851874e+01  9.910249e+01  9.968623e+01  1.002700e+02
  1.025110e+02  1.047520e+02  1.069930e+02  1.092340e+02  1.114750e+02
  1.137160e+02  1.159570e+02  1.181980e+02  1.204390e+02  1.226800e+02
  1.256800e+02  1.286800e+02  1.316800e+02  1.346800e+02  1.376800e+02
  1.406800e+02  1.436800e+02  1.466800e+02  1.496800e+02  1.526800e+02
  1.586800e+02  1.646800e+02  1.706800e+02  1.766800e+02  1.826800e+02
  1.926800e+02  2.026800e+02  2.126800e+02  2.226800e+02
6** / chs / fixed source energy spectrum
/CHI U_235 from JEFF-3.1.1
 4.98472e-05 2.00324e-04 1.13842e-03 2.50547e-03 5.61927e-03 1.60397e-02
 3.05081e-02 7.99783e-02 7.62523e-02 4.37217e-02 4.63810e-02 1.98992e-02
 4.00037e-03 2.41880e-02 7.30858e-02 7.15157e-02 8.90320e-02 1.14673e-01
 6.27061e-02 2.73374e-02 4.71250e-02 3.80487e-02 4.24774e-02 2.18273e-02
 3.08367e-02 1.59502e-02 7.74215e-03 3.70433e-03 1.04823e-03 6.07374e-04
 1.86537e-04 2.19216e-04 5.97163e-04 5.38754e-04 1.70683e-04 5.75558e-05
 2.49940e-05 3.44369e-06 1.25266e-06 5.50785e-07 1.75888e-07 2.27175e-08
 1.21404e-08 3.72794e-09 / 1.76098e-09 1.19568e-09 3.80803e-10
7** /material density by zone
    223r1.0000e+00
8$$ / zone number by body
 190 186 188 187 185 142 165 143 161 158 159 162 144 166 145 167 146
 168 147 169 148 170 149 171 150 172 151 173 152 174 153 175 154 176
 155 177 156 178 157 179 180 181 182 183 184 159 163 164 159 185 160
 2r185 160 2r185 160 185 2r163 49 64 79 163 185 160 185 2r163 36 50 65
 80 94 3r163 25 37 51 66 81 95 107 163 185 160 185 2r163 16 26 38 52 67
 82 96 108 118 163 185 160 185 2r163 9 17 27 39 53 68 83 97 109 119 127
 3r163 4 10 18 28 40 54 69 84 98 110 120 128 134 163 185 160 2r185 160
 185 2r163 1 5 11 19 29 41 55 70 85 99 111 121 129 135 139 163 185 160
 185 2 6 12 20 30 42 56 71 86 100 112 122 130 136 140 185 160 185 3 7
 13 21 31 43 57 72 87 101 113 123 131 137 141 185 160 185 2r163 8 14 22
 32 44 58 73 88 102 114 124 132 138 163 185 160 185 2r163 15 23 33 45
 59 74 89 103 115 125 133 163 185 160 185 2r163 24 34 46 60 75 90 104
 116 126 163 185 160 185 2r163 35 47 61 76 91 105 117 163 185 160 185
 2r163 48 62 77 92 106 3r163 63 78 93 163 185 160 2r185 160 185 163 185
 159 189 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205
 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222
 223
9$$  /material number by material zone
 141r4 18r9 2 4r5 3 17r6 7 8 1 4r6 3 33r9
14** / body left boundaries
     4r-9.591000e+01    41r-9.400000e+01     4r-5.950000e+01
     3r-5.865000e+01     3r-5.667043e+01     3r-5.459061e+01
     6r-5.225000e+01     3r-5.051089e+01     8r-4.908000e+01
    10r-4.592000e+01     3r-4.458808e+01    12r-3.958000e+01
     3r-3.704976e+01    14r-3.642000e+01    16r-3.008000e+01
     3r-2.818563e+01     3r-1.833634e+01    18r-1.425000e+01
     3r-7.880396e+00    15r-4.750000e+00      3r2.780396e+00
     15r4.750000e+00      3r1.323634e+01     16r1.425000e+01
      3r2.308563e+01     14r3.008000e+01      3r3.194976e+01
     12r3.642000e+01      3r3.948808e+01     10r3.958000e+01
      3r4.541090e+01      8r4.592000e+01      6r4.908000e+01
      3r4.949061e+01      3r5.157042e+01        5.225000e+01
        5.355000e+01        5.950000e+01        8.890000e+01
    33r-5.000000e-01
15** / body right boundaries
      2r9.081000e+01       -9.400000e+01        9.081000e+01
      -5.865000e+01      5r8.890000e+01       -5.950000e+01
     34r8.890000e+01        5.950000e+01       -5.225000e+01
      2r5.950000e+01     3r-5.667043e+01     3r-5.459061e+01
     3r-5.051089e+01     6r-4.908000e+01     3r-4.458808e+01
     8r-4.592000e+01    10r-3.958000e+01     3r-3.704976e+01
    12r-3.642000e+01     3r-2.818563e+01    14r-3.008000e+01
    16r-1.425000e+01     3r-1.833634e+01     3r-7.880396e+00
      2r1.425000e+01    15r-4.750000e+00        1.425000e+01
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
        3r2.780396e+00     15r4.750000e+00      3r1.323634e+01
       15r1.425000e+01      3r2.308563e+01     16r3.008000e+01
        3r3.194976e+01     14r3.642000e+01      3r3.948808e+01
       12r3.958000e+01      3r4.541090e+01     10r4.592000e+01
        3r4.949061e+01      8r4.908000e+01      6r5.225000e+01
        3r5.157042e+01      3r5.355000e+01        5.950000e+01
        2r8.890000e+01        9.081000e+01     33r5.000000e-01
16** / body inside boundaries
       2r-9.081000e+01       -8.890000e+01        1.021000e+02
      42r-8.890000e+01     2r-7.100000e+01        7.100000e+01
         -8.890000e+01        1.269603e+00        1.193040e+01
         -8.890000e+01       -9.186345e+00        2.238634e+01
         -8.890000e+01       -1.903563e+01        3.223563e+01
         -7.100000e+01     2r-1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01       -8.890000e+01
         -2.789976e+01        4.109976e+01       -7.100000e+01
       2r-1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
         -7.100000e+01     2r-3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
         -8.890000e+01       -3.543808e+01        4.863808e+01
         -7.100000e+01     2r-3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01       -8.890000e+01
         -4.136090e+01        5.456090e+01       -7.100000e+01
       2r-4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
         -7.100000e+01     2r-4.763000e+01       -4.064000e+01
         -3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        4.064000e+01        4.763000e+01
         -8.890000e+01       -4.544061e+01        5.864061e+01
         -8.890000e+01       -4.752042e+01        6.072042e+01
         -7.100000e+01     2r-5.144000e+01       -4.763000e+01
         -4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          4.763000e+01        5.144000e+01       -8.890000e+01
         -4.950000e+01        6.270000e+01       -5.144000e+01
         -4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.752042e+01        6.072042e+01       -5.144000e+01
         -4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.544061e+01        5.864061e+01       -7.100000e+01
       2r-4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.136090e+01        5.456090e+01       -7.100000e+01
       2r-4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
         -8.890000e+01       -3.543808e+01        4.863808e+01
         -7.100000e+01     2r-3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01       -8.890000e+01
         -2.789976e+01        4.109976e+01       -7.100000e+01
       2r-3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01       -8.890000e+01
         -1.903563e+01        3.223563e+01       -7.100000e+01
       2r-1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
         -7.100000e+01     2r-1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01       -8.890000e+01
         -9.186345e+00        2.238634e+01       -8.890000e+01
          1.269603e+00        1.193040e+01       -7.100000e+01
       3r-8.890000e+01    15r-5.000000e-01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01
17** / body outside boundaries
          1.040100e+02       -8.890000e+01        1.021000e+02
          1.040100e+02     41r1.021000e+02       -7.100000e+01
        2r7.100000e+01        1.021000e+02        1.269603e+00
          1.193040e+01        1.021000e+02       -9.186345e+00
          2.238634e+01        1.021000e+02       -1.903563e+01
          3.223563e+01        1.021000e+02       -1.588000e+01
          1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        7.100000e+01       -2.789976e+01
          4.109976e+01        1.021000e+02       -1.969000e+01
          1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          7.100000e+01       -3.175000e+01        3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        7.100000e+01       -3.543808e+01
          4.863808e+01        1.021000e+02       -3.556000e+01
          3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        7.100000e+01       -4.136090e+01
          5.456090e+01        1.021000e+02       -4.064000e+01
          4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          7.100000e+01       -4.763000e+01        4.763000e+01
         -4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          4.763000e+01        7.100000e+01       -4.544061e+01
          5.864061e+01        1.021000e+02       -4.752042e+01
          6.072042e+01        1.021000e+02       -5.144000e+01
          5.144000e+01       -4.763000e+01       -4.064000e+01
         -3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        4.064000e+01        4.763000e+01
          5.144000e+01        7.100000e+01       -4.950000e+01
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
         6.270000e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.752042e+01
         6.072042e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.544061e+01
         5.864061e+01        1.021000e+02       -4.763000e+01
         4.763000e+01       -4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        4.763000e+01        7.100000e+01
        -4.136090e+01        5.456090e+01        1.021000e+02
        -4.064000e+01        4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        7.100000e+01       -3.543808e+01
         4.863808e+01        1.021000e+02       -3.556000e+01
         3.556000e+01       -3.175000e+01       -1.969000e+01
        -1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        1.969000e+01        3.175000e+01
         3.556000e+01        7.100000e+01       -2.789976e+01
         4.109976e+01        1.021000e+02       -3.175000e+01
         3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        7.100000e+01
        -1.903563e+01        3.223563e+01        1.021000e+02
        -1.969000e+01        1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        7.100000e+01       -1.588000e+01
         1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        7.100000e+01       -9.186345e+00
         2.238634e+01        1.021000e+02        1.269603e+00
         1.193040e+01        1.021000e+02        7.100000e+01
       3r1.021000e+02     15r5.000000e-01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01
18** / body bottom boundaries
        -1.198000e+02     4r-1.980000e+01       -1.662000e+01
        -1.610000e+01       -1.100000e+00        0.000000e+00
         1.200000e+00        1.300000e+00        1.700000e+00
         2.900000e+00        3.640000e+00        8.740000e+00
         9.480000e+00        1.460000e+01        1.534000e+01
         2.046000e+01        2.120000e+01        2.630000e+01
         2.704000e+01        3.224000e+01        3.298000e+01
         3.813000e+01        3.887000e+01        4.407000e+01
         4.481000e+01        5.001000e+01        5.075000e+01
         5.600000e+01        5.674000e+01        6.192000e+01
         6.266000e+01        6.773000e+01        6.847000e+01
         7.359000e+01        7.433000e+01        7.951000e+01
         8.025000e+01        8.535000e+01        9.060000e+01
         9.560000e+01        1.002700e+02        1.226800e+02
       2r1.300000e+00        1.600000e+00        1.300000e+00
      9r-1.980000e+01      2r1.300000e+00      3r1.400000e+00
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        5r1.400000e+00      3r1.300000e+00      7r1.400000e+00
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        9r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00     11r1.400000e+00      3r1.300000e+00
       13r1.400000e+00         1.300000e+00     6r-1.980000e+01
        2r1.300000e+00     15r1.400000e+00         1.300000e+00
       3r-1.980000e+01     15r1.400000e+00     3r-1.980000e+01
       15r1.400000e+00     3r-1.980000e+01      2r1.300000e+00
       13r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00     11r1.400000e+00         1.300000e+00
       3r-1.980000e+01      2r1.300000e+00      9r1.400000e+00
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        7r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00      5r1.400000e+00      3r1.300000e+00
        3r1.400000e+00         1.300000e+00     6r-1.980000e+01
          1.300000e+00        -1.980000e+01         1.300000e+00
         -1.980000e+01        -7.000000e-01         3.150000e+00
          8.990000e+00         1.485000e+01         2.071000e+01
          2.655000e+01         3.249000e+01         3.838000e+01
          4.432000e+01         5.026000e+01         5.625000e+01
          6.217000e+01         6.798000e+01         7.384000e+01
          7.975999e+01      6r2.071000e+01      6r5.026000e+01
        6r7.975999e+01
19** / body top boundaries
         -1.980000e+01      3r2.226800e+02        -1.662000e+01
         -1.610000e+01        -1.100000e+00         0.000000e+00
          1.200000e+00         1.300000e+00         1.700000e+00
          2.900000e+00         3.640000e+00         8.740000e+00
          9.480000e+00         1.460000e+01         1.534000e+01
          2.046000e+01         2.120000e+01         2.630000e+01
          2.704000e+01         3.224000e+01         3.298000e+01
          3.813000e+01         3.887000e+01         4.407000e+01
          4.481000e+01         5.001000e+01         5.075000e+01
          5.600000e+01         5.674000e+01         6.192000e+01
          6.266000e+01         6.773000e+01         6.847000e+01
          7.359000e+01         7.433000e+01         7.951000e+01
          8.025000e+01         8.535000e+01         9.060000e+01
          9.560000e+01         1.002700e+02         1.226800e+02
          2.226800e+02         1.700000e+00         1.600000e+00
        2r1.700000e+00     9r-1.662000e+01         1.600000e+00
          1.400000e+00      4r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00      7r1.600000e+00
          1.400000e+00      8r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00     10r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
       13r1.600000e+00         1.400000e+00     14r1.600000e+00
       6r-1.662000e+01         1.600000e+00         1.400000e+00
       16r1.600000e+00     3r-1.662000e+01     15r1.600000e+00
       3r-1.662000e+01     15r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00     14r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
       12r1.600000e+00     3r-1.662000e+01         1.600000e+00
          1.400000e+00     10r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00      8r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
        7r1.600000e+00         1.400000e+00      4r1.600000e+00
       6r-1.662000e+01         1.600000e+00        -1.662000e+01
          1.700000e+00         2.226800e+02        -4.000000e-01
          3.390000e+00         9.230000e+00         1.509000e+01
          2.095000e+01         2.679000e+01         3.273000e+01
          3.862000e+01         4.456000e+01         5.050000e+01
          5.649000e+01         6.241000e+01         6.822000e+01
          7.408000e+01         8.000000e+01      6r2.095000e+01
        6r5.050000e+01      6r8.000000e+01
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
21$$ / itmbg / iteration limit by group
       44r60
22** / i key flux locations
     33r0.0000e+00
23** / j key flux locations
     15r0.0000e+00        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01        2.5000e+01
        5.0000e+01        7.5000e+01       -2.5000e+01       -5.0000e+01
       -7.5000e+01        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01
24** / k key flux locations
       -5.5000e-01        3.2700e+00        9.1100e+00        1.4970e+01
        2.0830e+01        2.6670e+01        3.2610e+01        3.8500e+01
        4.4440e+01        5.0380e+01        5.6370e+01        6.2290e+01
        6.8100e+01        7.3960e+01        7.9880e+01      6r2.0830e+01
      6r5.0380e+01      6r7.9880e+01
27** /group response by group
/   16-S_32    MT=103 (n,p)     FLAT WEIGHTING   (IRDF-2002)
 1.7639e-01 3.0787e-01 3.8051e-01 3.3979e-01 3.2202e-01 3.1380e-01
 2.4629e-01 2.7592e-01 1.9108e-01 1.0053e-01 6.8686e-02 7.2417e-02
 6.6472e-02 6.1245e-02 2.1377e-02 4.1502e-03 5.9998e-04 6.0917e-05
 1.6785e-06 25z /3z
/
/   49-In_115  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 5.8133e-02 9.1680e-02 2.0239e-01 2.7381e-01 3.0859e-01 3.3417e-01
 3.3897e-01 3.2538e-01 3.3341e-01 3.5259e-01 3.5385e-01 3.4311e-01
 3.3654e-01 3.2759e-01 2.9012e-01 2.3022e-01 1.7096e-01 1.0336e-01
 4.9401e-02 2.7891e-02 1.5489e-02 6.3893e-03 2.2558e-03 1.6310e-04
 20z /3z
/
/   45-Rh_103  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 2.3466e-01 3.8742e-01 8.1816e-01 1.2190e+00 1.2753e+00 1.2305e+00
 1.1732e+00 1.1091e+00 1.0370e+00 9.8735e-01 9.5185e-01 9.2536e-01
 9.1570e-01 9.0494e-01 8.6764e-01 8.0955e-01 7.4452e-01 6.6193e-01
 5.8044e-01 4.9269e-01 3.3867e-01 1.9319e-01 1.3801e-01 1.0374e-01
 6.6383e-02 2.3291e-02 5.8219e-03 1.6581e-03 3.4572e-06 15z /3z
/
/   79-Au_197  MT=102 (n,gamma) FLAT WEIGHTING   (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 6.8138e-04 1.6063e-03 1.6769e-03 1.1792e-03 9.1672e-04 2.9908e-03
 6.0619e-03 1.0673e-02 1.9494e-02 2.7032e-02 3.1752e-02 3.5656e-02
 3.7624e-02 4.0070e-02 4.9391e-02 6.0152e-02 6.7842e-02 7.5077e-02
 8.4031e-02 9.0899e-02 9.8907e-02 1.2061e-01 1.5148e-01 1.8519e-01
 2.3553e-01 2.7527e-01 3.2852e-01 4.2145e-01 5.3159e-01 5.9625e-01
 6.3013e-01 6.5349e-01 7.6339e-01 1.1561e+00 1.8461e+00 2.9907e+00
 8.0657e+00 1.2390e+01 1.0332e+01 1.8528e+01 6.5715e-01 9.5267e+01
 3.6192e+02 2.5048e+01 /2.5505e+01 3.5582e+01 9.4230e+01
/
/   13-Al_27   MT=107 (n,alpha) FLAT WEIGHTING   (IRDF-2002)
 9.7222e-02 1.2398e-01 1.0678e-01 7.7279e-02 4.1475e-02 1.1792e-02
 4.6528e-04 2.6020e-06 1.5730e-07 35z /3z
/
/   16-S_32    MT=103 (n,p)     1/4 T PV WEIGHTING  (IRDF-2002)
 1.9546e-01 3.1934e-01 3.7876e-01 3.3761e-01 3.2276e-01 3.1147e-01
 2.4085e-01 2.7606e-01 1.8725e-01 1.0010e-01 6.8656e-02 7.2333e-02
 6.6472e-02 6.1061e-02 2.1176e-02 3.8470e-03 5.7068e-04 5.6340e-05
 1.2101e-06 25z /3z
/
/   49-In_115  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 5.9192e-02 9.8480e-02 2.1539e-01 2.7598e-01 3.1011e-01 3.3546e-01
 3.3869e-01 3.2516e-01 3.3444e-01 3.5268e-01 3.5387e-01 3.4283e-01
 3.3654e-01 3.2736e-01 2.8986e-01 2.2810e-01 1.6934e-01 1.0148e-01
 4.7963e-02 2.7746e-02 1.4938e-02 6.4499e-03 2.1316e-03 1.5017e-04
 20z /3z
/
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
/   45-Rh_103  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 2.4762e-01 4.0937e-01 8.8683e-01 1.2278e+00 1.2744e+00 1.2262e+00
 1.1713e+00 1.1079e+00 1.0344e+00 9.8700e-01 9.5196e-01 9.2492e-01
 9.1570e-01 9.0468e-01 8.6739e-01 8.0741e-01 7.4261e-01 6.5961e-01
 5.7702e-01 4.9153e-01 3.2977e-01 1.9398e-01 1.3615e-01 1.0322e-01
 6.5599e-02 2.3237e-02 5.3946e-03 1.6350e-03 3.5663e-06 15z /3z
/
/   79-Au_197  MT=102 (n,gamma) 1/4 T PV WEIGHTING  (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 8.3799e-04 1.6630e-03 1.6244e-03 1.1555e-03 9.2183e-04 3.2177e-03
 6.1638e-03 1.0778e-02 1.9894e-02 2.7081e-02 3.1738e-02 3.5740e-02
 3.7624e-02 4.0129e-02 4.9455e-02 6.0480e-02 6.7970e-02 7.5320e-02
 8.4390e-02 9.0962e-02 9.9387e-02 1.2037e-01 1.5320e-01 1.8579e-01
 2.3642e-01 2.7531e-01 3.3518e-01 4.2224e-01 5.3069e-01 6.0536e-01
 6.3008e-01 6.5264e-01 7.5910e-01 1.1317e+00 1.8736e+00 3.1830e+00
 8.5877e+00 1.2102e+01 1.0530e+01 2.0634e+01 8.3767e-01 1.1673e+02
 2.9092e+02 2.4922e+01 /2.5685e+01 3.8156e+01 6.7837e+01
/
/   13-Al_27   MT=107 (n,alpha) 1/4 T PV WEIGHTING  (IRDF-2002)
 1.0459e-01 1.2390e-01 1.0305e-01 7.5681e-02 3.9827e-02 1.0004e-02
 4.0899e-04 2.4394e-06 1.3764e-07 35z /3z
/
/ E > 8.0 MeV Neutron Flux
      4r1. 4.8764e-01 39z /3z
/
/ E > 3.0 MeV Neutron Flux
      9r1. 3.9728e-02 34z /3z
/
/ E > 1.0 MeV Neutron Flux
     18r1.  1.3000e-02  25z /3z
/
/ E > 0.1 MeV Neutron Flux
     26r1.  2.1034e-01  17z /3z
/
/ E > 0.87643 eV Neutron Flux
     44r1. /3z
t
95** / shapg / source shape by group
/CHI U_235 from JEFF-3.1.1
 4.98472e-05 2.00324e-04 1.13842e-03 2.50547e-03 5.61927e-03 1.60397e-02
 3.05081e-02 7.99783e-02 7.62523e-02 4.37217e-02 4.63810e-02 1.98992e-02
 4.00037e-03 2.41880e-02 7.30858e-02 7.15157e-02 8.90320e-02 1.14673e-01
 6.27061e-02 2.73374e-02 4.71250e-02 3.80487e-02 4.24774e-02 2.18273e-02
 3.08367e-02 1.59502e-02 7.74215e-03 3.70433e-03 1.04823e-03 6.07374e-04
 1.86537e-04 2.19216e-04 5.97163e-04 5.38754e-04 1.70683e-04 5.75558e-05
 2.49940e-05 3.44369e-06 1.25266e-06 5.50785e-07 1.75888e-07 2.27175e-08
 1.21404e-08 3.72794e-09 /1.76098e-09 1.19568e-09 3.80803e-10
96** / distributed source distribution
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
1054r0.0000e+00     3r2.4580e+07     4r2.5250e+07     4r2.4480e+07
  62r0.0000e+00     3r2.4580e+07     4r2.5250e+07     4r2.4480e+07
  62r0.0000e+00     3r2.4580e+07     4r2.5250e+07     4r2.4480e+07
  57r0.0000e+00     5r2.7450e+07     3r3.0720e+07     4r3.1500e+07
   4r3.0670e+07     5r2.6850e+07    52r0.0000e+00     5r2.7450e+07
   3r3.0720e+07     4r3.1500e+07     4r3.0670e+07     5r2.6850e+07
  52r0.0000e+00     5r2.7450e+07     3r3.0720e+07     4r3.1500e+07
   4r3.0670e+07     5r2.6850e+07    52r0.0000e+00     5r2.7450e+07
   3r3.0720e+07     4r3.1500e+07     4r3.0670e+07     5r2.6850e+07
  50r0.0000e+00     2r2.8960e+07     5r3.3960e+07     3r3.7700e+07
   4r3.8550e+07     4r3.7580e+07     5r3.3200e+07     2r2.7120e+07
  48r0.0000e+00     2r2.8960e+07     5r3.3960e+07     3r3.7700e+07
   4r3.8550e+07     4r3.7580e+07     5r3.3200e+07     2r2.7120e+07
  46r0.0000e+00     2r3.0040e+07     2r3.2990e+07     5r3.8550e+07
   3r4.2670e+07     4r4.3570e+07     4r4.2470e+07     5r3.7660e+07
   2r3.1010e+07     2r2.7480e+07    44r0.0000e+00     2r3.0040e+07
   2r3.2990e+07     5r3.8550e+07     3r4.2670e+07     4r4.3570e+07
   4r4.2470e+07     5r3.7660e+07     2r3.1010e+07     2r2.7480e+07
  41r0.0000e+00     3r3.1820e+07     2r3.5620e+07     2r3.9120e+07
   5r4.5720e+07     3r5.0530e+07     4r5.1490e+07     4r5.0130e+07
   5r4.4610e+07     2r3.7130e+07     2r3.3170e+07     3r2.8870e+07
  38r0.0000e+00     3r3.1820e+07     2r3.5620e+07     2r3.9120e+07
   5r4.5720e+07     3r5.0530e+07     4r5.1490e+07     4r5.0130e+07
   5r4.4610e+07     2r3.7130e+07     2r3.3170e+07     3r2.8870e+07
  38r0.0000e+00     3r3.1820e+07     2r3.5620e+07     2r3.9120e+07
   5r4.5720e+07     3r5.0530e+07     4r5.1490e+07     4r5.0130e+07
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
37r0.0000e+00        3.1360e+07      3r3.5740e+07      2r4.0010e+07
 2r4.4000e+07      5r5.1570e+07      3r5.7010e+07      4r5.8020e+07
 4r5.6430e+07      5r5.0310e+07      2r4.2210e+07      2r3.7950e+07
 3r3.3310e+07        2.8430e+07     36r0.0000e+00        3.1360e+07
 3r3.5740e+07      2r4.0010e+07      2r4.4000e+07      5r5.1570e+07
 3r5.7010e+07      4r5.8020e+07      4r5.6430e+07      5r5.0310e+07
 2r4.2210e+07      2r3.7950e+07      3r3.3310e+07        2.8430e+07
34r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
33r0.0000e+00        3.1500e+07      3r3.5750e+07      2r4.0030e+07
 2r4.4120e+07      5r5.2020e+07      3r5.7700e+07      4r5.8700e+07
 4r5.6990e+07      5r5.0800e+07      2r4.2820e+07      2r3.8730e+07
 3r3.4310e+07        2.9700e+07     37r0.0000e+00      3r3.2490e+07
 2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
 4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
 2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
     2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
     4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
     2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
     2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
     4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
     2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
     2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
     4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
     2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
     2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
     4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
     2r3.4220e+07      3r3.0090e+07     41r0.0000e+00      2r3.1860e+07
     2r3.5000e+07      5r4.0920e+07      3r4.5140e+07      4r4.5870e+07
     4r4.4460e+07      5r3.9250e+07      2r3.2400e+07      2r2.8860e+07
    44r0.0000e+00      2r3.1860e+07      2r3.5000e+07      5r4.0920e+07
     3r4.5140e+07      4r4.5870e+07      4r4.4460e+07      5r3.9250e+07
     2r3.2400e+07      2r2.8860e+07     46r0.0000e+00      2r3.1760e+07
     5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
     5r3.5290e+07      2r2.8900e+07     48r0.0000e+00      2r3.1760e+07
     5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
     5r3.5290e+07      2r2.8900e+07     50r0.0000e+00      5r3.1730e+07
     3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
    52r0.0000e+00      5r3.1730e+07      3r3.4960e+07      4r3.5370e+07
     4r3.4040e+07      5r2.9750e+07     52r0.0000e+00      5r3.1730e+07
     3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
    57r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
    62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
    62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
    62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
  1417r0.0000e+00
  5767r0.0000e+00
  f0.
/zone     1 volume= 7.2390e+00  source= 1.7793e+08 density= 1.0000e+00 mat.    4
/zone     2 volume= 7.2390e+00  source= 1.8278e+08 density= 1.0000e+00 mat.    4
/zone     3 volume= 7.2390e+00  source= 1.7721e+08 density= 1.0000e+00 mat.    4
/zone     4 volume= 2.2130e+01  source= 6.0748e+08 density= 1.0000e+00 mat.    4
/zone     5 volume= 1.3281e+01  source= 4.0799e+08 density= 1.0000e+00 mat.    4
/zone     6 volume= 1.3281e+01  source= 4.1835e+08 density= 1.0000e+00 mat.    4
/zone     7 volume= 1.3281e+01  source= 4.0733e+08 density= 1.0000e+00 mat.    4
/zone     8 volume= 2.2130e+01  source= 5.9420e+08 density= 1.0000e+00 mat.    4
/zone     9 volume= 6.4414e+00  source= 1.8654e+08 density= 1.0000e+00 mat.    4
/zone    10 volume= 1.6083e+01  source= 5.4619e+08 density= 1.0000e+00 mat.    4
/zone    11 volume= 9.6520e+00  source= 3.6388e+08 density= 1.0000e+00 mat.    4
/zone    12 volume= 9.6520e+00  source= 3.7208e+08 density= 1.0000e+00 mat.    4
/zone    13 volume= 9.6520e+00  source= 3.6272e+08 density= 1.0000e+00 mat.    4
/zone    14 volume= 1.6083e+01  source= 5.3396e+08 density= 1.0000e+00 mat.    4
/zone    15 volume= 6.4414e+00  source= 1.7469e+08 density= 1.0000e+00 mat.    4
/zone    16 volume= 2.4079e+00  source= 7.2334e+07 density= 1.0000e+00 mat.    4
/zone    17 volume= 4.8311e+00  source= 1.5938e+08 density= 1.0000e+00 mat.    4
/zone    18 volume= 1.2062e+01  source= 4.6501e+08 density= 1.0000e+00 mat.    4
/zone    19 volume= 7.2390e+00  source= 3.0889e+08 density= 1.0000e+00 mat.    4
/zone    20 volume= 7.2390e+00  source= 3.1540e+08 density= 1.0000e+00 mat.    4
/zone    21 volume= 7.2390e+00  source= 3.0744e+08 density= 1.0000e+00 mat.    4
/zone    22 volume= 1.2062e+01  source= 4.5427e+08 density= 1.0000e+00 mat.    4
/zone    23 volume= 4.8311e+00  source= 1.4981e+08 density= 1.0000e+00 mat.    4
/zone    24 volume= 2.4079e+00  source= 6.6170e+07 density= 1.0000e+00 mat.    4
/zone    25 volume= 1.5292e+01  source= 4.8659e+08 density= 1.0000e+00 mat.    4
/zone    26 volume= 7.6219e+00  source= 2.7149e+08 density= 1.0000e+00 mat.    4
/zone    27 volume= 1.5292e+01  source= 5.9823e+08 density= 1.0000e+00 mat.    4
/zone    28 volume= 3.8182e+01  source= 1.7457e+09 density= 1.0000e+00 mat.    4
/zone    29 volume= 2.2914e+01  source= 1.1578e+09 density= 1.0000e+00 mat.    4
/zone    30 volume= 2.2914e+01  source= 1.1798e+09 density= 1.0000e+00 mat.    4
/zone    31 volume= 2.2914e+01  source= 1.1487e+09 density= 1.0000e+00 mat.    4
/zone    32 volume= 3.8182e+01  source= 1.7033e+09 density= 1.0000e+00 mat.    4
/zone    33 volume= 1.5292e+01  source= 5.6779e+08 density= 1.0000e+00 mat.    4
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
/zone    34 volume= 7.6219e+00  source= 2.5282e+08 density= 1.0000e+00 mat.    4
/zone    35 volume= 1.5292e+01  source= 4.4148e+08 density= 1.0000e+00 mat.    4
/zone    36 volume= 2.4079e+00  source= 7.5512e+07 density= 1.0000e+00 mat.    4
/zone    37 volume= 4.8311e+00  source= 1.7266e+08 density= 1.0000e+00 mat.    4
/zone    38 volume= 2.4079e+00  source= 9.6341e+07 density= 1.0000e+00 mat.    4
/zone    39 volume= 4.8311e+00  source= 2.1257e+08 density= 1.0000e+00 mat.    4
/zone    40 volume= 1.2062e+01  source= 6.2206e+08 density= 1.0000e+00 mat.    4
/zone    41 volume= 7.2390e+00  source= 4.1270e+08 density= 1.0000e+00 mat.    4
/zone    42 volume= 7.2390e+00  source= 4.2001e+08 density= 1.0000e+00 mat.    4
/zone    43 volume= 7.2390e+00  source= 4.0850e+08 density= 1.0000e+00 mat.    4
/zone    44 volume= 1.2062e+01  source= 6.0686e+08 density= 1.0000e+00 mat.    4
/zone    45 volume= 4.8311e+00  source= 2.0392e+08 density= 1.0000e+00 mat.    4
/zone    46 volume= 2.4079e+00  source= 9.1381e+07 density= 1.0000e+00 mat.    4
/zone    47 volume= 4.8311e+00  source= 1.6092e+08 density= 1.0000e+00 mat.    4
/zone    48 volume= 2.4079e+00  source= 6.8457e+07 density= 1.0000e+00 mat.    4
/zone    49 volume= 6.7141e+00  source= 2.0317e+08 density= 1.0000e+00 mat.    4
/zone    50 volume= 6.6929e+00  source= 2.2254e+08 density= 1.0000e+00 mat.    4
/zone    51 volume= 1.3428e+01  source= 5.0812e+08 density= 1.0000e+00 mat.    4
/zone    52 volume= 6.6929e+00  source= 2.8371e+08 density= 1.0000e+00 mat.    4
/zone    53 volume= 1.3428e+01  source= 6.2696e+08 density= 1.0000e+00 mat.    4
/zone    54 volume= 3.3528e+01  source= 1.8410e+09 density= 1.0000e+00 mat.    4
/zone    55 volume= 2.0121e+01  source= 1.2232e+09 density= 1.0000e+00 mat.    4
/zone    56 volume= 2.0121e+01  source= 1.2441e+09 density= 1.0000e+00 mat.    4
/zone    57 volume= 2.0121e+01  source= 1.2091e+09 density= 1.0000e+00 mat.    4
/zone    58 volume= 3.3528e+01  source= 1.7984e+09 density= 1.0000e+00 mat.    4
/zone    59 volume= 1.3428e+01  source= 6.0735e+08 density= 1.0000e+00 mat.    4
/zone    60 volume= 6.6929e+00  source= 2.7334e+08 density= 1.0000e+00 mat.    4
/zone    61 volume= 1.3428e+01  source= 4.8435e+08 density= 1.0000e+00 mat.    4
/zone    62 volume= 6.6929e+00  source= 2.0768e+08 density= 1.0000e+00 mat.    4
/zone    63 volume= 6.7141e+00  source= 1.8470e+08 density= 1.0000e+00 mat.    4
/zone    64 volume= 6.7077e+00  source= 2.1009e+08 density= 1.0000e+00 mat.    4
/zone    65 volume= 6.6866e+00  source= 2.2915e+08 density= 1.0000e+00 mat.    4
/zone    66 volume= 1.3415e+01  source= 5.2226e+08 density= 1.0000e+00 mat.    4
/zone    67 volume= 6.6866e+00  source= 2.9180e+08 density= 1.0000e+00 mat.    4
/zone    68 volume= 1.3415e+01  source= 6.4595e+08 density= 1.0000e+00 mat.    4
/zone    69 volume= 3.3496e+01  source= 1.9039e+09 density= 1.0000e+00 mat.    4
/zone    70 volume= 2.0102e+01  source= 1.2672e+09 density= 1.0000e+00 mat.    4
/zone    71 volume= 2.0102e+01  source= 1.2889e+09 density= 1.0000e+00 mat.    4
/zone    72 volume= 2.0102e+01  source= 1.2518e+09 density= 1.0000e+00 mat.    4
/zone    73 volume= 3.3496e+01  source= 1.8634e+09 density= 1.0000e+00 mat.    4
/zone    74 volume= 1.3415e+01  source= 6.3187e+08 density= 1.0000e+00 mat.    4
/zone    75 volume= 6.6866e+00  source= 2.8552e+08 density= 1.0000e+00 mat.    4
/zone    76 volume= 1.3415e+01  source= 5.0871e+08 density= 1.0000e+00 mat.    4
/zone    77 volume= 6.6866e+00  source= 2.1979e+08 density= 1.0000e+00 mat.    4
/zone    78 volume= 6.7077e+00  source= 1.9667e+08 density= 1.0000e+00 mat.    4
/zone    79 volume= 6.7141e+00  source= 2.0411e+08 density= 1.0000e+00 mat.    4
/zone    80 volume= 6.6929e+00  source= 2.2234e+08 density= 1.0000e+00 mat.    4
/zone    81 volume= 1.3428e+01  source= 5.0611e+08 density= 1.0000e+00 mat.    4
/zone    82 volume= 6.6929e+00  source= 2.8264e+08 density= 1.0000e+00 mat.    4
/zone    83 volume= 1.3428e+01  source= 6.2575e+08 density= 1.0000e+00 mat.    4
/zone    84 volume= 3.3528e+01  source= 1.8457e+09 density= 1.0000e+00 mat.    4
/zone    85 volume= 2.0121e+01  source= 1.2294e+09 density= 1.0000e+00 mat.    4
/zone    86 volume= 2.0121e+01  source= 1.2505e+09 density= 1.0000e+00 mat.    4
/zone    87 volume= 2.0121e+01  source= 1.2141e+09 density= 1.0000e+00 mat.    4
/zone    88 volume= 3.3528e+01  source= 1.8062e+09 density= 1.0000e+00 mat.    4
/zone    89 volume= 1.3428e+01  source= 6.1219e+08 density= 1.0000e+00 mat.    4
/zone    90 volume= 6.6929e+00  source= 2.7662e+08 density= 1.0000e+00 mat.    4
/zone    91 volume= 1.3428e+01  source= 4.9321e+08 density= 1.0000e+00 mat.    4
/zone    92 volume= 6.6929e+00  source= 2.1337e+08 density= 1.0000e+00 mat.    4
/zone    93 volume= 6.7141e+00  source= 1.9135e+08 density= 1.0000e+00 mat.    4
/zone    94 volume= 2.4079e+00  source= 7.5850e+07 density= 1.0000e+00 mat.    4
/zone    95 volume= 4.8311e+00  source= 1.7271e+08 density= 1.0000e+00 mat.    4
/zone    96 volume= 2.4079e+00  source= 9.6389e+07 density= 1.0000e+00 mat.    4
/zone    97 volume= 4.8311e+00  source= 2.1315e+08 density= 1.0000e+00 mat.    4
/zone    98 volume= 1.2062e+01  source= 6.2749e+08 density= 1.0000e+00 mat.    4
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
/zone     99 volume= 7.2390e+00  source= 4.1769e+08 density= 1.0000e+00 mat.    4
/zone    100 volume= 7.2390e+00  source= 4.2493e+08 density= 1.0000e+00 mat.    4
/zone    101 volume= 7.2390e+00  source= 4.1255e+08 density= 1.0000e+00 mat.    4
/zone    102 volume= 1.2062e+01  source= 6.1277e+08 density= 1.0000e+00 mat.    4
/zone    103 volume= 4.8311e+00  source= 2.0687e+08 density= 1.0000e+00 mat.    4
/zone    104 volume= 2.4079e+00  source= 9.3259e+07 density= 1.0000e+00 mat.    4
/zone    105 volume= 4.8311e+00  source= 1.6575e+08 density= 1.0000e+00 mat.    4
/zone    106 volume= 2.4079e+00  source= 7.1515e+07 density= 1.0000e+00 mat.    4
/zone    107 volume= 1.5292e+01  source= 4.9684e+08 density= 1.0000e+00 mat.    4
/zone    108 volume= 7.6219e+00  source= 2.7706e+08 density= 1.0000e+00 mat.    4
/zone    109 volume= 1.5292e+01  source= 6.1153e+08 density= 1.0000e+00 mat.    4
/zone    110 volume= 3.8182e+01  source= 1.7930e+09 density= 1.0000e+00 mat.    4
/zone    111 volume= 2.2914e+01  source= 1.1908e+09 density= 1.0000e+00 mat.    4
/zone    112 volume= 2.2914e+01  source= 1.2112e+09 density= 1.0000e+00 mat.    4
/zone    113 volume= 2.2914e+01  source= 1.1755e+09 density= 1.0000e+00 mat.    4
/zone    114 volume= 3.8182e+01  source= 1.7392e+09 density= 1.0000e+00 mat.    4
/zone    115 volume= 1.5292e+01  source= 5.8217e+08 density= 1.0000e+00 mat.    4
/zone    116 volume= 7.6219e+00  source= 2.6082e+08 density= 1.0000e+00 mat.    4
/zone    117 volume= 1.5292e+01  source= 4.6014e+08 density= 1.0000e+00 mat.    4
/zone    118 volume= 2.4079e+00  source= 7.6716e+07 density= 1.0000e+00 mat.    4
/zone    119 volume= 4.8311e+00  source= 1.6909e+08 density= 1.0000e+00 mat.    4
/zone    120 volume= 1.2062e+01  source= 4.9360e+08 density= 1.0000e+00 mat.    4
/zone    121 volume= 7.2390e+00  source= 3.2677e+08 density= 1.0000e+00 mat.    4
/zone    122 volume= 7.2390e+00  source= 3.3205e+08 density= 1.0000e+00 mat.    4
/zone    123 volume= 7.2390e+00  source= 3.2185e+08 density= 1.0000e+00 mat.    4
/zone    124 volume= 1.2062e+01  source= 4.7345e+08 density= 1.0000e+00 mat.    4
/zone    125 volume= 4.8311e+00  source= 1.5653e+08 density= 1.0000e+00 mat.    4
/zone    126 volume= 2.4079e+00  source= 6.9493e+07 density= 1.0000e+00 mat.    4
/zone    127 volume= 6.4414e+00  source= 2.0458e+08 density= 1.0000e+00 mat.    4
/zone    128 volume= 1.6083e+01  source= 5.9685e+08 density= 1.0000e+00 mat.    4
/zone    129 volume= 9.6520e+00  source= 3.9457e+08 density= 1.0000e+00 mat.    4
/zone    130 volume= 9.6520e+00  source= 4.0046e+08 density= 1.0000e+00 mat.    4
/zone    131 volume= 9.6520e+00  source= 3.8753e+08 density= 1.0000e+00 mat.    4
/zone    132 volume= 1.6083e+01  source= 5.6758e+08 density= 1.0000e+00 mat.    4
/zone    133 volume= 6.4414e+00  source= 1.8616e+08 density= 1.0000e+00 mat.    4
/zone    134 volume= 2.2130e+01  source= 7.0220e+08 density= 1.0000e+00 mat.    4
/zone    135 volume= 1.3281e+01  source= 4.6430e+08 density= 1.0000e+00 mat.    4
/zone    136 volume= 1.3281e+01  source= 4.6975e+08 density= 1.0000e+00 mat.    4
/zone    137 volume= 1.3281e+01  source= 4.5209e+08 density= 1.0000e+00 mat.    4
/zone    138 volume= 2.2130e+01  source= 6.5838e+08 density= 1.0000e+00 mat.    4
/zone    139 volume= 7.2390e+00  source= 2.1522e+08 density= 1.0000e+00 mat.    4
/zone    140 volume= 7.2390e+00  source= 2.1674e+08 density= 1.0000e+00 mat.    4
/zone    141 volume= 7.2390e+00  source= 2.0740e+08 density= 1.0000e+00 mat.    4
/zone    142 volume= 1.8166e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    143 volume= 3.8427e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    144 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    145 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    146 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    147 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    148 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    149 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    150 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    151 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    152 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    153 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    154 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    155 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    156 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    157 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    158 volume= 3.4934e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    159 volume= 7.2144e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    160 volume= 3.1441e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    2
/zone    161 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    162 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    163 volume= 3.3327e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
/zone   164 volume= 1.6898e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone   165 volume= 5.2401e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone   166 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   167 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   168 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   169 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   170 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   171 volume= 1.7991e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   172 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   173 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   174 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   175 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   176 volume= 1.7711e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   177 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   178 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   179 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   180 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   181 volume= 1.7467e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   182 volume= 1.6314e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   183 volume= 7.8287e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    7
/zone   184 volume= 3.4934e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    8
/zone   185 volume= 7.9648e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    1
/zone   186 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   187 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   188 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   189 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   190 volume= 3.6377e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone   191 volume= 3.0000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   192 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   193 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   194 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   195 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   196 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   197 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   198 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   199 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   200 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   201 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   202 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   203 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   204 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   205 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   206 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   207 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   208 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   209 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   210 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   211 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   212 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   213 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   214 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   215 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   216 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   217 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   218 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   219 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   220 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   221 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   222 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   223 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/     Total volume= 1.2458e+07  source= 7.6059e+10
/
/ mat.    1 volume= 7.9648e+04  source= 0.0000e+00
/ mat.    2 volume= 3.1441e+04  source= 0.0000e+00
/ mat.    3 volume= 4.1617e+06  source= 0.0000e+00
```

TAB. C2 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGJEFF311.BOLIB Library (44-Group Calculation).

