812

JAERI 1248

JAERI 1248
INDC(JAP)-31/G
NEANDC(J)-45/AL

Fission Product Fast Reactor Constants System of JNDC

November 1976

日 本 原 子 力 研 究 所

Japan Atomic Energy Research Institute

JAERI レポート

この報告書は，日本原子力研究所で行なわれた研究および技術の成果を研究成果編集委員会の審査を経て，不定期に刊行しているものです．

入手（資料交換による），複製などのお問合わせは，日本原子力研究所技術情報部（〒319-11 茨城県那珂郡東海村）あて，お申しこみください．なお，このほかに財団法人原子力弘済会情報サービス事業部（茨城県那珂郡東海村日本原子力研究所内）で複写による実費頒布をおこなっております．

JAERI Report

Inquiries about the availability of reports and their reproduction should be addressed to the Division of Technical Information, Japan Atomic Energy Research Institute, Tokai-mura, Naka-gun, Ibaraki-ken, Japan.

編集兼発行　日本原子力研究所
印　　刷　学術図書印刷

Fission Product Fast Reactor Constants System of JNDC

Yasuyuki KIKUCHI, Akira HASEGAWA, Hideo NISHIMURA
and Kanji TASAKA

FP Fast Reactor Constants Working Group
Japanese Nuclear Data Committee
Tokai Research Establishment

Received July 17, 1976

Abstract

The Fission Product Fast Reactor Constants System of JNDC has been developed for providing the FP group constants set rather automatically from the Japanese Evaluated Nuclear Data Library (JENDL). In the present version, the evaluation by JNDC was adopted for the 28 important nuclides and the evaluation by Cook was supplementally used for the other nuclides to obtain the lumped group constants.

The burn-up time dependence of the lumped constants were examined. The change of capture cross sections are about 5% between 60 days and 720 days of burn-up for any type of fast reactors. The 28 important nuclides take more than 80% of total capture by fission products and cover 40% of elastic scattering and 60% of inelastic scattering.

The JNDC FP lumped constants were compared with those based on Cook's evaluation and on the ENDF/B-4. The discrepancies among the three are 15% for capture and 10% for both of elastic and inelastic scattering.

A benchmark test was performed using the integral measurements made in RCN, Petten, the Netherlands, in order to check the reliability of the JNDC FP group constants. The JNDC constants give better agreements than the Cook and ENDF/B-4 constants with the experiments both for FP mixtures and for separated isotopes.

JNDC-FP 高速炉定数システム

菊池康之，長谷川　明，西村秀夫，田坂完二

シグマ研究専門委員会，炉定数専門部会
FP 高速炉定数ワーキンググループ

1976 年 6 月 17 日　受理

要　旨

シグマ委員会 (JNDC) で評価され，JENDL (Japanese Evaluated Nuclear Data Library) に収納されたFP 核データから，半自動的に FP 炉定数を作成するシステムを開発し，JNDC-FP 高速炉定数システムと命名した．今回は，重要 28 核種に対して JNDC の評価値を，その他の核種に対しては Cook の評価値を用いて，ランプ化定数を作成した．

ランプ化定数の燃焼度依存性を調べた結果，捕獲断面積の変化は，60 日から 720 日の間で約 5% であった．重要 28 核種のランプ化定数への寄与は，捕獲，弾性散乱，非弾性散乱に対して，それぞれ 80%，40%，60% である．今回の定数を，ENDF/B-4 や Cook の評価値によるものと比較すると，捕獲で 15%，弾性・非弾性散乱で 10% 程度の不一致が見られた．

今回の定数の信頼性を確認するために，オランダの Petten 研究所で測定された積分実験値を用いて，ベンチマークテストを行なった．その結果，今回の定数は，ENDF/B-4 や Cook による定数より，実験値を良好に再現できる事が判明した．

Contents

目　次

1. Introduction

Effects of fission products (FP) have an important role in predicting long term characteristics of fast reactors. When the JAERI-Fast set[1,2] was produced in 1969, however, no evaluated FP data were available in Japan and rather old values in the ABBN-set[3] were temporarily adopted. Since then several evaluations[4-9] have been carried out in other countries. However, there exist considerable discrepancies among them, since most of FP nuclides are radioactive and therefore their experimental data are generally scarce. It is difficult to select the most reliable set among them, because the details of these evaluations are not known for us. Hence it has been much required to evaluate FP nuclear data by ourselves.

Under this situation, the Japanese Nuclear Data Committee started evaluation of FP nuclear data in 1970. At the first stage 28 nuclides were selected as important ones because of their large macroscopic cross sections in the equilibrium core of typical fast reactors, and main efforts were devoted to evaluation of these nuclides.

Preliminary results of this work[10] were released in 1973. A set of group constants of JAERI-Fast set type was produced and various tests were performed.[11,12] It was pointed out from these tests that the capture cross sections were too high in this preliminary version. This may be caused partly by negligence of the Porter-Thomas fluctuation of neutron width and partly by applying the statistical model in the energy range down to 100 eV where the resonance structure cannot be neglected. Bearing in mind these drawbacks in the preliminary evaluation, a revision work was carried out on the 28 important nuclides using a more sophisticated model and taking accout of the resonance structure. The revised version[13] of evaluation was released early in 1975. The group constants were also revised with these new data. This report concerns the revised version of JNDC FP group constants.

As widely known, the group constants of individual FP nuclides are not generally used in actual reactor calculations, and they must be lumped to the constants of a few pseudo FP nuclides by using their concentrations as weights. Though the present 28 important FP nuclides cover more than 80% of total capture by fission products, the number of 28 is not sufficient to produce the lumped group constants. On the other hand, we already have group constants of 192 FP nuclides[14] based on evaluated data by Cook[6]. These constants of 192 nuclides were used supplementally in producing the lumped cross sections.

Evaluation of another 68 FP nuclides are now in progress by JNDC, and the group constants of these nuclides must be produced in future. Considering such a situation, we have developed a system in which the lumped group constants can be produced rather automatically from the evaluated cross sections of the ENDF/B format. This system is named as JNDC FP Fast Reactor Constants System. Detailed description of the system is given in Chapter 2.

In Chapter 3 some problems are discussed concerning the JNDC group constants. Burn-up time dependence of the lumped cross sections is examined for two typical fast reactors. The JNDC group constants are compared with various other sets. Contribution of the 28 nuclides is discussed to capture, elastic scattering and inelastic scattering by fission products.

The JNDC group constants were tested by the use of integral measurements performed at the STEK facility in RCN, Petten, the Netherlands, with which they adjusted their FP group constants[15,16]. Central reactivity worths were calculated with the JNDC constants for three FP mixture samples and for some separated isotope samples. The calculated results were compared

with the experimental ones. The applicability of the JNDC constants was thus proved to be excellent. The discussion is given in Chapter 4.

The group constants of the 28 nuclides are tabulated in Appendix 1. The lumped constants at burn-up of 360 days are given in Appendix 2 and the concentrations of each nuclide are given in Appendix 3 at various burn-up stages. User's guides to drive the JNDC FP Fast Reactor Constants System are given in Appendix 4.

2. JNDC FP Fast Reactor Constants System

2.1 General Description

A block diagram of the system is shown in **Fig. 1**. The process codes UKTOA, COMPLETION, REPLACE, FPYD and FPLUMP were developed for the present purpose. On the other hand, the codes PROF-GROUCH-G-II[17], PROF-GROUCH-G[18] and FP-S[19] were already developed for more general purposes and only subsystems of these codes are used in the present system.

The evaluated data by JNDC are stored in the JENDL-1 (the Japanese Evaluated Nuclear Data Library Version 1) with the ENDF/B-4 format. The 28 important nuclides are:

^{90}Sr, ^{93}Zr, ^{95}Mo, ^{97}Mo, ^{99}Tc, ^{101}Ru, ^{102}Ru, ^{104}Ru, ^{106}Ru, ^{103}Rh, ^{105}Pd, ^{107}Pd, ^{109}Ag, ^{129}I, ^{131}Xe, ^{133}Cs, ^{135}Cs, ^{137}Cs, ^{144}Ce, ^{143}Nd, ^{144}Nd, ^{145}Nd, ^{147}Pm, ^{147}Sm, ^{149}Sm, ^{151}Sm, ^{153}Eu, ^{155}Eu.

The evaluated quantities are total, elastic scattering, inelastic scattering and capture cross sections, the angular distribution of elastically scattered neutrons and the energy distribution of inelastically scattered neutrons. These data are processed with the PROF-GROUCH-G-II[17] code and multi-group constants of 25 or 70 group structure are produced. They are stored on tapes with the format of the JNDC group constants. The detail of production will be described in section 2.2.

As mentioned in the previous chapter supplemental group constants are required to obtain the lumped constants. We adopted the group constants of 192 FP nuclides based on evaluation by Cook for this purpose. The evaporation model was adopted to estimate the energy distribution of secondary neutrons. After that ^{82}Se was added to this supplemental library. Detailed description will be given on the supplemental library in section 2.3.

The REPLACE code replaces the group constants in the supplemental library with the JNDC group constants for the 28 nuclides, providing the JNDC FP Fast Reactor Constants Library which consists of the JNDC group constants for the 28 nuclides and of the supplemental ones for the other 165 nuclides. This process will be described in section 2.4.

Concentrations of 193 nuclides are obtained by solving β-decay chains with the independent yield data evaluated by Meek and Rider[20]. The detail of the calculation will be discussed in section 2.5. The JNDC lumped group constants are finally obtained by the FPLUMP code using the concentrations as weights. The lumped constants will be explained in section 2.6.

Two standard formats are used for storing group constants on magnetic tapes. The format of the JNDC group constants is designed to store the group constants of each nuclide independently. This format is used to store the output of PROF-GROUCH-G-II[17] and the lumped group constants. The detailed description of this format is given in Appendix 4.1. On the other hand, the format of the JNDC FP constants library is designed to store the group constants of the 193 nuclides as a whole. A heading information precedes the group constants of the 193 FP nuclides whose order is fixed in this format. This format is used in the supplemental library and in the JNDC FP Fast Reactor Constants Library. Details are written concerning this format in Appendix 4.2.

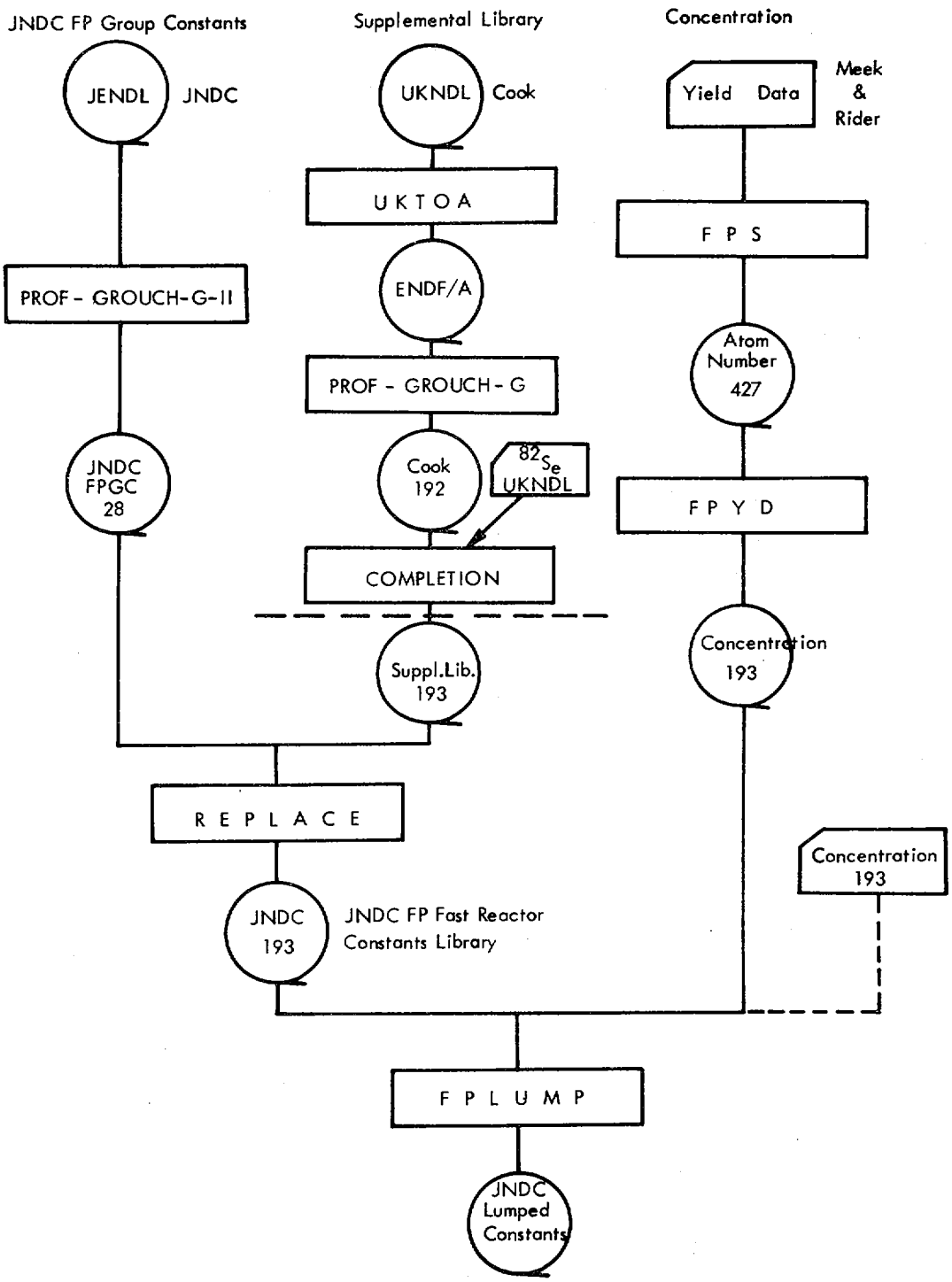

Fig. 1 Block diagram of JNDC FP Fast Reactor Constants System.

2. 2 Production of Multi-group Constants

A set of group constants of 70 and 25 group structures was produced fully automatically from a nuclear data library of the ENDF/B format by the PROF-GROUCH-G-II[17] system. The group structures are the same as those of the JAERI-Fast set and are given in TABLE 1.

Only the group constants for an infinitely dilute system were provided, since the resonance self-shielding effects were concluded to be negligible for each FP nuclide. This is based on the following observations:

TABLE 1 Group structure of the JAERI-Fast set

70 Group structure

Group number	Upper energy (eV)		Lower energy (eV)		Δu
1	1.05	+7	8.30	+6	0.2351
2	8.30	+6	6.50	+6	0.2445
3	6.50	+6	5.10	+6	0.2426
4	5.10	+6	4.00	+6	0.2429
5	4.00	+6	3.10	+6	0.2549
6	3.10	+6	2.50	+6	0.2151
7	2.50	+6	1.90	+6	0.2744
8	1.90	+6	1.40	+6	0.3054
9	1.40	+6	1.10	+6	0.2412
10	1.10	+6	8.00	+5	0.3185
11	8.00	+5	6.30	+5	0.2389
12	6.30	+5	5.00	+5	0.2311
13	5.00	+5	4.00	+5	0.2231
14	4.00	+5	3.10	+5	0.2549
15	3.10	+5	2.50	+5	0.2151
16	2.50	+5	2.00	+5	0.2231
17	2.00	+5	1.50	+5	0.2877
18	1.50	+5	1.20	+5	0.2231
19	1.20	+5	1.00	+5	0.1823
20	1.00	+5	7.73	+4	0.2575
21	7.73	+4	5.98	+4	0.2567
22	5.98	+4	4.65	+4	0.2516
23	4.65	+4	3.60	+4	0.2559
24	3.60	+4	2.78	+4	0.2585
25	2.78	+4	2.15	+4	0.2570
26	2.15	+4	1.66	+4	0.2587
27	1.66	+4	1.29	+4	0.2522
28	1.29	+4	1.00	+4	0.2546
29	1.00	+4	7.73	+3	0.2575
30	7.73	+3	5.98	+3	0.2567
31	5.98	+3	4.65	+3	0.2516
32	4.65	+3	3.60	+3	0.2559
33	3.60	+3	2.78	+3	0.2585
34	2.78	+3	2.15	+3	0.2570
35	2.15	+3	1.66	+3	0.2587
36	1.66	+3	1.29	+3	0.2522
37	1.29	+3	1.00	+3	0.2546
38	1.00	+3	7.73	+2	0.2575
39	7.73	+2	5.98	+2	0.2567
40	5.98	+2	4.65	+2	0.2516
41	4.65	+2	3.60	+2	0.2559
42	3.60	+2	2.78	+2	0.2585
43	2.78	+2	2.15	+2	0.2570
44	2.15	+2	1.66	+2	0.2587
45	1.66	+2	1.29	+2	0.2522
46	1.29	+2	1.00	+2	0.2546
47	1.00	+2	7.73	+1	0.2575
48	7.73	+1	5.98	+1	0.2567
49	5.98	+1	4.65	+1	0.2516
50	4.65	+1	3.60	+1	0.2559
51	3.60	+1	2.78	+1	0.2585
52	2.78	+1	2.15	+1	0.2570
53	2.15	+1	1.66	+1	0.2587
54	1.66	+1	1.29	+1	0.2522
55	1.29	+1	1.00	+1	0.2546
56	1.00	+1	7.73		0.2575
57	7.73		5.98		0.2567
58	5.98		4.65		0.2516
59	4.65		3.60		0.2559
60	3.60		2.78		0.2585
61	2.78		2.15		0.2570
62	2.15		1.66		0.2587
63	1.66		1.29		0.2522
64	1.29		1.00		0.2546
65	1.00		7.73	−1	0.2575
66	7.73	−1	5.98	−1	0.2567
67	5.98	−1	4.65	−1	0.2516
68	4.65	−1	3.60	−1	0.2559
69	3.60	−1	2.78	−1	0.2585
70	2.78	−1	2.15	−1	0.2570

25 Group structure

Group number	Upper energy (eV)		Lower energy (eV)		Δu
1	1.05	+7	6.50	+6	0.4796
2	6.50	+6	4.00	+6	0.4855
3	4.00	+6	2.50	+6	0.4700
4	2.50	+6	1.40	+6	0.5798
5	1.40	+6	8.00	+5	0.5596
6	8.00	+5	4.00	+5	0.6931
7	4.00	+5	2.00	+5	0.6931
8	2.00	+5	1.00	+5	0.6931
9	1.00	+5	4.65	+4	0.7657
10	4.65	+4	2.15	+4	0.7714
11	2.15	+4	1.00	+4	0.7655
12	1.00	+4	4.65	+3	0.7657
13	4.65	+3	2.15	+3	0.7714
14	2.15	+3	1.00	+3	0.7655
15	1.00	+3	4.65	+2	0.7657
16	4.65	+2	2.15	+2	0.7714
17	2.15	+2	1.00	+2	0.7655
18	1.00	+2	4.65	+1	0.7657
19	4.65	+1	2.15	+1	0.7714
20	2.15	+1	1.00	+1	0.7655
21	1.00	+1	4.65		0.7657
22	4.65		2.15		0.7714
23	2.15		1.00		0.7655
24	1.00		4.65	−1	0.7657
25	4.65	−1	2.15	−1	0.7714

1) About 10% of fissile nuclides disappear with fission at the final stage of burn-up.
2) The effective admixture cross section (σ_0) for fissile nuclides is more than 100 barns for a typical fast reactor.
3) Therefore the σ_0-value for a pseudo FP nuclide is more than 1,000 barns.
4) Any individual FP nuclide has a concentration no higher than 10% of the total.
5) Hence the effective admixture cross section is more than 10,000 barns for any individual FP nuclide.

The weighting spectrum is the same as that of the JAERI-Fast set, i.e., assumed to be $1/E$ spectrum below 1 MeV and to be fission spectrum above 1 MeV as:

$$\phi(E)=A_0 \exp(-E/A_1) \sinh\sqrt{A_2 \times E},$$

where A_0, A_1 and A_2 are 4.84×10^{-7}, 1×10^{6} eV and 2×10^{-6} eV^{-1} respectively, and energy is in eV unit.

The elastic removal cross sections and the average value of the cosine of the angle in elastic scattering were calculated with the angular distribution of elastically scattered neutrons stored in file 4 of JENDL-1. The transfer matrices due to inelastic scattering were calculated with the angular and energy distribution of scattered neutrons.

Detailed description of the PROF-GROUCH-G-II system is given in Appendix 4. 1, where input specifications are described with examples of input data preparation as well as the job

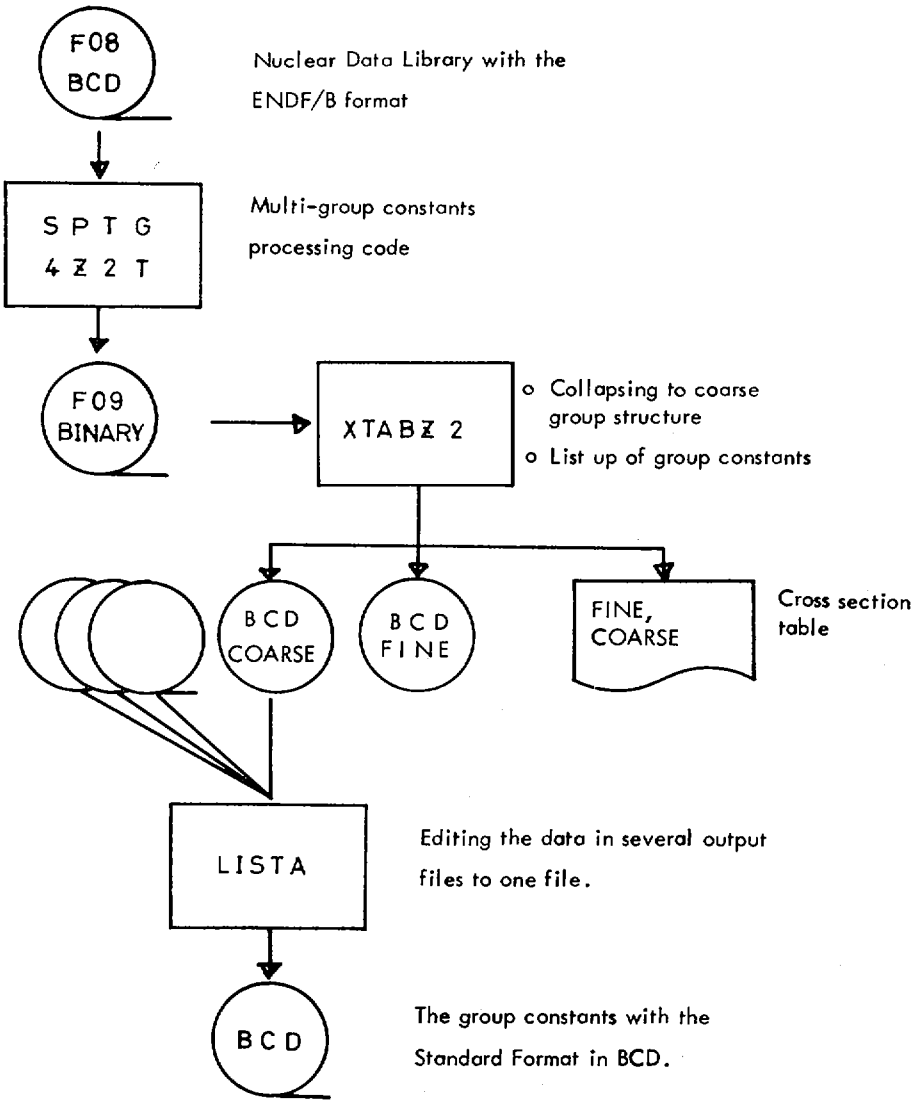

Fig. 2 Process flow of PROF-GROUCH-G-II.

control language list. Here only the general function will be described.

For production of FP group constants, only a subsystem of the PROF-GROUCH-G-II is used. The process flow is shown in **Fig. 2.** The process is divided into the following three steps:

1) Multi-group constants production
   Multi-group constants of a fine group structure (70 for the present case) are produced by the subcode SPTG4Z2T from a nuclear data library with the ENDF/B format (up to version 4). The produced group constants are stored under binary form in a specified file.
2) Collapsing of the group constants
   The group constants obtained in the foregoing step are collapsed into a coarse group structure (25 for the present case) in this step with the subcode XTABZ2. These constants of two group structures are stored in separated files with the standard format of the JNDC group constants. A tabulated list of the group constants is also obtained in this step.
3) Editing of the group constants on a tape
   It is often impossible to process all the nuclides at one time because of limit in computing time. In such a case, processing is performed in parts, resulting in more than one output file from XTABZ2 for the same group structure. In this step, the data in several files are combined and stored in one file for each group structure by the subcode LISTA.

2.3 Supplemental Group Constants Library

Supplemental group constants are required in order to obtain the lumped group constants. We have already had a set of constants for 192 FP nuclides[14] based on the evaluation by Cook[6], and have performed various tests concerning behaviors of the lumped group cross sections[11,14]. Hence this set was adopted as the supplemental library. Some drawbacks were pointed out[14,21] for Cook's evaluation especially on inconsistencies between the resonance and the smooth cross section. Nevertheless the errors in the supplemental library affect little the lumped constants, since more than 80% of total capture is due to the 28 important nuclides. ^{82}Se, which has a considerable yield, was not contained in Cook's evaluation. The capture cross section was taken from the 1968 UKNDL[22], and the elastic and inelastic scattering cross sections were assumed to be the same as those of ^{82}Kr.

The reactions evaluated by Cook are the total, elastic scattering, nonelastic, total inelastic, capture and transport cross sections. Neither angular distribution nor energy distribution of the scattered neutrons was given by Cook. Then the following ad hoc evaluation was carried out[14].

1) As to the average value of the cosine of the angle for elastically scattered neutrons (μ_L), we assumed them to be $2/3A$ instead of using the transport cross sections evaluated by Cook.
2) The elastic removal cross section ($\sigma_{el.r}$) was calculated as

$$\sigma_{el.r}=\sigma_{el}\times\frac{\xi}{\Delta u}$$

   where σ_{el} is the elastic scattering cross section, Δu the lethargy width of the group and ξ the mean lethargy gain due to one event of elastic scattering.
3) As to the inelastic matrices, the energy distribution of the scattered neutrons was estimated with the evaporation model as

$$F(E)dE=\frac{E}{T^2}\exp(-E/T)dE,$$

   where the nuclear temperature (T) was assumed to be the same for all the nuclides and was determined to be 0.638 MeV with averaging the recommended values by Gilbert and

Cameron[23].

The actual process is as follows: Cook's evaluated data were sent from CCDN with the UKNDL format in 1971. At that time a multi-group constants production code in JAERI could treat only the ENDF/A format. Therefore the UKNDL format was converted to the ENDF/A format with a small program UKTOA. Then the PROF-GROUCH-G[18] code produced the group constants. The COMPLETION code added μ_L, the elastic removal cross sections and the inelastic matrices, and stored the data with the format of the JNDC FP constants library on a magnetic tape as a multi-file, providing the complete supplemental library.

2.4 JNDC FP Fast Reactor Constants Library

The JNDC FP Fast Reactor Constants Library is a complete library containing the group constants of 193 nuclides and will be released to users as the standard FP group constants library in Japan. This library consists of the constants based on evaluation by JNDC for the 28 important nuclides and of the constants contained in the supplemental library for the other 165 nuclides. The REPLACE code has a function to replace the constants of specified nuclides on the library by the corresponding new group constants.

The data are stored in a BCD card image format as a multi-file; the first file contains the constants of 25 group structure and the second file contains those of 70 group structure. The library consists of a heading information and 193 sets of material data. The heading information consists of control data, a label of the library, comments, group structure, weighting flux for collapsing and a list of the materials. The material data consist of asterisks for material separation, material identification and control data as well as the group constants. The format is described in Appendix 4.2 in detail.

2.5 Concentrations

The concentration of each FP nuclide depends not only on its fission yield but also on the burn-up or cooling time, since most of FP nuclides are radioactive and transform themselves through β-decays. Therefore it is necessary to solve β-decay chains so as to obtain the concentrations at various burn-up time stages. The β-decay chains are solved with the FP-S code[19]. The transfer to another β-decay chain by neutron capture reaction was proved[12] to be very small under normal conditions of fast reactors and therefore was neglected in the present work.

The fission yield data were taken from the recommendation by Meek and Rider[20]. A total of 123 β-decay chains was solved in the present calculation and the concentrations of 427 FP nuclides were obtained. The FPYD code renormalizes the output of the FP-S code and calculates the concentrations of 193 nuclides. In the FPYD code, the concentration of a nuclide other than the 193 nuclides was added to that of the daughter nuclide in the β-decay chain. The error of this approximation is expected to be small, for such nuclides other than the 193 are short-lived and their concentrations are small. Sum of the concentrations of the 193 nuclides is normalized to two. The detail of the FP-S and FPYD codes is given in Appendix 4.3.

2.6 Lumped Group Constants

The group constants in the JNDC FP Fast Reactor Constants Library were lumped to those of a pseudo FP nuclide with the FPLUMP code by using the concentrations as weights. The average cosine of the angle in elastic scattering ($\bar{\mu}_L$) is lumped as

$$\bar{\mu}_L = \sum_i y_i \mu_L{}^i \sigma_{el}{}^i / \sum_i y_i \sigma_{el}{}^i,$$

where y_i is the concentration, $\sigma_{el}{}^i$ the elastic scattering cross section and $\mu_L{}^i$ the average cosine, respectively, for nuclide i.

It should be noted that the lumped cross section is microscopic cross section of fission products per one fission event, as the concentrations are normalized to two. Therefore a pseudo fission product has a mass and cross sections almost twice as much as the individual FP nuclide has.

Three types of the lumped constants were produced, corresponding to the fission products due to ^{239}Pu fission with thermal neutrons, to ^{235}U fission with thermal neutrons and to ^{238}U fission with fission spectrum neutrons. We calculated each of them for burn-up of 1, 30, 60, 180, 360 and 720 days. The lumped constants at 360 days of burn-up are tabulated in Appendix 2. The lumped group constants are stored on a tape as a multi-file system. The standard format of the JNDC group constants were used, since a set of the lumped constants is treated as that of a nuclide.

It is also possible to lump the JNDC FP Fast Reactor Constants Library with an arbitrary set of concentrations. In such a case, the concentrations must be given as card input. The detail of FPLUMP is described in Appendix 4. 4.

3. JNDC FP Group Constants Set

In this chapter we discuss problems concerning lumping, and compare the JNDC FP group constants set with some constants sets based on other evaluations. Hereafter an abbreviated name of the JNDC set will be used including both the JNDC FP Fast Reactor Constants Library and the JNDC FP Lumped Constants. Brief descriptions are given here concerning the other FP group constants sets.

- Cook set[14] ; using Cook's evaluation[6] for all the 192 nuclides.
- JNDC-P set[12] ; using the preliminary evaluation[10] by JNDC for the 28 nuclides.
- ENDF/B-4 set ; using data in the ENDF/B-4[8] for 163 nuclides. This set was obtained by the use of the present system.
- ABBN-set[3] ; the 25 group cross sections in the ABBN set. They are given only as the lumped FP constants due to fission of ^{233}U, ^{235}U and ^{239}Pu.
- RCN-set[9] ; the 25 group cross sections evaluated at RCN, Petten, the Netherlands. This set is compared in limited cases, since only capture cross sections are available and their weighting spectrum is different from ours.

Benzi's evaluation[4,5] was ignored in this report, as his evaluation is limited to the energy range above 1 keV.

3.1 Burn-up Time Dependence

As mentioned before, the lumped group constants depend on burn-up and cooling time. Therefore we produced the constants at various burn-up time steps. It is not easy task, however, to change the lumped constants according to the burn-up time step in an actual calculation. In this section, the burn-up time dependence is examined for the lumped constants and the errors are estimated if the time dependence is neglected.

To make the comparison easier, the group constants are collapsed to one group with neutron spectra of two typical fast reactors, i.e., an experimental reactor of JOYO class and a large commercial reactor of 1000 MWe. The spectra are shown in TABLE 2 and the collapsed group cross sections are given for various burn-up time stages in TABLE 3. It is known from TABLE 3 that the time dependence is the largest for capture, smaller for inelastic scattering and negligible for elastic scattering.

To make the burn-up time dependence clearer, the cross sections are normalized to those at 360 days, for the one-group cross sections depend on the collapsing spectra and on the mother nuclide from which fission products are born. The normalized capture and inelastic scattering cross sections are shown for two spectra in **Fig. 3** and for two mother nuclides in **Fig. 4**. It was found that the cross sections varried considerably between 1 day and 60 days, during which effects of fission products are small because of their rather small number densities. After that, the changes are about 5% for capture and less than 1.5% for inelastic scattering until 720 days of burn-up. It was also found that the burn-up time dependence was much affected neither by the spectra nor by the mother nuclides.

The burn-up time dependence are examined with various sets. The one group capture cross sections are shown in **Fig. 5**. The same tendencies are observed for all the sets.
The disagreements of cross section value are, however, much larger among the sets than the

TABLE 2 25 group spectra of two typical fast reactor

Group	A commercial FBR with 1000 MWe	An EFBR of JOYO class
1	1.6608 −3	2.5700 −3
2	8.7706 −3	1.5370 −2
3	2.3138 −2	3.9090 −2
4	4.6475 −2	8.6470 −2
5	7.1985 −2	1.0418 −1
6	9.8439 −2	1.7831 −1
7	1,5100 −1	1.7483 −1
8	1.5240 −1	1.5312 −1
9	1.5202 −1	1.0919 −1
10	1.2448 −1	6.7980 −2
11	7.2622 −2	3.9160 −2
12	3.6823 −2	1.5560 −2
13	2.0977 −2	5.0600 −3
14	2.2819 −2	6.4300 −3
15	1.0795 −2	2.0500 −3
16	4.1293 −3	5.2000 −4
17	1.1887 −3	1.0000 −4
18	2.3320 −4	1.0000 −5
19	4.5502 −5	0.
20	5.6878 −6	0.
21	0.	0.
22	0.	0.
23	0.	0.
24	0.	0.
25	0.	0.
Sum	1.0	1.0

TABLE 3 One group lumped cross sections at various burn-up stages

FP due to fission of ^{239}Pu with thermal neutrons

Burn-up (days)	σ_c (barn)		σ_{el} (barn)		σ_{in} (barn)	
	A	B	A	B	A	B
1	0.385	0.195	16.11	14.28	0.506	0.845
30	0.531	0.273	15.91	14.07	0.541	0.886
60	0.545	0.281	15.89	14.02	0.545	0.891
180	0.560	0.290	15.88	13.98	0.551	0.899
360	0.567	0.295	15.90	13.98	0.554	0.903
720	0.575	0.297	15.92	13.97	0.554	0.904

FP due to fission of ^{235}U with thermal neutrons

Burn-up (days)	σ_c (barn)		σ_{el} (barn)		σ_{in} (barn)	
	A	B	A	B	A	B
1	0.284	0.139	16.46	14.51	0.456	0.763
30	0.399	0.199	16.24	14.28	0.480	0.791
60	0.411	0.205	16.19	14.22	0.483	0.793
180	0.424	0.213	16.18	14.18	0.486	0.798
360	0.430	0.217	16.21	14.18	0.489	0.801
720	0.435	0.220	16.26	14.18	0.490	0.803

FP due to fission of ^{238}U with fission spectrum neutrons

Burn-up (days)	σ_c (barn)		σ_{el} (barn)		σ_{in} (barn)	
	A	B	A	B	A	B
1	0.373	0.186	16.33	14.42	0.492	0.822
30	0.511	0.258	16.13	14.19	0.526	0.860
60	0.525	0.266	16.09	14.14	0.530	0.864
180	0.541	0.276	16.08	14.10	0.535	0.872
360	0.549	0.280	16.10	14.10	0.538	0.875
720	0.554	0.283	16.14	14.10	0.539	0.876

A : Collapsed with the spectrum of 1000 MWe FBR.
B : Collapsed with the spectrum of JOYO class FBR.

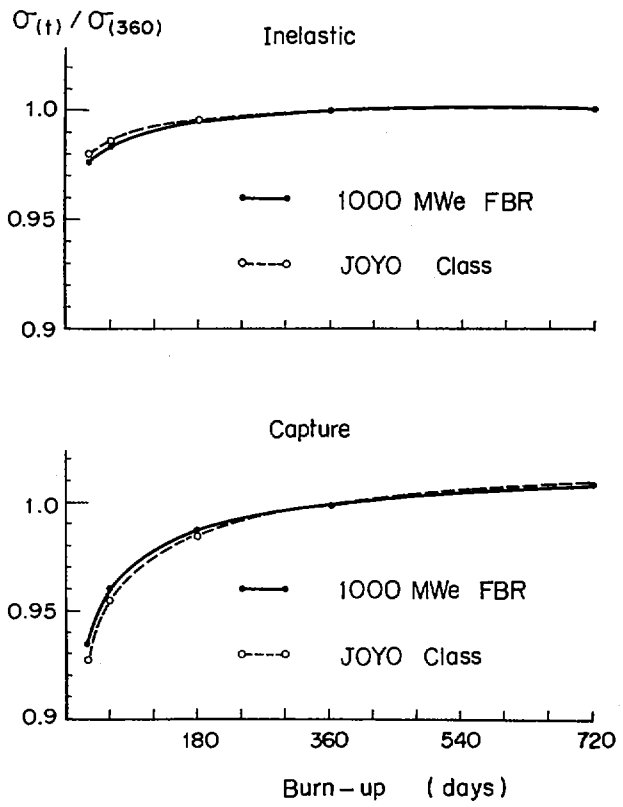

Fig. 3 Burn-up time dependence of one group cross sections of FP due to ^{239}Pu fission.

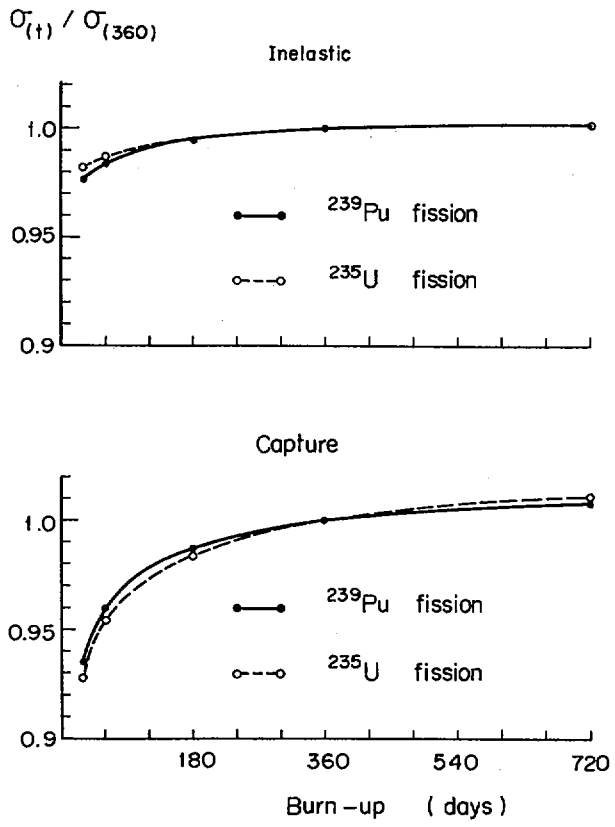

Fig. 4 Burn-up time dependence of one group FP cross sections collapsed with the spectrum of 1000 MWe FBR.

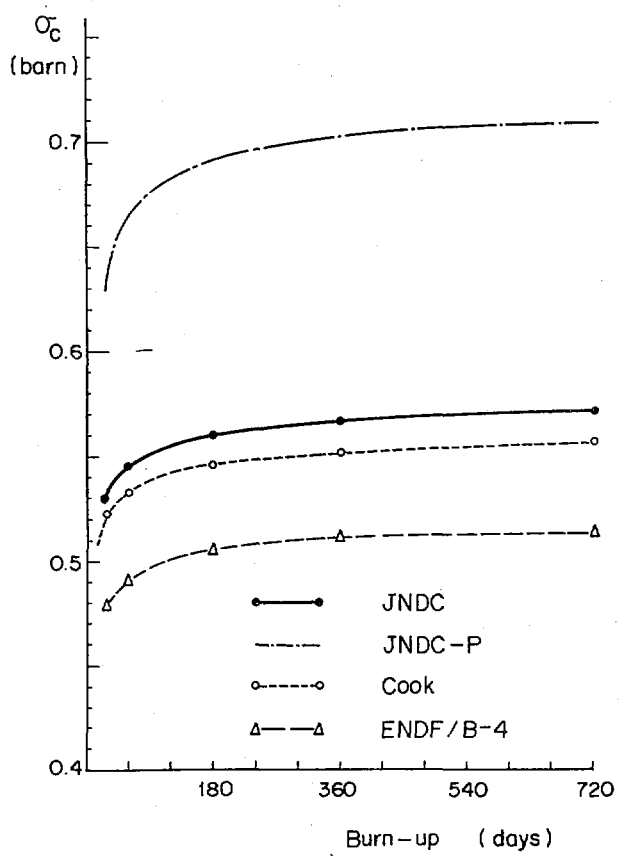

Fig. 5 Burn-up time dependence of one group capture cross sections of FP due to ^{239}Pu fission collapsed with the spectrum of 1000 MWe FBR.

change due to burn-up time dependence.

On the other hand, the lumped cross sections are expected to decrease a little according to burn-up, if it is taken into consideration that some gaseous fission products may leak from fuel pellets to plenums. This effect was discussed in our previous work[11,12] and was found to compensate considerably the burn-up time dependence presently discussed.

It could be concluded from the above observations that the errors caused by negligence of the burn-up time dependence are not significant, considering the uncertainties of evaluated data and the errors resulting from other origins. Hence the lumped constants at 360 days will be mainly discussed hereafter. It should be noted that the burn-up time dependence is not affected by the flux density of reactors, since the effect of neutron capture was proved[12] to be negligible on the concentration of each fission product.

3. 2 Contribution of 28 Nuclides in Lumped Cross Sections

Contributions of the 28 nuclides in the lumped cross sections were evaluated in order to confirm the importance of these 28 nuclides. TABLE 4 shows the contributions to total capture, to total elastic scattering and to total inelastic scattering at burn-up of 360 days. It is clearly shown that the 28 nuclides cover more than 80% of total capture by FP for all the cases, while their contributions to elastic and inelastic scattering are about 45% and 60% respectively. The contributions of the individual nuclides are given in TABLES 5. 1 to 5. 3 for the 1000 MWe FBR. The present selection of the important nuclides are proved to be reasonable, though some nuclides such as ^{90}Sr, ^{106}Ru, ^{137}Cs, ^{144}Ce and ^{144}Nd have rather minor role for capture.

Considering the contributions of the other nuclides in **TABLES 5.1** to **5.3**, JNDC selected the following 68 nuclides as the secondarily important ones and their evaluation is now in progress:

^{81}Br, ^{82}Se, ^{83}Kr, ^{84}Kr, ^{85}Kr, ^{86}Kr, ^{85}Rb, ^{87}Rb, ^{88}Sr, ^{89}Sr, ^{89}Y, ^{91}Y, ^{91}Zr, ^{92}Zr, ^{94}Zr, ^{95}Zr, ^{96}Zr, ^{95}Nb, ^{96}Mo, ^{98}Mo, ^{100}Mo, ^{100}Ru, ^{103}Ru, ^{105}Rh, ^{104}Pd, ^{106}Pd, ^{108}Pd, ^{110}Pd, ^{110m}Ag, ^{110}Cd, ^{111}Cd, ^{112}Cd, ^{113}Cd, ^{127m}Te, ^{128}Te, ^{129m}Te, ^{130}Te, ^{127}I, ^{131}I, ^{132}Xe, ^{133}Xe, ^{134}Xe, ^{135}Xe, ^{136}Xe, ^{134}Cs, ^{138}Ba, ^{140}Ba, ^{139}La, ^{140}Ce, ^{141}Ce, ^{142}Ce, ^{141}Pr, ^{143}Pr, ^{142}Nd, ^{146}Nd, ^{147}Nd, ^{148}Nd, ^{150}Nd, ^{148}Pm, ^{148m}Pm, ^{148}Sm, ^{150}Sm, ^{152}Sm, ^{154}Sm, ^{154}Eu, ^{155}Gd, ^{156}Gd, ^{157}Gd.

Their evaluation will be completed early in 1977. The group constants will be easily produced with the present system. Adding these 68 nuclides to the 28, more than 98% will be covered for all the types of reaction.

TABLE 4 Contribution of the 28 nuclides at 360 days of burn-up

Mother nuclide	Reaction	1000 MWe FBR (%)	JOYO class (%)
^{239}Pu	σ_c	83.3	84.5
	σ_{el}	46.5	46.8
	σ_{in}	64.9	62.6
^{235}U	σ_c	80.4	81.2
	σ_{el}	40.3	40.0
	σ_{in}	57.1	55.3
^{238}U	σ_c	82.0	82.9
	σ_{el}	44.4	44.5
	σ_{in}	62.4	60.7

TABLE 5.1 Contribution of the individual FP nuclides to total capture

PU-239(THERMAL) BURN-UP 360 DAYS

	NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
1	RU101 *	0.75890E+00	0.60539E-01	0.80960E+01	0.80960E+01
2	PD105 *	0.80738E+00	0.53673E-01	0.76363E+01	0.15732E+02
3	RH103 *	0.70516E+00	0.58825E-01	0.73096E+01	0.23042E+02
4	TC 99 *	0.58870E+00	0.63753E-01	0.66137E+01	0.29656E+02
5	CS133 *	0.53767E+00	0.66848E-01	0.63337E+01	0.35989E+02
6	SM149 *	0.23668E+01	0.12365E-01	0.51573E+01	0.41147E+02
7	PD107 *	0.80019E+00	0.30046E-01	0.42367E+01	0.45383E+02
8	CS135 *	0.32120E+00	0.72209E-01	0.40872E+01	0.49470E+02
9	PM147 *	0.12713E+01	0.16502E-01	0.36968E+01	0.53167E+02
10	MO 97 *	0.34530E+00	0.55786E-01	0.33945E+01	0.56562E+02
11	SM151 *	0.24773E+01	0.76035E-02	0.33192E+01	0.59881E+02
12	XE131 *	0.43313E+00	0.37693E-01	0.28770E+01	0.62758E+02
13	ND143 *	0.34981E+00	0.42062E-01	0.25928E+01	0.65351E+02
14	RU102 *	0.22743E+00	0.61012E-01	0.24452E+01	0.67796E+02
15	ND145 *	0.43110E+00	0.30202E-01	0.22944E+01	0.70090E+02
16	AG109 *	0.88640E+00	0.13799E-01	0.21554E+01	0.72246E+02
17	RU104 *	0.18680E+00	0.60489E-01	0.19911E+01	0.74237E+02
18	EU153 *	0.27556E+01	0.38187E-02	0.18543E+01	0.76091E+02
19	MO 98	0.18115E+00	0.57189E-01	0.18256E+01	0.77917E+02
20	MO 95 *	0.32761E+00	0.29981E-01	0.17308E+01	0.79648E+02
21	I 129 *	0.49786E+00	0.16883E-01	0.14812E+01	0.81129E+02
22	PR141	0.15732E+00	0.52214E-01	0.14475E+01	0.82576E+02
23	MO100	0.11724E+00	0.68879E-01	0.14230E+01	0.83999E+02
24	ZR 93 *	0.20895E+00	0.37822E-01	0.13926E+01	0.85392E+02
25	SM150	0.68366E+00	0.10005E-01	0.12054E+01	0.86597E+02
26	XE132	0.11496E+00	0.51090E-01	0.10350E+01	0.87632E+02
27	RU103	0.50432E+00	0.11072E-01	0.98401E+00	0.88616E+02
28	EU155 *	0.24992E+01	0.17251E-02	0.75973E+00	0.89376E+02
29	SM152	0.69376E+00	0.57697E-02	0.70536E+00	0.90081E+02
30	ND148	0.23212E+00	0.16625E-01	0.68004E+00	0.90761E+02
31	LA139	0.56396E-01	0.58549E-01	0.58186E+00	0.91343E+02
32	SM147 *	0.14253E+01	0.21470E-02	0.53925E+00	0.91882E+02
33	PD108	0.11809E+00	0.25315E-01	0.52681E+00	0.92409E+02
34	RU106 *	0.94804E-01	0.30921E-01	0.51657E+00	0.92926E+02
35	I 127	0.54860E+00	0.48473E-02	0.46860E+00	0.93394E+02
36	ZR 96	0.53116E-01	0.49403E-01	0.46240E+00	0.93857E+02
37	ND146	0.96998E-01	0.24867E-01	0.42504E+00	0.94282E+02
38	CE142	0.44683E-01	0.49876E-01	0.39272E+00	0.94675E+02
39	ZR 91	0.10037E+00	0.18780E-01	0.33216E+00	0.95007E+02
40	PD106	0.15626E+00	0.11737E-01	0.32321E+00	0.95330E+02
41	CE144 *	0.59609E-01	0.25156E-01	0.26424E+00	0.95594E+02
42	CS137 *	0.22909E-01	0.64754E-01	0.26141E+00	0.95856E+02
43	XE134	0.18009E-01	0.72413E-01	0.22980E+00	0.96085E+02
44	KR 83	0.44079E+00	0.29287E-02	0.22748E+00	0.96313E+02
45	ND144 *	0.99489E-01	0.12681E-01	0.22232E+00	0.96535E+02
46	NB 95	0.18179E+00	0.65820E-02	0.21085E+00	0.96746E+02
47	ZR 95	0.92004E-01	0.12504E-01	0.20273E+00	0.96949E+02
48	PR143	0.47829E+00	0.23882E-02	0.20129E+00	0.97150E+02
49	CE140	0.20001E-01	0.51867E-01	0.18281E+00	0.97333E+02
50	CE141	0.13161E+00	0.75424E-02	0.17492E+00	0.97508E+02

* One group cross section.

** Normalized to 2., i.e., per fission.

TABLE 5.1 (Cont.)

PU-239(THERMAL) BURN-UP 360 DAYS

	NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
51	BR 81	0.53584E+00	0.18188E-02	0.17174E+00	0.97680E+02
52	SM154	0.29944E+00	0.27209E-02	0.14358E+00	0.97823E+02
53	RB 85	0.15912E+00	0.46637E-02	0.13077E+00	0.97954E+02
54	CD111	0.24979E+00	0.26420E-02	0.11629E+00	0.98070E+02
55	BA140	0.20665E+00	0.28224E-02	0.10278E+00	0.98173E+02
56	GD157	0.74480E+00	0.75466E-03	0.99047E-01	0.98272E+02
57	ZR 94	0.12247E-01	0.43063E-01	0.92938E-01	0.98365E+02
58	ND147	0.59741E+00	0.86888E-03	0.91471E-01	0.98456E+02
59	GD155	0.14684E+01	0.34726E-03	0.89856E-01	0.98546E+02
60	TE128	0.52974E-01	0.84587E-02	0.78961E-01	0.98625E+02
61	BA138	0.74738E-02	0.57049E-01	0.75134E-01	0.98700E+02
62	TB159	0.16847E+01	0.22426E-03	0.66578E-01	0.98767E+02
63	ZR 92	0.12263E-01	0.29337E-01	0.63394E-01	0.98830E+02
64	PD110	0.48508E-01	0.74071E-02	0.63316E-01	0.98894E+02
65	GD156	0.45935E+00	0.77703E-03	0.62898E-01	0.98957E+02
66	KR 84	0.71112E-01	0.46942E-02	0.58824E-01	0.99015E+02
67	RB 87	0.32213E-01	0.95129E-02	0.54000E-01	0.99069E+02
68	Y 91	0.53214E-01	0.55591E-02	0.52129E-01	0.99122E+02
69	XE136	0.38422E-02	0.65683E-01	0.44472E-01	0.99166E+02
70	CD113	0.29623E+00	0.84136E-03	0.43920E-01	0.99210E+02
71	I 131	0.18364E+00	0.12577E-02	0.40698E-01	0.99251E+02
72	SR 90 *	0.10964E-01	0.21008E-01	0.40590E-01	0.99291E+02
73	CD112	0.19559E+00	0.11697E-02	0.40314E-01	0.99331E+02
74	TE130	0.81875E-02	0.26856E-01	0.38747E-01	0.99370E+02
75	MO 99	0.28384E+00	0.72182E-03	0.36103E-01	0.99406E+02
76	KR 85	0.13173E+00	0.14675E-02	0.34066E-01	0.99440E+02
77	SB121	0.43706E+00	0.41391E-03	0.31878E-01	0.99472E+02
78	IN115	0.51526E+00	0.34939E-03	0.31724E-01	0.99504E+02
79	XE133	0.11264E+00	0.14477E-02	0.28736E-01	0.99533E+02
80	Y 89	0.11511E-01	0.13264E-01	0.26906E-01	0.99560E+02
81	SB125	0.16242E+00	0.93867E-03	0.26865E-01	0.99587E+02
82	GD158	0.33688E+00	0.42154E-03	0.25024E-01	0.99612E+02
83	PM149	0.12417E+01	0.11435E-03	0.25021E-01	0.99637E+02
84	SN117	0.30915E+00	0.35499E-03	0.19339E-01	0.99656E+02
85	SB123	0.32820E+00	0.32044E-03	0.18533E-01	0.99674E+02
86	SE 79	0.40823E+00	0.24789E-03	0.17832E-01	0.99692E+02
87	BA136	0.10021E+00	0.95592E-03	0.16881E-01	0.99709E+02
88	TE827	0.28251E+00	0.33117E-03	0.16487E-01	0.99726E+02
89	EU154	0.31269E+01	0.29870E-04	0.16459E-01	0.99742E+02
90	CD114	0.16718E+00	0.54268E-03	0.15987E-01	0.99758E+02
91	EU156	0.18154E+01	0.49358E-04	0.15790E-01	0.99774E+02
92	TE124	0.13222E+00	0.67413E-03	0.15707E-01	0.99790E+02
93	BA137	0.11458E+00	0.74412E-03	0.15025E-01	0.99805E+02
94	RH105	0.25683E+00	0.32390E-03	0.14659E-01	0.99819E+02
95	SN119	0.21651E+00	0.35934E-03	0.13710E-01	0.99833E+02
96	SB124	0.34203E+00	0.20903E-03	0.12599E-01	0.99846E+02
97	SR 88	0.48747E-02	0.13497E-01	0.11594E-01	0.99857E+02
98	TE126	0.74212E-01	0.77680E-03	0.10159E-01	0.99867E+02
99	SM153	0.16712E+01	0.30230E-04	0.89026E-02	0.99876E+02
100	DY161	0.11403E+01	0.43935E-04	0.88282E-02	0.99885E+02

* One group cross sections.

** Normalized to 2.,i.e., per fission.

TABLE 5.1 (Cont.)

PU-239(THERMAL) BURN-UP 360 DAYS

NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
101 PM151	0.12681E+01	0.36024E-04	0.80502E-02	0.99893E+02
102 SR 89	0.11874E-01	0.34564E-02	0.72322E-02	0.99900E+02
103 KR 86	0.53915E-02	0.74471E-02	0.70753E-02	0.99907E+02
104 SN118	0.10838E+00	0.34963E-03	0.66775E-02	0.99914E+02
105 TE125	0.32009E+00	0.11112E-03	0.62681E-02	0.99920E+02
106 CE143	0.14135E+00	0.24313E-03	0.60562E-02	0.99926E+02
107 SN123	0.13802E+00	0.24309E-03	0.59125E-02	0.99932E+02
108 AG111	0.30889E+00	0.82048E-04	0.44661E-02	0.99937E+02
109 SE 77	0.27563E+00	0.85297E-04	0.41430E-02	0.99941E+02
110 SN124	0.33603E-01	0.69601E-03	0.41214E-02	0.99945E+02
111 SE 78	0.80951E-01	0.28597E-03	0.40794E-02	0.99949E+02
112 SE 80	0.45566E-01	0.47794E-03	0.38376E-02	0.99953E+02
113 SE 82	0.11735E-01	0.16269E-02	0.33644E-02	0.99956E+02
114 SN122	0.38703E-01	0.47444E-03	0.32358E-02	0.99960E+02
115 SN120	0.46427E-01	0.37335E-03	0.30545E-02	0.99963E+02
116 SN126	0.12096E-01	0.13652E-02	0.29100E-02	0.99966E+02
117 SB126	0.39104E+00	0.40917E-04	0.28195E-02	0.99968E+02
118 CD116	0.40687E-01	0.36986E-03	0.26518E-02	0.99971E+02
119 XE130	0.25201E+00	0.47325E-04	0.21017E-02	0.99973E+02
120 SB127	0.13163E+00	0.83229E-04	0.19305E-02	0.99975E+02
121 DY160	0.84470E+00	0.12967E-04	0.19301E-02	0.99977E+02
122 PR145	0.35928E+00	0.30437E-04	0.19270E-02	0.99979E+02
123 RU105	0.33294E+00	0.31901E-04	0.18717E-02	0.99981E+02
124 PD109	0.30834E+00	0.33418E-04	0.18158E-02	0.99983E+02
125 CS136	0.18916E+00	0.52491E-04	0.17497E-02	0.99984E+02
126 RU100	0.50877E+00	0.18234E-04	0.16347E-02	0.99986E+02
127 TB160	0.16720E+01	0.49262E-05	0.14515E-02	0.99987E+02
128 ZR 97	0.51352E-01	0.15530E-03	0.14053E-02	0.99989E+02
129 GD160	0.77076E-01	0.98094E-04	0.13323E-02	0.99990E+02
130 AS 75	0.47500E+00	0.13883E-04	0.11621E-02	0.99991E+02
131 KR 82	0.17425E+00	0.36052E-04	0.11070E-02	0.99992E+02
132 TC799	0.45938E+00	0.94108E-05	0.76181E-03	0.99993E+02
133 SN125	0.11109E+00	0.37209E-04	0.72841E-03	0.99994E+02
134 MO 96	0.10426E+00	0.36658E-04	0.67348E-03	0.99995E+02
135 TE829	0.12865E+00	0.26086E-04	0.59138E-03	0.99995E+02
136 SN115	0.16103E+00	0.18390E-04	0.52185E-03	0.99996E+02
137 TE825	0.31700E+00	0.87359E-05	0.48799E-03	0.99996E+02
138 EU157	0.11929E+01	0.18212E-05	0.38282E-03	0.99997E+02
139 Y 93	0.33143E-01	0.65363E-04	0.38174E-03	0.99997E+02
140 TE127	0.24421E+00	0.81217E-05	0.34950E-03	0.99997E+02
141 XE135	0.16482E-01	0.11125E-03	0.32311E-03	0.99998E+02
142 TE129	0.93892E-01	0.16767E-04	0.27741E-03	0.99998E+02
143 ZR 90	0.58951E-02	0.25122E-03	0.26098E-03	0.99998E+02
144 CD115	0.36749E+00	0.33352E-05	0.21598E-03	0.99998E+02
145 TB161	0.91439E+00	0.12193E-05	0.19647E-03	0.99999E+02
146 SM148	0.24056E+00	0.43054E-05	0.18251E-03	0.99999E+02
147 SR 91	0.18964E-01	0.37133E-04	0.12409E-03	0.99999E+02
148 LA140	0.20999E+00	0.29061E-05	0.10754E-03	0.99999E+02
149 XE128	0.38473E+00	0.15401E-05	0.10441E-03	0.99999E+02
150 GE 73	0.22094E+00	0.24759E-05	0.96395E-04	0.99999E+02

* One group cross section.

** Normalized to 2.,i.e., per fission.

TABLE 5.1 (Cont.)

PU-239(THERMAL) BURN-UP 360 DAYS

NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
151 SN121	0.27376E+00	0.18557E-05	0.89525E-04	0.99999E+02
152 TE132	0.70326E-03	0.66448E-03	0.82347E-04	0.99999E+02
153 SM156	0.45882E+00	0.96087E-06	0.77689E-04	0.99999E+02
154 GE 76	0.13468E-01	0.30743E-04	0.72966E-04	0.10000E+03
155 CS134	0.48513E+00	0.64951E-06	0.55525E-04	0.10000E+03
156 GD159	0.36887E+00	0.65877E-06	0.45143E-04	0.10000E+03
157 PD112	0.64249E-01	0.39517E-05	0.44741E-04	0.10000E+03
158 Y 90	0.43381E-01	0.54046E-05	0.41316E-04	0.10000E+03
159 SB128	0.17650E+00	0.12422E-05	0.39074E-04	0.10000E+03
160 AS 77	0.38103E+00	0.55584E-06	0.37322E-04	0.10000E+03
161 TE831	0.59073E-02	0.29950E-04	0.31177E-04	0.10000E+03
162 PD104	0.43457E+00	0.33648E-06	0.25767E-04	0.10000E+03
163 BR 82	0.61404E+00	0.21399E-06	0.23155E-04	0.10000E+03
164 I 135	0.18070E-02	0.67807E-04	0.21592E-04	0.10000E+03
165 I 133	0.40342E-03	0.24484E-03	0.17406E-04	0.10000E+03
166 PM148	0.10098E+01	0.95154E-07	0.16933E-04	0.10000E+03
167 TE122	0.24226E+00	0.36785E-06	0.15704E-04	0.10000E+03
168 GE 74	0.14249E-01	0.59542E-05	0.14950E-04	0.10000E+03
169 SN116	0.12827E+00	0.62850E-06	0.14207E-04	0.10000E+03
170 I 130	0.63655E+00	0.97939E-07	0.10986E-04	0.10000E+03
171 BA134	0.41109E+00	0.11431E-06	0.82810E-05	0.10000E+03
172 CD110	0.31417E+00	0.12354E-06	0.68393E-05	0.10000E+03
173 GE 72	0.21103E-01	0.11014E-05	0.40959E-05	0.10000E+03
174 TE131	0.37343E-02	0.43583E-05	0.28679E-05	0.10000E+03
175 GE 77	0.85650E-01	0.16227E-06	0.24491E-05	0.10000E+03
176 SR 86	0.38742E-01	0.12706E-06	0.86742E-06	0.10000E+03
177 RB 86	0.33004E+00	0.10269E-07	0.59725E-06	0.10000E+03
178 SB122	0.75316E+00	0.41729E-08	0.55383E-06	0.10000E+03
179 ND142	0.84834E-01	0.29076E-07	0.43467E-06	0.10000E+03
180 GA 72	0.21222E+00	0.26197E-08	0.97971E-07	0.10000E+03
181 ZN 72	0.51455E-02	0.86391E-08	0.78334E-08	0.10000E+03
182 PR142	0.32942E+00	0.93519E-10	0.54287E-08	0.10000E+03
183 SE 76	0.10087E+00	0.21755E-09	0.38669E-08	0.10000E+03
184 AS 76	0.82606E+00	0.96694E-12	0.14075E-09	0.10000E+03
185 TE123	0.46605E+00	0.0	0.0	0.10000E+03
186 ND150	0.11758E+00	0.0	0.0	0.10000E+03
187 DY162	0.44459E+00	0.0	0.0	0.10000E+03
188 DY163	0.66046E+00	0.0	0.0	0.10000E+03
189 DY164	0.11367E+00	0.0	0.0	0.10000E+03
190 HO165	0.15917E+01	0.0	0.0	0.10000E+03
191 CD615	0.38540E+00	0.0	0.0	0.10000E+03
192 TE823	0.50546E+00	0.0	0.0	0.10000E+03
193 PM648	0.15006E+01	0.0	0.0	0.10000E+03

LUMPED ONE GROUP CROSS SECTION 0.56748E+00

* One group cross section.

** Normalized to 2.,i.e., per fission.

TABLE 5.2 Contribution of the individual FP nuclides to total capture

U-235(THERMAL) BURN-UP 360 DAYS

NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
1 RU101 *	0.75690E+00	0.50967E-01	0.89855E+01	0.89855E+01
2 TC 99 *	0.58870E+00	0.60607E-01	0.82887E+01	0.17274E+02
3 CS133 *	0.53767E+00	0.65930E-01	0.82351E+01	0.25509E+02
4 SM149 *	0.23668E+01	0.10603E-01	0.58298E+01	0.31339E+02
5 PM147 *	0.12713E+01	0.19050E-01	0.56262E+01	0.36965E+02
6 CS135 *	0.32120E+00	0.67027E-01	0.50015E+01	0.41967E+02
7 MO 97 *	0.34530E+00	0.59247E-01	0.47527E+01	0.46719E+02
8 ND143 *	0.34981E+00	0.56330E-01	0.45776E+01	0.51297E+02
9 RH103 *	0.70516E+00	0.26112E-01	0.42775E+01	0.55575E+02
10 ND145 *	0.43110E+00	0.39460E-01	0.39519E+01	0.59526E+02
11 ZR 93 *	0.20895E+00	0.63962E-01	0.31048E+01	0.62631E+02
12 MO 95 *	0.32761E+00	0.40151E-01	0.30558E+01	0.65687E+02
13 XE131 *	0.43313E+00	0.26812E-01	0.26979E+01	0.68385E+02
14 MO 98	0.18115E+00	0.57883E-01	0.24359E+01	0.70821E+02
15 SM151 *	0.24773E+01	0.41862E-02	0.24091E+01	0.73230E+02
16 RU102 *	0.22743E+00	0.42060E-01	0.22222E+01	0.75452E+02
17 PR141	0.15732E+00	0.50833E-01	0.18577E+01	0.77310E+02
18 PD105 *	0.80738E+00	0.94008E-02	0.17633E+01	0.79073E+02
19 MO100	0.11724E+00	0.62833E-01	0.17113E+01	0.80785E+02
20 XE132	0.11496E+00	0.40703E-01	0.10871E+01	0.81872E+02
21 ZR 91	0.10037E+00	0.45608E-01	0.10635E+01	0.82935E+02
22 EU153 *	0.27556E+01	0.16228E-02	0.10389E+01	0.83974E+02
23 SM150	0.68366E+00	0.64933E-02	0.10313E+01	0.85005E+02
24 I 129 *	0.49786E+00	0.85160E-02	0.98494E+00	0.85990E+02
25 ND148	0.23212E+00	0.16894E-01	0.91102E+00	0.86901E+02
26 LA139	0.56396E-01	0.65829E-01	0.86245E+00	0.87764E+02
27 SM147 *	0.14253E+01	0.24785E-02	0.82068E+00	0.88584E+02
28 RU104 *	0.18680E+00	0.18316E-01	0.79482E+00	0.89379E+02
29 ZR 96	0.53116E-01	0.62790E-01	0.77478E+00	0.90154E+02
30 ND146	0.96998E-01	0.29963E-01	0.67518E+00	0.90829E+02
31 CE142	0.44683E-01	0.59520E-01	0.61784E+00	0.91447E+02
32 RU103	0.50432E+00	0.49150E-02	0.57583E+00	0.92023E+02
33 KR 83	0.44079E+00	0.53493E-02	0.54777E+00	0.92571E+02
34 CE144 *	0.59609E-01	0.36204E-01	0.50134E+00	0.93072E+02
35 SM152	0.69376E+00	0.26469E-02	0.42659E+00	0.93496E+02
36 ND144 *	0.99489E-01	0.18241E-01	0.42159E+00	0.93920E+02
37 RB 85	0.15912E+00	0.10388E-01	0.38398E+00	0.94304E+02
38 NB 95	0.18179E+00	0.87180E-02	0.36816E+00	0.94672E+02
39 PR143	0.47829E+00	0.32248E-02	0.35831E+00	0.95030E+02
40 PD107 *	0.80019E+00	0.19111E-02	0.35525E+00	0.95386E+02
41 ZR 95	0.92004E-01	0.16562E-01	0.35399E+00	0.95740E+02
42 CS137 *	0.22909E-01	0.61520E-01	0.32741E+00	0.96067E+02
43 XE134	0.18009E-01	0.71876E-01	0.30070E+00	0.96368E+02
44 CE140	0.20001E-01	0.59511E-01	0.27651E+00	0.96644E+02
45 BR 81	0.53584E+00	0.19652E-02	0.24463E+00	0.96889E+02
46 CE141	0.13161E+00	0.77896E-02	0.23816E+00	0.97127E+02
47 RB 87	0.32213E-01	0.25532E-01	0.19106E+00	0.97318E+02
48 ZR 94	0.12247E-01	0.64483E-01	0.18346E+00	0.97502E+02
49 ZR 92	0.12963E-01	0.59872E-01	0.17056E+00	0.97672E+02
50 Y 91	0.53214E-01	0.13422E-01	0.16593E+00	0.97838E+02

* One group cross section.

** Normalized to 2., i.e., per fission.

TABLE 5.2 (Cont.)

U-235(THERMAL) BURN-UP 360 DAYS

	NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
51	KR 84	0.71112E-01	0.99724E-02	0.16474E+00	0.98003E+02
52	EU155 *	0.24392E+01	0.27692E-03	0.16077E+00	0.98164E+02
53	BA140	0.20665E+00	0.32291E-02	0.15502E+00	0.98319E+02
54	I 127	0.54860E+00	0.12013E-02	0.15310E+00	0.98472E+02
55	SR 90 *	0.10964E-01	0.58586E-01	0.14923E+00	0.98621E+02
56	ND147	0.59741E+00	0.10031E-02	0.13921E+00	0.98760E+02
57	BA138	0.74738E-02	0.67418E-01	0.11705E+00	0.98877E+02
58	Y 89	0.11511E-01	0.38151E-01	0.10202E+00	0.98979E+02
59	KR 85	0.13173E+00	0.29648E-02	0.90729E-01	0.99070E+02
60	RU106 *	0.94804E-01	0.28344E-02	0.62424E-01	0.99132E+02
61	AG109 *	0.88640E+00	0.27339E-03	0.56297E-01	0.99189E+02
62	XE136	0.38422E-02	0.61167E-01	0.54597E-01	0.99243E+02
63	SE 79	0.40823E+00	0.55036E-03	0.52194E-01	0.99296E+02
64	TE128	0.52974E-01	0.40230E-02	0.49508E-01	0.99345E+02
65	SM154	0.29944E+00	0.71020E-03	0.49404E-01	0.99394E+02
66	MO 99	0.28384E+00	0.68619E-03	0.45246E-01	0.99440E+02
67	SR 88	0.48747E-02	0.36460E-01	0.41289E-01	0.99481E+02
68	PD106	0.15426E+00	0.10720E-02	0.38917E-01	0.99520E+02
69	I 131	0.18364E+00	0.89418E-03	0.38147E-01	0.99558E+02
70	TE130	0.81875E-02	0.20029E-01	0.38096E-01	0.99596E+02
71	XE133	0.11264E+00	0.14277E-02	0.37359E-01	0.99634E+02
72	PM149	0.12417E+01	0.98127E-04	0.28305E-01	0.99662E+02
73	SR 89	0.11374E-01	0.99419E-02	0.27424E-01	0.99689E+02
74	KR 86	0.53915E-02	0.19361E-01	0.24249E-01	0.99714E+02
75	PD108	0.11809E+00	0.70407E-03	0.19316E-01	0.99733E+02
76	BA137	0.11458E+00	0.72005E-03	0.19166E-01	0.99752E+02
77	GD155	0.14684E+01	0.55591E-04	0.18963E-01	0.99771E+02
78	SB121	0.43706E+00	0.17728E-03	0.18000E-01	0.99789E+02
79	GD156	0.45935E+00	0.12511E-03	0.13351E-01	0.99802E+02
80	IN115	0.51526E+00	0.99161E-04	0.11870E-01	0.99814E+02
81	SN117	0.30915E+00	0.16088E-03	0.11554E-01	0.99826E+02
82	GD157	0.74480E+00	0.64041E-04	0.11081E-01	0.99837E+02
83	TE827	0.28251E+00	0.16782E-03	0.11014E-01	0.99848E+02
84	CE143	0.14135E+00	0.32641E-03	0.10719E-01	0.99859E+02
85	SB123	0.32820E+00	0.13589E-03	0.10361E-01	0.99869E+02
86	CD111	0.24979E+00	0.17665E-03	0.10251E-01	0.99879E+02
87	SE 80	0.45366E-01	0.94648E-03	0.10019E-01	0.99889E+02
88	CD113	0.29623E+00	0.12790E-03	0.88015E-02	0.99898E+02
89	SB125	0.16242E+00	0.21606E-03	0.81520E-02	0.99906E+02
90	SE 82	0.11735E-01	0.24339E-02	0.66356E-02	0.99913E+02
91	SN119	0.21651E+00	0.12608E-03	0.63414E-02	0.99919E+02
92	PM151	0.12681E+01	0.19871E-04	0.58542E-02	0.99925E+02
93	SE 77	0.27563E+00	0.91073E-04	0.58315E-02	0.99931E+02
94	CD112	0.19559E+00	0.12723E-03	0.57809E-02	0.99937E+02
95	CD114	0.16718E+00	0.12935E-03	0.50235E-02	0.99942E+02
96	SM153	0.16712E+01	0.11889E-04	0.46157E-02	0.99946E+02
97	TB159	0.16847E+01	0.10877E-04	0.42571E-02	0.99950E+02
98	SE 78	0.80951E-01	0.20327E-03	0.38227E-02	0.99954E+02
99	SN118	0.10838E+00	0.14753E-03	0.37145E-02	0.99958E+02
100	RH105	0.25683E+00	0.56742E-04	0.33855E-02	0.99961E+02

* One group cross section.

** Normalized to 2.,i.e., per fission.

TABLE 5.2 (Cont.)

U-235(THERMAL) BURN-UP 360 DAYS

	NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
101	EU156	0.18154E+01	0.80035E-05	0.33754E-02	0.99965E+02
102	GD158	0.33588E+00	0.42776E-04	0.33477E-02	0.99968E+02
103	SN123	0.13802E+00	0.10356E-03	0.33207E-02	0.99971E+02
104	PR145	0.35928E+00	0.39771E-04	0.33195E-02	0.99975E+02
105	PD110	0.48508E-01	0.20005E-03	0.22544E-02	0.99977E+02
106	ZR 97	0.51352E-01	0.16829E-03	0.20076E-02	0.99979E+02
107	TE125	0.32009E+00	0.25452E-04	0.18927E-02	0.99981E+02
108	BA136	0.10021E+00	0.66311E-04	0.15438E-02	0.99982E+02
109	SN126	0.12096E-01	0.50254E-03	0.14121E-02	0.99984E+02
110	SN120	0.46427E-01	0.13063E-03	0.14090E-02	0.99985E+02
111	SN124	0.33603E-01	0.17835E-03	0.13923E-02	0.99987E+02
112	SN122	0.38703E-01	0.15062E-03	0.13542E-02	0.99988E+02
113	AS 75	0.47500E+00	0.12071E-04	0.13320E-02	0.99989E+02
114	EU154	0.31269E+01	0.14627E-05	0.12078E-02	0.99991E+02
115	CD116	0.40687E-01	0.11064E-03	0.10458E-02	0.99992E+02
116	ZR 90	0.56951E-02	0.70497E-03	0.96545E-03	0.99993E+02
117	TC799	0.45938E+00	0.89465E-05	0.95475E-03	0.99994E+02
118	Y 93	0.33143E-01	0.11051E-03	0.85086E-03	0.99994E+02
119	RU105	0.33294E+00	0.72163E-05	0.55815E-03	0.99995E+02
120	SB127	0.13163E+00	0.18144E-04	0.55480E-03	0.99995E+02
121	SR 91	0.18964E-01	0.92516E-04	0.40757E-03	0.99996E+02
122	XE135	0.16482E-01	0.10324E-03	0.39529E-03	0.99996E+02
123	AG111	0.30689E+00	0.54861E-05	0.39367E-03	0.99997E+02
124	TE126	0.74212E-01	0.19050E-04	0.32843E-03	0.99997E+02
125	SN125	0.11109E+00	0.93853E-05	0.24221E-03	0.99997E+02
126	DY161	0.11403E+01	0.82004E-06	0.21723E-03	0.99997E+02
127	SN115	0.16103E+00	0.52210E-05	0.19532E-03	0.99998E+02
128	XE130	0.25201E+00	0.31756E-05	0.18592E-03	0.99998E+02
129	CS136	0.16916E+00	0.35275E-05	0.15501E-03	0.99998E+02
130	Y 90	0.43381E-01	0.15119E-04	0.15237E-03	0.99998E+02
131	TE129	0.93692E-01	0.68077E-05	0.14849E-03	0.99998E+02
132	TE825	0.31700E+00	0.20052E-05	0.14766E-03	0.99998E+02
133	RU100	0.50877E+00	0.12489E-05	0.14761E-03	0.99999E+02
134	MO 96	0.10426E+00	0.51355E-05	0.12438E-03	0.99999E+02
135	TE127	0.24421E+00	0.21065E-05	0.11951E-03	0.99999E+02
136	GE 76	0.13468E-01	0.35199E-04	0.11013E-03	0.99999E+02
137	SR 86	0.38742E-01	0.11247E-04	0.10122E-03	0.99999E+02
138	SB126	0.39104E+00	0.10036E-05	0.91169E-04	0.99999E+02
139	TE132	0.70326E-03	0.53490E-03	0.87389E-04	0.99999E+02
140	CD115	0.36749E+00	0.94535E-06	0.80707E-04	0.99999E+02
141	SM148	0.24056E+00	0.11732E-05	0.65563E-04	0.99999E+02
142	RB 86	0.33004E+00	0.82261E-06	0.63070E-04	0.99999E+02
143	GD160	0.77076E-01	0.33071E-05	0.59215E-04	0.99999E+02
144	GE 73	0.22094E+00	0.10391E-05	0.53332E-04	0.10000E+03
145	AS 77	0.38103E+00	0.59347E-06	0.52533E-04	0.10000E+03
146	SN121	0.27376E+00	0.80381E-06	0.51121E-04	0.10000E+03
147	PD109	0.30834E+00	0.66215E-06	0.47430E-04	0.10000E+03
148	EU157	0.11929E+01	0.16063E-06	0.44513E-04	0.10000E+03
149	XE128	0.38473E+00	0.38167E-06	0.34112E-04	0.10000E+03
150	I 135	0.18070E-02	0.71569E-04	0.30044E-04	0.10000E+03

* One group cross section.

** Normalized to 2.,i.e., per fission.

TABLE 5.2 (Cont.)

U-235(THERMAL) BURN-UP 360 DAYS

NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
151 SB128	0.17850E+00	0.64407E-06	0.26708E-04	0.10000E+03
152 KR 82	0.17425E+00	0.64640E-06	0.26166E-04	0.10000E+03
153 I 133	0.40342E-03	0.24154E-03	0.22637E-04	0.10000E+03
154 SM156	0.45882E+00	0.18885E-06	0.20129E-04	0.10000E+03
155 CS134	0.48513E+00	0.12149E-06	0.13692E-04	0.10000E+03
156 TE831	0.59073E-02	0.85309E-05	0.11707E-04	0.10000E+03
157 GE 74	0.14249E-01	0.34070E-05	0.11278E-04	0.10000E+03
158 TE829	0.12865E+00	0.24363E-06	0.72812E-05	0.10000E+03
159 PD112	0.64249E-01	0.40997E-06	0.61192E-05	0.10000E+03
160 PM148	0.10098E+01	0.25748E-07	0.60405E-05	0.10000E+03
161 TB161	0.91439E+00	0.23213E-07	0.49311E-05	0.10000E+03
162 GE 77	0.85650E-01	0.17327E-06	0.34476E-05	0.10000E+03
163 GD159	0.38887E+00	0.32982E-07	0.29795E-05	0.10000E+03
164 TE131	0.37343E-02	0.33595E-05	0.29144E-05	0.10000E+03
165 TE124	0.13222E+00	0.91532E-07	0.28115E-05	0.10000E+03
166 LA140	0.20999E+00	0.55236E-07	0.26946E-05	0.10000E+03
167 SB124	0.34203E+00	0.28383E-07	0.22552E-05	0.10000E+03
168 BA134	0.41109E+00	0.21383E-07	0.20420E-05	0.10000E+03
169 TE122	0.24226E+00	0.24599E-07	0.13844E-05	0.10000E+03
170 SN116	0.12827E+00	0.46359E-07	0.13815E-05	0.10000E+03
171 GE 72	0.21103E-01	0.23440E-06	0.11491E-05	0.10000E+03
172 I 130	0.63655E+00	0.65887E-08	0.97432E-06	0.10000E+03
173 DY160	0.84470E+00	0.31310E-08	0.61441E-06	0.10000E+03
174 BR 82	0.61404E+00	0.37556E-08	0.53573E-06	0.10000E+03
175 TB160	0.16720E+01	0.12052E-08	0.46812E-06	0.10000E+03
176 PD104	0.43457E+00	0.99510E-09	0.10046E-06	0.10000E+03
177 SB122	0.75316E+00	0.27916E-09	0.48843E-07	0.10000E+03
178 GA 72	0.21222E+00	0.55752E-09	0.27487E-07	0.10000E+03
179 ND142	0.84834E-01	0.98895E-09	0.19490E-07	0.10000E+03
180 CD110	0.31417E+00	0.13710E-09	0.10006E-07	0.10000E+03
181 ZN 72	0.51455E-02	0.18386E-08	0.21977E-08	0.10000E+03
182 SE 76	0.10087E+00	0.71022E-10	0.16642E-08	0.10000E+03
183 PR142	0.32942E+00	0.31808E-11	0.24342E-09	0.10000E+03
184 AS 76	0.82606E+00	0.31566E-12	0.60576E-10	0.10000E+03
185 TE123	0.46605E+00	0.0	0.0	0.10000E+03
186 ND150	0.11758E+00	0.0	0.0	0.10000E+03
187 DY162	0.44459E+00	0.0	0.0	0.10000E+03
188 DY163	0.66046E+00	0.0	0.0	0.10000E+03
189 DY164	0.11367E+00	0.0	0.0	0.10000E+03
190 HO165	0.15917E+01	0.0	0.0	0.10000E+03
191 CD815	0.38540E+00	0.0	0.0	0.10000E+03
192 TE823	0.50546E+00	0.0	0.0	0.10000E+03
193 PM848	0.15006E+01	0.0	0.0	0.10000E+03

LUMPED ONE GROUP CROSS SECTION 0.43046E+00

* One group cross section.

** Normalized to 2.,i.e., per fission.

TABLE 5.3 Contribution of the individual FP nuclides to total capture

U-238(FISSION SPECT) BURN-UP 360 DAYS

	NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
1	RU101 *	0.75890E+00	0.63698E-01	0.88045E+01	0.88045E+01
2	SM149 *	0.23668E+01	0.18243E-01	0.78640E+01	0.16669E+02
3	RH103 *	0.70516E+00	0.53759E-01	0.69044E+01	0.23573E+02
4	TC 99 *	0.58870E+00	0.63436E-01	0.68018E+01	0.30375E+02
5	CS133 *	0.53767E+00	0.63044E-01	0.61738E+01	0.36548E+02
6	PM147 *	0.12713E+01	0.21666E-01	0.50167E+01	0.41565E+02
7	PD105 *	0.80738E+00	0.32052E-01	0.47133E+01	0.46278E+02
8	SM151 *	0.24773E+01	0.91603E-02	0.41331E+01	0.50412E+02
9	CS135 *	0.32120E+00	0.66467E-01	0.38884E+01	0.54300E+02
10	MO 97 *	0.34530E+00	0.59384E-01	0.37347E+01	0.58035E+02
11	ND145 *	0.43110E+00	0.37274E-01	0.29266E+01	0.60961E+02
12	XE131 *	0.43313E+00	0.35405E-01	0.27930E+01	0.63754E+02
13	ND143 *	0.34981E+00	0.42554E-01	0.27112E+01	0.66466E+02
14	RU102 *	0.22743E+00	0.63699E-01	0.26386E+01	0.69104E+02
15	MO 95 *	0.32761E+00	0.34045E-01	0.20314E+01	0.71136E+02
16	EU153 *	0.27556E+01	0.40438E-02	0.20296E+01	0.73165E+02
17	MO 98	0.18115E+00	0.60200E-01	0.19862E+01	0.75151E+02
18	PD107 *	0.80019E+00	0.13054E-01	0.19025E+01	0.77054E+02
19	ZR 93 *	0.20895E+00	0.48139E-01	0.18321E+01	0.78886E+02
20	SM150	0.68366E+00	0.12839E-01	0.15987E+01	0.80485E+02
21	RU104 *	0.18680E+00	0.45044E-01	0.15325E+01	0.82017E+02
22	MO100	0.11724E+00	0.63643E-01	0.13590E+01	0.83376E+02
23	PR141	0.15732E+00	0.47181E-01	0.13519E+01	0.84728E+02
24	XE132	0.11496E+00	0.52526E-01	0.10998E+01	0.85828E+02
25	I 127	0.54860E+00	0.99055E-02	0.98976E+00	0.86818E+02
26	RU103	0.50432E+00	0.10119E-01	0.92946E+00	0.87747E+02
27	ND148	0.23212E+00	0.21135E-01	0.89353E+00	0.88641E+02
28	SM147 *	0.14253E+01	0.28914E-02	0.75059E+00	0.89391E+02
29	SM152	0.69376E+00	0.58379E-02	0.73766E+00	0.90129E+02
30	ZR 91	0.10037E+00	0.34477E-01	0.63027E+00	0.90759E+02
31	ND146	0.96998E-01	0.33827E-01	0.59761E+00	0.91357E+02
32	I 129 *	0.49786E+00	0.63306E-02	0.57404E+00	0.91931E+02
33	LA139	0.56396E-01	0.53105E-01	0.54547E+00	0.92476E+02
34	ZR 96	0.53116E-01	0.54887E-01	0.53099E+00	0.93007E+02
35	EU155 *	0.24992E+01	0.11567E-02	0.52652E+00	0.93534E+02
36	AG109 *	0.88640E+00	0.26931E-02	0.43478E+00	0.93969E+02
37	CE142	0.44683E-01	0.46917E-01	0.38182E+00	0.94350E+02
38	RU106 *	0.94804E-01	0.20545E-01	0.35475E+00	0.94705E+02
39	KR 83	0.44079E+00	0.41192E-02	0.33070E+00	0.95036E+02
40	CE144 *	0.59609E-01	0.30192E-01	0.32779E+00	0.95364E+02
41	ND144 *	0.99489E-01	0.15181E-01	0.27509E+00	0.95639E+02
42	NB 95	0.18179E+00	0.74748E-02	0.24748E+00	0.95886E+02
43	XE134	0.18009E-01	0.75211E-01	0.24669E+00	0.96133E+02
44	CS137 *	0.22909E-01	0.58777E-01	0.24525E+00	0.96378E+02
45	ZR 95	0.92004E-01	0.14205E-01	0.23804E+00	0.96616E+02
46	PD106	0.15626E+00	0.77750E-02	0.22129E+00	0.96837E+02
47	PR143	0.47829E+00	0.24675E-02	0.21495E+00	0.97052E+02
48	CE140	0.20001E-01	0.55951E-01	0.20382E+00	0.97256E+02
49	RB 85	0.15912E+00	0.63316E-02	0.18349E+00	0.97440E+02
50	CE141	0.13161E+00	0.72302E-02	0.17331E+00	0.97613E+02

* One group cross section.