```
/ mat.    4 volume= 1.7367e+03  source= 7.6059e+10
/ mat.    5 volume= 8.8864e+04  source= 0.0000e+00
/ mat.    6 volume= 3.3895e+06  source= 0.0000e+00
/ mat.    7 volume= 7.8287e+05  source= 0.0000e+00
/ mat.    8 volume= 3.4934e+06  source= 0.0000e+00
/ mat.    9 volume= 4.2922e+05  source= 0.0000e+00
/     Total volume= 1.2458e+07  source= 7.6059e+10
t
=end
```

TAB. C3

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
=tort
WINFRITH Iron-88, X-Y-Z Model.
/ 44 Neutron Energy Groups, Inhomogeneous Neutron Fission Source,
/ TORT-3.2, S8 Full Symmetric Quadrature Sets,
/ P3 Cross Sections from BUGENDF70.BOLIB Library.
61$$ / input/output file logical unit numbers
/ ntflx  ntfog  ntsig  ntbsi  ntdsi  ntrso   ntnpr  ntscl
    0       0      8     0     -3       0      0      1  e
62$$ / procedure control integers
/ nsrmx  nfxmx  icsprt ifxprt modep  nkeyfx iepsbz  nresp ktype nsctt
    1     -60      0     0      0     -33     11     -15    0     -1
/ iadj  negfix  nsclmx nbfacc mode    nbuf  locobj lcmobj minblk maxblk
    0      -1     50     0      0       0   100000    0     0      0 e
63$$ / geometry control integers
/  im    jm    km   ibl    ibr   ibi   ibo   ibb   ibt  ingeom
   73    79   278     0     0     0     0     0     0     0
/  izm  inreg  mm  mmesh  spare  nism  njsm  spare
   223    0    96   317     0     1     1     0     e
64$$ / cross section control integers
/  igm  ncrx  nsctm  iht  ihm   iups  neut
    44    9     3     3    70     e
66** / procedure control reals
/  epp
  1.0e-3 e
67** / problem control reals
/  xnf
  17.040e-24 e
t
t
81** / w / quadrature weights
0 2r151235-7 0 4r113425-7 0 113425-7 11574-6 2r113425-7 11574-6 113425-7
0 151235-7 2r113425-7 2r151235-7 2r113425-7 151235-7
  3q  24
82** / emu / first-direction cosines
-30861-5 -21822-5 21822-5 -61721-5 -57735-5 -21822-5 21822-5 57735-5
-8165-4 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 -9759-4
-95119-5 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 95119-5
  3q  24
83** / eta / last-direction cosines
3r-95119-5 5r-7868-4 7r-57735-5 9r-21822-5
   q  24 g  48
84** / rcmb /x coarse mesh boundaries number
   -95.91 90.81 f999
85** / thcmb /y coarse mesh boundaries number
  -90.81  104.01 f999
86** / zcmb /z coarse mesh boundaries
  -119.80 222.68 f999
t
2** / x fine mesh boundaries
 -9.591000e+01 -9.400000e+01 -9.112500e+01 -8.825000e+01 -8.537500e+01
 -8.250000e+01 -7.962500e+01 -7.675000e+01 -7.387500e+01 -7.100000e+01
 -6.812500e+01 -6.525000e+01 -6.237500e+01 -5.950000e+01 -5.865000e+01
 -5.667043e+01 -5.459061e+01 -5.225000e+01 -5.051089e+01 -4.908000e+01
 -4.592000e+01 -4.458808e+01 -4.208404e+01 -3.958000e+01 -3.704976e+01
 -3.642000e+01 -3.325000e+01 -3.008000e+01 -2.818563e+01 -2.490253e+01
 -2.161944e+01 -1.833634e+01 -1.425000e+01 -1.106520e+01 -7.880396e+00
 -4.750000e+00 -5.000000e-01  5.000000e-01  2.780396e+00  4.750000e+00
  7.578781e+00  1.040756e+01  1.323634e+01  1.425000e+01  1.719521e+01
  2.014042e+01  2.308563e+01  2.658282e+01  3.008000e+01  3.194976e+01
  3.642000e+01  3.948808e+01  3.958000e+01  4.249545e+01  4.541090e+01
  4.592000e+01  4.908000e+01  4.949061e+01  5.157042e+01  5.225000e+01
  5.355000e+01  5.652500e+01  5.950000e+01  6.244000e+01  6.538000e+01
  6.832000e+01  7.126000e+01  7.420000e+01  7.714001e+01  8.008001e+01
  8.302001e+01  8.596001e+01  8.890000e+01  9.081000e+01
3** / y fine mesh boundaries
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
 -9.081000e+01 -8.890000e+01 -8.555000e+01 -8.220000e+01 -7.885001e+01
 -7.550000e+01 -7.450000e+01 -7.100000e+01 -6.820571e+01 -6.541142e+01
 -6.261714e+01 -5.982285e+01 -5.702857e+01 -5.423428e+01 -5.144000e+01
 -5.050000e+01 -4.950000e+01 -4.763000e+01 -4.752042e+01 -4.544061e+01
 -4.136090e+01 -4.064000e+01 -3.810000e+01 -3.556000e+01 -3.543808e+01
 -3.175000e+01 -2.789976e+01 -2.550000e+01 -2.450000e+01 -2.209500e+01
 -1.969000e+01 -1.903563e+01 -1.588000e+01 -1.253317e+01 -9.186345e+00
 -5.290000e+00 -2.895000e+00 -5.000000e-01  5.000000e-01  1.269603e+00
  5.290000e+00  8.610198e+00  1.193040e+01  1.588000e+01  1.969000e+01
  2.238634e+01  2.450000e+01  2.550000e+01  2.862500e+01  3.175000e+01
  3.223563e+01  3.556000e+01  3.810000e+01  4.064000e+01  4.109976e+01
  4.436488e+01  4.763000e+01  4.863808e+01  4.950000e+01  5.050000e+01
  5.144000e+01  5.456090e+01  5.864061e+01  6.072042e+01  6.270000e+01
  6.546667e+01  6.823334e+01  7.100000e+01  7.450000e+01  7.550000e+01
  7.845556e+01  8.141112e+01  8.436668e+01  8.732224e+01  9.027779e+01
  9.323335e+01  9.618891e+01  9.914447e+01  1.021000e+02  1.040100e+02
4** / z fine mesh boundaries
 -1.198000e+02 -1.098000e+02 -9.980000e+01 -8.980000e+01 -7.980000e+01
 -7.408572e+01 -6.837143e+01 -6.265714e+01 -5.694286e+01 -5.122857e+01
 -4.551428e+01 -3.980000e+01 -3.694286e+01 -3.408571e+01 -3.122857e+01
 -2.837143e+01 -2.551428e+01 -2.265714e+01 -1.980000e+01 -1.916400e+01
 -1.852800e+01 -1.789200e+01 -1.725600e+01 -1.662000e+01 -1.610000e+01
 -1.550000e+01 -1.490000e+01 -1.430000e+01 -1.370000e+01 -1.310000e+01
 -1.250000e+01 -1.190000e+01 -1.130000e+01 -1.070000e+01 -1.010000e+01
 -9.499996e+00 -8.899996e+00 -8.299995e+00 -7.699996e+00 -7.099996e+00
 -6.499996e+00 -5.899996e+00 -5.299996e+00 -4.699996e+00 -4.099996e+00
 -3.499996e+00 -2.899996e+00 -2.299996e+00 -1.699996e+00 -1.100000e+00
 -7.000000e-01 -4.000000e-01  0.000000e+00  6.000000e-01  1.200000e+00
  1.300000e+00  1.400000e+00  1.600000e+00  1.700000e+00  2.300000e+00
  2.900000e+00  3.150000e+00  3.390000e+00  3.640000e+00  4.277500e+00
  4.915000e+00  5.552500e+00  6.190000e+00  6.827499e+00  7.464999e+00
  8.102499e+00  8.740000e+00  8.990000e+00  9.230000e+00  9.480000e+00
  1.004889e+01  1.061778e+01  1.118667e+01  1.175555e+01  1.232444e+01
  1.289333e+01  1.346222e+01  1.403111e+01  1.460000e+01  1.485000e+01
  1.509000e+01  1.534000e+01  1.590889e+01  1.647778e+01  1.704667e+01
  1.761556e+01  1.818445e+01  1.875334e+01  1.932223e+01  1.989112e+01
  2.046000e+01  2.071000e+01  2.095000e+01  2.120000e+01  2.183750e+01
  2.247500e+01  2.311250e+01  2.375000e+01  2.438750e+01  2.502501e+01
  2.566251e+01  2.630000e+01  2.655000e+01  2.679000e+01  2.704000e+01
  2.761778e+01  2.819556e+01  2.877333e+01  2.935111e+01  2.992889e+01
  3.050667e+01  3.108445e+01  3.166222e+01  3.224000e+01  3.249000e+01
  3.273000e+01  3.298000e+01  3.355222e+01  3.412445e+01  3.469667e+01
  3.526889e+01  3.584112e+01  3.641334e+01  3.698557e+01  3.755779e+01
  3.813000e+01  3.838000e+01  3.862000e+01  3.887000e+01  3.944778e+01
  4.002555e+01  4.060333e+01  4.118111e+01  4.175889e+01  4.233667e+01
  4.291444e+01  4.349222e+01  4.407000e+01  4.432000e+01  4.456000e+01
  4.481000e+01  4.538778e+01  4.596556e+01  4.654333e+01  4.712111e+01
  4.769889e+01  4.827667e+01  4.885445e+01  4.943222e+01  5.001000e+01
  5.026000e+01  5.050000e+01  5.075000e+01  5.133333e+01  5.191666e+01
  5.250000e+01  5.308333e+01  5.366666e+01  5.424999e+01  5.483332e+01
  5.541666e+01  5.600000e+01  5.625000e+01  5.649000e+01  5.674000e+01
  5.731556e+01  5.789111e+01  5.846666e+01  5.904222e+01  5.961777e+01
  6.019333e+01  6.076888e+01  6.134443e+01  6.192000e+01  6.217000e+01
  6.241000e+01  6.266000e+01  6.329375e+01  6.392750e+01  6.456125e+01
  6.519500e+01  6.582875e+01  6.646250e+01  6.709625e+01  6.773000e+01
  6.798000e+01  6.822000e+01  6.847000e+01  6.903889e+01  6.960777e+01
  7.017666e+01  7.074554e+01  7.131443e+01  7.188332e+01  7.245220e+01
  7.302109e+01  7.359000e+01  7.384000e+01  7.408000e+01  7.433000e+01
  7.490556e+01  7.548111e+01  7.605666e+01  7.663222e+01  7.720777e+01
  7.778333e+01  7.835888e+01  7.893443e+01  7.951000e+01  7.975999e+01
  8.000000e+01  8.025000e+01  8.088750e+01  8.152499e+01  8.216249e+01
  8.279999e+01  8.343748e+01  8.407498e+01  8.471248e+01  8.535000e+01
  8.593333e+01  8.651667e+01  8.710001e+01  8.768334e+01  8.826668e+01
  8.885001e+01  8.943335e+01  9.001669e+01  9.060000e+01  9.122500e+01
  9.185000e+01  9.247500e+01  9.310000e+01  9.372500e+01  9.435000e+01
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
  9.497500e+01  9.560000e+01  9.618375e+01  9.676749e+01  9.735124e+01
  9.793499e+01  9.851874e+01  9.910249e+01  9.968623e+01  1.002700e+02
  1.025110e+02  1.047520e+02  1.069930e+02  1.092340e+02  1.114750e+02
  1.137160e+02  1.159570e+02  1.181980e+02  1.204390e+02  1.226800e+02
  1.256800e+02  1.286800e+02  1.316800e+02  1.346800e+02  1.376800e+02
  1.406800e+02  1.436800e+02  1.466800e+02  1.496800e+02  1.526800e+02
  1.586800e+02  1.646800e+02  1.706800e+02  1.766800e+02  1.826800e+02
  1.926800e+02  2.026800e+02  2.126800e+02  2.226800e+02
6** / chs / fixed source energy spectrum
/CHI U_235 from BUGENDF70.BOLIB
 4.9839e-05 2.0031e-04 1.1384e-03 2.5055e-03 5.6195e-03 1.6041e-02
 3.0511e-02 7.9986e-02 7.6258e-02 4.3728e-02 4.6388e-02 1.9903e-02
 4.0013e-03 2.4193e-02 7.3105e-02 7.1538e-02 8.9083e-02 1.1474e-01
 6.2734e-02 2.7329e-02 4.7130e-02 3.8038e-02 4.2436e-02 2.1807e-02
 3.0779e-02 1.5922e-02 7.7147e-03 3.6943e-03 1.0459e-03 6.0374e-04
 1.8501e-04 2.1735e-04 5.8781e-04 5.3054e-04 1.7033e-04 5.7386e-05
 2.4884e-05 3.4200e-06 1.2414e-06 5.4440e-07 1.7323e-07 2.9006e-08
 1.3842e-08 3.8754e-09 /1.7694e-09 1.1790e-09 3.7167e-10
7** /material density by zone
    223r1.0000e+00
8$$ / zone number by body
 190 186 188 187 185 142 165 143 161 158 159 162 144 166 145 167 146
 168 147 169 148 170 149 171 150 172 151 173 152 174 153 175 154 176
 155 177 156 178 157 179 180 181 182 183 184 159 163 164 159 185 160
 2r185 160 2r185 160 185 2r163 49 64 79 163 185 160 185 2r163 36 50 65
 80 94 3r163 25 37 51 66 81 95 107 163 185 160 185 2r163 16 26 38 52 67
 82 96 108 118 163 185 160 185 2r163 9 17 27 39 53 68 83 97 109 119 127
 3r163 4 10 18 28 40 54 69 84 98 110 120 128 134 163 185 160 2r185 160
 185 2r163 1 5 11 19 29 41 55 70 85 99 111 121 129 135 139 163 185 160
 185 2 6 12 20 30 42 56 71 86 100 112 122 130 136 140 185 160 185 3 7
 13 21 31 43 57 72 87 101 113 123 131 137 141 185 160 185 2r163 8 14 22
 32 44 58 73 88 102 114 124 132 138 163 185 160 185 2r163 15 23 33 45
 59 74 89 103 115 125 133 163 185 160 185 2r163 24 34 46 60 75 90 104
 116 126 163 185 160 185 2r163 35 47 61 76 91 105 117 163 185 160 185
 2r163 48 62 77 92 106 3r163 63 78 93 163 185 160 2r185 160 185 163 185
 159 189 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205
 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222
 223
9$$  /material number by material zone
 141r4 18r9 2 4r5 3 17r6 7 8 1 4r6 3 33r9
14** / body left boundaries
     4r-9.591000e+01    41r-9.400000e+01     4r-5.950000e+01
     3r-5.865000e+01     3r-5.667043e+01     3r-5.459061e+01
     6r-5.225000e+01     3r-5.051089e+01     8r-4.908000e+01
    10r-4.592000e+01     3r-4.458808e+01    12r-3.958000e+01
     3r-3.704976e+01    14r-3.642000e+01    16r-3.008000e+01
     3r-2.818563e+01     3r-1.833634e+01    18r-1.425000e+01
     3r-7.880396e+00    15r-4.750000e+00      3r2.780396e+00
     15r4.750000e+00      3r1.323634e+01     16r1.425000e+01
      3r2.308563e+01     14r3.008000e+01      3r3.194976e+01
     12r3.642000e+01      3r3.948808e+01     10r3.958000e+01
      3r4.541090e+01      8r4.592000e+01      6r4.908000e+01
      3r4.949061e+01      3r5.157042e+01        5.225000e+01
        5.355000e+01        5.950000e+01        8.890000e+01
    33r-5.000000e-01
15** / body right boundaries
      2r9.081000e+01       -9.400000e+01        9.081000e+01
      -5.865000e+01      5r8.890000e+01       -5.950000e+01
     34r8.890000e+01        5.950000e+01       -5.225000e+01
      2r5.950000e+01     3r-5.667043e+01     3r-5.459061e+01
     3r-5.051089e+01     6r-4.908000e+01     3r-4.458808e+01
     8r-4.592000e+01    10r-3.958000e+01     3r-3.704976e+01
    12r-3.642000e+01     3r-2.818563e+01    14r-3.008000e+01
    16r-1.425000e+01     3r-1.833634e+01     3r-7.880396e+00
      2r1.425000e+01    15r-4.750000e+00        1.425000e+01
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
        3r2.780396e+00     15r4.750000e+00      3r1.323634e+01
       15r1.425000e+01      3r2.308563e+01     16r3.008000e+01
        3r3.194976e+01     14r3.642000e+01      3r3.948808e+01
       12r3.958000e+01      3r4.541090e+01     10r4.592000e+01
        3r4.949061e+01      8r4.908000e+01      6r5.225000e+01
        3r5.157042e+01      3r5.355000e+01        5.950000e+01
        2r8.890000e+01        9.081000e+01     33r5.000000e-01
16** / body inside boundaries
       2r-9.081000e+01       -8.890000e+01        1.021000e+02
      42r-8.890000e+01     2r-7.100000e+01        7.100000e+01
         -8.890000e+01        1.269603e+00        1.193040e+01
         -8.890000e+01       -9.186345e+00        2.238634e+01
         -8.890000e+01       -1.903563e+01        3.223563e+01
         -7.100000e+01     2r-1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01       -8.890000e+01
         -2.789976e+01        4.109976e+01       -7.100000e+01
       2r-1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
         -7.100000e+01     2r-3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
         -8.890000e+01       -3.543808e+01        4.863808e+01
         -7.100000e+01     2r-3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01       -8.890000e+01
         -4.136090e+01        5.456090e+01       -7.100000e+01
       2r-4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
         -7.100000e+01     2r-4.763000e+01       -4.064000e+01
         -3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        4.064000e+01        4.763000e+01
         -8.890000e+01       -4.544061e+01        5.864061e+01
         -8.890000e+01       -4.752042e+01        6.072042e+01
         -7.100000e+01     2r-5.144000e+01       -4.763000e+01
         -4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          4.763000e+01        5.144000e+01       -8.890000e+01
         -4.950000e+01        6.270000e+01       -5.144000e+01
         -4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.752042e+01        6.072042e+01       -5.144000e+01
         -4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.544061e+01        5.864061e+01       -7.100000e+01
       2r-4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.136090e+01        5.456090e+01       -7.100000e+01
       2r-4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
        -8.890000e+01       -3.543808e+01        4.863808e+01
        -7.100000e+01     2r-3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01       -8.890000e+01
        -2.789976e+01        4.109976e+01       -7.100000e+01
      2r-3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01       -8.890000e+01
        -1.903563e+01        3.223563e+01       -7.100000e+01
      2r-1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
        -7.100000e+01     2r-1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01       -8.890000e+01
        -9.186345e+00        2.238634e+01       -8.890000e+01
         1.269603e+00        1.193040e+01       -7.100000e+01
      3r-8.890000e+01    15r-5.000000e-01        2.450000e+01
         4.950000e+01        7.450000e+01       -2.550000e+01
        -5.050000e+01       -7.550000e+01        2.450000e+01
         4.950000e+01        7.450000e+01       -2.550000e+01
        -5.050000e+01       -7.550000e+01        2.450000e+01
         4.950000e+01        7.450000e+01       -2.550000e+01
        -5.050000e+01       -7.550000e+01
17** / body outside boundaries
         1.040100e+02       -8.890000e+01        1.021000e+02
         1.040100e+02     41r1.021000e+02       -7.100000e+01
       2r7.100000e+01        1.021000e+02        1.269603e+00
         1.193040e+01        1.021000e+02       -9.186345e+00
         2.238634e+01        1.021000e+02       -1.903563e+01
         3.223563e+01        1.021000e+02       -1.588000e+01
         1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        7.100000e+01       -2.789976e+01
         4.109976e+01        1.021000e+02       -1.969000e+01
         1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         7.100000e+01       -3.175000e+01        3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        7.100000e+01       -3.543808e+01
         4.863808e+01        1.021000e+02       -3.556000e+01
         3.556000e+01       -3.175000e+01       -1.969000e+01
        -1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        1.969000e+01        3.175000e+01
         3.556000e+01        7.100000e+01       -4.136090e+01
         5.456090e+01        1.021000e+02       -4.064000e+01
         4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         7.100000e+01       -4.763000e+01        4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        7.100000e+01       -4.544061e+01
         5.864061e+01        1.021000e+02       -4.752042e+01
         6.072042e+01        1.021000e+02       -5.144000e+01
         5.144000e+01       -4.763000e+01       -4.064000e+01
        -3.556000e+01       -3.175000e+01       -1.969000e+01
        -1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        1.969000e+01        3.175000e+01
         3.556000e+01        4.064000e+01        4.763000e+01
         5.144000e+01        7.100000e+01       -4.950000e+01
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
         6.270000e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.752042e+01
         6.072042e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.544061e+01
         5.864061e+01        1.021000e+02       -4.763000e+01
         4.763000e+01       -4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        4.763000e+01        7.100000e+01
        -4.136090e+01        5.456090e+01        1.021000e+02
        -4.064000e+01        4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        7.100000e+01       -3.543808e+01
         4.863808e+01        1.021000e+02       -3.556000e+01
         3.556000e+01       -3.175000e+01       -1.969000e+01
        -1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        1.969000e+01        3.175000e+01
         3.556000e+01        7.100000e+01       -2.789976e+01
         4.109976e+01        1.021000e+02       -3.175000e+01
         3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        7.100000e+01
        -1.903563e+01        3.223563e+01        1.021000e+02
        -1.969000e+01        1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        7.100000e+01       -1.588000e+01
         1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        7.100000e+01       -9.186345e+00
         2.238634e+01        1.021000e+02        1.269603e+00
         1.193040e+01        1.021000e+02        7.100000e+01
       3r1.021000e+02     15r5.000000e-01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01
18** / body bottom boundaries
        -1.198000e+02     4r-1.980000e+01       -1.662000e+01
        -1.610000e+01       -1.100000e+00        0.000000e+00
         1.200000e+00        1.300000e+00        1.700000e+00
         2.900000e+00        3.640000e+00        8.740000e+00
         9.480000e+00        1.460000e+01        1.534000e+01
         2.046000e+01        2.120000e+01        2.630000e+01
         2.704000e+01        3.224000e+01        3.298000e+01
         3.813000e+01        3.887000e+01        4.407000e+01
         4.481000e+01        5.001000e+01        5.075000e+01
         5.600000e+01        5.674000e+01        6.192000e+01
         6.266000e+01        6.773000e+01        6.847000e+01
         7.359000e+01        7.433000e+01        7.951000e+01
         8.025000e+01        8.535000e+01        9.060000e+01
         9.560000e+01        1.002700e+02        1.226800e+02
       2r1.300000e+00        1.600000e+00        1.300000e+00
      9r-1.980000e+01      2r1.300000e+00      3r1.400000e+00
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        5r1.400000e+00      3r1.300000e+00      7r1.400000e+00
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        9r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00     11r1.400000e+00      3r1.300000e+00
       13r1.400000e+00         1.300000e+00     6r-1.980000e+01
        2r1.300000e+00     15r1.400000e+00         1.300000e+00
       3r-1.980000e+01     15r1.400000e+00     3r-1.980000e+01
       15r1.400000e+00     3r-1.980000e+01      2r1.300000e+00
       13r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00     11r1.400000e+00         1.300000e+00
       3r-1.980000e+01      2r1.300000e+00      9r1.400000e+00
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        7r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00      5r1.400000e+00      3r1.300000e+00
        3r1.400000e+00         1.300000e+00     6r-1.980000e+01
          1.300000e+00        -1.980000e+01         1.300000e+00
         -1.980000e+01        -7.000000e-01         3.150000e+00
          8.990000e+00         1.485000e+01         2.071000e+01
          2.655000e+01         3.249000e+01         3.838000e+01
          4.432000e+01         5.026000e+01         5.625000e+01
          6.217000e+01         6.798000e+01         7.384000e+01
          7.975999e+01      6r2.071000e+01      6r5.026000e+01
        6r7.975999e+01
19** / body top boundaries
         -1.980000e+01      3r2.226800e+02        -1.662000e+01
         -1.610000e+01        -1.100000e+00         0.000000e+00
          1.200000e+00         1.300000e+00         1.700000e+00
          2.900000e+00         3.640000e+00         8.740000e+00
          9.480000e+00         1.460000e+01         1.534000e+01
          2.046000e+01         2.120000e+01         2.630000e+01
          2.704000e+01         3.224000e+01         3.298000e+01
          3.813000e+01         3.887000e+01         4.407000e+01
          4.481000e+01         5.001000e+01         5.075000e+01
          5.600000e+01         5.674000e+01         6.192000e+01
          6.266000e+01         6.773000e+01         6.847000e+01
          7.359000e+01         7.433000e+01         7.951000e+01
          8.025000e+01         8.535000e+01         9.060000e+01
          9.560000e+01         1.002700e+02         1.226800e+02
          2.226800e+02         1.700000e+00         1.600000e+00
        2r1.700000e+00     9r-1.662000e+01         1.600000e+00
          1.400000e+00      4r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00      7r1.600000e+00
          1.400000e+00      8r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00     10r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
       13r1.600000e+00         1.400000e+00     14r1.600000e+00
       6r-1.662000e+01         1.600000e+00         1.400000e+00
       16r1.600000e+00     3r-1.662000e+01     15r1.600000e+00
       3r-1.662000e+01     15r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00     14r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
       12r1.600000e+00     3r-1.662000e+01         1.600000e+00
          1.400000e+00     10r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00      8r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
        7r1.600000e+00         1.400000e+00      4r1.600000e+00
       6r-1.662000e+01         1.600000e+00        -1.662000e+01
          1.700000e+00         2.226800e+02        -4.000000e-01
          3.390000e+00         9.230000e+00         1.509000e+01
          2.095000e+01         2.679000e+01         3.273000e+01
          3.862000e+01         4.456000e+01         5.050000e+01
          5.649000e+01         6.241000e+01         6.822000e+01
          7.408000e+01         8.000000e+01      6r2.095000e+01
        6r5.050000e+01      6r8.000000e+01
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
21$$ / itmbg / iteration limit by group
       44r60
22** / i key flux locations
     33r0.0000e+00
23** / j key flux locations
     15r0.0000e+00        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01        2.5000e+01
        5.0000e+01        7.5000e+01       -2.5000e+01       -5.0000e+01
       -7.5000e+01        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01
24** / k key flux locations
       -5.5000e-01        3.2700e+00        9.1100e+00        1.4970e+01
        2.0830e+01        2.6670e+01        3.2610e+01        3.8500e+01
        4.4440e+01        5.0380e+01        5.6370e+01        6.2290e+01
        6.8100e+01        7.3960e+01        7.9880e+01      6r2.0830e+01
      6r5.0380e+01      6r7.9880e+01
27** /group response by group
/   16-S_32    MT=103 (n,p)     FLAT WEIGHTING   (IRDF-2002)
 1.7639e-01 3.0787e-01 3.8051e-01 3.3979e-01 3.2202e-01 3.1380e-01
 2.4629e-01 2.7592e-01 1.9108e-01 1.0053e-01 6.8686e-02 7.2417e-02
 6.6472e-02 6.1245e-02 2.1377e-02 4.1502e-03 5.9998e-04 6.0917e-05
 1.6785e-06 25z /3z
/
/   49-In_115  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 5.8133e-02 9.1680e-02 2.0239e-01 2.7381e-01 3.0859e-01 3.3417e-01
 3.3897e-01 3.2538e-01 3.3341e-01 3.5259e-01 3.5385e-01 3.4311e-01
 3.3654e-01 3.2759e-01 2.9012e-01 2.3022e-01 1.7096e-01 1.0336e-01
 4.9401e-02 2.7891e-02 1.5489e-02 6.3893e-03 2.2558e-03 1.6310e-04
 20z /3z
/
/   45-Rh_103  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 2.3466e-01 3.8742e-01 8.1816e-01 1.2190e+00 1.2753e+00 1.2305e+00
 1.1732e+00 1.1091e+00 1.0370e+00 9.8735e-01 9.5185e-01 9.2536e-01
 9.1570e-01 9.0494e-01 8.6764e-01 8.0955e-01 7.4452e-01 6.6193e-01
 5.8044e-01 4.9269e-01 3.3867e-01 1.9319e-01 1.3801e-01 1.0374e-01
 6.6383e-02 2.3291e-02 5.8219e-03 1.6581e-03 3.4572e-06 15z /3z
/
/   79-Au_197  MT=102 (n,gamma) FLAT WEIGHTING   (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 6.8138e-04 1.6063e-03 1.6769e-03 1.1792e-03 9.1672e-04 2.9908e-03
 6.0619e-03 1.0673e-02 1.9494e-02 2.7032e-02 3.1752e-02 3.5656e-02
 3.7624e-02 4.0070e-02 4.9391e-02 6.0152e-02 6.7842e-02 7.5077e-02
 8.4031e-02 9.0899e-02 9.8907e-02 1.2061e-01 1.5148e-01 1.8519e-01
 2.3553e-01 2.7527e-01 3.2852e-01 4.2145e-01 5.3159e-01 5.9625e-01
 6.3013e-01 6.5349e-01 7.6339e-01 1.1561e+00 1.8461e+00 2.9907e+00
 8.0657e+00 1.2390e+01 1.0332e+01 1.8528e+01 6.5715e-01 9.5267e+01
 3.6192e+02 2.5048e+01 /2.5505e+01 3.5582e+01 9.4230e+01
/
/   13-Al_27   MT=107 (n,alpha) FLAT WEIGHTING   (IRDF-2002)
 9.7222e-02 1.2398e-01 1.0678e-01 7.7279e-02 4.1475e-02 1.1792e-02
 4.6528e-04 2.6020e-06 1.5730e-07 35z /3z
/
/   16-S_32    MT=103 (n,p)     1/4 T PV WEIGHTING  (IRDF-2002)
 1.9504e-01 3.1939e-01 3.7877e-01 3.3756e-01 3.2279e-01 3.1134e-01
 2.4087e-01 2.7597e-01 1.8679e-01 9.9856e-02 6.8690e-02 7.2357e-02
 6.6472e-02 6.1120e-02 2.1288e-02 3.8128e-03 5.7288e-04 5.5136e-05
 1.3091e-06 25z /3z
/
/   49-In_115  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 5.9174e-02 9.8495e-02 2.1529e-01 2.7602e-01 3.1014e-01 3.3553e-01
 3.3870e-01 3.2519e-01 3.3463e-01 3.5274e-01 3.5384e-01 3.4291e-01
 3.3654e-01 3.2744e-01 2.8997e-01 2.2780e-01 1.6955e-01 1.0098e-01
 4.8555e-02 2.7780e-02 1.4595e-02 6.4916e-03 2.1464e-03 1.5024e-04
 20z /3z
/
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
/   45-Rh_103  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 2.4736e-01 4.0943e-01 8.8628e-01 1.2280e+00 1.2743e+00 1.2259e+00
 1.1713e+00 1.1080e+00 1.0340e+00 9.8681e-01 9.5184e-01 9.2505e-01
 9.1570e-01 9.0476e-01 8.6750e-01 8.0709e-01 7.4285e-01 6.5898e-01
 5.7853e-01 4.9180e-01 3.2413e-01 1.9458e-01 1.3637e-01 1.0321e-01
 6.5947e-02 2.3120e-02 5.3290e-03 1.6314e-03 3.5772e-06 15z /3z
/
/   79-Au_197  MT=102 (n,gamma) 1/4 T PV WEIGHTING  (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 8.3465e-04 1.6633e-03 1.6248e-03 1.1551e-03 9.2211e-04 3.2299e-03
 6.1612e-03 1.0768e-02 1.9964e-02 2.7109e-02 3.1753e-02 3.5716e-02
 3.7624e-02 4.0110e-02 4.9426e-02 6.0528e-02 6.7956e-02 7.5386e-02
 8.4235e-02 9.0947e-02 9.9769e-02 1.2016e-01 1.5300e-01 1.8581e-01
 2.3623e-01 2.7556e-01 3.3608e-01 4.2233e-01 5.3060e-01 6.0556e-01
 6.3011e-01 6.5271e-01 7.5889e-01 1.1324e+00 1.8761e+00 3.1791e+00
 8.5846e+00 1.2102e+01 1.0530e+01 2.0632e+01 8.3750e-01 1.1670e+02
 2.9102e+02 2.4922e+01 /2.5684e+01 3.8169e+01 6.7849e+01
/
/   13-Al_27   MT=107 (n,alpha) 1/4 T PV WEIGHTING  (IRDF-2002)
 1.0443e-01 1.2391e-01 1.0308e-01 7.5654e-02 3.9795e-02 9.9044e-03
 4.0980e-04 2.4639e-06 1.3485e-07 35z /3z
/
/ E > 8.0 MeV Neutron Flux
      4r1. 4.8764e-01 39z /3z
/
/ E > 3.0 MeV Neutron Flux
      9r1. 3.9728e-02 34z /3z
/
/ E > 1.0 MeV Neutron Flux
     18r1.  1.3000e-02  25z /3z
/
/ E > 0.1 MeV Neutron Flux
     26r1.  2.1034e-01  17z /3z
/
/ E > 0.87643 eV Neutron Flux
     44r1. /3z
t
95** / shapg / source shape by group
/CHI U_235 from BUGENDF70.BOLIB
 4.9839e-05 2.0031e-04 1.1384e-03 2.5055e-03 5.6195e-03 1.6041e-02
 3.0511e-02 7.9986e-02 7.6258e-02 4.3728e-02 4.6388e-02 1.9903e-02
 4.0013e-03 2.4193e-02 7.3105e-02 7.1538e-02 8.9083e-02 1.1474e-01
 6.2734e-02 2.7329e-02 4.7130e-02 3.8038e-02 4.2436e-02 2.1807e-02
 3.0779e-02 1.5922e-02 7.7147e-03 3.6943e-03 1.0459e-03 6.0374e-04
 1.8501e-04 2.1735e-04 5.8781e-04 5.3054e-04 1.7033e-04 5.7386e-05
 2.4884e-05 3.4200e-06 1.2414e-06 5.4440e-07 1.7323e-07 2.9006e-08
 1.3842e-08 3.8754e-09 /1.7694e-09 1.1790e-09 3.7167e-10
96** / distributed source distribution
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
1054r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  62r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  62r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  57r0.0000e+00      5r2.7450e+07      3r3.0720e+07      4r3.1500e+07
   4r3.0670e+07      5r2.6850e+07     52r0.0000e+00      5r2.7450e+07
   3r3.0720e+07      4r3.1500e+07      4r3.0670e+07      5r2.6850e+07
  52r0.0000e+00      5r2.7450e+07      3r3.0720e+07      4r3.1500e+07
   4r3.0670e+07      5r2.6850e+07     52r0.0000e+00      5r2.7450e+07
   3r3.0720e+07      4r3.1500e+07      4r3.0670e+07      5r2.6850e+07
  50r0.0000e+00      2r2.8960e+07      5r3.3960e+07      3r3.7700e+07
   4r3.8550e+07      4r3.7580e+07      5r3.3200e+07      2r2.7120e+07
  48r0.0000e+00      2r2.8960e+07      5r3.3960e+07      3r3.7700e+07
   4r3.8550e+07      4r3.7580e+07      5r3.3200e+07      2r2.7120e+07
  46r0.0000e+00      2r3.0040e+07      2r3.2990e+07      5r3.8550e+07
   3r4.2670e+07      4r4.3570e+07      4r4.2470e+07      5r3.7660e+07
   2r3.1010e+07      2r2.7480e+07     44r0.0000e+00      2r3.0040e+07
   2r3.2990e+07      5r3.8550e+07      3r4.2670e+07      4r4.3570e+07
   4r4.2470e+07      5r3.7660e+07      2r3.1010e+07      2r2.7480e+07
  41r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
   5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
  38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
   5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
  38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
37r0.0000e+00        3.1360e+07      3r3.5740e+07      2r4.0010e+07
 2r4.4000e+07      5r5.1570e+07      3r5.7010e+07      4r5.8020e+07
 4r5.6430e+07      5r5.0310e+07      2r4.2210e+07      2r3.7950e+07
 3r3.3310e+07        2.8430e+07     36r0.0000e+00        3.1360e+07
 3r3.5740e+07      2r4.0010e+07      2r4.4000e+07      5r5.1570e+07
 3r5.7010e+07      4r5.8020e+07      4r5.6430e+07      5r5.0310e+07
 2r4.2210e+07      2r3.7950e+07      3r3.3310e+07        2.8430e+07
34r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
33r0.0000e+00        3.1500e+07      3r3.5750e+07      2r4.0030e+07
 2r4.4120e+07      5r5.2020e+07      3r5.7700e+07      4r5.8700e+07
 4r5.6990e+07      5r5.0800e+07      2r4.2820e+07      2r3.8730e+07
 3r3.4310e+07        2.9700e+07     37r0.0000e+00      3r3.2490e+07
 2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
 4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
 2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     41r0.0000e+00      2r3.1860e+07
      2r3.5000e+07      5r4.0920e+07      3r4.5140e+07      4r4.5870e+07
      4r4.4460e+07      5r3.9250e+07      2r3.2400e+07      2r2.8860e+07
     44r0.0000e+00      2r3.1860e+07      2r3.5000e+07      5r4.0920e+07
      3r4.5140e+07      4r4.5870e+07      4r4.4460e+07      5r3.9250e+07
      2r3.2400e+07      2r2.8860e+07     46r0.0000e+00      2r3.1760e+07
      5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
      5r3.5290e+07      2r2.8900e+07     48r0.0000e+00      2r3.1760e+07
      5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
      5r3.5290e+07      2r2.8900e+07     50r0.0000e+00      5r3.1730e+07
      3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
     52r0.0000e+00      5r3.1730e+07      3r3.4960e+07      4r3.5370e+07
      4r3.4040e+07      5r2.9750e+07     52r0.0000e+00      5r3.1730e+07
      3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
     57r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
   1417r0.0000e+00
   5767r0.0000e+00
   f0.
/zone     1 volume= 7.2390e+00  source= 1.7793e+08 density= 1.0000e+00 mat.    4
/zone     2 volume= 7.2390e+00  source= 1.8278e+08 density= 1.0000e+00 mat.    4
/zone     3 volume= 7.2390e+00  source= 1.7721e+08 density= 1.0000e+00 mat.    4
/zone     4 volume= 2.2130e+01  source= 6.0748e+08 density= 1.0000e+00 mat.    4
/zone     5 volume= 1.3281e+01  source= 4.0799e+08 density= 1.0000e+00 mat.    4
/zone     6 volume= 1.3281e+01  source= 4.1835e+08 density= 1.0000e+00 mat.    4
/zone     7 volume= 1.3281e+01  source= 4.0733e+08 density= 1.0000e+00 mat.    4
/zone     8 volume= 2.2130e+01  source= 5.9420e+08 density= 1.0000e+00 mat.    4
/zone     9 volume= 6.4414e+00  source= 1.8654e+08 density= 1.0000e+00 mat.    4
/zone    10 volume= 1.6083e+01  source= 5.4619e+08 density= 1.0000e+00 mat.    4
/zone    11 volume= 9.6520e+00  source= 3.6388e+08 density= 1.0000e+00 mat.    4
/zone    12 volume= 9.6520e+00  source= 3.7208e+08 density= 1.0000e+00 mat.    4
/zone    13 volume= 9.6520e+00  source= 3.6272e+08 density= 1.0000e+00 mat.    4
/zone    14 volume= 1.6083e+01  source= 5.3396e+08 density= 1.0000e+00 mat.    4
/zone    15 volume= 6.4414e+00  source= 1.7469e+08 density= 1.0000e+00 mat.    4
/zone    16 volume= 2.4079e+00  source= 7.2334e+07 density= 1.0000e+00 mat.    4
/zone    17 volume= 4.8311e+00  source= 1.5938e+08 density= 1.0000e+00 mat.    4
/zone    18 volume= 1.2062e+01  source= 4.6501e+08 density= 1.0000e+00 mat.    4
/zone    19 volume= 7.2390e+00  source= 3.0889e+08 density= 1.0000e+00 mat.    4
/zone    20 volume= 7.2390e+00  source= 3.1540e+08 density= 1.0000e+00 mat.    4
/zone    21 volume= 7.2390e+00  source= 3.0744e+08 density= 1.0000e+00 mat.    4
/zone    22 volume= 1.2062e+01  source= 4.5427e+08 density= 1.0000e+00 mat.    4
/zone    23 volume= 4.8311e+00  source= 1.4981e+08 density= 1.0000e+00 mat.    4
/zone    24 volume= 2.4079e+00  source= 6.6170e+07 density= 1.0000e+00 mat.    4
/zone    25 volume= 1.5292e+01  source= 4.8659e+08 density= 1.0000e+00 mat.    4
/zone    26 volume= 7.6219e+00  source= 2.7149e+08 density= 1.0000e+00 mat.    4
/zone    27 volume= 1.5292e+01  source= 5.9823e+08 density= 1.0000e+00 mat.    4
/zone    28 volume= 3.8182e+01  source= 1.7457e+09 density= 1.0000e+00 mat.    4
/zone    29 volume= 2.2914e+01  source= 1.1578e+09 density= 1.0000e+00 mat.    4
/zone    30 volume= 2.2914e+01  source= 1.1798e+09 density= 1.0000e+00 mat.    4
/zone    31 volume= 2.2914e+01  source= 1.1487e+09 density= 1.0000e+00 mat.    4
/zone    32 volume= 3.8182e+01  source= 1.7033e+09 density= 1.0000e+00 mat.    4
/zone    33 volume= 1.5292e+01  source= 5.6779e+08 density= 1.0000e+00 mat.    4
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
/zone    34 volume= 7.6219e+00  source= 2.5282e+08 density= 1.0000e+00 mat.    4
/zone    35 volume= 1.5292e+01  source= 4.4148e+08 density= 1.0000e+00 mat.    4
/zone    36 volume= 2.4079e+00  source= 7.5512e+07 density= 1.0000e+00 mat.    4
/zone    37 volume= 4.8311e+00  source= 1.7266e+08 density= 1.0000e+00 mat.    4
/zone    38 volume= 2.4079e+00  source= 9.6341e+07 density= 1.0000e+00 mat.    4
/zone    39 volume= 4.8311e+00  source= 2.1257e+08 density= 1.0000e+00 mat.    4
/zone    40 volume= 1.2062e+01  source= 6.2206e+08 density= 1.0000e+00 mat.    4
/zone    41 volume= 7.2390e+00  source= 4.1270e+08 density= 1.0000e+00 mat.    4
/zone    42 volume= 7.2390e+00  source= 4.2001e+08 density= 1.0000e+00 mat.    4
/zone    43 volume= 7.2390e+00  source= 4.0850e+08 density= 1.0000e+00 mat.    4
/zone    44 volume= 1.2062e+01  source= 6.0686e+08 density= 1.0000e+00 mat.    4
/zone    45 volume= 4.8311e+00  source= 2.0392e+08 density= 1.0000e+00 mat.    4
/zone    46 volume= 2.4079e+00  source= 9.1381e+07 density= 1.0000e+00 mat.    4
/zone    47 volume= 4.8311e+00  source= 1.6092e+08 density= 1.0000e+00 mat.    4
/zone    48 volume= 2.4079e+00  source= 6.8457e+07 density= 1.0000e+00 mat.    4
/zone    49 volume= 6.7141e+00  source= 2.0317e+08 density= 1.0000e+00 mat.    4
/zone    50 volume= 6.6929e+00  source= 2.2254e+08 density= 1.0000e+00 mat.    4
/zone    51 volume= 1.3428e+01  source= 5.0812e+08 density= 1.0000e+00 mat.    4
/zone    52 volume= 6.6929e+00  source= 2.8371e+08 density= 1.0000e+00 mat.    4
/zone    53 volume= 1.3428e+01  source= 6.2696e+08 density= 1.0000e+00 mat.    4
/zone    54 volume= 3.3528e+01  source= 1.8410e+09 density= 1.0000e+00 mat.    4
/zone    55 volume= 2.0121e+01  source= 1.2232e+09 density= 1.0000e+00 mat.    4
/zone    56 volume= 2.0121e+01  source= 1.2441e+09 density= 1.0000e+00 mat.    4
/zone    57 volume= 2.0121e+01  source= 1.2091e+09 density= 1.0000e+00 mat.    4
/zone    58 volume= 3.3528e+01  source= 1.7984e+09 density= 1.0000e+00 mat.    4
/zone    59 volume= 1.3428e+01  source= 6.0735e+08 density= 1.0000e+00 mat.    4
/zone    60 volume= 6.6929e+00  source= 2.7334e+08 density= 1.0000e+00 mat.    4
/zone    61 volume= 1.3428e+01  source= 4.8435e+08 density= 1.0000e+00 mat.    4
/zone    62 volume= 6.6929e+00  source= 2.0768e+08 density= 1.0000e+00 mat.    4
/zone    63 volume= 6.7141e+00  source= 1.8470e+08 density= 1.0000e+00 mat.    4
/zone    64 volume= 6.7077e+00  source= 2.1009e+08 density= 1.0000e+00 mat.    4
/zone    65 volume= 6.6866e+00  source= 2.2915e+08 density= 1.0000e+00 mat.    4
/zone    66 volume= 1.3415e+01  source= 5.2226e+08 density= 1.0000e+00 mat.    4
/zone    67 volume= 6.6866e+00  source= 2.9180e+08 density= 1.0000e+00 mat.    4
/zone    68 volume= 1.3415e+01  source= 6.4595e+08 density= 1.0000e+00 mat.    4
/zone    69 volume= 3.3496e+01  source= 1.9039e+09 density= 1.0000e+00 mat.    4
/zone    70 volume= 2.0102e+01  source= 1.2672e+09 density= 1.0000e+00 mat.    4
/zone    71 volume= 2.0102e+01  source= 1.2889e+09 density= 1.0000e+00 mat.    4
/zone    72 volume= 2.0102e+01  source= 1.2518e+09 density= 1.0000e+00 mat.    4
/zone    73 volume= 3.3496e+01  source= 1.8634e+09 density= 1.0000e+00 mat.    4
/zone    74 volume= 1.3415e+01  source= 6.3187e+08 density= 1.0000e+00 mat.    4
/zone    75 volume= 6.6866e+00  source= 2.8552e+08 density= 1.0000e+00 mat.    4
/zone    76 volume= 1.3415e+01  source= 5.0871e+08 density= 1.0000e+00 mat.    4
/zone    77 volume= 6.6866e+00  source= 2.1979e+08 density= 1.0000e+00 mat.    4
/zone    78 volume= 6.7077e+00  source= 1.9667e+08 density= 1.0000e+00 mat.    4
/zone    79 volume= 6.7141e+00  source= 2.0411e+08 density= 1.0000e+00 mat.    4
/zone    80 volume= 6.6929e+00  source= 2.2234e+08 density= 1.0000e+00 mat.    4
/zone    81 volume= 1.3428e+01  source= 5.0611e+08 density= 1.0000e+00 mat.    4
/zone    82 volume= 6.6929e+00  source= 2.8264e+08 density= 1.0000e+00 mat.    4
/zone    83 volume= 1.3428e+01  source= 6.2575e+08 density= 1.0000e+00 mat.    4
/zone    84 volume= 3.3528e+01  source= 1.8457e+09 density= 1.0000e+00 mat.    4
/zone    85 volume= 2.0121e+01  source= 1.2294e+09 density= 1.0000e+00 mat.    4
/zone    86 volume= 2.0121e+01  source= 1.2505e+09 density= 1.0000e+00 mat.    4
/zone    87 volume= 2.0121e+01  source= 1.2141e+09 density= 1.0000e+00 mat.    4
/zone    88 volume= 3.3528e+01  source= 1.8062e+09 density= 1.0000e+00 mat.    4
/zone    89 volume= 1.3428e+01  source= 6.1219e+08 density= 1.0000e+00 mat.    4
/zone    90 volume= 6.6929e+00  source= 2.7662e+08 density= 1.0000e+00 mat.    4
/zone    91 volume= 1.3428e+01  source= 4.9321e+08 density= 1.0000e+00 mat.    4
/zone    92 volume= 6.6929e+00  source= 2.1337e+08 density= 1.0000e+00 mat.    4
/zone    93 volume= 6.7141e+00  source= 1.9135e+08 density= 1.0000e+00 mat.    4
/zone    94 volume= 2.4079e+00  source= 7.5850e+07 density= 1.0000e+00 mat.    4
/zone    95 volume= 4.8311e+00  source= 1.7271e+08 density= 1.0000e+00 mat.    4
/zone    96 volume= 2.4079e+00  source= 9.6389e+07 density= 1.0000e+00 mat.    4
/zone    97 volume= 4.8311e+00  source= 2.1315e+08 density= 1.0000e+00 mat.    4
/zone    98 volume= 1.2062e+01  source= 6.2749e+08 density= 1.0000e+00 mat.    4
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
/zone     99 volume= 7.2390e+00  source= 4.1769e+08 density= 1.0000e+00 mat.    4
/zone    100 volume= 7.2390e+00  source= 4.2493e+08 density= 1.0000e+00 mat.    4
/zone    101 volume= 7.2390e+00  source= 4.1255e+08 density= 1.0000e+00 mat.    4
/zone    102 volume= 1.2062e+01  source= 6.1277e+08 density= 1.0000e+00 mat.    4
/zone    103 volume= 4.8311e+00  source= 2.0687e+08 density= 1.0000e+00 mat.    4
/zone    104 volume= 2.4079e+00  source= 9.3259e+07 density= 1.0000e+00 mat.    4
/zone    105 volume= 4.8311e+00  source= 1.6575e+08 density= 1.0000e+00 mat.    4
/zone    106 volume= 2.4079e+00  source= 7.1515e+07 density= 1.0000e+00 mat.    4
/zone    107 volume= 1.5292e+01  source= 4.9684e+08 density= 1.0000e+00 mat.    4
/zone    108 volume= 7.6219e+00  source= 2.7706e+08 density= 1.0000e+00 mat.    4
/zone    109 volume= 1.5292e+01  source= 6.1153e+08 density= 1.0000e+00 mat.    4
/zone    110 volume= 3.8182e+01  source= 1.7930e+09 density= 1.0000e+00 mat.    4
/zone    111 volume= 2.2914e+01  source= 1.1908e+09 density= 1.0000e+00 mat.    4
/zone    112 volume= 2.2914e+01  source= 1.2112e+09 density= 1.0000e+00 mat.    4
/zone    113 volume= 2.2914e+01  source= 1.1755e+09 density= 1.0000e+00 mat.    4
/zone    114 volume= 3.8182e+01  source= 1.7392e+09 density= 1.0000e+00 mat.    4
/zone    115 volume= 1.5292e+01  source= 5.8217e+08 density= 1.0000e+00 mat.    4
/zone    116 volume= 7.6219e+00  source= 2.6082e+08 density= 1.0000e+00 mat.    4
/zone    117 volume= 1.5292e+01  source= 4.6014e+08 density= 1.0000e+00 mat.    4
/zone    118 volume= 2.4079e+00  source= 7.6716e+07 density= 1.0000e+00 mat.    4
/zone    119 volume= 4.8311e+00  source= 1.6909e+08 density= 1.0000e+00 mat.    4
/zone    120 volume= 1.2062e+01  source= 4.9360e+08 density= 1.0000e+00 mat.    4
/zone    121 volume= 7.2390e+00  source= 3.2677e+08 density= 1.0000e+00 mat.    4
/zone    122 volume= 7.2390e+00  source= 3.3205e+08 density= 1.0000e+00 mat.    4
/zone    123 volume= 7.2390e+00  source= 3.2185e+08 density= 1.0000e+00 mat.    4
/zone    124 volume= 1.2062e+01  source= 4.7345e+08 density= 1.0000e+00 mat.    4
/zone    125 volume= 4.8311e+00  source= 1.5653e+08 density= 1.0000e+00 mat.    4
/zone    126 volume= 2.4079e+00  source= 6.9493e+07 density= 1.0000e+00 mat.    4
/zone    127 volume= 6.4414e+00  source= 2.0458e+08 density= 1.0000e+00 mat.    4
/zone    128 volume= 1.6083e+01  source= 5.9685e+08 density= 1.0000e+00 mat.    4
/zone    129 volume= 9.6520e+00  source= 3.9457e+08 density= 1.0000e+00 mat.    4
/zone    130 volume= 9.6520e+00  source= 4.0046e+08 density= 1.0000e+00 mat.    4
/zone    131 volume= 9.6520e+00  source= 3.8753e+08 density= 1.0000e+00 mat.    4
/zone    132 volume= 1.6083e+01  source= 5.6758e+08 density= 1.0000e+00 mat.    4
/zone    133 volume= 6.4414e+00  source= 1.8616e+08 density= 1.0000e+00 mat.    4
/zone    134 volume= 2.2130e+01  source= 7.0220e+08 density= 1.0000e+00 mat.    4
/zone    135 volume= 1.3281e+01  source= 4.6430e+08 density= 1.0000e+00 mat.    4
/zone    136 volume= 1.3281e+01  source= 4.6975e+08 density= 1.0000e+00 mat.    4
/zone    137 volume= 1.3281e+01  source= 4.5209e+08 density= 1.0000e+00 mat.    4
/zone    138 volume= 2.2130e+01  source= 6.5838e+08 density= 1.0000e+00 mat.    4
/zone    139 volume= 7.2390e+00  source= 2.1522e+08 density= 1.0000e+00 mat.    4
/zone    140 volume= 7.2390e+00  source= 2.1674e+08 density= 1.0000e+00 mat.    4
/zone    141 volume= 7.2390e+00  source= 2.0740e+08 density= 1.0000e+00 mat.    4
/zone    142 volume= 1.8166e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    143 volume= 3.8427e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    144 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    145 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    146 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    147 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    148 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    149 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    150 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    151 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    152 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    153 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    154 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    155 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    156 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    157 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    158 volume= 3.4934e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    159 volume= 7.2144e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    160 volume= 3.1441e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    2
/zone    161 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    162 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    163 volume= 3.3327e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
/zone   164 volume= 1.6898e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone   165 volume= 5.2401e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone   166 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   167 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   168 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   169 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   170 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   171 volume= 1.7991e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   172 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   173 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   174 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   175 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   176 volume= 1.7711e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   177 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   178 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   179 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   180 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   181 volume= 1.7467e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   182 volume= 1.6314e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   183 volume= 7.8287e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    7
/zone   184 volume= 3.4934e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    8
/zone   185 volume= 7.9648e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    1
/zone   186 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   187 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   188 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   189 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone   190 volume= 3.6377e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone   191 volume= 3.0000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   192 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   193 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   194 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   195 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   196 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   197 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   198 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   199 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   200 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   201 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   202 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   203 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   204 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   205 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   206 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   207 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   208 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   209 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   210 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   211 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   212 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   213 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   214 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   215 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   216 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   217 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   218 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   219 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   220 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   221 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   222 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone   223 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/     Total volume= 1.2458e+07  source= 7.6059e+10
/
/ mat.    1 volume= 7.9648e+04  source= 0.0000e+00
/ mat.    2 volume= 3.1441e+04  source= 0.0000e+00
/ mat.    3 volume= 4.1617e+06  source= 0.0000e+00
```