** Normalized to 2.,i.e., per fission.

TABLE 5.3 (Cont.)

U-238(FISSION SPECT) BURN-UP 360 DAYS

	NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
51	BR 81	0.53584E+00	0.15884E-02	0.15502E+00	0.97766E+02
52	PD108	0.11809E+00	0.64052E-02	0.13777E+00	0.97906E+02
53	SM154	0.29944E+00	0.24456E-02	0.13338E+00	0.98039E+02
54	ND147	0.59741E+00	0.11399E-02	0.12404E+00	0.98163E+02
55	BA140	0.20665E+00	0.30470E-02	0.11469E+00	0.98278E+02
56	ZR 94	0.12247E-01	0.51354E-01	0.11455E+00	0.98392E+02
57	KR 84	0.71112E-01	0.84880E-02	0.10994E+00	0.98502E+02
58	Y 91	0.53214E-01	0.10455E-01	0.10133E+00	0.98604E+02
59	ZR 92	0.12263E-01	0.39052E-01	0.87221E-01	0.98691E+02
60	RB 87	0.32213E-01	0.14145E-01	0.82988E-01	0.98774E+02
61	BA138	0.74738E-02	0.59120E-01	0.80476E-01	0.98854E+02
62	SR 90 *	0.10964E-01	0.32387E-01	0.64677E-01	0.98919E+02
63	GD155	0.14684E+01	0.23213E-03	0.62081E-01	0.98981E+02
64	GD156	0.45935E+00	0.70141E-03	0.58683E-01	0.99040E+02
65	GD157	0.74480E+00	0.37782E-03	0.51253E-01	0.99091E+02
66	Y 89	0.11511E-01	0.23896E-01	0.50100E-01	0.99141E+02
67	XE136	0.38422E-02	0.67472E-01	0.47217E-01	0.99188E+02
68	IN115	0.51526E+00	0.50109E-03	0.47025E-01	0.99235E+02
69	CD111	0.24979E+00	0.99728E-03	0.45371E-01	0.99281E+02
70	KR 85	0.13173E+00	0.18056E-02	0.43321E-01	0.99324E+02
71	I 131	0.18364E+00	0.11800E-02	0.39469E-01	0.99364E+02
72	PM149	0.12417E+01	0.16856E-03	0.38122E-01	0.99402E+02
73	TE127	0.28251E+00	0.73896E-03	0.38023E-01	0.99440E+02
74	MO 99	0.28384E+00	0.71825E-03	0.37131E-01	0.99477E+02
75	CD112	0.19559E+00	0.88221E-03	0.31427E-01	0.99508E+02
76	SE 79	0.40823E+00	0.41050E-03	0.30522E-01	0.99539E+02
77	TE128	0.52974E-01	0.30948E-02	0.29859E-01	0.99569E+02
78	SB121	0.43706E+00	0.37408E-03	0.29778E-01	0.99598E+02
79	CD113	0.29623E+00	0.54577E-03	0.29446E-01	0.99628E+02
80	SB125	0.16242E+00	0.96232E-03	0.28467E-01	0.99656E+02
81	XE133	0.11264E+00	0.13651E-02	0.28007E-01	0.99684E+02
82	TB159	0.16847E+01	0.87231E-04	0.26766E-01	0.99711E+02
83	SN117	0.30915E+00	0.40075E-03	0.22565E-01	0.99734E+02
84	TE130	0.81875E-02	0.14675E-01	0.21884E-01	0.99756E+02
85	SR 88	0.48747E-02	0.16757E-01	0.14877E-01	0.99770E+02
86	EU156	0.18154E+01	0.44934E-04	0.14858E-01	0.99785E+02
87	SN119	0.21651E+00	0.36926E-03	0.14561E-01	0.99800E+02
88	SB123	0.32820E+00	0.23811E-03	0.14234E-01	0.99814E+02
89	BA137	0.11458E+00	0.67267E-03	0.14038E-01	0.99828E+02
90	SR 89	0.11874E-01	0.62271E-02	0.13467E-01	0.99842E+02
91	KR 86	0.53915E-02	0.13626E-01	0.13381E-01	0.99855E+02
92	CD114	0.16718E+00	0.42010E-03	0.12792E-01	0.99868E+02
93	PD110	0.48508E-01	0.14170E-02	0.12520E-01	0.99880E+02
94	GD158	0.33688E+00	0.17386E-03	0.10667E-01	0.99891E+02
95	PM151	0.12681E+01	0.43507E-04	0.10049E-01	0.99901E+02
96	SM153	0.16712E+01	0.32050E-04	0.97555E-02	0.99911E+02
97	RH105	0.25683E+00	0.19019E-03	0.88964E-02	0.99920E+02
98	SE 80	0.45566E-01	0.88167E-03	0.73171E-02	0.99927E+02
99	SN118	0.10838E+00	0.36875E-03	0.72791E-02	0.99934E+02
100	TE125	0.32009E+00	0.11326E-03	0.66032E-02	0.99941E+02

* One group cross section.

** Normalized to 2.,i.e., per fission.

TABLE 5.3 (Cont.)

U-238(FISSION SPECT) BURN-UP 360 DAYS

	NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
101	CE143	0.14135E+00	0.25126E-03	0.64686E-02	0.99947E+02
102	SE 82	0.11735E-01	0.26420E-02	0.56470E-02	0.99953E+02
103	SN123	0.13802E+00	0.18175E-03	0.45689E-02	0.99958E+02
104	TE129	0.12865E+00	0.19027E-03	0.44582E-02	0.99962E+02
105	DY161	0.11403E+01	0.19269E-04	0.40019E-02	0.99966E+02
106	SN120	0.46427E-01	0.37026E-03	0.31309E-02	0.99969E+02
107	SN124	0.33603E-01	0.46345E-03	0.28365E-02	0.99972E+02
108	CD116	0.40687E-01	0.37713E-03	0.27948E-02	0.99975E+02
109	SN122	0.38703E-01	0.38529E-03	0.27160E-02	0.99977E+02
110	PR145	0.35928E+00	0.37567E-04	0.24583E-02	0.99980E+02
111	SE 78	0.80951E-01	0.14256E-03	0.21020E-02	0.99982E+02
112	BA136	0.10021E+00	0.10850E-03	0.19805E-02	0.99984E+02
113	SE 77	0.27563E+00	0.37581E-04	0.18866E-02	0.99986E+02
114	AG111	0.30889E+00	0.30971E-04	0.17424E-02	0.99988E+02
115	ZR 97	0.51352E-01	0.16420E-03	0.15358E-02	0.99989E+02
116	SN126	0.12096E-01	0.63541E-03	0.13998E-02	0.99991E+02
117	RU105	0.33294E+00	0.19653E-04	0.11916E-02	0.99992E+02
118	SN125	0.11109E+00	0.42439E-04	0.85869E-03	0.99993E+02
119	TC799	0.45938E+00	0.93640E-05	0.78347E-03	0.99993E+02
120	SN115	0.16103E+00	0.26372E-04	0.77346E-03	0.99994E+02
121	TE127	0.24421E+00	0.16435E-04	0.73101E-03	0.99995E+02
122	TE825	0.31700E+00	0.89226E-05	0.51516E-03	0.99995E+02
123	Y 93	0.33143E-01	0.83215E-04	0.50232E-03	0.99996E+02
124	GD160	0.77076E-01	0.33971E-04	0.47689E-03	0.99996E+02
125	ZR 90	0.58951E-02	0.40442E-03	0.43423E-03	0.99997E+02
126	SB127	0.13163E+00	0.15594E-04	0.37355E-03	0.99997E+02
127	PD109	0.30834E+00	0.64662E-05	0.36313E-03	0.99998E+02
128	CD115	0.36749E+00	0.47851E-05	0.32028E-03	0.99998E+02
129	AS 75	0.47500E+00	0.34566E-05	0.29904E-03	0.99998E+02
130	XE135	0.16482E-01	0.88202E-04	0.26477E-03	0.99998E+02
131	SR 91	0.18964E-01	0.72837E-04	0.25157E-03	0.99999E+02
132	EU157	0.11929E+01	0.96172E-06	0.20894E-03	0.99999E+02
133	CS136	0.18916E+00	0.59629E-05	0.20544E-03	0.99999E+02
134	SM156	0.45882E+00	0.11677E-05	0.97580E-04	0.99999E+02
135	TE129	0.93692E-01	0.56315E-05	0.96304E-04	0.99999E+02
136	TB161	0.91439E+00	0.54817E-06	0.91294E-04	0.99999E+02
137	TE132	0.70326E-03	0.68972E-03	0.88345E-04	0.10000E+03
138	SN121	0.27376E+00	0.16976E-05	0.84645E-04	0.10000E+03
139	MO 96	0.10426E+00	0.41852E-05	0.79472E-04	0.10000E+03
140	Y 90	0.43381E-01	0.83689E-05	0.66125E-04	0.10000E+03
141	PD112	0.64249E-01	0.31043E-05	0.36327E-04	0.10000E+03
142	TE126	0.74212E-01	0.18051E-05	0.24399E-04	0.10000E+03
143	GE 76	0.13468E-01	0.97787E-05	0.23988E-04	0.10000E+03
144	I 135	0.18070E-02	0.63684E-04	0.20960E-04	0.10000E+03
145	SB128	0.17850E+00	0.58755E-06	0.19101E-04	0.10000E+03
146	GD159	0.38887E+00	0.26734E-06	0.18934E-04	0.10000E+03
147	EU154	0.31269E+01	0.32268E-07	0.18377E-04	0.10000E+03
148	AS 77	0.38103E+00	0.24490E-06	0.16996E-04	0.10000E+03
149	I 133	0.40342E-03	0.23013E-03	0.16909E-04	0.10000E+03
150	GE 73	0.22094E+00	0.28767E-06	0.11576E-04	0.10000E+03

* One group cross section.

** Normalized to 2., i.e., per fission.

TABLE 5.3 (Cont.)

U-238(FISSION SPECT) BURN-UP 360 DAYS

NUCLIDE	1-G.C.S.* (BARN)	CONCENTRATION**	CONTRIBUTION (%)	ACCUMLTD (%)
151 TE831	0.59073E-02	0.65427E-05	0.70394E-05	0.10000E+03
152 SB126	0.39104E+00	0.94874E-07	0.67571E-05	0.10000E+03
153 DY160	0.84470E+00	0.32944E-07	0.50684E-05	0.10000E+03
154 TB160	0.16720E+01	0.12803E-07	0.38989E-05	0.10000E+03
155 TE131	0.37343E-02	0.48707E-05	0.33127E-05	0.10000E+03
156 RU100	0.50877E+00	0.34360E-07	0.31839E-05	0.10000E+03
157 GE 74	0.14249E-01	0.97887E-06	0.25404E-05	0.10000E+03
158 XE130	0.25201E+00	0.32296E-07	0.14824E-05	0.10000E+03
159 GE 77	0.85650E-01	0.71507E-07	0.11155E-05	0.10000E+03
160 TE124	0.13222E+00	0.35834E-07	0.86294E-06	0.10000E+03
161 SB124	0.34203E+00	0.11112E-07	0.69219E-06	0.10000E+03
162 GE 72	0.21103E-01	0.43010E-07	0.16531E-06	0.10000E+03
163 KR 82	0.17425E+00	0.31576E-08	0.10021E-06	0.10000E+03
164 CS134	0.48513E+00	0.86634E-09	0.76549E-07	0.10000E+03
165 SN116	0.12827E+00	0.20976E-08	0.49005E-07	0.10000E+03
166 SM148	0.24056E+00	0.10554E-08	0.46243E-07	0.10000E+03
167 LA140	0.20999E+00	0.81882E-09	0.31317E-07	0.10000E+03
168 TE122	0.24226E+00	0.54616E-09	0.24099E-07	0.10000E+03
169 BA134	0.41109E+00	0.15248E-09	0.11416E-07	0.10000E+03
170 SR 86	0.38742E-01	0.13955E-08	0.98467E-08	0.10000E+03
171 I 130	0.63655E+00	0.67006E-10	0.77685E-08	0.10000E+03
172 RB 86	0.33004E+00	0.11279E-09	0.67798E-08	0.10000E+03
173 XE128	0.38473E+00	0.78709E-10	0.55154E-08	0.10000E+03
174 PD104	0.43457E+00	0.68682E-10	0.54362E-08	0.10000E+03
175 PM148	0.10098E+01	0.23307E-10	0.42867E-08	0.10000E+03
176 GA 72	0.21222E+00	0.10230E-09	0.39543E-08	0.10000E+03
177 BR 82	0.61404E+00	0.18743E-10	0.20962E-08	0.10000E+03
178 SB122	0.75316E+00	0.61980E-11	0.85022E-09	0.10000E+03
179 ZN 72	0.51455E-02	0.33736E-09	0.31617E-09	0.10000E+03
180 CD110	0.31417E+00	0.43283E-11	0.24767E-09	0.10000E+03
181 SE 76	0.10087E+00	0.66527E-12	0.12222E-10	0.10000E+03
182 ND142	0.84834E-01	0.40124E-13	0.61997E-12	0.10000E+03
183 AS 76	0.82606E+00	0.29569E-14	0.44487E-12	0.10000E+03
184 PR142	0.32942E+00	0.12905E-15	0.77430E-14	0.10000E+03
185 TE123	0.46605E+00	0.0	0.0	0.10000E+03
186 ND150	0.11758E+00	0.0	0.0	0.10000E+03
187 DY162	0.44459E+00	0.0	0.0	0.10000E+03
188 DY163	0.66046E+00	0.0	0.0	0.10000E+03
189 DY164	0.11367E+00	0.0	0.0	0.10000E+03
190 HO165	0.15917E+01	0.0	0.0	0.10000E+03
191 CD815	0.38540E+00	0.0	0.0	0.10000E+03
192 TE823	0.50546E+00	0.0	0.0	0.10000E+03
193 PM848	0.15006E+01	0.0	0.0	0.10000E+03

LUMPED ONE GROUP CROSS SECTION 0.54904E+00

* One group cross section.

** Normalized to 2.,i.e., per fission.

3. 3 Comparison with Other Sets

As shown in section 3. 1, disagreements of FP cross sections among various sets are larger than the uncertainties due to burn-up dependence. The JNDC set is compared with the other sets in this section. The burn-up time dependence is neglected here and the lumped constants are compared at burn-up of 360 days.

The 25 group lumped cross sections are compared with each other in **Figs. 6. 1, 6. 2** and **6. 3**. Considerable discrepancies are observed in the capture and inelastic scattering cross sections. Agreements are fairly good for the elastic scattering. As for the capture cross sections, the JNDC and the ENDF/B-4 sets have larger values above 1 MeV and smaller ones below 500 keV than the Cook and the JNDC-P sets. The difference of energy dependence is caused between the JNDC and the JNDC-P sets by the fact that the Porter-Thomas fluctuation was taken into

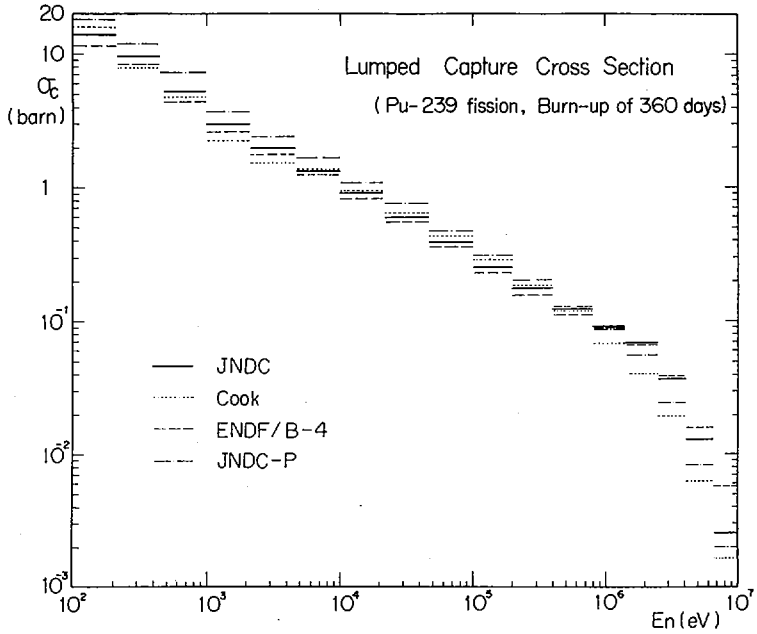

Fig. 6. 1 Lumped capture cross sections of FP due to ^{239}Pu fission at burn-up of 360 days.

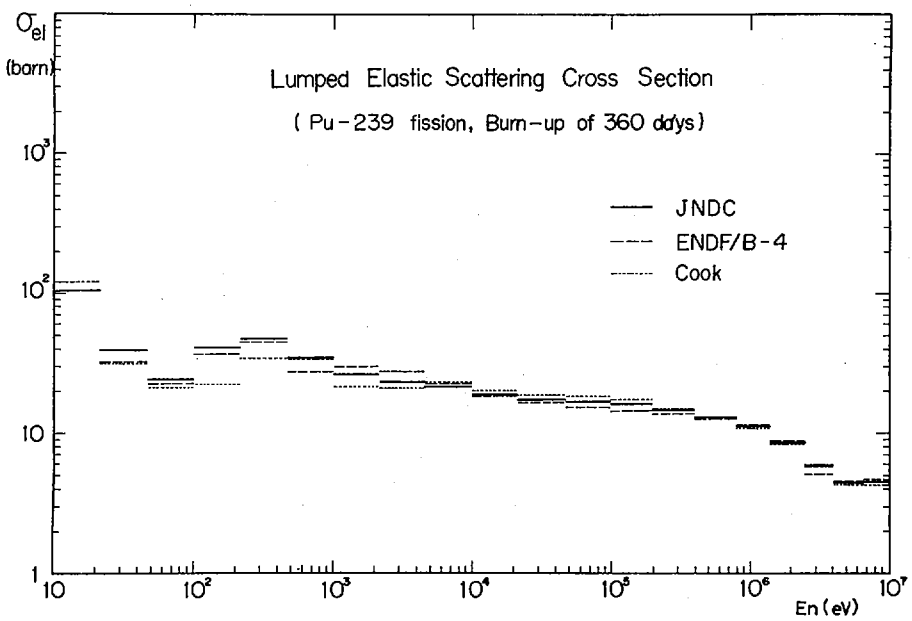

Fig. 6. 2 Lumped elastic scattering cross section of FP due to ^{239}Pu fission at burn-up of 360 days.

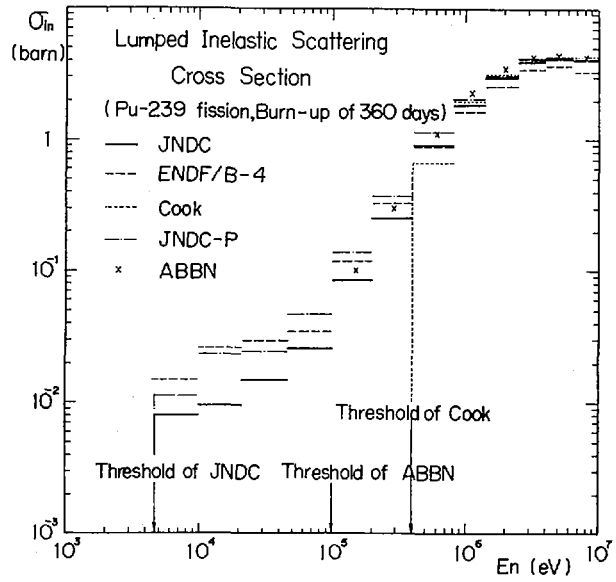

Fig. 6.3 Lumped inelastic scattering cross sections of FP due to ^{239}Pu fission at burn-up of 360 days.

account in the JNDC set but not in the JNDC-P set. The Cook set has a discontinuity at 4.65 keV which cannot be explained by the statistical fluctuation[14,21].

As for the inelastic scattering cross sections, disagreements are evident in the threshold energy. The Cook set has much higher threshold energy than the other sets. The JNDC and the JNDC-P sets have the same threshold energy, which is determined by the threshold of ^{151}Sm. No threshold energy exists in the ENDF/B-4 set, since ^{153}Eu has very small (n, n′α) cross section down to the thermal energy and this cross section is treated as the inelastic scattering in the present group constants*. The threshold lies at 100 keV in the ABBN set.

To make these characteristics clearer for each set, we compare in TABLE 6 one group cross sections collapsed with the spectra of the two typical fast reactors. The following were observed:

1) The JNDC-P set has the largest capture cross sections.
2) The ENDF/B-4 set has the smallest capture cross sections.
3) The Cook set has the largest elastic scattering cross sections and rather small inelastic scattering cross sections.
4) The JNDC set has no extreme values for all the cases.
5) The maximum discrepancies are about 40% in capture, 50% in inelastic scattering and 20% in elastic scattering.
6) The discrepancies are decreased to be 15%, 10% and 10% in capture, inelastic scattering and elastic scattering respectively, when we exclude the JNDC-P set, which is preliminary, and the ABBN set, details of which are not known.

Though fairly good agreements are observed in the one-group lumped cross sections among the JNDC, Cook and ENDF/B-4 sets, this does not mean that the cross sections of the individual nuclides agree with each other. One group cross sections of 28 nuclides are compared in TABLES 7.1 to 7.3. The Cook set has smaller capture cross sections than the JNDC set for most of nuclides but has much larger ones for ^{101}Ru, whose concentration is large, resulting in nearly the same values of the one group lumped capture cross section.

It is difficult to say which set is the most reliable without carrying out what is called the benchmark test. This will be discussed in Chapter 4.

* The (n, n′α) cross section was ignored in the evaluation by JNDC.

TABLE 6 One group lumped cross sections at 360 days of burn-up for various sets

FP due to fission of ^{239}Pu with thermal neutrons

Set	σ_c (barn)		σ_{el} (barn)		σ_{in} (barn)	
	A	B	A	B	A	B
JNDC	0.567	0.295	15.90	13.98	0.554	0.903
JNDC-P	0.703	0.353	15.80	13.85	0.637	1.022
Cook	0.552	0.299	16.46	14.49	0.499	0.843
ENDF/B-4	0.511	0.269	15.20	13.31	0.520	0.830
ABBN	0.596	0.310	13.92	12.91	0.638	1.045

FP due to fission of ^{235}U with thermal neutrons

Set	σ_c (barn)		σ_{el} (barn)		σ_{in} (barn)	
	A	B	A	B	A	B
JNDC	0.430	0.217	16.21	14.18	0.489	0.801
JNDC-P	0.545	0.263	16.16	14.10	0.554	0.895
Cook	0.442	0.232	16.98	14.84	0.469	0.793
ENDF/B-4	0.383	0.198	15.50	13.46	0.443	0.712
ABBN	0.498	0.254	14.00	12.97	0.638	1.045

FP due to fission of ^{238}U with fission spectrum neutrons

Set	σ_c (barn)		σ_{el} (barn)		σ_{in} (barn)	
	A	B	A	B	A	B
JNDC	0.549	0.280	16.10	14.10	0.538	0.875
JNDC-P	0.675	0.332	16.02	13.99	0.619	0.990
Cook	0.551	0.296	16.78	14.70	0.489	0.827
ENDF/B-4	0.492	0.256	15.50	13.46	0.511	0.811
ABBN	—	—	—	—	—	—

A : Collapsed with the spectrum of 1000 MWe FBR.
B : Collapsed with the spectrum of JOYO class FBR.

TABLE 7.1 One group capture cross sections* of the 28 nuclides in various sets (barns)

Nuclide	JNDC	Cook	ENDF/B-4	JNDC-P	RCN
Sr-90	0.011	0.007	0.013	0.028	0.025
Zr-93	0.209	0.134	0.123	0.257	0.210
Mo-95	0.328	0.320	0.321	0.400	0.332
Mo-97	0.345	0.278	0.305	0.393	0.360
Tc-99	0.589	0.514	0.533	0.758	0.737
Ru-101	0.759	1.601	0.569	0.970	0.781
Ru-102	0.227	0.306	0.194	0.323	0.298
Ru-104	0.187	0.159	0.161	0.188	0.297
Ru-106	0.095	0.069	0.091	0.144	0.276
Rh-103	0.705	0.584	0.759	0.810	0.605
Pd-105	0.807	0.499	0.880	1.039	0.872
Pd-107	0.800	0.496	0.604	1.029	0.863
Ag-109	0.886	0.625	0.556	1.117	1.082
I-129	0.498	0.290	0.420	0.746	0.445
Xe-131	0.433	0.464	0.228	0.663	0.370
Cs-133	0.538	0.439	0.550	0.827	0.600
Cs-135	0.321	0.225	0.841	0.464	0.255
Cs-137	0.023	0.018	0.016	0.035	0.219
Ce-144	0.060	0.072	0.057	0.899	—
Nd-143	0.350	0.479	0.359	0.566	0.319
Nd-144	0.099	0.143	0.103	0.128	0.076
Nd-145	0.431	0.410	0.406	0.695	0.434
Pm-147	1.271	1.296	1.465	1.960	1.320
Sm-147	1.425	1.370	0.960	1.941	1.035
Sm-149	2.367	1.589	1.688	2.465	1.878
Sm-151	2.477	2.841	2.606	1.443	2.349
Eu-153	2.756	2.146	2.668	3.564	2.700
Eu-155	2.499	1.922	2.935	1.631	1.991

* Collapsed with the spectrum of a 1000 MWe FBR.

TABLE 7.2 One group elastic scattering cross sections* of the 28 nuclides in various sets (barns)

Nuclide	JNDC	Cook	ENDF/B-4	JNDC-P
Sr-90	7.53	8.82	7.02	7.91
Zr-93	7.86	7.30	7.49	7.76
Mo-95	7.74	7.09	7.23	7.58
Mo-97	7.83	12.32	7.16	7.72
Tc-99	7.40	7.58	7.18	7.12
Ru-101	7.07	6.28	6.51	6.71
Ru-102	7.72	7.75	6.99	7.68
Ru-104	7.79	7.40	7.15	7.63
Ru-106	7.55	6.75	6.81	7.48
Rh-103	7.24	7.68	6.94	6.97
Pd-105	6.88	6.43	6.30	6.59
Pd-107	6.69	6.17	6.17	6.39
Ag-109	6.67	6.50	7.81	6.27
I-129	6.02	6.20	5.64	5.79
Xe-131	6.30	6.65	6.78	6.12
Cs-133	6.09	7.10	6.99	6.17
Cs-135	6.93	7.24	6.52	6.97
Cs-137	7.27	6.86	6.53	7.81
Ce-144	8.56	12.59	7.72	9.31
Nd-143	8.99	11.89	12.82	8.82
Nd-144	12.90	12.92	13.27	9.39
Nd-145	8.62	10.08	13.31	8.85
Pm-147	8.83	10.96	16.31	8.51
Sm-147	9.62	11.75	16.35	9.59
Sm-149	8.34	11.28	9.17	8.39
Sm-151	7.37	7.95	7.72	8.07
Eu-153	7.98	8.02	8.43	7.72
Eu-155	8.71	7.64	7.59	9.76

* Collapsed with the spectrum of a 1000 MWe FBR.

TABLE 7.3 One group inelastic scattering cross sections* of the 28 nuclides in various sets (barns)

Nuclide	JNDC	Cook	ENDF/B-4	JNDC-P
Sr-90	0.151	0.182	0.108	0.196
Zr-93	0.209	0.301	0.161	0.262
Mo-95	0.329	0.317	0.263	0.395
Mo-97	0.261	0.171	0.217	0.296
Tc-99	0.409	0.327	0.411	0.506
Ru-101	0.553	0.325	0.492	0.666
Ru-102	0.247	0.220	0.186	0.317
Ru-104	0.298	0.260	0.198	0.375
Ru-106	0.346	0.274	0.273	0.440
Rh-103	0.399	0.270	0.474	0.479
Pd-105	0.430	0.270	0.363	0.506
Pd-107	0.485	0.271	0.444	0.565
Ag-109	0.353	0.318	0.407	0.435
I-129	0.478	0.362	0.404	0.635
Xe-131	0.441	0.360	0.490	0.548
Cs-133	0.461	0.369	0.520	0.548
Cs-135	0.285	0.337	0.246	0.322
Cs-137	0.165	0.358	0.169	0.198
Ce-144	0.308	0.413	0.056	0.390
Nd-143	0.130	0.199	0.148	0.160
Nd-144	0.214	0.209	0.164	0.272
Nd-145	0.495	0.424	0.493	0.610
Pm-147	0.495	0.424	0.542	0.618
Sm-147	0.425	0.416	0.478	0.535
Sm-149	0.700	0.370	1.175	1.014
Sm-151	1.386	0.438	2.233	2.188
Eu-153	0.786	0.434	0.986	1.144
Eu-155	0.675	0.428	0.864	0.965

* Collapsed with the spectrum of a 1000 MWe FBR.

4. Test of FP Group Constants with Integral Data

As pointed out in section 3. 3, there remains considerable discrepancy among the existing sets of evaluated FP cross sections. Moreover it is not easy to say which set is the most reliable, since experimental data are scarce for most of FP nuclides.

On the other hand, central reactivity worths of FP mixtures and of some FP isotopes were measured at various cores of STEK facility in Petten, the Netherlands. Detailed descriptions of the experiments are given in Refs. 15 and 16. The results* of the experiments were already published[15,16,24,25,26]. Therefore it seems very useful to perform the benchmark test using various FP group constants in order to confirm their reliability, though some of the published experimental results are noted as preliminary ones. Five STEK cores were used; they are STEK-4000, STEK-3000, STEK-2000, STEK-1000 and STEK-500. STEK-4000 has the softest spectrum and STEK-500 has the hardest one. The newest values of the flux and the adjoint flux for these cores were sent from RCN as a private communication[27].

It should be noted, however, that the STEK cores were designed as mock-up experiments of steam cooled fast reactors and their spectra are softer than those of LMFBR. As an example the capture rates of the lumped FP are shown in **Fig. 7** for two STEK cores. It is evident that more than 25% of capture occurs below 100 eV for STEK-4000 and that even STEK-1000 has a softer spectrum than SNR-300, a prototype LMFBR. Therefore the results with STEK-500, STEK-1000 and STEK-2000 will be regarded as important for LMFBR in the following benchmark tests. On the other hand, the results with STEK-3000 and STEK-4000 should be considered only as references.

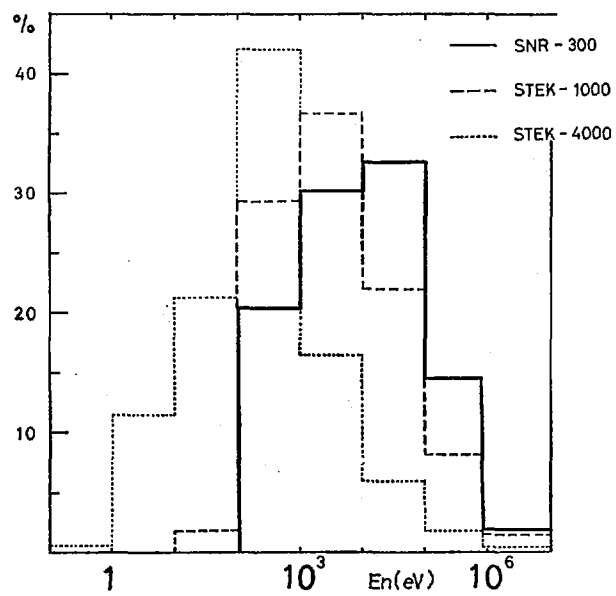

Fig. 7 Neutron capture rates in two STEK and SNR-3000 spectra.

* In these references, the reactivity worth ρ is always normalized with respect to a normalizing worth ρ_0, obtained from the apparent reactivity effect of a $^{252}C_f$ source and the absolute fission rate of a thin ^{235}U foil. The detail is given in Ref. 16. Our calculated worths are also normalized to ρ_0.

4.1 Integral Quantities of Pseudo FP Nuclides in SNR-300

In Ref. 16, the integral quantities of pseudo FP mixtures in SNR-300 are calculated with different cross section sets. Then the same quantities were calculated with the JNDC, JNDC-P, Cook and ENDF/B-4 sets before carrying out the benchmark test. The concentration of these mixtures are given in Ref. 16 as well as the flux and the adjoint flux of SNR-300. The calculated results are compared in TABLE 8 with the values calculated in RCN. This table is useful to understand the relation among various sets. The Cook set and the Australian set in TABLE 8 are based on the same evaluated data and the difference between them might be caused by the different weighting flux used in producing the group cross sections.

TABLE 8 Calculated integral quantities of pseudo FP mixtures in SNR-300 for various cross section sets

	Capture rate per fission per sec ($\times 10^9$)								
Mixture	JNDC	JNDC-P	Cook	ENDF/B-4	RCN-1 *	ABBN *	UKNDL *	Australian *	Benzi *et al.* *
^{235}U	1.91	2.40	1.98	1.72	1.96± 9%	2.19	2.08	1.95	1.94
^{238}U	2.37	2.90	2.42	2.15	2.43±10%	—	2.66	2.38	2.42
^{239}Pu	2.50	3.09	2.50	2.28	2.65±10%	2.64	2.89	2.47	2.57
^{241}Pu	2.62	3.23	2.52	2.39	2.84±10%	—	3.06	2.49	2.70

	Negative reactivity due to capture (arbitrary units)								
Mixture	JNDC	JNDC-P	Cook	ENDF/B-4	RCN-1 *	ABBN *	UKNDL *	Australian *	Benzi *et al.* *
^{235}U	0.885	1.11	0.912	0.797	0.905± 9%	1.02	0.973	0.898	0.898
^{238}U	1.10	1.35	1.11	0.992	1.12 ± 9%	—	1.24	1.09	1.12
^{239}Pu	1.16	1.43	1.15	1.05	1.22 ±10%	1.23	1.35	1.13	1.19
^{241}Pu	1.21	1.49	1.16	1.10	1.31 ±10%	—	1.43	1.14	1.25

* Taken from Ref. 16.

4.2 Mixture of Fission Products

The central reactivity worths were measured at STEK-1000, -2000, -3000, and -4000 for two irradiated FP mixture samples; HFR-101 (with a burn-up of 60% FIMA) and HFR-102 (with 30% FIMA), and a mock-up sample (KFK-sample). The experimental values were reported in Refs. 15 and 16*, as well as the calculation with the RCN-1 set.[9] Then we calculated the reactivity worths due to capture with the JNDC, JNDC-P, Cook and ENDF/B-4 sets.

The calculated results are compared in TABLE 9 with the experimental values. The ratios of calculated value to experimental one, C/E, are illustrated in Fig. 8. The following can be pointed out from this comparison:

1) The JNDC, RCN and Cook sets underestimate the negative reactivities by about 10% for the HFR-101 sample, while the ENDF/B-4 set underestimates them by more than 20% and the JNDC-P set overestimates them by 10%.
2) The JNDC, RCN and Cook sets underestimate the reactivities by 20~25% for the HFR-102 sample, while the JNDC-P set shows fairly good agreement with the experimental data.
3) The C/E values with the JNDC, JNDC-P, Cook and ENDF/B-4 sets depend on the core for the KFK-sample, while the results with the RCN-set do not.

* Revised values were sent from RCN later as a private communication[27] and they are used in this comparison.

TABLE 9 Comparison of capture components of the central reactivity worths (ρ/ρ_0) for FP mixtures

STEK core	Sample	Exp.	JNDC		JNDC-P		Cook		ENDF/B-4		RCN-1[27]	
			Value	C/E	Value	C/E	Value	C/E	Value	C/E	Value	C/E
4000	HFR-101	−0.501	−0.431	0.859	−0.501	1.000	−0.409	0.816	−0.396	0.790	−0.465	0.928
	HFR-102	−0.579	−0.459	0.703	−0.533	0.921	−0.437	0.754	−0.424	0.732	−0.492	0.850
	KFK	−0.631	−0.539	0.854	−0.590	0.935	−0.508	0.805	−0.500	0.792	−0.679	1.076
3000	HFR-101	−0.406	−0.353	0.869	−0.431	1.061	−0.341	0.840	−0.315	0.776	−0.360	0.887
	HFR-102	−0.451	−0.371	0.823	−0.455	1.008	−0.360	0.798	−0.332	0.736	−0.374	0.829
	KFK	−0.434	−0.418	0.963	−0.473	1.090	−0.394	0.907	−0.374	0.862	−0.460	1.060
2000	HFR-101	−0.346	−0.307	0.887	−0.389	1.125	−0.302	0.873	−0.272	0.786	−0.302	0.873
	HFR-102	−0.435	−0.321	0.738	−0.403	0.926	−0.316	0.726	−0.284	0.653	−0.311	0.715
	KFK	−0.350	−0.358	1.023	−0.413	1.179	−0.340	0.971	−0.318	0.909	−0.364	1.04
1000	HFR-101	−0.287	−0.256	0.892	−0.322	1.121	−0.258	0.898	−0.228	0.794	−0.254	0.885
	HFR-102	−0.359	−0.266	0.740	−0.337	0.937	−0.268	0.746	−0.237	0.660	−0.261	0.727
	KFK	−0.267	−0.300	1.122	−0.347	1.298	−0.288	1.079	−0.268	1.004	−0.304	1.139
500	HFR-101		−0.181		−0.223		−0.190		−0.165			
	HFR-102		−0.187		−0.232		−0.200		−0.171			
	KFK		−0.216		−0.247		−0.213		−0.196			

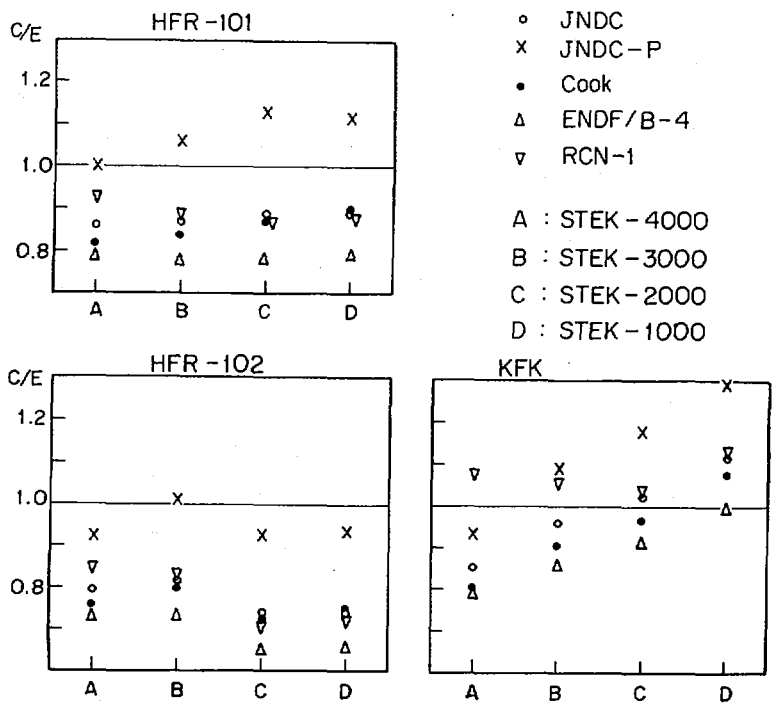

Fig. 8 C/E ratio of the capture component of the central reactivity worths of FP mixture samples.

4) The results with the JNDC, Cook and RCN sets agree with each other for the cores of harder spectrum (STEK-1000, -2000) but deviates from each other for cores of soft spectrum.
5) The ENDF/B-4 set gives the smallest C/E values and the JNDC-P set gives the largest ones.

It is not clear from the present comparison why the C/E values are 10% lower for the HFR-102 sample than for the HFR-101 sample with all the sets. This may suggest some systematic errors in the experiments. It is also questionable why such a strong core dependence appears in our calculation with the JNDC, JNDC-P, Cook and ENDF/B-4 sets only for the KFK sample. It is difficult to say which set is the most reliable from the present comparison, since the mixture

is composed of so many isotopes and the error of each nuclide cancels each other. Hence the integral data for separated isotopes seem more helpful. This will be discussed in the next section.

4. 3 Reactivity Worths of FP Isotopes

The reactivity worths of 57 isotopic samples were also measured at STEK cores, and the results were already published in Refs. 24, 25 and 26. The correction of self-shielding effect is difficult in these experiments, and the results are noted to be preliminary. It is, however, worthwhile to check our set with these integral data*, as they are the only available integral data at present time. The results reported in Refs. 24, 25 and 26 are the total reactivity worths. The flux and the adjoint flux are independently required in order to calculate the reactivity worths due to elastic scattering and inelastic scattering. They were informed as a private communication[27].

TABLE 10 gives the experimental data and the calculated ones with various sets. They are illustrated in Fig. 9. The results with the JNDC-P set are given only when necessary. The C/E ratios are shown in Fig. 10. First we discuss on each nuclide.

Zr-93 : The core dependence is different between experiments and calculations. As for STEK-1000 and -500, the JNDC set gives the best value.

Mo-95 : The calculated results agree with each other and agree well with the experiments for STEK-2000, -1000 and -500.

Mo-97 : The JNDC set gives the best results for STEK-1000 and -500.

Tc-99 : The JNDC, Cook and ENDF/B-4 sets underestimate the negative reactivities. The JNDC-P set gives fairly good results. Considering the existing differential data, however, the JNDC-P set cannot be adopted.

Ru-101 : The JNDC set gives very good results, while the Cook set much overestimates the negative reactivities and the ENDF/B-4 set underestimates them.

Ru-102 : The results with the JNDC and ENDF/B-4 sets agree well with the experiments for STEK-4000 to STEK-2000, but are higher than the experiments for STEK-1000 and -500.

Ru-104 : All the calculations overestimate the negative reactivities.

Rh-103 : The ENDF/B-4 set gives the best agreements. The results with the JNDC-set are also satisfactory.

Pd-105 : The calculations show underestimation. The JNDC-P set gives better results than the other sets. The ENDF/B-4 set seem better than the JNDC set for this nuclide.

Pd-107 : The JNDC-P set gives the best results. The JNDC set is better than the ENDF/B-4 and Cook sets.

Ag-109 : The JNDC and JNDC-P sets give satisfactory results.

* The reactivity worths of other nuclides were also measured. The calculation was also performed for B and ^{235}U using the JAERI-Fast set, in order to confirm that there are no systematic errors in the measurement at STEK. The calculated results agree very well with the experimental ones as shown below for these cases.

(ρ/ρ_0) per gram of ^{235}U and B

Core	^{235}U			B		
	Exp.	Cal.	C/E	Exp.	Cal.	C/E
STEK-4000	0.524±0.009	0.4924	0.940	−17.1 ±0.7	−15.17	0.892
STEK-3000	0.610±0.008	0.5914	0.970	−12.32±0.21	−11.88	0.964
STEK-2000	0.70 ±0.01	0.6549	0.936	−11.54±0.21	−10.57	1.092
STEK-1000	0.820±0.004	0.7685	0.937	−9.84±0.17	−9.00	0.915
STEK-500	1.026±0.015	0.9873	0.962	−7.50±0.14	−6.69	0.892

I-129 : The JNDC set gives the best agreement.

Cs-133 : The JNDC and ENDF/B-4 sets underestimate the negative reactivities a little, but give better agreements than the other sets.

Cs-135 : The core dependence of the experimental values is contrary to that of the calculations. Some systematic errors might exist in the experiments. Hence we ignore this case.

Nd-143 : The JNDC and ENDF/B-4 sets give satisfactory agreements with the experiments.

Nd-144 : The JNDC set gives better results than the other sets, though it still overestimates the negative reactivities.

Nd-145 : The JNDC, Cook and ENDF/B-4 sets underestimate the negative reactivities for STEK-1000 and -500.

Pm-147 : The JNDC-P set gives the best results. The JNDC, Cook and ENDF/B-4 sets may a little underestimate the negative reactivities.

Sm-147 : The JNDC-set shows very satisfactory agreement with the experiments.

Sm-149 : The JNDC-set gives better results than the other sets, though it underestimates the negative reactivities for STEK-2000 to -500.

Sm-151 : A slight underestimation is observed with the JNDC and ENDF/B-4 sets.

Eu-153 : The JNDC and ENDF/B-4 sets underestimate the negative reactivities, while the JNDC-P set overestimates them.

The following can be said from the above observations :

1) The JNDC set gives satisfactory results for
^{93}Zr, ^{95}Mo, ^{97}Mo, ^{101}Ru, ^{103}Rh, ^{109}Ag, ^{129}I, ^{133}Cs, ^{143}Nd and ^{147}Sm. (Category 1)
2) The results with the JNDC set deviate from the experiments, but give the best or one of the best agreement with the experiments for
^{102}Ru, ^{104}Ru, ^{144}Nd, ^{145}Nd, ^{149}Sm, ^{151}Sm and ^{153}Eu. (Category 2)
3) The JNDC-P set seems to give the best agreement with the experimental data for
^{99}Tc, ^{105}Pd, ^{107}Pd and ^{147}Pm. (Category 3)
4) The Cook set often shows the extreme values, for example, for ^{101}Ru, ^{102}Ru, ^{105}Pd, ^{144}Nd, ^{153}Eu and ^{151}Sm.
5) The ENDF/B-4 set gives slightly better results than the JNDC set for ^{103}Rh, ^{105}Pd and ^{147}Pm but gives much worse results for ^{101}Ru and ^{149}Sm.

Based on the benchmark test by the use of the presently available integral data, it can be said that the JNDC set is the most reliable one among the four sets compared here. Further investigation should be required for the nuclides of categories 2 and 3. Especially we are examining the cases of ^{105}Pd, ^{107}Pd and ^{147}Pm for which the JNDC-P set gives better results and no differential experimental data exist above 1 keV. It should be noted, however, that it seems dangerous to rely too much on one set of integral measurements. Hence we made no adjustment of FP group constants using the present benchmark test.

TABLE 10 Comparison of the central reactivity worths (ρ/ρ_0) per gram of FP isotopes

Nuclide	STEK-Core	Experiments	JNDC	JNDC-P	Cook	ENDF/B-4
Zr-93	4000	−0.540±0.21	−0.708	−0.513	−0.556	−0.625
	3000	−0.305±0.038	−0.621	−0.510	−0.462	−0.516
	2000	−0.242±0.046	−0.512	−0.479	−0.354	−0.390
	1000	−0.400±0.21	−0.372	−0.397	−0.221	−0.247
	500	−0.24 ±0.24	−0.187	−0.245	−0.051	−0.079
Mo-95	4000	−0.694±0.054	−1.074	−1.315	−1.018	−1.022
	3000	−0.556±0.052	−0.801	−1.043	−0.770	−0.768
	2000	−0.607±0.093	−0.635	−0.847	−0.615	−0.616
	1000	−0.495±0.043	−0.486	−0.645	−0.475	−0.480
	500	−0.470±0.15	−0.307	−0.386	−0.309	−0.315
Mo-97	4000	−0.560±0.064	−0.518	−0.761	−0.407	−0.451
	3000	−0.472±0.032	−0.538	−0.747	−0.419	−0.463
	2000	−0.68 ±0.16	−0.535	−0.701	−0.418	−0.455
	1000	−0.441±0.021	−0.470	−0.587	−0.376	−0.402
	500	−0.354±0.034	−0.318	−0.377	−0.274	−0.283
Tc-99	4000	−1.47 ±0.10	−1.190	−1.328	−1.086	−1.403
	3000	−1.30 ±0.10	−1.023	−1.206	−0.907	−1.069
	2000	−1.30 ±0.15	−0.942	−1.155	−0.818	−0.929
	1000	−1.26 ±0.16	−0.827	−1.045	−0.703	−0.784
	500	−1.03 ±0.12	−0.617	−0.804	−0.505	−0.552
Ru-101	4000	−1.19 ±0.09	−1.335	−1.455	−1.504	−1.016
	3000	−1.12 ±0.07	−1.223	−1.419	−1.628	−0.900
	2000	−1.19 ±0.08	−1.134	−1.377	−1.736	−0.824
	1000	−1.17 ±0.11	−0.996	−1.259	−1.831	−0.721
	500	−0.8 ±0.08	−0.751	−0.992	−1.826	−0.540
Ru-102	4000	−0.198±0.044	−0.175	−0.412	−0.386	−0.165
	3000	−0.235±0.062	−0.211	−0.435	−0.420	−0.196
	2000	−0.21 ±0.05	−0.239	−0.434	−0.431	−0.217
	1000	−0.11 ±0.02	−0.242	−0.397	−0.394	−0.216
	500	−0.43 ±0.033	−0.212	−0.307	−0.290	−0.185
Ru-104	4000	−0.155±0.052	−0.258	−0.280	−0.205	−0.223
	3000	−0.140±0.030	−0.266	−0.280	−0.217	−0.235
	2000	−0.14 ±0.03	−0.256	−0.264	−0.214	−0.231
	1000	−0.085±0.027	−0.211	−0.215	−0.177	−0.200
	500	−0.071±0.024	−0.120	−0.119	−0.093	−0.132
Rh-103	4000	−2.65 ±0.10	−1.964	−2.004	−1.777	−2.080
	3000	−1.37 ±0.05	−1.216	−1.294	−1.027	−1.329
	2000	−1.19 ±0.03	−1.037	−1.143	−0.850	−1.150
	1000	−1.05 ±0.03	−0.929	−1.050	−0.766	−1.028
	500	−0.814±0.035	−0.705	−0.825	−0.602	−0.774
Pd-105	4000	−1.635±0.091	−1.198	−1.423	−0.822	−1.267
	3000	−2.11 ±0.21	−1.136	−1.408	−0.738	−1.240
	2000	−1.61 ±0.11	−1.089	−1.384	−0.681	−1.220
	1000	−1.375±0.064	−0.995	−1.287	−0.610	−1.134
	500	−1.17 ±0.11	−0.795	−1.046	−0.485	−0.924
Pd-107	4000	−1.98 ±0.36	−1.210	−1.340	−0.763	−0.936
	3000	−1.9 ±1.1	−1.128	−1.341	−0.698	−0.863
	2000	−2.33 ±0.60	−1.073	−1.331	−0.657	−0.802
	1000	−1.44 ±0.27	−0.971	−1.243	−0.595	−0.713
	500	−0.87 ±0.50	−0.762	−1.008	−0.477	−0.556
Ag-109	4000	−2.51 ±0.17	−3.278	−3.330	−3.097	−3.092
	3000	−3.0 ±0.4	−1.914	−2.052	−1.711	−1.679
	2000	−1.8 ±0.5	−1.426	−1.624	−1.193	−1.147
	1000	−1.4 ±0.2	−1.149	−1.389	−0.885	−0.820
	500	−1.2 ±0.2	−0.869	−1.123	−0.584	−0.498
I-129	4000	−0.54 ±0.13	−0.742	−1.207	−0.365	−0.570
	3000	−0.63 ±0.18	−0.726	−1.179	−0.349	−0.566
	2000	−0.70 ±0.19	−0.680	−1.093	−0.324	−0.542
	1000	−0.21 ±0.07	−0.571	−0.901	−0.277	−0.472
	500	−0.34 ±0.11	−0.372	−0.559	−0.192	−0.332

TABLE 10 Continued

Nuclide	STEK-Core	Experiments	JNDC	JNDC-P	Cook	ENDF/B-4
Cs-133	4000	−1.66 ±0.10	−1.370	−1.854	−1.157	−1.312
	3000	−1.10 ±0.06	−1.016	−1.511	−0.825	−0.978
	2000	−0.95 ±0.06	−0.822	−1.288	−0.654	−0.800
	1000	−0.734±0.022	−0.628	−1.009	−0.497	−0.630
	500	−0.51 ±0.05	−0.373	−0.594	−0.296	−0.406
Cs-135	4000	+0.93 ±0.61	−0.705	−0.780	−0.874	−0.378
	3000	+0.12 ±0.64	−0.598	−0.749	−0.715	−0.259
	2000	−0.24 ±0.58	−0.494	−0.677	−0.532	−0.175
	1000	−0.88 ±0.72	−0.366	−0.538	−0.327	−0.101
	500	−0.33 ±0.55	−0.192	−0.306	−0.085	−0.027
Nd-143	4000	−0.80 ±0.11	−0.882	−1.075	−0.957	−0.871
	3000	−0.685±0.090	−0.723	−0.987	−0.865	−0.715
	2000	−0.58 ±0.12	−0.584	−0.862	−0.743	−0.579
	1000	−0.351±0.035	−0.427	−0.674	−0.564	−0.420
	500	−0.33 ±0.12	−0.228	−0.395	−0.300	−0.215
Nd-144	4000	−0.095±0.030	−0.095	−0.138	−0.143	−0.095
	3000	−0.051±0.014	−0.092	−0.130	−0.144	−0.096
	2000	−0.039±0.014	−0.082	−0.116	−0.135	−0.089
	1000	−0.020±0.008	−0.061	−0.092	−0.111	−0.075
	500	+0.015±0.012	−0.024	−0.052	−0.068	−0.048
Nd-145	4000	−1.65 ±0.33	−1.163	−1.704	−1.264	−1.010
	3000	−0.85 ±0.10	−0.877	−1.370	−0.931	−0.769
	2000	−0.83 ±0.10	−0.688	−1.117	−0.706	−0.613
	1000	−0.645±0.086	−0.492	−0.828	−0.485	−0.449
	500	−0.61 ±0.13	−0.240	−0.437	−0.216	−0.231
Pm-147	4000	−4.8 ±0.7	−4.32	−5.75	−4.52	−4.64
	3000	−3.38 ±0.51	−2.70	−4.05	−2.86	−2.98
	2000	−4.0 ±0.8	−2.00	−3.19	−2.12	−2.27
	1000	−2.0 ±0.2	−1.48	−2.39	−1.55	−1.70
	500	−1.42 ±0.46	−0.870	−1.36	−0.910	−1.02
Sm-147	4000	−3.75 ±0.40	−3.68	−4.60	−3.24	−3.15
	3000	−2.65 ±0.28	−2.80	−3.82	−2.56	−2.22
	2000	−2.27 ±0.17	−2.24	−3.17	−2.09	−1.65
	1000	−1.80 ±0.13	−1.69	−2.40	−1.60	−1.16
	500	−1.23 ±0.24	−1.00	−1.34	−0.968	−0.641
Sm-149	4000	−7.11 ±0.59	−7.30	−7.24	−5.19	−5.52
	3000	−5.59 ±0.48	−4.94	−4.88	−2.98	−3.47
	2000	−5.01 ±0.48	−3.86	−3.93	−2.29	−2.63
	1000	−3.72 ±0.30	−2.90	−3.00	−1.80	−1.96
	500	−2.54 ±0.36	−1.70	−1.70	−1.16	−1.14
Sm-151	4000	−16.4 ±5.7	−8.37	−3.51	−5.04	−7.64
	3000	−10.4 ±4.3	−5.36	−2.12	−3.75	−5.16
	2000	−4.4 ±2.3	−4.07	−1.65	−3.30	−4.05
	1000	−6.2 ±3.0	−3.03	−1.37	−2.88	−3.10
	500	−3.4 ±3.3	−1.74	−1.02	−2.17	−1.86
Eu-153	4000	−6.14 ±0.41	−5.37	−6.73	−3.54	−5.44
	3000	−5.05 ±0.48	−4.21	−5.71	−2.73	−4.22
	2000	−4.44 ±0.42	−3.63	−5.01	−2.41	−3.58
	1000	−3.41 ±0.24	−2.98	−4.02	−2.10	−2.89
	500	−2.64 ±0.24	−2.00	−2.46	−1.59	−1.90

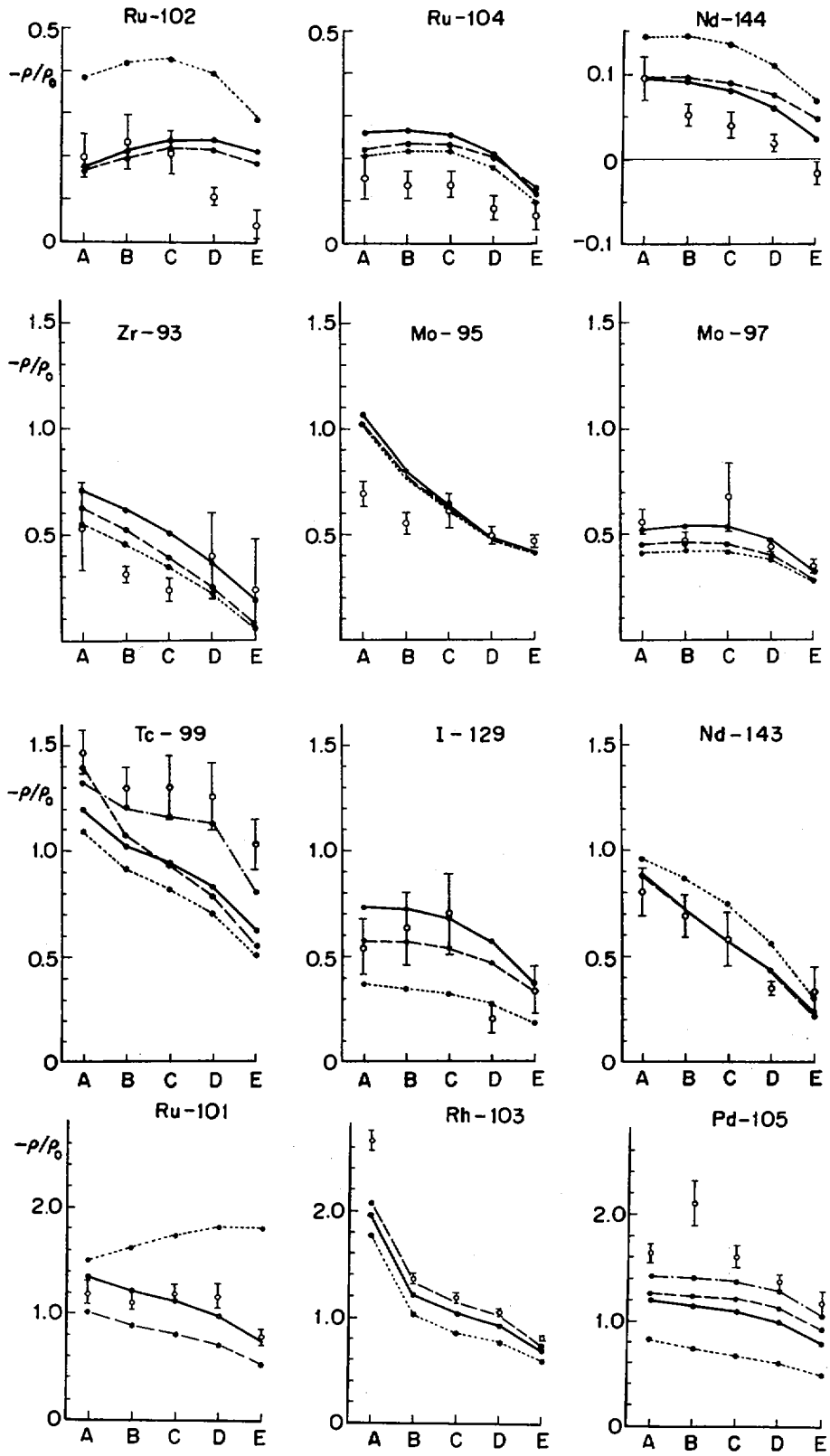

Fig. 9 Central reactivity worths of FP isotopes.
They are normalized to ρ_0 obtained from the reactivity of a ^{252}Cf source and the absolute fission rate of a thin ^{235}U foil.

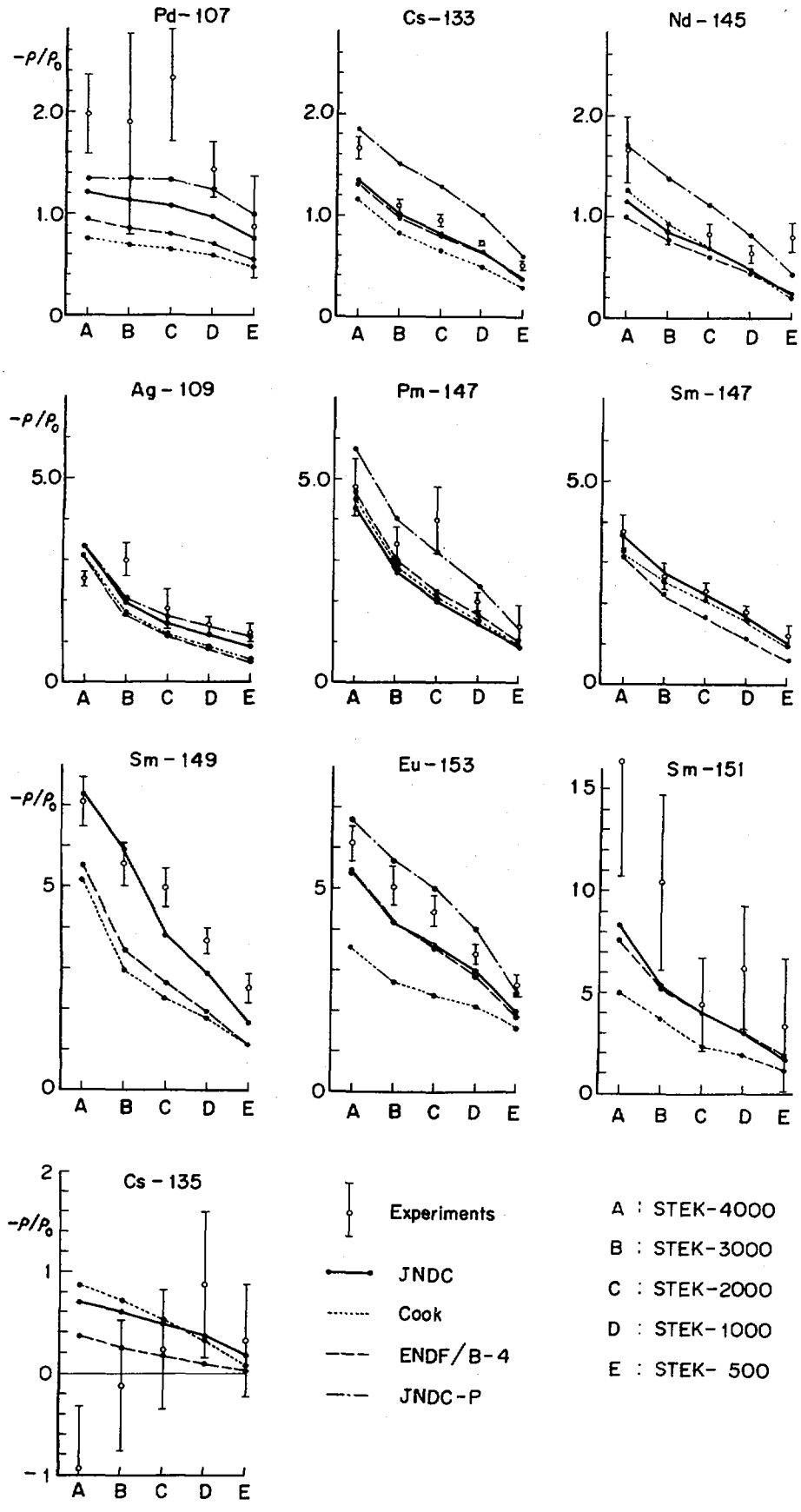

Fig. 9 Continued

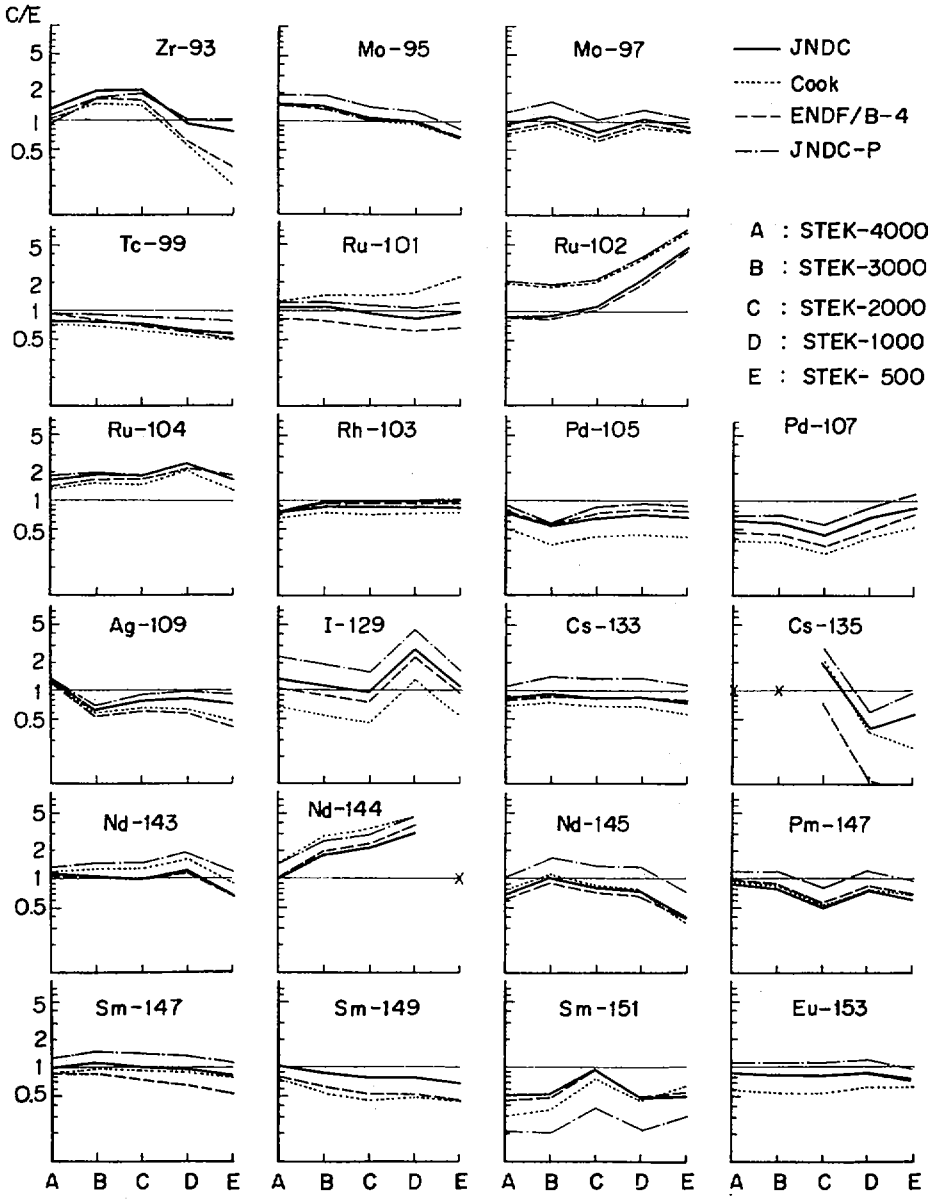

Fig. 10 C/E ratio of the central reactivity worths of FP isotopes in various STEK cores. x mark denotes that the experimental worth is positive.

5. Conclusion

The JNDC FP Fast Reactor Constants System has been developed for providing the FP group constants set which is important to predict long term characteristics of fast reactors. The group constants of 28 important nuclides are derived on the basis of the evaluation by JNDC, and the evaluation by Cook is supplementally used. The present system can produce rather auto matically the lumped group constants from the JENDL-1 Library. Thus the production of constants will be easy when JNDC evaluates more FP nuclides in future.

The burn-up time dependence of the lumped constants was examined. The change of the capture cross section does not depend on the reactor type nor on mother fissile nuclides from which the fission products are born. The extent of the change is about 5% between 60 days and 720 days of burn-up. This is less than the uncertainties of FP cross sections themselves. Therefore the fixed lumped cross sections can be used for most of burn-up calculations.

The 28 important nuclides take more than 80% of total capture but cover only 40% of elastic scattering and 60% of inelastic scattering. When 68 secondarily important nuclides are added to the 28, more than 98% will be covered for all the types of reaction. The evaluation of the 68 nuclides will be completed in a year.

The JNDC lumped FP constants were compared with those based on Cook's evaluation and on the ENDF/B-4. The discrepancies among the three are 15% for capture and 10% for both of elastic and inelastic scattering, when collapsed to one group with spectra of typical fast reactors.

The reliability of the JNDC group constants set was examined by the integral measurements performed at the STEK facility in RCN, Petten, the Netherlands. The JNDC set underestimates the negative reactivities of FP mixtures. However, the Cook and ENDF/B-4 sets underestimates them more. As for the benchmark test of separated isotopes, the JNDC set gives the best agreements for most of nuclides, tough there exist poor agreements between the experiments and the calculations for some nuclides. As a whole it can be concluded that the JNDC set is more reliable than the Cook and ENDF/B-4 sets.

Acknowledgment

The authors wish to thank members of the FP Reactor Constants Working Group and of the FP Nuclear Data Working Group of JNDC for their helpful discussions. They are much indebted to Dr. Dragt in RCN, Petten, for sending a lot of invaluable information concerning the experiments at STEK. They also thank Miss Suzuki for production of the ENDF/B-4 set with using the present system.

References

1) KATSURAGI, S., TONE, T. and HASEGAWA, A.: JAERI Fast Reactor Group Constants Systems・Part I, JAERI 1195 (1970)
2) KATSURAGI, S., ISHIGURO, Y., TAKANO, H. and NAKAGAWA, M.: JAERI Fast Reactor Group Constants Systems・Part II-1, JAERI 1199 (1970)

3) ABAGYAN, L. P., *et al.*: "Group Constants for Nuclear Reactor Calculations", Consultants Bureau, New York (1964)
4) BENZI, V., D'ORAZI, R., REFFO, G. and VACCARI, M.: Fast Neutron Radiative Capture Cross Sections of Stable Nuclei with $29 \leq Z \leq 79$, Doc. CEC (71) 9 (1971)
5) BENZI, V., PANINI, G. C., REFFO, G. and VACCARI, M.: An Estimate of (n, n′), (n, 2n) and (n, γ) Excitation Functions for Some Fission Product Nuclei, Doc. CEC (71) 2 (1971)
6) COOK, J. L.: Fission Product Cross Sections, AAEC/TM-549 (1970)
7) SCHENTER, R. E. and SCHMITTROTH, F. A.: Cross Section Evaluation of Twenty-Seven Fission Product Isotopes for ENDF/B-III, MAT 1201-1231, HEDL-TME-71-143 (1971)
8) SCHMITTROTH, F. A. and SCHENTER, R. E.: Fast Neutron Capture Cross Section for Fission Product Isotopes, HEDL-TME-73-63 (1973)
9) LAUTENBACH, G.: Calculated Neutron Absorption Cross Section of 75 Fission Products, RCN-191 (1973)
10) JNDC: Evaluation of Fission Product Nuclear Data for Fast Reactor (Neutron Cross Sections for 28 nuclides), JAERI-M 5752 (1974)
11) KIKUCHI, Y., OTAKE, I., TASAKA, K., NISHIMURA, H., HASEGAWA, A. and KATSURAGI, S.: Group Constants Set of Fission Products, B-4, Proceedings of International Symposium on Physics of Fast Reactors, Tokyo, October 1973
12) KIKUCHI, Y., HASEGAWA, A., TASAKA, K., NISHIMURA, H., OTAKE, I. and KATSURAGI, S.: JNDC Fission Product Group Constants—Preliminary Version—, JAERI-M 6001 (1975)
13) IIJIMA, S., NAKAGAWA, T., KIKUCHI, Y., KAWAI, M., MATSUNOBU, H., MAKI, K. and IGARASI, S.: to be published in *J. Nucl. Sci. Technol.*
14) KIKUCHI, Y., TASAKA, K., NISHIMURA, H., HASEGAWA, A. and KATSURAGI, S.: Production of FP Group Constants for Fast Reactors with Cook's Evaluated Data, JAERI-M 5492 (1973)
15) BUSTRAAN, M. *et al.*: Experiences with STEK: Derivation of Fission Product Cross Sections and Their Improvement by Statistical Adjustment Using Sample Reactivity Worths, B-26, Proceedings of International Symposium on Physics of Fast Reactors, Tokyo, October 1973
16) GRUPPELAAR, H. *et al.*: RCN-1 Pseudo Fission-Product Capture Group Cross Sections, RCN-205 (1974)
17) HASEGAWA, A. and KATSURAGI, S.: PROF-GROUCH-G-II, to be published as JAERI-Report
18) TONE, T. and KATSURAGI, S.: PROF-GROUCH-G, JAERI 1192 (1970)
19) TASAKA, K. and SASAMOTO, N.: FP-S, JAERI 1198 (1970)
20) MEEK, M. E. and RIDER, B. F.: Compilation of Fission Product Yields, NEDO-12154 (1972)
21) KIKUCHI, Y.: Errors of the Lumped FP Group Constants, Proceedings of AESJ 1973 Topical Meeting on Fast Reactor Physics, Tokai, 1973 (in Japanese)
22) NORTON, D. S.: The U. K. A. E. A. Nuclear Data Library, Febrary 1968, AEEW-M824 (1968)
23) GILBERT, A. and CAMERON, A. G. W.: *Can. J. Phys.* **43** (1965) 1446
24) HOEKSTRA, E. K.: Fast Reactor Programme, Second Quarter 1973 Progress Report, RCN-190 (1973)
25) HOEKSTRA, E. K.: Fast Reactor Programme, Third Quarter 1973 Progress Report, RCN-199 (1973)
26) HOEKSTRA, E. K.: Fast Reactor Programme, Fourth Quarter 1973 Progress Report, RCN-207 (1974)
27) DRAGT, J.: A private communication 1975

Appendices

Appendix 1: Tables of the JNDC Group Constants of 25 group structure for the 28 nuclides.

Appendix 2: Tables of the JNDC Lumped Constants at 360 days of burn-up

Appendix 3: Tables of the concentrations at various burn-up stages

Appendix 4: User's guides for driving the present system

- A. 4. 1 PROF-GROUCH-G-II
- A. 4. 2 REPLACE
- A. 4. 3 FP-S and FPYD
- A. 4. 4 FPLUMP

Appendix 1. Tables of the JNDC Group Constants of 25 Group Structure of the 28 Nuclides.

NUCLID = 38SR 90 MAT NO = 3890
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.27575E+00	0.0	0.0	3.23949E-04	2.52433E+00	1.75109E+00	0.0	7.65071E-01	7.50016E-02	1.69804E-02	0.0
2	3.89363E+00	0.0	0.0	1.08157E-03	2.14200E+00	1.75055E+00	0.0	6.13438E-01	6.94334E-02	8.92878E-02	0.0
3	3.85532E+00	0.0	0.0	3.36117E-03	2.25505E+00	1.59691E+00	0.0	4.70880E-01	8.05460E-02	1.79938E-01	0.0
4	4.49744E+00	0.0	0.0	5.59613E-03	3.35701E+00	1.13483E+00	0.0	4.14221E-01	8.62335E-02	2.58407E-01	0.0
5	5.84733E+00	0.0	0.0	5.28477E-03	5.25013E+00	5.91910E-01	0.0	3.80025E-01	1.66644E-01	2.02345E-01	0.0
6	7.41695E+00	0.0	0.0	8.97546E-03	7.40797E+00	0.0	0.0	2.80679E-01	2.00555E-01	2.38821E-01	0.0
7	8.43707E+00	0.0	0.0	8.85440E-03	8.42822E+00	0.0	0.0	1.71384E-01	2.45368E-01	2.38821E-01	0.0
8	8.65471E+00	0.0	0.0	8.97072E-03	8.64573E+00	0.0	0.0	8.53450E-02	2.63230E-01	2.38821E-01	0.0
9	8.53222E+00	0.0	0.0	1.00157E-02	8.52220E+00	0.0	0.0	3.73674E-02	2.41096E-01	2.63825E-01	0.0
10	8.40448E+00	0.0	0.0	1.48056E-02	8.38968E+00	0.0	0.0	1.70041E-02	2.40898E-01	2.65782E-01	0.0
11	8.50624E+00	0.0	0.0	2.64913E-02	8.47975E+00	0.0	0.0	7.67838E-03	2.50620E-01	2.63739E-01	0.0
12	7.88532E+00	0.0	0.0	3.00583E-02	7.85526E+00	0.0	0.0	7.47907E-03	1.74011E-01	2.63825E-01	0.0
13	5.98556E+00	0.0	0.0	2.56150E-03	5.98300E+00	0.0	0.0	7.47907E-03	1.72729E-01	2.65782E-01	0.0
14	5.98676E+00	0.0	0.0	3.76113E-03	5.98300E+00	0.0	0.0	7.47907E-03	1.74068E-01	2.63739E-01	0.0
15	5.98852E+00	0.0	0.0	5.51527E-03	5.98300E+00	0.0	0.0	7.47907E-03	1.74011E-01	2.63825E-01	0.0
16	5.99110E+00	0.0	0.0	8.10024E-03	5.98300E+00	0.0	0.0	7.47907E-03	1.72730E-01	2.65782E-01	0.0
17	5.99489E+00	0.0	0.0	1.18938E-02	5.98300E+00	0.0	0.0	7.47907E-03	1.74068E-01	2.63739E-01	0.0
18	6.00044E+00	0.0	0.0	1.74410E-02	5.98300E+00	0.0	0.0	7.47907E-03	1.74011E-01	2.63825E-01	0.0
19	6.00862E+00	0.0	0.0	2.56154E-02	5.98300E+00	0.0	0.0	7.47907E-03	1.72730E-01	2.65782E-01	0.0
20	6.02061E+00	0.0	0.0	3.76119E-02	5.98300E+00	0.0	0.0	7.47907E-03	1.74068E-01	2.63739E-01	0.0
21	6.03815E+00	0.0	0.0	5.51537E-02	5.98300E+00	0.0	0.0	7.47907E-03	1.74011E-01	2.63825E-01	0.0
22	6.06400E+00	0.0	0.0	8.10039E-02	5.98300E+00	0.0	0.0	7.47907E-03	1.72730E-01	2.65782E-01	0.0
23	6.10194E+00	0.0	0.0	1.18940E-01	5.98300E+00	0.0	0.0	7.47907E-03	1.74070E-01	2.63739E-01	0.0
24	6.15741E+00	0.0	0.0	1.74413E-01	5.98300E+00	0.0	0.0	7.47907E-03	1.74013E-01	2.63825E-01	0.0
25	6.23916E+00	0.0	0.0	2.56159E-01	5.98300E+00	0.0	0.0	1.69583E-02	1.72731E-01	2.65782E-01	0.0

NUCLID = 38SR 90 MAT NUMBER = 3890 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I J= EXIT GROUP 1 11 ** KK ** 2 12 KK = I + J - 1 3 4 5 6 7 8 9 10

1
1.85785E-03 7.11431E-02 2.65852E-01 5.27865E-01 4.42611E-01 2.92453E-01 1.05699E-01 3.18324E-02 9.14638E-03 2.08430E-03
4.54491E-04 9.62071E-05

2
1.46969E-02 1.65378E-01 4.46014E-01 5.10772E-01 3.91193E-01 1.54952E-01 4.89101E-02 1.43974E-02 3.32251E-03 7.28766E-04
1.59797E-04 2.52324E-05

3
9.22358E-02 4.64912E-01 3.34638E-01 3.60138E-01 1.80563E-01 1.17802E-01 3.58387E-02 8.41387E-03 1.86041E-03 4.09450E-04
8.95182E-05 7.21046E-06

4
1.30626E-01 5.07800E-01 3.56031E-01 7.82793E-02 4.39474E-02 1.40823E-02 3.17808E-03 6.91485E-04 1.47859E-04 3.88810E-05
4.25030E-06 0.0

5
0.0 1.96886E-01 2.37004E-01 7.93783E-02 4.24529E-02 1.98282E-02 9.10760E-03 4.33155E-03 1.90814E-03 1.01307E-03
0.0 0.0

NUCLID = 40ZR 93 MAT NO = 4093
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.27027E+00	0.0	0.0	1.25862E-03	2.50879E+00	1.76023E+00	0.0	7.61735E-01	7.30989E-02	1.69804E-02	0.0
2	3.88901E+00	0.0	0.0	6.65705E-03	2.13756E+00	1.74479E+00	0.0	6.03721E-01	7.11899E-02	8.92878E-02	0.0
3	3.87086E+00	0.0	0.0	4.33854E-02	2.44243E+00	1.38504E+00	0.0	4.56308E-01	8.65734E-02	1.79938E-01	0.0
4	4.69258E+00	0.0	0.0	5.61967E-02	3.67553E+00	9.60853E-01	0.0	4.16610E-01	9.45873E-02	2.58407E-01	0.0
5	6.14265E+00	0.0	0.0	4.64804E-02	5.50979E+00	5.86384E-01	0.0	4.01003E-01	1.42585E-01	2.02345E-01	0.0
6	7.75062E+00	0.0	0.0	4.13636E-02	7.16246E+00	5.46790E-01	0.0	3.28673E-01	1.81696E-01	2.38821E-01	0.0
7	8.78447E+00	0.0	0.0	4.52092E-02	8.61934E+00	1.19921E-01	0.0	2.00344E-01	2.40078E-01	2.38821E-01	0.0
8	9.00634E+00	0.0	0.0	6.06475E-02	8.94569E+00	0.0	0.0	1.04438E-01	2.58036E-01	2.38821E-01	0.0
9	8.78003E+00	0.0	0.0	9.56481E-02	8.68438E+00	0.0	0.0	4.88733E-02	2.32989E-01	2.63825E-01	0.0
10	8.48871E+00	0.0	0.0	1.71790E-01	8.31692E+00	0.0	0.0	2.25649E-02	2.26637E-01	2.65782E-01	0.0
11	8.42569E+00	0.0	0.0	3.02067E-01	8.12363E+00	0.0	0.0	1.09614E-02	2.28263E-01	2.63739E-01	0.0
12	8.69366E+00	0.0	0.0	4.91996E-01	8.20168E+00	0.0	0.0	7.23758E-03	2.34929E-01	2.63825E-01	0.0
13	9.37972E+00	0.0	0.0	7.43619E-01	8.63611E+00	0.0	0.0	7.23758E-03	2.50518E-01	2.65782E-01	0.0
14	1.05845E+01	0.0	0.0	1.10543E+00	9.47912E+00	0.0	0.0	7.23758E-03	2.82142E-01	2.63739E-01	0.0
15	1.24954E+01	0.0	0.0	1.73146E+00	1.07640E+01	0.0	0.0	7.23758E-03	3.24261E-01	2.63825E-01	0.0
16	1.28505E+01	0.0	0.0	2.04606E+00	1.08044E+01	0.0	0.0	7.23758E-03	1.80195E-01	2.65782E-01	0.0
17	6.34462E+01	0.0	0.0	3.17625E+01	3.16838E+01	0.0	0.0	7.23758E-03	8.46884E-02	2.63739E-01	0.0
18	5.09559E+00	0.0	0.0	3.74242E-01	4.72135E+00	0.0	0.0	7.23758E-03	1.48126E-01	2.63825E-01	0.0
19	5.46246E+00	0.0	0.0	7.68705E-02	5.38559E+00	0.0	0.0	7.23758E-03	1.52567E-01	2.65782E-01	0.0
20	5.56886E+00	0.0	0.0	7.45510E-02	5.49433E+00	0.0	0.0	7.23758E-03	1.55401E-01	2.63739E-01	0.0
21	5.62475E+00	0.0	0.0	9.30689E-02	5.53168E+00	0.0	0.0	7.23758E-03	1.55999E-01	2.63825E-01	0.0
22	5.67457E+00	0.0	0.0	1.27478E-01	5.54710E+00	0.0	0.0	7.23758E-03	1.55129E-01	2.65782E-01	0.0
23	5.73521E+00	0.0	0.0	1.81333E-01	5.55388E+00	0.0	0.0	7.23758E-03	1.56455E-01	2.63739E-01	0.0
24	5.81907E+00	0.0	0.0	2.62131E-01	5.55694E+00	0.0	0.0	7.23758E-03	1.56462E-01	2.63825E-01	0.0
25	5.94076E+00	0.0	0.0	3.82418E-01	5.55835E+00	0.0	0.0	1.64175E-02	1.55335E-01	2.65782E-01	0.0