TAB. C3 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGENDF70.BOLIB Library.

```
/ mat.    4 volume= 1.7367e+03  source= 7.6059e+10
/ mat.    5 volume= 8.8864e+04  source= 0.0000e+00
/ mat.    6 volume= 3.3895e+06  source= 0.0000e+00
/ mat.    7 volume= 7.8287e+05  source= 0.0000e+00
/ mat.    8 volume= 3.4934e+06  source= 0.0000e+00
/ mat.    9 volume= 4.2922e+05  source= 0.0000e+00
/     Total volume= 1.2458e+07  source= 7.6059e+10
t
=end
```

TAB. C4

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
=tort
WINFRITH Iron-88, X-Y-Z Model.
/ 44 Neutron Energy Groups, Inhomogeneous Neutron Fission Source,
/ TORT-3.2, S8 Full Symmetric Quadrature Sets,
/ P3 Cross Sections from BUGLE-B7 Library.
61$$ / input/output file logical unit numbers
/ ntflx  ntfog  ntsig  ntbsi  ntdsi  ntrso   ntnpr  ntscl
    0       0      8     0     -3       0      0      1  e
62$$ / procedure control integers
/ nsrmx  nfxmx  icsprt ifxprt modep  nkeyfx iepsbz  nresp ktype nsctt
    1     -60      0     0      0     -33     11     -15    0     -1
/ iadj  negfix  nsclmx nbfacc mode    nbuf  locobj lcmobj minblk maxblk
    0      -1     50     0      0       0   100000    0     0      0 e
63$$ / geometry control integers
/  im    jm    km   ibl    ibr   ibi   ibo   ibb   ibt  ingeom
   73    79   278     0     0     0     0     0     0     0
/  izm  inreg  mm  mmesh  spare  nism  njsm  spare
   223    0    96   317     0     1     1     0     e
64$$ / cross section control integers
/  igm  ncrx  nsctm  iht  ihm   iups  neut
    44    9     3     3    70     e
66** / procedure control reals
/  epp
  1.0e-3 e
67** / problem control reals
/  xnf
  17.040e-24 e
t
t
81** / w / quadrature weights
0 2r151235-7 0 4r113425-7 0 113425-7 11574-6 2r113425-7 11574-6 113425-7
0 151235-7 2r113425-7 2r151235-7 2r113425-7 151235-7
  3q  24
82** / emu / first-direction cosines
-30861-5 -21822-5 21822-5 -61721-5 -57735-5 -21822-5 21822-5 57735-5
-8165-4 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 -9759-4
-95119-5 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 95119-5
  3q  24
83** / eta / last-direction cosines
3r-95119-5 5r-7868-4 7r-57735-5 9r-21822-5
   q  24 g  48
84** / rcmb /x coarse mesh boundaries number
   -95.91 90.81 f999
85** / thcmb /y coarse mesh boundaries number
  -90.81  104.01 f999
86** / zcmb /z coarse mesh boundaries
  -119.80 222.68 f999
t
2** / x fine mesh boundaries
 -9.591000e+01 -9.400000e+01 -9.112500e+01 -8.825000e+01 -8.537500e+01
 -8.250000e+01 -7.962500e+01 -7.675000e+01 -7.387500e+01 -7.100000e+01
 -6.812500e+01 -6.525000e+01 -6.237500e+01 -5.950000e+01 -5.865000e+01
 -5.667043e+01 -5.459061e+01 -5.225000e+01 -5.051089e+01 -4.908000e+01
 -4.592000e+01 -4.458808e+01 -4.208404e+01 -3.958000e+01 -3.704976e+01
 -3.642000e+01 -3.325000e+01 -3.008000e+01 -2.818563e+01 -2.490253e+01
 -2.161944e+01 -1.833634e+01 -1.425000e+01 -1.106520e+01 -7.880396e+00
 -4.750000e+00 -5.000000e-01  5.000000e-01  2.780396e+00  4.750000e+00
  7.578781e+00  1.040756e+01  1.323634e+01  1.425000e+01  1.719521e+01
  2.014042e+01  2.308563e+01  2.658282e+01  3.008000e+01  3.194976e+01
  3.642000e+01  3.948808e+01  3.958000e+01  4.249545e+01  4.541090e+01
  4.592000e+01  4.908000e+01  4.949061e+01  5.157042e+01  5.225000e+01
  5.355000e+01  5.652500e+01  5.950000e+01  6.244000e+01  6.538000e+01
  6.832000e+01  7.126000e+01  7.420000e+01  7.714001e+01  8.008001e+01
  8.302001e+01  8.596001e+01  8.890000e+01  9.081000e+01
3** / y fine mesh boundaries
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
 -9.081000e+01 -8.890000e+01 -8.555000e+01 -8.220000e+01 -7.885001e+01
 -7.550000e+01 -7.450000e+01 -7.100000e+01 -6.820571e+01 -6.541142e+01
 -6.261714e+01 -5.982285e+01 -5.702857e+01 -5.423428e+01 -5.144000e+01
 -5.050000e+01 -4.950000e+01 -4.763000e+01 -4.752042e+01 -4.544061e+01
 -4.136090e+01 -4.064000e+01 -3.810000e+01 -3.556000e+01 -3.543808e+01
 -3.175000e+01 -2.789976e+01 -2.550000e+01 -2.450000e+01 -2.209500e+01
 -1.969000e+01 -1.903563e+01 -1.588000e+01 -1.253317e+01 -9.186345e+00
 -5.290000e+00 -2.895000e+00 -5.000000e-01  5.000000e-01  1.269603e+00
  5.290000e+00  8.610198e+00  1.193040e+01  1.588000e+01  1.969000e+01
  2.238634e+01  2.450000e+01  2.550000e+01  2.862500e+01  3.175000e+01
  3.223563e+01  3.556000e+01  3.810000e+01  4.064000e+01  4.109976e+01
  4.436488e+01  4.763000e+01  4.863808e+01  4.950000e+01  5.050000e+01
  5.144000e+01  5.456090e+01  5.864061e+01  6.072042e+01  6.270000e+01
  6.546667e+01  6.823334e+01  7.100000e+01  7.450000e+01  7.550000e+01
  7.845556e+01  8.141112e+01  8.436668e+01  8.732224e+01  9.027779e+01
  9.323335e+01  9.618891e+01  9.914447e+01  1.021000e+02  1.040100e+02
4** / z fine mesh boundaries
 -1.198000e+02 -1.098000e+02 -9.980000e+01 -8.980000e+01 -7.980000e+01
 -7.408572e+01 -6.837143e+01 -6.265714e+01 -5.694286e+01 -5.122857e+01
 -4.551428e+01 -3.980000e+01 -3.694286e+01 -3.408571e+01 -3.122857e+01
 -2.837143e+01 -2.551428e+01 -2.265714e+01 -1.980000e+01 -1.916400e+01
 -1.852800e+01 -1.789200e+01 -1.725600e+01 -1.662000e+01 -1.610000e+01
 -1.550000e+01 -1.490000e+01 -1.430000e+01 -1.370000e+01 -1.310000e+01
 -1.250000e+01 -1.190000e+01 -1.130000e+01 -1.070000e+01 -1.010000e+01
 -9.499996e+00 -8.899996e+00 -8.299995e+00 -7.699996e+00 -7.099996e+00
 -6.499996e+00 -5.899996e+00 -5.299996e+00 -4.699996e+00 -4.099996e+00
 -3.499996e+00 -2.899996e+00 -2.299996e+00 -1.699996e+00 -1.100000e+00
 -7.000000e-01 -4.000000e-01  0.000000e+00  6.000000e-01  1.200000e+00
  1.300000e+00  1.400000e+00  1.600000e+00  1.700000e+00  2.300000e+00
  2.900000e+00  3.150000e+00  3.390000e+00  3.640000e+00  4.277500e+00
  4.915000e+00  5.552500e+00  6.190000e+00  6.827499e+00  7.464999e+00
  8.102499e+00  8.740000e+00  8.990000e+00  9.230000e+00  9.480000e+00
  1.004889e+01  1.061778e+01  1.118667e+01  1.175555e+01  1.232444e+01
  1.289333e+01  1.346222e+01  1.403111e+01  1.460000e+01  1.485000e+01
  1.509000e+01  1.534000e+01  1.590889e+01  1.647778e+01  1.704667e+01
  1.761556e+01  1.818445e+01  1.875334e+01  1.932223e+01  1.989112e+01
  2.046000e+01  2.071000e+01  2.095000e+01  2.120000e+01  2.183750e+01
  2.247500e+01  2.311250e+01  2.375000e+01  2.438750e+01  2.502501e+01
  2.566251e+01  2.630000e+01  2.655000e+01  2.679000e+01  2.704000e+01
  2.761778e+01  2.819556e+01  2.877333e+01  2.935111e+01  2.992889e+01
  3.050667e+01  3.108445e+01  3.166222e+01  3.224000e+01  3.249000e+01
  3.273000e+01  3.298000e+01  3.355222e+01  3.412445e+01  3.469667e+01
  3.526889e+01  3.584112e+01  3.641334e+01  3.698557e+01  3.755779e+01
  3.813000e+01  3.838000e+01  3.862000e+01  3.887000e+01  3.944778e+01
  4.002555e+01  4.060333e+01  4.118111e+01  4.175889e+01  4.233667e+01
  4.291444e+01  4.349222e+01  4.407000e+01  4.432000e+01  4.456000e+01
  4.481000e+01  4.538778e+01  4.596556e+01  4.654333e+01  4.712111e+01
  4.769889e+01  4.827667e+01  4.885445e+01  4.943222e+01  5.001000e+01
  5.026000e+01  5.050000e+01  5.075000e+01  5.133333e+01  5.191666e+01
  5.250000e+01  5.308333e+01  5.366666e+01  5.424999e+01  5.483332e+01
  5.541666e+01  5.600000e+01  5.625000e+01  5.649000e+01  5.674000e+01
  5.731556e+01  5.789111e+01  5.846666e+01  5.904222e+01  5.961777e+01
  6.019333e+01  6.076888e+01  6.134443e+01  6.192000e+01  6.217000e+01
  6.241000e+01  6.266000e+01  6.329375e+01  6.392750e+01  6.456125e+01
  6.519500e+01  6.582875e+01  6.646250e+01  6.709625e+01  6.773000e+01
  6.798000e+01  6.822000e+01  6.847000e+01  6.903889e+01  6.960777e+01
  7.017666e+01  7.074554e+01  7.131443e+01  7.188332e+01  7.245220e+01
  7.302109e+01  7.359000e+01  7.384000e+01  7.408000e+01  7.433000e+01
  7.490556e+01  7.548111e+01  7.605666e+01  7.663222e+01  7.720777e+01
  7.778333e+01  7.835888e+01  7.893443e+01  7.951000e+01  7.975999e+01
  8.000000e+01  8.025000e+01  8.088750e+01  8.152499e+01  8.216249e+01
  8.279999e+01  8.343748e+01  8.407498e+01  8.471248e+01  8.535000e+01
  8.593333e+01  8.651667e+01  8.710001e+01  8.768334e+01  8.826668e+01
  8.885001e+01  8.943335e+01  9.001669e+01  9.060000e+01  9.122500e+01
  9.185000e+01  9.247500e+01  9.310000e+01  9.372500e+01  9.435000e+01
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
  9.497500e+01  9.560000e+01  9.618375e+01  9.676749e+01  9.735124e+01
  9.793499e+01  9.851874e+01  9.910249e+01  9.968623e+01  1.002700e+02
  1.025110e+02  1.047520e+02  1.069930e+02  1.092340e+02  1.114750e+02
  1.137160e+02  1.159570e+02  1.181980e+02  1.204390e+02  1.226800e+02
  1.256800e+02  1.286800e+02  1.316800e+02  1.346800e+02  1.376800e+02
  1.406800e+02  1.436800e+02  1.466800e+02  1.496800e+02  1.526800e+02
  1.586800e+02  1.646800e+02  1.706800e+02  1.766800e+02  1.826800e+02
  1.926800e+02  2.026800e+02  2.126800e+02  2.226800e+02
6** / chs / fixed source energy spectrum
/ CHI U-235 from BUGLE-B7
 4.8822e-05 2.0162e-04 1.1459e-03 2.5220e-03 5.6564e-03 1.6146e-02
 3.0711e-02 8.0511e-02 7.6758e-02 4.4010e-02 4.6685e-02 2.0029e-02
 4.0263e-03 2.4344e-02 7.3548e-02 7.1947e-02 8.9497e-02 1.1503e-01
 6.2687e-02 2.7240e-02 4.6852e-02 3.7617e-02 4.1772e-02 2.1390e-02
 3.0048e-02 1.5408e-02 7.4253e-03 3.5462e-03 9.9809e-04 5.6978e-04
 1.7337e-04 2.0306e-04 5.4039e-04 4.8421e-04 1.5747e-04 5.1157e-05
 1.4763e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
 0.0000e+00 0.0000e+00 / 0.0000e+00 0.0000e+00 0.0000e+00
7** /material density by zone
    223r1.0000e+00
8$$ / zone number by body
 190 186 188 187 185 142 165 143 161 158 159 162 144 166 145 167 146
 168 147 169 148 170 149 171 150 172 151 173 152 174 153 175 154 176
 155 177 156 178 157 179 180 181 182 183 184 159 163 164 159 185 160
 2r185 160 2r185 160 185 2r163 49 64 79 163 185 160 185 2r163 36 50 65
 80 94 3r163 25 37 51 66 81 95 107 163 185 160 185 2r163 16 26 38 52 67
 82 96 108 118 163 185 160 185 2r163 9 17 27 39 53 68 83 97 109 119 127
 3r163 4 10 18 28 40 54 69 84 98 110 120 128 134 163 185 160 2r185 160
 185 2r163 1 5 11 19 29 41 55 70 85 99 111 121 129 135 139 163 185 160
 185 2 6 12 20 30 42 56 71 86 100 112 122 130 136 140 185 160 185 3 7
 13 21 31 43 57 72 87 101 113 123 131 137 141 185 160 185 2r163 8 14 22
 32 44 58 73 88 102 114 124 132 138 163 185 160 185 2r163 15 23 33 45
 59 74 89 103 115 125 133 163 185 160 185 2r163 24 34 46 60 75 90 104
 116 126 163 185 160 185 2r163 35 47 61 76 91 105 117 163 185 160 185
 2r163 48 62 77 92 106 3r163 63 78 93 163 185 160 2r185 160 185 163 185
 159 189 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205
 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222
 223
9$$  /material number by material zone
 141r4 18r9 2 4r5 3 17r6 7 8 1 4r6 3 33r9
14** / body left boundaries
     4r-9.591000e+01    41r-9.400000e+01     4r-5.950000e+01
     3r-5.865000e+01     3r-5.667043e+01     3r-5.459061e+01
     6r-5.225000e+01     3r-5.051089e+01     8r-4.908000e+01
    10r-4.592000e+01     3r-4.458808e+01    12r-3.958000e+01
     3r-3.704976e+01    14r-3.642000e+01    16r-3.008000e+01
     3r-2.818563e+01     3r-1.833634e+01    18r-1.425000e+01
     3r-7.880396e+00    15r-4.750000e+00      3r2.780396e+00
     15r4.750000e+00      3r1.323634e+01     16r1.425000e+01
      3r2.308563e+01     14r3.008000e+01      3r3.194976e+01
     12r3.642000e+01      3r3.948808e+01     10r3.958000e+01
      3r4.541090e+01      8r4.592000e+01      6r4.908000e+01
      3r4.949061e+01      3r5.157042e+01        5.225000e+01
        5.355000e+01        5.950000e+01        8.890000e+01
    33r-5.000000e-01
15** / body right boundaries
      2r9.081000e+01       -9.400000e+01        9.081000e+01
      -5.865000e+01      5r8.890000e+01       -5.950000e+01
     34r8.890000e+01        5.950000e+01       -5.225000e+01
      2r5.950000e+01     3r-5.667043e+01     3r-5.459061e+01
     3r-5.051089e+01     6r-4.908000e+01     3r-4.458808e+01
     8r-4.592000e+01    10r-3.958000e+01     3r-3.704976e+01
    12r-3.642000e+01     3r-2.818563e+01    14r-3.008000e+01
    16r-1.425000e+01     3r-1.833634e+01     3r-7.880396e+00
      2r1.425000e+01    15r-4.750000e+00        1.425000e+01
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
        3r2.780396e+00     15r4.750000e+00      3r1.323634e+01
       15r1.425000e+01      3r2.308563e+01     16r3.008000e+01
        3r3.194976e+01     14r3.642000e+01      3r3.948808e+01
       12r3.958000e+01      3r4.541090e+01     10r4.592000e+01
        3r4.949061e+01      8r4.908000e+01      6r5.225000e+01
        3r5.157042e+01      3r5.355000e+01        5.950000e+01
        2r8.890000e+01        9.081000e+01     33r5.000000e-01
16** / body inside boundaries
       2r-9.081000e+01       -8.890000e+01        1.021000e+02
      42r-8.890000e+01     2r-7.100000e+01        7.100000e+01
         -8.890000e+01        1.269603e+00        1.193040e+01
         -8.890000e+01       -9.186345e+00        2.238634e+01
         -8.890000e+01       -1.903563e+01        3.223563e+01
         -7.100000e+01     2r-1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01       -8.890000e+01
         -2.789976e+01        4.109976e+01       -7.100000e+01
       2r-1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
         -7.100000e+01     2r-3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
         -8.890000e+01       -3.543808e+01        4.863808e+01
         -7.100000e+01     2r-3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01       -8.890000e+01
         -4.136090e+01        5.456090e+01       -7.100000e+01
       2r-4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
         -7.100000e+01     2r-4.763000e+01       -4.064000e+01
         -3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        4.064000e+01        4.763000e+01
         -8.890000e+01       -4.544061e+01        5.864061e+01
         -8.890000e+01       -4.752042e+01        6.072042e+01
         -7.100000e+01     2r-5.144000e+01       -4.763000e+01
         -4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          4.763000e+01        5.144000e+01       -8.890000e+01
         -4.950000e+01        6.270000e+01       -5.144000e+01
         -4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.752042e+01        6.072042e+01       -5.144000e+01
         -4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.544061e+01        5.864061e+01       -7.100000e+01
       2r-4.763000e+01       -4.064000e+01       -3.556000e+01
         -3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01        3.556000e+01
          4.064000e+01        4.763000e+01       -8.890000e+01
         -4.136090e+01        5.456090e+01       -7.100000e+01
       2r-4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
         -8.890000e+01       -3.543808e+01        4.863808e+01
         -7.100000e+01     2r-3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01       -8.890000e+01
         -2.789976e+01        4.109976e+01       -7.100000e+01
       2r-3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01       -8.890000e+01
         -1.903563e+01        3.223563e+01       -7.100000e+01
       2r-1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
         -7.100000e+01     2r-1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01       -8.890000e+01
         -9.186345e+00        2.238634e+01       -8.890000e+01
          1.269603e+00        1.193040e+01       -7.100000e+01
       3r-8.890000e+01    15r-5.000000e-01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01
17** / body outside boundaries
          1.040100e+02       -8.890000e+01        1.021000e+02
          1.040100e+02     41r1.021000e+02       -7.100000e+01
        2r7.100000e+01        1.021000e+02        1.269603e+00
          1.193040e+01        1.021000e+02       -9.186345e+00
          2.238634e+01        1.021000e+02       -1.903563e+01
          3.223563e+01        1.021000e+02       -1.588000e+01
          1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        7.100000e+01       -2.789976e+01
          4.109976e+01        1.021000e+02       -1.969000e+01
          1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          7.100000e+01       -3.175000e+01        3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        7.100000e+01       -3.543808e+01
          4.863808e+01        1.021000e+02       -3.556000e+01
          3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        7.100000e+01       -4.136090e+01
          5.456090e+01        1.021000e+02       -4.064000e+01
          4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          7.100000e+01       -4.763000e+01        4.763000e+01
         -4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          4.763000e+01        7.100000e+01       -4.544061e+01
          5.864061e+01        1.021000e+02       -4.752042e+01
          6.072042e+01        1.021000e+02       -5.144000e+01
          5.144000e+01       -4.763000e+01       -4.064000e+01
         -3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        4.064000e+01        4.763000e+01
          5.144000e+01        7.100000e+01       -4.950000e+01
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
         6.270000e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.752042e+01
         6.072042e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.544061e+01
         5.864061e+01        1.021000e+02       -4.763000e+01
         4.763000e+01       -4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        4.763000e+01        7.100000e+01
        -4.136090e+01        5.456090e+01        1.021000e+02
        -4.064000e+01        4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        7.100000e+01       -3.543808e+01
         4.863808e+01        1.021000e+02       -3.556000e+01
         3.556000e+01       -3.175000e+01       -1.969000e+01
        -1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        1.969000e+01        3.175000e+01
         3.556000e+01        7.100000e+01       -2.789976e+01
         4.109976e+01        1.021000e+02       -3.175000e+01
         3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        7.100000e+01
        -1.903563e+01        3.223563e+01        1.021000e+02
        -1.969000e+01        1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        7.100000e+01       -1.588000e+01
         1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        7.100000e+01       -9.186345e+00
         2.238634e+01        1.021000e+02        1.269603e+00
         1.193040e+01        1.021000e+02        7.100000e+01
       3r1.021000e+02     15r5.000000e-01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01
18** / body bottom boundaries
        -1.198000e+02     4r-1.980000e+01       -1.662000e+01
        -1.610000e+01       -1.100000e+00        0.000000e+00
         1.200000e+00        1.300000e+00        1.700000e+00
         2.900000e+00        3.640000e+00        8.740000e+00
         9.480000e+00        1.460000e+01        1.534000e+01
         2.046000e+01        2.120000e+01        2.630000e+01
         2.704000e+01        3.224000e+01        3.298000e+01
         3.813000e+01        3.887000e+01        4.407000e+01
         4.481000e+01        5.001000e+01        5.075000e+01
         5.600000e+01        5.674000e+01        6.192000e+01
         6.266000e+01        6.773000e+01        6.847000e+01
         7.359000e+01        7.433000e+01        7.951000e+01
         8.025000e+01        8.535000e+01        9.060000e+01
         9.560000e+01        1.002700e+02        1.226800e+02
       2r1.300000e+00        1.600000e+00        1.300000e+00
      9r-1.980000e+01      2r1.300000e+00      3r1.400000e+00
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
        1.300000e+00     3r-1.980000e+01      2r1.300000e+00
      5r1.400000e+00      3r1.300000e+00      7r1.400000e+00
        1.300000e+00     3r-1.980000e+01      2r1.300000e+00
      9r1.400000e+00        1.300000e+00     3r-1.980000e+01
      2r1.300000e+00     11r1.400000e+00      3r1.300000e+00
     13r1.400000e+00        1.300000e+00     6r-1.980000e+01
      2r1.300000e+00     15r1.400000e+00        1.300000e+00
     3r-1.980000e+01     15r1.400000e+00     3r-1.980000e+01
     15r1.400000e+00     3r-1.980000e+01      2r1.300000e+00
     13r1.400000e+00        1.300000e+00     3r-1.980000e+01
      2r1.300000e+00     11r1.400000e+00        1.300000e+00
     3r-1.980000e+01      2r1.300000e+00      9r1.400000e+00
        1.300000e+00     3r-1.980000e+01      2r1.300000e+00
      7r1.400000e+00        1.300000e+00     3r-1.980000e+01
      2r1.300000e+00      5r1.400000e+00      3r1.300000e+00
      3r1.400000e+00        1.300000e+00     6r-1.980000e+01
        1.300000e+00       -1.980000e+01        1.300000e+00
       -1.980000e+01       -7.000000e-01        3.150000e+00
        8.990000e+00        1.485000e+01        2.071000e+01
        2.655000e+01        3.249000e+01        3.838000e+01
        4.432000e+01        5.026000e+01        5.625000e+01
        6.217000e+01        6.798000e+01        7.384000e+01
        7.975999e+01      6r2.071000e+01      6r5.026000e+01
      6r7.975999e+01
19** / body top boundaries
       -1.980000e+01      3r2.226800e+02       -1.662000e+01
       -1.610000e+01       -1.100000e+00        0.000000e+00
        1.200000e+00        1.300000e+00        1.700000e+00
        2.900000e+00        3.640000e+00        8.740000e+00
        9.480000e+00        1.460000e+01        1.534000e+01
        2.046000e+01        2.120000e+01        2.630000e+01
        2.704000e+01        3.224000e+01        3.298000e+01
        3.813000e+01        3.887000e+01        4.407000e+01
        4.481000e+01        5.001000e+01        5.075000e+01
        5.600000e+01        5.674000e+01        6.192000e+01
        6.266000e+01        6.773000e+01        6.847000e+01
        7.359000e+01        7.433000e+01        7.951000e+01
        8.025000e+01        8.535000e+01        9.060000e+01
        9.560000e+01        1.002700e+02        1.226800e+02
        2.226800e+02        1.700000e+00        1.600000e+00
      2r1.700000e+00     9r-1.662000e+01        1.600000e+00
        1.400000e+00      4r1.600000e+00     3r-1.662000e+01
        1.600000e+00        1.400000e+00      7r1.600000e+00
        1.400000e+00      8r1.600000e+00     3r-1.662000e+01
        1.600000e+00        1.400000e+00     10r1.600000e+00
     3r-1.662000e+01        1.600000e+00        1.400000e+00
     13r1.600000e+00        1.400000e+00     14r1.600000e+00
     6r-1.662000e+01        1.600000e+00        1.400000e+00
     16r1.600000e+00     3r-1.662000e+01     15r1.600000e+00
     3r-1.662000e+01     15r1.600000e+00     3r-1.662000e+01
        1.600000e+00        1.400000e+00     14r1.600000e+00
     3r-1.662000e+01        1.600000e+00        1.400000e+00
     12r1.600000e+00     3r-1.662000e+01        1.600000e+00
        1.400000e+00     10r1.600000e+00     3r-1.662000e+01
        1.600000e+00        1.400000e+00      8r1.600000e+00
     3r-1.662000e+01        1.600000e+00        1.400000e+00
      7r1.600000e+00        1.400000e+00      4r1.600000e+00
     6r-1.662000e+01        1.600000e+00       -1.662000e+01
        1.700000e+00        2.226800e+02       -4.000000e-01
        3.390000e+00        9.230000e+00        1.509000e+01
        2.095000e+01        2.679000e+01        3.273000e+01
        3.862000e+01        4.456000e+01        5.050000e+01
        5.649000e+01        6.241000e+01        6.822000e+01
        7.408000e+01        8.000000e+01      6r2.095000e+01
      6r5.050000e+01      6r8.000000e+01
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
21$$ / itmbg / iteration limit by group
       44r60
22** / i key flux locations
     33r0.0000e+00
23** / j key flux locations
     15r0.0000e+00        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01        2.5000e+01
        5.0000e+01        7.5000e+01       -2.5000e+01       -5.0000e+01
       -7.5000e+01        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01
24** / k key flux locations
       -5.5000e-01        3.2700e+00        9.1100e+00        1.4970e+01
        2.0830e+01        2.6670e+01        3.2610e+01        3.8500e+01
        4.4440e+01        5.0380e+01        5.6370e+01        6.2290e+01
        6.8100e+01        7.3960e+01        7.9880e+01      6r2.0830e+01
      6r5.0380e+01      6r7.9880e+01
27** /group response by group
/   16-S_32    MT=103 (n,p)     FLAT WEIGHTING   (IRDF-2002)
 1.7639e-01 3.0787e-01 3.8051e-01 3.3979e-01 3.2202e-01 3.1380e-01
 2.4629e-01 2.7592e-01 1.9108e-01 1.0053e-01 6.8686e-02 7.2417e-02
 6.6472e-02 6.1245e-02 2.1377e-02 4.1502e-03 5.9998e-04 6.0917e-05
 1.6785e-06 25z /3z
/
/   49-In_115  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 5.8133e-02 9.1680e-02 2.0239e-01 2.7381e-01 3.0859e-01 3.3417e-01
 3.3897e-01 3.2538e-01 3.3341e-01 3.5259e-01 3.5385e-01 3.4311e-01
 3.3654e-01 3.2759e-01 2.9012e-01 2.3022e-01 1.7096e-01 1.0336e-01
 4.9401e-02 2.7891e-02 1.5489e-02 6.3893e-03 2.2558e-03 1.6310e-04
 20z /3z
/
/   45-Rh_103  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 2.3466e-01 3.8742e-01 8.1816e-01 1.2190e+00 1.2753e+00 1.2305e+00
 1.1732e+00 1.1091e+00 1.0370e+00 9.8735e-01 9.5185e-01 9.2536e-01
 9.1570e-01 9.0494e-01 8.6764e-01 8.0955e-01 7.4452e-01 6.6193e-01
 5.8044e-01 4.9269e-01 3.3867e-01 1.9319e-01 1.3801e-01 1.0374e-01
 6.6383e-02 2.3291e-02 5.8219e-03 1.6581e-03 3.4572e-06 15z /3z
/
/   79-Au_197  MT=102 (n,gamma) FLAT WEIGHTING   (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 6.8138e-04 1.6063e-03 1.6769e-03 1.1792e-03 9.1672e-04 2.9908e-03
 6.0619e-03 1.0673e-02 1.9494e-02 2.7032e-02 3.1752e-02 3.5656e-02
 3.7624e-02 4.0070e-02 4.9391e-02 6.0152e-02 6.7842e-02 7.5077e-02
 8.4031e-02 9.0899e-02 9.8907e-02 1.2061e-01 1.5148e-01 1.8519e-01
 2.3553e-01 2.7527e-01 3.2852e-01 4.2145e-01 5.3159e-01 5.9625e-01
 6.3013e-01 6.5349e-01 7.6339e-01 1.1561e+00 1.8461e+00 2.9907e+00
 8.0657e+00 1.2390e+01 1.0332e+01 1.8528e+01 6.5715e-01 9.5267e+01
 3.6192e+02 2.5048e+01 /2.5505e+01 3.5582e+01 9.4230e+01
/
/   13-Al_27   MT=107 (n,alpha) FLAT WEIGHTING   (IRDF-2002)
 9.7222e-02 1.2398e-01 1.0678e-01 7.7279e-02 4.1475e-02 1.1792e-02
 4.6528e-04 2.6020e-06 1.5730e-07 35z /3z
/
/   16-S_32    MT=103 (n,p)     1/4 T PV WEIGHTING  (IRDF-2002)
 1.9505e-01 3.1938e-01 3.7877e-01 3.3756e-01 3.2278e-01 3.1134e-01
 2.4087e-01 2.7593e-01 1.8679e-01 9.9856e-02 6.8685e-02 7.2355e-02
 6.6472e-02 6.1113e-02 2.1310e-02 3.8115e-03 5.7404e-04 5.5072e-05
 1.3126e-06 25z /3z
/
/   49-In_115  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 5.9174e-02 9.8489e-02 2.1530e-01 2.7603e-01 3.1013e-01 3.3553e-01
 3.3869e-01 3.2518e-01 3.3463e-01 3.5274e-01 3.5385e-01 3.4290e-01
 3.3654e-01 3.2743e-01 2.9001e-01 2.2779e-01 1.6961e-01 1.0091e-01
 4.8572e-02 2.7790e-02 1.4534e-02 6.5064e-03 2.1655e-03 1.4951e-04
 20z /3z
/
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
/   45-Rh_103  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 2.4736e-01 4.0941e-01 8.8634e-01 1.2280e+00 1.2743e+00 1.2260e+00
 1.1713e+00 1.1079e+00 1.0340e+00 9.8681e-01 9.5186e-01 9.2504e-01
 9.1570e-01 9.0475e-01 8.6753e-01 8.0709e-01 7.4292e-01 6.5889e-01
 5.7858e-01 4.9188e-01 3.2311e-01 1.9478e-01 1.3666e-01 1.0314e-01
 6.5980e-02 2.3024e-02 5.3402e-03 1.6344e-03 3.5772e-06 15z /3z
/
/   79-Au_197  MT=102 (n,gamma) 1/4 T PV WEIGHTING  (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 8.3467e-04 1.6632e-03 1.6248e-03 1.1551e-03 9.2202e-04 3.2297e-03
 6.1632e-03 1.0773e-02 1.9964e-02 2.7108e-02 3.1751e-02 3.5718e-02
 3.7624e-02 4.0112e-02 4.9418e-02 6.0528e-02 6.7951e-02 7.5396e-02
 8.4230e-02 9.0943e-02 9.9846e-02 1.2009e-01 1.5274e-01 1.8589e-01
 2.3622e-01 2.7570e-01 3.3595e-01 4.2222e-01 5.3060e-01 6.0555e-01
 6.3015e-01 6.5269e-01 7.5886e-01 1.1326e+00 1.8761e+00 3.1787e+00
 8.5835e+00 1.2102e+01 1.0532e+01 2.0635e+01 8.3772e-01 1.1664e+02
 2.9157e+02 2.4930e+01 /2.5694e+01 3.8151e+01 6.7693e+01
/
/   13-Al_27   MT=107 (n,alpha) 1/4 T PV WEIGHTING  (IRDF-2002)
 1.0443e-01 1.2391e-01 1.0308e-01 7.5651e-02 3.9809e-02 9.9059e-03
 4.0921e-04 2.4602e-06 1.3486e-07 35z /3z
/
/ E > 8.0 MeV Neutron Flux
      4r1. 4.8764e-01 39z /3z
/
/ E > 3.0 MeV Neutron Flux
      9r1. 3.9728e-02 34z /3z
/
/ E > 1.0 MeV Neutron Flux
     18r1.  1.3000e-02  25z /3z
/
/ E > 0.1 MeV Neutron Flux
     26r1.  2.1034e-01  17z /3z
/
/ E > 0.87643 eV Neutron Flux
     44r1. /3z
t
95** / shapg / source shape by group
/ CHI U-235 from BUGLE-B7
 4.8822e-05 2.0162e-04 1.1459e-03 2.5220e-03 5.6564e-03 1.6146e-02
 3.0711e-02 8.0511e-02 7.6758e-02 4.4010e-02 4.6685e-02 2.0029e-02
 4.0263e-03 2.4344e-02 7.3548e-02 7.1947e-02 8.9497e-02 1.1503e-01
 6.2687e-02 2.7240e-02 4.6852e-02 3.7617e-02 4.1772e-02 2.1390e-02
 3.0048e-02 1.5408e-02 7.4253e-03 3.5462e-03 9.9809e-04 5.6978e-04
 1.7337e-04 2.0306e-04 5.4039e-04 4.8421e-04 1.5747e-04 5.1157e-05
 1.4763e-05 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00 0.0000e+00
 0.0000e+00 0.0000e+00 / 0.0000e+00 0.0000e+00 0.0000e+00
96** / distributed source distribution
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
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5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
1054r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  62r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  62r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  57r0.0000e+00      5r2.7450e+07      3r3.0720e+07      4r3.1500e+07
   4r3.0670e+07      5r2.6850e+07     52r0.0000e+00      5r2.7450e+07
   3r3.0720e+07      4r3.1500e+07      4r3.0670e+07      5r2.6850e+07
  52r0.0000e+00      5r2.7450e+07      3r3.0720e+07      4r3.1500e+07
   4r3.0670e+07      5r2.6850e+07     52r0.0000e+00      5r2.7450e+07
   3r3.0720e+07      4r3.1500e+07      4r3.0670e+07      5r2.6850e+07
  50r0.0000e+00      2r2.8960e+07      5r3.3960e+07      3r3.7700e+07
   4r3.8550e+07      4r3.7580e+07      5r3.3200e+07      2r2.7120e+07
  48r0.0000e+00      2r2.8960e+07      5r3.3960e+07      3r3.7700e+07
   4r3.8550e+07      4r3.7580e+07      5r3.3200e+07      2r2.7120e+07
  46r0.0000e+00      2r3.0040e+07      2r3.2990e+07      5r3.8550e+07
   3r4.2670e+07      4r4.3570e+07      4r4.2470e+07      5r3.7660e+07
   2r3.1010e+07      2r2.7480e+07     44r0.0000e+00      2r3.0040e+07
   2r3.2990e+07      5r3.8550e+07      3r4.2670e+07      4r4.3570e+07
   4r4.2470e+07      5r3.7660e+07      2r3.1010e+07      2r2.7480e+07
  41r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
   5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
  38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
   5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
  38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
37r0.0000e+00        3.1360e+07      3r3.5740e+07      2r4.0010e+07
 2r4.4000e+07      5r5.1570e+07      3r5.7010e+07      4r5.8020e+07
 4r5.6430e+07      5r5.0310e+07      2r4.2210e+07      2r3.7950e+07
 3r3.3310e+07        2.8430e+07     36r0.0000e+00        3.1360e+07
 3r3.5740e+07      2r4.0010e+07      2r4.4000e+07      5r5.1570e+07
 3r5.7010e+07      4r5.8020e+07      4r5.6430e+07      5r5.0310e+07
 2r4.2210e+07      2r3.7950e+07      3r3.3310e+07        2.8430e+07
34r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
33r0.0000e+00        3.1500e+07      3r3.5750e+07      2r4.0030e+07
 2r4.4120e+07      5r5.2020e+07      3r5.7700e+07      4r5.8700e+07
 4r5.6990e+07      5r5.0800e+07      2r4.2820e+07      2r3.8730e+07
 3r3.4310e+07        2.9700e+07     37r0.0000e+00      3r3.2490e+07
 2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
 4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
 2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     41r0.0000e+00      2r3.1860e+07
      2r3.5000e+07      5r4.0920e+07      3r4.5140e+07      4r4.5870e+07
      4r4.4460e+07      5r3.9250e+07      2r3.2400e+07      2r2.8860e+07
     44r0.0000e+00      2r3.1860e+07      2r3.5000e+07      5r4.0920e+07
      3r4.5140e+07      4r4.5870e+07      4r4.4460e+07      5r3.9250e+07
      2r3.2400e+07      2r2.8860e+07     46r0.0000e+00      2r3.1760e+07
      5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
      5r3.5290e+07      2r2.8900e+07     48r0.0000e+00      2r3.1760e+07
      5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
      5r3.5290e+07      2r2.8900e+07     50r0.0000e+00      5r3.1730e+07
      3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
     52r0.0000e+00      5r3.1730e+07      3r3.4960e+07      4r3.5370e+07
      4r3.4040e+07      5r2.9750e+07     52r0.0000e+00      5r3.1730e+07
      3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
     57r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
   1417r0.0000e+00
   5767r0.0000e+00
   f0.
/zone     1 volume= 7.2390e+00  source= 1.7793e+08 density= 1.0000e+00 mat.    4
/zone     2 volume= 7.2390e+00  source= 1.8278e+08 density= 1.0000e+00 mat.    4
/zone     3 volume= 7.2390e+00  source= 1.7721e+08 density= 1.0000e+00 mat.    4
/zone     4 volume= 2.2130e+01  source= 6.0748e+08 density= 1.0000e+00 mat.    4
/zone     5 volume= 1.3281e+01  source= 4.0799e+08 density= 1.0000e+00 mat.    4
/zone     6 volume= 1.3281e+01  source= 4.1835e+08 density= 1.0000e+00 mat.    4
/zone     7 volume= 1.3281e+01  source= 4.0733e+08 density= 1.0000e+00 mat.    4
/zone     8 volume= 2.2130e+01  source= 5.9420e+08 density= 1.0000e+00 mat.    4
/zone     9 volume= 6.4414e+00  source= 1.8654e+08 density= 1.0000e+00 mat.    4
/zone    10 volume= 1.6083e+01  source= 5.4619e+08 density= 1.0000e+00 mat.    4
/zone    11 volume= 9.6520e+00  source= 3.6388e+08 density= 1.0000e+00 mat.    4
/zone    12 volume= 9.6520e+00  source= 3.7208e+08 density= 1.0000e+00 mat.    4
/zone    13 volume= 9.6520e+00  source= 3.6272e+08 density= 1.0000e+00 mat.    4
/zone    14 volume= 1.6083e+01  source= 5.3396e+08 density= 1.0000e+00 mat.    4
/zone    15 volume= 6.4414e+00  source= 1.7469e+08 density= 1.0000e+00 mat.    4
/zone    16 volume= 2.4079e+00  source= 7.2334e+07 density= 1.0000e+00 mat.    4
/zone    17 volume= 4.8311e+00  source= 1.5938e+08 density= 1.0000e+00 mat.    4
/zone    18 volume= 1.2062e+01  source= 4.6501e+08 density= 1.0000e+00 mat.    4
/zone    19 volume= 7.2390e+00  source= 3.0889e+08 density= 1.0000e+00 mat.    4
/zone    20 volume= 7.2390e+00  source= 3.1540e+08 density= 1.0000e+00 mat.    4
/zone    21 volume= 7.2390e+00  source= 3.0744e+08 density= 1.0000e+00 mat.    4
/zone    22 volume= 1.2062e+01  source= 4.5427e+08 density= 1.0000e+00 mat.    4
/zone    23 volume= 4.8311e+00  source= 1.4981e+08 density= 1.0000e+00 mat.    4
/zone    24 volume= 2.4079e+00  source= 6.6170e+07 density= 1.0000e+00 mat.    4
/zone    25 volume= 1.5292e+01  source= 4.8659e+08 density= 1.0000e+00 mat.    4
/zone    26 volume= 7.6219e+00  source= 2.7149e+08 density= 1.0000e+00 mat.    4
/zone    27 volume= 1.5292e+01  source= 5.9823e+08 density= 1.0000e+00 mat.    4
/zone    28 volume= 3.8182e+01  source= 1.7457e+09 density= 1.0000e+00 mat.    4
/zone    29 volume= 2.2914e+01  source= 1.1578e+09 density= 1.0000e+00 mat.    4
/zone    30 volume= 2.2914e+01  source= 1.1798e+09 density= 1.0000e+00 mat.    4
/zone    31 volume= 2.2914e+01  source= 1.1487e+09 density= 1.0000e+00 mat.    4
/zone    32 volume= 3.8182e+01  source= 1.7033e+09 density= 1.0000e+00 mat.    4
/zone    33 volume= 1.5292e+01  source= 5.6779e+08 density= 1.0000e+00 mat.    4
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
/zone    34 volume= 7.6219e+00  source= 2.5282e+08 density= 1.0000e+00 mat.    4
/zone    35 volume= 1.5292e+01  source= 4.4148e+08 density= 1.0000e+00 mat.    4
/zone    36 volume= 2.4079e+00  source= 7.5512e+07 density= 1.0000e+00 mat.    4
/zone    37 volume= 4.8311e+00  source= 1.7266e+08 density= 1.0000e+00 mat.    4
/zone    38 volume= 2.4079e+00  source= 9.6341e+07 density= 1.0000e+00 mat.    4
/zone    39 volume= 4.8311e+00  source= 2.1257e+08 density= 1.0000e+00 mat.    4
/zone    40 volume= 1.2062e+01  source= 6.2206e+08 density= 1.0000e+00 mat.    4
/zone    41 volume= 7.2390e+00  source= 4.1270e+08 density= 1.0000e+00 mat.    4
/zone    42 volume= 7.2390e+00  source= 4.2001e+08 density= 1.0000e+00 mat.    4
/zone    43 volume= 7.2390e+00  source= 4.0850e+08 density= 1.0000e+00 mat.    4
/zone    44 volume= 1.2062e+01  source= 6.0686e+08 density= 1.0000e+00 mat.    4
/zone    45 volume= 4.8311e+00  source= 2.0392e+08 density= 1.0000e+00 mat.    4
/zone    46 volume= 2.4079e+00  source= 9.1381e+07 density= 1.0000e+00 mat.    4
/zone    47 volume= 4.8311e+00  source= 1.6092e+08 density= 1.0000e+00 mat.    4
/zone    48 volume= 2.4079e+00  source= 6.8457e+07 density= 1.0000e+00 mat.    4
/zone    49 volume= 6.7141e+00  source= 2.0317e+08 density= 1.0000e+00 mat.    4
/zone    50 volume= 6.6929e+00  source= 2.2254e+08 density= 1.0000e+00 mat.    4
/zone    51 volume= 1.3428e+01  source= 5.0812e+08 density= 1.0000e+00 mat.    4
/zone    52 volume= 6.6929e+00  source= 2.8371e+08 density= 1.0000e+00 mat.    4
/zone    53 volume= 1.3428e+01  source= 6.2696e+08 density= 1.0000e+00 mat.    4
/zone    54 volume= 3.3528e+01  source= 1.8410e+09 density= 1.0000e+00 mat.    4
/zone    55 volume= 2.0121e+01  source= 1.2232e+09 density= 1.0000e+00 mat.    4
/zone    56 volume= 2.0121e+01  source= 1.2441e+09 density= 1.0000e+00 mat.    4
/zone    57 volume= 2.0121e+01  source= 1.2091e+09 density= 1.0000e+00 mat.    4
/zone    58 volume= 3.3528e+01  source= 1.7984e+09 density= 1.0000e+00 mat.    4
/zone    59 volume= 1.3428e+01  source= 6.0735e+08 density= 1.0000e+00 mat.    4
/zone    60 volume= 6.6929e+00  source= 2.7334e+08 density= 1.0000e+00 mat.    4
/zone    61 volume= 1.3428e+01  source= 4.8435e+08 density= 1.0000e+00 mat.    4
/zone    62 volume= 6.6929e+00  source= 2.0768e+08 density= 1.0000e+00 mat.    4
/zone    63 volume= 6.7141e+00  source= 1.8470e+08 density= 1.0000e+00 mat.    4
/zone    64 volume= 6.7077e+00  source= 2.1009e+08 density= 1.0000e+00 mat.    4
/zone    65 volume= 6.6866e+00  source= 2.2915e+08 density= 1.0000e+00 mat.    4
/zone    66 volume= 1.3415e+01  source= 5.2226e+08 density= 1.0000e+00 mat.    4
/zone    67 volume= 6.6866e+00  source= 2.9180e+08 density= 1.0000e+00 mat.    4
/zone    68 volume= 1.3415e+01  source= 6.4595e+08 density= 1.0000e+00 mat.    4
/zone    69 volume= 3.3496e+01  source= 1.9039e+09 density= 1.0000e+00 mat.    4
/zone    70 volume= 2.0102e+01  source= 1.2672e+09 density= 1.0000e+00 mat.    4
/zone    71 volume= 2.0102e+01  source= 1.2889e+09 density= 1.0000e+00 mat.    4
/zone    72 volume= 2.0102e+01  source= 1.2518e+09 density= 1.0000e+00 mat.    4
/zone    73 volume= 3.3496e+01  source= 1.8634e+09 density= 1.0000e+00 mat.    4
/zone    74 volume= 1.3415e+01  source= 6.3187e+08 density= 1.0000e+00 mat.    4
/zone    75 volume= 6.6866e+00  source= 2.8552e+08 density= 1.0000e+00 mat.    4
/zone    76 volume= 1.3415e+01  source= 5.0871e+08 density= 1.0000e+00 mat.    4
/zone    77 volume= 6.6866e+00  source= 2.1979e+08 density= 1.0000e+00 mat.    4
/zone    78 volume= 6.7077e+00  source= 1.9667e+08 density= 1.0000e+00 mat.    4
/zone    79 volume= 6.7141e+00  source= 2.0411e+08 density= 1.0000e+00 mat.    4
/zone    80 volume= 6.6929e+00  source= 2.2234e+08 density= 1.0000e+00 mat.    4
/zone    81 volume= 1.3428e+01  source= 5.0611e+08 density= 1.0000e+00 mat.    4
/zone    82 volume= 6.6929e+00  source= 2.8264e+08 density= 1.0000e+00 mat.    4
/zone    83 volume= 1.3428e+01  source= 6.2575e+08 density= 1.0000e+00 mat.    4
/zone    84 volume= 3.3528e+01  source= 1.8457e+09 density= 1.0000e+00 mat.    4
/zone    85 volume= 2.0121e+01  source= 1.2294e+09 density= 1.0000e+00 mat.    4
/zone    86 volume= 2.0121e+01  source= 1.2505e+09 density= 1.0000e+00 mat.    4
/zone    87 volume= 2.0121e+01  source= 1.2141e+09 density= 1.0000e+00 mat.    4
/zone    88 volume= 3.3528e+01  source= 1.8062e+09 density= 1.0000e+00 mat.    4
/zone    89 volume= 1.3428e+01  source= 6.1219e+08 density= 1.0000e+00 mat.    4
/zone    90 volume= 6.6929e+00  source= 2.7662e+08 density= 1.0000e+00 mat.    4
/zone    91 volume= 1.3428e+01  source= 4.9321e+08 density= 1.0000e+00 mat.    4
/zone    92 volume= 6.6929e+00  source= 2.1337e+08 density= 1.0000e+00 mat.    4
/zone    93 volume= 6.7141e+00  source= 1.9135e+08 density= 1.0000e+00 mat.    4
/zone    94 volume= 2.4079e+00  source= 7.5850e+07 density= 1.0000e+00 mat.    4
/zone    95 volume= 4.8311e+00  source= 1.7271e+08 density= 1.0000e+00 mat.    4
/zone    96 volume= 2.4079e+00  source= 9.6389e+07 density= 1.0000e+00 mat.    4
/zone    97 volume= 4.8311e+00  source= 2.1315e+08 density= 1.0000e+00 mat.    4
/zone    98 volume= 1.2062e+01  source= 6.2749e+08 density= 1.0000e+00 mat.    4
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
/zone     99 volume= 7.2390e+00  source= 4.1769e+08 density= 1.0000e+00 mat.    4
/zone    100 volume= 7.2390e+00  source= 4.2493e+08 density= 1.0000e+00 mat.    4
/zone    101 volume= 7.2390e+00  source= 4.1255e+08 density= 1.0000e+00 mat.    4
/zone    102 volume= 1.2062e+01  source= 6.1277e+08 density= 1.0000e+00 mat.    4
/zone    103 volume= 4.8311e+00  source= 2.0687e+08 density= 1.0000e+00 mat.    4
/zone    104 volume= 2.4079e+00  source= 9.3259e+07 density= 1.0000e+00 mat.    4
/zone    105 volume= 4.8311e+00  source= 1.6575e+08 density= 1.0000e+00 mat.    4
/zone    106 volume= 2.4079e+00  source= 7.1515e+07 density= 1.0000e+00 mat.    4
/zone    107 volume= 1.5292e+01  source= 4.9684e+08 density= 1.0000e+00 mat.    4
/zone    108 volume= 7.6219e+00  source= 2.7706e+08 density= 1.0000e+00 mat.    4
/zone    109 volume= 1.5292e+01  source= 6.1153e+08 density= 1.0000e+00 mat.    4
/zone    110 volume= 3.8182e+01  source= 1.7930e+09 density= 1.0000e+00 mat.    4
/zone    111 volume= 2.2914e+01  source= 1.1908e+09 density= 1.0000e+00 mat.    4
/zone    112 volume= 2.2914e+01  source= 1.2112e+09 density= 1.0000e+00 mat.    4
/zone    113 volume= 2.2914e+01  source= 1.1755e+09 density= 1.0000e+00 mat.    4
/zone    114 volume= 3.8182e+01  source= 1.7392e+09 density= 1.0000e+00 mat.    4
/zone    115 volume= 1.5292e+01  source= 5.8217e+08 density= 1.0000e+00 mat.    4
/zone    116 volume= 7.6219e+00  source= 2.6082e+08 density= 1.0000e+00 mat.    4
/zone    117 volume= 1.5292e+01  source= 4.6014e+08 density= 1.0000e+00 mat.    4
/zone    118 volume= 2.4079e+00  source= 7.6716e+07 density= 1.0000e+00 mat.    4
/zone    119 volume= 4.8311e+00  source= 1.6909e+08 density= 1.0000e+00 mat.    4
/zone    120 volume= 1.2062e+01  source= 4.9360e+08 density= 1.0000e+00 mat.    4
/zone    121 volume= 7.2390e+00  source= 3.2677e+08 density= 1.0000e+00 mat.    4
/zone    122 volume= 7.2390e+00  source= 3.3205e+08 density= 1.0000e+00 mat.    4
/zone    123 volume= 7.2390e+00  source= 3.2185e+08 density= 1.0000e+00 mat.    4
/zone    124 volume= 1.2062e+01  source= 4.7345e+08 density= 1.0000e+00 mat.    4
/zone    125 volume= 4.8311e+00  source= 1.5653e+08 density= 1.0000e+00 mat.    4
/zone    126 volume= 2.4079e+00  source= 6.9493e+07 density= 1.0000e+00 mat.    4
/zone    127 volume= 6.4414e+00  source= 2.0458e+08 density= 1.0000e+00 mat.    4
/zone    128 volume= 1.6083e+01  source= 5.9685e+08 density= 1.0000e+00 mat.    4
/zone    129 volume= 9.6520e+00  source= 3.9457e+08 density= 1.0000e+00 mat.    4
/zone    130 volume= 9.6520e+00  source= 4.0046e+08 density= 1.0000e+00 mat.    4
/zone    131 volume= 9.6520e+00  source= 3.8753e+08 density= 1.0000e+00 mat.    4
/zone    132 volume= 1.6083e+01  source= 5.6758e+08 density= 1.0000e+00 mat.    4
/zone    133 volume= 6.4414e+00  source= 1.8616e+08 density= 1.0000e+00 mat.    4
/zone    134 volume= 2.2130e+01  source= 7.0220e+08 density= 1.0000e+00 mat.    4
/zone    135 volume= 1.3281e+01  source= 4.6430e+08 density= 1.0000e+00 mat.    4
/zone    136 volume= 1.3281e+01  source= 4.6975e+08 density= 1.0000e+00 mat.    4
/zone    137 volume= 1.3281e+01  source= 4.5209e+08 density= 1.0000e+00 mat.    4
/zone    138 volume= 2.2130e+01  source= 6.5838e+08 density= 1.0000e+00 mat.    4
/zone    139 volume= 7.2390e+00  source= 2.1522e+08 density= 1.0000e+00 mat.    4
/zone    140 volume= 7.2390e+00  source= 2.1674e+08 density= 1.0000e+00 mat.    4
/zone    141 volume= 7.2390e+00  source= 2.0740e+08 density= 1.0000e+00 mat.    4
/zone    142 volume= 1.8166e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    143 volume= 3.8427e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    144 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    145 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    146 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    147 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    148 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    149 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    150 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    151 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    152 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    153 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    154 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    155 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    156 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    157 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    158 volume= 3.4934e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    159 volume= 7.2144e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    160 volume= 3.1441e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    2
/zone    161 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    162 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    163 volume= 3.3327e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
/zone    164 volume= 1.6898e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    165 volume= 5.2401e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone    166 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    167 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    168 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    169 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    170 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    171 volume= 1.7991e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    172 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    173 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    174 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    175 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    176 volume= 1.7711e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    177 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    178 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    179 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    180 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    181 volume= 1.7467e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    182 volume= 1.6314e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    183 volume= 7.8287e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    7
/zone    184 volume= 3.4934e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    8
/zone    185 volume= 7.9648e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    1
/zone    186 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    187 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    188 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    189 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    190 volume= 3.6377e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone    191 volume= 3.0000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    192 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    193 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    194 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    195 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    196 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    197 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    198 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    199 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    200 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    201 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    202 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    203 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    204 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    205 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    206 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    207 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    208 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    209 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    210 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    211 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    212 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    213 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    214 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    215 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    216 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    217 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    218 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    219 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    220 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    221 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    222 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    223 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/     Total volume= 1.2458e+07  source= 7.6059e+10
/
/ mat.    1 volume= 7.9648e+04  source= 0.0000e+00
/ mat.    2 volume= 3.1441e+04  source= 0.0000e+00
/ mat.    3 volume= 4.1617e+06  source= 0.0000e+00
```

TAB. C4 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-B7 Library.

```
/ mat.    4 volume= 1.7367e+03  source= 7.6059e+10
/ mat.    5 volume= 8.8864e+04  source= 0.0000e+00
/ mat.    6 volume= 3.3895e+06  source= 0.0000e+00
/ mat.    7 volume= 7.8287e+05  source= 0.0000e+00
/ mat.    8 volume= 3.4934e+06  source= 0.0000e+00
/ mat.    9 volume= 4.2922e+05  source= 0.0000e+00
/     Total volume= 1.2458e+07  source= 7.6059e+10
t
=end
```

TAB. C5

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
=tort
WINFRITH Iron-88, X-Y-Z Model.
/ 44 Neutron Energy Groups, Inhomogeneous Neutron Fission Source,
/ TORT-3.2, S8 Full Symmetric Quadrature Sets,
/ P3 Cross Sections from BUGLE-96 Library.
61$$ / input/output file logical unit numbers
/ ntflx  ntfog  ntsig  ntbsi  ntdsi  ntrso   ntnpr  ntscl
    0       0      8     0     -3       0      0      1  e
62$$ / procedure control integers
/ nsrmx  nfxmx  icsprt ifxprt modep  nkeyfx iepsbz  nresp ktype nsctt
    1     -60      0     0      0     -33     11     -15    0     -1
/ iadj  negfix  nsclmx nbfacc mode    nbuf  locobj lcmobj minblk maxblk
    0      -1     50     0      0       0   100000    0     0      0 e
63$$ / geometry control integers
/  im    jm    km   ibl    ibr   ibi   ibo   ibb   ibt  ingeom
   73    79   278     0     0     0     0     0     0     0
/  izm  inreg  mm  mmesh  spare  nism  njsm  spare
   223    0    96   317     0     1     1     0     e
64$$ / cross section control integers
/  igm  ncrx  nsctm  iht  ihm   iups  neut
    44    9     3     3    70     e
66** / procedure control reals
/  epp
  1.0e-3 e
67** / problem control reals
/  xnf
  17.040e-24 e
t
t
81** / w / quadrature weights
0 2r151235-7 0 4r113425-7 0 113425-7 11574-6 2r113425-7 11574-6 113425-7
0 151235-7 2r113425-7 2r151235-7 2r113425-7 151235-7
  3q  24
82** / emu / first-direction cosines
-30861-5 -21822-5 21822-5 -61721-5 -57735-5 -21822-5 21822-5 57735-5
-8165-4 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 -9759-4
-95119-5 -7868-4 -57735-5 -21822-5 21822-5 57735-5 7868-4 95119-5
  3q  24
83** / eta / last-direction cosines
3r-95119-5 5r-7868-4 7r-57735-5 9r-21822-5
   q  24 g  48
84** / rcmb /x coarse mesh boundaries number
   -95.91 90.81 f999
85** / thcmb /y coarse mesh boundaries number
  -90.81  104.01 f999
86** / zcmb /z coarse mesh boundaries
  -119.80 222.68 f999
t
2** / x fine mesh boundaries
 -9.591000e+01 -9.400000e+01 -9.112500e+01 -8.825000e+01 -8.537500e+01
 -8.250000e+01 -7.962500e+01 -7.675000e+01 -7.387500e+01 -7.100000e+01
 -6.812500e+01 -6.525000e+01 -6.237500e+01 -5.950000e+01 -5.865000e+01
 -5.667043e+01 -5.459061e+01 -5.225000e+01 -5.051089e+01 -4.908000e+01
 -4.592000e+01 -4.458808e+01 -4.208404e+01 -3.958000e+01 -3.704976e+01
 -3.642000e+01 -3.325000e+01 -3.008000e+01 -2.818563e+01 -2.490253e+01
 -2.161944e+01 -1.833634e+01 -1.425000e+01 -1.106520e+01 -7.880396e+00
 -4.750000e+00 -5.000000e-01  5.000000e-01  2.780396e+00  4.750000e+00
  7.578781e+00  1.040756e+01  1.323634e+01  1.425000e+01  1.719521e+01
  2.014042e+01  2.308563e+01  2.658282e+01  3.008000e+01  3.194976e+01
  3.642000e+01  3.948808e+01  3.958000e+01  4.249545e+01  4.541090e+01
  4.592000e+01  4.908000e+01  4.949061e+01  5.157042e+01  5.225000e+01
  5.355000e+01  5.652500e+01  5.950000e+01  6.244000e+01  6.538000e+01
  6.832000e+01  7.126000e+01  7.420000e+01  7.714001e+01  8.008001e+01
  8.302001e+01  8.596001e+01  8.890000e+01  9.081000e+01
3** / y fine mesh boundaries
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
 -9.081000e+01 -8.890000e+01 -8.555000e+01 -8.220000e+01 -7.885001e+01
 -7.550000e+01 -7.450000e+01 -7.100000e+01 -6.820571e+01 -6.541142e+01
 -6.261714e+01 -5.982285e+01 -5.702857e+01 -5.423428e+01 -5.144000e+01
 -5.050000e+01 -4.950000e+01 -4.763000e+01 -4.752042e+01 -4.544061e+01
 -4.136090e+01 -4.064000e+01 -3.810000e+01 -3.556000e+01 -3.543808e+01
 -3.175000e+01 -2.789976e+01 -2.550000e+01 -2.450000e+01 -2.209500e+01
 -1.969000e+01 -1.903563e+01 -1.588000e+01 -1.253317e+01 -9.186345e+00
 -5.290000e+00 -2.895000e+00 -5.000000e-01  5.000000e-01  1.269603e+00
  5.290000e+00  8.610198e+00  1.193040e+01  1.588000e+01  1.969000e+01
  2.238634e+01  2.450000e+01  2.550000e+01  2.862500e+01  3.175000e+01
  3.223563e+01  3.556000e+01  3.810000e+01  4.064000e+01  4.109976e+01
  4.436488e+01  4.763000e+01  4.863808e+01  4.950000e+01  5.050000e+01
  5.144000e+01  5.456090e+01  5.864061e+01  6.072042e+01  6.270000e+01
  6.546667e+01  6.823334e+01  7.100000e+01  7.450000e+01  7.550000e+01
  7.845556e+01  8.141112e+01  8.436668e+01  8.732224e+01  9.027779e+01
  9.323335e+01  9.618891e+01  9.914447e+01  1.021000e+02  1.040100e+02
4** / z fine mesh boundaries
 -1.198000e+02 -1.098000e+02 -9.980000e+01 -8.980000e+01 -7.980000e+01
 -7.408572e+01 -6.837143e+01 -6.265714e+01 -5.694286e+01 -5.122857e+01
 -4.551428e+01 -3.980000e+01 -3.694286e+01 -3.408571e+01 -3.122857e+01
 -2.837143e+01 -2.551428e+01 -2.265714e+01 -1.980000e+01 -1.916400e+01
 -1.852800e+01 -1.789200e+01 -1.725600e+01 -1.662000e+01 -1.610000e+01
 -1.550000e+01 -1.490000e+01 -1.430000e+01 -1.370000e+01 -1.310000e+01
 -1.250000e+01 -1.190000e+01 -1.130000e+01 -1.070000e+01 -1.010000e+01
 -9.499996e+00 -8.899996e+00 -8.299995e+00 -7.699996e+00 -7.099996e+00
 -6.499996e+00 -5.899996e+00 -5.299996e+00 -4.699996e+00 -4.099996e+00
 -3.499996e+00 -2.899996e+00 -2.299996e+00 -1.699996e+00 -1.100000e+00
 -7.000000e-01 -4.000000e-01  0.000000e+00  6.000000e-01  1.200000e+00
  1.300000e+00  1.400000e+00  1.600000e+00  1.700000e+00  2.300000e+00
  2.900000e+00  3.150000e+00  3.390000e+00  3.640000e+00  4.277500e+00
  4.915000e+00  5.552500e+00  6.190000e+00  6.827499e+00  7.464999e+00
  8.102499e+00  8.740000e+00  8.990000e+00  9.230000e+00  9.480000e+00
  1.004889e+01  1.061778e+01  1.118667e+01  1.175555e+01  1.232444e+01
  1.289333e+01  1.346222e+01  1.403111e+01  1.460000e+01  1.485000e+01
  1.509000e+01  1.534000e+01  1.590889e+01  1.647778e+01  1.704667e+01
  1.761556e+01  1.818445e+01  1.875334e+01  1.932223e+01  1.989112e+01
  2.046000e+01  2.071000e+01  2.095000e+01  2.120000e+01  2.183750e+01
  2.247500e+01  2.311250e+01  2.375000e+01  2.438750e+01  2.502501e+01
  2.566251e+01  2.630000e+01  2.655000e+01  2.679000e+01  2.704000e+01
  2.761778e+01  2.819556e+01  2.877333e+01  2.935111e+01  2.992889e+01
  3.050667e+01  3.108445e+01  3.166222e+01  3.224000e+01  3.249000e+01
  3.273000e+01  3.298000e+01  3.355222e+01  3.412445e+01  3.469667e+01
  3.526889e+01  3.584112e+01  3.641334e+01  3.698557e+01  3.755779e+01
  3.813000e+01  3.838000e+01  3.862000e+01  3.887000e+01  3.944778e+01
  4.002555e+01  4.060333e+01  4.118111e+01  4.175889e+01  4.233667e+01
  4.291444e+01  4.349222e+01  4.407000e+01  4.432000e+01  4.456000e+01
  4.481000e+01  4.538778e+01  4.596556e+01  4.654333e+01  4.712111e+01
  4.769889e+01  4.827667e+01  4.885445e+01  4.943222e+01  5.001000e+01
  5.026000e+01  5.050000e+01  5.075000e+01  5.133333e+01  5.191666e+01
  5.250000e+01  5.308333e+01  5.366666e+01  5.424999e+01  5.483332e+01
  5.541666e+01  5.600000e+01  5.625000e+01  5.649000e+01  5.674000e+01
  5.731556e+01  5.789111e+01  5.846666e+01  5.904222e+01  5.961777e+01
  6.019333e+01  6.076888e+01  6.134443e+01  6.192000e+01  6.217000e+01
  6.241000e+01  6.266000e+01  6.329375e+01  6.392750e+01  6.456125e+01
  6.519500e+01  6.582875e+01  6.646250e+01  6.709625e+01  6.773000e+01
  6.798000e+01  6.822000e+01  6.847000e+01  6.903889e+01  6.960777e+01
  7.017666e+01  7.074554e+01  7.131443e+01  7.188332e+01  7.245220e+01
  7.302109e+01  7.359000e+01  7.384000e+01  7.408000e+01  7.433000e+01
  7.490556e+01  7.548111e+01  7.605666e+01  7.663222e+01  7.720777e+01
  7.778333e+01  7.835888e+01  7.893443e+01  7.951000e+01  7.975999e+01
  8.000000e+01  8.025000e+01  8.088750e+01  8.152499e+01  8.216249e+01
  8.279999e+01  8.343748e+01  8.407498e+01  8.471248e+01  8.535000e+01
  8.593333e+01  8.651667e+01  8.710001e+01  8.768334e+01  8.826668e+01
  8.885001e+01  8.943335e+01  9.001669e+01  9.060000e+01  9.122500e+01
  9.185000e+01  9.247500e+01  9.310000e+01  9.372500e+01  9.435000e+01
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
  9.497500e+01  9.560000e+01  9.618375e+01  9.676749e+01  9.735124e+01
  9.793499e+01  9.851874e+01  9.910249e+01  9.968623e+01  1.002700e+02
  1.025110e+02  1.047520e+02  1.069930e+02  1.092340e+02  1.114750e+02
  1.137160e+02  1.159570e+02  1.181980e+02  1.204390e+02  1.226800e+02
  1.256800e+02  1.286800e+02  1.316800e+02  1.346800e+02  1.376800e+02
  1.406800e+02  1.436800e+02  1.466800e+02  1.496800e+02  1.526800e+02
  1.586800e+02  1.646800e+02  1.706800e+02  1.766800e+02  1.826800e+02
  1.926800e+02  2.026800e+02  2.126800e+02  2.226800e+02
6** / chs / fixed source energy spectrum
/CHI U-235 from BUGLE-96
 5.0179e-05 2.0166e-04 1.1460e-03 2.5222e-03 5.6568e-03 1.6147e-02
 3.0712e-02 8.0512e-02 7.6758e-02 4.4010e-02 4.6685e-02 2.0028e-02
 4.0262e-03 2.4344e-02 7.3547e-02 7.1946e-02 8.9495e-02 1.1503e-01
 6.2685e-02 2.7239e-02 4.6851e-02 3.7615e-02 4.1771e-02 2.1390e-02
 3.0048e-02 1.5408e-02 7.4251e-03 3.5461e-03 9.9806e-04 5.6977e-04
 1.7337e-04 2.0305e-04 5.4037e-04 4.8419e-04 1.5746e-04 5.1156e-05
 2.0827e-05 2.5484e-06 8.2729e-07 3.0900e-07 5.9997e-08 5.4050e-12
 2z /3z
7** /material density by zone
    223r1.0000e+00
8$$ / zone number by body
 190 186 188 187 185 142 165 143 161 158 159 162 144 166 145 167 146
 168 147 169 148 170 149 171 150 172 151 173 152 174 153 175 154 176
 155 177 156 178 157 179 180 181 182 183 184 159 163 164 159 185 160
 2r185 160 2r185 160 185 2r163 49 64 79 163 185 160 185 2r163 36 50 65
 80 94 3r163 25 37 51 66 81 95 107 163 185 160 185 2r163 16 26 38 52 67
 82 96 108 118 163 185 160 185 2r163 9 17 27 39 53 68 83 97 109 119 127
 3r163 4 10 18 28 40 54 69 84 98 110 120 128 134 163 185 160 2r185 160
 185 2r163 1 5 11 19 29 41 55 70 85 99 111 121 129 135 139 163 185 160
 185 2 6 12 20 30 42 56 71 86 100 112 122 130 136 140 185 160 185 3 7
 13 21 31 43 57 72 87 101 113 123 131 137 141 185 160 185 2r163 8 14 22
 32 44 58 73 88 102 114 124 132 138 163 185 160 185 2r163 15 23 33 45
 59 74 89 103 115 125 133 163 185 160 185 2r163 24 34 46 60 75 90 104
 116 126 163 185 160 185 2r163 35 47 61 76 91 105 117 163 185 160 185
 2r163 48 62 77 92 106 3r163 63 78 93 163 185 160 2r185 160 185 163 185
 159 189 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205
 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222
 223
9$$  /material number by material zone
 141r4 18r9 2 4r5 3 17r6 7 8 1 4r6 3 33r9
14** / body left boundaries
     4r-9.591000e+01    41r-9.400000e+01     4r-5.950000e+01
     3r-5.865000e+01     3r-5.667043e+01     3r-5.459061e+01
     6r-5.225000e+01     3r-5.051089e+01     8r-4.908000e+01
    10r-4.592000e+01     3r-4.458808e+01    12r-3.958000e+01
     3r-3.704976e+01    14r-3.642000e+01    16r-3.008000e+01
     3r-2.818563e+01     3r-1.833634e+01    18r-1.425000e+01
     3r-7.880396e+00    15r-4.750000e+00      3r2.780396e+00
     15r4.750000e+00      3r1.323634e+01     16r1.425000e+01
      3r2.308563e+01     14r3.008000e+01      3r3.194976e+01
     12r3.642000e+01      3r3.948808e+01     10r3.958000e+01
      3r4.541090e+01      8r4.592000e+01      6r4.908000e+01
      3r4.949061e+01      3r5.157042e+01        5.225000e+01
        5.355000e+01        5.950000e+01        8.890000e+01
    33r-5.000000e-01
15** / body right boundaries
      2r9.081000e+01       -9.400000e+01        9.081000e+01
      -5.865000e+01      5r8.890000e+01       -5.950000e+01
     34r8.890000e+01        5.950000e+01       -5.225000e+01
      2r5.950000e+01     3r-5.667043e+01     3r-5.459061e+01
     3r-5.051089e+01     6r-4.908000e+01     3r-4.458808e+01
     8r-4.592000e+01    10r-3.958000e+01     3r-3.704976e+01
    12r-3.642000e+01     3r-2.818563e+01    14r-3.008000e+01
    16r-1.425000e+01     3r-1.833634e+01     3r-7.880396e+00
      2r1.425000e+01    15r-4.750000e+00        1.425000e+01
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
      3r2.780396e+00     15r4.750000e+00      3r1.323634e+01
     15r1.425000e+01      3r2.308563e+01     16r3.008000e+01
      3r3.194976e+01     14r3.642000e+01      3r3.948808e+01
     12r3.958000e+01      3r4.541090e+01     10r4.592000e+01
      3r4.949061e+01      8r4.908000e+01      6r5.225000e+01
      3r5.157042e+01      3r5.355000e+01        5.950000e+01
      2r8.890000e+01        9.081000e+01     33r5.000000e-01
16** / body inside boundaries
     2r-9.081000e+01       -8.890000e+01        1.021000e+02
    42r-8.890000e+01     2r-7.100000e+01        7.100000e+01
       -8.890000e+01        1.269603e+00        1.193040e+01
       -8.890000e+01       -9.186345e+00        2.238634e+01
       -8.890000e+01       -1.903563e+01        3.223563e+01
       -7.100000e+01     2r-1.588000e+01       -5.290000e+00
        5.290000e+00        1.588000e+01       -8.890000e+01
       -2.789976e+01        4.109976e+01       -7.100000e+01
     2r-1.969000e+01       -1.588000e+01       -5.290000e+00
        5.290000e+00        1.588000e+01        1.969000e+01
       -7.100000e+01     2r-3.175000e+01       -1.969000e+01
       -1.588000e+01       -5.290000e+00        5.290000e+00
        1.588000e+01        1.969000e+01        3.175000e+01
       -8.890000e+01       -3.543808e+01        4.863808e+01
       -7.100000e+01     2r-3.556000e+01       -3.175000e+01
       -1.969000e+01       -1.588000e+01       -5.290000e+00
        5.290000e+00        1.588000e+01        1.969000e+01
        3.175000e+01        3.556000e+01       -8.890000e+01
       -4.136090e+01        5.456090e+01       -7.100000e+01
     2r-4.064000e+01       -3.556000e+01       -3.175000e+01
       -1.969000e+01       -1.588000e+01       -5.290000e+00
        5.290000e+00        1.588000e+01        1.969000e+01
        3.175000e+01        3.556000e+01        4.064000e+01
       -7.100000e+01     2r-4.763000e+01       -4.064000e+01
       -3.556000e+01       -3.175000e+01       -1.969000e+01
       -1.588000e+01       -5.290000e+00        5.290000e+00
        1.588000e+01        1.969000e+01        3.175000e+01
        3.556000e+01        4.064000e+01        4.763000e+01
       -8.890000e+01       -4.544061e+01        5.864061e+01
       -8.890000e+01       -4.752042e+01        6.072042e+01
       -7.100000e+01     2r-5.144000e+01       -4.763000e+01
       -4.064000e+01       -3.556000e+01       -3.175000e+01
       -1.969000e+01       -1.588000e+01       -5.290000e+00
        5.290000e+00        1.588000e+01        1.969000e+01
        3.175000e+01        3.556000e+01        4.064000e+01
        4.763000e+01        5.144000e+01       -8.890000e+01
       -4.950000e+01        6.270000e+01       -5.144000e+01
       -4.763000e+01       -4.064000e+01       -3.556000e+01
       -3.175000e+01       -1.969000e+01       -1.588000e+01
       -5.290000e+00        5.290000e+00        1.588000e+01
        1.969000e+01        3.175000e+01        3.556000e+01
        4.064000e+01        4.763000e+01       -8.890000e+01
       -4.752042e+01        6.072042e+01       -5.144000e+01
       -4.763000e+01       -4.064000e+01       -3.556000e+01
       -3.175000e+01       -1.969000e+01       -1.588000e+01
       -5.290000e+00        5.290000e+00        1.588000e+01
        1.969000e+01        3.175000e+01        3.556000e+01
        4.064000e+01        4.763000e+01       -8.890000e+01
       -4.544061e+01        5.864061e+01       -7.100000e+01
     2r-4.763000e+01       -4.064000e+01       -3.556000e+01
       -3.175000e+01       -1.969000e+01       -1.588000e+01
       -5.290000e+00        5.290000e+00        1.588000e+01
        1.969000e+01        3.175000e+01        3.556000e+01
        4.064000e+01        4.763000e+01       -8.890000e+01
       -4.136090e+01        5.456090e+01       -7.100000e+01
     2r-4.064000e+01       -3.556000e+01       -3.175000e+01
       -1.969000e+01       -1.588000e+01       -5.290000e+00
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
         -8.890000e+01       -3.543808e+01        4.863808e+01
         -7.100000e+01     2r-3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01       -8.890000e+01
         -2.789976e+01        4.109976e+01       -7.100000e+01
       2r-3.175000e+01       -1.969000e+01       -1.588000e+01
         -5.290000e+00        5.290000e+00        1.588000e+01
          1.969000e+01        3.175000e+01       -8.890000e+01
         -1.903563e+01        3.223563e+01       -7.100000e+01
       2r-1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
         -7.100000e+01     2r-1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01       -8.890000e+01
         -9.186345e+00        2.238634e+01       -8.890000e+01
          1.269603e+00        1.193040e+01       -7.100000e+01
       3r-8.890000e+01    15r-5.000000e-01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01        2.450000e+01
          4.950000e+01        7.450000e+01       -2.550000e+01
         -5.050000e+01       -7.550000e+01
17** / body outside boundaries
          1.040100e+02       -8.890000e+01        1.021000e+02
          1.040100e+02     41r1.021000e+02       -7.100000e+01
        2r7.100000e+01        1.021000e+02        1.269603e+00
          1.193040e+01        1.021000e+02       -9.186345e+00
          2.238634e+01        1.021000e+02       -1.903563e+01
          3.223563e+01        1.021000e+02       -1.588000e+01
          1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        7.100000e+01       -2.789976e+01
          4.109976e+01        1.021000e+02       -1.969000e+01
          1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          7.100000e+01       -3.175000e+01        3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        7.100000e+01       -3.543808e+01
          4.863808e+01        1.021000e+02       -3.556000e+01
          3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        7.100000e+01       -4.136090e+01
          5.456090e+01        1.021000e+02       -4.064000e+01
          4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          7.100000e+01       -4.763000e+01        4.763000e+01
         -4.064000e+01       -3.556000e+01       -3.175000e+01
         -1.969000e+01       -1.588000e+01       -5.290000e+00
          5.290000e+00        1.588000e+01        1.969000e+01
          3.175000e+01        3.556000e+01        4.064000e+01
          4.763000e+01        7.100000e+01       -4.544061e+01
          5.864061e+01        1.021000e+02       -4.752042e+01
          6.072042e+01        1.021000e+02       -5.144000e+01
          5.144000e+01       -4.763000e+01       -4.064000e+01
         -3.556000e+01       -3.175000e+01       -1.969000e+01
         -1.588000e+01       -5.290000e+00        5.290000e+00
          1.588000e+01        1.969000e+01        3.175000e+01
          3.556000e+01        4.064000e+01        4.763000e+01
          5.144000e+01        7.100000e+01       -4.950000e+01
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
         6.270000e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.752042e+01
         6.072042e+01        1.021000e+02       -4.763000e+01
        -4.064000e+01       -3.556000e+01       -3.175000e+01
        -1.969000e+01       -1.588000e+01       -5.290000e+00
         5.290000e+00        1.588000e+01        1.969000e+01
         3.175000e+01        3.556000e+01        4.064000e+01
         4.763000e+01        5.144000e+01       -4.544061e+01
         5.864061e+01        1.021000e+02       -4.763000e+01
         4.763000e+01       -4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        4.763000e+01        7.100000e+01
        -4.136090e+01        5.456090e+01        1.021000e+02
        -4.064000e+01        4.064000e+01       -3.556000e+01
        -3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        3.556000e+01
         4.064000e+01        7.100000e+01       -3.543808e+01
         4.863808e+01        1.021000e+02       -3.556000e+01
         3.556000e+01       -3.175000e+01       -1.969000e+01
        -1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        1.969000e+01        3.175000e+01
         3.556000e+01        7.100000e+01       -2.789976e+01
         4.109976e+01        1.021000e+02       -3.175000e+01
         3.175000e+01       -1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        3.175000e+01        7.100000e+01
        -1.903563e+01        3.223563e+01        1.021000e+02
        -1.969000e+01        1.969000e+01       -1.588000e+01
        -5.290000e+00        5.290000e+00        1.588000e+01
         1.969000e+01        7.100000e+01       -1.588000e+01
         1.588000e+01       -5.290000e+00        5.290000e+00
         1.588000e+01        7.100000e+01       -9.186345e+00
         2.238634e+01        1.021000e+02        1.269603e+00
         1.193040e+01        1.021000e+02        7.100000e+01
       3r1.021000e+02     15r5.000000e-01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01        2.550000e+01
         5.050000e+01        7.550000e+01       -2.450000e+01
        -4.950000e+01       -7.450000e+01
18** / body bottom boundaries
        -1.198000e+02     4r-1.980000e+01       -1.662000e+01
        -1.610000e+01       -1.100000e+00        0.000000e+00
         1.200000e+00        1.300000e+00        1.700000e+00
         2.900000e+00        3.640000e+00        8.740000e+00
         9.480000e+00        1.460000e+01        1.534000e+01
         2.046000e+01        2.120000e+01        2.630000e+01
         2.704000e+01        3.224000e+01        3.298000e+01
         3.813000e+01        3.887000e+01        4.407000e+01
         4.481000e+01        5.001000e+01        5.075000e+01
         5.600000e+01        5.674000e+01        6.192000e+01
         6.266000e+01        6.773000e+01        6.847000e+01
         7.359000e+01        7.433000e+01        7.951000e+01
         8.025000e+01        8.535000e+01        9.060000e+01
         9.560000e+01        1.002700e+02        1.226800e+02
       2r1.300000e+00        1.600000e+00        1.300000e+00
      9r-1.980000e+01      2r1.300000e+00      3r1.400000e+00
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        5r1.400000e+00      3r1.300000e+00      7r1.400000e+00
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        9r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00     11r1.400000e+00      3r1.300000e+00
       13r1.400000e+00         1.300000e+00     6r-1.980000e+01
        2r1.300000e+00     15r1.400000e+00         1.300000e+00
       3r-1.980000e+01     15r1.400000e+00     3r-1.980000e+01
       15r1.400000e+00     3r-1.980000e+01      2r1.300000e+00
       13r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00     11r1.400000e+00         1.300000e+00
       3r-1.980000e+01      2r1.300000e+00      9r1.400000e+00
          1.300000e+00     3r-1.980000e+01      2r1.300000e+00
        7r1.400000e+00         1.300000e+00     3r-1.980000e+01
        2r1.300000e+00      5r1.400000e+00      3r1.300000e+00
        3r1.400000e+00         1.300000e+00     6r-1.980000e+01
          1.300000e+00        -1.980000e+01         1.300000e+00
         -1.980000e+01        -7.000000e-01         3.150000e+00
          8.990000e+00         1.485000e+01         2.071000e+01
          2.655000e+01         3.249000e+01         3.838000e+01
          4.432000e+01         5.026000e+01         5.625000e+01
          6.217000e+01         6.798000e+01         7.384000e+01
          7.975999e+01      6r2.071000e+01      6r5.026000e+01
        6r7.975999e+01
19** / body top boundaries
         -1.980000e+01      3r2.226800e+02        -1.662000e+01
         -1.610000e+01        -1.100000e+00         0.000000e+00
          1.200000e+00         1.300000e+00         1.700000e+00
          2.900000e+00         3.640000e+00         8.740000e+00
          9.480000e+00         1.460000e+01         1.534000e+01
          2.046000e+01         2.120000e+01         2.630000e+01
          2.704000e+01         3.224000e+01         3.298000e+01
          3.813000e+01         3.887000e+01         4.407000e+01
          4.481000e+01         5.001000e+01         5.075000e+01
          5.600000e+01         5.674000e+01         6.192000e+01
          6.266000e+01         6.773000e+01         6.847000e+01
          7.359000e+01         7.433000e+01         7.951000e+01
          8.025000e+01         8.535000e+01         9.060000e+01
          9.560000e+01         1.002700e+02         1.226800e+02
          2.226800e+02         1.700000e+00         1.600000e+00
        2r1.700000e+00     9r-1.662000e+01         1.600000e+00
          1.400000e+00      4r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00      7r1.600000e+00
          1.400000e+00      8r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00     10r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
       13r1.600000e+00         1.400000e+00     14r1.600000e+00
       6r-1.662000e+01         1.600000e+00         1.400000e+00
       16r1.600000e+00     3r-1.662000e+01     15r1.600000e+00
       3r-1.662000e+01     15r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00     14r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
       12r1.600000e+00     3r-1.662000e+01         1.600000e+00
          1.400000e+00     10r1.600000e+00     3r-1.662000e+01
          1.600000e+00         1.400000e+00      8r1.600000e+00
       3r-1.662000e+01         1.600000e+00         1.400000e+00
        7r1.600000e+00         1.400000e+00      4r1.600000e+00
       6r-1.662000e+01         1.600000e+00        -1.662000e+01
          1.700000e+00         2.226800e+02        -4.000000e-01
          3.390000e+00         9.230000e+00         1.509000e+01
          2.095000e+01         2.679000e+01         3.273000e+01
          3.862000e+01         4.456000e+01         5.050000e+01
          5.649000e+01         6.241000e+01         6.822000e+01
          7.408000e+01         8.000000e+01      6r2.095000e+01
        6r5.050000e+01      6r8.000000e+01
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
21$$ / itmbg / iteration limit by group
        44r60
22** / i key flux locations
     33r0.0000e+00
23** / j key flux locations
     15r0.0000e+00        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01        2.5000e+01
        5.0000e+01        7.5000e+01       -2.5000e+01       -5.0000e+01
       -7.5000e+01        2.5000e+01        5.0000e+01        7.5000e+01
       -2.5000e+01       -5.0000e+01       -7.5000e+01
24** / k key flux locations
       -5.5000e-01        3.2700e+00        9.1100e+00        1.4970e+01
        2.0830e+01        2.6670e+01        3.2610e+01        3.8500e+01
        4.4440e+01        5.0380e+01        5.6370e+01        6.2290e+01
        6.8100e+01        7.3960e+01        7.9880e+01      6r2.0830e+01
      6r5.0380e+01      6r7.9880e+01
27** /group response by group
/   16-S_32    MT=103 (n,p)     FLAT WEIGHTING   (IRDF-2002)
 1.7639e-01 3.0787e-01 3.8051e-01 3.3979e-01 3.2202e-01 3.1380e-01
 2.4629e-01 2.7592e-01 1.9108e-01 1.0053e-01 6.8686e-02 7.2417e-02
 6.6472e-02 6.1245e-02 2.1377e-02 4.1502e-03 5.9998e-04 6.0917e-05
 1.6785e-06 25z /3z
/
/   49-In_115  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 5.8133e-02 9.1680e-02 2.0239e-01 2.7381e-01 3.0859e-01 3.3417e-01
 3.3897e-01 3.2538e-01 3.3341e-01 3.5259e-01 3.5385e-01 3.4311e-01
 3.3654e-01 3.2759e-01 2.9012e-01 2.3022e-01 1.7096e-01 1.0336e-01
 4.9401e-02 2.7891e-02 1.5489e-02 6.3893e-03 2.2558e-03 1.6310e-04
 20z /3z
/
/   45-Rh_103  MT=  4 (n,n')    FLAT WEIGHTING   (IRDF-2002)
 2.3466e-01 3.8742e-01 8.1816e-01 1.2190e+00 1.2753e+00 1.2305e+00
 1.1732e+00 1.1091e+00 1.0370e+00 9.8735e-01 9.5185e-01 9.2536e-01
 9.1570e-01 9.0494e-01 8.6764e-01 8.0955e-01 7.4452e-01 6.6193e-01
 5.8044e-01 4.9269e-01 3.3867e-01 1.9319e-01 1.3801e-01 1.0374e-01
 6.6383e-02 2.3291e-02 5.8219e-03 1.6581e-03 3.4572e-06 15z /3z
/
/   79-Au_197  MT=102 (n,gamma) FLAT WEIGHTING   (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 6.8138e-04 1.6063e-03 1.6769e-03 1.1792e-03 9.1672e-04 2.9908e-03
 6.0619e-03 1.0673e-02 1.9494e-02 2.7032e-02 3.1752e-02 3.5656e-02
 3.7624e-02 4.0070e-02 4.9391e-02 6.0152e-02 6.7842e-02 7.5077e-02
 8.4031e-02 9.0899e-02 9.8907e-02 1.2061e-01 1.5148e-01 1.8519e-01
 2.3553e-01 2.7527e-01 3.2852e-01 4.2145e-01 5.3159e-01 5.9625e-01
 6.3013e-01 6.5349e-01 7.6339e-01 1.1561e+00 1.8461e+00 2.9907e+00
 8.0657e+00 1.2390e+01 1.0332e+01 1.8528e+01 6.5715e-01 9.5267e+01
 3.6192e+02 2.5048e+01 /2.5505e+01 3.5582e+01 9.4230e+01
/
/   13-Al_27   MT=107 (n,alpha) FLAT WEIGHTING   (IRDF-2002)
 9.7222e-02 1.2398e-01 1.0678e-01 7.7279e-02 4.1475e-02 1.1792e-02
 4.6528e-04 2.6020e-06 1.5730e-07 35z /3z
/
/   16-S_32    MT=103 (n,p)     1/4 T PV WEIGHTING  (IRDF-2002)
 1.9559e-01 3.1902e-01 3.7870e-01 3.3761e-01 3.2271e-01 3.1129e-01
 2.4137e-01 2.7623e-01 1.8660e-01 9.9863e-02 6.8684e-02 7.2357e-02
 6.6472e-02 6.1132e-02 2.1297e-02 3.8088e-03 5.7312e-04 5.5073e-05
 1.3126e-06 25z /3z
/
/   49-In_115  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 5.9202e-02 9.8250e-02 2.1510e-01 2.7598e-01 3.1003e-01 3.3556e-01
 3.3873e-01 3.2521e-01 3.3469e-01 3.5273e-01 3.5385e-01 3.4291e-01
 3.3654e-01 3.2745e-01 2.8999e-01 2.2777e-01 1.6956e-01 1.0091e-01
 4.8582e-02 2.7786e-02 1.4531e-02 6.5054e-03 2.1654e-03 1.4947e-04
 20z /3z
/
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
/   45-Rh_103  MT=  4 (n,n')    1/4 T PV WEIGHTING  (IRDF-2002)
 2.4772e-01 4.0865e-01 8.8555e-01 1.2278e+00 1.2744e+00 1.2258e+00
 1.1715e+00 1.1082e+00 1.0339e+00 9.8682e-01 9.5186e-01 9.2505e-01
 9.1570e-01 9.0478e-01 8.6752e-01 8.0707e-01 7.4286e-01 6.5890e-01
 5.7861e-01 4.9185e-01 3.2307e-01 1.9477e-01 1.3666e-01 1.0314e-01
 6.5891e-02 2.3016e-02 5.3395e-03 1.6339e-03 3.5776e-06 15z /3z
/
/   79-Au_197  MT=102 (n,gamma) 1/4 T PV WEIGHTING  (IRDF-2002)
/              (self-shielded, Sigma0=1695)
 8.3919e-04 1.6616e-03 1.6250e-03 1.1556e-03 9.2147e-04 3.2356e-03
 6.1508e-03 1.0751e-02 1.9986e-02 2.7108e-02 3.1751e-02 3.5716e-02
 3.7624e-02 4.0106e-02 4.9422e-02 6.0532e-02 6.7955e-02 7.5395e-02
 8.4227e-02 9.0945e-02 9.9849e-02 1.2010e-01 1.5274e-01 1.8589e-01
 2.3630e-01 2.7571e-01 3.3596e-01 4.2224e-01 5.3060e-01 6.0555e-01
 6.3015e-01 6.5269e-01 7.5881e-01 1.1323e+00 1.8760e+00 3.1792e+00
 8.5832e+00 1.2102e+01 1.0530e+01 2.0632e+01 8.3730e-01 1.1666e+02
 2.9075e+02 2.4925e+01 /2.5727e+01 3.8000e+01 6.8829e+01
/
/   13-Al_27   MT=107 (n,alpha) 1/4 T PV WEIGHTING  (IRDF-2002)
 1.0463e-01 1.2392e-01 1.0309e-01 7.5687e-02 3.9922e-02 9.8648e-03
 4.1534e-04 2.4751e-06 1.3384e-07 35z /3z
/
/ E > 8.0 MeV Neutron Flux
      4r1. 4.8764e-01 39z /3z
/
/ E > 3.0 MeV Neutron Flux
      9r1. 3.9728e-02 34z /3z
/
/ E > 1.0 MeV Neutron Flux
     18r1.  1.3000e-02  25z /3z
/
/ E > 0.1 MeV Neutron Flux
     26r1.  2.1034e-01  17z /3z
/
/ E > 0.87643 eV Neutron Flux
     44r1. /3z
t
95** / shapg / source shape by group
/CHI U-235 from BUGLE-96
 5.0179e-05 2.0166e-04 1.1460e-03 2.5222e-03 5.6568e-03 1.6147e-02
 3.0712e-02 8.0512e-02 7.6758e-02 4.4010e-02 4.6685e-02 2.0028e-02
 4.0262e-03 2.4344e-02 7.3547e-02 7.1946e-02 8.9495e-02 1.1503e-01
 6.2685e-02 2.7239e-02 4.6851e-02 3.7615e-02 4.1771e-02 2.1390e-02
 3.0048e-02 1.5408e-02 7.4251e-03 3.5461e-03 9.9806e-04 5.6977e-04
 1.7337e-04 2.0305e-04 5.4037e-04 4.8419e-04 1.5746e-04 5.1156e-05
 2.0827e-05 2.5484e-06 8.2729e-07 3.0900e-07 5.9997e-08 5.4050e-12
 2z /3z
96** / distributed source distribution
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
   5767r0.0000e+00
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
5767r0.0000e+00
1054r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  62r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  62r0.0000e+00      3r2.4580e+07      4r2.5250e+07      4r2.4480e+07
  57r0.0000e+00      5r2.7450e+07      3r3.0720e+07      4r3.1500e+07
   4r3.0670e+07      5r2.6850e+07     52r0.0000e+00      5r2.7450e+07
   3r3.0720e+07      4r3.1500e+07      4r3.0670e+07      5r2.6850e+07
  52r0.0000e+00      5r2.7450e+07      3r3.0720e+07      4r3.1500e+07
   4r3.0670e+07      5r2.6850e+07     52r0.0000e+00      5r2.7450e+07
   3r3.0720e+07      4r3.1500e+07      4r3.0670e+07      5r2.6850e+07
  50r0.0000e+00      2r2.8960e+07      5r3.3960e+07      3r3.7700e+07
   4r3.8550e+07      4r3.7580e+07      5r3.3200e+07      2r2.7120e+07
  48r0.0000e+00      2r2.8960e+07      5r3.3960e+07      3r3.7700e+07
   4r3.8550e+07      4r3.7580e+07      5r3.3200e+07      2r2.7120e+07
  46r0.0000e+00      2r3.0040e+07      2r3.2990e+07      5r3.8550e+07
   3r4.2670e+07      4r4.3570e+07      4r4.2470e+07      5r3.7660e+07
   2r3.1010e+07      2r2.7480e+07     44r0.0000e+00      2r3.0040e+07
   2r3.2990e+07      5r3.8550e+07      3r4.2670e+07      4r4.3570e+07
   4r4.2470e+07      5r3.7660e+07      2r3.1010e+07      2r2.7480e+07
  41r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
   5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
  38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
   5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
  38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
   5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
38r0.0000e+00      3r3.1820e+07      2r3.5620e+07      2r3.9120e+07
 5r4.5720e+07      3r5.0530e+07      4r5.1490e+07      4r5.0130e+07
 5r4.4610e+07      2r3.7130e+07      2r3.3170e+07      3r2.8870e+07
37r0.0000e+00        3.1360e+07      3r3.5740e+07      2r4.0010e+07
 2r4.4000e+07      5r5.1570e+07      3r5.7010e+07      4r5.8020e+07
 4r5.6430e+07      5r5.0310e+07      2r4.2210e+07      2r3.7950e+07
 3r3.3310e+07        2.8430e+07     36r0.0000e+00        3.1360e+07
 3r3.5740e+07      2r4.0010e+07      2r4.4000e+07      5r5.1570e+07
 3r5.7010e+07      4r5.8020e+07      4r5.6430e+07      5r5.0310e+07
 2r4.2210e+07      2r3.7950e+07      3r3.3310e+07        2.8430e+07
34r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.0260e+07        3.3250e+07      3r3.7840e+07
 2r4.2390e+07      2r4.6690e+07      5r5.4910e+07      3r6.0790e+07
 4r6.1830e+07      4r6.0090e+07      5r5.3640e+07      2r4.5230e+07
 2r4.0840e+07      3r3.6070e+07        3.1030e+07      3r2.7510e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.1320e+07        3.4270e+07      3r3.8930e+07
 2r4.3640e+07      2r4.8150e+07      5r5.6840e+07      3r6.3040e+07
 4r6.4120e+07      4r6.2270e+07      5r5.5630e+07      2r4.7100e+07
 2r4.2700e+07      3r3.7920e+07        3.2870e+07      3r2.9320e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
31r0.0000e+00      2r3.0400e+07        3.3220e+07      3r3.7690e+07
 2r4.2230e+07      2r4.6600e+07      5r5.5050e+07      3r6.1100e+07
 4r6.2150e+07      4r6.0340e+07      5r5.3870e+07      2r4.5590e+07
 2r4.1330e+07      3r3.6730e+07        3.1880e+07      3r2.8500e+07
33r0.0000e+00        3.1500e+07      3r3.5750e+07      2r4.0030e+07
 2r4.4120e+07      5r5.2020e+07      3r5.7700e+07      4r5.8700e+07
 4r5.6990e+07      5r5.0800e+07      2r4.2820e+07      2r3.8730e+07
 3r3.4310e+07        2.9700e+07     37r0.0000e+00      3r3.2490e+07
 2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
 4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
 2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     38r0.0000e+00      3r3.2490e+07
      2r3.6350e+07      2r3.9990e+07      5r4.6960e+07      3r5.1970e+07
      4r5.2860e+07      4r5.1300e+07      5r4.5550e+07      2r3.8070e+07
      2r3.4220e+07      3r3.0090e+07     41r0.0000e+00      2r3.1860e+07
      2r3.5000e+07      5r4.0920e+07      3r4.5140e+07      4r4.5870e+07
      4r4.4460e+07      5r3.9250e+07      2r3.2400e+07      2r2.8860e+07
     44r0.0000e+00      2r3.1860e+07      2r3.5000e+07      5r4.0920e+07
      3r4.5140e+07      4r4.5870e+07      4r4.4460e+07      5r3.9250e+07
      2r3.2400e+07      2r2.8860e+07     46r0.0000e+00      2r3.1760e+07
      5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
      5r3.5290e+07      2r2.8900e+07     48r0.0000e+00      2r3.1760e+07
      5r3.7110e+07      3r4.0880e+07      4r4.1490e+07      4r4.0150e+07
      5r3.5290e+07      2r2.8900e+07     50r0.0000e+00      5r3.1730e+07
      3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
     52r0.0000e+00      5r3.1730e+07      3r3.4960e+07      4r3.5370e+07
      4r3.4040e+07      5r2.9750e+07     52r0.0000e+00      5r3.1730e+07
      3r3.4960e+07      4r3.5370e+07      4r3.4040e+07      5r2.9750e+07
     57r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
     62r0.0000e+00      3r2.9730e+07      4r2.9940e+07      4r2.8650e+07
   1417r0.0000e+00
   5767r0.0000e+00
   f0.
/zone      1 volume= 7.2390e+00  source= 1.7793e+08 density= 1.0000e+00 mat.     4
/zone      2 volume= 7.2390e+00  source= 1.8278e+08 density= 1.0000e+00 mat.     4
/zone      3 volume= 7.2390e+00  source= 1.7721e+08 density= 1.0000e+00 mat.     4
/zone      4 volume= 2.2130e+01  source= 6.0748e+08 density= 1.0000e+00 mat.     4
/zone      5 volume= 1.3281e+01  source= 4.0799e+08 density= 1.0000e+00 mat.     4
/zone      6 volume= 1.3281e+01  source= 4.1835e+08 density= 1.0000e+00 mat.     4
/zone      7 volume= 1.3281e+01  source= 4.0733e+08 density= 1.0000e+00 mat.     4
/zone      8 volume= 2.2130e+01  source= 5.9420e+08 density= 1.0000e+00 mat.     4
/zone      9 volume= 6.4414e+00  source= 1.8654e+08 density= 1.0000e+00 mat.     4
/zone     10 volume= 1.6083e+01  source= 5.4619e+08 density= 1.0000e+00 mat.     4
/zone     11 volume= 9.6520e+00  source= 3.6388e+08 density= 1.0000e+00 mat.     4
/zone     12 volume= 9.6520e+00  source= 3.7208e+08 density= 1.0000e+00 mat.     4
/zone     13 volume= 9.6520e+00  source= 3.6272e+08 density= 1.0000e+00 mat.     4
/zone     14 volume= 1.6083e+01  source= 5.3396e+08 density= 1.0000e+00 mat.     4
/zone     15 volume= 6.4414e+00  source= 1.7469e+08 density= 1.0000e+00 mat.     4
/zone     16 volume= 2.4079e+00  source= 7.2334e+07 density= 1.0000e+00 mat.     4
/zone     17 volume= 4.8311e+00  source= 1.5938e+08 density= 1.0000e+00 mat.     4
/zone     18 volume= 1.2062e+01  source= 4.6501e+08 density= 1.0000e+00 mat.     4
/zone     19 volume= 7.2390e+00  source= 3.0889e+08 density= 1.0000e+00 mat.     4
/zone     20 volume= 7.2390e+00  source= 3.1540e+08 density= 1.0000e+00 mat.     4
/zone     21 volume= 7.2390e+00  source= 3.0744e+08 density= 1.0000e+00 mat.     4
/zone     22 volume= 1.2062e+01  source= 4.5427e+08 density= 1.0000e+00 mat.     4
/zone     23 volume= 4.8311e+00  source= 1.4981e+08 density= 1.0000e+00 mat.     4
/zone     24 volume= 2.4079e+00  source= 6.6170e+07 density= 1.0000e+00 mat.     4
/zone     25 volume= 1.5292e+01  source= 4.8659e+08 density= 1.0000e+00 mat.     4
/zone     26 volume= 7.6219e+00  source= 2.7149e+08 density= 1.0000e+00 mat.     4
/zone     27 volume= 1.5292e+01  source= 5.9823e+08 density= 1.0000e+00 mat.     4
/zone     28 volume= 3.8182e+01  source= 1.7457e+09 density= 1.0000e+00 mat.     4
/zone     29 volume= 2.2914e+01  source= 1.1578e+09 density= 1.0000e+00 mat.     4
/zone     30 volume= 2.2914e+01  source= 1.1798e+09 density= 1.0000e+00 mat.     4
/zone     31 volume= 2.2914e+01  source= 1.1487e+09 density= 1.0000e+00 mat.     4
/zone     32 volume= 3.8182e+01  source= 1.7033e+09 density= 1.0000e+00 mat.     4
/zone     33 volume= 1.5292e+01  source= 5.6779e+08 density= 1.0000e+00 mat.     4
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
/zone    34 volume= 7.6219e+00  source= 2.5282e+08 density= 1.0000e+00 mat.    4
/zone    35 volume= 1.5292e+01  source= 4.4148e+08 density= 1.0000e+00 mat.    4
/zone    36 volume= 2.4079e+00  source= 7.5512e+07 density= 1.0000e+00 mat.    4
/zone    37 volume= 4.8311e+00  source= 1.7266e+08 density= 1.0000e+00 mat.    4
/zone    38 volume= 2.4079e+00  source= 9.6341e+07 density= 1.0000e+00 mat.    4
/zone    39 volume= 4.8311e+00  source= 2.1257e+08 density= 1.0000e+00 mat.    4
/zone    40 volume= 1.2062e+01  source= 6.2206e+08 density= 1.0000e+00 mat.    4
/zone    41 volume= 7.2390e+00  source= 4.1270e+08 density= 1.0000e+00 mat.    4
/zone    42 volume= 7.2390e+00  source= 4.2001e+08 density= 1.0000e+00 mat.    4
/zone    43 volume= 7.2390e+00  source= 4.0850e+08 density= 1.0000e+00 mat.    4
/zone    44 volume= 1.2062e+01  source= 6.0686e+08 density= 1.0000e+00 mat.    4
/zone    45 volume= 4.8311e+00  source= 2.0392e+08 density= 1.0000e+00 mat.    4
/zone    46 volume= 2.4079e+00  source= 9.1381e+07 density= 1.0000e+00 mat.    4
/zone    47 volume= 4.8311e+00  source= 1.6092e+08 density= 1.0000e+00 mat.    4
/zone    48 volume= 2.4079e+00  source= 6.8457e+07 density= 1.0000e+00 mat.    4
/zone    49 volume= 6.7141e+00  source= 2.0317e+08 density= 1.0000e+00 mat.    4
/zone    50 volume= 6.6929e+00  source= 2.2254e+08 density= 1.0000e+00 mat.    4
/zone    51 volume= 1.3428e+01  source= 5.0812e+08 density= 1.0000e+00 mat.    4
/zone    52 volume= 6.6929e+00  source= 2.8371e+08 density= 1.0000e+00 mat.    4
/zone    53 volume= 1.3428e+01  source= 6.2696e+08 density= 1.0000e+00 mat.    4
/zone    54 volume= 3.3528e+01  source= 1.8410e+09 density= 1.0000e+00 mat.    4
/zone    55 volume= 2.0121e+01  source= 1.2232e+09 density= 1.0000e+00 mat.    4
/zone    56 volume= 2.0121e+01  source= 1.2441e+09 density= 1.0000e+00 mat.    4
/zone    57 volume= 2.0121e+01  source= 1.2091e+09 density= 1.0000e+00 mat.    4
/zone    58 volume= 3.3528e+01  source= 1.7984e+09 density= 1.0000e+00 mat.    4
/zone    59 volume= 1.3428e+01  source= 6.0735e+08 density= 1.0000e+00 mat.    4
/zone    60 volume= 6.6929e+00  source= 2.7334e+08 density= 1.0000e+00 mat.    4
/zone    61 volume= 1.3428e+01  source= 4.8435e+08 density= 1.0000e+00 mat.    4
/zone    62 volume= 6.6929e+00  source= 2.0768e+08 density= 1.0000e+00 mat.    4
/zone    63 volume= 6.7141e+00  source= 1.8470e+08 density= 1.0000e+00 mat.    4
/zone    64 volume= 6.7077e+00  source= 2.1009e+08 density= 1.0000e+00 mat.    4
/zone    65 volume= 6.6866e+00  source= 2.2915e+08 density= 1.0000e+00 mat.    4
/zone    66 volume= 1.3415e+01  source= 5.2226e+08 density= 1.0000e+00 mat.    4
/zone    67 volume= 6.6866e+00  source= 2.9180e+08 density= 1.0000e+00 mat.    4
/zone    68 volume= 1.3415e+01  source= 6.4595e+08 density= 1.0000e+00 mat.    4
/zone    69 volume= 3.3496e+01  source= 1.9039e+09 density= 1.0000e+00 mat.    4
/zone    70 volume= 2.0102e+01  source= 1.2672e+09 density= 1.0000e+00 mat.    4
/zone    71 volume= 2.0102e+01  source= 1.2889e+09 density= 1.0000e+00 mat.    4
/zone    72 volume= 2.0102e+01  source= 1.2518e+09 density= 1.0000e+00 mat.    4
/zone    73 volume= 3.3496e+01  source= 1.8634e+09 density= 1.0000e+00 mat.    4
/zone    74 volume= 1.3415e+01  source= 6.3187e+08 density= 1.0000e+00 mat.    4
/zone    75 volume= 6.6866e+00  source= 2.8552e+08 density= 1.0000e+00 mat.    4
/zone    76 volume= 1.3415e+01  source= 5.0871e+08 density= 1.0000e+00 mat.    4
/zone    77 volume= 6.6866e+00  source= 2.1979e+08 density= 1.0000e+00 mat.    4
/zone    78 volume= 6.7077e+00  source= 1.9667e+08 density= 1.0000e+00 mat.    4
/zone    79 volume= 6.7141e+00  source= 2.0411e+08 density= 1.0000e+00 mat.    4
/zone    80 volume= 6.6929e+00  source= 2.2234e+08 density= 1.0000e+00 mat.    4
/zone    81 volume= 1.3428e+01  source= 5.0611e+08 density= 1.0000e+00 mat.    4
/zone    82 volume= 6.6929e+00  source= 2.8264e+08 density= 1.0000e+00 mat.    4
/zone    83 volume= 1.3428e+01  source= 6.2575e+08 density= 1.0000e+00 mat.    4
/zone    84 volume= 3.3528e+01  source= 1.8457e+09 density= 1.0000e+00 mat.    4
/zone    85 volume= 2.0121e+01  source= 1.2294e+09 density= 1.0000e+00 mat.    4
/zone    86 volume= 2.0121e+01  source= 1.2505e+09 density= 1.0000e+00 mat.    4
/zone    87 volume= 2.0121e+01  source= 1.2141e+09 density= 1.0000e+00 mat.    4
/zone    88 volume= 3.3528e+01  source= 1.8062e+09 density= 1.0000e+00 mat.    4
/zone    89 volume= 1.3428e+01  source= 6.1219e+08 density= 1.0000e+00 mat.    4
/zone    90 volume= 6.6929e+00  source= 2.7662e+08 density= 1.0000e+00 mat.    4
/zone    91 volume= 1.3428e+01  source= 4.9321e+08 density= 1.0000e+00 mat.    4
/zone    92 volume= 6.6929e+00  source= 2.1337e+08 density= 1.0000e+00 mat.    4
/zone    93 volume= 6.7141e+00  source= 1.9135e+08 density= 1.0000e+00 mat.    4
/zone    94 volume= 2.4079e+00  source= 7.5850e+07 density= 1.0000e+00 mat.    4
/zone    95 volume= 4.8311e+00  source= 1.7271e+08 density= 1.0000e+00 mat.    4
/zone    96 volume= 2.4079e+00  source= 9.6389e+07 density= 1.0000e+00 mat.    4
/zone    97 volume= 4.8311e+00  source= 2.1315e+08 density= 1.0000e+00 mat.    4
/zone    98 volume= 1.2062e+01  source= 6.2749e+08 density= 1.0000e+00 mat.    4
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
/zone     99 volume= 7.2390e+00  source= 4.1769e+08 density= 1.0000e+00 mat.    4
/zone    100 volume= 7.2390e+00  source= 4.2493e+08 density= 1.0000e+00 mat.    4
/zone    101 volume= 7.2390e+00  source= 4.1255e+08 density= 1.0000e+00 mat.    4
/zone    102 volume= 1.2062e+01  source= 6.1277e+08 density= 1.0000e+00 mat.    4
/zone    103 volume= 4.8311e+00  source= 2.0687e+08 density= 1.0000e+00 mat.    4
/zone    104 volume= 2.4079e+00  source= 9.3259e+07 density= 1.0000e+00 mat.    4
/zone    105 volume= 4.8311e+00  source= 1.6575e+08 density= 1.0000e+00 mat.    4
/zone    106 volume= 2.4079e+00  source= 7.1515e+07 density= 1.0000e+00 mat.    4
/zone    107 volume= 1.5292e+01  source= 4.9684e+08 density= 1.0000e+00 mat.    4
/zone    108 volume= 7.6219e+00  source= 2.7706e+08 density= 1.0000e+00 mat.    4
/zone    109 volume= 1.5292e+01  source= 6.1153e+08 density= 1.0000e+00 mat.    4
/zone    110 volume= 3.8182e+01  source= 1.7930e+09 density= 1.0000e+00 mat.    4
/zone    111 volume= 2.2914e+01  source= 1.1908e+09 density= 1.0000e+00 mat.    4
/zone    112 volume= 2.2914e+01  source= 1.2112e+09 density= 1.0000e+00 mat.    4
/zone    113 volume= 2.2914e+01  source= 1.1755e+09 density= 1.0000e+00 mat.    4
/zone    114 volume= 3.8182e+01  source= 1.7392e+09 density= 1.0000e+00 mat.    4
/zone    115 volume= 1.5292e+01  source= 5.8217e+08 density= 1.0000e+00 mat.    4
/zone    116 volume= 7.6219e+00  source= 2.6082e+08 density= 1.0000e+00 mat.    4
/zone    117 volume= 1.5292e+01  source= 4.6014e+08 density= 1.0000e+00 mat.    4
/zone    118 volume= 2.4079e+00  source= 7.6716e+07 density= 1.0000e+00 mat.    4
/zone    119 volume= 4.8311e+00  source= 1.6909e+08 density= 1.0000e+00 mat.    4
/zone    120 volume= 1.2062e+01  source= 4.9360e+08 density= 1.0000e+00 mat.    4
/zone    121 volume= 7.2390e+00  source= 3.2677e+08 density= 1.0000e+00 mat.    4
/zone    122 volume= 7.2390e+00  source= 3.3205e+08 density= 1.0000e+00 mat.    4
/zone    123 volume= 7.2390e+00  source= 3.2185e+08 density= 1.0000e+00 mat.    4
/zone    124 volume= 1.2062e+01  source= 4.7345e+08 density= 1.0000e+00 mat.    4
/zone    125 volume= 4.8311e+00  source= 1.5653e+08 density= 1.0000e+00 mat.    4
/zone    126 volume= 2.4079e+00  source= 6.9493e+07 density= 1.0000e+00 mat.    4
/zone    127 volume= 6.4414e+00  source= 2.0458e+08 density= 1.0000e+00 mat.    4
/zone    128 volume= 1.6083e+01  source= 5.9685e+08 density= 1.0000e+00 mat.    4
/zone    129 volume= 9.6520e+00  source= 3.9457e+08 density= 1.0000e+00 mat.    4
/zone    130 volume= 9.6520e+00  source= 4.0046e+08 density= 1.0000e+00 mat.    4
/zone    131 volume= 9.6520e+00  source= 3.8753e+08 density= 1.0000e+00 mat.    4
/zone    132 volume= 1.6083e+01  source= 5.6758e+08 density= 1.0000e+00 mat.    4
/zone    133 volume= 6.4414e+00  source= 1.8616e+08 density= 1.0000e+00 mat.    4
/zone    134 volume= 2.2130e+01  source= 7.0220e+08 density= 1.0000e+00 mat.    4
/zone    135 volume= 1.3281e+01  source= 4.6430e+08 density= 1.0000e+00 mat.    4
/zone    136 volume= 1.3281e+01  source= 4.6975e+08 density= 1.0000e+00 mat.    4
/zone    137 volume= 1.3281e+01  source= 4.5209e+08 density= 1.0000e+00 mat.    4
/zone    138 volume= 2.2130e+01  source= 6.5838e+08 density= 1.0000e+00 mat.    4
/zone    139 volume= 7.2390e+00  source= 2.1522e+08 density= 1.0000e+00 mat.    4
/zone    140 volume= 7.2390e+00  source= 2.1674e+08 density= 1.0000e+00 mat.    4
/zone    141 volume= 7.2390e+00  source= 2.0740e+08 density= 1.0000e+00 mat.    4
/zone    142 volume= 1.8166e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    143 volume= 3.8427e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    144 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    145 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    146 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    147 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    148 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    149 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    150 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    151 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    152 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    153 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    154 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    155 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    156 volume= 2.5851e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    157 volume= 2.5849e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    158 volume= 3.4934e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    159 volume= 7.2144e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    160 volume= 3.1441e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    2
/zone    161 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    162 volume= 4.1921e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    163 volume= 3.3327e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
/zone    164 volume= 1.6898e+03  source= 0.0000e+00 density= 1.0000e+00 mat.    5
/zone    165 volume= 5.2401e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone    166 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    167 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    168 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    169 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    170 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    171 volume= 1.7991e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    172 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    173 volume= 1.8166e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    174 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    175 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    176 volume= 1.7711e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    177 volume= 1.7886e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    178 volume= 1.8096e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    179 volume= 1.7816e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    180 volume= 1.8340e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    181 volume= 1.7467e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    182 volume= 1.6314e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    183 volume= 7.8287e+05  source= 0.0000e+00 density= 1.0000e+00 mat.    7
/zone    184 volume= 3.4934e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    8
/zone    185 volume= 7.9648e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    1
/zone    186 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    187 volume= 8.6477e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    188 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    189 volume= 8.8459e+04  source= 0.0000e+00 density= 1.0000e+00 mat.    6
/zone    190 volume= 3.6377e+06  source= 0.0000e+00 density= 1.0000e+00 mat.    3
/zone    191 volume= 3.0000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    192 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    193 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    194 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    195 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    196 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    197 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    198 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    199 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    200 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    201 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    202 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    203 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    204 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    205 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    206 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    207 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    208 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    209 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    210 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    211 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    212 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    213 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    214 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    215 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    216 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    217 volume= 2.4000e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    218 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    219 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    220 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    221 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    222 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/zone    223 volume= 2.4001e-01  source= 0.0000e+00 density= 1.0000e+00 mat.    9
/     Total volume= 1.2458e+07  source= 7.6059e+10
/
/ mat.    1 volume= 7.9648e+04  source= 0.0000e+00
/ mat.    2 volume= 3.1441e+04  source= 0.0000e+00
/ mat.    3 volume= 4.1617e+06  source= 0.0000e+00
```