NUCLID = 40ZR 93 MAT NUMBER = 4093 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I J= EXIT GROUP 1 11 ** KK ** 2 12 KK = I + J - 1 3 4 5 6 7 8 9 10

1
9.41227E-04 5.62548E-02 2.66997E-01 5.34016E-01 4.50422E-01 2.98697E-01 1.08198E-01 3.26224E-02 9.37885E-03 2.13793E-03
4.66252E-04 9.87297E-05

2
2.12562E-02 1.57918E-01 3.77595E-01 5.39241E-01 4.13088E-01 1.64063E-01 5.18572E-02 1.52757E-02 3.52650E-03 7.73644E-04
1.69651E-04 2.67828E-05

3
1.31104E-01 4.12824E-01 3.43218E-01 2.68766E-01 1.26366E-01 6.08504E-02 3.22513E-02 7.54773E-03 1.66152E-03 3.64220E-04
7.90583E-05 5.77029E-06

4
2.16744E-01 2.64174E-01 2.72992E-01 1.31092E-01 5.25769E-02 1.74380E-02 4.19298E-03 1.11063E-03 3.14421E-04 1.77668E-04
3.98935E-05 0.0

5
2.46989E-01 2.94354E-01 2.67928E-02 1.14076E-02 5.26348E-03 1.23230E-03 2.68406E-04 5.86811E-05 1.35932E-05 2.74461E-06
6.77998E-07 0.0

6
1.45618E-01 2.87121E-01 1.14051E-01 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0

7
0.0 3.27709E-02 6.34968E-02 1.52702E-02 4.51533E-03 2.10348E-03 9.83610E-04 4.47961E-04 2.08430E-04 1.00597E-04
2.35760E-05 0.0

NUCLID = 42MO 95 MAT NO = 4295
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.26456E+00	0.0	0.0	3.16933E-03	2.49676E+00	1.76463E+00	0.0	7.59045E-01	7.20005E-02	1.69804E-02	0.0
2	3.89620E+00	0.0	0.0	1.01279E-02	2.07398E+00	1.81209E+00	0.0	6.14617E-01	5.99426E-02	8.92878E-02	0.0
3	3.97045E+00	0.0	0.0	2.12488E-02	2.13748E+00	1.81173E+00	0.0	5.37196E-01	5.89819E-02	1.79938E-01	0.0
4	4.81883E+00	0.0	0.0	3.52091E-02	3.12349E+00	1.66014E+00	0.0	5.17793E-01	6.52386E-02	2.58407E-01	0.0
5	6.27409E+00	0.0	0.0	5.87768E-02	5.07921E+00	1.13610E+00	0.0	4.59636E-01	1.34989E-01	2.02345E-01	0.0
6	7.91645E+00	0.0	0.0	8.28069E-02	7.20566E+00	6.27978E-01	0.0	3.49918E-01	1.71286E-01	2.38821E-01	0.0
7	8.98407E+00	0.0	0.0	9.17785E-02	8.57649E+00	3.15798E-01	0.0	2.22675E-01	2.33520E-01	2.38821E-01	0.0
8	9.19098E+00	0.0	0.0	1.34201E-01	9.05678E+00	0.0	0.0	1.18652E-01	2.51764E-01	2.38821E-01	0.0
9	8.92384E+00	0.0	0.0	2.16193E-01	8.70764E+00	0.0	0.0	5.82563E-02	2.25157E-01	2.63825E-01	0.0
10	8.54673E+00	0.0	0.0	3.72777E-01	8.17395E+00	0.0	0.0	2.75442E-02	2.14729E-01	2.65782E-01	0.0
11	8.39121E+00	0.0	0.0	6.05334E-01	7.78588E+00	0.0	0.0	1.41803E-02	2.11495E-01	2.63739E-01	0.0
12	8.56628E+00	0.0	0.0	8.95871E-01	7.67040E+00	0.0	0.0	7.06506E-03	2.12819E-01	2.63825E-01	0.0
13	9.15189E+00	0.0	0.0	1.25429E+00	7.89760E+00	0.0	0.0	7.06506E-03	2.20676E-01	2.65782E-01	0.0
14	1.20463E+01	0.0	0.0	1.98556E+00	1.00607E+01	0.0	0.0	7.06506E-03	1.70547E-01	2.63739E-01	0.0
15	1.47239E+01	0.0	0.0	2.85454E+00	1.18694E+01	0.0	0.0	7.06506E-03	1.69558E-01	2.63825E-01	0.0
16	1.34021E+01	0.0	0.0	2.70642E+00	1.06956E+01	0.0	0.0	7.06506E-03	1.66913E-01	2.65782E-01	0.0
17	8.24541E+00	0.0	0.0	1.69038E+00	6.55503E+00	0.0	0.0	7.06506E-03	1.94563E-01	2.63739E-01	0.0
18	2.00555E+01	0.0	0.0	4.01105E+00	1.60444E+01	0.0	0.0	7.06506E-03	2.87672E+00	2.63825E-01	0.0
19	2.89203E+02	0.0	0.0	1.29968E+02	1.59234E+02	0.0	0.0	7.06506E-03	1.00694E-01	2.65782E-01	0.0
20	4.95871E+00	0.0	0.0	8.88738E-01	4.06998E+00	0.0	0.0	7.06506E-03	1.18608E-01	2.63739E-01	0.0
21	5.42667E+00	0.0	0.0	1.01267E+00	4.41400E+00	0.0	0.0	7.08506E-03	1.23803E-01	2.63825E-01	0.0
22	5.90882E+00	0.0	0.0	1.37350E+00	4.53532E+00	0.0	0.0	7.08506E-03	1.24943E-01	2.65782E-01	0.0
23	6.53948E+00	0.0	0.0	1.95431E+00	4.58517E+00	0.0	0.0	7.08506E-03	1.26794E-01	2.63739E-01	0.0
24	7.43434E+00	0.0	0.0	2.82733E+00	4.60701E+00	0.0	0.0	7.08506E-03	1.27151E-01	2.63825E-01	0.0
25	8.74385E+00	0.0	0.0	4.12690E+00	4.61695E+00	0.0	0.0	1.60807E-02	1.26396E-01	2.65782E-01	0.0

NUCLID = 42MO 95 MAT NUMBER = 4295 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I J= EXIT 1 11 GROUP 2 12 ** KK ** KK = I + J - 1 3 4 5 6 7 8 9 10

1
3.71977E-03 7.58169E-02 2.47500E-01 5.20042E-01 4.52633E-01 3.06036E-01 1.12194E-01 3.40348E-02 9.81575E-03 2.24119E-03
4.89145E-04 1.03562E-04

2
2.96781E-02 2.15440E-01 4.50449E-01 4.97376E-01 3.91833E-01 1.57944E-01 5.03047E-02 1.48767E-02 3.44142E-03 7.55701E-04
1.65790E-04 2.61393E-05

3
9.79693E-02 5.10505E-01 4.74575E-01 4.36918E-01 1.98092E-01 6.70431E-02 2.04590E-02 4.81091E-03 1.06455E-03 2.34376E-04
5.12500E-05 3.13678E-06

4
1.70008E-01 5.51502E-01 5.92364E-01 2.37870E-01 7.42345E-02 2.63036E-02 6.13375E-03 1.35655E-03 2.87042E-04 6.43312E-05
1.15012E-05 0.0

5
1.78767E-01 3.85980E-01 3.16086E-01 1.66681E-01 6.20083E-02 1.81408E-02 5.50453E-03 2.25282E-03 5.34697E-04 1.22632E-04
2.09891E-05 0.0

6
2.31818E-01 3.65620E-01 1.98386E-02 0.0 2.93852E-03 5.80283E-03 1.35065E-03 4.74138E-04 1.08563E-04 2.57954E-05
0.0 0.0

7
0.0 1.89489E-01 9.15552E-02 2.03100E-02 7.77649E-03 3.61911E-03 1.69133E-03 7.84065E-04 3.63721E-04 1.75562E-04
3.41965E-05 0.0

NUCLID = 42MO 97 MAT NO = 4297
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.25805E+00	0.0	0.0	1.53483E-03	2.48095E+00	1.77557E+00	0.0	7.56096E-01	7.07734E-02	1.69804E-02	0.0
2	3.89617E+00	0.0	0.0	6.28381E-03	2.05378E+00	1.83611E+00	0.0	6.13084E-01	5.80120E-02	8.92878E-02	0.0
3	4.01660E+00	0.0	0.0	1.41375E-02	2.16175E+00	1.84071E+00	0.0	5.30300E-01	5.66147E-02	1.79938E-01	0.0
4	4.94303E+00	0.0	0.0	2.72460E-02	3.21636E+00	1.69892E+00	0.0	5.32728E-01	6.39139E-02	2.58407E-01	0.0
5	6.43138E+00	0.0	0.0	5.60302E-02	5.06838E+00	1.30697E+00	0.0	4.85656E-01	1.21527E-01	2.02345E-01	0.0
6	8.02872E+00	0.0	0.0	8.47268E-02	7.67740E+00	2.66599E-01	0.0	3.49753E-01	1.83261E-01	2.38821E-01	0.0
7	9.11784E+00	0.0	0.0	9.41698E-02	9.02367E+00	0.0	0.0	2.32328E-01	2.27716E-01	2.38821E-01	0.0
8	9.32051E+00	0.0	0.0	1.25227E-01	9.19529E+00	0.0	0.0	1.33664E-01	2.46832E-01	2.38821E-01	0.0
9	9.03224E+00	0.0	0.0	2.00715E-01	8.83152E+00	0.0	0.0	6.86765E-02	2.21313E-01	2.63825E-01	0.0
10	8.58974E+00	0.0	0.0	3.48987E-01	8.24076E+00	0.0	0.0	3.33009E-02	2.10288E-01	2.65782E-01	0.0
11	8.40190E+00	0.0	0.0	6.22022E-01	7.77988E+00	0.0	0.0	1.78521E-02	2.04626E-01	2.63739E-01	0.0
12	8.65795E+00	0.0	0.0	1.07244E+00	7.58551E+00	0.0	0.0	9.22791E-03	2.05140E-01	2.63825E-01	0.0
13	9.38040E+00	0.0	0.0	1.64370E+00	7.73670E+00	0.0	0.0	6.93884E-03	2.12054E-01	2.65782E-01	0.0
14	1.02216E+01	0.0	0.0	2.14295E+00	8.07863E+00	0.0	0.0	6.93884E-03	1.48596E-01	2.63739E-01	0.0
15	1.55898E+01	0.0	0.0	3.61402E+00	1.19758E+01	0.0	0.0	6.93884E-03	1.25232E-01	2.63825E-01	0.0
16	9.51778E+00	0.0	0.0	3.59837E+00	5.91941E+00	0.0	0.0	6.93884E-03	1.32140E-01	2.65782E-01	0.0
17	5.47499E+00	0.0	0.0	3.72005E-01	5.10299E+00	0.0	0.0	6.93884E-03	1.40815E-01	2.63739E-01	0.0
18	1.31551E+01	0.0	0.0	7.10810E+00	6.04701E+00	0.0	0.0	6.93884E-03	1.35188E-01	2.63825E-01	0.0
19	5.13275E+00	0.0	0.0	6.98386E-02	5.06291E+00	0.0	0.0	6.93884E-03	1.36454E-01	2.65782E-01	0.0
20	5.23780E+00	0.0	0.0	1.34956E-01	5.10284E+00	0.0	0.0	6.93884E-03	1.38015E-01	2.63739E-01	0.0
21	5.24990E+00	0.0	0.0	1.35406E-01	5.11449E+00	0.0	0.0	6.93884E-03	1.38161E-01	2.63825E-01	0.0
22	5.31673E+00	0.0	0.0	1.97523E-01	5.11921E+00	0.0	0.0	6.93884E-03	1.37225E-01	2.65782E-01	0.0
23	5.41053E+00	0.0	0.0	2.89251E-01	5.12128E+00	0.0	0.0	6.93884E-03	1.38325E-01	2.63739E-01	0.0
24	5.54589E+00	0.0	0.0	4.23682E-01	5.12221E+00	0.0	0.0	6.93884E-03	1.38297E-01	2.63825E-01	0.0
25	5.74456E+00	0.0	0.0	6.21920E-01	5.12264E+00	0.0	0.0	1.57477E-02	1.37286E-01	2.65782E-01	0.0

NUCLID = 42MO 97 MAT NUMBER = 4297 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I J= EXIT 1 11 GROUP 2 12 ** KK ** KK = I + J - 1 3 4 5 6 7 8 9 10

1
2.20331E-03 5.90859E-02 2.24660E-01 5.12912E-01 4.71507E-01 3.29753E-01 1.23442E-01 3.78491E-02 1.09759E-02 2.51326E-03
5.49259E-04 1.16367E-04

2
1.91126E-02 1.76693E-01 4.38242E-01 5.19556E-01 4.26881E-01 1.76613E-01 5.70099E-02 1.69766E-02 3.94137E-03 8.66945E-04
1.90343E-04 3.00566E-05

3
7.21327E-02 4.32015E-01 4.98042E-01 4.94882E-01 2.31830E-01 7.98038E-02 2.45680E-02 5.80368E-03 1.28699E-03 2.83630E-04
6.20488E-05 3.86597E-06

4
1.47412E-01 6.05918E-01 5.52450E-01 2.51997E-01 7.43733E-02 4.39380E-02 1.77467E-02 3.97071E-03 8.81534E-04 1.95441E-04
3.83434E-05 0.0

5
2.59291E-02 5.43704E-01 4.78875E-01 1.94360E-01 5.01308E-02 1.09365E-02 2.36497E-03 5.22712E-04 1.14729E-04 2.77814E-05
3.76241E-06 0.0

6
0.0 7.09839E-02 9.30881E-02 6.46650E-02 2.87324E-02 7.56077E-03 1.09768E-03 3.17641E-04 1.02631E-04 3.99369E-05
1.05250E-05 0.0

NUCLID = 43TC 99 MAT NO = 4399
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.25588E+00	0.0	0.0	5.00325E-03	2.46874E+00	1.78213E+00	0.0	7.53607E-01	6.96472E-02	1.69804E-02	0.0
2	3.90287E+00	0.0	0.0	2.02022E-02	2.05067E+00	1.83200E+00	0.0	6.10203E-01	5.75969E-02	8.92878E-02	0.0
3	4.06003E+00	0.0	0.0	4.16312E-02	2.23788E+00	1.78051E+00	0.0	5.50114E-01	5.90784E-02	1.79938E-01	0.0
4	5.05330E+00	0.0	0.0	9.53144E-02	3.50583E+00	1.45215E+00	0.0	5.13007E-01	7.41915E-02	2.58407E-01	0.0
5	6.56666E+00	0.0	0.0	1.54632E-01	5.44037E+00	9.71656E-01	0.0	4.70592E-01	1.20139E-01	2.02345E-01	0.0
6	8.09466E+00	0.0	0.0	1.45440E-01	7.06859E+00	8.80635E-01	0.0	3.95347E-01	1.48199E-01	2.38821E-01	0.0
7	9.12007E+00	0.0	0.0	1.70228E-01	8.22630E+00	7.23541E-01	0.0	2.71213E-01	2.03201E-01	2.38821E-01	0.0
8	9.20851E+00	0.0	0.0	2.72590E-01	8.83799E+00	9.79372E-02	0.0	1.53420E-01	2.32730E-01	2.38821E-01	0.0
9	9.03887E+00	0.0	0.0	4.59199E-01	8.57967E+00	0.0	0.0	8.08472E-02	2.06552E-01	2.63825E-01	0.0
10	8.56801E+00	0.0	0.0	7.39969E-01	7.82804E+00	0.0	0.0	4.07294E-02	1.92072E-01	2.65782E-01	0.0
11	8.29056E+00	0.0	0.0	1.09041E+00	7.20015E+00	0.0	0.0	2.18780E-02	1.82936E-01	2.63739E-01	0.0
12	8.33534E+00	0.0	0.0	1.45583E+00	6.87951E+00	0.0	0.0	1.24169E-02	1.80868E-01	2.63825E-01	0.0
13	8.80985E+00	0.0	0.0	1.91770E+00	6.89215E+00	0.0	0.0	6.79854E-03	1.83130E-01	2.65782E-01	0.0
14	9.95036E+00	0.0	0.0	2.83379E+00	7.11657E+00	0.0	0.0	6.79854E-03	1.92178E-01	2.63739E-01	0.0
15	1.16803E+01	0.0	0.0	4.24492E+00	7.43537E+00	0.0	0.0	6.79854E-03	2.01065E-01	2.63825E-01	0.0
16	1.39939E+01	0.0	0.0	6.66495E+00	7.32895E+00	0.0	0.0	6.79854E-03	1.29961E-01	2.65782E-01	0.0
17	2.33468E+01	0.0	0.0	1.39315E+01	9.41536E+00	0.0	0.0	6.79854E-03	1.05863E-01	2.63739E-01	0.0
18	6.84195E+00	0.0	0.0	2.48450E+00	4.35745E+00	0.0	0.0	6.79854E-03	1.15646E-01	2.63825E-01	0.0
19	7.69383E+00	0.0	0.0	3.03421E+00	4.65962E+00	0.0	0.0	6.79854E-03	1.56287E-01	2.65782E-01	0.0
20	3.98592E+01	0.0	0.0	3.50797E+01	4.77954E+00	0.0	0.0	6.79854E-03	1.18179E-01	2.63739E-01	0.0
21	1.82352E+02	0.0	0.0	1.76551E+02	5.80119E+00	0.0	0.0	6.79854E-03	7.71008E-02	2.63825E-01	0.0
22	1.42613E+01	0.0	0.0	1.06817E+01	3.57963E+00	0.0	0.0	6.79854E-03	1.00035E-01	2.65782E-01	0.0
23	8.03743E+00	0.0	0.0	4.16307E+00	3.87436E+00	0.0	0.0	6.79854E-03	1.03634E-01	2.63739E-01	0.0
24	8.28322E+00	0.0	0.0	4.34677E+00	3.93646E+00	0.0	0.0	6.79854E-03	1.04521E-01	2.63825E-01	0.0
25	9.53956E+00	0.0	0.0	5.58054E+00	3.95902E+00	0.0	0.0	1.54453E-02	1.04123E-01	2.65782E-01	0.0

NUCLID = 43TC 99 MAT NUMBER = 4399 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	2.60915E-03	5.32431E-02	2.18705E-01	5.11530E-01	4.77773E-01	3.37445E-01	1.27093E-01	3.90905E-02	1.13541E-02	2.60204E-03	5.66882E-04	1.20537E-04
2	2.55341E-02	1.41349E-01	4.34933E-01	5.26947E-01	4.38345E-01	1.82752E-01	5.92250E-02	1.76722E-02	4.10723E-03	9.03877E-04	1.98498E-04	3.13667E-05
3	1.02498E-01	3.27742E-01	4.95171E-01	5.02461E-01	2.37481E-01	8.21271E-02	2.53438E-02	5.99443E-03	1.33007E-03	2.93202E-04	6.41511E-05	3.94967E-06
4	3.05475E-01	3.81451E-01	3.38306E-01	2.78734E-01	1.04036E-01	3.36472E-02	8.15804E-03	1.83129E-03	4.05868E-04	8.90246E-05	1.74961E-05	0.0
5	3.76701E-01	3.82755E-01	1.35116E-01	4.78731E-02	1.11527E-02	9.66076E-04	1.20284E-02	3.97947E-03	8.75252E-04	1.88122E-04	2.16111E-05	0.0
6	4.14208E-01	4.32689E-01	9.89201E-03	1.32105E-02	7.78302E-03	2.22539E-03	4.88439E-04	1.08944E-04	2.37676E-05	5.45777E-06	0.0	0.0
7	1.55522E-01	3.87643E-01	1.68597E-01	1.03182E-02	1.46150E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	1.90886E-02	4.64436E-02	2.46796E-02	5.94205E-03	1.05244E-03	4.21593E-04	1.82318E-04	8.21644E-05	3.82442E-05	6.59835E-06	0.0

NUCLID = 44RU101 MAT NO = 4401
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.25477E+00	0.0	0.0	5.27978E-03	2.45493E+00	1.79455E+00	0.0	7.51168E-01	6.83814E-02	1.69804E-02	0.0
2	3.91211E+00	0.0	0.0	2.37206E-02	2.03736E+00	1.85103E+00	0.0	6.11360E-01	5.53950E-02	8.92878E-02	0.0
3	4.10277E+00	0.0	0.0	5.13320E-02	2.23916E+00	1.81229E+00	0.0	5.68072E-01	5.40489E-02	1.79938E-01	0.0
4	5.15229E+00	0.0	0.0	6.70667E-02	3.30268E+00	1.78255E+00	0.0	5.67578E-01	5.57101E-02	2.58407E-01	0.0
5	6.64484E+00	0.0	0.0	8.27486E-02	4.80295E+00	1.75914E+00	0.0	5.48704E-01	8.89009E-02	2.02345E-01	0.0
6	8.08472E+00	0.0	0.0	1.38113E-01	6.35305E+00	1.59355E+00	0.0	4.52834E-01	1.28508E-01	2.38821E-01	0.0
7	9.03347E+00	0.0	0.0	2.73171E-01	8.06559E+00	6.94711E-01	0.0	2.90110E-01	1.89911E-01	2.38821E-01	0.0
8	9.17398E+00	0.0	0.0	4.41135E-01	8.59548E+00	1.37364E-01	0.0	1.70011E-01	2.17513E-01	2.38821E-01	0.0
9	8.98016E+00	0.0	0.0	7.11137E-01	8.26902E+00	0.0	0.0	9.33372E-02	1.91731E-01	2.63825E-01	0.0
10	8.50531E+00	0.0	0.0	1.06876E+00	7.43655E+00	0.0	0.0	4.85463E-02	1.76552E-01	2.65782E-01	0.0
11	8.20788E+00	0.0	0.0	1.44663E+00	6.76124E+00	0.0	0.0	2.61438E-02	1.67385E-01	2.63739E-01	0.0
12	8.22728E+00	0.0	0.0	1.79544E+00	6.43184E+00	0.0	0.0	1.54218E-02	1.64516E-01	2.63825E-01	0.0
13	8.63920E+00	0.0	0.0	2.23171E+00	6.40748E+00	0.0	0.0	7.55694E-03	1.66082E-01	2.65782E-01	0.0
14	9.51517E+00	0.0	0.0	2.98282E+00	6.53235E+00	0.0	0.0	6.66380E-03	1.71580E-01	2.63739E-01	0.0
15	1.19983E+01	0.0	0.0	3.84313E+00	8.15522E+00	0.0	0.0	6.66380E-03	2.59814E-01	2.63825E-01	0.0
16	2.29182E+01	0.0	0.0	9.73519E+00	1.31830E+01	0.0	0.0	6.66380E-03	1.38118E-01	2.65782E-01	0.0
17	1.57111E+01	0.0	0.0	9.04760E+00	6.66348E+00	0.0	0.0	6.66380E-03	2.67613E-01	2.63739E-01	0.0
18	3.32317E+01	0.0	0.0	2.31445E+01	1.00872E+01	0.0	0.0	6.66380E-03	1.43842E-01	2.63825E-01	0.0
19	2.77194E+01	0.0	0.0	2.15717E+01	6.14771E+00	0.0	0.0	6.66380E-03	1.31965E-01	2.65782E-01	0.0
20	6.45508E+01	0.0	0.0	5.84267E+01	6.12408E+00	0.0	0.0	6.66380E-03	1.15534E-01	2.63739E-01	0.0
21	5.15549E+00	0.0	0.0	5.52039E-01	4.60345E+00	0.0	0.0	6.66380E-03	1.21425E-01	2.63825E-01	0.0
22	5.14649E+00	0.0	0.0	4.32250E-01	4.71424E+00	0.0	0.0	6.66380E-03	1.21930E-01	2.65782E-01	0.0
23	5.26812E+00	0.0	0.0	5.20073E-01	4.74804E+00	0.0	0.0	6.66380E-03	1.23401E-01	2.63739E-01	0.0
24	5.46514E+00	0.0	0.0	7.03585E-01	4.76155E+00	0.0	0.0	6.66380E-03	1.23587E-01	2.63825E-01	0.0
25	5.76461E+00	0.0	0.0	9.97122E-01	4.76748E+00	0.0	0.0	1.51334E-02	1.22777E-01	2.65782E-01	0.0

NUCLID = 44RU101 MAT NUMBER = 4401 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	3.19635E-03	5.09965E-02	2.09084E-01	5.07720E-01	4.86060E-01	3.48596E-01	1.32543E-01	4.09651E-02	1.19284E-02	2.73718E-03	5.98792E-04	1.26892E-04
2	3.48892E-02	1.65143E-01	4.17791E-01	5.21131E-01	4.41582E-01	1.86221E-01	6.07070E-02	1.81697E-02	4.22958E-03	9.31496E-04	2.04633E-04	3.22675E-05
3	1.51097E-01	4.59021E-01	4.32270E-01	4.49463E-01	2.15232E-01	7.49414E-02	2.32082E-02	5.49945E-03	1.22129E-03	2.69332E-04	5.89393E-05	3.50251E-06
4	3.78266E-01	6.91636E-01	4.25520E-01	1.86323E-01	7.06843E-02	2.29427E-02	5.57186E-03	1.25173E-03	2.77519E-04	6.08823E-05	1.18227E-05	0.0
5	3.28537E-01	8.88483E-01	3.62465E-01	1.26979E-01	4.06035E-02	9.05975E-03	2.33213E-03	5.35332E-04	1.17270E-04	2.73598E-05	4.19511E-06	0.0
6	3.13914E-01	7.51778E-01	3.98581E-01	1.02787E-01	1.95499E-02	4.24240E-03	1.84833E-03	6.68047E-04	1.46455E-04	3.34312E-05	3.66903E-06	0.0
7	1.66010E-01	3.25989E-01	1.69016E-01	2.62690E-02	5.77796E-03	1.26450E-03	2.81284E-04	6.06895E-05	1.40306E-05	1.85415E-05	9.48532E-06	0.0
8	0.0	5.86984E-02	6.10237E-02	9.70644E-03	4.27616E-03	1.99729E-03	9.17487E-04	4.24959E-04	2.13743E-04	8.91419E-05	1.66961E-05	0.0

NUCLID = 44RU102 MAT NO = 4402

INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4,25603E+00	0.0	0.0	4,36665E-03	2,45023E+00	1,80144E+00	0.0	7,49978E-01	6,79172E-02	1,69804E-02	0.0
2	3,91831E+00	0.0	0.0	2,25516E-02	2,05103E+00	1,84473E+00	0.0	6,06722E-01	5,71909E-02	8,92878E-02	0.0
3	4,11956E+00	0.0	0.0	5,56341E-02	2,34793E+00	1,71599E+00	0.0	5,49852E-01	6,10355E-02	1,79938E-01	0.0
4	5,15381E+00	0.0	0.0	7,12232E-02	3,62165E+00	1,46093E+00	0.0	5,27042E-01	6,86931E-02	2,58407E-01	0.0
5	6,64430E+00	0.0	0.0	7,39201E-02	5,50376E+00	1,06662E+00	0.0	4,84810E-01	1,16819E-01	2,02345E-01	0.0
6	8,06697E+00	0.0	0.0	8,91812E-02	7,53500E+00	4,42784E-01	0.0	3,86464E-01	1,64401E-01	2,38821E-01	0.0
7	9,01114E+00	0.0	0.0	1,09836E-01	8,90131E+00	0.0	0.0	2,67350E-01	2,04147E-01	2,38821E-01	0.0
8	9,20132E+00	0.0	0.0	1,23376E-01	9,07794E+00	0.0	0.0	1,65277E-01	2,24845E-01	2,38821E-01	0.0
9	8,92944E+00	0.0	0.0	1,81380E-01	8,74805E+00	0.0	0.0	9,19436E-02	2,04581E-01	2,63825E-01	0.0
10	8,46025E+00	0.0	0.0	3,05550E-01	8,15470E+00	0.0	0.0	4,69099E-02	1,95564E-01	2,65782E-01	0.0
11	8,16185E+00	0.0	0.0	4,92467E-01	7,66938E+00	0.0	0.0	2,48959E-02	1,90554E-01	2,63739E-01	0.0
12	8,17567E+00	0.0	0.0	7,17061E-01	7,45860E+00	0.0	0.0	1,47020E-02	1,90904E-01	2,63825E-01	0.0
13	8,58059E+00	0.0	0.0	9,55084E-01	7,62551E+00	0.0	0.0	7,40185E-03	1,99575E-01	2,65782E-01	0.0
14	9,24001E+00	0.0	0.0	1,02586E+00	8,21415E+00	0.0	0.0	6,59903E-03	1,34812E-01	2,63739E-01	0.0
15	5,37806E+00	0.0	0.0	8,38630E-03	5,36967E+00	0.0	0.0	6,59903E-03	1,39867E-01	2,63825E-01	0.0
16	5,79810E+00	0.0	0.0	3,98557E-01	5,39954E+00	0.0	0.0	6,59903E-03	1,37833E-01	2,65782E-01	0.0
17	5,55283E+00	0.0	0.0	1,47196E-01	5,40563E+00	0.0	0.0	6,59903E-03	1,39008E-01	2,63739E-01	0.0
18	5,43882E+00	0.0	0.0	2,54989E-02	5,41332E+00	0.0	0.0	6,59903E-03	1,39087E-01	2,63825E-01	0.0
19	5,45362E+00	0.0	0.0	3,73667E-02	5,41625E+00	0.0	0.0	6,59903E-03	1,38107E-01	2,65782E-01	0.0
20	5,47227E+00	0.0	0.0	5,48465E-02	5,41743E+00	0.0	0.0	6,59903E-03	1,39197E-01	2,63739E-01	0.0
21	5,49835E+00	0.0	0.0	8,04083E-02	5,41794E+00	0.0	0.0	6,59903E-03	1,39160E-01	2,63825E-01	0.0
22	5,53625E+00	0.0	0.0	1,18074E-01	5,41817E+00	0.0	0.0	6,59903E-03	1,38139E-01	2,65782E-01	0.0
23	5,59164E+00	0.0	0.0	1,73364E-01	5,41828E+00	0.0	0.0	6,59903E-03	1,39213E-01	2,63739E-01	0.0
24	5,67256E+00	0.0	0.0	2,54229E-01	5,41833E+00	0.0	0.0	6,59903E-03	1,39168E-01	2,63825E-01	0.0
25	5,79173E+00	0.0	0.0	3,73376E-01	5,41835E+00	0.0	0.0	1,49851E-02	1,38144E-01	2,65782E-01	0.0

NUCLID = 44RU102 MAT NUMBER = 4402 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	1,43482E-03	4,94875E-02	2,00578E-01	5,03411E-01	4,92533E-01	3,58049E-01	1,37281E-01	4,26117E-02	1,24352E-02	2,85677E-03	6,25269E-04	1,32528E-04
2	2,15846E-02	1,80972E-01	4,16421E-01	5,11917E-01	4,40703E-01	1,87688E-01	6,14970E-02	1,84546E-02	4,30178E-03	9,48003E-04	2,08321E-04	3,27323E-05
3	1,10278E-01	5,26525E-01	4,11847E-01	3,34942E-01	2,18938E-01	8,09653E-02	2,49082E-02	5,91579E-03	1,31530E-03	2,90222E-04	6,35269E-05	4,24711E-06
4	1,90087E-01	5,60891E-01	4,15180E-01	1,97995E-01	6,49362E-02	2,20620E-02	7,52064E-03	1,75483E-03	3,94335E-04	8,95252E-05	2,04284E-05	0.0
5	1,04759E-01	5,88001E-01	2,57298E-01	7,78916E-02	2,91973E-02	7,41741E-03	1,60298E-03	3,55126E-04	7,70772E-05	1,95494E-05	2,69088E-06	0.0
6	0.0	1,97411E-01	1,46386E-01	6,36513E-02	2,96068E-02	3,58923E-03	1,17772E-03	5,50101E-04	2,52699E-04	1,18915E-04	4,05507E-05	0.0

NUCLID = 44RU104 MAT NO = 4404

INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4,25959E+00	0.0	0.0	2,36180E-03	2,43560E+00	1,82163E+00	0.0	7,47090E-01	6,67816E-02	1,69804E-02	0.0
2	3,93854E+00	0.0	0.0	1,41266E-02	2,04923E+00	1,87518E+00	0.0	6,06940E-01	5,60425E-02	8,92878E-02	0.0
3	4,17005E+00	0.0	0.0	3,30985E-02	2,39892E+00	1,73803E+00	0.0	5,56247E-01	6,01917E-02	1,79938E-01	0.0
4	5,28311E+00	0.0	0.0	3,62565E-02	3,70690E+00	1,53995E+00	0.0	5,36414E-01	6,66058E-02	2,58407E-01	0.0
5	6,73448E+00	0.0	0.0	3,45283E-02	5,50942E+00	1,19053E+00	0.0	4,95971E-01	1,12234E-01	2,02345E-01	0.0
6	8,02232E+00	0.0	0.0	3,94655E-02	7,19695E+00	7,85883E-01	0.0	4,11966E-01	1,48689E-01	2,38821E-01	0.0
7	8,79586E+00	0.0	0.0	6,42783E-02	8,70896E+00	2,26177E-02	0.0	2,81650E-01	1,93395E-01	2,38821E-01	0.0
8	9,00398E+00	0.0	0.0	7,30242E-02	8,93095E+00	0.0	0.0	1,77330E-01	2,14445E-01	2,38821E-01	0.0
9	8,75127E+00	0.0	0.0	1,00833E-01	8,65044E+00	0.0	0.0	1,01042E-01	1,97667E-01	2,63825E-01	0.0
10	8,31024E+00	0.0	0.0	1,72443E-01	8,13780E+00	0.0	0.0	5,22188E-02	1,91587E-01	2,65782E-01	0.0
11	8,02775E+00	0.0	0.0	2,94356E-01	7,73339E+00	0.0	0.0	2,75863E-02	1,88984E-01	2,63739E-01	0.0
12	8,04929E+00	0.0	0.0	4,62612E-01	7,58668E+00	0.0	0.0	1,59270E-02	1,90855E-01	2,63825E-01	0.0
13	8,45627E+00	0.0	0.0	6,58629E-01	7,79964E+00	0.0	0.0	7,41091E-03	2,00748E-01	2,65782E-01	0.0
14	1,20815E+01	0.0	0.0	1,23383E+00	1,08476E+01	0.0	0.0	6,47142E-03	9,26440E-02	2,63739E-01	0.0
15	1,48824E+01	0.0	0.0	1,83999E+00	1,30424E+01	0.0	0.0	6,47142E-03	1,23102E-01	2,63825E-01	0.0
16	1,11436E+01	0.0	0.0	4,82947E+00	6,31410E+00	0.0	0.0	6,47142E-03	9,53648E-02	2,65782E-01	0.0
17	5,08007E+00	0.0	0.0	2,08764E-02	5,05920E+00	0.0	0.0	6,47142E-03	1,31151E-01	2,63739E-01	0.0
18	5,24600E+00	0.0	0.0	9,16166E-03	5,23684E+00	0.0	0.0	6,47142E-03	1,32454E-01	2,63825E-01	0.0
19	5,28121E+00	0.0	0.0	1,23248E-02	5,26888E+00	0.0	0.0	6,47142E-03	1,31945E-01	2,65782E-01	0.0
20	5,29867E+00	0.0	0.0	1,75782E-02	5,28110E+00	0.0	0.0	6,47142E-03	1,33162E-01	2,63739E-01	0.0
21	5,31179E+00	0.0	0.0	2,54674E-02	5,28632E+00	0.0	0.0	6,47142E-03	1,33205E-01	2,63825E-01	0.0
22	5,32589E+00	0.0	0.0	3,72131E-02	5,28868E+00	0.0	0.0	6,47142E-03	1,32263E-01	2,65782E-01	0.0
23	5,34426E+00	0.0	0.0	5,45104E-02	5,28975E+00	0.0	0.0	6,47142E-03	1,33306E-01	2,63739E-01	0.0
24	5,37010E+00	0.0	0.0	7,98496E-02	5,29025E+00	0.0	0.0	6,47142E-03	1,33271E-01	2,63825E-01	0.0
25	5,40769E+00	0.0	0.0	1,17213E-01	5,29048E+00	0.0	0.0	1,46985E-02	1,32293E-01	2,65782E-01	0.0

NUCLID = 44RU104 MAT NUMBER = 4404 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	2,03335E-03	3,93401E-02	1,83205E-01	4,94985E-01	5,08272E-01	3,80786E-01	1,48745E-01	4,66132E-02	1,36700E-02	3,14849E-03	6,89966E-04	1,46315E-04
2	2,76992E-02	1,56883E-01	3,89333E-01	5,28231E-01	4,72175E-01	2,05835E-01	6,82596E-02	2,06118E-02	4,82023E-03	1,06387E-03	2,33946E-04	3,68353E-05
3	1,46453E-01	4,71538E-01	3,81475E-01	4,22640E-01	2,10523E-01	7,48222E-02	2,34195E-02	5,58049E-03	1,24253E-03	2,74344E-04	6,00700E-05	3,41975E-06
4	3,05476E-01	6,02237E-01	4,16638E-01	1,38450E-01	5,38634E-02	1,77095E-02	4,33003E-03	9,75831E-04	2,16668E-04	4,75652E-05	9,16591E-06	0.0
5	2,16940E-01	6,23665E-01	1,93598E-01	9,71315E-02	4,52002E-02	1,06512E-02	2,51209E-03	6,31573E-04	1,56364E-04	3,76793E-05	4,33310E-06	0.0
6	6,08501E-02	4,11750E-01	2,05033E-01	9,36012E-02	1,46481E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	9,84262E-03	6,90429E-03	3,21028E-03	1,50425E-03	6,88665E-04	3,15005E-04	1,52581E-04	0.0	0.0

NUCLID = 44RU106 MAT NO = 4406
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.26471E+00	0.0	0.0	9.35939E-04	2.42243E+00	1.84134E+00	0.0	7.44746E-01	6.55319E-02	1.69804E-02	0.0
2	3.96020E+00	0.0	0.0	7.73941E-03	2.05168E+00	1.90078E+00	0.0	6.07698E-01	5.52653E-02	8.92878E-02	0.0
3	4.21580E+00	0.0	0.0	2.23521E-02	2.46194E+00	1.73151E+00	0.0	5.61659E-01	6.08211E-02	1.79938E-01	0.0
4	5.34753E+00	0.0	0.0	2.49333E-02	3.83813E+00	1.48447E+00	0.0	5.35108E-01	6.67055E-02	2.58407E-01	0.0
5	6.77237E+00	0.0	0.0	1.70119E-02	5.50872E+00	1.24664E+00	0.0	5.03618E-01	1.07913E-01	2.02345E-01	0.0
6	7.93182E+00	0.0	0.0	2.00858E-02	6.97292E+00	9.38817E-01	0.0	4.28432E-01	1.29467E-01	2.38821E-01	0.0
7	8.57894E+00	0.0	0.0	3.08323E-02	8.31664E+00	2.31466E-01	0.0	2.99070E-01	1.82598E-01	2.38821E-01	0.0
8	8.77418E+00	0.0	0.0	4.66973E-02	8.72748E+00	0.0	0.0	1.87047E-01	2.03542E-01	2.38821E-01	0.0
9	8.54118E+00	0.0	0.0	5.99677E-02	8.48121E+00	0.0	0.0	1.08446E-01	1.89551E-01	2.63825E-01	0.0
10	8.14007E+00	0.0	0.0	1.01312E-01	8.03876E+00	0.0	0.0	5.65374E-02	1.85893E-01	2.65782E-01	0.0
11	7.89138E+00	0.0	0.0	1.78926E-01	7.71245E+00	0.0	0.0	2.97385E-02	1.85565E-01	2.63739E-01	0.0
12	7.94071E+00	0.0	0.0	2.97650E-01	7.64306E+00	0.0	0.0	1.68632E-02	1.89380E-01	2.63825E-01	0.0
13	8.37616E+00	0.0	0.0	4.50690E-01	7.92547E+00	0.0	0.0	8.84792E-03	2.00896E-01	2.65782E-01	0.0
14	9.27793E+00	0.0	0.0	6.32075E-01	8.64585E+00	0.0	0.0	6.34921E-03	2.26322E-01	2.63739E-01	0.0
15	1.01721E+01	0.0	0.0	7.88958E-01	9.38312E+00	0.0	0.0	6.34921E-03	1.27225E-01	2.63825E-01	0.0
16	5.14831E+00	0.0	0.0	1.31465E-03	5.14700E+00	0.0	0.0	6.34921E-03	1.26288E-01	2.65782E-01	0.0
17	5.14893E+00	0.0	0.0	1.93031E-03	5.14700E+00	0.0	0.0	6.34921E-03	1.27267E-01	2.63739E-01	0.0
18	5.14983E+00	0.0	0.0	2.83053E-03	5.14700E+00	0.0	0.0	6.34921E-03	1.27225E-01	2.63825E-01	0.0
19	5.15116E+00	0.0	0.0	4.15709E-03	5.14700E+00	0.0	0.0	6.34921E-03	1.26288E-01	2.65782E-01	0.0
20	5.15310E+00	0.0	0.0	6.10386E-03	5.14700E+00	0.0	0.0	6.34921E-03	1.27267E-01	2.63739E-01	0.0
21	5.15595E+00	0.0	0.0	8.95046E-03	5.14700E+00	0.0	0.0	6.34921E-03	1.27225E-01	2.63825E-01	0.0
22	5.16015E+00	0.0	0.0	1.31452E-02	5.14700E+00	0.0	0.0	6.34921E-03	1.26288E-01	2.65782E-01	0.0
23	5.16630E+00	0.0	0.0	1.93011E-02	5.14700E+00	0.0	0.0	6.34921E-03	1.27267E-01	2.63739E-01	0.0
24	5.17530E+00	0.0	0.0	2.83024E-02	5.14700E+00	0.0	0.0	6.34921E-03	1.27225E-01	2.63825E-01	0.0
25	5.18857E+00	0.0	0.0	4.15668E-02	5.14700E+00	0.0	0.0	1.44238E-02	1.26288E-01	2.65782E-01	0.0