TAB. C5 Continued

TORT Input - Inhomogeneous Fission Neutron Source Calculation
with the BUGLE-96 Library.

```
/ mat.    4 volume= 1.7367e+03  source= 7.6059e+10
/ mat.    5 volume= 8.8864e+04  source= 0.0000e+00
/ mat.    6 volume= 3.3895e+06  source= 0.0000e+00
/ mat.    7 volume= 7.8287e+05  source= 0.0000e+00
/ mat.    8 volume= 3.4934e+06  source= 0.0000e+00
/ mat.    9 volume= 4.2922e+05  source= 0.0000e+00
/     Total volume= 1.2458e+07  source= 7.6059e+10
t
=end
```

APPENDIX D

Neutron Spectra Calculated along the Horizontal Axis Z with the BUGJEFF311.BOLIB Library

TAB. D1

Iron-88 - Calculated Neutron Spectrum, Measurement Position A2 at Z = 3.27 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.1030E+04	1.1030E+04
2	1.4191E+01	4.4608E+04	5.5638E+04
3	1.2214E+01	2.5867E+05	3.1431E+05
4	1.0000E+01	5.7541E+05	8.8971E+05
5	8.6071E+00	1.3015E+06	2.1912E+06
6	7.4082E+00	3.7285E+06	5.9196E+06
7	6.0653E+00	7.4834E+06	1.3403E+07
8	4.9659E+00	2.1734E+07	3.5137E+07
9	3.6788E+00	2.1442E+07	5.6579E+07
10	3.0119E+00	1.3719E+07	7.0298E+07
11	2.7253E+00	1.5555E+07	8.5853E+07
12	2.4660E+00	8.2451E+06	9.4098E+07
13	2.3653E+00	1.5324E+06	9.5631E+07
14	2.3457E+00	9.1130E+06	1.0474E+08
15	2.2313E+00	2.9380E+07	1.3412E+08
16	1.9205E+00	3.2368E+07	1.6649E+08
17	1.6530E+00	4.5544E+07	2.1204E+08
18	1.3534E+00	7.7535E+07	2.8957E+08
19	1.0026E+00	4.3945E+07	3.3352E+08
20	8.2085E-01	2.4075E+07	3.5759E+08
21	7.4274E-01	6.1356E+07	4.1895E+08
22	6.0810E-01	5.5335E+07	4.7428E+08
23	4.9787E-01	8.2238E+07	5.5652E+08
24	3.6883E-01	6.2080E+07	6.1860E+08
25	2.9721E-01	1.0529E+08	7.2389E+08
26	1.8316E-01	9.4038E+07	8.1793E+08
27	1.1109E-01	7.7512E+07	8.9544E+08
28	6.7379E-02	4.9129E+07	9.4457E+08
29	4.0868E-02	1.0463E+07	9.5503E+08
30	3.1828E-02	2.5404E+07	9.8043E+08
31	2.6058E-02	2.4076E+07	1.0045E+09
32	2.4176E-02	1.2838E+07	1.0173E+09
33	2.1875E-02	3.3998E+07	1.0513E+09
34	1.5034E-02	4.9784E+07	1.1011E+09
35	7.1017E-03	5.0259E+07	1.1514E+09
36	3.3546E-03	3.9152E+07	1.1905E+09
37	1.5846E-03	6.0670E+07	1.2512E+09
38	4.5400E-04	3.1353E+07	1.2826E+09
39	2.1445E-04	3.0103E+07	1.3127E+09
40	1.0130E-04	3.5641E+07	1.3483E+09
41	3.7266E-05	3.7041E+07	1.3853E+09
42	1.0677E-05	1.9316E+07	1.4047E+09
43	5.0435E-06	2.3615E+07	1.4283E+09
44	1.8554E-06	1.5365E+07	1.4436E+09
45	8.7643E-07	1.3534E+07	1.4572E+09
	4.1399E-07		

TAB. D2

Iron-88 - Calculated Neutron Spectrum, Measurement Position A3 at Z = 9.11 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.8899E+03	1.8899E+03
2	1.4191E+01	7.3683E+03	9.2581E+03
3	1.2214E+01	4.2432E+04	5.1691E+04
4	1.0000E+01	9.3390E+04	1.4508E+05
5	8.6071E+00	2.0666E+05	3.5174E+05
6	7.4082E+00	5.8434E+05	9.3608E+05
7	6.0653E+00	1.1999E+06	2.1360E+06
8	4.9659E+00	3.9808E+06	6.1168E+06
9	3.6788E+00	4.6310E+06	1.0748E+07
10	3.0119E+00	3.2281E+06	1.3976E+07
11	2.7253E+00	3.9120E+06	1.7888E+07
12	2.4660E+00	1.9972E+06	1.9885E+07
13	2.3653E+00	4.6921E+05	2.0354E+07
14	2.3457E+00	2.6649E+06	2.3019E+07
15	2.2313E+00	8.7999E+06	3.1819E+07
16	1.9205E+00	1.1595E+07	4.3414E+07
17	1.6530E+00	1.7964E+07	6.1377E+07
18	1.3534E+00	3.7193E+07	9.8570E+07
19	1.0026E+00	2.8813E+07	1.2738E+08
20	8.2085E-01	1.3633E+07	1.4102E+08
21	7.4274E-01	5.0732E+07	1.9175E+08
22	6.0810E-01	4.2128E+07	2.3388E+08
23	4.9787E-01	6.5579E+07	2.9945E+08
24	3.6883E-01	6.5439E+07	3.6489E+08
25	2.9721E-01	8.3575E+07	4.4847E+08
26	1.8316E-01	9.0008E+07	5.3848E+08
27	1.1109E-01	6.1924E+07	6.0040E+08
28	6.7379E-02	4.1236E+07	6.4164E+08
29	4.0868E-02	1.0844E+07	6.5248E+08
30	3.1828E-02	3.9352E+06	6.5641E+08
31	2.6058E-02	2.4895E+07	6.8131E+08
32	2.4176E-02	1.2286E+07	6.9359E+08
33	2.1875E-02	2.3552E+07	7.1715E+08
34	1.5034E-02	2.7179E+07	7.4433E+08
35	7.1017E-03	3.8817E+07	7.8314E+08
36	3.3546E-03	2.9018E+07	8.1216E+08
37	1.5846E-03	4.3107E+07	8.5527E+08
38	4.5400E-04	1.8999E+07	8.7427E+08
39	2.1445E-04	2.1117E+07	8.9538E+08
40	1.0130E-04	2.5673E+07	9.2106E+08
41	3.7266E-05	2.6466E+07	9.4752E+08
42	1.0677E-05	1.2630E+07	9.6015E+08
43	5.0435E-06	1.2522E+07	9.7267E+08
44	1.8554E-06	6.3505E+06	9.7902E+08
45	8.7643E-07	3.9433E+06	9.8297E+08
	4.1399E-07		

TAB. D3

Iron-88 - Calculated Neutron Spectrum, Measurement Position A4 at Z = 14.97 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	6.3236E+02	6.3236E+02
2	1.4191E+01	2.4138E+03	3.0462E+03
3	1.2214E+01	1.3850E+04	1.6897E+04
4	1.0000E+01	3.0263E+04	4.7160E+04
5	8.6071E+00	6.5715E+04	1.1287E+05
6	7.4082E+00	1.8079E+05	2.9367E+05
7	6.0653E+00	3.6648E+05	6.6014E+05
8	4.9659E+00	1.2710E+06	1.9311E+06
9	3.6788E+00	1.5928E+06	3.5238E+06
10	3.0119E+00	1.1386E+06	4.6625E+06
11	2.7253E+00	1.3955E+06	6.0580E+06
12	2.4660E+00	7.1857E+05	6.7766E+06
13	2.3653E+00	1.8146E+05	6.9580E+06
14	2.3457E+00	1.0340E+06	7.9920E+06
15	2.2313E+00	3.4673E+06	1.1459E+07
16	1.9205E+00	5.0289E+06	1.6488E+07
17	1.6530E+00	8.2199E+06	2.4708E+07
18	1.3534E+00	1.9290E+07	4.3998E+07
19	1.0026E+00	1.7980E+07	6.1978E+07
20	8.2085E-01	8.1328E+06	7.0111E+07
21	7.4274E-01	3.7284E+07	1.0739E+08
22	6.0810E-01	3.1187E+07	1.3858E+08
23	4.9787E-01	5.0149E+07	1.8873E+08
24	3.6883E-01	5.8364E+07	2.4709E+08
25	2.9721E-01	6.6774E+07	3.1387E+08
26	1.8316E-01	7.9534E+07	3.9340E+08
27	1.1109E-01	5.1290E+07	4.4469E+08
28	6.7379E-02	3.3970E+07	4.7866E+08
29	4.0868E-02	9.1226E+06	4.8778E+08
30	3.1828E-02	3.2724E+06	4.9106E+08
31	2.6058E-02	2.3067E+07	5.1412E+08
32	2.4176E-02	1.1583E+07	5.2571E+08
33	2.1875E-02	1.8492E+07	5.4420E+08
34	1.5034E-02	1.8612E+07	5.6281E+08
35	7.1017E-03	2.8172E+07	5.9098E+08
36	3.3546E-03	2.1285E+07	6.1227E+08
37	1.5846E-03	3.0817E+07	6.4308E+08
38	4.5400E-04	1.3090E+07	6.5617E+08
39	2.1445E-04	1.4450E+07	6.7063E+08
40	1.0130E-04	1.7604E+07	6.8823E+08
41	3.7266E-05	1.8000E+07	7.0623E+08
42	1.0677E-05	8.4527E+06	7.1468E+08
43	5.0435E-06	7.8121E+06	7.2249E+08
44	1.8554E-06	3.5666E+06	7.2606E+08
45	8.7643E-07	1.8380E+06	7.2790E+08
	4.1399E-07		

TAB. D4

Iron-88 - Calculated Neutron Spectrum, Measurement Position A5 at Z = 20.83 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.3872E+02	2.3872E+02
2	1.4191E+01	8.8937E+02	1.1281E+03
3	1.2214E+01	5.0660E+03	6.1941E+03
4	1.0000E+01	1.0951E+04	1.7145E+04
5	8.6071E+00	2.3266E+04	4.0411E+04
6	7.4082E+00	6.1951E+04	1.0236E+05
7	6.0653E+00	1.2300E+05	2.2536E+05
8	4.9659E+00	4.3824E+05	6.6361E+05
9	3.6788E+00	5.8060E+05	1.2442E+06
10	3.0119E+00	4.2272E+05	1.6669E+06
11	2.7253E+00	5.2083E+05	2.1878E+06
12	2.4660E+00	2.7059E+05	2.4583E+06
13	2.3653E+00	7.1641E+04	2.5300E+06
14	2.3457E+00	4.1368E+05	2.9437E+06
15	2.2313E+00	1.4062E+06	4.3498E+06
16	1.9205E+00	2.2100E+06	6.5599E+06
17	1.6530E+00	3.7803E+06	1.0340E+07
18	1.3534E+00	9.9484E+06	2.0289E+07
19	1.0026E+00	1.0908E+07	3.1197E+07
20	8.2085E-01	4.7826E+06	3.5979E+07
21	7.4274E-01	2.6183E+07	6.2162E+07
22	6.0810E-01	2.2327E+07	8.4489E+07
23	4.9787E-01	3.6913E+07	1.2140E+08
24	3.6883E-01	4.8789E+07	1.7019E+08
25	2.9721E-01	5.2520E+07	2.2271E+08
26	1.8316E-01	6.7553E+07	2.9026E+08
27	1.1109E-01	4.2345E+07	3.3261E+08
28	6.7379E-02	2.7858E+07	3.6047E+08
29	4.0868E-02	7.4973E+06	3.6796E+08
30	3.1828E-02	2.6847E+06	3.7065E+08
31	2.6058E-02	2.0738E+07	3.9139E+08
32	2.4176E-02	1.0624E+07	4.0201E+08
33	2.1875E-02	1.5267E+07	4.1728E+08
34	1.5034E-02	1.4477E+07	4.3176E+08
35	7.1017E-03	2.1370E+07	4.5313E+08
36	3.3546E-03	1.6047E+07	4.6917E+08
37	1.5846E-03	2.2721E+07	4.9189E+08
38	4.5400E-04	9.5519E+06	5.0145E+08
39	2.1445E-04	1.0391E+07	5.1184E+08
40	1.0130E-04	1.2485E+07	5.2432E+08
41	3.7266E-05	1.2593E+07	5.3692E+08
42	1.0677E-05	5.8727E+06	5.4279E+08
43	5.0435E-06	5.3045E+06	5.4809E+08
44	1.8554E-06	2.3426E+06	5.5044E+08
45	8.7643E-07	1.1359E+06	5.5157E+08
	4.1399E-07		

TAB. D5

Iron-88 - Calculated Neutron Spectrum, Measurement Position A6 at Z = 26.67 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	9.6335E+01	9.6335E+01
2	1.4191E+01	3.5109E+02	4.4742E+02
3	1.2214E+01	1.9839E+03	2.4313E+03
4	1.0000E+01	4.2273E+03	6.6586E+03
5	8.6071E+00	8.7574E+03	1.5416E+04
6	7.4082E+00	2.2466E+04	3.7882E+04
7	6.0653E+00	4.3433E+04	8.1315E+04
8	4.9659E+00	1.5712E+05	2.3844E+05
9	3.6788E+00	2.1767E+05	4.5610E+05
10	3.0119E+00	1.6078E+05	6.1689E+05
11	2.7253E+00	1.9855E+05	8.1544E+05
12	2.4660E+00	1.0398E+05	9.1942E+05
13	2.3653E+00	2.8516E+04	9.4794E+05
14	2.3457E+00	1.6753E+05	1.1155E+06
15	2.2313E+00	5.7668E+05	1.6922E+06
16	1.9205E+00	9.7340E+05	2.6656E+06
17	1.6530E+00	1.7333E+06	4.3989E+06
18	1.3534E+00	5.0814E+06	9.4803E+06
19	1.0026E+00	6.4881E+06	1.5968E+07
20	8.2085E-01	2.7790E+06	1.8747E+07
21	7.4274E-01	1.7872E+07	3.6620E+07
22	6.0810E-01	1.5607E+07	5.2227E+07
23	4.9787E-01	2.6464E+07	7.8691E+07
24	3.6883E-01	3.9176E+07	1.1787E+08
25	2.9721E-01	4.0789E+07	1.5866E+08
26	1.8316E-01	5.5889E+07	2.1454E+08
27	1.1109E-01	3.4680E+07	2.4922E+08
28	6.7379E-02	2.2726E+07	2.7195E+08
29	4.0868E-02	6.1153E+06	2.7807E+08
30	3.1828E-02	2.1886E+06	2.8025E+08
31	2.6058E-02	1.8205E+07	2.9846E+08
32	2.4176E-02	9.5206E+06	3.0798E+08
33	2.1875E-02	1.2917E+07	3.2090E+08
34	1.5034E-02	1.1946E+07	3.3284E+08
35	7.1017E-03	1.7069E+07	3.4991E+08
36	3.3546E-03	1.2633E+07	3.6254E+08
37	1.5846E-03	1.7540E+07	3.8009E+08
38	4.5400E-04	7.3254E+06	3.8741E+08
39	2.1445E-04	7.8841E+06	3.9529E+08
40	1.0130E-04	9.3483E+06	4.0464E+08
41	3.7266E-05	9.2998E+06	4.1394E+08
42	1.0677E-05	4.3023E+06	4.1824E+08
43	5.0435E-06	3.8404E+06	4.2209E+08
44	1.8554E-06	1.6750E+06	4.2376E+08
45	8.7643E-07	7.9736E+05	4.2456E+08
	4.1399E-07		

TAB. D6

Iron-88 - Calculated Neutron Spectrum, Measurement Position A7 at Z = 32.61 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	4.0169E+01	4.0169E+01
2	1.4191E+01	1.4246E+02	1.8263E+02
3	1.2214E+01	7.9233E+02	9.7496E+02
4	1.0000E+01	1.6546E+03	2.6295E+03
5	8.6071E+00	3.3253E+03	5.9549E+03
6	7.4082E+00	8.1842E+03	1.4139E+04
7	6.0653E+00	1.5349E+04	2.9488E+04
8	4.9659E+00	5.6073E+04	8.5561E+04
9	3.6788E+00	8.0858E+04	1.6642E+05
10	3.0119E+00	6.0524E+04	2.2694E+05
11	2.7253E+00	7.4799E+04	3.0174E+05
12	2.4660E+00	3.9455E+04	3.4120E+05
13	2.3653E+00	1.1146E+04	3.5234E+05
14	2.3457E+00	6.6709E+04	4.1905E+05
15	2.2313E+00	2.3248E+05	6.5153E+05
16	1.9205E+00	4.2007E+05	1.0716E+06
17	1.6530E+00	7.7682E+05	1.8484E+06
18	1.3534E+00	2.5344E+06	4.3828E+06
19	1.0026E+00	3.7587E+06	8.1415E+06
20	8.2085E-01	1.5801E+06	9.7216E+06
21	7.4274E-01	1.1859E+07	2.1580E+07
22	6.0810E-01	1.0627E+07	3.2207E+07
23	4.9787E-01	1.8463E+07	5.0670E+07
24	3.6883E-01	3.0412E+07	8.1081E+07
25	2.9721E-01	3.1159E+07	1.1224E+08
26	1.8316E-01	4.5144E+07	1.5738E+08
27	1.1109E-01	2.8000E+07	1.8538E+08
28	6.7379E-02	1.8330E+07	2.0371E+08
29	4.0868E-02	4.9318E+06	2.0865E+08
30	3.1828E-02	1.7642E+06	2.1041E+08
31	2.6058E-02	1.5618E+07	2.2603E+08
32	2.4176E-02	8.3477E+06	2.3438E+08
33	2.1875E-02	1.0986E+07	2.4536E+08
34	1.5034E-02	1.0042E+07	2.5540E+08
35	7.1017E-03	1.4050E+07	2.6945E+08
36	3.3546E-03	1.0266E+07	2.7972E+08
37	1.5846E-03	1.4040E+07	2.9376E+08
38	4.5400E-04	5.8284E+06	2.9959E+08
39	2.1445E-04	6.2207E+06	3.0581E+08
40	1.0130E-04	7.2998E+06	3.1311E+08
41	3.7266E-05	7.1789E+06	3.2029E+08
42	1.0677E-05	3.2957E+06	3.2358E+08
43	5.0435E-06	2.9150E+06	3.2650E+08
44	1.8554E-06	1.2617E+06	3.2776E+08
45	8.7643E-07	5.9566E+05	3.2835E+08
	4.1399E-07		

TAB. D7

Iron-88 - Calculated Neutron Spectrum, Measurement Position A8 at Z = 38.50 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.7139E+01	1.7139E+01
2	1.4191E+01	5.9161E+01	7.6300E+01
3	1.2214E+01	3.2347E+02	3.9977E+02
4	1.0000E+01	6.6124E+02	1.0610E+03
5	8.6071E+00	1.2878E+03	2.3488E+03
6	7.4082E+00	3.0383E+03	5.3871E+03
7	6.0653E+00	5.5246E+03	1.0912E+04
8	4.9659E+00	2.0318E+04	3.1230E+04
9	3.6788E+00	3.0378E+04	6.1608E+04
10	3.0119E+00	2.3018E+04	8.4627E+04
11	2.7253E+00	2.8471E+04	1.1310E+05
12	2.4660E+00	1.5111E+04	1.2821E+05
13	2.3653E+00	4.3735E+03	1.3258E+05
14	2.3457E+00	2.6681E+04	1.5926E+05
15	2.2313E+00	9.4166E+04	2.5343E+05
16	1.9205E+00	1.8145E+05	4.3488E+05
17	1.6530E+00	3.4774E+05	7.8261E+05
18	1.3534E+00	1.2597E+06	2.0423E+06
19	1.0026E+00	2.1612E+06	4.2035E+06
20	8.2085E-01	8.9567E+05	5.0991E+06
21	7.4274E-01	7.7786E+06	1.2878E+07
22	6.0810E-01	7.1558E+06	2.0034E+07
23	4.9787E-01	1.2721E+07	3.2755E+07
24	3.6883E-01	2.3149E+07	5.5904E+07
25	2.9721E-01	2.3626E+07	7.9530E+07
26	1.8316E-01	3.5971E+07	1.1550E+08
27	1.1109E-01	2.2422E+07	1.3792E+08
28	6.7379E-02	1.4697E+07	1.5262E+08
29	4.0868E-02	3.9549E+06	1.5657E+08
30	3.1828E-02	1.4144E+06	1.5799E+08
31	2.6058E-02	1.3203E+07	1.7119E+08
32	2.4176E-02	7.2110E+06	1.7840E+08
33	2.1875E-02	9.3540E+06	1.8776E+08
34	1.5034E-02	8.4964E+06	1.9625E+08
35	7.1017E-03	1.1774E+07	2.0803E+08
36	3.3546E-03	8.5364E+06	2.1656E+08
37	1.5846E-03	1.1563E+07	2.2813E+08
38	4.5400E-04	4.7797E+06	2.3291E+08
39	2.1445E-04	5.0715E+06	2.3798E+08
40	1.0130E-04	5.9080E+06	2.4389E+08
41	3.7266E-05	5.7623E+06	2.4965E+08
42	1.0677E-05	2.6302E+06	2.5228E+08
43	5.0435E-06	2.3104E+06	2.5459E+08
44	1.8554E-06	9.9456E+05	2.5558E+08
45	8.7643E-07	4.6716E+05	2.5605E+08
	4.1399E-07		

TAB. D8

Iron-88 - Calculated Neutron Spectrum, Measurement Position A9 at Z = 44.44 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	7.3826E+00	7.3826E+00
2	1.4191E+01	2.4762E+01	3.2144E+01
3	1.2214E+01	1.3264E+02	1.6478E+02
4	1.0000E+01	2.6468E+02	4.2946E+02
5	8.6071E+00	4.9840E+02	9.2786E+02
6	7.4082E+00	1.1255E+03	2.0534E+03
7	6.0653E+00	1.9818E+03	4.0352E+03
8	4.9659E+00	7.3185E+03	1.1354E+04
9	3.6788E+00	1.1316E+04	2.2669E+04
10	3.0119E+00	8.6728E+03	3.1342E+04
11	2.7253E+00	1.0735E+04	4.2077E+04
12	2.4660E+00	5.7289E+03	4.7806E+04
13	2.3653E+00	1.6935E+03	4.9500E+04
14	2.3457E+00	1.0531E+04	6.0030E+04
15	2.2313E+00	3.7651E+04	9.7681E+04
16	1.9205E+00	7.7253E+04	1.7493E+05
17	1.6530E+00	1.5327E+05	3.2820E+05
18	1.3534E+00	6.1690E+05	9.4510E+05
19	1.0026E+00	1.2243E+06	2.1694E+06
20	8.2085E-01	5.0171E+05	2.6711E+06
21	7.4274E-01	5.0250E+06	7.6961E+06
22	6.0810E-01	4.7445E+06	1.2441E+07
23	4.9787E-01	8.6243E+06	2.1065E+07
24	3.6883E-01	1.7276E+07	3.8341E+07
25	2.9721E-01	1.7709E+07	5.6049E+07
26	1.8316E-01	2.8237E+07	8.4286E+07
27	1.1109E-01	1.7742E+07	1.0203E+08
28	6.7379E-02	1.1663E+07	1.1369E+08
29	4.0868E-02	3.1397E+06	1.1683E+08
30	3.1828E-02	1.1226E+06	1.1795E+08
31	2.6058E-02	1.0998E+07	1.2895E+08
32	2.4176E-02	6.1355E+06	1.3509E+08
33	2.1875E-02	7.9136E+06	1.4300E+08
34	1.5034E-02	7.1561E+06	1.5016E+08
35	7.1017E-03	9.8862E+06	1.6004E+08
36	3.3546E-03	7.1430E+06	1.6719E+08
37	1.5846E-03	9.6263E+06	1.7681E+08
38	4.5400E-04	3.9696E+06	1.8078E+08
39	2.1445E-04	4.1970E+06	1.8498E+08
40	1.0130E-04	4.8671E+06	1.8985E+08
41	3.7266E-05	4.7217E+06	1.9457E+08
42	1.0677E-05	2.1470E+06	1.9671E+08
43	5.0435E-06	1.8771E+06	1.9859E+08
44	1.8554E-06	8.0505E+05	1.9940E+08
45	8.7643E-07	3.7684E+05	1.9977E+08
	4.1399E-07		

TAB. D9

Iron-88 - Calculated Neutron Spectrum, Measurement Position A10 at Z = 50.38 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	3.1549E+00	3.1549E+00
2	1.4191E+01	1.0286E+01	1.3441E+01
3	1.2214E+01	5.4076E+01	6.7517E+01
4	1.0000E+01	1.0553E+02	1.7304E+02
5	8.6071E+00	1.9244E+02	3.6548E+02
6	7.4082E+00	4.1638E+02	7.8187E+02
7	6.0653E+00	7.1070E+02	1.4926E+03
8	4.9659E+00	2.6340E+03	4.1265E+03
9	3.6788E+00	4.2041E+03	8.3306E+03
10	3.0119E+00	3.2578E+03	1.1588E+04
11	2.7253E+00	4.0397E+03	1.5628E+04
12	2.4660E+00	2.1658E+03	1.7794E+04
13	2.3653E+00	6.5106E+02	1.8445E+04
14	2.3457E+00	4.1293E+03	2.2574E+04
15	2.2313E+00	1.4972E+04	3.7547E+04
16	1.9205E+00	3.2654E+04	7.0201E+04
17	1.6530E+00	6.7037E+04	1.3724E+05
18	1.3534E+00	2.9992E+05	4.3716E+05
19	1.0026E+00	6.8830E+05	1.1255E+06
20	8.2085E-01	2.7967E+05	1.4051E+06
21	7.4274E-01	3.2184E+06	4.6235E+06
22	6.0810E-01	3.1163E+06	7.7398E+06
23	4.9787E-01	5.7870E+06	1.3527E+07
24	3.6883E-01	1.2716E+07	2.6243E+07
25	2.9721E-01	1.3165E+07	3.9408E+07
26	1.8316E-01	2.1928E+07	6.1336E+07
27	1.1109E-01	1.3912E+07	7.5249E+07
28	6.7379E-02	9.1807E+06	8.4429E+07
29	4.0868E-02	2.4729E+06	8.6902E+07
30	3.1828E-02	8.8414E+05	8.7786E+07
31	2.6058E-02	9.0591E+06	9.6845E+07
32	2.4176E-02	5.1588E+06	1.0200E+08
33	2.1875E-02	6.6486E+06	1.0865E+08
34	1.5034E-02	5.9909E+06	1.1464E+08
35	7.1017E-03	8.2786E+06	1.2292E+08
36	3.3546E-03	5.9766E+06	1.2890E+08
37	1.5846E-03	8.0397E+06	1.3694E+08
38	4.5400E-04	3.3121E+06	1.4025E+08
39	2.1445E-04	3.4960E+06	1.4375E+08
40	1.0130E-04	4.0449E+06	1.4779E+08
41	3.7266E-05	3.9129E+06	1.5170E+08
42	1.0677E-05	1.7754E+06	1.5348E+08
43	5.0435E-06	1.5480E+06	1.5503E+08
44	1.8554E-06	6.6244E+05	1.5569E+08
45	8.7643E-07	3.0945E+05	1.5600E+08
	4.1399E-07		

TAB. D10

Iron-88 - Calculated Neutron Spectrum, Measurement Position A11 at Z = 56.37 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.3526E+00	1.3526E+00
2	1.4191E+01	4.2814E+00	5.6340E+00
3	1.2214E+01	2.2032E+01	2.7666E+01
4	1.0000E+01	4.1961E+01	6.9627E+01
5	8.6071E+00	7.3999E+01	1.4363E+02
6	7.4082E+00	1.5329E+02	2.9691E+02
7	6.0653E+00	2.5348E+02	5.5039E+02
8	4.9659E+00	9.4089E+02	1.4913E+03
9	3.6788E+00	1.5472E+03	3.0385E+03
10	3.0119E+00	1.2115E+03	4.2500E+03
11	2.7253E+00	1.5048E+03	5.7548E+03
12	2.4660E+00	8.1013E+02	6.5649E+03
13	2.3653E+00	2.4724E+02	6.8122E+03
14	2.3457E+00	1.5985E+03	8.4107E+03
15	2.2313E+00	5.8788E+03	1.4290E+04
16	1.9205E+00	1.3623E+04	2.7912E+04
17	1.6530E+00	2.8920E+04	5.6832E+04
18	1.3534E+00	1.4403E+05	2.0086E+05
19	1.0026E+00	3.8267E+05	5.8354E+05
20	8.2085E-01	1.5444E+05	7.3797E+05
21	7.4274E-01	2.0389E+06	2.7769E+06
22	6.0810E-01	2.0229E+06	4.7998E+06
23	4.9787E-01	3.8350E+06	8.6347E+06
24	3.6883E-01	9.2264E+06	1.7861E+07
25	2.9721E-01	9.6861E+06	2.7547E+07
26	1.8316E-01	1.6829E+07	4.4376E+07
27	1.1109E-01	1.0792E+07	5.5168E+07
28	6.7379E-02	7.1543E+06	6.2323E+07
29	4.0868E-02	1.9283E+06	6.4251E+07
30	3.1828E-02	6.8941E+05	6.4941E+07
31	2.6058E-02	7.3743E+06	7.2315E+07
32	2.4176E-02	4.2851E+06	7.6600E+07
33	2.1875E-02	5.5335E+06	8.2134E+07
34	1.5034E-02	4.9706E+06	8.7104E+07
35	7.1017E-03	6.8811E+06	9.3985E+07
36	3.3546E-03	4.9709E+06	9.8956E+07
37	1.5846E-03	6.6878E+06	1.0564E+08
38	4.5400E-04	2.7548E+06	1.0840E+08
39	2.1445E-04	2.9068E+06	1.1131E+08
40	1.0130E-04	3.3608E+06	1.1467E+08
41	3.7266E-05	3.2476E+06	1.1791E+08
42	1.0677E-05	1.4722E+06	1.1939E+08
43	5.0435E-06	1.2820E+06	1.2067E+08
44	1.8554E-06	5.4803E+05	1.2122E+08
45	8.7643E-07	2.5573E+05	1.2147E+08
	4.1399E-07		

TAB. D11

Iron-88 - Calculated Neutron Spectrum, Measurement Position A12 at Z = 62.29 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	5.8996E-01	5.8996E-01
2	1.4191E+01	1.8122E+00	2.4021E+00
3	1.2214E+01	9.1141E+00	1.1516E+01
4	1.0000E+01	1.6932E+01	2.8448E+01
5	8.6071E+00	2.8882E+01	5.7330E+01
6	7.4082E+00	5.7320E+01	1.1465E+02
7	6.0653E+00	9.1895E+01	2.0654E+02
8	4.9659E+00	3.4111E+02	5.4766E+02
9	3.6788E+00	5.7658E+02	1.1242E+03
10	3.0119E+00	4.5582E+02	1.5801E+03
11	2.7253E+00	5.6724E+02	2.1473E+03
12	2.4660E+00	3.0650E+02	2.4538E+03
13	2.3653E+00	9.4763E+01	2.5486E+03
14	2.3457E+00	6.2404E+02	3.1726E+03
15	2.2313E+00	2.3279E+03	5.5005E+03
16	1.9205E+00	5.7219E+03	1.1222E+04
17	1.6530E+00	1.2549E+04	2.3771E+04
18	1.3534E+00	6.9518E+04	9.3289E+04
19	1.0026E+00	2.1345E+05	3.0674E+05
20	8.2085E-01	8.5710E+04	3.9245E+05
21	7.4274E-01	1.2928E+06	1.6852E+06
22	6.0810E-01	1.3123E+06	2.9975E+06
23	4.9787E-01	2.5370E+06	5.5345E+06
24	3.6883E-01	6.6601E+06	1.2195E+07
25	2.9721E-01	7.1067E+06	1.9301E+07
26	1.8316E-01	1.2858E+07	3.2160E+07
27	1.1109E-01	8.3371E+06	4.0497E+07
28	6.7379E-02	5.5540E+06	4.6051E+07
29	4.0868E-02	1.4980E+06	4.7549E+07
30	3.1828E-02	5.3556E+05	4.8084E+07
31	2.6058E-02	5.9672E+06	5.4052E+07
32	2.4176E-02	3.5364E+06	5.7588E+07
33	2.1875E-02	4.5822E+06	6.2170E+07
34	1.5034E-02	4.1047E+06	6.6275E+07
35	7.1017E-03	5.6963E+06	7.1971E+07
36	3.3546E-03	4.1207E+06	7.6092E+07
37	1.5846E-03	5.5507E+06	8.1643E+07
38	4.5400E-04	2.2874E+06	8.3930E+07
39	2.1445E-04	2.4146E+06	8.6345E+07
40	1.0130E-04	2.7926E+06	8.9137E+07
41	3.7266E-05	2.6988E+06	9.1836E+07
42	1.0677E-05	1.2233E+06	9.3059E+07
43	5.0435E-06	1.0651E+06	9.4124E+07
44	1.8554E-06	4.5517E+05	9.4580E+07
45	8.7643E-07	2.1234E+05	9.4792E+07
	4.1399E-07		

TAB. D12

Iron-88 - Calculated Neutron Spectrum, Measurement Position A13 at Z = 68.10 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.6154E-01	2.6154E-01
2	1.4191E+01	7.8011E-01	1.0417E+00
3	1.2214E+01	3.8373E+00	4.8789E+00
4	1.0000E+01	6.9613E+00	1.1840E+01
5	8.6071E+00	1.1501E+01	2.3341E+01
6	7.4082E+00	2.1903E+01	4.5244E+01
7	6.0653E+00	3.4087E+01	7.9331E+01
8	4.9659E+00	1.2640E+02	2.0573E+02
9	3.6788E+00	2.1912E+02	4.2484E+02
10	3.0119E+00	1.7478E+02	5.9962E+02
11	2.7253E+00	2.1796E+02	8.1759E+02
12	2.4660E+00	1.1815E+02	9.3573E+02
13	2.3653E+00	3.6935E+01	9.7267E+02
14	2.3457E+00	2.4750E+02	1.2202E+03
15	2.2313E+00	9.3652E+02	2.1567E+03
16	1.9205E+00	2.4373E+03	4.5939E+03
17	1.6530E+00	5.5158E+03	1.0110E+04
18	1.3534E+00	3.3947E+04	4.4057E+04
19	1.0026E+00	1.2013E+05	1.6419E+05
20	8.2085E-01	4.8062E+04	2.1225E+05
21	7.4274E-01	8.2448E+05	1.0367E+06
22	6.0810E-01	8.5488E+05	1.8916E+06
23	4.9787E-01	1.6834E+06	3.5750E+06
24	3.6883E-01	4.8052E+06	8.3802E+06
25	2.9721E-01	5.2184E+06	1.3599E+07
26	1.8316E-01	9.8179E+06	2.3416E+07
27	1.1109E-01	6.4358E+06	2.9852E+07
28	6.7379E-02	4.3088E+06	3.4161E+07
29	4.0868E-02	1.1630E+06	3.5324E+07
30	3.1828E-02	4.1580E+05	3.5740E+07
31	2.6058E-02	4.8146E+06	4.0555E+07
32	2.4176E-02	2.9094E+06	4.3464E+07
33	2.1875E-02	3.7848E+06	4.7249E+07
34	1.5034E-02	3.3820E+06	5.0631E+07
35	7.1017E-03	4.7065E+06	5.5337E+07
36	3.3546E-03	3.4107E+06	5.8748E+07
37	1.5846E-03	4.6028E+06	6.3351E+07
38	4.5400E-04	1.8982E+06	6.5249E+07
39	2.1445E-04	2.0056E+06	6.7255E+07
40	1.0130E-04	2.3217E+06	6.9576E+07
41	3.7266E-05	2.2456E+06	7.1822E+07
42	1.0677E-05	1.0184E+06	7.2840E+07
43	5.0435E-06	8.8702E+05	7.3727E+07
44	1.8554E-06	3.7918E+05	7.4107E+07
45	8.7643E-07	1.7692E+05	7.4283E+07
	4.1399E-07		

TAB. D13

Iron-88 - Calculated Neutron Spectrum, Measurement Position A14 at Z = 73.96 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.1565E-01	1.1565E-01
2	1.4191E+01	3.3438E-01	4.5003E-01
3	1.2214E+01	1.6056E+00	2.0556E+00
4	1.0000E+01	2.8422E+00	4.8978E+00
5	8.6071E+00	4.5466E+00	9.4444E+00
6	7.4082E+00	8.3104E+00	1.7755E+01
7	6.0653E+00	1.2557E+01	3.0311E+01
8	4.9659E+00	4.6447E+01	7.6758E+01
9	3.6788E+00	8.2462E+01	1.5922E+02
10	3.0119E+00	6.6337E+01	2.2556E+02
11	2.7253E+00	8.2907E+01	3.0846E+02
12	2.4660E+00	4.5073E+01	3.5354E+02
13	2.3653E+00	1.4235E+01	3.6777E+02
14	2.3457E+00	9.6993E+01	4.6477E+02
15	2.2313E+00	3.7235E+02	8.3711E+02
16	1.9205E+00	1.0263E+03	1.8634E+03
17	1.6530E+00	2.3963E+03	4.2597E+03
18	1.3534E+00	1.6418E+04	2.0678E+04
19	1.0026E+00	6.7090E+04	8.7768E+04
20	8.2085E-01	2.6767E+04	1.1453E+05
21	7.4274E-01	5.2218E+05	6.3671E+05
22	6.0810E-01	5.5260E+05	1.1893E+06
23	4.9787E-01	1.1076E+06	2.2969E+06
24	3.6883E-01	3.4361E+06	5.7330E+06
25	2.9721E-01	3.8027E+06	9.5357E+06
26	1.8316E-01	7.4409E+06	1.6977E+07
27	1.1109E-01	4.9306E+06	2.1907E+07
28	6.7379E-02	3.3184E+06	2.5226E+07
29	4.0868E-02	8.9639E+05	2.6122E+07
30	3.1828E-02	3.2049E+05	2.6442E+07
31	2.6058E-02	3.8529E+06	3.0295E+07
32	2.4176E-02	2.3764E+06	3.2672E+07
33	2.1875E-02	3.1035E+06	3.5775E+07
34	1.5034E-02	2.7669E+06	3.8542E+07
35	7.1017E-03	3.8632E+06	4.2405E+07
36	3.3546E-03	2.8058E+06	4.5211E+07
37	1.5846E-03	3.7961E+06	4.9007E+07
38	4.5400E-04	1.5671E+06	5.0574E+07
39	2.1445E-04	1.6580E+06	5.2232E+07
40	1.0130E-04	1.9222E+06	5.4155E+07
41	3.7266E-05	1.8617E+06	5.6016E+07
42	1.0677E-05	8.4499E+05	5.6861E+07
43	5.0435E-06	7.3657E+05	5.7598E+07
44	1.8554E-06	3.1502E+05	5.7913E+07
45	8.7643E-07	1.4703E+05	5.8060E+07
	4.1399E-07		

TAB. D14

Iron-88 - Calculated Neutron Spectrum, Measurement Position A15 at Z = 79.88 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGJEFF311.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	5.0815E-02	5.0815E-02
2	1.4191E+01	1.4231E-01	1.9312E-01
3	1.2214E+01	6.6610E-01	8.5922E-01
4	1.0000E+01	1.1499E+00	2.0091E+00
5	8.6071E+00	1.7808E+00	3.7899E+00
6	7.4082E+00	3.1241E+00	6.9140E+00
7	6.0653E+00	4.5838E+00	1.1498E+01
8	4.9659E+00	1.6892E+01	2.8390E+01
9	3.6788E+00	3.0671E+01	5.9061E+01
10	3.0119E+00	2.4875E+01	8.3936E+01
11	2.7253E+00	3.1159E+01	1.1509E+02
12	2.4660E+00	1.6985E+01	1.3208E+02
13	2.3653E+00	5.4134E+00	1.3749E+02
14	2.3457E+00	3.7491E+01	1.7498E+02
15	2.2313E+00	1.4606E+02	3.2104E+02
16	1.9205E+00	4.2652E+02	7.4756E+02
17	1.6530E+00	1.0277E+03	1.7753E+03
18	1.3534E+00	7.8591E+03	9.6344E+03
19	1.0026E+00	3.7180E+04	4.6814E+04
20	8.2085E-01	1.4807E+04	6.1621E+04
21	7.4274E-01	3.2856E+05	3.9019E+05
22	6.0810E-01	3.5473E+05	7.4492E+05
23	4.9787E-01	7.2323E+05	1.4681E+06
24	3.6883E-01	2.4379E+06	3.9060E+06
25	2.9721E-01	2.7525E+06	6.6585E+06
26	1.8316E-01	5.6066E+06	1.2265E+07
27	1.1109E-01	3.7520E+06	1.6017E+07
28	6.7379E-02	2.5403E+06	1.8557E+07
29	4.0868E-02	6.8680E+05	1.9244E+07
30	3.1828E-02	2.4557E+05	1.9490E+07
31	2.6058E-02	3.0603E+06	2.2550E+07
32	2.4176E-02	1.9312E+06	2.4481E+07
33	2.1875E-02	2.5286E+06	2.7010E+07
34	1.5034E-02	2.2508E+06	2.9261E+07
35	7.1017E-03	3.1571E+06	3.2418E+07
36	3.3546E-03	2.3002E+06	3.4718E+07
37	1.5846E-03	3.1230E+06	3.7841E+07
38	4.5400E-04	1.2911E+06	3.9132E+07
39	2.1445E-04	1.3685E+06	4.0501E+07
40	1.0130E-04	1.5896E+06	4.2090E+07
41	3.7266E-05	1.5421E+06	4.3632E+07
42	1.0677E-05	7.0041E+05	4.4333E+07
43	5.0435E-06	6.1088E+05	4.4944E+07
44	1.8554E-06	2.6133E+05	4.5205E+07
45	8.7643E-07	1.2198E+05	4.5327E+07
	4.1399E-07		

APPENDIX E

Neutron Spectra Calculated along the Horizontal Axis Z with the BUGENDF70.BOLIB Library

TAB. E1

Iron-88 - Calculated Neutron Spectrum, Measurement Position A2 at Z = 3.27 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.1075E+04	1.1075E+04
2	1.4191E+01	4.4825E+04	5.5901E+04
3	1.2214E+01	2.5922E+05	3.1512E+05
4	1.0000E+01	5.7581E+05	8.9093E+05
5	8.6071E+00	1.3022E+06	2.1931E+06
6	7.4082E+00	3.7315E+06	5.9245E+06
7	6.0653E+00	7.5147E+06	1.3439E+07
8	4.9659E+00	2.1715E+07	3.5154E+07
9	3.6788E+00	2.1160E+07	5.6314E+07
10	3.0119E+00	1.3623E+07	6.9937E+07
11	2.7253E+00	1.5775E+07	8.5712E+07
12	2.4660E+00	8.3522E+06	9.4064E+07
13	2.3653E+00	1.5561E+06	9.5620E+07
14	2.3457E+00	9.1214E+06	1.0474E+08
15	2.2313E+00	2.9354E+07	1.3410E+08
16	1.9205E+00	3.1874E+07	1.6597E+08
17	1.6530E+00	4.4840E+07	2.1081E+08
18	1.3534E+00	7.7833E+07	2.8864E+08
19	1.0026E+00	4.3353E+07	3.3200E+08
20	8.2085E-01	2.3708E+07	3.5570E+08
21	7.4274E-01	6.2864E+07	4.1857E+08
22	6.0810E-01	5.5286E+07	4.7385E+08
23	4.9787E-01	8.0384E+07	5.5424E+08
24	3.6883E-01	6.3639E+07	6.1788E+08
25	2.9721E-01	1.0341E+08	7.2128E+08
26	1.8316E-01	9.1672E+07	8.1296E+08
27	1.1109E-01	7.7090E+07	8.9005E+08
28	6.7379E-02	4.9303E+07	9.3935E+08
29	4.0868E-02	1.0215E+07	9.4956E+08
30	3.1828E-02	2.5168E+07	9.7473E+08
31	2.6058E-02	2.3251E+07	9.9798E+08
32	2.4176E-02	1.3061E+07	1.0110E+09
33	2.1875E-02	3.4543E+07	1.0456E+09
34	1.5034E-02	5.0598E+07	1.0962E+09
35	7.1017E-03	5.0482E+07	1.1467E+09
36	3.3546E-03	3.9270E+07	1.1859E+09
37	1.5846E-03	6.0682E+07	1.2466E+09
38	4.5400E-04	3.1383E+07	1.2780E+09
39	2.1445E-04	3.0173E+07	1.3082E+09
40	1.0130E-04	3.5721E+07	1.3439E+09
41	3.7266E-05	3.7100E+07	1.3810E+09
42	1.0677E-05	1.9340E+07	1.4003E+09
43	5.0435E-06	2.3657E+07	1.4240E+09
44	1.8554E-06	1.5378E+07	1.4394E+09
	8.7643E-07		

TAB. E2

Iron-88 - Calculated Neutron Spectrum, Measurement Position A3 at Z = 9.11 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.8989E+03	1.8989E+03
2	1.4191E+01	7.4761E+03	9.3750E+03
3	1.2214E+01	4.2508E+04	5.1883E+04
4	1.0000E+01	9.4069E+04	1.4595E+05
5	8.6071E+00	2.0756E+05	3.5351E+05
6	7.4082E+00	5.9049E+05	9.4401E+05
7	6.0653E+00	1.2353E+06	2.1793E+06
8	4.9659E+00	3.9208E+06	6.1001E+06
9	3.6788E+00	4.2126E+06	1.0313E+07
10	3.0119E+00	3.1060E+06	1.3419E+07
11	2.7253E+00	4.0335E+06	1.7452E+07
12	2.4660E+00	2.0754E+06	1.9528E+07
13	2.3653E+00	5.0084E+05	2.0028E+07
14	2.3457E+00	2.6791E+06	2.2708E+07
15	2.2313E+00	8.7485E+06	3.1456E+07
16	1.9205E+00	1.1205E+07	4.2661E+07
17	1.6530E+00	1.7454E+07	6.0116E+07
18	1.3534E+00	3.8437E+07	9.8553E+07
19	1.0026E+00	2.7637E+07	1.2619E+08
20	8.2085E-01	1.2956E+07	1.3915E+08
21	7.4274E-01	5.3074E+07	1.9222E+08
22	6.0810E-01	4.1727E+07	2.3395E+08
23	4.9787E-01	6.2230E+07	2.9618E+08
24	3.6883E-01	6.8148E+07	3.6432E+08
25	2.9721E-01	8.0386E+07	4.4471E+08
26	1.8316E-01	8.6600E+07	5.3131E+08
27	1.1109E-01	6.1966E+07	5.9328E+08
28	6.7379E-02	4.1896E+07	6.3517E+08
29	4.0868E-02	1.0404E+07	6.4558E+08
30	3.1828E-02	3.9170E+06	6.4949E+08
31	2.6058E-02	2.3915E+07	6.7341E+08
32	2.4176E-02	1.2741E+07	6.8615E+08
33	2.1875E-02	2.4856E+07	7.1101E+08
34	1.5034E-02	2.8917E+07	7.3992E+08
35	7.1017E-03	3.9853E+07	7.7978E+08
36	3.3546E-03	2.9161E+07	8.0894E+08
37	1.5846E-03	4.3173E+07	8.5211E+08
38	4.5400E-04	1.9004E+07	8.7111E+08
39	2.1445E-04	2.1191E+07	8.9231E+08
40	1.0130E-04	2.5770E+07	9.1808E+08
41	3.7266E-05	2.6540E+07	9.4462E+08
42	1.0677E-05	1.2657E+07	9.5727E+08
43	5.0435E-06	1.2542E+07	9.6981E+08
44	1.8554E-06	6.3546E+06	9.7617E+08
	8.7643E-07		

TAB. E3

Iron-88 - Calculated Neutron Spectrum, Measurement Position A4 at Z = 14.97 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	6.3536E+02	6.3536E+02
2	1.4191E+01	2.4596E+03	3.0950E+03
3	1.2214E+01	1.3888E+04	1.6983E+04
4	1.0000E+01	3.0687E+04	4.7669E+04
5	8.6071E+00	6.6345E+04	1.1401E+05
6	7.4082E+00	1.8428E+05	2.9829E+05
7	6.0653E+00	3.8418E+05	6.8248E+05
8	4.9659E+00	1.2422E+06	1.9247E+06
9	3.6788E+00	1.3751E+06	3.2997E+06
10	3.0119E+00	1.0666E+06	4.3663E+06
11	2.7253E+00	1.4336E+06	5.8000E+06
12	2.4660E+00	7.4990E+05	6.5499E+06
13	2.3653E+00	1.9721E+05	6.7471E+06
14	2.3457E+00	1.0398E+06	7.7869E+06
15	2.2313E+00	3.4227E+06	1.1210E+07
16	1.9205E+00	4.8126E+06	1.6022E+07
17	1.6530E+00	7.9456E+06	2.3968E+07
18	1.3534E+00	2.0272E+07	4.4240E+07
19	1.0026E+00	1.6938E+07	6.1178E+07
20	8.2085E-01	7.5190E+06	6.8697E+07
21	7.4274E-01	3.9205E+07	1.0790E+08
22	6.0810E-01	3.0927E+07	1.3883E+08
23	4.9787E-01	4.6834E+07	1.8566E+08
24	3.6883E-01	6.1297E+07	2.4696E+08
25	2.9721E-01	6.3662E+07	3.1062E+08
26	1.8316E-01	7.5677E+07	3.8630E+08
27	1.1109E-01	5.1233E+07	4.3753E+08
28	6.7379E-02	3.4576E+07	4.7211E+08
29	4.0868E-02	8.7262E+06	4.8083E+08
30	3.1828E-02	3.2434E+06	4.8408E+08
31	2.6058E-02	2.1999E+07	5.0608E+08
32	2.4176E-02	1.2037E+07	5.1811E+08
33	2.1875E-02	1.9953E+07	5.3807E+08
34	1.5034E-02	2.0338E+07	5.5840E+08
35	7.1017E-03	2.9529E+07	5.8793E+08
36	3.3546E-03	2.1673E+07	6.0961E+08
37	1.5846E-03	3.1102E+07	6.4071E+08
38	4.5400E-04	1.3141E+07	6.5385E+08
39	2.1445E-04	1.4512E+07	6.6836E+08
40	1.0130E-04	1.7696E+07	6.8606E+08
41	3.7266E-05	1.8082E+07	7.0414E+08
42	1.0677E-05	8.4860E+06	7.1262E+08
43	5.0435E-06	7.8356E+06	7.2046E+08
44	1.8554E-06	3.5728E+06	7.2403E+08
	8.7643E-07		

TAB. E4

Iron-88 - Calculated Neutron Spectrum, Measurement Position A5 at Z = 20.83 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.3918E+02	2.3918E+02
2	1.4191E+01	9.0739E+02	1.1466E+03
3	1.2214E+01	5.0825E+03	6.2291E+03
4	1.0000E+01	1.1182E+04	1.7411E+04
5	8.6071E+00	2.3626E+04	4.1037E+04
6	7.4082E+00	6.3680E+04	1.0472E+05
7	6.0653E+00	1.3118E+05	2.3589E+05
8	4.9659E+00	4.2598E+05	6.6188E+05
9	3.6788E+00	4.8023E+05	1.1421E+06
10	3.0119E+00	3.8665E+05	1.5288E+06
11	2.7253E+00	5.3147E+05	2.0602E+06
12	2.4660E+00	2.8259E+05	2.3428E+06
13	2.3653E+00	7.9000E+04	2.4218E+06
14	2.3457E+00	4.1633E+05	2.8382E+06
15	2.2313E+00	1.3797E+06	4.2178E+06
16	1.9205E+00	2.1014E+06	6.3192E+06
17	1.6530E+00	3.6451E+06	9.9644E+06
18	1.3534E+00	1.0635E+07	2.0599E+07
19	1.0026E+00	1.0136E+07	3.0735E+07
20	8.2085E-01	4.3204E+06	3.5055E+07
21	7.4274E-01	2.7654E+07	6.2709E+07
22	6.0810E-01	2.2236E+07	8.4945E+07
23	4.9787E-01	3.4124E+07	1.1907E+08
24	3.6883E-01	5.1643E+07	1.7071E+08
25	2.9721E-01	4.9894E+07	2.2061E+08
26	1.8316E-01	6.3695E+07	2.8430E+08
27	1.1109E-01	4.2113E+07	3.2641E+08
28	6.7379E-02	2.8277E+07	3.5469E+08
29	4.0868E-02	7.1414E+06	3.6183E+08
30	3.1828E-02	2.6479E+06	3.6448E+08
31	2.6058E-02	1.9623E+07	3.8410E+08
32	2.4176E-02	1.1007E+07	3.9511E+08
33	2.1875E-02	1.6675E+07	4.1179E+08
34	1.5034E-02	1.5988E+07	4.2777E+08
35	7.1017E-03	2.2670E+07	4.5044E+08
36	3.3546E-03	1.6521E+07	4.6696E+08
37	1.5846E-03	2.3138E+07	4.9010E+08
38	4.5400E-04	9.6609E+06	4.9976E+08
39	2.1445E-04	1.0489E+07	5.1025E+08
40	1.0130E-04	1.2600E+07	5.2285E+08
41	3.7266E-05	1.2692E+07	5.3554E+08
42	1.0677E-05	5.9136E+06	5.4146E+08
43	5.0435E-06	5.3348E+06	5.4679E+08
44	1.8554E-06	2.3526E+06	5.4914E+08
	8.7643E-07		

TAB. E5

Iron-88 - Calculated Neutron Spectrum, Measurement Position A6 at Z = 26.67 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	9.6078E+01	9.6078E+01
2	1.4191E+01	3.5806E+02	4.5414E+02
3	1.2214E+01	1.9903E+03	2.4445E+03
4	1.0000E+01	4.3452E+03	6.7897E+03
5	8.6071E+00	8.9409E+03	1.5731E+04
6	7.4082E+00	2.3265E+04	3.8995E+04
7	6.0653E+00	4.7044E+04	8.6040E+04
8	4.9659E+00	1.5206E+05	2.3810E+05
9	3.6788E+00	1.7361E+05	4.1170E+05
10	3.0119E+00	1.4391E+05	5.5561E+05
11	2.7253E+00	2.0097E+05	7.5658E+05
12	2.4660E+00	1.0847E+05	8.6506E+05
13	2.3653E+00	3.1833E+04	8.9689E+05
14	2.3457E+00	1.6884E+05	1.0657E+06
15	2.2313E+00	5.6290E+05	1.6286E+06
16	1.9205E+00	9.2148E+05	2.5501E+06
17	1.6530E+00	1.6699E+06	4.2200E+06
18	1.3534E+00	5.5296E+06	9.7496E+06
19	1.0026E+00	5.9576E+06	1.5707E+07
20	8.2085E-01	2.4611E+06	1.8168E+07
21	7.4274E-01	1.8972E+07	3.7140E+07
22	6.0810E-01	1.5637E+07	5.2777E+07
23	4.9787E-01	2.4307E+07	7.7084E+07
24	3.6883E-01	4.1806E+07	1.1889E+08
25	2.9721E-01	3.8742E+07	1.5763E+08
26	1.8316E-01	5.2320E+07	2.0995E+08
27	1.1109E-01	3.4318E+07	2.4427E+08
28	6.7379E-02	2.2961E+07	2.6723E+08
29	4.0868E-02	5.7946E+06	2.7303E+08
30	3.1828E-02	2.1464E+06	2.7517E+08
31	2.6058E-02	1.7067E+07	2.9224E+08
32	2.4176E-02	9.8102E+06	3.0205E+08
33	2.1875E-02	1.4180E+07	3.1623E+08
34	1.5034E-02	1.3208E+07	3.2944E+08
35	7.1017E-03	1.8168E+07	3.4761E+08
36	3.3546E-03	1.3068E+07	3.6067E+08
37	1.5846E-03	1.7962E+07	3.7864E+08
38	4.5400E-04	7.4523E+06	3.8609E+08
39	2.1445E-04	8.0023E+06	3.9409E+08
40	1.0130E-04	9.4788E+06	4.0357E+08
41	3.7266E-05	9.4107E+06	4.1298E+08
42	1.0677E-05	4.3482E+06	4.1733E+08
43	5.0435E-06	3.8753E+06	4.2120E+08
44	1.8554E-06	1.6873E+06	4.2289E+08
	8.7643E-07		

TAB. E6

Iron-88 - Calculated Neutron Spectrum, Measurement Position A7 at Z = 32.61 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	3.9816E+01	3.9816E+01
2	1.4191E+01	1.4495E+02	1.8476E+02
3	1.2214E+01	7.9388E+02	9.7864E+02
4	1.0000E+01	1.7103E+03	2.6889E+03
5	8.6071E+00	3.4103E+03	6.0992E+03
6	7.4082E+00	8.5292E+03	1.4628E+04
7	6.0653E+00	1.6866E+04	3.1494E+04
8	4.9659E+00	5.4056E+04	8.5550E+04
9	3.6788E+00	6.2416E+04	1.4797E+05
10	3.0119E+00	5.3069E+04	2.0103E+05
11	2.7253E+00	7.5010E+04	2.7604E+05
12	2.4660E+00	4.1056E+04	3.1710E+05
13	2.3653E+00	1.2591E+04	3.2969E+05
14	2.3457E+00	6.7371E+04	3.9706E+05
15	2.2313E+00	2.2588E+05	6.2295E+05
16	1.9205E+00	3.9654E+05	1.0195E+06
17	1.6530E+00	7.4863E+05	1.7681E+06
18	1.3534E+00	2.8116E+06	4.5798E+06
19	1.0026E+00	3.4147E+06	7.9944E+06
20	8.2085E-01	1.3748E+06	9.3692E+06
21	7.4274E-01	1.2666E+07	2.2035E+07
22	6.0810E-01	1.0727E+07	3.2762E+07
23	4.9787E-01	1.6892E+07	4.9654E+07
24	3.6883E-01	3.2742E+07	8.2396E+07
25	2.9721E-01	2.9664E+07	1.1206E+08
26	1.8316E-01	4.2029E+07	1.5409E+08
27	1.1109E-01	2.7575E+07	1.8166E+08
28	6.7379E-02	1.8426E+07	2.0009E+08
29	4.0868E-02	4.6476E+06	2.0474E+08
30	3.1828E-02	1.7202E+06	2.0646E+08
31	2.6058E-02	1.4501E+07	2.2096E+08
32	2.4176E-02	8.5431E+06	2.2950E+08
33	2.1875E-02	1.2068E+07	2.4157E+08
34	1.5034E-02	1.1066E+07	2.5264E+08
35	7.1017E-03	1.4920E+07	2.6756E+08
36	3.3546E-03	1.0611E+07	2.7817E+08
37	1.5846E-03	1.4389E+07	2.9256E+08
38	4.5400E-04	5.9386E+06	2.9849E+08
39	2.1445E-04	6.3283E+06	3.0482E+08
40	1.0130E-04	7.4205E+06	3.1224E+08
41	3.7266E-05	7.2833E+06	3.1953E+08
42	1.0677E-05	3.3394E+06	3.2287E+08
43	5.0435E-06	2.9488E+06	3.2581E+08
44	1.8554E-06	1.2740E+06	3.2709E+08
	8.7643E-07		

TAB. E7

Iron-88 - Calculated Neutron Spectrum, Measurement Position A8 at Z = 38.50 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.6869E+01	1.6869E+01
2	1.4191E+01	6.0008E+01	7.6877E+01
3	1.2214E+01	3.2356E+02	4.0044E+02
4	1.0000E+01	6.8703E+02	1.0875E+03
5	8.6071E+00	1.3263E+03	2.4137E+03
6	7.4082E+00	3.1854E+03	5.5991E+03
7	6.0653E+00	6.1530E+03	1.1752E+04
8	4.9659E+00	1.9524E+04	3.1277E+04
9	3.6788E+00	2.2763E+04	5.4039E+04
10	3.0119E+00	1.9793E+04	7.3832E+04
11	2.7253E+00	2.8265E+04	1.0210E+05
12	2.4660E+00	1.5665E+04	1.1776E+05
13	2.3653E+00	4.9928E+03	1.2275E+05
14	2.3457E+00	2.7010E+04	1.4976E+05
15	2.2313E+00	9.1119E+04	2.4088E+05
16	1.9205E+00	1.7096E+05	4.1185E+05
17	1.6530E+00	3.3549E+05	7.4733E+05
18	1.3534E+00	1.4260E+06	2.1733E+06
19	1.0026E+00	1.9439E+06	4.1173E+06
20	8.2085E-01	7.6722E+05	4.8845E+06
21	7.4274E-01	8.3668E+06	1.3251E+07
22	6.0810E-01	7.2837E+06	2.0535E+07
23	4.9787E-01	1.1619E+07	3.2154E+07
24	3.6883E-01	2.5159E+07	5.7313E+07
25	2.9721E-01	2.2589E+07	7.9902E+07
26	1.8316E-01	3.3362E+07	1.1326E+08
27	1.1109E-01	2.1993E+07	1.3526E+08
28	6.7379E-02	1.4706E+07	1.4996E+08
29	4.0868E-02	3.7087E+06	1.5367E+08
30	3.1828E-02	1.3720E+06	1.5504E+08
31	2.6058E-02	1.2145E+07	1.6719E+08
32	2.4176E-02	7.3253E+06	1.7451E+08
33	2.1875E-02	1.0254E+07	1.8477E+08
34	1.5034E-02	9.3136E+06	1.9408E+08
35	7.1017E-03	1.2440E+07	2.0652E+08
36	3.3546E-03	8.7879E+06	2.1531E+08
37	1.5846E-03	1.1817E+07	2.2713E+08
38	4.5400E-04	4.8594E+06	2.3199E+08
39	2.1445E-04	5.1518E+06	2.3714E+08
40	1.0130E-04	6.0011E+06	2.4314E+08
41	3.7266E-05	5.8447E+06	2.4898E+08
42	1.0677E-05	2.6651E+06	2.5165E+08
43	5.0435E-06	2.3378E+06	2.5399E+08
44	1.8554E-06	1.0048E+06	2.5499E+08
	8.7643E-07		

TAB. E8

Iron-88 - Calculated Neutron Spectrum, Measurement Position A9 at Z = 44.44 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	7.2080E+00	7.2080E+00
2	1.4191E+01	2.5013E+01	3.2221E+01
3	1.2214E+01	1.3236E+02	1.6458E+02
4	1.0000E+01	2.7624E+02	4.4082E+02
5	8.6071E+00	5.1520E+02	9.5602E+02
6	7.4082E+00	1.1864E+03	2.1424E+03
7	6.0653E+00	2.2357E+03	4.3782E+03
8	4.9659E+00	7.0134E+03	1.1392E+04
9	3.6788E+00	8.2482E+03	1.9640E+04
10	3.0119E+00	7.3176E+03	2.6957E+04
11	2.7253E+00	1.0542E+04	3.7500E+04
12	2.4660E+00	5.9106E+03	4.3410E+04
13	2.3653E+00	1.9523E+03	4.5362E+04
14	2.3457E+00	1.0690E+04	5.6052E+04
15	2.2313E+00	3.6296E+04	9.2349E+04
16	1.9205E+00	7.2717E+04	1.6507E+05
17	1.6530E+00	1.4814E+05	3.1320E+05
18	1.3534E+00	7.1353E+05	1.0267E+06
19	1.0026E+00	1.0908E+06	2.1175E+06
20	8.2085E-01	4.2364E+05	2.5411E+06
21	7.4274E-01	5.4494E+06	7.9906E+06
22	6.0810E-01	4.8746E+06	1.2865E+07
23	4.9787E-01	7.8778E+06	2.0743E+07
24	3.6883E-01	1.8970E+07	3.9712E+07
25	2.9721E-01	1.7030E+07	5.6743E+07
26	1.8316E-01	2.6128E+07	8.2871E+07
27	1.1109E-01	1.7350E+07	1.0022E+08
28	6.7379E-02	1.1626E+07	1.1185E+08
29	4.0868E-02	2.9324E+06	1.1478E+08
30	3.1828E-02	1.0845E+06	1.1586E+08
31	2.6058E-02	1.0027E+07	1.2589E+08
32	2.4176E-02	6.1848E+06	1.3208E+08
33	2.1875E-02	8.6447E+06	1.4072E+08
34	1.5034E-02	7.7977E+06	1.4852E+08
35	7.1017E-03	1.0383E+07	1.5890E+08
36	3.3546E-03	7.3123E+06	1.6621E+08
37	1.5846E-03	9.7904E+06	1.7600E+08
38	4.5400E-04	4.0177E+06	1.8002E+08
39	2.1445E-04	4.2468E+06	1.8427E+08
40	1.0130E-04	4.9271E+06	1.8919E+08
41	3.7266E-05	4.7758E+06	1.9397E+08
42	1.0677E-05	2.1702E+06	1.9614E+08
43	5.0435E-06	1.8954E+06	1.9804E+08
44	1.8554E-06	8.1180E+05	1.9885E+08
	8.7643E-07		

TAB. E9

Iron-88 - Calculated Neutron Spectrum, Measurement Position A10 at Z = 50.38 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	3.0555E+00	3.0555E+00
2	1.4191E+01	1.0350E+01	1.3405E+01
3	1.2214E+01	5.3857E+01	6.7262E+01
4	1.0000E+01	1.1067E+02	1.7793E+02
5	8.6071E+00	1.9974E+02	3.7768E+02
6	7.4082E+00	4.4144E+02	8.1912E+02
7	6.0653E+00	8.1205E+02	1.6312E+03
8	4.9659E+00	2.5188E+03	4.1500E+03
9	3.6788E+00	2.9849E+03	7.1349E+03
10	3.0119E+00	2.6979E+03	9.8328E+03
11	2.7253E+00	3.9215E+03	1.3754E+04
12	2.4660E+00	2.2211E+03	1.5975E+04
13	2.3653E+00	7.5669E+02	1.6732E+04
14	2.3457E+00	4.2029E+03	2.0935E+04
15	2.2313E+00	1.4383E+04	3.5318E+04
16	1.9205E+00	3.0719E+04	6.6037E+04
17	1.6530E+00	6.4934E+04	1.3097E+05
18	1.3534E+00	3.5483E+05	4.8580E+05
19	1.0026E+00	6.0753E+05	1.0933E+06
20	8.2085E-01	2.3305E+05	1.3264E+06
21	7.4274E-01	3.5227E+06	4.8490E+06
22	6.0810E-01	3.2343E+06	8.0833E+06
23	4.9787E-01	5.2947E+06	1.3378E+07
24	3.6883E-01	1.4117E+07	2.7495E+07
25	2.9721E-01	1.2753E+07	4.0248E+07
26	1.8316E-01	2.0271E+07	6.0519E+07
27	1.1109E-01	1.3579E+07	7.4098E+07
28	6.7379E-02	9.1269E+06	8.3224E+07
29	4.0868E-02	2.3029E+06	8.5527E+07
30	3.1828E-02	8.5146E+05	8.6379E+07
31	2.6058E-02	8.1898E+06	9.4569E+07
32	2.4176E-02	5.1603E+06	9.9729E+07
33	2.1875E-02	7.2316E+06	1.0696E+08
34	1.5034E-02	6.4880E+06	1.1345E+08
35	7.1017E-03	8.6405E+06	1.2209E+08
36	3.3546E-03	6.0812E+06	1.2817E+08
37	1.5846E-03	8.1300E+06	1.3630E+08
38	4.5400E-04	3.3337E+06	1.3963E+08
39	2.1445E-04	3.5190E+06	1.4315E+08
40	1.0130E-04	4.0749E+06	1.4723E+08
41	3.7266E-05	3.9400E+06	1.5117E+08
42	1.0677E-05	1.7870E+06	1.5295E+08
43	5.0435E-06	1.5570E+06	1.5451E+08
44	1.8554E-06	6.6553E+05	1.5518E+08
	8.7643E-07		