NUCLID = 44RU106 MAT NUMBER = 4406 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12								
1	2.02166E-03	3.52897E-02	1.74550E-01	4.91593E-01	5.18721E-01	3.95282E-01	1.56042E-01	4.91647E-02	1.44584E-02	3.33491E-03
	7.31313E-04	1.55120E-04								
2	3.17977E-02	1.37950E-01	3.99391E-01	5.32033E-01	4.85500E-01	2.14374E-01	7.15643E-02	2.16839E-02	5.08002E-03	1.12215E-03
	2.46857E-04	3.88206E-05								
3	2.02390E-01	4.27141E-01	3.25271E-01	4.57549E-01	2.11960E-01	7.59852E-02	2.38903E-02	5.70600E-03	1.27186E-03	2.80965E-04
	6.15341E-05	3.54595E-06								
4	4.67633E-01	6.01131E-01	2.43681E-01	7.15765E-02	6.22475E-02	2.94483E-02	6.82285E-03	1.50825E-03	3.31118E-04	7.61726E-05
	1.33104E-05	0.0								
5	3.18452E-01	6.08405E-01	2.01251E-01	7.86970E-02	3.08270E-02	6.87965E-03	1.58520E-03	4.15231E-04	1.08016E-04	1.68878E-05
	3.43475E-06	0.0								
6	2.35946E-01	4.86278E-01	2.09339E-01	4.14658E-03	1.64517E-03	3.55879E-04	7.82217E-05	1.72818E-05	5.08333E-04	5.02257E-04
	0.0	0.0								
7	0.0	5.75060E-02	1.21367E-01	3.44894E-02	9.75352E-03	4.53305E-03	2.11954E-03	9.81600E-04	4.34846E-04	2.29222E-04
	5.24791E-05	0.0								

NUCLID = 45RH103 MAT NO = 4503
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.25856E+00	0.0	0.0	2.83242E-03	2.44181E+00	1.61392E+00	0.0	7.49089E-01	6.70144E-02	1.69804E-02	0.0
2	3.93111E+00	0.0	0.0	1.37508E-02	2.03116E+00	1.88620E+00	0.0	6.13020E-01	5.37196E-02	8.92878E-02	0.0
3	4.14895E+00	0.0	0.0	3.18281E-02	2.27029E+00	1.84683E+00	0.0	5.79590E-01	5.25178E-02	1.79938E-01	0.0
4	5.23824E+00	0.0	0.0	6.62719E-02	3.42936E+00	1.74281E+00	0.0	5.68148E-01	5.90585E-02	2.58407E-01	0.0
5	6.69866E+00	0.0	0.0	8.95996E-02	5.12550E+00	1.48356E+00	0.0	5.26891E-01	9.96551E-02	2.02345E-01	0.0
6	8.05354E+00	0.0	0.0	1.27633E-01	6.72677E+00	1.19913E+00	0.0	4.36764E-01	1.35704E-01	2.38821E-01	0.0
7	8.90464E+00	0.0	0.0	2.72295E-01	8.44802E+00	1.84319E-01	0.0	2.86357E-01	1.90911E-01	2.38821E-01	0.0
8	9.10172E+00	0.0	0.0	4.16552E-01	8.66789E+00	1.72788E-02	0.0	1.78048E-01	2.08355E-01	2.38821E-01	0.0
9	8.84375E+00	0.0	0.0	6.41959E-01	8.19942E+00	2.37054E-03	0.0	1.02323E-01	1.85637E-01	2.63825E-01	0.0
10	8.38661E+00	0.0	0.0	9.59020E-01	7.42756E+00	2.35112E-05	0.0	5.39723E-02	1.72838E-01	2.65782E-01	0.0
11	8.09376E+00	0.0	0.0	1.28976E+00	6.80401E+00	0.0	0.0	2.90246E-02	1.65431E-01	2.63739E-01	0.0
12	8.10946E+00	0.0	0.0	1.58535E+00	6.52411E+00	0.0	0.0	1.67790E-02	1.64233E-01	2.63825E-01	0.0
13	9.30825E+00	0.0	0.0	2.08615E+00	7.22210E+00	0.0	0.0	1.61479E-02	1.29782E-01	2.65782E-01	0.0
14	1.08396E+01	0.0	0.0	2.90890E+00	7.93070E+00	0.0	0.0	6.53428E-03	1.32267E-01	2.63739E-01	0.0
15	1.22993E+01	0.0	0.0	4.10128E+00	8.19796E+00	0.0	0.0	6.53428E-03	1.44314E-01	2.63825E-01	0.0
16	1.97057E+01	0.0	0.0	1.02121E+01	9.49365E+00	0.0	0.0	6.53428E-03	1.19652E-01	2.65782E-01	0.0
17	1.89538E+01	0.0	0.0	9.66672E+00	9.26705E+00	0.0	0.0	6.53428E-03	1.15337E-01	2.63739E-01	0.0
18	6.70941E+00	0.0	0.0	2.07776E+00	4.63166E+00	0.0	0.0	6.53428E-03	1.28988E-01	2.63825E-01	0.0
19	4.89495E+00	0.0	0.0	2.19497E-01	4.67546E+00	0.0	0.0	6.53428E-03	1.19675E-01	2.65782E-01	0.0
20	4.86973E+00	0.0	0.0	7.94176E-02	4.79031E+00	0.0	0.0	6.53428E-03	1.23240E-01	2.63739E-01	0.0
21	5.52087E+00	0.0	0.0	5.74535E-01	4.94633E+00	0.0	0.0	6.53428E-03	1.29111E-01	2.63825E-01	0.0
22	1.39164E+01	0.0	0.0	8.45233E+00	5.46409E+00	0.0	0.0	6.53428E-03	1.55331E-01	2.65782E-01	0.0
23	1.15424E+03	0.0	0.0	1.14493E+03	9.30036E+00	0.0	0.0	6.53428E-03	4.59822E-02	2.63739E-01	0.0
24	1.70610E+02	0.0	0.0	1.67768E+02	2.84217E+00	0.0	0.0	6.53428E-03	8.55208E-02	2.63825E-01	0.0
25	7.59050E+01	0.0	0.0	7.23597E+01	3.54530E+00	0.0	0.0	1.51043E-02	9.23936E-02	2.65782E-01	0.0

NUCLID = 45RH103 MAT NUMBER = 4503 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12								
1	1.85787E-03	4.38740E-02	2.01712E-01	5.07828E-01	4.97834E-01	3.62343E-01	1.39033E-01	4.31720E-02	1.26012E-02	2.89520E-03
	6.33732E-04	1.34338E-04								
2	1.98963E-02	1.29174E-01	4.25396E-01	5.46617E-01	4.71975E-01	2.01371E-01	6.60415E-02	1.98278E-02	4.62301E-03	1.01891E-03
	2.23915E-04	3.54024E-05								
3	9.15128E-02	3.18451E-01	5.10484E-01	5.36594E-01	2.61000E-01	9.16188E-02	2.84927E-02	6.76653E-03	1.50423E-03	3.31886E-04
	7.26444E-05	4.49843E-06								
4	3.05135E-01	5.26189E-01	4.90369E-01	2.55054E-01	1.18066E-01	3.63810E-02	8.86440E-03	1.99445E-03	4.42503E-04	9.71085E-05
	1.90374E-05	0.0								
5	3.51524E-01	7.42577E-01	2.32350E-01	1.02717E-01	3.95833E-02	1.15231E-02	2.56695E-03	5.62551E-04	1.23617E-04	3.09171E-05
	2.33011E-06	0.0								
6	2.38450E-01	5.61901E-01	3.34247E-01	5.49033E-02	8.76774E-03	6.75972E-04	1.48099E-04	3.27872E-05	6.20823E-06	8.62538E-07
	0.0	0.0								
7	9.16875E-02	1.33833E-02	5.05973E-02	2.04872E-02	6.34354E-03	1.40691E-03	3.23243E-04	7.05903E-05	1.54489E-05	3.71706E-06
	2.02057E-07	0.0								
8	1.00187E-02	6.93454E-03	2.63385E-04	5.08780E-05	1.12491E-05	0.0	0.0	0.0	0.0	0.0
	0.0	0.0								
9	7.85158E-04	1.25894E-03	2.46026E-04	7.14688E-05	7.00475E-06	1.51522E-06	3.33185E-07	7.35728E-08	1.65851E-08	2.24973E-09
	0.0	0.0								
10	0.0	0.0	5.33341E-06	9.81497E-06	4.51495E-06	2.09994E-06	9.86773E-07	4.55680E-07	2.01496E-07	1.03964E-07
	0.0	0.0								

NUCLID = 46PD105 MAT NO = 4605
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.26123E+00	0.0	0.0	4.48020E-03	2.42924E+00	1.82750E+00	0.0	7.46494E-01	6.59210E-02	1.69804E-02	0.0
2	3.94906E+00	0.0	0.0	2.38823E-02	2.03522E+00	1.68996E+00	0.0	6.12332E-01	5.32392E-02	8.92878E-02	0.0
3	4.19268E+00	0.0	0.0	5.47178E-02	2.33550E+00	1.80246E+00	0.0	5.81841E-01	5.32127E-02	1.79938E-01	0.0
4	5.31827E+00	0.0	0.0	8.27773E-02	3.50702E+00	1.72848E+00	0.0	5.74979E-01	5.63362E-02	2.58407E-01	0.0
5	6.74833E+00	0.0	0.0	9.88065E-02	4.98354E+00	1.66598E+00	0.0	5.51718E-01	8.58954E-02	2.02345E-01	0.0
6	7.96279E+00	0.0	0.0	1.59125E-01	6.38994E+00	1.41372E+00	0.0	4.65215E-01	1.21286E-01	2.38821E-01	0.0
7	8.70174E+00	0.0	0.0	3.46235E-01	8.16090E+00	1.94601E-01	0.0	3.02643E-01	1.78287E-01	2.38821E-01	0.0
8	8.89903E+00	0.0	0.0	5.17852E-01	8.38117E+00	0.0	0.0	1.91500E-01	1.94116E-01	2.38821E-01	0.0
9	8.65993E+00	0.0	0.0	7.79887E-01	7.88004E+00	0.0	0.0	1.13296E-01	1.72701E-01	2.63825E-01	0.0
10	8.23462E+00	0.0	0.0	1.14826E+00	7.08636E+00	0.0	0.0	6.11687E-02	1.60191E-01	2.65782E-01	0.0
11	7.96607E+00	0.0	0.0	1.52287E+00	6.44320E+00	0.0	0.0	3.31391E-02	1.52712E-01	2.63739E-01	0.0
12	7.99934E+00	0.0	0.0	1.86380E+00	6.13553E+00	0.0	0.0	1.88638E-02	1.50654E-01	2.63825E-01	0.0
13	8.41730E+00	0.0	0.0	2.30505E+00	6.11225E+00	0.0	0.0	1.03622E-02	1.52333E-01	2.65782E-01	0.0
14	9.29585E+00	0.0	0.0	3.07605E+00	6.21981E+00	0.0	0.0	6.40970E-03	1.56972E-01	2.63739E-01	0.0
15	1.07827E+01	0.0	0.0	4.41748E+00	6.36523E+00	0.0	0.0	6.40970E-03	1.60590E-01	2.63825E-01	0.0
16	1.31132E+01	0.0	0.0	6.60642E+00	6.50673E+00	0.0	0.0	6.40970E-03	1.62742E-01	2.65782E-01	0.0
17	1.20350E+01	0.0	0.0	6.24390E+00	5.79113E+00	0.0	0.0	6.40970E-03	1.37955E-01	2.63739E-01	0.0
18	2.95758E+01	0.0	0.0	2.28488E+01	6.72698E+00	0.0	0.0	6.40970E-03	1.15968E-01	2.63825E-01	0.0
19	2.37620E+01	0.0	0.0	1.84614E+01	5.30066E+00	0.0	0.0	6.40970E-03	1.13003E-01	2.65782E-01	0.0
20	5.09581E+01	0.0	0.0	4.54465E+01	5.51160E+00	0.0	0.0	6.40970E-03	1.07662E-01	2.63739E-01	0.0
21	5.91952E+00	0.0	0.0	1.35336E+00	4.56616E+00	0.0	0.0	6.40970E-03	1.16383E-01	2.63825E-01	0.0
22	6.08389E+00	0.0	0.0	1.38739E+00	4.69650E+00	0.0	0.0	6.40970E-03	1.16852E-01	2.65782E-01	0.0
23	6.64623E+00	0.0	0.0	1.91764E+00	4.72859E+00	0.0	0.0	6.40970E-03	1.18220E-01	2.63739E-01	0.0
24	7.49530E+00	0.0	0.0	2.75453E+00	4.74076E+00	0.0	0.0	6.40970E-03	1.18374E-01	2.63825E-01	0.0
25	8.75800E+00	0.0	0.0	4.01199E+00	4.74600E+00	0.0	0.0	1.45621E-02	1.17587E-01	2.65782E-01	0.0

NUCLID = 46PD105 MAT NUMBER = 4605 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12								
1										
	2.29623E-03	4.22027E-02	1.93849E-01	5.04490E-01	5.05456E-01	3.72918E-01	1.44297E-01	4.49999E-02	1.31639E-02	3.02797E-03
	6.63151E-04	1.40584E-04								
2										
	2.72209E-02	1.44584E-01	4.08847E-01	5.36964E-01	4.73008E-01	2.03862E-01	6.72084E-02	2.02327E-02	4.72406E-03	1.04187E-03
	2.29030E-04	3.61314E-05								
3										
	1.31037E-01	4.14237E-01	4.36197E-01	4.72874E-01	2.32572E-01	8.21132E-02	2.56133E-02	6.09226E-03	1.35534E-03	2.99136E-04
	6.54865E-05	3.88581E-06								
4										
	3.51174E-01	6.78987E-01	3.82304E-01	2.05364E-01	7.73425E-02	2.53396E-02	6.18418E-03	1.39248E-03	3.09055E-04	6.78342E-05
	1.31878E-05	0.0								
5										
	2.75644E-01	9.29258E-01	3.24738E-01	9.03327E-02	3.56409E-02	8.03245E-03	1.77970E-03	3.73330E-04	8.60205E-05	6.72966E-05
	2.91278E-05	0.0								
6										
	1.55277E-01	6.56456E-01	4.57871E-01	1.12450E-01	2.39040E-02	5.48239E-03	1.68239E-03	4.69801E-04	1.03098E-04	2.42575E-05
	2.05470E-06	0.0								
7										
	0.0	1.12991E-02	1.14095E-01	5.84270E-02	7.17749E-03	2.25808E-03	6.08926E-04	3.19691E-04	1.40735E-04	6.68123E-05
	8.80041E-06	0.0								

NUCLID = 46PD107 MAT NO = 4607
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.26899E+00	0.0	0.0	2.78891E-03	2.41724E+00	1.84897E+00	0.0	7.44452E-01	6.46210E-02	1.69804E-02	0.0
2	3.97501E+00	0.0	0.0	1.83658E-02	2.03749E+00	1.91915E+00	0.0	6.15074E-01	5.19165E-02	8.92878E-02	0.0
3	4.24368E+00	0.0	0.0	5.01128E-02	2.37666E+00	1.81691E+00	0.0	5.91410E-01	5.19709E-02	1.79938E-01	0.0
4	5.39043E+00	0.0	0.0	7.96203E-02	3.56779E+00	1.74302E+00	0.0	5.83249E-01	5.51668E-02	2.58407E-01	0.0
5	6.77566E+00	0.0	0.0	8.75376E-02	4.97696E+00	1.71116E+00	0.0	5.59669E-01	8.09244E-02	2.02345E-01	0.0
6	7.86866E+00	0.0	0.0	1.26373E-01	6.17371E+00	1.36858E+00	0.0	4.63495E-01	1.12985E-01	2.38821E-01	0.0
7	8.48520E+00	0.0	0.0	3.27715E-01	7.80015E+00	3.57336E-01	0.0	3.19301E-01	1.62781E-01	2.38821E-01	0.0
8	8.62507E+00	0.0	0.0	5.09405E-01	8.04705E+00	6.86176E-02	0.0	2.04180E-01	1.82406E-01	2.38821E-01	0.0
9	8.42715E+00	0.0	0.0	7.75422E-01	7.65173E+00	0.0	0.0	1.21706E-01	1.63652E-01	2.63825E-01	0.0
10	8.04784E+00	0.0	0.0	1.13615E+00	6.91169E+00	0.0	0.0	6.64382E-02	1.53060E-01	2.65782E-01	0.0
11	7.82143E+00	0.0	0.0	1.50521E+00	6.31622E+00	0.0	0.0	3.60159E-02	1.46946E-01	2.63739E-01	0.0
12	7.89144E+00	0.0	0.0	1.84964E+00	6.04180E+00	0.0	0.0	2.02555E-02	1.45698E-01	2.63825E-01	0.0
13	8.34517E+00	0.0	0.0	2.30700E+00	6.03817E+00	0.0	0.0	1.13754E-02	1.47891E-01	2.65782E-01	0.0
14	9.26433E+00	0.0	0.0	3.10621E+00	6.15812E+00	0.0	0.0	6.28978E-03	1.52662E-01	2.63739E-01	0.0
15	1.08023E+01	0.0	0.0	4.48938E+00	6.31296E+00	0.0	0.0	6.28978E-03	1.56430E-01	2.63825E-01	0.0
16	1.32026E+01	0.0	0.0	6.73974E+00	6.46286E+00	0.0	0.0	6.28978E-03	1.58742E-01	2.65782E-01	0.0
17	1.68150E+01	0.0	0.0	1.02212E+01	6.59380E+00	0.0	0.0	6.28978E-03	1.62904E-01	2.63739E-01	0.0
18	2.21569E+01	0.0	0.0	1.54568E+01	6.70017E+00	0.0	0.0	6.28978E-03	1.65194E-01	2.63825E-01	0.0
19	3.00691E+01	0.0	0.0	2.32849E+01	6.78419E+00	0.0	0.0	6.28978E-03	1.65787E-01	2.65782E-01	0.0
20	4.17376E+01	0.0	0.0	3.48875E+01	6.85033E+00	0.0	0.0	6.28978E-03	1.68463E-01	2.63739E-01	0.0
21	5.28297E+01	0.0	0.0	4.61081E+01	6.72155E+00	0.0	0.0	6.28978E-03	1.24082E-01	2.63825E-01	0.0
22	5.96703E+00	0.0	0.0	9.00025E-01	5.06700E+00	0.0	0.0	6.28978E-03	1.23169E-01	2.65782E-01	0.0
23	6.38853E+00	0.0	0.0	1.32153E+00	5.06700E+00	0.0	0.0	6.28978E-03	1.24123E-01	2.63739E-01	0.0
24	7.00489E+00	0.0	0.0	1.93789E+00	5.06700E+00	0.0	0.0	6.28978E-03	1.24082E-01	2.63825E-01	0.0
25	7.91316E+00	0.0	0.0	2.84616E+00	5.06700E+00	0.0	0.0	1.42901E-02	1.23168E-01	2.65782E-01	0.0

NUCLID = 46PD107 MAT NUMBER = 4607 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12								
1										
	1.87962E-03	3.59535E-02	1.81300E-01	4.99073E-01	5.18789E-01	3.91652E-01	1.53716E-01	4.82882E-02	1.41790E-02	3.26785E-03
	7.16340E-04	1.51916E-04								
2										
	2.55044E-02	1.26401E-01	3.99605E-01	5.50877E-01	4.97434E-01	2.18211E-01	7.25984E-02	2.19566E-02	5.13968E-03	1.13484E-03
	2.49600E-04	3.93996E-05								
3										
	1.35732E-01	3.69530E-01	4.41099E-01	4.95851E-01	2.49227E-01	8.89954E-02	2.79238E-02	6.66227E-03	1.48428E-03	3.27812E-04
	7.17865E-05	4.26429E-06								
4										
	4.02506E-01	6.48426E-01	3.53314E-01	2.17568E-01	8.45045E-02	2.78933E-02	6.83408E-03	1.54164E-03	3.42451E-04	7.51940E-05
	1.46203E-05	0.0								
5										
	3.85513E-01	9.99677E-01	2.17107E-01	7.70504E-02	2.32646E-02	6.63535E-03	1.39170E-03	3.94689E-04	8.74492E-05	1.89808E-05
	2.12777E-06	0.0								
6										
	1.83564E-01	7.41608E-01	4.64523E-01	1.42865E-01	2.67914E-02	7.02114E-03	1.77423E-03	3.46202E-04	7.17882E-05	1.70451E-05
	6.72749E-07	0.0								
7										
	9.51077E-02	1.38719E-01	8.06115E-02	2.85653E-02	9.35077E-03	2.75316E-03	1.61438E-03	4.80448E-04	1.08438E-04	2.48303E-05
	8.00786E-07	0.0								
8										
	0.0	3.87143E-02	2.06331E-02	5.73135E-03	2.66820E-03	7.53087E-04	6.47868E-05	3.01565E-05	1.40950E-05	6.46582E-06
	2.26315E-06	0.0								

NUCLID = 47AG109 MAT NO = 4709
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.27503E+00	0.0	0.0	3.81775E-03	2.40196E+00	1.86925E+00	0.0	7.41714E-01	6.33970E-02	1.69804E-02	0.0
2	4.00302E+00	0.0	0.0	2.43807E-02	2.04113E+00	1.93750E+00	0.0	6.17865E-01	5.06982E-02	8.92878E-02	0.0
3	4.30142E+00	0.0	0.0	6.61895E-02	2.42608E+00	1.80916E+00	0.0	6.00300E-01	5.13159E-02	1.79938E-01	0.0
4	5.46050E+00	0.0	0.0	1.12613E-01	3.67948E+00	1.66841E+00	0.0	5.83380E-01	5.71339E-02	2.58407E-01	0.0
5	6.78695E+00	0.0	0.0	1.42139E-01	5.22229E+00	1.42252E+00	0.0	5.38730E-01	9.10282E-02	2.02345E-01	0.0
6	7.73478E+00	0.0	0.0	2.31289E-01	6.58391E+00	9.19588E-01	0.0	4.53068E-01	1.17368E-01	2.38821E-01	0.0
7	8.24531E+00	0.0	0.0	4.11515E-01	7.71159E+00	1.22203E-01	0.0	3.23105E-01	1.53409E-01	2.38821E-01	0.0
8	8.33609E+00	0.0	0.0	5.89826E-01	7.73531E+00	1.09562E-02	0.0	2.14909E-01	1.67983E-01	2.38821E-01	0.0
9	8.14356E+00	0.0	0.0	8.55472E-01	7.28800E+00	7.90679E-05	0.0	1.31456E-01	1.52113E-01	2.63825E-01	0.0
10	7.82579E+00	0.0	0.0	1.18813E+00	6.63766E+00	0.0	0.0	7.21913E-02	1.44642E-01	2.65782E-01	0.0
11	7.66051E+00	0.0	0.0	1.49915E+00	6.16137E+00	0.0	0.0	3.88044E-02	1.41718E-01	2.63739E-01	0.0
12	7.78956E+00	0.0	0.0	1.78975E+00	5.99981E+00	0.0	0.0	2.14088E-02	1.43028E-01	2.63825E-01	0.0
13	8.30689E+00	0.0	0.0	2.22151E+00	6.08539E+00	0.0	0.0	1.25431E-02	1.47169E-01	2.65782E-01	0.0
14	9.30223E+00	0.0	0.0	3.01690E+00	6.28534E+00	0.0	0.0	6.17433E-03	1.52113E-01	2.63739E-01	0.0
15	1.68043E+01	0.0	0.0	6.09467E+00	1.07096E+01	0.0	0.0	6.17433E-03	2.33071E-01	2.63825E-01	0.0
16	1.68325E+01	0.0	0.0	7.00662E+00	9.82591E+00	0.0	0.0	6.17433E-03	1.28363E-01	2.65782E-01	0.0
17	3.19923E+01	0.0	0.0	1.82065E+01	1.37858E+01	0.0	0.0	6.17433E-03	1.06735E-01	2.63739E-01	0.0
18	4.58067E+01	0.0	0.0	3.38805E+01	1.19262E+01	0.0	0.0	6.17433E-03	1.01377E-01	2.63825E-01	0.0
19	4.91199E+01	0.0	0.0	4.27517E+01	6.36822E+00	0.0	0.0	6.17433E-03	1.03319E-01	2.65782E-01	0.0
20	7.24798E+00	0.0	0.0	1.77311E+00	5.47487E+00	0.0	0.0	6.17433E-03	1.72604E-01	2.63739E-01	0.0
21	1.82984E+03	0.0	0.0	1.66156E+03	1.64286E+02	0.0	0.0	6.17433E-03	1.05227E+00	2.63825E-01	0.0
22	1.00188E+02	0.0	0.0	9.68141E+01	3.37432E+00	0.0	0.0	6.17433E-03	2.89364E-02	2.65782E-01	0.0
23	2.48588E+01	0.0	0.0	2.33976E+01	1.46134E+00	0.0	0.0	6.17433E-03	3.94787E-02	2.63739E-01	0.0
24	2.47619E+01	0.0	0.0	2.30150E+01	1.74694E+00	0.0	0.0	6.17433E-03	4.38053E-02	2.63825E-01	0.0
25	3.07721E+01	0.0	0.0	2.69053E+01	1.86679E+00	0.0	0.0	1.41673E-02	4.53353E-02	2.65782E-01	0.0

NUCLID = 47AG109 MAT NUMBER = 4709 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	1.32925E-03	3.51693E-02	1.81243E-01	5.03020E-01	5.25711E-01	3.98215E-01	1.56618E-01	4.92525E-02	1.44701E-02	3.33590E-03	7.31355E-04	1.55094E-04
2	1.76719E-02	1.21843E-01	4.03381E-01	5.59869E-01	5.07746E-01	2.23332E-01	7.44052E-02	2.25213E-02	5.27334E-03	1.16455E-03	2.56156E-04	4.04526E-05
3	9.46969E-02	3.65916E-01	4.51454E-01	5.10118E-01	2.57222E-01	9.20041E-02	2.88929E-02	6.89663E-03	1.53682E-03	3.39449E-04	7.43382E-05	4.41458E-06
4	2.68906E-01	5.72924E-01	4.86492E-01	2.17243E-01	8.56202E-02	2.82865E-02	6.93359E-03	1.56443E-03	3.47547E-04	7.63161E-05	1.48181E-05	0.0
5	2.57800E-01	6.57429E-01	2.96775E-01	1.53491E-01	4.47136E-02	9.54106E-03	2.15687E-03	4.77029E-04	1.05949E-04	2.52961E-05	2.30862E-06	0.0
6	1.62468E-01	4.21473E-01	2.31269E-01	8.22040E-02	1.73475E-02	3.76726E-03	8.27421E-04	1.81485E-04	4.00892E-05	9.49504E-06	7.85164E-07	0.0
7	5.23380E-02	2.42681E-02	3.05402E-02	1.17488E-02	2.57902E-03	5.68808E-04	1.25767E-04	2.68749E-05	6.33148E-06	1.05897E-06	0.0	0.0
8	1.21406E-03	6.94162E-03	2.22237E-03	5.56124E-04	1.71606E-05	3.78598E-06	8.21197E-07	1.78686E-07	3.89056E-08	5.21652E-09	0.0	0.0
9	0.0	0.0	7.11476E-06	3.86553E-05	1.80655E-05	8.31238E-06	3.86690E-06	1.79828E-06	8.69648E-07	3.85228E-07	0.0	0.0

NUCLID = 531 129 MAT NO = 5329
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.41427E+00	0.0	0.0	1.27946E-03	2.32892E+00	2.08408E+00	0.0	7.22693E-01	5.38889E-02	1.69804E-02	0.0
2	4.42072E+00	0.0	0.0	8.06428E-03	2.28956E+00	2.12310E+00	0.0	6.62945E-01	4.31462E-02	8.92878E-02	0.0
3	5.23025E+00	0.0	0.0	2.53316E-02	3.11481E+00	2.09012E+00	0.0	6.74537E-01	4.71180E-02	1.79938E-01	0.0
4	6.23123E+00	0.0	0.0	6.04863E-02	4.42614E+00	1.74462E+00	0.0	6.01432E-01	5.64301E-02	2.58407E-01	0.0
5	6.61579E+00	0.0	0.0	8.08277E-02	5.31318E+00	1.22178E+00	0.0	4.95993E-01	8.00819E-02	2.02345E-01	0.0
6	6.28748E+00	0.0	0.0	1.18398E-01	5.54134E+00	6.27742E-01	0.0	4.23151E-01	1.37909E-02	2.38821E-01	0.0
7	5.91779E+00	0.0	0.0	1.39594E-01	5.35216E+00	4.26034E-01	0.0	3.47127E-01	8.39413E-02	2.38821E-01	0.0
8	5.89911E+00	0.0	0.0	1.84886E-01	5.35892E+00	3.55311E-01	0.0	2.36152E-01	9.89629E-02	2.38821E-01	0.0
9	6.15073E+00	0.0	0.0	2.77989E-01	5.58232E+00	2.90419E-01	0.0	1.38124E-01	1.06638E-01	2.63825E-01	0.0
10	6.72335E+00	0.0	0.0	4.74018E-01	6.13774E+00	1.11590E-01	0.0	6.78012E-02	1.26335E-01	2.65782E-01	0.0
11	7.75445E+00	0.0	0.0	7.54531E-01	6.99992E+00	0.0	0.0	3.20585E-02	1.49657E-01	2.63739E-01	0.0
12	9.33763E+00	0.0	0.0	1.14620E+00	8.19144E+00	0.0	0.0	1.61551E-02	1.80324E-01	2.63825E-01	0.0
13	1.17607E+01	0.0	0.0	1.84646E+00	9.91423E+00	0.0	0.0	6.20000E-03	2.20463E-01	2.65782E-01	0.0
14	1.53787E+01	0.0	0.0	3.16868E+00	1.22100E+01	0.0	0.0	5.21273E-03	2.74738E-01	2.63739E-01	0.0
15	2.07238E+01	0.0	0.0	5.60485E+00	1.51190E+01	0.0	0.0	5.21273E-03	3.40098E-01	2.63825E-01	0.0
16	2.86368E+01	0.0	0.0	9.95176E+00	1.86851E+01	0.0	0.0	5.21273E-03	4.16151E-01	2.65782E-01	0.0
17	2.58537E+01	0.0	0.0	1.27192E+01	1.31345E+01	0.0	0.0	5.21273E-03	7.90741E-02	2.63739E-01	0.0
18	1.13316E+01	0.0	0.0	6.82454E+00	4.50708E+00	0.0	0.0	5.21273E-03	7.72496E-02	2.63825E-01	0.0
19	4.62572E+00	0.0	0.0	7.78704E-01	3.84702E+00	0.0	0.0	5.21273E-03	7.80841E-02	2.65782E-01	0.0
20	5.01903E+00	0.0	0.0	1.13740E+00	3.88163E+00	0.0	0.0	5.21273E-03	7.90254E-02	2.63739E-01	0.0
21	5.55778E+00	0.0	0.0	1.66577E+00	3.89201E+00	0.0	0.0	5.21273E-03	7.91265E-02	2.63825E-01	0.0
22	6.34162E+00	0.0	0.0	2.44544E+00	3.89618E+00	0.0	0.0	5.21273E-03	7.85978E-02	2.65782E-01	0.0
23	7.48807E+00	0.0	0.0	3.59007E+00	3.89800E+00	0.0	0.0	5.21273E-03	7.92321E-02	2.63739E-01	0.0
24	9.16313E+00	0.0	0.0	5.26431E+00	3.89882E+00	0.0	0.0	5.21273E-03	7.92174E-02	2.63825E-01	0.0
25	1.16302E+01	0.0	0.0	7.73127E+00	3.89920E+00	0.0	0.0	1.18652E-02	7.86388E-02	2.65782E-01	0.0

NUCLID = 531 129 MAT NUMBER = 5329 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	2.22942E-03	5.42523E-02	2.37055E-01	5.86699E-01	5.68741E-01	4.11078E-01	1.57054E-01	4.86604E-02	1.41871E-02	3.25764E-03	7.12869E-04	1.51073E-04
2	2.59630E-02	1.72031E-01	4.78875E-01	6.06698E-01	5.19183E-01	2.20288E-01	7.20393E-02	2.15966E-02	5.03157E-03	1.10856E-03	2.43575E-04	3.84426E-05
3	1.39672E-01	4.56828E-01	5.36814E-01	5.56401E-01	2.68525E-01	9.38777E-02	2.91337E-02	6.91114E-03	1.53559E-03	3.38723E-04	7.41328E-05	4.45039E-06
4	3.72956E-01	6.07176E-01	4.59918E-01	1.61529E-01	9.50482E-02	3.65731E-02	8.86690E-03	1.99388E-03	4.40530E-04	9.84400E-05	1.85083E-05	0.0
5	3.70927E-01	4.48825E-01	2.47349E-01	1.09777E-01	3.23804E-02	9.86022E-03	2.08338E-03	4.52843E-04	9.84447E-05	2.37447E-05	2.61332E-06	0.0
6	3.75033E-01	1.59708E-01	5.53622E-02	2.02397E-02	1.00779E-02	4.94043E-03	1.78710E-03	4.66431E-04	1.02227E-04	2.25887E-05	2.21358E-06	0.0
7	3.02272E-01	8.65737E-02	2.23350E-02	9.05174E-03	4.51614E-03	1.00404E-03	2.20317E-04	4.77649E-05	1.07159E-05	2.17439E-06	3.01739E-07	0.0
8	2.30903E-01	1.24408E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	1.19298E-01	1.50149E-01	2.09724E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	5.66151E-02	3.10861E-02	1.29264E-02	5.93481E-03	2.77236E-03	1.29135E-03	6.18325E-04	3.07357E-04	3.84434E-05	0.0	0.0

NUCLID = 54XE131 MAT NO = 5431
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.42528E+00	0.0	0.0	8.81250E-04	2.32789E+00	2.09650E+00	0.0	7.21639E-01	5.31845E-02	1.69804E-02	0.0
2	4.47167E+00	0.0	0.0	5.52870E-03	2.32584E+00	2.14030E+00	0.0	6.68182E-01	4.22958E-02	8.92878E-02	0.0
3	5.33398E+00	0.0	0.0	1.60516E-02	3.17053E+00	2.14740E+00	0.0	6.85541E-01	4.50809E-02	1.79938E-01	0.0
4	6.33372E+00	0.0	0.0	2.98404E-02	4.38646E+00	1.91742E+00	0.0	6.18331E-01	5.22958E-02	2.58407E-01	0.0
5	6.64232E+00	0.0	0.0	4.24734E-02	5.10770E+00	1.49215E+00	0.0	5.09365E-01	7.19075E-02	2.02345E-01	0.0
6	6.19415E+00	0.0	0.0	7.18077E-02	5.20024E+00	9.22103E-01	0.0	4.34342E-01	7.00720E-02	2.38821E-01	0.0
7	5.76300E+00	0.0	0.0	1.29686E-01	5.30459E+00	3.28719E-01	0.0	3.35317E-01	8.40962E-02	2.38821E-01	0.0
8	5.79383E+00	0.0	0.0	1.80325E-01	5.42256E+00	1.90945E-01	0.0	2.23781E-01	1.01258E-01	2.38821E-01	0.0
9	6.12899E+00	0.0	0.0	2.68780E-01	5.83778E+00	2.24298E-02	0.0	1.27171E-01	1.11533E-01	2.63825E-01	0.0
10	6.86805E+00	0.0	0.0	4.14176E-01	6.45388E+00	0.0	0.0	6.25050E-02	1.31046E-01	2.65782E-01	0.0
11	8.06499E+00	0.0	0.0	6.31257E-01	7.43373E+00	0.0	0.0	2.95995E-02	1.58845E-01	2.63739E-01	0.0
12	9.90900E+00	0.0	0.0	9.67597E-01	8.94140E+00	0.0	0.0	1.48648E-02	1.96533E-01	2.63825E-01	0.0
13	1.27044E+01	0.0	0.0	1.57748E+00	1.11270E+01	0.0	0.0	5.99138E-03	2.46951E-01	2.65782E-01	0.0
14	1.68573E+01	0.0	0.0	2.75020E+00	1.41071E+01	0.0	0.0	5.13314E-03	3.17019E-01	2.63739E-01	0.0
15	1.58956E+01	0.0	0.0	3.56718E+00	1.23284E+01	0.0	0.0	5.13314E-03	2.07050E-01	2.63825E-01	0.0
16	2.87095E+01	0.0	0.0	5.35311E+00	2.33564E+01	0.0	0.0	5.13314E-03	1.31200E-01	2.65782E-01	0.0
17	1.39376E+02	0.0	0.0	2.97538E+01	1.09622E+02	0.0	0.0	5.13314E-03	2.54283E-02	2.63739E-01	0.0
18	1.11654E+01	0.0	0.0	7.01027E+00	4.15509E+00	0.0	0.0	5.13314E-03	2.25973E-01	2.63825E-01	0.0
19	3.32754E+01	0.0	0.0	1.78163E+01	1.54591E+01	0.0	0.0	5.13314E-03	7.59669E-01	2.65782E-01	0.0
20	3.48192E+03	0.0	0.0	1.04961E+03	2.43231E+03	0.0	0.0	5.13314E-03	1.13635E+00	2.63739E-01	0.0
21	3.75529E+01	0.0	0.0	1.83680E+01	1.91849E+01	0.0	0.0	5.13314E-03	1.62052E-01	2.63825E-01	0.0
22	1.77166E+01	0.0	0.0	1.18725E+01	5.84405E+00	0.0	0.0	5.13314E-03	9.10210E-02	2.65782E-01	0.0
23	1.77797E+01	0.0	0.0	1.37377E+01	4.04193E+00	0.0	0.0	5.13314E-03	7.37443E-02	2.63739E-01	0.0
24	2.18438E+01	0.0	0.0	1.83503E+01	3.49351E+00	0.0	0.0	5.13314E-03	6.71690E-02	2.63825E-01	0.0
25	2.91517E+01	0.0	0.0	2.58735E+01	3.27817E+00	0.0	0.0	1.15699E-02	6.39497E-02	2.65782E-01	0.0

NUCLID = 54XE131 MAT NUMBER = 5431 IPL = 0

TABLE OF INELA*(N,2N) MATRICES

PAGE 1 OF 1

GROUP EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	2.39493E-03	5.33806E-02	2.38991E-01	5.90802E-01	5.72275E-01	4.13432E-01	1.57906E-01	4.89168E-02	1.42607E-02	3.27441E-03	7.16525E-04	1.51863E-04
2	2.52482E-02	1.53683E-01	4.88119E-01	6.18159E-01	5.28846E-01	2.24349E-01	7.33603E-02	2.19916E-02	5.12345E-03	1.12879E-03	2.48019E-04	3.92052E-05
3	1.32044E-01	4.31985E-01	5.63437E-01	5.93148E-01	2.86228E-01	1.00061E-01	3.10515E-02	7.36597E-03	1.63663E-03	3.61010E-04	7.90105E-05	4.78876E-06
4	3.98791E-01	6.62178E-01	4.67650E-01	2.51451E-01	9.62369E-02	3.13098E-02	7.61323E-03	1.71131E-03	3.79514E-04	8.32684E-05	1.61690E-05	0.0
5	4.03963E-01	7.29815E-01	2.19665E-01	1.00921E-01	2.94891E-02	6.41403E-03	1.46759E-03	3.28152E-04	7.22759E-05	1.55116E-05	1.72826E-06	0.0
6	2.50697E-01	3.79610E-01	1.90523E-01	8.15322E-02	1.66591E-02	2.40642E-03	5.27297E-04	1.17449E-04	2.47232E-05	6.17200E-06	0.0	0.0
7	1.39434E-01	1.44896E-01	1.77604E-02	1.74119E-02	7.19523E-03	1.57997E-03	3.46187E-04	7.52975E-05	1.68085E-05	3.82939E-06	0.0	0.0
8	3.31551E-02	1.02875E-01	4.96041E-02	5.22080E-03	7.05877E-05	1.54481E-05	3.33631E-06	7.64726E-07	0.0	0.0	0.0	0.0
9	0.0	0.0	1.06630E-02	6.33855E-03	2.96604E-03	1.35565E-03	6.44180E-04	2.87166E-04	1.74619E-04	6.14521E-07	0.0	0.0

NUCLID = 55CS133 MAT NO = 5533
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.43694E+00	0.0	0.0	8.06633E-04	2.32816E+00	2.10797E+00	0.0	7.20507E-01	5.25847E-02	1.69804E-02	0.0
2	4.53099E+00	0.0	0.0	5.18032E-03	2.37247E+00	2.15334E+00	0.0	6.73670E-01	4.17396E-02	8.92878E-02	0.0
3	5.45108E+00	0.0	0.0	1.51458E-02	3.25055E+00	2.18539E+00	0.0	6.94781E-01	4.38301E-02	1.79938E-01	0.0
4	6.45213E+00	0.0	0.0	3.23752E-02	4.41162E+00	2.00814E+00	0.0	6.28384E-01	5.06254E-02	2.58407E-01	0.0
5	6.66170E+00	0.0	0.0	5.74436E-02	5.08241E+00	1.52184E+00	0.0	5.04436E-01	7.39692E-02	2.02345E-01	0.0
6	6.09663E+00	0.0	0.0	1.12177E-01	5.25094E+00	7.33513E-01	0.0	4.11083E-01	6.90912E-02	2.38821E-01	0.0
7	5.65803E+00	0.0	0.0	1.45744E-01	5.03294E+00	4.79345E-01	0.0	3.34641E-01	7.85772E-02	2.38821E-01	0.0
8	5.66719E+00	0.0	0.0	2.06198E-01	5.22451E+00	2.36484E-01	0.0	2.20335E-01	9.81764E-02	2.38821E-01	0.0
9	6.15374E+00	0.0	0.0	3.28847E-01	5.79743E+00	2.74608E-02	0.0	1.21981E-01	1.10912E-01	2.63825E-01	0.0
10	7.07604E+00	0.0	0.0	5.06773E-01	6.56927E+00	0.0	0.0	5.89623E-02	1.33336E-01	2.65782E-01	0.0
11	8.52683E+00	0.0	0.0	7.73777E-01	7.75305E+00	0.0	0.0	2.75924E-02	1.65153E-01	2.63739E-01	0.0
12	1.07243E+01	0.0	0.0	1.21014E+00	9.51413E+00	0.0	0.0	1.38714E-02	2.07556E-01	2.63825E-01	0.0
13	1.40210E+01	0.0	0.0	2.03023E+00	1.19908E+01	0.0	0.0	5.82591E-03	2.63230E-01	2.65782E-01	0.0
14	1.57818E+01	0.0	0.0	3.45281E+00	1.23290E+01	0.0	0.0	5.05598E-03	1.10537E-02	2.63739E-01	0.0
15	1.29542E+01	0.0	0.0	5.05554E+00	7.89870E+00	0.0	0.0	5.05598E-03	1.27117E-01	2.63825E-01	0.0
16	3.64282E+01	0.0	0.0	1.20768E+01	2.43514E+01	0.0	0.0	5.05598E-03	3.87741E-02	2.65782E-01	0.0
17	2.85729E+01	0.0	0.0	1.64740E+01	1.20989E+01	0.0	0.0	5.05598E-03	5.54105E-02	2.63739E-01	0.0
18	3.43105E+01	0.0	0.0	2.75545E+01	6.75598E+00	0.0	0.0	5.05598E-03	2.43149E-01	2.63825E-01	0.0
19	3.72922E+01	0.0	0.0	3.27335E+01	4.55869E+00	0.0	0.0	5.05598E-03	2.67475E-02	2.65782E-01	0.0
20	4.28888E+00	0.0	0.0	1.73016E+00	2.55872E+00	0.0	0.0	5.05598E-03	6.23105E-02	2.63739E-01	0.0
21	4.17896E+02	0.0	0.0	3.94007E+02	2.38891E+01	0.0	0.0	5.05598E-03	2.65112E-02	2.63825E-01	0.0
22	1.13087E+01	0.0	0.0	9.69202E+00	1.61663E+00	0.0	0.0	5.05598E-03	3.56494E-02	2.65782E-01	0.0
23	7.36468E+00	0.0	0.0	5.45974E+00	1.90494E+00	0.0	0.0	5.05598E-03	3.86403E-02	2.63739E-01	0.0
24	8.43527E+00	0.0	0.0	6.44721E+00	1.98805E+00	0.0	0.0	5.05598E-03	3.95831E-02	2.63825E-01	0.0
25	1.07631E+01	0.0	0.0	8.74309E+00	2.01999E+00	0.0	0.0	1.15382E-02	3.96865E-02	2.65782E-01	0.0