TAB. E10

Iron-88 - Calculated Neutron Spectrum, Measurement Position A11 at Z = 56.37 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.2985E+00	1.2985E+00
2	1.4191E+01	4.2888E+00	5.5873E+00
3	1.2214E+01	2.1887E+01	2.7474E+01
4	1.0000E+01	4.4196E+01	7.1670E+01
5	8.6071E+00	7.7093E+01	1.4876E+02
6	7.4082E+00	1.6339E+02	3.1215E+02
7	6.0653E+00	2.9317E+02	6.0532E+02
8	4.9659E+00	8.9831E+02	1.5036E+03
9	3.6788E+00	1.0719E+03	2.5755E+03
10	3.0119E+00	9.8523E+02	3.5608E+03
11	2.7253E+00	1.4433E+03	5.0041E+03
12	2.4660E+00	8.2523E+02	5.8293E+03
13	2.3653E+00	2.8953E+02	6.1188E+03
14	2.3457E+00	1.6318E+03	7.7506E+03
15	2.2313E+00	5.6291E+03	1.3380E+04
16	1.9205E+00	1.2817E+04	2.6197E+04
17	1.6530E+00	2.8092E+04	5.4289E+04
18	1.3534E+00	1.7452E+05	2.2881E+05
19	1.0026E+00	3.3465E+05	5.6346E+05
20	8.2085E-01	1.2710E+05	6.9056E+05
21	7.4274E-01	2.2549E+06	2.9455E+06
22	6.0810E-01	2.1225E+06	5.0680E+06
23	4.9787E-01	3.5194E+06	8.5874E+06
24	3.6883E-01	1.0365E+07	1.8953E+07
25	2.9721E-01	9.4621E+06	2.8415E+07
26	1.8316E-01	1.5561E+07	4.3976E+07
27	1.1109E-01	1.0524E+07	5.4501E+07
28	6.7379E-02	7.1009E+06	6.1601E+07
29	4.0868E-02	1.7925E+06	6.3394E+07
30	3.1828E-02	6.6268E+05	6.4057E+07
31	2.6058E-02	6.6143E+06	7.0671E+07
32	2.4176E-02	4.2537E+06	7.4925E+07
33	2.1875E-02	5.9904E+06	8.0915E+07
34	1.5034E-02	5.3501E+06	8.6265E+07
35	7.1017E-03	7.1374E+06	9.3402E+07
36	3.3546E-03	5.0269E+06	9.8429E+07
37	1.5846E-03	6.7223E+06	1.0515E+08
38	4.5400E-04	2.7564E+06	1.0791E+08
39	2.1445E-04	2.9090E+06	1.1082E+08
40	1.0130E-04	3.3668E+06	1.1418E+08
41	3.7266E-05	3.2525E+06	1.1744E+08
42	1.0677E-05	1.4741E+06	1.1891E+08
43	5.0435E-06	1.2830E+06	1.2019E+08
44	1.8554E-06	5.4790E+05	1.2074E+08
	8.7643E-07		

TAB. E11

Iron-88 - Calculated Neutron Spectrum, Measurement Position A12 at Z = 62.29 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	5.6129E-01	5.6129E-01
2	1.4191E+01	1.8066E+00	2.3679E+00
3	1.2214E+01	9.0285E+00	1.1396E+01
4	1.0000E+01	1.7903E+01	2.9300E+01
5	8.6071E+00	3.0194E+01	5.9494E+01
6	7.4082E+00	6.1412E+01	1.2091E+02
7	6.0653E+00	1.0751E+02	2.2841E+02
8	4.9659E+00	3.2533E+02	5.5375E+02
9	3.6788E+00	3.9051E+02	9.4426E+02
10	3.0119E+00	3.6435E+02	1.3086E+03
11	2.7253E+00	5.3752E+02	1.8461E+03
12	2.4660E+00	3.0994E+02	2.1561E+03
13	2.3653E+00	1.1169E+02	2.2677E+03
14	2.3457E+00	6.3894E+02	2.9067E+03
15	2.2313E+00	2.2227E+03	5.1293E+03
16	1.9205E+00	5.3869E+03	1.0516E+04
17	1.6530E+00	1.2229E+04	2.2745E+04
18	1.3534E+00	8.6329E+04	1.0907E+05
19	1.0026E+00	1.8496E+05	2.9403E+05
20	8.2085E-01	6.9709E+04	3.6374E+05
21	7.4274E-01	1.4457E+06	1.8094E+06
22	6.0810E-01	1.3928E+06	3.2022E+06
23	4.9787E-01	2.3380E+06	5.5403E+06
24	3.6883E-01	7.5756E+06	1.3116E+07
25	2.9721E-01	7.0076E+06	2.0123E+07
26	1.8316E-01	1.1906E+07	3.2029E+07
27	1.1109E-01	8.1320E+06	4.0161E+07
28	6.7379E-02	5.5095E+06	4.5671E+07
29	4.0868E-02	1.3915E+06	4.7062E+07
30	3.1828E-02	5.1441E+05	4.7577E+07
31	2.6058E-02	5.3138E+06	5.2890E+07
32	2.4176E-02	3.4848E+06	5.6375E+07
33	2.1875E-02	4.9366E+06	6.1312E+07
34	1.5034E-02	4.3921E+06	6.5704E+07
35	7.1017E-03	5.8734E+06	7.1577E+07
36	3.3546E-03	4.1425E+06	7.5720E+07
37	1.5846E-03	5.5465E+06	8.1266E+07
38	4.5400E-04	2.2753E+06	8.3542E+07
39	2.1445E-04	2.4024E+06	8.5944E+07
40	1.0130E-04	2.7815E+06	8.8726E+07
41	3.7266E-05	2.6876E+06	9.1413E+07
42	1.0677E-05	1.2181E+06	9.2631E+07
43	5.0435E-06	1.0600E+06	9.3691E+07
44	1.8554E-06	4.5261E+05	9.4144E+07
	8.7643E-07		

TAB. E12

Iron-88 - Calculated Neutron Spectrum, Measurement Position A13 at Z = 68.10 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.4667E-01	2.4667E-01
2	1.4191E+01	7.7411E-01	1.0208E+00
3	1.2214E+01	3.7910E+00	4.8118E+00
4	1.0000E+01	7.3881E+00	1.2200E+01
5	8.6071E+00	1.2065E+01	2.4264E+01
6	7.4082E+00	2.3585E+01	4.7850E+01
7	6.0653E+00	4.0312E+01	8.8162E+01
8	4.9659E+00	1.2049E+02	2.0865E+02
9	3.6788E+00	1.4536E+02	3.5401E+02
10	3.0119E+00	1.3743E+02	4.9144E+02
11	2.7253E+00	2.0408E+02	6.9552E+02
12	2.4660E+00	1.1856E+02	8.1407E+02
13	2.3653E+00	4.3771E+01	8.5785E+02
14	2.3457E+00	2.5415E+02	1.1120E+03
15	2.2313E+00	8.9190E+02	2.0039E+03
16	1.9205E+00	2.2971E+03	4.3009E+03
17	1.6530E+00	5.3943E+03	9.6952E+03
18	1.3534E+00	4.3220E+04	5.2916E+04
19	1.0026E+00	1.0316E+05	1.5607E+05
20	8.2085E-01	3.8656E+04	1.9473E+05
21	7.4274E-01	9.3280E+05	1.1275E+06
22	6.0810E-01	9.1812E+05	2.0456E+06
23	4.9787E-01	1.5595E+06	3.6051E+06
24	3.6883E-01	5.5362E+06	9.1413E+06
25	2.9721E-01	5.1976E+06	1.4339E+07
26	1.8316E-01	9.1106E+06	2.3450E+07
27	1.1109E-01	6.2843E+06	2.9734E+07
28	6.7379E-02	4.2761E+06	3.4010E+07
29	4.0868E-02	1.0807E+06	3.5091E+07
30	3.1828E-02	3.9948E+05	3.5490E+07
31	2.6058E-02	4.2597E+06	3.9750E+07
32	2.4176E-02	2.8469E+06	4.2597E+07
33	2.1875E-02	4.0580E+06	4.6655E+07
34	1.5034E-02	3.5985E+06	5.0253E+07
35	7.1017E-03	4.8254E+06	5.5079E+07
36	3.3546E-03	3.4093E+06	5.8488E+07
37	1.5846E-03	4.5732E+06	6.3061E+07
38	4.5400E-04	1.8774E+06	6.4938E+07
39	2.1445E-04	1.9840E+06	6.6922E+07
40	1.0130E-04	2.2993E+06	6.9222E+07
41	3.7266E-05	2.2237E+06	7.1445E+07
42	1.0677E-05	1.0083E+06	7.2454E+07
43	5.0435E-06	8.7791E+05	7.3332E+07
44	1.8554E-06	3.7496E+05	7.3707E+07
	8.7643E-07		

TAB. E13

Iron-88 - Calculated Neutron Spectrum, Measurement Position A14 at Z = 73.96 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.0813E-01	1.0813E-01
2	1.4191E+01	3.3019E-01	4.3832E-01
3	1.2214E+01	1.5815E+00	2.0198E+00
4	1.0000E+01	3.0270E+00	5.0468E+00
5	8.6071E+00	4.7856E+00	9.8323E+00
6	7.4082E+00	8.9925E+00	1.8825E+01
7	6.0653E+00	1.5005E+01	3.3830E+01
8	4.9659E+00	4.4280E+01	7.8110E+01
9	3.6788E+00	5.3647E+01	1.3176E+02
10	3.0119E+00	5.1339E+01	1.8310E+02
11	2.7253E+00	7.6688E+01	2.5978E+02
12	2.4660E+00	4.4860E+01	3.0464E+02
13	2.3653E+00	1.6960E+01	3.2160E+02
14	2.3457E+00	9.9903E+01	4.2151E+02
15	2.2313E+00	3.5380E+02	7.7531E+02
16	1.9205E+00	9.6877E+02	1.7441E+03
17	1.6530E+00	2.3530E+03	4.0971E+03
18	1.3534E+00	2.1455E+04	2.5552E+04
19	1.0026E+00	5.7081E+04	8.2634E+04
20	8.2085E-01	2.1293E+04	1.0393E+05
21	7.4274E-01	5.9822E+05	7.0215E+05
22	6.0810E-01	6.0095E+05	1.3031E+06
23	4.9787E-01	1.0326E+06	2.3357E+06
24	3.6883E-01	4.0127E+06	6.3484E+06
25	2.9721E-01	3.8294E+06	1.0178E+07
26	1.8316E-01	6.9257E+06	1.7103E+07
27	1.1109E-01	4.8236E+06	2.1927E+07
28	6.7379E-02	3.2976E+06	2.5225E+07
29	4.0868E-02	8.3391E+05	2.6059E+07
30	3.1828E-02	3.0827E+05	2.6367E+07
31	2.6058E-02	3.3884E+06	2.9755E+07
32	2.4176E-02	2.3092E+06	3.2064E+07
33	2.1875E-02	3.3109E+06	3.5375E+07
34	1.5034E-02	2.9273E+06	3.8303E+07
35	7.1017E-03	3.9382E+06	4.2241E+07
36	3.3546E-03	2.7887E+06	4.5029E+07
37	1.5846E-03	3.7500E+06	4.8779E+07
38	4.5400E-04	1.5410E+06	5.0320E+07
39	2.1445E-04	1.6306E+06	5.1951E+07
40	1.0130E-04	1.8925E+06	5.3844E+07
41	3.7266E-05	1.8328E+06	5.5676E+07
42	1.0677E-05	8.3179E+05	5.6508E+07
43	5.0435E-06	7.2480E+05	5.7233E+07
44	1.8554E-06	3.0972E+05	5.7543E+07
	8.7643E-07		

TAB. E14

Iron-88 - Calculated Neutron Spectrum, Measurement Position A15 at Z = 79.88 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGENDF70.BOLIB Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	4.7091E-02	4.7091E-02
2	1.4191E+01	1.3980E-01	1.8689E-01
3	1.2214E+01	6.5402E-01	8.4091E-01
4	1.0000E+01	1.2287E+00	2.0696E+00
5	8.6071E+00	1.8805E+00	3.9501E+00
6	7.4082E+00	3.3969E+00	7.3470E+00
7	6.0653E+00	5.5328E+00	1.2880E+01
8	4.9659E+00	1.6114E+01	2.8994E+01
9	3.6788E+00	1.9592E+01	4.8586E+01
10	3.0119E+00	1.8956E+01	6.7542E+01
11	2.7253E+00	2.8471E+01	9.6013E+01
12	2.4660E+00	1.6761E+01	1.1277E+02
13	2.3653E+00	6.4791E+00	1.1925E+02
14	2.3457E+00	3.8737E+01	1.5799E+02
15	2.2313E+00	1.3850E+02	2.9649E+02
16	1.9205E+00	4.0345E+02	6.9994E+02
17	1.6530E+00	1.0136E+03	1.7136E+03
18	1.3534E+00	1.0554E+04	1.2267E+04
19	1.0026E+00	3.1332E+04	4.3600E+04
20	8.2085E-01	1.1650E+04	5.5250E+04
21	7.4274E-01	3.8141E+05	4.3666E+05
22	6.0810E-01	3.9093E+05	8.2759E+05
23	4.9787E-01	6.7934E+05	1.5069E+06
24	3.6883E-01	2.8875E+06	4.3944E+06
25	2.9721E-01	2.8054E+06	7.1998E+06
26	1.8316E-01	5.2374E+06	1.2437E+07
27	1.1109E-01	3.6799E+06	1.6117E+07
28	6.7379E-02	2.5297E+06	1.8647E+07
29	4.0868E-02	6.4023E+05	1.9287E+07
30	3.1828E-02	2.3668E+05	1.9524E+07
31	2.6058E-02	2.6763E+06	2.2200E+07
32	2.4176E-02	1.8633E+06	2.4063E+07
33	2.1875E-02	2.6830E+06	2.6746E+07
34	1.5034E-02	2.3672E+06	2.9113E+07
35	7.1017E-03	3.1993E+06	3.2313E+07
36	3.3546E-03	2.2725E+06	3.4585E+07
37	1.5846E-03	3.0666E+06	3.7652E+07
38	4.5400E-04	1.2620E+06	3.8914E+07
39	2.1445E-04	1.3378E+06	4.0252E+07
40	1.0130E-04	1.5556E+06	4.1807E+07
41	3.7266E-05	1.5090E+06	4.3316E+07
42	1.0677E-05	6.8534E+05	4.4002E+07
43	5.0435E-06	5.9754E+05	4.4599E+07
44	1.8554E-06	2.5541E+05	4.4854E+07
	8.7643E-07		

APPENDIX F

Neutron Spectra Calculated along the Horizontal Axis Z with the BUGLE-B7 Library

TAB. F1

Iron-88 - Calculated Neutron Spectrum, Measurement Position A2 at Z = 3.27 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.0849E+04	1.0849E+04
2	1.4191E+01	4.5097E+04	5.5946E+04
3	1.2214E+01	2.6088E+05	3.1683E+05
4	1.0000E+01	5.7958E+05	8.9641E+05
5	8.6071E+00	1.3104E+06	2.2068E+06
6	7.4082E+00	3.7551E+06	5.9619E+06
7	6.0653E+00	7.5641E+06	1.3526E+07
8	4.9659E+00	2.1864E+07	3.5390E+07
9	3.6788E+00	2.1306E+07	5.6697E+07
10	3.0119E+00	1.3719E+07	7.0415E+07
11	2.7253E+00	1.5884E+07	8.6299E+07
12	2.4660E+00	8.4105E+06	9.4709E+07
13	2.3653E+00	1.5676E+06	9.6277E+07
14	2.3457E+00	9.1943E+06	1.0547E+08
15	2.2313E+00	2.9594E+07	1.3507E+08
16	1.9205E+00	3.2123E+07	1.6719E+08
17	1.6530E+00	4.5244E+07	2.1243E+08
18	1.3534E+00	7.8636E+07	2.9107E+08
19	1.0026E+00	4.3650E+07	3.3472E+08
20	8.2085E-01	2.3950E+07	3.5867E+08
21	7.4274E-01	6.2777E+07	4.2145E+08
22	6.0810E-01	5.5871E+07	4.7732E+08
23	4.9787E-01	7.9680E+07	5.5700E+08
24	3.6883E-01	6.4067E+07	6.2106E+08
25	2.9721E-01	1.0441E+08	7.2547E+08
26	1.8316E-01	9.2603E+07	8.1807E+08
27	1.1109E-01	7.8534E+07	8.9661E+08
28	6.7379E-02	5.0366E+07	9.4697E+08
29	4.0868E-02	1.0366E+07	9.5734E+08
30	3.1828E-02	2.5401E+07	9.8274E+08
31	2.6058E-02	2.3547E+07	1.0063E+09
32	2.4176E-02	1.3285E+07	1.0196E+09
33	2.1875E-02	3.4995E+07	1.0546E+09
34	1.5034E-02	5.1120E+07	1.1057E+09
35	7.1017E-03	5.1015E+07	1.1567E+09
36	3.3546E-03	3.9642E+07	1.1963E+09
37	1.5846E-03	6.1203E+07	1.2575E+09
38	4.5400E-04	3.1614E+07	1.2892E+09
39	2.1445E-04	3.0333E+07	1.3195E+09
40	1.0130E-04	3.5924E+07	1.3554E+09
41	3.7266E-05	3.7314E+07	1.3927E+09
42	1.0677E-05	1.9453E+07	1.4122E+09
43	5.0435E-06	2.3293E+07	1.4355E+09
44	1.8554E-06	1.4356E+07	1.4498E+09
	8.7643E-07		

TAB. F2

Iron-88 - Calculated Neutron Spectrum, Measurement Position A3 at Z = 9.11 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.8602E+03	1.8602E+03
2	1.4191E+01	7.5179E+03	9.3780E+03
3	1.2214E+01	4.2784E+04	5.2162E+04
4	1.0000E+01	9.4687E+04	1.4685E+05
5	8.6071E+00	2.0902E+05	3.5587E+05
6	7.4082E+00	5.9427E+05	9.5014E+05
7	6.0653E+00	1.2425E+06	2.1927E+06
8	4.9659E+00	3.9442E+06	6.1368E+06
9	3.6788E+00	4.2384E+06	1.0375E+07
10	3.0119E+00	3.1198E+06	1.3495E+07
11	2.7253E+00	4.0478E+06	1.7543E+07
12	2.4660E+00	2.0787E+06	1.9622E+07
13	2.3653E+00	5.0123E+05	2.0123E+07
14	2.3457E+00	2.6868E+06	2.2810E+07
15	2.2313E+00	8.7839E+06	3.1593E+07
16	1.9205E+00	1.1214E+07	4.2808E+07
17	1.6530E+00	1.7468E+07	6.0275E+07
18	1.3534E+00	3.8503E+07	9.8779E+07
19	1.0026E+00	2.7701E+07	1.2648E+08
20	8.2085E-01	1.3125E+07	1.3960E+08
21	7.4274E-01	5.2550E+07	1.9215E+08
22	6.0810E-01	4.2479E+07	2.3463E+08
23	4.9787E-01	6.0540E+07	2.9517E+08
24	3.6883E-01	6.9204E+07	3.6438E+08
25	2.9721E-01	8.1512E+07	4.4589E+08
26	1.8316E-01	8.7774E+07	5.3366E+08
27	1.1109E-01	6.3788E+07	5.9745E+08
28	6.7379E-02	4.3224E+07	6.4068E+08
29	4.0868E-02	1.0662E+07	6.5134E+08
30	3.1828E-02	4.0022E+06	6.5534E+08
31	2.6058E-02	2.4357E+07	6.7970E+08
32	2.4176E-02	1.3052E+07	6.9275E+08
33	2.1875E-02	2.5310E+07	7.1806E+08
34	1.5034E-02	2.9320E+07	7.4738E+08
35	7.1017E-03	4.0398E+07	7.8778E+08
36	3.3546E-03	2.9528E+07	8.1730E+08
37	1.5846E-03	4.3636E+07	8.6094E+08
38	4.5400E-04	1.9190E+07	8.8013E+08
39	2.1445E-04	2.1348E+07	9.0148E+08
40	1.0130E-04	2.5962E+07	9.2744E+08
41	3.7266E-05	2.6733E+07	9.5417E+08
42	1.0677E-05	1.2740E+07	9.6691E+08
43	5.0435E-06	1.1812E+07	9.7873E+08
44	1.8554E-06	5.2538E+06	9.8398E+08
	8.7643E-07		

TAB. F3

Iron-88 - Calculated Neutron Spectrum, Measurement Position A4 at Z = 14.97 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	6.2239E+02	6.2239E+02
2	1.4191E+01	2.4728E+03	3.0952E+03
3	1.2214E+01	1.3978E+04	1.7073E+04
4	1.0000E+01	3.0889E+04	4.7962E+04
5	8.6071E+00	6.6845E+04	1.1481E+05
6	7.4082E+00	1.8546E+05	3.0027E+05
7	6.0653E+00	3.8628E+05	6.8655E+05
8	4.9659E+00	1.2486E+06	1.9352E+06
9	3.6788E+00	1.3823E+06	3.3175E+06
10	3.0119E+00	1.0693E+06	4.3868E+06
11	2.7253E+00	1.4347E+06	5.8216E+06
12	2.4660E+00	7.4820E+05	6.5698E+06
13	2.3653E+00	1.9637E+05	6.7661E+06
14	2.3457E+00	1.0384E+06	7.8045E+06
15	2.2313E+00	3.4239E+06	1.1228E+07
16	1.9205E+00	4.7888E+06	1.6017E+07
17	1.6530E+00	7.8961E+06	2.3913E+07
18	1.3534E+00	2.0149E+07	4.4062E+07
19	1.0026E+00	1.6859E+07	6.0921E+07
20	8.2085E-01	7.5993E+06	6.8520E+07
21	7.4274E-01	3.8448E+07	1.0697E+08
22	6.0810E-01	3.1477E+07	1.3845E+08
23	4.9787E-01	4.4978E+07	1.8342E+08
24	3.6883E-01	6.1960E+07	2.4538E+08
25	2.9721E-01	6.4658E+07	3.1004E+08
26	1.8316E-01	7.6659E+07	3.8670E+08
27	1.1109E-01	5.3026E+07	4.3973E+08
28	6.7379E-02	3.5905E+07	4.7563E+08
29	4.0868E-02	9.0066E+06	4.8464E+08
30	3.1828E-02	3.3385E+06	4.8798E+08
31	2.6058E-02	2.2504E+07	5.1048E+08
32	2.4176E-02	1.2383E+07	5.2286E+08
33	2.1875E-02	2.0413E+07	5.4328E+08
34	1.5034E-02	2.0717E+07	5.6399E+08
35	7.1017E-03	3.0044E+07	5.9404E+08
36	3.3546E-03	2.2022E+07	6.1606E+08
37	1.5846E-03	3.1533E+07	6.4759E+08
38	4.5400E-04	1.3340E+07	6.6093E+08
39	2.1445E-04	1.4745E+07	6.7568E+08
40	1.0130E-04	1.7937E+07	6.9361E+08
41	3.7266E-05	1.8297E+07	7.1191E+08
42	1.0677E-05	8.5739E+06	7.2049E+08
43	5.0435E-06	7.3483E+06	7.2783E+08
44	1.8554E-06	2.9268E+06	7.3076E+08
	8.7643E-07		

TAB. F4

Iron-88 - Calculated Neutron Spectrum, Measurement Position A5 at Z = 20.83 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.3430E+02	2.3430E+02
2	1.4191E+01	9.1210E+02	1.1464E+03
3	1.2214E+01	5.1157E+03	6.2621E+03
4	1.0000E+01	1.1255E+04	1.7518E+04
5	8.6071E+00	2.3817E+04	4.1334E+04
6	7.4082E+00	6.4093E+04	1.0543E+05
7	6.0653E+00	1.3185E+05	2.3728E+05
8	4.9659E+00	4.2782E+05	6.6509E+05
9	3.6788E+00	4.8236E+05	1.1474E+06
10	3.0119E+00	3.8688E+05	1.5343E+06
11	2.7253E+00	5.3042E+05	2.0647E+06
12	2.4660E+00	2.8088E+05	2.3456E+06
13	2.3653E+00	7.8248E+04	2.4239E+06
14	2.3457E+00	4.1385E+05	2.8377E+06
15	2.2313E+00	1.3747E+06	4.2124E+06
16	1.9205E+00	2.0779E+06	6.2903E+06
17	1.6530E+00	3.5942E+06	9.8844E+06
18	1.3534E+00	1.0472E+07	2.0357E+07
19	1.0026E+00	9.9942E+06	3.0351E+07
20	8.2085E-01	4.3434E+06	3.4694E+07
21	7.4274E-01	2.6780E+07	6.1475E+07
22	6.0810E-01	2.2536E+07	8.4011E+07
23	4.9787E-01	3.2363E+07	1.1637E+08
24	3.6883E-01	5.1707E+07	1.6808E+08
25	2.9721E-01	5.0594E+07	2.1868E+08
26	1.8316E-01	6.4309E+07	2.8298E+08
27	1.1109E-01	4.3666E+07	3.2665E+08
28	6.7379E-02	2.9467E+07	3.5612E+08
29	4.0868E-02	7.4009E+06	3.6352E+08
30	3.1828E-02	2.7365E+06	3.6625E+08
31	2.6058E-02	2.0120E+07	3.8637E+08
32	2.4176E-02	1.1350E+07	3.9772E+08
33	2.1875E-02	1.7121E+07	4.1485E+08
34	1.5034E-02	1.6347E+07	4.3119E+08
35	7.1017E-03	2.3152E+07	4.5434E+08
36	3.3546E-03	1.6847E+07	4.7119E+08
37	1.5846E-03	2.3540E+07	4.9473E+08
38	4.5400E-04	9.8467E+06	5.0458E+08
39	2.1445E-04	1.0722E+07	5.1530E+08
40	1.0130E-04	1.2850E+07	5.2815E+08
41	3.7266E-05	1.2915E+07	5.4107E+08
42	1.0677E-05	6.0060E+06	5.4707E+08
43	5.0435E-06	5.0284E+06	5.5210E+08
44	1.8554E-06	1.9471E+06	5.5405E+08
	8.7643E-07		

TAB. F5

Iron-88 - Calculated Neutron Spectrum, Measurement Position A6 at Z = 26.67 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	9.4113E+01	9.4113E+01
2	1.4191E+01	3.5988E+02	4.5399E+02
3	1.2214E+01	2.0034E+03	2.4574E+03
4	1.0000E+01	4.3740E+03	6.8314E+03
5	8.6071E+00	9.0188E+03	1.5850E+04
6	7.4082E+00	2.3417E+04	3.9267E+04
7	6.0653E+00	4.7271E+04	8.6538E+04
8	4.9659E+00	1.5257E+05	2.3911E+05
9	3.6788E+00	1.7421E+05	4.1332E+05
10	3.0119E+00	1.4371E+05	5.5703E+05
11	2.7253E+00	2.0002E+05	7.5705E+05
12	2.4660E+00	1.0741E+05	8.6445E+05
13	2.3653E+00	3.1366E+04	8.9582E+05
14	2.3457E+00	1.6703E+05	1.0628E+06
15	2.2313E+00	5.5850E+05	1.6213E+06
16	1.9205E+00	9.0512E+05	2.5265E+06
17	1.6530E+00	1.6328E+06	4.1593E+06
18	1.3534E+00	5.3898E+06	9.5490E+06
19	1.0026E+00	5.8120E+06	1.5361E+07
20	8.2085E-01	2.4560E+06	1.7817E+07
21	7.4274E-01	1.8105E+07	3.5922E+07
22	6.0810E-01	1.5738E+07	5.1661E+07
23	4.9787E-01	2.2763E+07	7.4423E+07
24	3.6883E-01	4.1346E+07	1.1577E+08
25	2.9721E-01	3.9111E+07	1.5488E+08
26	1.8316E-01	5.2544E+07	2.0742E+08
27	1.1109E-01	3.5542E+07	2.4297E+08
28	6.7379E-02	2.3947E+07	2.6691E+08
29	4.0868E-02	6.0121E+06	2.7293E+08
30	3.1828E-02	2.2206E+06	2.7515E+08
31	2.6058E-02	1.7506E+07	2.9265E+08
32	2.4176E-02	1.0125E+07	3.0278E+08
33	2.1875E-02	1.4592E+07	3.1737E+08
34	1.5034E-02	1.3536E+07	3.3091E+08
35	7.1017E-03	1.8605E+07	3.4951E+08
36	3.3546E-03	1.3365E+07	3.6288E+08
37	1.5846E-03	1.8329E+07	3.8120E+08
38	4.5400E-04	7.6174E+06	3.8882E+08
39	2.1445E-04	8.2057E+06	3.9703E+08
40	1.0130E-04	9.7046E+06	4.0673E+08
41	3.7266E-05	9.6181E+06	4.1635E+08
42	1.0677E-05	4.4360E+06	4.2079E+08
43	5.0435E-06	3.6723E+06	4.2446E+08
44	1.8554E-06	1.4084E+06	4.2587E+08
	8.7643E-07		

TAB. F6

Iron-88 - Calculated Neutron Spectrum, Measurement Position A7 at Z = 32.61 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	3.9000E+01	3.9000E+01
2	1.4191E+01	1.4566E+02	1.8466E+02
3	1.2214E+01	7.9915E+02	9.8381E+02
4	1.0000E+01	1.7217E+03	2.7055E+03
5	8.6071E+00	3.4427E+03	6.1482E+03
6	7.4082E+00	8.5859E+03	1.4734E+04
7	6.0653E+00	1.6942E+04	3.1676E+04
8	4.9659E+00	5.4187E+04	8.5863E+04
9	3.6788E+00	6.2568E+04	1.4843E+05
10	3.0119E+00	5.2888E+04	2.0132E+05
11	2.7253E+00	7.4446E+04	2.7577E+05
12	2.4660E+00	4.0496E+04	3.1626E+05
13	2.3653E+00	1.2339E+04	3.2860E+05
14	2.3457E+00	6.6309E+04	3.9491E+05
15	2.2313E+00	2.2311E+05	6.1802E+05
16	1.9205E+00	3.8672E+05	1.0047E+06
17	1.6530E+00	7.2545E+05	1.7302E+06
18	1.3534E+00	2.7098E+06	4.4400E+06
19	1.0026E+00	3.2912E+06	7.7312E+06
20	8.2085E-01	1.3594E+06	9.0906E+06
21	7.4274E-01	1.1888E+07	2.0978E+07
22	6.0810E-01	1.0696E+07	3.1674E+07
23	4.9787E-01	1.5609E+07	4.7283E+07
24	3.6883E-01	3.1914E+07	7.9196E+07
25	2.9721E-01	2.9733E+07	1.0893E+08
26	1.8316E-01	4.1906E+07	1.5084E+08
27	1.1109E-01	2.8455E+07	1.7929E+08
28	6.7379E-02	1.9183E+07	1.9847E+08
29	4.0868E-02	4.8151E+06	2.0329E+08
30	3.1828E-02	1.7772E+06	2.0507E+08
31	2.6058E-02	1.4856E+07	2.1992E+08
32	2.4176E-02	8.8138E+06	2.2874E+08
33	2.1875E-02	1.2427E+07	2.4116E+08
34	1.5034E-02	1.1349E+07	2.5251E+08
35	7.1017E-03	1.5301E+07	2.6781E+08
36	3.3546E-03	1.0870E+07	2.7868E+08
37	1.5846E-03	1.4712E+07	2.9340E+08
38	4.5400E-04	6.0817E+06	2.9948E+08
39	2.1445E-04	6.5003E+06	3.0598E+08
40	1.0130E-04	7.6135E+06	3.1359E+08
41	3.7266E-05	7.4633E+06	3.2105E+08
42	1.0677E-05	3.4167E+06	3.2447E+08
43	5.0435E-06	2.8050E+06	3.2728E+08
44	1.8554E-06	1.0696E+06	3.2835E+08
	8.7643E-07		

TAB. F7

Iron-88 - Calculated Neutron Spectrum, Measurement Position A8 at Z = 38.50 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.6523E+01	1.6523E+01
2	1.4191E+01	6.0298E+01	7.6822E+01
3	1.2214E+01	3.2573E+02	4.0255E+02
4	1.0000E+01	6.9163E+02	1.0942E+03
5	8.6071E+00	1.3399E+03	2.4341E+03
6	7.4082E+00	3.2069E+03	5.6410E+03
7	6.0653E+00	6.1792E+03	1.1820E+04
8	4.9659E+00	1.9554E+04	3.1374E+04
9	3.6788E+00	2.2795E+04	5.4169E+04
10	3.0119E+00	1.9686E+04	7.3855E+04
11	2.7253E+00	2.7977E+04	1.0183E+05
12	2.4660E+00	1.5394E+04	1.1723E+05
13	2.3653E+00	4.8668E+03	1.2209E+05
14	2.3457E+00	2.6448E+04	1.4854E+05
15	2.2313E+00	8.9591E+04	2.3813E+05
16	1.9205E+00	1.6551E+05	4.0364E+05
17	1.6530E+00	3.2209E+05	7.2573E+05
18	1.3534E+00	1.3583E+06	2.0840E+06
19	1.0026E+00	1.8498E+06	3.9338E+06
20	8.2085E-01	7.5065E+05	4.6845E+06
21	7.4274E-01	7.7144E+06	1.2399E+07
22	6.0810E-01	7.1825E+06	1.9581E+07
23	4.9787E-01	1.0589E+07	3.0170E+07
24	3.6883E-01	2.4136E+07	5.4306E+07
25	2.9721E-01	2.2429E+07	7.6735E+07
26	1.8316E-01	3.2976E+07	1.0971E+08
27	1.1109E-01	2.2567E+07	1.3228E+08
28	6.7379E-02	1.5250E+07	1.4753E+08
29	4.0868E-02	3.8284E+06	1.5136E+08
30	3.1828E-02	1.4123E+06	1.5277E+08
31	2.6058E-02	1.2410E+07	1.6518E+08
32	2.4176E-02	7.5448E+06	1.7272E+08
33	2.1875E-02	1.0553E+07	1.8328E+08
34	1.5034E-02	9.5455E+06	1.9282E+08
35	7.1017E-03	1.2757E+07	2.0558E+08
36	3.3546E-03	9.0044E+06	2.1458E+08
37	1.5846E-03	1.2089E+07	2.2667E+08
38	4.5400E-04	4.9794E+06	2.3165E+08
39	2.1445E-04	5.2946E+06	2.3695E+08
40	1.0130E-04	6.1615E+06	2.4311E+08
41	3.7266E-05	5.9951E+06	2.4910E+08
42	1.0677E-05	2.7301E+06	2.5183E+08
43	5.0435E-06	2.2280E+06	2.5406E+08
44	1.8554E-06	8.4621E+05	2.5491E+08
	8.7643E-07		

TAB. F8

Iron-88 - Calculated Neutron Spectrum, Measurement Position A9 at Z = 44.44 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	7.0599E+00	7.0599E+00
2	1.4191E+01	2.5131E+01	3.2191E+01
3	1.2214E+01	1.3326E+02	1.6545E+02
4	1.0000E+01	2.7810E+02	4.4355E+02
5	8.6071E+00	5.2097E+02	9.6452E+02
6	7.4082E+00	1.1946E+03	2.1591E+03
7	6.0653E+00	2.2447E+03	4.4038E+03
8	4.9659E+00	7.0173E+03	1.1421E+04
9	3.6788E+00	8.2515E+03	1.9673E+04
10	3.0119E+00	7.2641E+03	2.6937E+04
11	2.7253E+00	1.0407E+04	3.7344E+04
12	2.4660E+00	5.7872E+03	4.3131E+04
13	2.3653E+00	1.8928E+03	4.5024E+04
14	2.3457E+00	1.0412E+04	5.5436E+04
15	2.2313E+00	3.5521E+04	9.0957E+04
16	1.9205E+00	6.9856E+04	1.6081E+05
17	1.6530E+00	1.4085E+05	3.0166E+05
18	1.3534E+00	6.7122E+05	9.7288E+05
19	1.0026E+00	1.0238E+06	1.9967E+06
20	8.2085E-01	4.0962E+05	2.4063E+06
21	7.4274E-01	4.9293E+06	7.3356E+06
22	6.0810E-01	4.7458E+06	1.2081E+07
23	4.9787E-01	7.0738E+06	1.9155E+07
24	3.6883E-01	1.7887E+07	3.7042E+07
25	2.9721E-01	1.6716E+07	5.3758E+07
26	1.8316E-01	2.5561E+07	7.9320E+07
27	1.1109E-01	1.7670E+07	9.6990E+07
28	6.7379E-02	1.1985E+07	1.0898E+08
29	4.0868E-02	3.0100E+06	1.1199E+08
30	3.1828E-02	1.1100E+06	1.1310E+08
31	2.6058E-02	1.0203E+07	1.2330E+08
32	2.4176E-02	6.3519E+06	1.2965E+08
33	2.1875E-02	8.8803E+06	1.3853E+08
34	1.5034E-02	7.9762E+06	1.4651E+08
35	7.1017E-03	1.0632E+07	1.5714E+08
36	3.3546E-03	7.4839E+06	1.6462E+08
37	1.5846E-03	1.0007E+07	1.7463E+08
38	4.5400E-04	4.1138E+06	1.7874E+08
39	2.1445E-04	4.3612E+06	1.8311E+08
40	1.0130E-04	5.0559E+06	1.8816E+08
41	3.7266E-05	4.8969E+06	1.9306E+08
42	1.0677E-05	2.2226E+06	1.9528E+08
43	5.0435E-06	1.8068E+06	1.9709E+08
44	1.8554E-06	6.8448E+05	1.9777E+08
	8.7643E-07		

TAB. F9

Iron-88 - Calculated Neutron Spectrum, Measurement Position A10 at Z = 50.38 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.9926E+00	2.9926E+00
2	1.4191E+01	1.0398E+01	1.3391E+01
3	1.2214E+01	5.4225E+01	6.7615E+01
4	1.0000E+01	1.1142E+02	1.7904E+02
5	8.6071E+00	2.0214E+02	3.8118E+02
6	7.4082E+00	4.4454E+02	8.2572E+02
7	6.0653E+00	8.1512E+02	1.6408E+03
8	4.9659E+00	2.5180E+03	4.1589E+03
9	3.6788E+00	2.9832E+03	7.1421E+03
10	3.0119E+00	2.6732E+03	9.8152E+03
11	2.7253E+00	3.8616E+03	1.3677E+04
12	2.4660E+00	2.1673E+03	1.5844E+04
13	2.3653E+00	7.2984E+02	1.6574E+04
14	2.3457E+00	4.0723E+03	2.0646E+04
15	2.2313E+00	1.4009E+04	3.4656E+04
16	1.9205E+00	2.9281E+04	6.3936E+04
17	1.6530E+00	6.1132E+04	1.2507E+05
18	1.3534E+00	3.2948E+05	4.5455E+05
19	1.0026E+00	5.6215E+05	1.0167E+06
20	8.2085E-01	2.2245E+05	1.2391E+06
21	7.4274E-01	3.1228E+06	4.3619E+06
22	6.0810E-01	3.1045E+06	7.4665E+06
23	4.9787E-01	4.6811E+06	1.2148E+07
24	3.6883E-01	1.3070E+07	2.5218E+07
25	2.9721E-01	1.2352E+07	3.7569E+07
26	1.8316E-01	1.9602E+07	5.7171E+07
27	1.1109E-01	1.3704E+07	7.0875E+07
28	6.7379E-02	9.3374E+06	8.0213E+07
29	4.0868E-02	2.3463E+06	8.2559E+07
30	3.1828E-02	8.6513E+05	8.3424E+07
31	2.6058E-02	8.2900E+06	9.1714E+07
32	2.4176E-02	5.2789E+06	9.6993E+07
33	2.1875E-02	7.4067E+06	1.0440E+08
34	1.5034E-02	6.6160E+06	1.1102E+08
35	7.1017E-03	8.8242E+06	1.1984E+08
36	3.3546E-03	6.2091E+06	1.2605E+08
37	1.5846E-03	8.2927E+06	1.3434E+08
38	4.5400E-04	3.4066E+06	1.3775E+08
39	2.1445E-04	3.6069E+06	1.4136E+08
40	1.0130E-04	4.1741E+06	1.4553E+08
41	3.7266E-05	4.0335E+06	1.4956E+08
42	1.0677E-05	1.8275E+06	1.5139E+08
43	5.0435E-06	1.4825E+06	1.5287E+08
44	1.8554E-06	5.6079E+05	1.5343E+08
	8.7643E-07		

TAB. F10

Iron-88 - Calculated Neutron Spectrum, Measurement Position A11 at Z = 56.37 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.2717E+00	1.2717E+00
2	1.4191E+01	4.3082E+00	5.5799E+00
3	1.2214E+01	2.2038E+01	2.7618E+01
4	1.0000E+01	4.4497E+01	7.2115E+01
5	8.6071E+00	7.8085E+01	1.5020E+02
6	7.4082E+00	1.6457E+02	3.1477E+02
7	6.0653E+00	2.9422E+02	6.0898E+02
8	4.9659E+00	8.9726E+02	1.5062E+03
9	3.6788E+00	1.0702E+03	2.5765E+03
10	3.0119E+00	9.7443E+02	3.5509E+03
11	2.7253E+00	1.4178E+03	4.9687E+03
12	2.4660E+00	8.0254E+02	5.7713E+03
13	2.3653E+00	2.7780E+02	6.0491E+03
14	2.3457E+00	1.5726E+03	7.6217E+03
15	2.2313E+00	5.4567E+03	1.3078E+04
16	1.9205E+00	1.2118E+04	2.5196E+04
17	1.6530E+00	2.6176E+04	5.1372E+04
18	1.3534E+00	1.5987E+05	2.1124E+05
19	1.0026E+00	3.0503E+05	5.1627E+05
20	8.2085E-01	1.1965E+05	6.3591E+05
21	7.4274E-01	1.9569E+06	2.5928E+06
22	6.0810E-01	2.0060E+06	4.5988E+06
23	4.9787E-01	3.0606E+06	7.6594E+06
24	3.6883E-01	9.4120E+06	1.7071E+07
25	2.9721E-01	9.0276E+06	2.6099E+07
26	1.8316E-01	1.4853E+07	4.0952E+07
27	1.1109E-01	1.0509E+07	5.1461E+07
28	6.7379E-02	7.1974E+06	5.8659E+07
29	4.0868E-02	1.8098E+06	6.0468E+07
30	3.1828E-02	6.6724E+05	6.1136E+07
31	2.6058E-02	6.6517E+06	6.7787E+07
32	2.4176E-02	4.3298E+06	7.2117E+07
33	2.1875E-02	6.1107E+06	7.8228E+07
34	1.5034E-02	5.4330E+06	8.3661E+07
35	7.1017E-03	7.2619E+06	9.0923E+07
36	3.3546E-03	5.1146E+06	9.6037E+07
37	1.5846E-03	6.8347E+06	1.0287E+08
38	4.5400E-04	2.8079E+06	1.0568E+08
39	2.1445E-04	2.9727E+06	1.0865E+08
40	1.0130E-04	3.4389E+06	1.1209E+08
41	3.7266E-05	3.3207E+06	1.1541E+08
42	1.0677E-05	1.5035E+06	1.1692E+08
43	5.0435E-06	1.2186E+06	1.1813E+08
44	1.8554E-06	4.6070E+05	1.1860E+08
	8.7643E-07		

TAB. F11

Iron-88 - Calculated Neutron Spectrum, Measurement Position A12 at Z = 62.29 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	5.4969E-01	5.4969E-01
2	1.4191E+01	1.8146E+00	2.3643E+00
3	1.2214E+01	9.0916E+00	1.1456E+01
4	1.0000E+01	1.8026E+01	2.9482E+01
5	8.6071E+00	3.0608E+01	6.0090E+01
6	7.4082E+00	6.1867E+01	1.2196E+02
7	6.0653E+00	1.0787E+02	2.2983E+02
8	4.9659E+00	3.2469E+02	5.5452E+02
9	3.6788E+00	3.8954E+02	9.4406E+02
10	3.0119E+00	3.5973E+02	1.3038E+03
11	2.7253E+00	5.2680E+02	1.8306E+03
12	2.4660E+00	3.0046E+02	2.1310E+03
13	2.3653E+00	1.0663E+02	2.2377E+03
14	2.3457E+00	6.1250E+02	2.8502E+03
15	2.2313E+00	2.1443E+03	4.9945E+03
16	1.9205E+00	5.0515E+03	1.0046E+04
17	1.6530E+00	1.1276E+04	2.1322E+04
18	1.3534E+00	7.7994E+04	9.9316E+04
19	1.0026E+00	1.6602E+05	2.6534E+05
20	8.2085E-01	6.4686E+04	3.3003E+05
21	7.4274E-01	1.2276E+06	1.5577E+06
22	6.0810E-01	1.2949E+06	2.8526E+06
23	4.9787E-01	1.9989E+06	4.8515E+06
24	3.6883E-01	6.7430E+06	1.1594E+07
25	2.9721E-01	6.5782E+06	1.8173E+07
26	1.8316E-01	1.1205E+07	2.9378E+07
27	1.1109E-01	8.0251E+06	3.7403E+07
28	6.7379E-02	5.5257E+06	4.2929E+07
29	4.0868E-02	1.3905E+06	4.4319E+07
30	3.1828E-02	5.1261E+05	4.4832E+07
31	2.6058E-02	5.3040E+06	5.0136E+07
32	2.4176E-02	3.5266E+06	5.3662E+07
33	2.1875E-02	5.0113E+06	5.8674E+07
34	1.5034E-02	4.4377E+06	6.3111E+07
35	7.1017E-03	5.9481E+06	6.9060E+07
36	3.3546E-03	4.1962E+06	7.3256E+07
37	1.5846E-03	5.6158E+06	7.8872E+07
38	4.5400E-04	2.3084E+06	8.1180E+07
39	2.1445E-04	2.4454E+06	8.3625E+07
40	1.0130E-04	2.8303E+06	8.6456E+07
41	3.7266E-05	2.7340E+06	8.9190E+07
42	1.0677E-05	1.2380E+06	9.0428E+07
43	5.0435E-06	1.0034E+06	9.1431E+07
44	1.8554E-06	3.7931E+05	9.1810E+07
	8.7643E-07		

TAB. F12

Iron-88 - Calculated Neutron Spectrum, Measurement Position A13 at Z = 68.10 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.4156E-01	2.4156E-01
2	1.4191E+01	7.7745E-01	1.0190E+00
3	1.2214E+01	3.8177E+00	4.8367E+00
4	1.0000E+01	7.4391E+00	1.2276E+01
5	8.6071E+00	1.2239E+01	2.4515E+01
6	7.4082E+00	2.3765E+01	4.8280E+01
7	6.0653E+00	4.0443E+01	8.8723E+01
8	4.9659E+00	1.2017E+02	2.0889E+02
9	3.6788E+00	1.4487E+02	3.5376E+02
10	3.0119E+00	1.3547E+02	4.8923E+02
11	2.7253E+00	1.9957E+02	6.8880E+02
12	2.4660E+00	1.1459E+02	8.0339E+02
13	2.3653E+00	4.1586E+01	8.4498E+02
14	2.3457E+00	2.4238E+02	1.0874E+03
15	2.2313E+00	8.5642E+02	1.9438E+03
16	1.9205E+00	2.1364E+03	4.0802E+03
17	1.6530E+00	4.9228E+03	9.0030E+03
18	1.3534E+00	3.8509E+04	4.7512E+04
19	1.0026E+00	9.1181E+04	1.3869E+05
20	8.2085E-01	3.5347E+04	1.7404E+05
21	7.4274E-01	7.7493E+05	9.4897E+05
22	6.0810E-01	8.3924E+05	1.7882E+06
23	4.9787E-01	1.3103E+06	3.0985E+06
24	3.6883E-01	4.8290E+06	7.9275E+06
25	2.9721E-01	4.7964E+06	1.2724E+07
26	1.8316E-01	8.4487E+06	2.1173E+07
27	1.1109E-01	6.1235E+06	2.7296E+07
28	6.7379E-02	4.2395E+06	3.1536E+07
29	4.0868E-02	1.0676E+06	3.2603E+07
30	3.1828E-02	3.9359E+05	3.2997E+07
31	2.6058E-02	4.2172E+06	3.7214E+07
32	2.4176E-02	2.8624E+06	4.0076E+07
33	2.1875E-02	4.0967E+06	4.4173E+07
34	1.5034E-02	3.6152E+06	4.7788E+07
35	7.1017E-03	4.8608E+06	5.2649E+07
36	3.3546E-03	3.4359E+06	5.6085E+07
37	1.5846E-03	4.6078E+06	6.0693E+07
38	4.5400E-04	1.8956E+06	6.2588E+07
39	2.1445E-04	2.0102E+06	6.4598E+07
40	1.0130E-04	2.3291E+06	6.6927E+07
41	3.7266E-05	2.2520E+06	6.9179E+07
42	1.0677E-05	1.0204E+06	7.0200E+07
43	5.0435E-06	8.2746E+05	7.1027E+07
44	1.8554E-06	3.1289E+05	7.1340E+07
	8.7643E-07		

TAB. F13

Iron-88 - Calculated Neutron Spectrum, Measurement Position A14 at Z = 73.96 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.0589E-01	1.0589E-01
2	1.4191E+01	3.3157E-01	4.3746E-01
3	1.2214E+01	1.5928E+00	2.0302E+00
4	1.0000E+01	3.0480E+00	5.0782E+00
5	8.6071E+00	4.8586E+00	9.9368E+00
6	7.4082E+00	9.0631E+00	1.9000E+01
7	6.0653E+00	1.5052E+01	3.4052E+01
8	4.9659E+00	4.4131E+01	7.8183E+01
9	3.6788E+00	5.3422E+01	1.3160E+02
10	3.0119E+00	5.0527E+01	1.8213E+02
11	2.7253E+00	7.4838E+01	2.5697E+02
12	2.4660E+00	4.3234E+01	3.0020E+02
13	2.3653E+00	1.6035E+01	3.1624E+02
14	2.3457E+00	9.4777E+01	4.1102E+02
15	2.2313E+00	3.3810E+02	7.4912E+02
16	1.9205E+00	8.9343E+02	1.6425E+03
17	1.6530E+00	2.1244E+03	3.7670E+03
18	1.3534E+00	1.8844E+04	2.2611E+04
19	1.0026E+00	4.9653E+04	7.2264E+04
20	8.2085E-01	1.9173E+04	9.1437E+04
21	7.4274E-01	4.8580E+05	5.7724E+05
22	6.0810E-01	5.3951E+05	1.1167E+06
23	4.9787E-01	8.5185E+05	1.9686E+06
24	3.6883E-01	3.4273E+06	5.3959E+06
25	2.9721E-01	3.4692E+06	8.8651E+06
26	1.8316E-01	6.3209E+06	1.5186E+07
27	1.1109E-01	4.6356E+06	1.9822E+07
28	6.7379E-02	3.2279E+06	2.3049E+07
29	4.0868E-02	8.1353E+05	2.3863E+07
30	3.1828E-02	2.9992E+05	2.4163E+07
31	2.6058E-02	3.3242E+06	2.7487E+07
32	2.4176E-02	2.3049E+06	2.9792E+07
33	2.1875E-02	3.3219E+06	3.3114E+07
34	1.5034E-02	2.9224E+06	3.6036E+07
35	7.1017E-03	3.9433E+06	3.9980E+07
36	3.3546E-03	2.7940E+06	4.2774E+07
37	1.5846E-03	3.7569E+06	4.6531E+07
38	4.5400E-04	1.5472E+06	4.8078E+07
39	2.1445E-04	1.6431E+06	4.9721E+07
40	1.0130E-04	1.9068E+06	5.1628E+07
41	3.7266E-05	1.8465E+06	5.3474E+07
42	1.0677E-05	8.3736E+05	5.4311E+07
43	5.0435E-06	6.7961E+05	5.4991E+07
44	1.8554E-06	2.5710E+05	5.5248E+07
	8.7643E-07		

TAB. F14

Iron-88 - Calculated Neutron Spectrum, Measurement Position A15 at Z = 79.88 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-B7 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	4.6111E-02	4.6111E-02
2	1.4191E+01	1.4037E-01	1.8648E-01
3	1.2214E+01	6.5873E-01	8.4521E-01
4	1.0000E+01	1.2372E+00	2.0824E+00
5	8.6071E+00	1.9106E+00	3.9931E+00
6	7.4082E+00	3.4245E+00	7.4176E+00
7	6.0653E+00	5.5496E+00	1.2967E+01
8	4.9659E+00	1.6050E+01	2.9017E+01
9	3.6788E+00	1.9495E+01	4.8511E+01
10	3.0119E+00	1.8627E+01	6.7139E+01
11	2.7253E+00	2.7728E+01	9.4867E+01
12	2.4660E+00	1.6108E+01	1.1097E+02
13	2.3653E+00	6.0963E+00	1.1707E+02
14	2.3457E+00	3.6555E+01	1.5363E+02
15	2.2313E+00	1.3171E+02	2.8534E+02
16	1.9205E+00	3.6884E+02	6.5418E+02
17	1.6530E+00	9.0509E+02	1.5593E+03
18	1.3534E+00	9.1323E+03	1.0692E+04
19	1.0026E+00	2.6808E+04	3.7499E+04
20	8.2085E-01	1.0323E+04	4.7822E+04
21	7.4274E-01	3.0253E+05	3.5036E+05
22	6.0810E-01	3.4432E+05	6.9468E+05
23	4.9787E-01	5.4973E+05	1.2444E+06
24	3.6883E-01	2.4132E+06	3.6576E+06
25	2.9721E-01	2.4910E+06	6.1486E+06
26	1.8316E-01	4.6995E+06	1.0848E+07
27	1.1109E-01	3.4846E+06	1.4333E+07
28	6.7379E-02	2.4422E+06	1.6775E+07
29	4.0868E-02	6.1610E+05	1.7391E+07
30	3.1828E-02	2.2715E+05	1.7618E+07
31	2.6058E-02	2.5999E+06	2.0218E+07
32	2.4176E-02	1.8450E+06	2.2063E+07
33	2.1875E-02	2.6744E+06	2.4737E+07
34	1.5034E-02	2.3472E+06	2.7085E+07
35	7.1017E-03	3.1823E+06	3.0267E+07
36	3.3546E-03	2.2620E+06	3.2529E+07
37	1.5846E-03	3.0525E+06	3.5581E+07
38	4.5400E-04	1.2590E+06	3.6840E+07
39	2.1445E-04	1.3396E+06	3.8180E+07
40	1.0130E-04	1.5576E+06	3.9737E+07
41	3.7266E-05	1.5108E+06	4.1248E+07
42	1.0677E-05	6.8571E+05	4.1934E+07
43	5.0435E-06	5.5689E+05	4.2491E+07
44	1.8554E-06	2.1074E+05	4.2702E+07
	8.7643E-07		

APPENDIX G

Neutron Spectra Calculated along the Horizontal Axis Z with the BUGLE-96 Library

TAB. G1

Iron-88 - Calculated Neutron Spectrum, Measurement Position A2 at Z = 3.27 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.1140E+04	1.1140E+04
2	1.4191E+01	4.5164E+04	5.6305E+04
3	1.2214E+01	2.6090E+05	3.1720E+05
4	1.0000E+01	5.7984E+05	8.9704E+05
5	8.6071E+00	1.3122E+06	2.2092E+06
6	7.4082E+00	3.7523E+06	5.9614E+06
7	6.0653E+00	7.5791E+06	1.3541E+07
8	4.9659E+00	2.1891E+07	3.5432E+07
9	3.6788E+00	2.1230E+07	5.6662E+07
10	3.0119E+00	1.3752E+07	7.0413E+07
11	2.7253E+00	1.5866E+07	8.6279E+07
12	2.4660E+00	8.3765E+06	9.4655E+07
13	2.3653E+00	1.5651E+06	9.6220E+07
14	2.3457E+00	9.1945E+06	1.0541E+08
15	2.2313E+00	2.9556E+07	1.3497E+08
16	1.9205E+00	3.2114E+07	1.6708E+08
17	1.6530E+00	4.5148E+07	2.1223E+08
18	1.3534E+00	7.8444E+07	2.9068E+08
19	1.0026E+00	4.3841E+07	3.3452E+08
20	8.2085E-01	2.4052E+07	3.5857E+08
21	7.4274E-01	6.2940E+07	4.2151E+08
22	6.0810E-01	5.5636E+07	4.7715E+08
23	4.9787E-01	8.0010E+07	5.5716E+08
24	3.6883E-01	6.4190E+07	6.2135E+08
25	2.9721E-01	1.0587E+08	7.2722E+08
26	1.8316E-01	9.2809E+07	8.2003E+08
27	1.1109E-01	7.5765E+07	8.9579E+08
28	6.7379E-02	4.9540E+07	9.4533E+08
29	4.0868E-02	9.9072E+06	9.5524E+08
30	3.1828E-02	2.4989E+07	9.8023E+08
31	2.6058E-02	2.3500E+07	1.0037E+09
32	2.4176E-02	1.3209E+07	1.0169E+09
33	2.1875E-02	3.4440E+07	1.0514E+09
34	1.5034E-02	5.0518E+07	1.1019E+09
35	7.1017E-03	5.1887E+07	1.1538E+09
36	3.3546E-03	3.9762E+07	1.1935E+09
37	1.5846E-03	6.1259E+07	1.2548E+09
38	4.5400E-04	3.1606E+07	1.2864E+09
39	2.1445E-04	3.0326E+07	1.3167E+09
40	1.0130E-04	3.5843E+07	1.3526E+09
41	3.7266E-05	3.7108E+07	1.3897E+09
42	1.0677E-05	1.9325E+07	1.4090E+09
43	5.0435E-06	2.2726E+07	1.4317E+09
44	1.8554E-06	1.5418E+07	1.4472E+09
	8.7643E-07		

TAB. G2

Iron-88 - Calculated Neutron Spectrum, Measurement Position A3 at Z = 9.11 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.9080E+03	1.9080E+03
2	1.4191E+01	7.5403E+03	9.4482E+03
3	1.2214E+01	4.2764E+04	5.2213E+04
4	1.0000E+01	9.4772E+04	1.4698E+05
5	8.6071E+00	2.0938E+05	3.5636E+05
6	7.4082E+00	5.9307E+05	9.4943E+05
7	6.0653E+00	1.2472E+06	2.1966E+06
8	4.9659E+00	3.9551E+06	6.1517E+06
9	3.6788E+00	4.2224E+06	1.0374E+07
10	3.0119E+00	3.1308E+06	1.3505E+07
11	2.7253E+00	4.0501E+06	1.7555E+07
12	2.4660E+00	2.0777E+06	1.9633E+07
13	2.3653E+00	5.0188E+05	2.0135E+07
14	2.3457E+00	2.6912E+06	2.2826E+07
15	2.2313E+00	8.7973E+06	3.1623E+07
16	1.9205E+00	1.1245E+07	4.2868E+07
17	1.6530E+00	1.7498E+07	6.0366E+07
18	1.3534E+00	3.8483E+07	9.8849E+07
19	1.0026E+00	2.7762E+07	1.2661E+08
20	8.2085E-01	1.3094E+07	1.3970E+08
21	7.4274E-01	5.2537E+07	1.9224E+08
22	6.0810E-01	4.2374E+07	2.3462E+08
23	4.9787E-01	6.0646E+07	2.9526E+08
24	3.6883E-01	6.9222E+07	3.6448E+08
25	2.9721E-01	8.2304E+07	4.4679E+08
26	1.8316E-01	8.7772E+07	5.3456E+08
27	1.1109E-01	6.2580E+07	5.9714E+08
28	6.7379E-02	4.2457E+07	6.3960E+08
29	4.0868E-02	1.0462E+07	6.5006E+08
30	3.1828E-02	3.9287E+06	6.5399E+08
31	2.6058E-02	2.4108E+07	6.7810E+08
32	2.4176E-02	1.2952E+07	6.9105E+08
33	2.1875E-02	2.5018E+07	7.1607E+08
34	1.5034E-02	2.9020E+07	7.4509E+08
35	7.1017E-03	4.0387E+07	7.8547E+08
36	3.3546E-03	2.9531E+07	8.1500E+08
37	1.5846E-03	4.3637E+07	8.5864E+08
38	4.5400E-04	1.9184E+07	8.7782E+08
39	2.1445E-04	2.1380E+07	8.9920E+08
40	1.0130E-04	2.5975E+07	9.2518E+08
41	3.7266E-05	2.6706E+07	9.5189E+08
42	1.0677E-05	1.2719E+07	9.6460E+08
43	5.0435E-06	1.1639E+07	9.7624E+08
44	1.8554E-06	5.7873E+06	9.8203E+08
	8.7643E-07		

TAB. G3

Iron-88 - Calculated Neutron Spectrum, Measurement Position A4 at Z = 14.97 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	6.3797E+02	6.3797E+02
2	1.4191E+01	2.4821E+03	3.1200E+03
3	1.2214E+01	1.3968E+04	1.7088E+04
4	1.0000E+01	3.0924E+04	4.8011E+04
5	8.6071E+00	6.6970E+04	1.1498E+05
6	7.4082E+00	1.8496E+05	2.9994E+05
7	6.0653E+00	3.8812E+05	6.8806E+05
8	4.9659E+00	1.2535E+06	1.9415E+06
9	3.6788E+00	1.3775E+06	3.3190E+06
10	3.0119E+00	1.0745E+06	4.3934E+06
11	2.7253E+00	1.4387E+06	5.8322E+06
12	2.4660E+00	7.4984E+05	6.5820E+06
13	2.3653E+00	1.9723E+05	6.7792E+06
14	2.3457E+00	1.0423E+06	7.8215E+06
15	2.2313E+00	3.4364E+06	1.1258E+07
16	1.9205E+00	4.8150E+06	1.6073E+07
17	1.6530E+00	7.9358E+06	2.4009E+07
18	1.3534E+00	2.0179E+07	4.4188E+07
19	1.0026E+00	1.6913E+07	6.1101E+07
20	8.2085E-01	7.5745E+06	6.8675E+07
21	7.4274E-01	3.8418E+07	1.0709E+08
22	6.0810E-01	3.1428E+07	1.3852E+08
23	4.9787E-01	4.5058E+07	1.8358E+08
24	3.6883E-01	6.1984E+07	2.4556E+08
25	2.9721E-01	6.5274E+07	3.1084E+08
26	1.8316E-01	7.6644E+07	3.8748E+08
27	1.1109E-01	5.2411E+07	4.3989E+08
28	6.7379E-02	3.5382E+07	4.7528E+08
29	4.0868E-02	8.8850E+06	4.8416E+08
30	3.1828E-02	3.2946E+06	4.8745E+08
31	2.6058E-02	2.2278E+07	5.0973E+08
32	2.4176E-02	1.2274E+07	5.2201E+08
33	2.1875E-02	2.0201E+07	5.4221E+08
34	1.5034E-02	2.0530E+07	5.6274E+08
35	7.1017E-03	2.9874E+07	5.9261E+08
36	3.3546E-03	2.1930E+07	6.1454E+08
37	1.5846E-03	3.1450E+07	6.4599E+08
38	4.5400E-04	1.3308E+07	6.5930E+08
39	2.1445E-04	1.4704E+07	6.7400E+08
40	1.0130E-04	1.7906E+07	6.9191E+08
41	3.7266E-05	1.8269E+07	7.1018E+08
42	1.0677E-05	8.5624E+06	7.1874E+08
43	5.0435E-06	7.2640E+06	7.2600E+08
44	1.8554E-06	3.2157E+06	7.2922E+08
	8.7643E-07		

TAB. G4

Iron-88 - Calculated Neutron Spectrum, Measurement Position A5 at Z = 20.83 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.4002E+02	2.4002E+02
2	1.4191E+01	9.1612E+02	1.1561E+03
3	1.2214E+01	5.1104E+03	6.2665E+03
4	1.0000E+01	1.1271E+04	1.7537E+04
5	8.6071E+00	2.3864E+04	4.1401E+04
6	7.4082E+00	6.3873E+04	1.0527E+05
7	6.0653E+00	1.3260E+05	2.3787E+05
8	4.9659E+00	4.2995E+05	6.6782E+05
9	3.6788E+00	4.8082E+05	1.1486E+06
10	3.0119E+00	3.8929E+05	1.5379E+06
11	2.7253E+00	5.3308E+05	2.0710E+06
12	2.4660E+00	2.8225E+05	2.3533E+06
13	2.3653E+00	7.8864E+04	2.4321E+06
14	2.3457E+00	4.1650E+05	2.8486E+06
15	2.2313E+00	1.3828E+06	4.2315E+06
16	1.9205E+00	2.0957E+06	6.3271E+06
17	1.6530E+00	3.6255E+06	9.9526E+06
18	1.3534E+00	1.0514E+07	2.0466E+07
19	1.0026E+00	1.0046E+07	3.0512E+07
20	8.2085E-01	4.3314E+06	3.4844E+07
21	7.4274E-01	2.6759E+07	6.1602E+07
22	6.0810E-01	2.2515E+07	8.4118E+07
23	4.9787E-01	3.2432E+07	1.1655E+08
24	3.6883E-01	5.1750E+07	1.6830E+08
25	2.9721E-01	5.1093E+07	2.1939E+08
26	1.8316E-01	6.4311E+07	2.8370E+08
27	1.1109E-01	4.3359E+07	3.2706E+08
28	6.7379E-02	2.9136E+07	3.5620E+08
29	4.0868E-02	7.3270E+06	3.6352E+08
30	3.1828E-02	2.7102E+06	3.6624E+08
31	2.6058E-02	1.9947E+07	3.8618E+08
32	2.4176E-02	1.1253E+07	3.9743E+08
33	2.1875E-02	1.6960E+07	4.1439E+08
34	1.5034E-02	1.6218E+07	4.3061E+08
35	7.1017E-03	2.2976E+07	4.5359E+08
36	3.3546E-03	1.6733E+07	4.7032E+08
37	1.5846E-03	2.3417E+07	4.9374E+08
38	4.5400E-04	9.7983E+06	5.0354E+08
39	2.1445E-04	1.0654E+07	5.1419E+08
40	1.0130E-04	1.2787E+07	5.2698E+08
41	3.7266E-05	1.2865E+07	5.3984E+08
42	1.0677E-05	5.9873E+06	5.4583E+08
43	5.0435E-06	4.9681E+06	5.5080E+08
44	1.8554E-06	2.1321E+06	5.5293E+08
	8.7643E-07		

TAB. G5

Iron-88 - Calculated Neutron Spectrum, Measurement Position A6 at Z = 26.67 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	9.6359E+01	9.6359E+01
2	1.4191E+01	3.6166E+02	4.5801E+02
3	1.2214E+01	2.0008E+03	2.4588E+03
4	1.0000E+01	4.3808E+03	6.8395E+03
5	8.6071E+00	9.0363E+03	1.5876E+04
6	7.4082E+00	2.3322E+04	3.9198E+04
7	6.0653E+00	4.7579E+04	8.6777E+04
8	4.9659E+00	1.5351E+05	2.4028E+05
9	3.6788E+00	1.7374E+05	4.1403E+05
10	3.0119E+00	1.4481E+05	5.5884E+05
11	2.7253E+00	2.0148E+05	7.6032E+05
12	2.4660E+00	1.0823E+05	8.6854E+05
13	2.3653E+00	3.1724E+04	9.0027E+05
14	2.3457E+00	1.6858E+05	1.0688E+06
15	2.2313E+00	5.6315E+05	1.6320E+06
16	1.9205E+00	9.1587E+05	2.5479E+06
17	1.6530E+00	1.6535E+06	4.2014E+06
18	1.3534E+00	5.4255E+06	9.6268E+06
19	1.0026E+00	5.8561E+06	1.5483E+07
20	8.2085E-01	2.4523E+06	1.7935E+07
21	7.4274E-01	1.8095E+07	3.6030E+07
22	6.0810E-01	1.5731E+07	5.1761E+07
23	4.9787E-01	2.2822E+07	7.4583E+07
24	3.6883E-01	4.1403E+07	1.1599E+08
25	2.9721E-01	3.9518E+07	1.5550E+08
26	1.8316E-01	5.2566E+07	2.0807E+08
27	1.1109E-01	3.5401E+07	2.4347E+08
28	6.7379E-02	2.3745E+07	2.6722E+08
29	4.0868E-02	5.9691E+06	2.7318E+08
30	3.1828E-02	2.2058E+06	2.7539E+08
31	2.6058E-02	1.7383E+07	2.9277E+08
32	2.4176E-02	1.0046E+07	3.0282E+08
33	2.1875E-02	1.4468E+07	3.1729E+08
34	1.5034E-02	1.3444E+07	3.3073E+08
35	7.1017E-03	1.8459E+07	3.4919E+08
36	3.3546E-03	1.3261E+07	3.6245E+08
37	1.5846E-03	1.8206E+07	3.8066E+08
38	4.5400E-04	7.5677E+06	3.8823E+08
39	2.1445E-04	8.1396E+06	3.9636E+08
40	1.0130E-04	9.6370E+06	4.0600E+08
41	3.7266E-05	9.5600E+06	4.1556E+08
42	1.0677E-05	4.4131E+06	4.1997E+08
43	5.0435E-06	3.6223E+06	4.2360E+08
44	1.8554E-06	1.5383E+06	4.2514E+08
	8.7643E-07		

TAB. G6

Iron-88 - Calculated Neutron Spectrum, Measurement Position A7 at Z = 32.61 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	3.9911E+01	3.9911E+01
2	1.4191E+01	1.4645E+02	1.8636E+02
3	1.2214E+01	7.9787E+02	9.8424E+02
4	1.0000E+01	1.7246E+03	2.7088E+03
5	8.6071E+00	3.4487E+03	6.1575E+03
6	7.4082E+00	8.5459E+03	1.4703E+04
7	6.0653E+00	1.7065E+04	3.1769E+04
8	4.9659E+00	5.4583E+04	8.6352E+04
9	3.6788E+00	6.2439E+04	1.4879E+05
10	3.0119E+00	5.3374E+04	2.0217E+05
11	2.7253E+00	7.5159E+04	2.7732E+05
12	2.4660E+00	4.0919E+04	3.1824E+05
13	2.3653E+00	1.2527E+04	3.3077E+05
14	2.3457E+00	6.7134E+04	3.9790E+05
15	2.2313E+00	2.2555E+05	6.2345E+05
16	1.9205E+00	3.9269E+05	1.0161E+06
17	1.6530E+00	7.3774E+05	1.7539E+06
18	1.3534E+00	2.7357E+06	4.4896E+06
19	1.0026E+00	3.3254E+06	7.8150E+06
20	8.2085E-01	1.3599E+06	9.1749E+06
21	7.4274E-01	1.1885E+07	2.1060E+07
22	6.0810E-01	1.0696E+07	3.1755E+07
23	4.9787E-01	1.5657E+07	4.7412E+07
24	3.6883E-01	3.1978E+07	7.9390E+07
25	2.9721E-01	3.0063E+07	1.0945E+08
26	1.8316E-01	4.1946E+07	1.5140E+08
27	1.1109E-01	2.8405E+07	1.7980E+08
28	6.7379E-02	1.9066E+07	1.9887E+08
29	4.0868E-02	4.7919E+06	2.0366E+08
30	3.1828E-02	1.7695E+06	2.0543E+08
31	2.6058E-02	1.4775E+07	2.2021E+08
32	2.4176E-02	8.7531E+06	2.2896E+08
33	2.1875E-02	1.2335E+07	2.4129E+08
34	1.5034E-02	1.1285E+07	2.5258E+08
35	7.1017E-03	1.5189E+07	2.6777E+08
36	3.3546E-03	1.0787E+07	2.7855E+08
37	1.5846E-03	1.4607E+07	2.9316E+08
38	4.5400E-04	6.0384E+06	2.9920E+08
39	2.1445E-04	6.4444E+06	3.0564E+08
40	1.0130E-04	7.5537E+06	3.1320E+08
41	3.7266E-05	7.4095E+06	3.2061E+08
42	1.0677E-05	3.3946E+06	3.2400E+08
43	5.0435E-06	2.7632E+06	3.2676E+08
44	1.8554E-06	1.1661E+06	3.2793E+08
	8.7643E-07		

TAB. G7

Iron-88 - Calculated Neutron Spectrum, Measurement Position A8 at Z = 38.50 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.6901E+01	1.6901E+01
2	1.4191E+01	6.0653E+01	7.7554E+01
3	1.2214E+01	3.2512E+02	4.0268E+02
4	1.0000E+01	6.9293E+02	1.0956E+03
5	8.6071E+00	1.3419E+03	2.4375E+03
6	7.4082E+00	3.1900E+03	5.6275E+03
7	6.0653E+00	6.2287E+03	1.1856E+04
8	4.9659E+00	1.9719E+04	3.1575E+04
9	3.6788E+00	2.2763E+04	5.4338E+04
10	3.0119E+00	1.9896E+04	7.4234E+04
11	2.7253E+00	2.8306E+04	1.0254E+05
12	2.4660E+00	1.5597E+04	1.1814E+05
13	2.3653E+00	4.9591E+03	1.2310E+05
14	2.3457E+00	2.6863E+04	1.4996E+05
15	2.2313E+00	9.0807E+04	2.4077E+05
16	1.9205E+00	1.6867E+05	4.0944E+05
17	1.6530E+00	3.2897E+05	7.3841E+05
18	1.3534E+00	1.3754E+06	2.1138E+06
19	1.0026E+00	1.8746E+06	3.9884E+06
20	8.2085E-01	7.5263E+05	4.7411E+06
21	7.4274E-01	7.7162E+06	1.2457E+07
22	6.0810E-01	7.1851E+06	1.9642E+07
23	4.9787E-01	1.0626E+07	3.0268E+07
24	3.6883E-01	2.4201E+07	5.4469E+07
25	2.9721E-01	2.2696E+07	7.7165E+07
26	1.8316E-01	3.3027E+07	1.1019E+08
27	1.1109E-01	2.2565E+07	1.3276E+08
28	6.7379E-02	1.5185E+07	1.4794E+08
29	4.0868E-02	3.8171E+06	1.5176E+08
30	3.1828E-02	1.4089E+06	1.5317E+08
31	2.6058E-02	1.2360E+07	1.6553E+08
32	2.4176E-02	7.5005E+06	1.7303E+08
33	2.1875E-02	1.0486E+07	1.8351E+08
34	1.5034E-02	9.5023E+06	1.9302E+08
35	7.1017E-03	1.2674E+07	2.0569E+08
36	3.3546E-03	8.9409E+06	2.1463E+08
37	1.5846E-03	1.2006E+07	2.2664E+08
38	4.5400E-04	4.9449E+06	2.3158E+08
39	2.1445E-04	5.2499E+06	2.3683E+08
40	1.0130E-04	6.1130E+06	2.4294E+08
41	3.7266E-05	5.9504E+06	2.4889E+08
42	1.0677E-05	2.7114E+06	2.5161E+08
43	5.0435E-06	2.1937E+06	2.5380E+08
44	1.8554E-06	9.2174E+05	2.5472E+08
	8.7643E-07		

TAB. G8

Iron-88 - Calculated Neutron Spectrum, Measurement Position A9 at Z = 44.44 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	7.2173E+00	7.2173E+00
2	1.4191E+01	2.5290E+01	3.2507E+01
3	1.2214E+01	1.3297E+02	1.6548E+02
4	1.0000E+01	2.7867E+02	4.4414E+02
5	8.6071E+00	5.2157E+02	9.6571E+02
6	7.4082E+00	1.1876E+03	2.1533E+03
7	6.0653E+00	2.2642E+03	4.4175E+03
8	4.9659E+00	7.0847E+03	1.1502E+04
9	3.6788E+00	8.2454E+03	1.9748E+04
10	3.0119E+00	7.3523E+03	2.7100E+04
11	2.7253E+00	1.0552E+04	3.7652E+04
12	2.4660E+00	5.8792E+03	4.3531E+04
13	2.3653E+00	1.9360E+03	4.5467E+04
14	2.3457E+00	1.0611E+04	5.6078E+04
15	2.2313E+00	3.6101E+04	9.2179E+04
16	1.9205E+00	7.1462E+04	1.6364E+05
17	1.6530E+00	1.4451E+05	3.0815E+05
18	1.3534E+00	6.8182E+05	9.8997E+05
19	1.0026E+00	1.0409E+06	2.0309E+06
20	8.2085E-01	4.1176E+05	2.4426E+06
21	7.4274E-01	4.9329E+06	7.3755E+06
22	6.0810E-01	4.7493E+06	1.2125E+07
23	4.9787E-01	7.1022E+06	1.9227E+07
24	3.6883E-01	1.7947E+07	3.7174E+07
25	2.9721E-01	1.6929E+07	5.4103E+07
26	1.8316E-01	2.5618E+07	7.9721E+07
27	1.1109E-01	1.7692E+07	9.7413E+07
28	6.7379E-02	1.1952E+07	1.0937E+08
29	4.0868E-02	3.0056E+06	1.1237E+08
30	3.1828E-02	1.1090E+06	1.1348E+08
31	2.6058E-02	1.0176E+07	1.2366E+08
32	2.4176E-02	6.3212E+06	1.2998E+08
33	2.1875E-02	8.8324E+06	1.3881E+08
34	1.5034E-02	7.9488E+06	1.4676E+08
35	7.1017E-03	1.0573E+07	1.5733E+08
36	3.3546E-03	7.4374E+06	1.6477E+08
37	1.5846E-03	9.9455E+06	1.7471E+08
38	4.5400E-04	4.0878E+06	1.7880E+08
39	2.1445E-04	4.3271E+06	1.8313E+08
40	1.0130E-04	5.0186E+06	1.8815E+08
41	3.7266E-05	4.8621E+06	1.9301E+08
42	1.0677E-05	2.2079E+06	1.9522E+08
43	5.0435E-06	1.7793E+06	1.9700E+08
44	1.8554E-06	7.4547E+05	1.9774E+08
	8.7643E-07		

TAB. G9

Iron-88 - Calculated Neutron Spectrum, Measurement Position A10 at Z = 50.38 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	3.0577E+00	3.0577E+00
2	1.4191E+01	1.0469E+01	1.3526E+01
3	1.2214E+01	5.4095E+01	6.7621E+01
4	1.0000E+01	1.1167E+02	1.7929E+02
5	8.6071E+00	2.0232E+02	3.8161E+02
6	7.4082E+00	4.4169E+02	8.2330E+02
7	6.0653E+00	8.2269E+02	1.6460E+03
8	4.9659E+00	2.5450E+03	4.1910E+03
9	3.6788E+00	2.9830E+03	7.1740E+03
10	3.0119E+00	2.7094E+03	9.8834E+03
11	2.7253E+00	3.9233E+03	1.3807E+04
12	2.4660E+00	2.2073E+03	1.6014E+04
13	2.3653E+00	7.4920E+02	1.6763E+04
14	2.3457E+00	4.1639E+03	2.0927E+04
15	2.2313E+00	1.4277E+04	3.5204E+04
16	1.9205E+00	3.0069E+04	6.5273E+04
17	1.6530E+00	6.3006E+04	1.2828E+05
18	1.3534E+00	3.3578E+05	4.6406E+05
19	1.0026E+00	5.7343E+05	1.0375E+06
20	8.2085E-01	2.2426E+05	1.2617E+06
21	7.4274E-01	3.1267E+06	4.3885E+06
22	6.0810E-01	3.1080E+06	7.4965E+06
23	4.9787E-01	4.7020E+06	1.2198E+07
24	3.6883E-01	1.3123E+07	2.5322E+07
25	2.9721E-01	1.2520E+07	3.7842E+07
26	1.8316E-01	1.9660E+07	5.7501E+07
27	1.1109E-01	1.3737E+07	7.1238E+07
28	6.7379E-02	9.3233E+06	8.0561E+07
29	4.0868E-02	2.3460E+06	8.2907E+07
30	3.1828E-02	8.6548E+05	8.3773E+07
31	2.6058E-02	8.2785E+06	9.2051E+07
32	2.4176E-02	5.2588E+06	9.7310E+07
33	2.1875E-02	7.3742E+06	1.0468E+08
34	1.5034E-02	6.6001E+06	1.1128E+08
35	7.1017E-03	8.7837E+06	1.2007E+08
36	3.3546E-03	6.1763E+06	1.2624E+08
37	1.5846E-03	8.2486E+06	1.3449E+08
38	4.5400E-04	3.3878E+06	1.3788E+08
39	2.1445E-04	3.5816E+06	1.4146E+08
40	1.0130E-04	4.1464E+06	1.4561E+08
41	3.7266E-05	4.0075E+06	1.4962E+08
42	1.0677E-05	1.8165E+06	1.5143E+08
43	5.0435E-06	1.4607E+06	1.5289E+08
44	1.8554E-06	6.1100E+05	1.5350E+08
	8.7643E-07		

TAB. G10

Iron-88 - Calculated Neutron Spectrum, Measurement Position A11 at Z = 56.37 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.2987E+00	1.2987E+00
2	1.4191E+01	4.3393E+00	5.6380E+00
3	1.2214E+01	2.1979E+01	2.7617E+01
4	1.0000E+01	4.4600E+01	7.2218E+01
5	8.6071E+00	7.8130E+01	1.5035E+02
6	7.4082E+00	1.6342E+02	3.1376E+02
7	6.0653E+00	2.9712E+02	6.1088E+02
8	4.9659E+00	9.0782E+02	1.5187E+03
9	3.6788E+00	1.0709E+03	2.5896E+03
10	3.0119E+00	9.8900E+02	3.5786E+03
11	2.7253E+00	1.4433E+03	5.0220E+03
12	2.4660E+00	8.1940E+02	5.8414E+03
13	2.3653E+00	2.8622E+02	6.1276E+03
14	2.3457E+00	1.6135E+03	7.7411E+03
15	2.2313E+00	5.5766E+03	1.3318E+04
16	1.9205E+00	1.2494E+04	2.5811E+04
17	1.6530E+00	2.7107E+04	5.2918E+04
18	1.3534E+00	1.6347E+05	2.1639E+05
19	1.0026E+00	3.1224E+05	5.2863E+05
20	8.2085E-01	1.2099E+05	6.4962E+05
21	7.4274E-01	1.9605E+06	2.6101E+06
22	6.0810E-01	2.0090E+06	4.6191E+06
23	4.9787E-01	3.0757E+06	7.6948E+06
24	3.6883E-01	9.4568E+06	1.7152E+07
25	2.9721E-01	9.1593E+06	2.6311E+07
26	1.8316E-01	1.4909E+07	4.1220E+07
27	1.1109E-01	1.0545E+07	5.1765E+07
28	6.7379E-02	7.1946E+06	5.8960E+07
29	4.0868E-02	1.8116E+06	6.0771E+07
30	3.1828E-02	6.6828E+05	6.1440E+07
31	2.6058E-02	6.6501E+06	6.8090E+07
32	2.4176E-02	4.3177E+06	7.2407E+07
33	2.1875E-02	6.0900E+06	7.8497E+07
34	1.5034E-02	5.4254E+06	8.3923E+07
35	7.1017E-03	7.2354E+06	9.1158E+07
36	3.3546E-03	5.0924E+06	9.6251E+07
37	1.5846E-03	6.8045E+06	1.0306E+08
38	4.5400E-04	2.7949E+06	1.0585E+08
39	2.1445E-04	2.9544E+06	1.0880E+08
40	1.0130E-04	3.4189E+06	1.1222E+08
41	3.7266E-05	3.3019E+06	1.1553E+08
42	1.0677E-05	1.4957E+06	1.1702E+08
43	5.0435E-06	1.2017E+06	1.1822E+08
44	1.8554E-06	5.0228E+05	1.1872E+08
	8.7643E-07		

TAB. G11

Iron-88 - Calculated Neutron Spectrum, Measurement Position A12 at Z = 62.29 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	5.6107E-01	5.6107E-01
2	1.4191E+01	1.8285E+00	2.3895E+00
3	1.2214E+01	9.0650E+00	1.1455E+01
4	1.0000E+01	1.8070E+01	2.9525E+01
5	8.6071E+00	3.0616E+01	6.0140E+01
6	7.4082E+00	6.1400E+01	1.2154E+02
7	6.0653E+00	1.0899E+02	2.3053E+02
8	4.9659E+00	3.2884E+02	5.5937E+02
9	3.6788E+00	3.9006E+02	9.4944E+02
10	3.0119E+00	3.6559E+02	1.3150E+03
11	2.7253E+00	5.3727E+02	1.8523E+03
12	2.4660E+00	3.0750E+02	2.1598E+03
13	2.3653E+00	1.1025E+02	2.2700E+03
14	2.3457E+00	6.3059E+02	2.9006E+03
15	2.2313E+00	2.1976E+03	5.0982E+03
16	1.9205E+00	5.2292E+03	1.0327E+04
17	1.6530E+00	1.1734E+04	2.2061E+04
18	1.3534E+00	8.0023E+04	1.0208E+05
19	1.0026E+00	1.7056E+05	2.7264E+05
20	8.2085E-01	6.5625E+04	3.3827E+05
21	7.4274E-01	1.2306E+06	1.5688E+06
22	6.0810E-01	1.2974E+06	2.8662E+06
23	4.9787E-01	2.0096E+06	4.8758E+06
24	3.6883E-01	6.7800E+06	1.1656E+07
25	2.9721E-01	6.6806E+06	1.8336E+07
26	1.8316E-01	1.1257E+07	2.9593E+07
27	1.1109E-01	8.0605E+06	3.7653E+07
28	6.7379E-02	5.5292E+06	4.3183E+07
29	4.0868E-02	1.3933E+06	4.4576E+07
30	3.1828E-02	5.1394E+05	4.5090E+07
31	2.6058E-02	5.3084E+06	5.0398E+07
32	2.4176E-02	3.5201E+06	5.3918E+07
33	2.1875E-02	4.9991E+06	5.8917E+07
34	1.5034E-02	4.4357E+06	6.3353E+07
35	7.1017E-03	5.9320E+06	6.9285E+07
36	3.3546E-03	4.1818E+06	7.3467E+07
37	1.5846E-03	5.5960E+06	7.9063E+07
38	4.5400E-04	2.2998E+06	8.1363E+07
39	2.1445E-04	2.4325E+06	8.3795E+07
40	1.0130E-04	2.8163E+06	8.6612E+07
41	3.7266E-05	2.7208E+06	8.9332E+07
42	1.0677E-05	1.2326E+06	9.0565E+07
43	5.0435E-06	9.9024E+05	9.1555E+07
44	1.8554E-06	4.1388E+05	9.1969E+07
	8.7643E-07		

TAB. G12

Iron-88 - Calculated Neutron Spectrum, Measurement Position A13 at Z = 68.10 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	2.4644E-01	2.4644E-01
2	1.4191E+01	7.8372E-01	1.0302E+00
3	1.2214E+01	3.8056E+00	4.8357E+00
4	1.0000E+01	7.4582E+00	1.2294E+01
5	8.6071E+00	1.2239E+01	2.4533E+01
6	7.4082E+00	2.3573E+01	4.8106E+01
7	6.0653E+00	4.0880E+01	8.8986E+01
8	4.9659E+00	1.2182E+02	2.1080E+02
9	3.6788E+00	1.4516E+02	3.5596E+02
10	3.0119E+00	1.3785E+02	4.9381E+02
11	2.7253E+00	2.0390E+02	6.9771E+02
12	2.4660E+00	1.1754E+02	8.1524E+02
13	2.3653E+00	4.3145E+01	8.5839E+02
14	2.3457E+00	2.5037E+02	1.1088E+03
15	2.2313E+00	8.8012E+02	1.9889E+03
16	1.9205E+00	2.2204E+03	4.2093E+03
17	1.6530E+00	5.1469E+03	9.3562E+03
18	1.3534E+00	3.9644E+04	4.9000E+04
19	1.0026E+00	9.4006E+04	1.4301E+05
20	8.2085E-01	3.5980E+04	1.7899E+05
21	7.4274E-01	7.7717E+05	9.5616E+05
22	6.0810E-01	8.4113E+05	1.7973E+06
23	4.9787E-01	1.3179E+06	3.1151E+06
24	3.6883E-01	4.8590E+06	7.9741E+06
25	2.9721E-01	4.8757E+06	1.2850E+07
26	1.8316E-01	8.4945E+06	2.1344E+07
27	1.1109E-01	6.1562E+06	2.7501E+07
28	6.7379E-02	4.2462E+06	3.1747E+07
29	4.0868E-02	1.0708E+06	3.2817E+07
30	3.1828E-02	3.9498E+05	3.3212E+07
31	2.6058E-02	4.2248E+06	3.7437E+07
32	2.4176E-02	2.8597E+06	4.0297E+07
33	2.1875E-02	4.0904E+06	4.4387E+07
34	1.5034E-02	3.6169E+06	4.8004E+07
35	7.1017E-03	4.8519E+06	5.2856E+07
36	3.3546E-03	3.4271E+06	5.6283E+07
37	1.5846E-03	4.5955E+06	6.0879E+07
38	4.5400E-04	1.8902E+06	6.2769E+07
39	2.1445E-04	2.0012E+06	6.4770E+07
40	1.0130E-04	2.3195E+06	6.7090E+07
41	3.7266E-05	2.2431E+06	6.9333E+07
42	1.0677E-05	1.0167E+06	7.0350E+07
43	5.0435E-06	8.1727E+05	7.1167E+07
44	1.8554E-06	3.4168E+05	7.1509E+07
	8.7643E-07		

TAB. G13

Iron-88 - Calculated Neutron Spectrum, Measurement Position A14 at Z = 73.96 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	1.0797E-01	1.0797E-01
2	1.4191E+01	3.3438E-01	4.4235E-01
3	1.2214E+01	1.5873E+00	2.0297E+00
4	1.0000E+01	3.0562E+00	5.0858E+00
5	8.6071E+00	4.8569E+00	9.9428E+00
6	7.4082E+00	8.9851E+00	1.8928E+01
7	6.0653E+00	1.5220E+01	3.4148E+01
8	4.9659E+00	4.4774E+01	7.8923E+01
9	3.6788E+00	5.3566E+01	1.3249E+02
10	3.0119E+00	5.1476E+01	1.8396E+02
11	2.7253E+00	7.6589E+01	2.6055E+02
12	2.4660E+00	4.4443E+01	3.0500E+02
13	2.3653E+00	1.6694E+01	3.2169E+02
14	2.3457E+00	9.8237E+01	4.1993E+02
15	2.2313E+00	3.4844E+02	7.6837E+02
16	1.9205E+00	9.3240E+02	1.7008E+03
17	1.6530E+00	2.2320E+03	3.9328E+03
18	1.3534E+00	1.9466E+04	2.3399E+04
19	1.0026E+00	5.1382E+04	7.4781E+04
20	8.2085E-01	1.9584E+04	9.4365E+04
21	7.4274E-01	4.8746E+05	5.8182E+05
22	6.0810E-01	5.4093E+05	1.1228E+06
23	4.9787E-01	8.5715E+05	1.9799E+06
24	3.6883E-01	3.4511E+06	5.4310E+06
25	2.9721E-01	3.5300E+06	8.9609E+06
26	1.8316E-01	6.3608E+06	1.5322E+07
27	1.1109E-01	4.6648E+06	1.9987E+07
28	6.7379E-02	3.2360E+06	2.3223E+07
29	4.0868E-02	8.1672E+05	2.4039E+07
30	3.1828E-02	3.0127E+05	2.4341E+07
31	2.6058E-02	3.3334E+06	2.7674E+07
32	2.4176E-02	2.3048E+06	2.9979E+07
33	2.1875E-02	3.3198E+06	3.3299E+07
34	1.5034E-02	2.9263E+06	3.6225E+07
35	7.1017E-03	3.9396E+06	4.0164E+07
36	3.3546E-03	2.7894E+06	4.2954E+07
37	1.5846E-03	3.7502E+06	4.6704E+07
38	4.5400E-04	1.5442E+06	4.8248E+07
39	2.1445E-04	1.6372E+06	4.9885E+07
40	1.0130E-04	1.9005E+06	5.1786E+07
41	3.7266E-05	1.8406E+06	5.3627E+07
42	1.0677E-05	8.3503E+05	5.4462E+07
43	5.0435E-06	6.7175E+05	5.5133E+07
44	1.8554E-06	2.8098E+05	5.5414E+07
	8.7643E-07		

TAB. G14

Iron-88 - Calculated Neutron Spectrum, Measurement Position A15 at Z = 79.88 cm.
[neutrons × cm^{-2} × s^{-1}]
P_3-S_8 TORT-3.2 (X,Y,Z) Calculation Using the BUGLE-96 Library.

Group	Upper Energy [MeV]	TORT-3.2 (X,Y,Z) Neutron Flux	Cumulative Neutron Flux
1	1.7332E+01	4.6995E-02	4.6995E-02
2	1.4191E+01	1.4162E-01	1.8861E-01
3	1.2214E+01	6.5631E-01	8.4492E-01
4	1.0000E+01	1.2407E+00	2.0856E+00
5	8.6071E+00	1.9094E+00	3.9950E+00
6	7.4082E+00	3.3932E+00	7.3882E+00
7	6.0653E+00	5.6136E+00	1.3002E+01
8	4.9659E+00	1.6297E+01	2.9299E+01
9	3.6788E+00	1.9560E+01	4.8859E+01
10	3.0119E+00	1.9000E+01	6.7858E+01
11	2.7253E+00	2.8423E+01	9.6282E+01
12	2.4660E+00	1.6593E+01	1.1288E+02
13	2.3653E+00	6.3685E+00	1.1924E+02
14	2.3457E+00	3.8021E+01	1.5726E+02
15	2.2313E+00	1.3613E+02	2.9340E+02
16	1.9205E+00	3.8656E+02	6.7996E+02
17	1.6530E+00	9.5575E+02	1.6357E+03
18	1.3534E+00	9.4675E+03	1.1103E+04
19	1.0026E+00	2.7847E+04	3.8950E+04
20	8.2085E-01	1.0583E+04	4.9533E+04
21	7.4274E-01	3.0372E+05	3.5325E+05
22	6.0810E-01	3.4536E+05	6.9862E+05
23	4.9787E-01	5.5339E+05	1.2520E+06
24	3.6883E-01	2.4318E+06	3.6838E+06
25	2.9721E-01	2.5371E+06	6.2209E+06
26	1.8316E-01	4.7336E+06	1.0954E+07
27	1.1109E-01	3.5098E+06	1.4464E+07
28	6.7379E-02	2.4506E+06	1.6915E+07
29	4.0868E-02	6.1909E+05	1.7534E+07
30	3.1828E-02	2.2839E+05	1.7762E+07
31	2.6058E-02	2.6095E+06	2.0372E+07
32	2.4176E-02	1.8466E+06	2.2218E+07
33	2.1875E-02	2.6751E+06	2.4894E+07
34	1.5034E-02	2.3524E+06	2.7246E+07
35	7.1017E-03	3.1821E+06	3.0428E+07
36	3.3546E-03	2.2602E+06	3.2688E+07
37	1.5846E-03	3.0497E+06	3.5738E+07
38	4.5400E-04	1.2576E+06	3.6996E+07
39	2.1445E-04	1.3358E+06	3.8331E+07
40	1.0130E-04	1.5537E+06	3.9885E+07
41	3.7266E-05	1.5071E+06	4.1392E+07
42	1.0677E-05	6.8424E+05	4.2077E+07
43	5.0435E-06	5.5075E+05	4.2627E+07
44	1.8554E-06	2.3042E+05	4.2858E+07
	8.7643E-07		