NUCLID = 55CS133 MAT NUMBER = 5533 IPL = 0

TABLE OF INELA*(N,2N) MATRICES

PAGE 1 OF 1

GROUP EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	2.20117E-03	5.53228E-02	2.42327E-01	5.95250E-01	5.74177E-01	4.13728E-01	1.57765E-01	4.88328E-02	1.42302E-02	3.26668E-03	7.14759E-04	1.51488E-04
2	2.48701E-02	1.63495E-01	4.91799E-01	6.19628E-01	5.28379E-01	2.23699E-01	7.30715E-02	2.18932E-02	5.09910E-03	1.12328E-03	2.46793E-04	3.90077E-05
3	1.20979E-01	4.77393E-01	5.66606E-01	5.94149E-01	2.86013E-01	9.98589E-02	3.09685E-02	7.34376E-03	1.63144E-03	3.59838E-04	7.87510E-05	4.77773E-06
4	3.61179E-01	7.04854E-01	5.47885E-01	2.55105E-01	9.74968E-02	3.16962E-02	7.70421E-03	1.73144E-03	3.83947E-04	8.42377E-05	1.63685E-05	0.0
5	3.68118E-01	5.92363E-01	3.46927E-01	1.47266E-01	4.86713E-02	1.45194E-02	3.16688E-03	6.53440E-04	1.22840E-04	3.02479E-05	1.82082E-06	0.0
6	3.75800E-01	2.52769E-01	4.61368E-02	3.47260E-02	1.17630E-02	7.33890E-03	3.19093E-03	1.41088E-03	3.07782E-04	6.96523E-05	6.65327E-07	0.0
7	1.81883E-01	2.38617E-01	4.96445E-02	7.30861E-03	9.35244E-04	7.47723E-04	1.63968E-04	3.55269E-05	7.83344E-06	1.78792E-06	0.0	0.0
8	3.25738E-02	1.15597E-01	7.31571E-02	1.36131E-02	1.20533E-03	2.65065E-04	5.74838E-05	1.25115E-05	2.77193E-06	2.82745E-07	0.0	0.0
9	0.0	0.0	1.23996E-02	8.11340E-03	3.78518E-03	1.74932E-03	8.24863E-04	3.73947E-04	1.99114E-04	1.54235E-05	0.0	0.0

NUCLID = 55CS135 MAT NO = 5535
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.44218E+00	0.0	0.0	6.13222E-04	2.32714E+00	2.11442E+00	0.0	7.19072E-01	5.20607E-02	1.69804E-02	0.0
2	4.57680E+00	0.0	0.0	2.72218E-03	2.41396E+00	2.16011E+00	0.0	6.76401E-01	4.17056E-02	8.92878E-02	0.0
3	5.54085E+00	0.0	0.0	7.08011E-03	3.34228E+00	2.19149E+00	0.0	6.95763E-01	4.48431E-02	1.79938E-01	0.0
4	6.54467E+00	0.0	0.0	2.27156E-02	4.69131E+00	1.83064E+00	0.0	6.01121E-01	6.18111E-02	2.58407E-01	0.0
5	6.68433E+00	0.0	0.0	5.05557E-02	5.64729E+00	9.86480E-01	0.0	4.48543E-01	8.65045E-02	2.02345E-01	0.0
6	6.03191E+00	0.0	0.0	6.72985E-02	5.56048E+00	4.04138E-01	0.0	3.73028E-01	7.58186E-02	2.38821E-01	0.0
7	5.53374E+00	0.0	0.0	8.66192E-02	5.34396E+00	1.03158E-01	0.0	3.00659E-01	8.66294E-02	2.38821E-01	0.0
8	5.65502E+00	0.0	0.0	1.20489E-01	5.53453E+00	0.0	0.0	1.98571E-01	1.03124E-01	2.38821E-01	0.0
9	6.19584E+00	0.0	0.0	1.71149E-01	6.02469E+00	0.0	0.0	1.12562E-01	1.15528E-01	2.63825E-01	0.0
10	7.27339E+00	0.0	0.0	2.68872E-01	7.00452E+00	0.0	0.0	5.35314E-02	1.42687E-01	2.65782E-01	0.0
11	8.94636E+00	0.0	0.0	4.27425E-01	8.51893E+00	0.0	0.0	2.47491E-02	1.81647E-01	2.63739E-01	0.0
12	1.14556E+01	0.0	0.0	6.77572E-01	1.07780E+01	0.0	0.0	1.13700E-02	2.36623E-01	2.63825E-01	0.0
13	1.52041E+01	0.0	0.0	1.12957E+00	1.40745E+01	0.0	0.0	4.98107E-03	3.09996E-01	2.65782E-01	0.0
14	2.07318E+01	0.0	0.0	2.01990E+00	1.87119E+01	0.0	0.0	4.98107E-03	4.17269E-01	2.63739E-01	0.0
15	2.88470E+01	0.0	0.0	3.77238E+00	2.50746E+01	0.0	0.0	4.98107E-03	5.60003E-01	2.63825E-01	0.0
16	4.08230E+01	0.0	0.0	7.14606E+00	3.36769E+01	0.0	0.0	4.98107E-03	7.46335E-01	2.65782E-01	0.0
17	5.84123E+01	0.0	0.0	1.34293E+01	4.49830E+01	0.0	0.0	4.98107E-03	9.99513E-01	2.63739E-01	0.0
18	8.40856E+01	0.0	0.0	2.47597E+01	5.93259E+01	0.0	0.0	4.98107E-03	1.30880E+00	2.63825E-01	0.0
19	6.51181E+01	0.0	0.0	2.23212E+01	4.27969E+01	0.0	0.0	4.98107E-03	6.54978E-02	2.65782E-01	0.0
20	3.76153E+00	0.0	0.0	3.63526E-01	3.39800E+00	0.0	0.0	4.98107E-03	6.60054E-02	2.63739E-01	0.0
21	3.93108E+00	0.0	0.0	5.33075E-01	3.39800E+00	0.0	0.0	4.98107E-03	6.59838E-02	2.63825E-01	0.0
22	4.18093E+00	0.0	0.0	7.82929E-01	3.39800E+00	0.0	0.0	4.98107E-03	6.54978E-02	2.65782E-01	0.0
23	4.54761E+00	0.0	0.0	1.14961E+00	3.39800E+00	0.0	0.0	4.98107E-03	6.60063E-02	2.63739E-01	0.0
24	5.08378E+00	0.0	0.0	1.68578E+00	3.39800E+00	0.0	0.0	4.98107E-03	6.59849E-02	2.63825E-01	0.0
25	5.87391E+00	0.0	0.0	2.47591E+00	3.39800E+00	0.0	0.0	1.13423E-02	6.54988E-02	2.65782E-01	0.0

NUCLID = 55CS135 MAT NUMBER = 5535 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	2.58846E-03	7.80807E-02	2.93812E-01	6.24931E-01	5.48317E-01	3.72574E-01	1.37007E-01	4.16272E-02	1.20151E-02	2.74451E-03	5.99113E-04	1.26855E-04
2	1.81701E-02	1.76926E-01	5.55725E-01	6.24581E-01	4.95515E-01	2.00605E-01	6.40347E-02	1.89588E-02	4.38835E-03	9.63908E-04	2.11495E-04	3.34788E-05
3	5.92003E-02	3.82912E-01	6.70657E-01	6.44890E-01	2.94200E-01	9.98899E-02	3.05332E-02	7.18605E-03	1.59076E-03	3.50293E-04	7.66039E-05	4.87012E-06
4	2.21080E-01	5.23706E-01	4.80092E-01	3.98564E-01	1.46046E-0	4.66827E-02	1.12468E-02	2.51711E-03	5.57096E-04	1.22117E-04	2.40700E-05	0.0
5	2.41391E-01	4.99974E-01	1.53173E-01	4.11130E-02	1.49615E-02	2.10097E-02	1.17898E-02	2.41177E-03	5.29793E-04	1.13822E-04	1.31900E-05	0.0
6	9.37459E-02	1.98409E-01	8.25439E-02	1.46768E-02	3.40747E-03	6.04222E-03	4.15405E-03	9.13679E-04	1.99170E-04	4.53344E-05	7.83581E-07	0.0
7	0.0	3.99306E-02	4.15128E-02	1.17280E-02	5.40215E-03	2.49956E-03	1.16228E-03	5.55429E-04	2.42793E-04	1.24889E-04	0.0	0.0

NUCLID = 55CS137 MAT NO = 5537
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.45305E+00	0.0	0.0	2.05900E-04	2.33202E+00	2.12082E+00	0.0	7.17719E-01	5.18954E-02	1.69804E-02	0.0
2	4.62003E+00	0.0	0.0	7.25250E-04	2.49645E+00	2.12285E+00	0.0	6.68538E-01	4.63154E-02	8.92878E-02	0.0
3	5.61635E+00	0.0	0.0	2.76512E-03	3.72701E+00	1.88658E+00	0.0	6.41825E-01	6.85899E-02	1.79938E-01	0.0
4	6.59010E+00	0.0	0.0	8.98570E-03	5.59794E+00	9.83178E-01	0.0	5.13337E-01	7.71322E-02	2.58407E-01	0.0
5	6.72417E+00	0.0	0.0	7.34012E-03	6.18801E+00	5.28820E-01	0.0	4.05066E-01	9.68997E-02	2.02345E-01	0.0
6	5.98153E+00	0.0	0.0	6.08742E-03	5.81480E+00	1.60642E-01	0.0	3.42259E-01	8.17493E-02	2.38821E-01	0.0
7	5.49144E+00	0.0	0.0	6.56305E-03	5.48487E+00	0.0	0.0	2.78719E-01	8.77820E-02	2.38821E-01	0.0
8	5.64694E+00	0.0	0.0	8.78096E-03	5.63816E+00	0.0	0.0	1.85947E-01	1.05932E-01	2.38821E-01	0.0
9	6.30613E+00	0.0	0.0	1.34424E-02	6.29269E+00	0.0	0.0	1.03419E-01	1.21619E-01	2.63825E-01	0.0
10	7.57687E+00	0.0	0.0	2.17243E-02	7.55514E+00	0.0	0.0	4.81882E-02	1.54626E-01	2.65782E-01	0.0
11	9.52105E+00	0.0	0.0	3.66484E-02	9.48440E+00	0.0	0.0	2.20538E-02	2.02436E-01	2.63739E-01	0.0
12	1.24108E+01	0.0	0.0	6.45614E-02	1.23463E+01	0.0	0.0	1.03119E-02	2.70538E-01	2.63825E-01	0.0
13	1.67139E+01	0.0	0.0	1.11841E-01	1.66020E+01	0.0	0.0	4.90835E-03	3.65726E-01	2.65782E-01	0.0
14	2.30440E+01	0.0	0.0	1.88110E-01	2.28558E+01	0.0	0.0	4.90835E-03	5.11608E-01	2.63739E-01	0.0
15	2.49510E+01	0.0	0.0	2.34556E-01	2.47164E+01	0.0	0.0	4.90835E-03	6.13320E-02	2.63825E-01	0.0
16	3.20599E+00	0.0	0.0	9.90133E-04	3.20500E+00	0.0	0.0	4.90835E-03	6.08804E-02	2.65782E-01	0.0
17	3.20645E+00	0.0	0.0	1.45383E-03	3.20500E+00	0.0	0.0	4.90835E-03	6.13521E-02	2.63739E-01	0.0
18	3.20713E+00	0.0	0.0	2.13188E-03	3.20500E+00	0.0	0.0	4.90835E-03	6.13320E-02	2.63825E-01	0.0
19	3.20813E+00	0.0	0.0	3.13106E-03	3.20500E+00	0.0	0.0	4.90835E-03	6.08804E-02	2.65782E-01	0.0
20	3.20960E+00	0.0	0.0	4.59740E-03	3.20500E+00	0.0	0.0	4.90835E-03	6.13521E-02	2.63739E-01	0.0
21	3.21174E+00	0.0	0.0	6.74155E-03	3.20500E+00	0.0	0.0	4.90835E-03	6.13320E-02	2.63825E-01	0.0
22	3.21490E+00	0.0	0.0	9.90123E-03	3.20500E+00	0.0	0.0	4.90835E-03	6.08804E-02	2.65782E-01	0.0
23	3.21954E+00	0.0	0.0	1.45382E-02	3.20500E+00	0.0	0.0	4.90835E-03	6.13511E-02	2.63739E-01	0.0
24	3.22632E+00	0.0	0.0	2.13186E-02	3.20500E+00	0.0	0.0	4.90835E-03	6.13311E-02	2.63825E-01	0.0
25	3.23631E+00	0.0	0.0	3.13103E-02	3.20500E+00	0.0	0.0	1.11776E-02	6.08793E-02	2.65782E-01	0.0

NUCLID = 55CS137 MAT NUMBER = 5537 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	2.34502E-03	7.17040E-02	2.94333E-01	6.28167E-01	5.52390E-01	3.75859E-01	1.38333E-01	4.20483E-02	1.21394E-02	2.77322E-03	6.05414E-04	1.28198E-04
2	1.74403E-02	1.39424E-01	5.39163E-01	6.31658E-01	5.01905E-01	2.03387E-01	6.49548E-02	1.92361E-02	4.45314E-03	9.78199E-04	2.14636E-04	3.39552E-05
3	1.10651E-01	3.61858E-01	3.68146E-01	5.41970E-01	3.41657E-01	1.16058E-01	3.55167E-02	8.36401E-03	1.85205E-03	4.07884E-04	8.92036E-05	6.10962E-06
4	2.59127E-01	4.73968E-01	1.61346E-01	2.69039E-02	3.14413E-02	2.14884E-02	5.05899E-03	2.56015E-03	1.01123E-03	2.24490E-04	4.78784E-05	0.0
5	8.20807E-02	2.85433E-01	1.12999E-01	2.61004E-02	1.47926E-02	5.12015E-03	1.71965E-03	4.49458E-04	9.78560E-05	2.35082E-05	3.68344E-06	0.0
6	0.0	7.74843E-02	4.89092E-02	2.44730E-02	5.88657E-03	2.10654E-03	9.81138E-04	4.58430E-04	2.10565E-04	9.68280E-05	3.49607E-05	0.0

NUCLID = 58CE144 MAT NO = 5844
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.50123E+00	0.0	0.0	7.31443E-04	2.34605E+00	2.15445E+00	0.0	7.18077E-01	4.96287E-02	1.69804E-02	0.0
2	4.82471E+00	0.0	0.0	3.96087E-03	2.64346E+00	2.17729E+00	0.0	6.90372E-01	4.21778E-02	8.92878E-02	0.0
3	5.93548E+00	0.0	0.0	1.01754E-02	3.77967E+00	2.14564E+00	0.0	6.96870E-01	4.88021E-02	1.79938E-01	0.0
4	6.95038E+00	0.0	0.0	1.53159E-02	5.09414E+00	1.84092E+00	0.0	5.96160E-01	5.95763E-02	2.58407E-01	0.0
5	6.90509E+00	0.0	0.0	1.58335E-02	5.61223E+00	1.27702E+00	0.0	4.29882E-01	8.36386E-02	2.02345E-01	0.0
6	5.96227E+00	0.0	0.0	2.04991E-02	5.34611E+00	5.95661E-01	0.0	3.14814E-01	8.14895E-02	2.38821E-01	0.0
7	5.45220E+00	0.0	0.0	3.57784E-02	5.41642E+00	0.0	0.0	2.29724E-01	8.88893E-02	2.38821E-01	0.0
8	5.91960E+00	0.0	0.0	4.16489E-02	5.87795E+00	0.0	0.0	1.47886E-01	1.12823E-01	2.38821E-01	0.0
9	7.16385E+00	0.0	0.0	5.16495E-02	7.11220E+00	0.0	0.0	7.82309E-02	1.39019E-01	2.63825E-01	0.0
10	9.36143E+00	0.0	0.0	6.46351E-02	9.29680E+00	0.0	0.0	3.51224E-02	1.89316E-01	2.65782E-01	0.0
11	1.26242E+01	0.0	0.0	8.97169E-02	1.25345E+01	0.0	0.0	1.61302E-02	2.62947E-01	2.63739E-01	0.0
12	1.73933E+01	0.0	0.0	1.31606E-01	1.72617E+01	0.0	0.0	5.62237E-03	3.67867E-01	2.63825E-01	0.0
13	2.44164E+01	0.0	0.0	1.95380E-01	2.42210E+01	0.0	0.0	4.66974E-03	5.16275E-01	2.65782E-01	0.0
14	3.47133E+01	0.0	0.0	3.10511E-01	3.44028E+01	0.0	0.0	4.66974E-03	7.41397E-01	2.63739E-01	0.0
15	4.44869E+01	0.0	0.0	4.83199E-01	4.40037E+01	0.0	0.0	4.66974E-03	4.84215E-02	2.63825E-01	0.0
16	2.66800E+00	0.0	0.0	9.00025E-03	2.65900E+00	0.0	0.0	4.66974E-03	4.80650E-02	2.65782E-01	0.0
17	2.67222E+00	0.0	0.0	1.32153E-02	2.65900E+00	0.0	0.0	4.66974E-03	4.84374E-02	2.63739E-01	0.0
18	2.67838E+00	0.0	0.0	1.93788E-02	2.65900E+00	0.0	0.0	4.66974E-03	4.84216E-02	2.63825E-01	0.0
19	2.68746E+00	0.0	0.0	2.84615E-02	2.65900E+00	0.0	0.0	4.66974E-03	4.80650E-02	2.65782E-01	0.0
20	2.70079E+00	0.0	0.0	4.17909E-02	2.65900E+00	0.0	0.0	4.66974E-03	4.84374E-02	2.63739E-01	0.0
21	2.72028E+00	0.0	0.0	6.12817E-02	2.65900E+00	0.0	0.0	4.66974E-03	4.84216E-02	2.63825E-01	0.0
22	2.74900E+00	0.0	0.0	9.00041E-02	2.65900E+00	0.0	0.0	4.66974E-03	4.80650E-02	2.65782E-01	0.0
23	2.79116E+00	0.0	0.0	1.32156E-01	2.65900E+00	0.0	0.0	4.66974E-03	4.84374E-02	2.63739E-01	0.0
24	2.85279E+00	0.0	0.0	1.93792E-01	2.65900E+00	0.0	0.0	4.66974E-03	4.84216E-02	2.63825E-01	0.0
25	2.94362E+00	0.0	0.0	2.84620E-01	2.65900E+00	0.0	0.0	1.06388E-02	4.80649E-02	2.65782E-01	0.0

NUCLID = 58CE144 MAT NUMBER = 5844 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I J= EXIT GROUP ** KK ** KK = I + J - 1

	1	2	3	4	5	6	7	8	9	10
	11	12								
1										
	1.89751E-03	4.44154E-02	2.18670E-01	5.87648E-01	6.01296E-01	4.49485E-01	1.75341E-01	5.49092E-02	1.60971E-02	3.70680E-03
	8.12244E-04	1.72264E-04								
2										
	2.45660E-02	1.47416E-01	4.63516E-01	6.26865E-01	5.59179E-01	2.43446E-01	8.06774E-02	2.43529E-02	5.69407E-03	1.25663E-03
	2.76323E-04	4.36307E-05								
3										
	1.36370E-01	4.59081E-01	5.28239E-01	5.84913E-01	2.91250E-01	1.03494E-01	3.23906E-02	7.71777E-03	1.71836E-03	3.79402E-04
	8.30729E-05	4.93795E-06								
4										
	4.27874E-01	7.27642E-01	3.62534E-01	2.07193E-01	8.07827E-02	2.65379E-02	6.48575E-03	1.46135E-03	3.24439E-04	7.12210E-05
	1.37154E-05	0.0								
5										
	3.20303E-01	8.45417E-01	5.67795E-02	3.60229E-02	1.18873E-02	5.11737E-03	1.16704E-03	2.59325E-04	5.75273E-05	1.25239E-05
	0.0	0.0								
6										
	3.97621E-04	3.41798E-01	1.66230E-01	4.73511E-02	2.16169E-02	9.93028E-03	4.65203E-03	2.13472E-03	9.18987E-04	6.31294E-04
	0.0	0.0								

NUCLID = 60ND143 MAT NO = 6043
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.49269E+00	0.0	0.0	2.02380E-04	2.34119E+00	2.15129E+00	0.0	7.17897E-01	4.97717E-02	1.69804E-02	0.0
2	4.79883E+00	0.0	0.0	2.38344E-03	2.61656E+00	2.17989E+00	0.0	6.90372E-01	4.19274E-02	8.92878E-02	0.0
3	5.89029E+00	0.0	0.0	3.54042E-02	3.82492E+00	2.02996E+00	0.0	6.82408E-01	6.19548E-02	1.79938E-01	0.0
4	6.88028E+00	0.0	0.0	1.21377E-01	5.75773E+00	1.00117E+00	0.0	5.25592E-01	8.10114E-02	2.58407E-01	0.0
5	6.86936E+00	0.0	0.0	1.13877E-01	6.56281E+00	1.92678E-01	0.0	3.69376E-01	1.03314E-01	2.02345E-01	0.0
6	5.94592E+00	0.0	0.0	8.97950E-02	5.85293E+00	3.19621E-03	0.0	2.92933E-01	8.05544E-02	2.38821E-01	0.0
7	5.42787E+00	0.0	0.0	9.38884E-02	5.33398E+00	0.0	0.0	2.38370E-01	8.69114E-02	2.38821E-01	0.0
8	5.84970E+00	0.0	0.0	1.17776E-01	5.73193E+00	0.0	0.0	1.54409E-01	1.09547E-01	2.38821E-01	0.0
9	7.01379E+00	0.0	0.0	1.59648E-01	6.85414E+00	0.0	0.0	8.22220E-02	1.33714E-01	2.63825E-01	0.0
10	9.08751E+00	0.0	0.0	2.38685E-01	8.84882E+00	0.0	0.0	3.70766E-02	1.80221E-01	2.65782E-01	0.0
11	1.21746E+01	0.0	0.0	3.75018E-01	1.17996E+01	0.0	0.0	1.69887E-02	2.47949E-01	2.63739E-01	0.0
12	1.66913E+01	0.0	0.0	6.09249E-01	1.60820E+01	0.0	0.0	6.87297E-03	3.26060E-01	2.63825E-01	0.0
13	1.96232E+01	0.0	0.0	9.69920E-01	1.86533E+01	0.0	0.0	4.70239E-03	4.18689E-01	2.65782E-01	0.0
14	3.72834E+01	0.0	0.0	2.23962E+00	3.50438E+01	0.0	0.0	4.70239E-03	3.94512E-02	2.63739E-01	0.0
15	2.11399E+01	0.0	0.0	3.09725E+00	1.80426E+01	0.0	0.0	4.70239E-03	3.87531E-01	2.63825E-01	0.0
16	1.31096E+02	0.0	0.0	9.73849E+00	1.21357E+02	0.0	0.0	4.70239E-03	1.95595E-01	2.65782E-01	0.0
17	3.66010E+02	0.0	0.0	3.32309E+01	3.32779E+02	0.0	0.0	4.70239E-03	2.39741E-02	2.63739E-01	0.0
18	3.74083E+01	0.0	0.0	2.51026E+01	1.23057E+01	0.0	0.0	4.70239E-03	1.22698E-02	2.63825E-01	0.0
19	1.93363E+00	0.0	0.0	9.71058E-01	9.62569E-01	0.0	0.0	4.70239E-03	2.94157E-02	2.65782E-01	0.0
20	5.12324E+00	0.0	0.0	2.12233E+00	3.00091E+00	0.0	0.0	4.70239E-03	8.68461E-02	2.63739E-01	0.0
21	1.31734E+01	0.0	0.0	5.66575E+00	7.50762E+00	0.0	0.0	4.70239E-03	1.93497E-01	2.63825E-01	0.0
22	2.83469E+01	0.0	0.0	1.40368E+01	1.43102E+01	0.0	0.0	4.70239E-03	3.25868E-01	2.65782E-01	0.0
23	5.04859E+01	0.0	0.0	2.92022E+01	2.12837E+01	0.0	0.0	4.70239E-03	4.43947E-01	2.63739E-01	0.0
24	7.86675E+01	0.0	0.0	5.21772E+01	2.64903E+01	0.0	0.0	4.70239E-03	5.19729E-01	2.63825E-01	0.0
25	1.14546E+02	0.0	0.0	8.49096E+01	2.96364E+01	0.0	0.0	1.09173E-02	5.57996E-01	2.65782E-01	0.0

NUCLID = 60ND143 MAT NUMBER = 6043 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I J= EXIT GROUP ** KK ** KK = I + J - 1

	1	2	3	4	5	6	7	8	9	10
	11	12								
1										
	1.77231E-04	2.56479E-02	1.81089E-01	5.54744E-01	6.18469E-01	4.87817E-01	1.96721E-01	6.26639E-02	1.85325E-02	4.28720E-03
	9.41434E-04	1.99883E-04								
2										
	1.26292E-03	6.80357E-02	3.99967E-01	6.59881E-01	6.29683E-01	2.85839E-01	9.67964E-02	2.95470E-02	6.94892E-03	1.53775E-03
	3.38566E-04	5.37302E-05								
3										
	1.55827E-02	2.30363E-01	4.63653E-01	5.06165E-01	4.74767E-01	2.39855E-01	7.60762E-02	1.82918E-02	4.09000E-03	9.04819E-04
	1.98298E-04	1.52902E-05								
4										
	4.87781E-02	3.33600E-01	3.66296E-01	1.69753E-01	5.94387E-02	1.66167E-02	4.08303E-03	1.86558E-03	5.83643E-04	1.35445E-04
	2.21445E-05	0.0								
5										
	0.0	7.52321E-02	5.04937E-02	3.60362E-02	2.26734E-02	4.95914E-03	2.03886E-03	8.90680E-04	2.78404E-04	6.31392E-05
	1.27122E-05	0.0								
6										
	0.0	0.0	0.0	3.51555E-04	1.54413E-03	7.10289E-04	3.30458E-04	1.53592E-04	7.17565E-05	3.44273E-05
	0.0	0.0								

NUCLID = 60ND144 MAT NO = 6044
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.50141E+00	0.0	0.0	2.02077E-04	2.34520E+00	2.15601E+00	0.0	7.18367E-01	4.94819E-02	1.69804E-02	0.0
2	4.82365E+00	0.0	0.0	2.31048E-03	2.63923E+00	2.18212E+00	0.0	6.91459E-01	4.19972E-02	8.92878E-02	0.0
3	5.92375E+00	0.0	0.0	1.64276E-02	3.79492E+00	2.11240E+00	0.0	6.94082E-01	5.14466E-02	1.79938E-01	0.0
4	6.90930E+00	0.0	0.0	3.65831E-02	5.29423E+00	1.57848E+00	0.0	5.73885E-01	6.75834E-02	2.58407E-01	0.0
5	6.90184E+00	0.0	0.0	4.28038E-02	5.97007E+00	8.88966E-01	0.0	4.04365E-01	9.28079E-02	2.02345E-01	0.0
6	5.96119E+00	0.0	0.0	4.99564E-02	5.85777E+00	5.34687E-02	0.0	2.87692E-01	8.17678E-02	2.38821E-01	0.0
7	5.45220E+00	0.0	0.0	4.46726E-02	5.40752E+00	0.0	0.0	2.30096E-01	8.87086E-02	2.38821E-01	0.0
8	5.91961E+00	0.0	0.0	5.09204E-02	5.86869E+00	0.0	0.0	1.48114E-01	1.12631E-01	2.38821E-01	0.0
9	7.16382E+00	0.0	0.0	6.14463E-02	7.10238E+00	0.0	0.0	7.83337E-02	1.38831E-01	2.63825E-01	0.0
10	9.36140E+00	0.0	0.0	7.63440E-02	9.28505E+00	0.0	0.0	3.51616E-02	1.89070E-01	2.65782E-01	0.0
11	1.26242E+01	0.0	0.0	1.05992E-01	1.25182E+01	0.0	0.0	1.61457E-02	2.62599E-01	2.63739E-01	0.0
12	2.03347E+01	0.0	0.0	1.56580E-01	2.01781E+01	0.0	0.0	5.40492E-03	1.48103E-02	2.63825E-01	0.0
13	1.34788E+01	0.0	0.0	1.66391E-01	1.33144E+01	0.0	0.0	4.66974E-03	2.59372E-01	2.65782E-01	0.0
14	1.33556E+02	0.0	0.0	6.72017E-01	1.32884E+02	0.0	0.0	4.66974E-03	1.64121E-02	2.63739E-01	0.0
15	1.42221E+01	0.0	0.0	1.04447E+00	1.31776E+01	0.0	0.0	4.66974E-03	9.35285E-01	2.63825E-01	0.0
16	6.01786E+02	0.0	0.0	2.99660E+00	5.98789E+02	0.0	0.0	4.66974E-03	2.99911E-01	2.65782E-01	0.0
17	8.06670E+00	0.0	0.0	9.82586E-02	7.96844E+00	0.0	0.0	4.66974E-03	8.11141E-02	2.63739E-01	0.0
18	3.48573E+00	0.0	0.0	8.91844E-02	3.39654E+00	0.0	0.0	4.66974E-03	5.01510E-02	2.63825E-01	0.0
19	2.55600E+00	0.0	0.0	1.12766E-01	2.44324E+00	0.0	0.0	4.66974E-03	4.03242E-02	2.65782E-01	0.0
20	2.27002E+00	0.0	0.0	1.56080E-01	2.11394E+00	0.0	0.0	4.66974E-03	3.69619E-02	2.63739E-01	0.0
21	2.20240E+00	0.0	0.0	2.23014E-01	1.97939E+00	0.0	0.0	4.66974E-03	3.53695E-02	2.63825E-01	0.0
22	2.24370E+00	0.0	0.0	3.23754E-01	1.91995E+00	0.0	0.0	4.66974E-03	3.44018E-02	2.65782E-01	0.0
23	2.36591E+00	0.0	0.0	4.72841E-01	1.89307E+00	0.0	0.0	4.66974E-03	3.43459E-02	2.63739E-01	0.0
24	2.57263E+00	0.0	0.0	6.91840E-01	1.88079E+00	0.0	0.0	4.66974E-03	3.41860E-02	2.63825E-01	0.0
25	2.89003E+00	0.0	0.0	1.01493E+00	1.87510E+00	0.0	0.0	1.06336E-02	3.38653E-02	2.65782E-01	0.0

NUCLID = 60ND144 MAT NUMBER = 6044 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	2.61482E-04	2.51092E-02	1.70667E-01	5.44186E-01	6.22807E-01	4.99392E-01	2.03452E-01	6.51484E-02	1.93194E-02	4.47553E-03	9.83436E-04	2.08852E-04
2	5.15938E-03	1.21390E-01	3.95946E-01	6.30602E-01	6.13197E-01	2.81639E-01	9.59564E-02	2.93831E-02	6.92177E-03	1.53292E-03	3.37624E-04	5.33077E-05
3	6.12368E-02	4.68042E-01	5.22747E-01	4.51881E-01	3.14292E-01	2.08939E-01	6.51037E-02	1.56889E-02	3.51170E-03	7.77262E-04	1.70382E-04	1.33339E-05
4	1.86216E-01	6.45055E-01	4.37612E-01	1.78854E-01	8.68321E-02	3.45419E-02	7.34854E-03	1.58304E-03	3.47383E-04	7.72731E-05	1.41393E-05	0.0
5	0.0	4.59868E-01	2.80127E-01	1.38938E-01	7.17602E-03	2.23930E-03	4.82468E-04	1.05393E-04	2.33917E-05	4.91199E-06	6.69691E-07	0.0
6	0.0	0.0	9.21900E-05	2.80238E-02	1.37243E-02	6.32827E-03	2.92978E-03	1.36380E-03	6.42830E-04	3.63778E-04	0.0	0.0

NUCLID = 60ND145 MAT NO = 6045
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.50854E+00	0.0	0.0	1.08334E-04	2.34739E+00	2.16104E+00	0.0	7.18344E-01	4.91974E-02	1.69804E-02	0.0
2	4.85749E+00	0.0	0.0	1.15437E-03	2.65295E+00	2.20339E+00	0.0	6.97277E-01	4.00529E-02	8.92878E-02	0.0
3	5.98333E+00	0.0	0.0	5.71443E-03	3.70107E+00	2.27654E+00	0.0	7.21107E-01	4.11475E-02	1.79938E-01	0.0
4	6.97781E+00	0.0	0.0	3.57554E-02	4.68364E+00	2.05842E+00	0.0	6.26149E-01	5.84552E-02	2.58407E-01	0.0
5	6.89819E+00	0.0	0.0	9.03942E-02	5.61320E+00	1.19460E+00	0.0	4.27707E-01	8.33906E-02	2.02345E-01	0.0
6	5.97113E+00	0.0	0.0	8.32303E-02	5.11905E+00	7.68843E-01	0.0	3.19967E-01	6.89004E-02	2.38821E-01	0.0
7	5.47194E+00	0.0	0.0	9.24608E-02	4.84213E+00	5.37355E-01	0.0	2.47828E-01	7.91121E-02	2.38821E-01	0.0
8	5.99511E+00	0.0	0.0	1.24129E-01	5.45461E+00	4.16372E-01	0.0	1.54384E-01	1.05488E-01	2.38821E-01	0.0
9	7.34368E+00	0.0	0.0	1.91316E-01	7.03808E+00	1.14284E-01	0.0	7.70548E-02	1.39712E-01	2.63825E-01	0.0
10	9.72107E+00	0.0	0.0	2.94204E-01	9.42687E+00	0.0	0.0	3.40342E-02	1.91306E-01	2.65782E-01	0.0
11	1.32294E+01	0.0	0.0	4.60186E-01	1.27692E+01	0.0	0.0	1.56912E-02	2.66423E-01	2.63739E-01	0.0
12	1.83521E+01	0.0	0.0	7.59098E-01	1.75930E+01	0.0	0.0	5.55815E-03	3.71782E-01	2.63825E-01	0.0
13	2.87806E+01	0.0	0.0	1.39470E+00	2.73859E+01	0.0	0.0	4.63755E-03	3.81317E-01	2.65782E-01	0.0
14	3.19970E+01	0.0	0.0	3.09151E+00	2.89055E+01	0.0	0.0	4.63755E-03	2.69606E+00	2.63739E-01	0.0
15	5.85233E+01	0.0	0.0	6.51121E+00	5.20121E+01	0.0	0.0	4.63755E-03	1.67097E+00	2.63825E-01	0.0
16	3.99487E+01	0.0	0.0	1.07572E+01	2.91914E+01	0.0	0.0	4.63755E-03	1.29486E-02	2.65782E-01	0.0
17	7.60605E+01	0.0	0.0	2.97733E+01	4.62872E+01	0.0	0.0	4.63755E-03	5.00826E+00	2.63739E-01	0.0
18	1.51273E+01	0.0	0.0	7.20290E+00	7.92442E+00	0.0	0.0	4.63755E-03	9.57896E-01	2.63825E-01	0.0
19	4.59985E+02	0.0	0.0	6.68670E+01	3.93118E+02	0.0	0.0	4.63755E-03	1.88800E-02	2.65782E-01	0.0
20	2.43803E+00	0.0	0.0	1.81804E+00	6.19990E-01	0.0	0.0	4.63755E-03	8.06021E-03	2.63739E-01	0.0
21	4.39129E+00	0.0	0.0	3.98282E+00	4.08463E-01	0.0	0.0	4.63755E-03	9.49371E-03	2.63825E-01	0.0
22	2.04197E+02	0.0	0.0	1.98332E+02	5.61565E+00	0.0	0.0	4.63755E-03	9.08234E-03	2.65782E-01	0.0
23	6.86830E+00	0.0	0.0	6.39969E+00	4.68609E-01	0.0	0.0	4.63755E-03	8.13293E-03	2.63739E-01	0.0
24	8.92125E+00	0.0	0.0	8.47898E+00	4.42270E-01	0.0	0.0	4.63755E-03	7.90917E-03	2.63825E-01	0.0
25	1.25549E+01	0.0	0.0	1.21201E+01	4.34782E-01	0.0	0.0	1.05412E-02	7.77232E-03	2.65782E-01	0.0

NUCLID = 60ND145 MAT NUMBER = 6045 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	6.61984E-04	3.57146E-02	2.02696E-01	5.76273E-01	6.11829E-01	4.68028E-01	1.85198E-01	5.84220E-02	1.71916E-02	3.96663E-03	8.69976E-04	1.84597E-04
2	6.15523E-03	9.67848E-02	4.60285E-01	6.51913E-01	5.98886E-01	2.65528E-01	8.86281E-02	2.69441E-02	6.31594E-03	1.39552E-03	3.07034E-04	4.86701E-05
3	3.42221E-02	2.09096E-01	6.65515E-01	7.72464E-01	3.94608E-01	1.42105E-01	4.47837E-02	1.07093E-02	2.38847E-03	5.27772E-04	1.15602E-04	7.47802E-06
4	3.04608E-01	2.67357E-01	6.70761E-01	3.71810E-01	3.08034E-01	1.03187E-01	2.53316E-02	5.72327E-03	1.26805E-03	2.81900E-04	5.47798E-05	0.0
5	6.83560E-01	2.35566E-01	1.40066E-01	8.64859E-02	3.83173E-02	8.18636E-03	1.88933E-03	4.13900E-04	9.20068E-05	2.10258E-05	2.21547E-06	0.0
6	5.93899E-01	1.64706E-01	0.0	8.85788E-05	7.81025E-03	1.82830E-03	3.99428E-04	8.81240E-05	1.91860E-05	4.18736E-06	0.0	0.0
7	3.15534E-01	2.21822E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9.97488E-02	2.21030E-01	9.55935E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	2.85919E-02	5.54442E-02	2.40854E-02	3.83145E-03	1.39450E-03	5.45311E-04	2.30700E-04	1.02960E-04	5.78034E-05	8.07860E-08	0.0

NUCLID = 61PM147 MAT NO = 6147
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.64933E+00	0.0	0.0	1.11622E-03	2.42960E+00	2.21861E+00	0.0	7.33384E-01	4.80296E-02	1.69804E-02	0.0
2	5.01320E+00	0.0	0.0	8.80919E-03	2.75335E+00	2.25098E+00	0.0	7.06307E-01	4.01239E-02	8.92878E-02	0.0
3	6.10070E+00	0.0	0.0	3.18391E-02	3.78766E+00	2.28120E+00	0.0	7.22366E-01	4.09082E-02	1.79938E-01	0.0
4	7.05274E+00	0.0	0.0	8.19320E-02	4.68348E+00	2.28733E+00	0.0	6.64037E-01	4.33278E-02	2.58407E-01	0.0
5	7.03244E+00	0.0	0.0	2.01048E-01	5.05135E+00	1.78003E+00	0.0	4.89305E-01	7.28648E-02	2.02345E-01	0.0
6	6.19391E+00	0.0	0.0	3.27383E-01	5.09289E+00	7.73635E-01	0.0	3.32965E-01	7.12840E-02	2.38821E-01	0.0
7	5.87741E+00	0.0	0.0	3.72711E-01	5.10024E+00	4.04455E-01	0.0	2.45524E-01	8.28494E-02	2.38821E-01	0.0
8	6.58083E+00	0.0	0.0	4.48342E-01	5.83594E+00	2.96556E-01	0.0	1.53773E-01	1.12261E-01	2.38821E-01	0.0
9	8.17796E+00	0.0	0.0	6.22607E-01	7.54220E+00	1.31519E-02	0.0	7.81706E-02	1.45531E-01	2.63825E-01	0.0
10	1.08605E+01	0.0	0.0	9.22829E-01	9.93766E+00	0.0	0.0	3.54041E-02	1.97723E-01	2.65782E-01	0.0
11	1.47591E+01	0.0	0.0	1.51391E+00	1.32452E+01	0.0	0.0	1.64669E-02	2.69396E-01	2.63739E-01	0.0
12	2.03960E+01	0.0	0.0	2.68456E+00	1.77114E+01	0.0	0.0	6.73289E-03	3.62851E-01	2.63825E-01	0.0
13	2.86505E+01	0.0	0.0	4.96616E+00	2.36844E+01	0.0	0.0	4.57445E-03	4.81294E-01	2.65782E-01	0.0
14	4.07229E+01	0.0	0.0	9.24394E+00	3.14789E+01	0.0	0.0	4.57445E-03	6.41358E-01	2.63739E-01	0.0
15	5.83465E+01	0.0	0.0	1.69951E+01	4.13515E+01	0.0	0.0	4.57445E-03	8.36743E-01	2.63825E-01	0.0
16	7.92436E+01	0.0	0.0	2.67897E+01	5.24539E+01	0.0	0.0	4.57445E-03	1.88222E-01	2.65782E-01	0.0
17	1.18245E+02	0.0	0.0	4.08013E+01	7.74442E+01	0.0	0.0	4.57445E-03	1.60065E-01	2.63739E-01	0.0
18	9.72784E+01	0.0	0.0	6.56768E+01	3.16017E+01	0.0	0.0	4.57445E-03	9.12444E-02	2.63825E-01	0.0
19	1.08208E+02	0.0	0.0	8.32106E+01	2.49976E+01	0.0	0.0	4.57445E-03	4.05571E-02	2.65782E-01	0.0
20	4.95748E+01	0.0	0.0	4.41147E+01	5.46006E+00	0.0	0.0	4.57445E-03	1.36211E-01	2.63739E-01	0.0
21	3.40171E+03	0.0	0.0	2.45714E+03	9.49566E+02	0.0	0.0	4.57445E-03	2.43484E+00	2.63825E-01	0.0
22	8.94064E+01	0.0	0.0	6.97995E+01	1.96070E+01	0.0	0.0	4.57445E-03	6.78831E-02	2.65782E-01	0.0
23	2.77714E+01	0.0	0.0	2.52949E+01	2.47659E+00	0.0	0.0	4.57445E-03	3.22183E-02	2.63739E-01	0.0
24	3.32646E+01	0.0	0.0	3.16808E+01	1.58326E+00	0.0	0.0	4.57445E-03	2.59446E-02	2.63825E-01	0.0
25	4.91325E+01	0.0	0.0	4.77281E+01	1.40441E+00	0.0	0.0	1.02976E-02	2.43320E-02	2.65782E-01	0.0

NUCLID = 61PM147 MAT NUMBER = 6147 IPL = 0

TABLE OF INELA*(N,2N) MATRICES

PAGE 1 OF 1

GROUP I J= EXIT 1 11 GROUP ** KK ** 2 12 KK = I + J - 1 3 4 5 6 7 8 9 10

1
6.94132E-04 2.99948E-02 1.84748E-01 5.69264E-01 6.37093E-01 5.03718E-01 2.03437E-01 6.48531E-02 1.91876E-02 4.43965E-03
9.75005E-04 2.06991E-04

2
7.55771E-03 9.44940E-02 4.36846E-01 6.59111E-01 6.30539E-01 2.86680E-01 9.71609E-02 2.96709E-02 6.97961E-03 1.54470E-03
3.40114E-04 5.36730E-05

3
4.00111E-02 3.00188E-01 6.10946E-01 3.39456E-01 3.89117E-01 1.42318E-01 4.52144E-02 1.08580E-02 2.42643E-03 5.36650E-04
1.17596E-04 7.36370E-06

4
1.58808E-01 5.50221E-01 7.86693E-01 4.97338E-01 2.02383E-01 6.79908E-02 1.68129E-02 3.80915E-03 8.47841E-04 1.86340E-04
3.67881E-05 0.0

5
3.00136E-01 6.42793E-01 4.25694E-01 2.84774E-01 9.48778E-02 2.44808E-02 5.65846E-03 1.27118E-03 2.80593E-04 6.02815E-05
9.14153E-06 0.0

6
3.09990E-01 2.43795E-01 1.05210E-01 6.27196E-02 2.60853E-02 9.48669E-03 1.02269E-02 4.80748E-03 1.03958E-03 2.33751E-04
4.05930E-05 0.0

7
1.93392E-01 2.11066E-01 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0

8
1.96088E-02 1.53467E-01 7.92959E-02 3.83010E-02 5.86286E-03 0.0 0.0 0.0 0.0 0.0
0.0 0.0

9
0.0 0.0 0.0 5.71548E-03 4.03731E-03 1.85737E-03 8.60515E-04 4.06683E-04 1.77795E-04 9.67437E-05
0.0 0.0

NUCLID = 62SM147 MAT NO = 6247
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.63066E+00	0.0	0.0	5.04162E-04	2.41246E+00	2.21770E+00	0.0	7.31540E-01	4.79085E-02	1.69804E-02	0.0
2	5.07202E+00	0.0	0.0	5.51105E-03	2.81970E+00	2.24681E+00	0.0	7.12610E-01	4.04481E-02	8.92878E-02	0.0
3	6.18002E+00	0.0	0.0	2.70743E-02	3.87861E+00	2.27433E+00	0.0	7.24431E-01	4.17721E-02	1.79938E-01	0.0
4	7.07155E+00	0.0	0.0	1.06066E-01	4.79326E+00	2.17223E+00	0.0	6.50328E-01	4.86786E-02	2.58407E-01	0.0
5	6.94609E+00	0.0	0.0	2.90186E-01	5.31851E+00	1.33740E+00	0.0	4.50670E-01	7.87325E-02	2.02345E-01	0.0
6	6.20656E+00	0.0	0.0	3.71167E-01	5.13706E+00	6.96353E-01	0.0	3.05191E-01	7.24177E-02	2.38821E-01	0.0
7	5.95056E+00	0.0	0.0	4.00304E-01	5.12020E+00	4.30054E-01	0.0	2.22749E-01	8.70828E-02	2.38821E-01	0.0
8	6.78051E+00	0.0	0.0	4.99815E-01	6.16353E+00	1.20163E-01	0.0	1.34873E-01	1.24188E-01	2.38821E-01	0.0
9	8.75149E+00	0.0	0.0	6.62153E-01	8.08933E+00	0.0	0.0	6.67643E-02	1.58781E-01	2.63825E-01	0.0
10	1.18825E+01	0.0	0.0	9.89456E-01	1.08930E+01	0.0	0.0	3.12485E-02	2.19222E-01	2.65782E-01	0.0
11	1.64194E+01	0.0	0.0	1.65954E+00	1.47596E+01	0.0	0.0	1.47963E-02	3.02341E-01	2.63739E-01	0.0
12	2.29625E+01	0.0	0.0	2.99560E+00	1.99669E+01	0.0	0.0	5.44702E-03	4.10884E-01	2.63825E-01	0.0
13	3.25310E+01	0.0	0.0	5.59566E+00	2.69344E+01	0.0	0.0	4.57445E-03	5.49247E-01	2.65782E-01	0.0
14	4.65160E+01	0.0	0.0	1.04716E+01	3.60444E+01	0.0	0.0	4.57445E-03	7.36411E-01	2.63739E-01	0.0
15	6.64465E+01	0.0	0.0	1.89012E+01	4.75454E+01	0.0	0.0	4.57445E-03	8.06285E-02	2.63825E-01	0.0
16	8.14906E+01	0.0	0.0	2.65087E+01	5.29821E+01	0.0	0.0	4.57445E-03	5.89605E-02	2.65782E-01	0.0
17	1.72220E+02	0.0	0.0	5.52458E+01	1.16975E+02	0.0	0.0	4.57445E-03	3.78540E+00	2.63739E-01	0.0
18	1.56068E+02	0.0	0.0	7.46659E+01	8.14025E+01	0.0	0.0	4.57445E-03	3.65156E-02	2.63825E-01	0.0
19	2.98876E+02	0.0	0.0	1.83714E+02	1.15162E+02	0.0	0.0	4.57445E-03	1.26380E-01	2.65782E-01	0.0
20	6.35829E+02	0.0	0.0	3.35317E+02	3.00512E+02	0.0	0.0	4.57445E-03	2.31725E-02	2.63739E-01	0.0
21	3.48148E+00	0.0	0.0	2.73855E+00	7.22929E-01	0.0	0.0	4.57445E-03	1.13947E-02	2.63825E-01	0.0
22	2.63407E+02	0.0	0.0	2.58116E+02	5.29052E+00	0.0	0.0	4.57445E-03	2.13676E-03	2.65782E-01	0.0
23	6.02367E+00	0.0	0.0	5.90504E+00	1.18629E-01	0.0	0.0	4.57445E-03	2.12762E-03	2.63739E-01	0.0
24	7.39106E+00	0.0	0.0	7.27109E+00	1.19964E-01	0.0	0.0	4.57445E-03	2.15503E-03	2.63825E-01	0.0
25	1.29772E+01	0.0	0.0	1.28552E+01	1.22015E-01	0.0	0.0	1.04825E-02	2.18287E-03	2.65782E-01	0.0

NUCLID = 62SM147 MAT NUMBER = 6247 IPL = 0

TABLE OF INELA*(N,2N) MATRICES

PAGE 1 OF 1

GROUP I J= EXIT 1 11 GROUP ** KK ** 2 12 KK = I + J - 1 3 4 5 6 7 8 9 10

1
5.27331E-04 3.09536E-02 1.88508E-01 5.72964E-01 6.35526E-01 4.99669E-01 2.01103E-01 6.39945E-02 1.89162E-02 4.37476E-03
9.60537E-04 2.03892E-04

2
5.91920E-03 9.84244E-02 4.41240E-01 6.58566E-01 6.25654E-01 2.83235E-01 9.57794E-02 2.92152E-02 6.86828E-03 1.51963E-03
3.34550E-04 5.29600E-05

3
3.20437E-02 2.92576E-01 6.21675E-01 7.40335E-01 3.87619E-01 1.41396E-01 4.48598E-02 1.07651E-02 2.40486E-03 5.31797E-04
1.16524E-04 7.33207E-06

4
1.77157E-01 4.45227E-01 6.91524E-01 5.67565E-01 2.01598E-01 6.76072E-02 1.67024E-02 3.78248E-03 8.41734E-04 1.84980E-04
3.65323E-05 0.0

5
4.83439E-01 3.92899E-01 2.07880E-01 1.44645E-01 4.78391E-02 3.55375E-02 1.91925E-02 4.67959E-03 1.03276E-03 2.26644E-04
2.69974E-05 0.0

6
4.03475E-01 2.68570E-01 6.25385E-04 1.71302E-02 6.69834E-03 1.44730E-03 3.17451E-04 6.98970E-05 1.49512E-05 3.66204E-06
0.0 0.0

7
1.22991E-01 2.32969E-01 6.70530E-02 4.65057E-03 1.52219E-03 5.69703E-04 2.33450E-04 6.40951E-05 0.0 0.0
0.0 0.0

8
0.0 6.01877E-02 4.19309E-02 8.72462E-03 4.07823E-03 1.91127E-03 1.44058E-03 1.35552E-03 3.98773E-04 1.35237E-04
0.0 0.0

NUCLID = 62SM149 MAT NO = 6249

INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.66239E+00	0.0	0.0	4.56083E-03	2.43550E+00	2.22231E+00	0.0	7.33814E-01	4.74152E-02	1.69804E-02	0.0
2	5.07093E+00	0.0	0.0	3.75250E-02	2.81159E+00	2.22181E+00	0.0	7.10886E-01	4.00173E-02	8.92878E-02	0.0
3	6.17805E+00	0.0	0.0	1.21948E-01	3.87155E+00	2.18456E+00	0.0	7.23408E-01	4.12428E-02	1.79938E-01	0.0
4	7.10294E+00	0.0	0.0	2.52585E-01	4.72958E+00	2.12077E+00	0.0	6.63497E-01	4.21993E-02	2.58407E-01	0.0
5	7.05788E+00	0.0	0.0	4.01961E-01	4.62808E+00	1.82784E+00	0.0	5.05479E-01	6.28560E-02	2.02345E-01	0.0
6	6.23999E+00	0.0	0.0	5.37642E-01	4.60487E+00	1.09748E+00	0.0	3.50967E-01	6.17288E-02	2.38821E-01	0.0
7	5.91502E+00	0.0	0.0	6.35179E-01	4.72393E+00	5.55921E-01	0.0	2.49726E-01	7.83288E-02	2.38821E-01	0.0
8	6.81679E+00	0.0	0.0	7.73518E-01	5.59087E+00	4.52403E-01	0.0	1.52734E-01	1.06278E-01	2.38821E-01	0.0
9	8.63934E+00	0.0	0.0	1.01786E+00	7.09097E+00	5.30507E-01	0.0	7.99983E-02	1.35423E-01	2.63825E-01	0.0
10	1.16022E+01	0.0	0.0	1.63569E+00	9.52664E+00	4.39889E-01	0.0	3.58835E-02	1.92098E-01	2.65782E-01	0.0
11	1.60172E+01	0.0	0.0	2.97719E+00	1.30400E+01	0.0	0.0	1.63732E-02	2.59330E-01	2.63739E-01	0.0
12	2.23266E+01	0.0	0.0	5.31037E+00	1.70163E+01	0.0	0.0	6.72643E-03	3.38940E-01	2.63825E-01	0.0
13	3.15438E+01	0.0	0.0	9.58278E+00	2.19610E+01	0.0	0.0	4.51304E-03	4.31922E-01	2.65782E-01	0.0
14	4.50223E+01	0.0	0.0	1.71086E+01	2.79135E+01	0.0	0.0	4.51304E-03	5.48261E-01	2.63739E-01	0.0
15	6.46884E+01	0.0	0.0	2.99052E+01	3.47832E+01	0.0	0.0	4.51304E-03	6.75983E-01	2.63825E-01	0.0
16	9.36439E+01	0.0	0.0	5.12170E+01	4.24266E+01	0.0	0.0	4.51304E-03	8.10276E-01	2.65782E-01	0.0
17	1.46241E+02	0.0	0.0	7.50253E+01	7.12158E+01	0.0	0.0	4.51304E-03	5.72926E-01	2.63739E-01	0.0
18	4.88554E+02	0.0	0.0	2.50233E+02	2.38322E+02	0.0	0.0	4.51304E-03	3.86664E-01	2.63825E-01	0.0
19	4.07578E+02	0.0	0.0	2.66914E+02	1.40665E+02	0.0	0.0	4.51304E-03	3.30093E-02	2.65782E-01	0.0
20	1.33747E+02	0.0	0.0	1.22473E+02	1.12736E+01	0.0	0.0	4.51304E-03	1.57314E-01	2.63739E-01	0.0
21	6.25408E+02	0.0	0.0	5.75176E+02	5.02319E+01	0.0	0.0	4.51304E-03	7.60409E-02	2.63825E-01	0.0
22	2.52232E+01	0.0	0.0	2.11211E+01	4.10212E+00	0.0	0.0	4.51304E-03	1.04572E-01	2.65782E-01	0.0
23	1.75145E+02	0.0	0.0	1.62772E+02	1.23734E+01	0.0	0.0	4.51304E-03	6.07889E-01	2.63739E-01	0.0
24	3.01390E+03	0.0	0.0	2.97337E+03	4.05271E+01	0.0	0.0	4.51304E-03	2.59545E-01	2.63825E-01	0.0
25	2.22960E+03	0.0	0.0	2.19053E+03	3.90697E+01	0.0	0.0	1.71658E-02	1.51678E+00	2.65782E-01	0.0

NUCLID = 62SM149 MAT NUMBER = 6249 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	7.42784E-04	2.51821E-02	1.66146E-01	5.51978E-01	6.43866E-01	5.22504E-01	2.14454E-01	6.89341E-02	2.04823E-02	4.74980E-03	1.04420E-03	2.21758E-04
2	1.03476E-02	6.69513E-02	4.06655E-01	6.44620E-01	6.36583E-01	2.95192E-01	1.01074E-01	3.10299E-02	7.31950E-03	1.62202E-03	3.57352E-04	5.65326E-05
3	6.82099E-02	2.91643E-01	5.54501E-01	6.97186E-01	3.75657E-01	1.39109E-01	4.44808E-02	1.07180E-02	2.39893E-03	5.30955E-04	1.16388E-04	7.15023E-06
4	3.02146E-01	5.96472E-01	5.98090E-01	3.90856E-01	1.61200E-01	5.45384E-02	1.35363E-02	3.07215E-03	6.84350E-04	1.50464E-04	2.94623E-05	0.0
5	5.02621E-01	7.63678E-01	3.49039E-01	1.45198E-01	5.03600E-02	1.30539E-02	3.02379E-03	6.79963E-04	1.50166E-04	3.22680E-05	4.77329E-06	0.0
6	4.88978E-01	3.21479E-01	1.93999E-01	5.30751E-02	3.05333E-02	7.34087E-03	1.62137E-03	3.57420E-04	7.74065E-05	1.61026E-05	1.46639E-06	0.0
7	3.41430E-01	8.88675E-02	6.22630E-02	3.06531E-02	2.41549E-02	6.68686E-03	1.46383E-03	3.16062E-04	6.88054E-05	1.59203E-05	1.22661E-06	0.0
8	3.09850E-01	1.42553E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	2.42856E-01	2.87651E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	3.92347E-02	2.31552E-01	1.18194E-01	2.74778E-02	1.26527E-02	5.88321E-03	2.74549E-03	1.25194E-03	5.54968E-04	3.41985E-04	0.0	0.0

NUCLID = 62SM151 MAT NO = 6251

INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.69901E+00	0.0	0.0	4.67089E-03	2.45895E+00	2.23540E+00	0.0	7.35944E-01	4.69466E-02	1.69804E-02	0.0
2	5.08263E+00	0.0	0.0	3.57559E-02	2.81036E+00	2.23651E+00	0.0	7.10020E-01	3.95345E-02	8.92878E-02	0.0
3	6.18939E+00	0.0	0.0	1.31309E-01	3.88967E+00	2.18841E+00	0.0	7.23610E-01	4.06053E-02	1.79938E-01	0.0
4	7.13914E+00	0.0	0.0	2.52059E-01	4.72147E+00	2.16561E+00	0.0	6.69618E-01	3.95794E-02	2.58407E-01	0.0
5	7.11451E+00	0.0	0.0	2.91880E-01	4.62650E+00	2.19613E+00	0.0	5.35872E-01	5.29939E-02	2.02345E-01	0.0
6	6.31444E+00	0.0	0.0	3.14622E-01	4.06442E+00	1.93540E+00	0.0	4.06279E-01	4.77954E-02	2.38821E-01	0.0
7	5.98611E+00	0.0	0.0	3.96369E-01	3.95910E+00	1.63064E+00	0.0	3.04378E-01	5.95988E-02	2.38821E-01	0.0
8	6.69338E+00	0.0	0.0	5.68912E-01	4.71499E+00	1.38947E+00	0.0	1.84864E-01	8.84571E-02	2.38821E-01	0.0
9	8.58037E+00	0.0	0.0	1.02890E+00	6.50929E+00	1.01217E+00	0.0	8.85974E-02	1.25602E-01	2.63825E-01	0.0
10	1.15547E+01	0.0	0.0	1.79259E+00	8.79104E+00	9.71210E-01	0.0	3.91460E-02	1.68384E-01	2.65782E-01	0.0
11	1.58393E+01	0.0	0.0	3.11392E+00	1.14663E+01	1.25908E+00	0.0	1.62164E-02	2.24129E-01	2.63739E-01	0.0
12	2.19681E+01	0.0	0.0	5.83545E+00	1.50713E+01	1.06138E+00	0.0	7.87133E-03	3.00915E-01	2.63825E-01	0.0
13	3.08997E+01	0.0	0.0	1.11365E+01	1.97632E+01	0.0	0.0	4.45326E-03	3.81124E-01	2.65782E-01	0.0
14	4.42819E+01	0.0	0.0	1.98326E+01	2.46493E+01	0.0	0.0	4.45326E-03	4.72416E-01	2.63739E-01	0.0
15	6.35735E+01	0.0	0.0	3.38019E+01	2.99716E+01	0.0	0.0	4.45326E-03	5.68012E-01	2.63825E-01	0.0
16	9.19797E+01	0.0	0.0	5.63416E+01	3.56381E+01	0.0	0.0	4.45326E-03	6.63514E-01	2.65782E-01	0.0
17	1.33682E+02	0.0	0.0	9.23254E+01	4.13564E+01	0.0	0.0	4.45326E-03	7.66310E-01	2.63739E-01	0.0
18	1.94486E+02	0.0	0.0	1.47735E+02	4.67506E+01	0.0	0.0	4.45326E-03	8.55994E-01	2.63825E-01	0.0
19	2.83913E+02	0.0	0.0	2.32302E+02	5.16103E+01	0.0	0.0	4.45326E-03	9.29403E-01	2.65782E-01	0.0
20	7.37229E+02	0.0	0.0	6.52328E+02	8.49010E+01	0.0	0.0	4.45326E-03	2.99789E-01	2.63739E-01	0.0
21	5.61567E+02	0.0	0.0	5.37640E+02	2.39276E+01	0.0	0.0	4.45326E-03	1.19231E-01	2.63825E-01	0.0
22	4.70722E+02	0.0	0.0	4.62062E+02	8.65982E+00	0.0	0.0	4.45326E-03	2.94100E-01	2.65782E-01	0.0
23	2.25964E+03	0.0	0.0	2.23992E+03	1.97231E+01	0.0	0.0	4.45326E-03	1.18555E-01	2.63739E-01	0.0
24	8.53333E+02	0.0	0.0	8.49334E+02	3.99871E+00	0.0	0.0	4.45326E-03	8.76220E-02	2.63825E-01	0.0
25	1.11173E+03	0.0	0.0	1.10579E+03	5.93782E+00	0.0	0.0	1.09893E-02	1.17669E-01	2.65782E-01	0.0

NUCLID = 62SM151 MAT NUMBER = 6251 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10	11	12
1	9.31509E-04	2.30906E-02	1.61478E-01	5.46320E-01	6.49943E-01	5.34021E-01	2.20871E-01	7.12761E-02	2.12220E-02	4.92657E-03	1.06360E-03	2.30175E-04
2	1.80607E-02	8.00625E-02	3.97554E-01	6.45190E-01	6.46882E-01	3.02804E-01	1.04188E-01	3.20670E-02	7.57413E-03	1.67949E-03	3.70118E-04	5.85362E-05
3	1.27018E-01	2.68740E-01	5.35726E-01	6.85709E-01	3.73592E-01	1.39151E-01	4.46294E-02	1.07708E-02	2.41255E-03	5.34153E-04	1.17108E-04	7.11589E-06
4	6.28487E-01	4.78473E-01	5.11814E-01	3.41591E-01	1.41715E-01	4.80948E-02	1.19565E-02	2.71567E-03	6.05155E-04	1.33074E-04	2.59256E-05	0.0
5	1.18934E+00	6.70705E-01	1.94849E-01	9.45942E-02	3.48794E-02	9.05738E-03	2.09982E-03	4.72367E-04	1.04340E-04	2.24228E-05	2.49959E-06	0.0
6	1.12056E+00	6.46345E-01	1.14484E-01	4.18984E-02	7.72469E-03	1.85144E-03	4.23002E-04	9.41098E-05	2.02926E-05	2.26515E-06	0.0	0.0
7	7.41684E-01	6.75139E-01	1.56190E-01	4.94029E-02	6.26638E-03	1.38849E-03	3.06774E-04	1.23962E-04	1.13171E-04	2.45406E-05	2.59911E-06	0.0
8	5.45549E-01	5.60659E-01	2.40827E-01	3.23155E-02	7.98128E-03	1.67953E-03	3.63729E-04	7.72418E-05	1.72156E-05	3.60176E-06	0.0	0.0
9	5.52755E-01	2.20379E-01	1.37452E-01	6.89540E-02	2.53984E-02	5.65667E-03	1.23160E-03	2.70316E-04	5.82841E-05	1.51147E-05	1.19953E-06	0.0
10	6.81251E-01	2.89960E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	5.80264E-01	6.78812E-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	8.90865E-02	5.31815E-01	2.65259E-01	9.41341E-02	4.39629E-02	2.02596E-02	9.48254E-03	4.32311E-03	1.89736E-03	1.16204E-03	0.0	0.0

NUCLID = 63EU153 MAT NO = 6353
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.71708E+00	0.0	0.0	2.76647E-03	2.46525E+00	2.24906E+00	0.0	7.36376E-01	4.63549E-02	1.69804E-02	0.0
2	5.14647E+00	0.0	0.0	2.57200E-02	2.86735E+00	2.25340E+00	0.0	7.14780E-01	3.93034E-02	8.92878E-02	0.0
3	6.26687E+00	0.0	0.0	1.22803E-01	3.94316E+00	2.20090E+00	0.0	7.25699E-01	4.05694E-02	1.79938E-01	0.0
4	7.17925E+00	0.0	0.0	3.17836E-01	4.77470E+00	2.08672E+00	0.0	6.66884E-01	4.03593E-02	2.58407E-01	0.0
5	7.13298E+00	0.0	0.0	4.49103E-01	4.70896E+00	1.97492E+00	0.0	5.20427E-01	5.59621E-02	2.02345E-01	0.0
6	6.35658E+00	0.0	0.0	4.76374E-01	4.20709E+00	1.67312E+00	0.0	3.75916E-01	5.18790E-02	2.38821E-01	0.0
7	6.08788E+00	0.0	0.0	5.35135E-01	4.21416E+00	1.33858E+00	0.0	2.71003E-01	6.71701E-02	2.38821E-01	0.0
8	6.85403E+00	0.0	0.0	8.64128E-01	5.35403E+00	6.35874E-01	0.0	1.56844E-01	1.05200E-01	2.38821E-01	0.0
9	9.07197E+00	0.0	0.0	1.56131E+00	7.45168E+00	5.89763E-02	0.0	7.56822E-02	1.39645E-01	2.63825E-01	0.0
10	1.23746E+01	0.0	0.0	2.51662E+00	9.85796E+00	0.0	0.0	3.47370E-02	1.86975E-01	2.65782E-01	0.0
11	1.71286E+01	0.0	0.0	4.32566E+00	1.28029E+01	0.0	0.0	1.65756E-02	2.45680E-01	2.63739E-01	0.0
12	2.39606E+01	0.0	0.0	7.61750E+00	1.63431E+01	0.0	0.0	6.72617E-03	3.13274E-01	2.63825E-01	0.0
13	3.24787E+01	0.0	0.0	1.19668E+01	2.05119E+01	0.0	0.0	4.39504E-03	3.87289E-01	2.65782E-01	0.0
14	4.44745E+01	0.0	0.0	1.92342E+01	2.52403E+01	0.0	0.0	4.39504E-03	4.75067E-01	2.63739E-01	0.0
15	6.15878E+01	0.0	0.0	3.12374E+01	3.03504E+01	0.0	0.0	4.39504E-03	5.64550E-01	2.63825E-01	0.0
16	7.89321E+01	0.0	0.0	4.32757E+01	3.56564E+01	0.0	0.0	4.39504E-03	6.51383E-01	2.65782E-01	0.0
17	9.01555E+01	0.0	0.0	4.92826E+01	4.08729E+01	0.0	0.0	4.39504E-03	7.43222E-01	2.63739E-01	0.0
18	1.57319E+02	0.0	0.0	1.29674E+02	2.76448E+01	0.0	0.0	4.39504E-03	1.24967E-01	2.63825E-01	0.0
19	1.17872E+02	0.0	0.0	1.05128E+02	1.27447E+01	0.0	0.0	4.39504E-03	1.90385E-01	2.65782E-01	0.0
20	2.58035E+02	0.0	0.0	2.40014E+02	1.80213E+01	0.0	0.0	4.39504E-03	1.50689E-01	2.63739E-01	0.0
21	2.06731E+02	0.0	0.0	1.95155E+02	1.15766E+01	0.0	0.0	4.39504E-03	1.69653E-01	2.63825E-01	0.0
22	9.79453E+02	0.0	0.0	9.62181E+02	1.72714E+01	0.0	0.0	4.39504E-03	4.79858E-02	2.65782E-01	0.0
23	1.22224E+02	0.0	0.0	1.17633E+02	4.59047E+00	0.0	0.0	4.39504E-03	9.28102E-02	2.63739E-01	0.0
24	9.67057E+01	0.0	0.0	9.08958E+01	5.80990E+00	0.0	0.0	4.39504E-03	1.03269E-01	2.63825E-01	0.0
25	1.40852E+02	0.0	0.0	1.35040E+02	5.81180E+00	0.0	0.0	1.01370E-02	1.01021E-01	2.65782E-01	0.0

NUCLID = 63EU153 MAT NUMBER = 6353 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12								
1										
	5.66538E-04	2.28836E-02	1.61245E-01	5.48261E-01	6.54381E-01	5.38774E-01	2.23121E-01	7.20513E-02	2.14595E-02	4.98258E-03
	1.09601E-03	2.32815E-04								
2										
	1.10904E-02	7.88368E-02	4.00127E-01	6.52095E-01	6.55572E-01	3.07385E-01	1.05856E-01	3.25949E-02	7.70064E-03	1.70773E-03
	3.76360E-04	5.95531E-05								
3										
	7.92470E-02	2.63295E-01	5.53389E-01	7.10999E-01	3.88281E-01	1.44800E-01	4.64708E-02	1.12190E-02	2.51332E-03	5.56506E-04
	1.22013E-04	7.47041E-06								
4										
	4.52081E-01	4.79861E-01	5.63754E-01	3.68940E-01	1.53295E-01	5.20669E-02	1.29494E-02	2.94177E-03	6.55601E-04	1.44173E-04
	2.81070E-05	0.0								
5										
	9.79916E-01	6.41926E-01	1.75448E-01	1.23589E-01	4.05040E-02	1.04266E-02	2.41870E-03	5.44276E-04	1.20234E-04	2.58400E-05
	2.88060E-06	0.0								
6										
	9.18039E-01	6.85502E-01	5.09326E-02	1.05621E-02	5.85010E-03	1.70560E-03	4.08353E-04	9.40956E-05	2.17296E-05	5.96104E-06
	0.0	0.0								
7										
	3.71473E-01	6.80875E-01	2.00885E-01	7.39270E-02	9.09444E-03	1.93928E-03	3.02434E-04	6.53752E-05	1.38050E-05	3.21023E-06
	0.0	0.0								
8										
	3.84914E-02	3.13555E-01	1.89173E-01	7.37194E-02	1.46936E-02	5.21164E-03	8.34450E-04	1.53950E-04	3.34650E-05	8.36638E-06
	0.0	0.0								
9										
	0.0	0.0	1.97122E-02	1.90841E-02	9.08475E-03	6.70658E-03	2.67437E-03	1.11213E-03	4.89478E-04	1.12691E-04
	0.0	0.0								

NUCLID = 63EU155 MAT NO = 6355
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	4.89389E+00	0.0	0.0	1.59795E-03	2.61641E+00	2.27566E+00	0.0	7.39710E-01	4.74606E-02	1.69804E-02	0.0
2	5.26555E+00	0.0	0.0	1.35221E-02	2.93622E+00	2.33580E+00	0.0	7.16457E-01	3.93451E-02	8.92878E-02	0.0
3	6.32504E+00	0.0	0.0	6.61367E-02	3.98730E+00	2.27180E+00	0.0	7.24877E-01	4.07194E-02	1.79938E-01	0.0
4	7.22233E+00	0.0	0.0	3.46292E-01	4.95763E+00	1.91650E+00	0.0	6.53496E-01	4.51643E-02	2.58407E-01	0.0
5	7.21180E+00	0.0	0.0	5.07684E-01	5.38839E+00	1.61573E+00	0.0	5.02544E-01	6.17960E-02	2.02345E-01	0.0
6	6.46986E+00	0.0	0.0	4.55740E-01	4.57411E+00	1.46001E+00	0.0	3.61905E-01	5.66430E-02	2.38821E-01	0.0
7	6.15596E+00	0.0	0.0	5.20860E-01	4.67350E+00	9.66862E-01	0.0	2.51343E-01	7.60342E-02	2.38821E-01	0.0
8	7.05603E+00	0.0	0.0	7.50572E-01	5.74894E+00	5.56523E-01	0.0	1.48670E-01	1.07647E-01	2.38821E-01	0.0
9	9.02438E+00	0.0	0.0	1.15620E+00	7.74033E+00	1.27847E-01	0.0	7.42040E-02	1.44963E-01	2.63825E-01	0.0
10	1.22704E+01	0.0	0.0	1.59161E+00	1.04188E+01	0.0	0.0	3.35321E-02	1.96597E-01	2.65782E-01	0.0
11	1.69462E+01	0.0	0.0	3.17825E+00	1.37637E+01	0.0	0.0	1.58512E-02	2.63401E-01	2.63739E-01	0.0
12	2.38687E+01	0.0	0.0	5.89549E+00	1.79782E+01	0.0	0.0	6.49124E-03	3.44433E-01	2.63825E-01	0.0
13	3.34911E+01	0.0	0.0	1.02411E+01	2.32100E+01	0.0	0.0	4.33836E-03	4.38942E-01	2.65782E-01	0.0
14	4.72492E+01	0.0	0.0	1.63505E+01	2.99977E+01	0.0	0.0	4.33836E-03	5.57016E-01	2.63739E-01	0.0
15	6.87871E+01	0.0	0.0	3.20441E+01	3.67411E+01	0.0	0.0	4.33836E-03	6.66439E-01	2.63825E-01	0.0
16	9.94159E+01	0.0	0.0	5.46210E+01	4.47929E+01	0.0	0.0	4.33836E-03	8.22293E-01	2.65782E-01	0.0
17	1.44857E+02	0.0	0.0	9.15714E+01	5.32859E+01	0.0	0.0	4.33836E-03	9.73276E-01	2.63739E-01	0.0
18	2.10805E+02	0.0	0.0	1.49124E+02	6.16804E+01	0.0	0.0	4.33836E-03	1.11241E+00	2.63825E-01	0.0
19	3.07776E+02	0.0	0.0	2.35179E+02	6.95975E+01	0.0	0.0	4.33836E-03	1.23561E+00	2.65782E-01	0.0
20	4.51215E+02	0.0	0.0	3.74279E+02	7.09417E+01	0.0	0.0	4.33836E-03	1.35813E+00	2.63739E-01	0.0
21	6.58907E+02	0.0	0.0	5.76036E+02	8.28496E+01	0.0	0.0	4.33836E-03	1.44513E+00	2.63825E-01	0.0
22	9.67660E+02	0.0	0.0	8.73686E+02	8.75940E+01	0.0	0.0	4.33836E-03	1.51281E+00	2.65782E-01	0.0
23	1.12769E+03	0.0	0.0	1.06052E+03	6.71733E+01	0.0	0.0	4.33836E-03	1.41309E-01	2.63739E-01	0.0
24	7.91335E+02	0.0	0.0	7.82986E+02	8.34700E+00	0.0	0.0	4.33836E-03	1.41263E-01	2.63825E-01	0.0
25	1.15830E+03	0.0	0.0	1.14936E+03	8.34700E+00	0.0	0.0	9.88939E-03	1.40222E-01	2.65782E-01	0.0

NUCLID = 63EU155 MAT NUMBER = 6355 IPL = 0

TABLE OF INELA+(N,2N) MATRICES

PAGE 1 OF 1

GROUP EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12								
1										
	4.53991E-04	2.60975E-02	1.76159E-01	5.69873E-01	6.58407E-01	5.31095E-01	2.17168E-01	6.96728E-02	2.06414E-02	4.79349E-03
	1.05355E-03	2.23717E-04								
2										
	6.16574E-03	7.62609E-02	4.33222E-01	6.79335E-01	6.66190E-01	3.07581E-01	1.05079E-01	3.22215E-02	7.59594E-03	1.68280E-03
	3.70693E-04	5.87266E-05								
3										
	4.17459E-02	1.67914E-01	5.14440E-01	7.96150E-01	4.27353E-01	1.57936E-01	5.04480E-02	1.21492E-02	2.71856E-03	6.01628E-04
	1.31673E-04	6.41103E-06								
4										
	4.10934E-01	3.42374E-01	4.77978E-01	2.92131E-01	2.51466E-01	1.07232E-01	2.66359E-02	6.04741E-03	1.34734E-03	2.96256E-04
	5.96458E-05	0.0								
5										
	9.33361E-01	5.65654E-01	5.88860E-02	3.57369E-02	1.52476E-02	4.92066E-03	1.30287E-03	2.92686E-04	1.66186E-04	1.42275E-04
	2.33063E-05	0.0								
6										
	7.57648E-01	5.65940E-01	1.23731E-01	1.16743E-02	6.23429E-04	3.07700E-04	6.72891E-05	1.47474E-05	3.19203E-06	0.0
	0.0	0.0								
7										
	3.43406E-01	4.45214E-01	1.22006E-01	3.75231E-02	5.83253E-03	1.28007E-03	3.52936E-04	8.04568E-04	1.92622E-04	4.15866E-05
	7.56359E-06	0.0								
8										
	8.50773E-02	2.99001E-01	1.57347E-01	1.15163E-02	2.79557E-03	6.16915E-04	1.32554E-04	2.90591E-05	6.25725E-06	1.63463E-06
	1.38967E-07	0.0								
9										
	0.0	1.56244E-02	6.46691E-02	3.00294E-02	1.40840E-02	2.42296E-03	5.97528E-04	2.79117E-04	1.28685E-04	5.95246E-05
	1.18041E-05	0.0								

Appendix 2. Tables of the JNDC Lumped Constants at 360 Days of Burn-up

Fission products due to fission of ^{239}Pu with thermal neutrons.

NUCLID = 949FP237 MAT NO = 4905
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	8.60512E+00	0.0	0.0	2.56351E-03	4.53416E+00	4.06840E+00	0.0	3.91751E-01	1.37604E-01	1.69804E-02	0.0
2	8.55775E+00	0.0	0.0	1.29740E-02	4.43403E+00	4.11075E+00	0.0	3.25427E-01	1.26278E-01	8.92878E-02	0.0
3	9.55130E+00	0.0	0.0	3.66734E-02	5.84213E+00	3.97250E+00	0.0	3.00733E-01	1.61153E-01	1.79938E-01	0.0
4	1.14781E+01	0.0	0.0	6.65127E-02	6.42161E+00	2.98793E+00	0.0	2.72425E-01	1.86398E-01	2.58407E-01	0.0
5	1.29758E+01	0.0	0.0	9.11435E-02	1.10255E+01	1.85916E+00	0.0	2.32594E-01	2.71500E-01	2.02345E-01	0.0
6	1.38709E+01	0.0	0.0	1.21563E-01	1.28498E+01	8.99540E-01	0.0	1.92003E-01	2.82087E-01	2.38821E-01	0.0
7	1.50518E+01	0.0	0.0	1.79306E-01	1.46191E+01	2.53370E-01	0.0	1.34652E-01	3.40316E-01	2.38821E-01	0.0
8	1.64032E+01	0.0	0.0	2.52494E-01	1.60666E+01	6.40680E-02	0.0	8.02311E-02	3.86887E-01	2.38821E-01	0.0
9	1.72037E+01	0.0	0.0	3.83415E-01	1.67942E+01	2.60954E-02	0.0	4.46822E-02	3.71899E-01	2.63825E-01	0.0
10	1.80028E+01	0.0	0.0	6.00012E-01	1.73881E+01	1.47094E-02	0.0	2.35085E-02	3.84076E-01	2.65782E-01	0.0
11	1.98154E+01	0.0	0.0	9.07025E-01	1.88988E+01	9.57340E-03	0.0	1.30574E-02	4.20526E-01	2.63739E-01	0.0
12	2.32794E+01	0.0	0.0	1.33211E+00	2.19392E+01	8.07019E-03	0.0	8.00060E-03	4.83225E-01	2.63825E-01	0.0
13	2.52103E+01	0.0	0.0	2.00823E+00	2.32021E+01	0.0	0.0	5.95869E-03	5.09533E-01	2.65782E-01	0.0
14	2.95067E+01	0.0	0.0	3.00566E+00	2.65010E+01	0.0	0.0	5.35554E-03	5.42320E-01	2.63739E-01	0.0
15	3.98037E+01	0.0	0.0	5.30749E+00	3.44962E+01	0.0	0.0	5.26128E-03	6.67467E-01	2.63825E-01	0.0
16	5.61036E+01	0.0	0.0	9.74251E+00	4.63611E+01	0.0	0.0	5.16174E-03	6.07277E-01	2.65782E-01	0.0
17	5.44742E+01	0.0	0.0	1.40455E+01	4.04287E+01	0.0	0.0	5.16626E-03	5.27664E-01	2.63739E-01	0.0
18	4.42416E+01	0.0	0.0	1.98716E+01	2.43698E+01	0.0	0.0	5.36276E-03	5.49974E-01	2.63825E-01	0.0
19	7.07757E+01	0.0	0.0	3.14393E+01	3.93364E+01	0.0	0.0	5.45114E-03	4.06326E-01	2.65782E-01	0.0
20	1.66858E+02	0.0	0.0	6.13570E+01	1.05501E+02	0.0	0.0	5.18609E-03	3.18409E-01	2.63739E-01	0.0
21	1.81138E+02	0.0	0.0	1.29308E+02	5.18297E+01	0.0	0.0	4.85041E-03	6.46683E-01	2.63825E-01	0.0
22	3.49117E+01	0.0	0.0	2.27414E+01	1.21703E+01	0.0	0.0	5.65933E-03	2.62106E-01	2.65782E-01	0.0
23	1.08066E+02	0.0	0.0	9.56900E+01	1.23762E+01	0.0	0.0	5.68894E-03	2.66579E-01	2.63739E-01	0.0
24	9.22514E+01	0.0	0.0	7.20233E+01	2.02281E+01	0.0	0.0	5.86242E-03	4.58530E-01	2.63825E-01	0.0
25	9.59108E+01	0.0	0.0	7.77869E+01	1.81239E+01	0.0	0.0	7.82097E-03	3.91054E-01	2.65782E-01	0.0

NUCLID = 949FP237 MAT NUMBER = 4905 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

J=	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16				
1										
	1.97338E-03	7.81924E-02	4.00253E-01	1.09288E+00	1.13979E+00	8.65587E-01	3.41353E-01	1.07615E-01	3.25665E-02	7.33732E-03
	6.65349E-04	1.45761E-04	3.17992E-05	4.87155E-06	0.0	0.0				
2										
	2.77328E-02	3.29078E-01	1.00061E+00	1.19037E+00	9.77766E-01	4.04790E-01	1.30261E-01	3.97445E-02	9.05673E-03	1.05069E-03
	2.30912E-04	5.04506E-05	9.96910E-06	0.0	0.0	0.0				
3										
	1.88049E-01	9.69395E-01	1.11285E+00	1.00786E+00	4.66843E-01	1.63689E-01	5.00853E-02	1.16124E-02	1.65702E-03	3.65597E-04
	8.00073E-05	1.71238E-05	9.78325E-07	0.0	0.0	0.0				
4										
	5.37935E-01	1.04688E+00	8.19443E-01	3.78749E-01	1.42537E-01	4.73118E-02	1.10644E-02	3.38986E-03	4.82782E-04	1.11264E-04
	2.39564E-05	3.51321E-06	3.08088E-07	2.32807E-08	0.0	0.0				
5										
	4.66980E-01	6.53334E-01	3.47024E-01	1.30356E-01	4.35470E-02	1.22622E-02	4.33742E-03	9.90670E-04	2.43071E-04	6.94173E-05
	1.04881E-05	2.06519E-06	5.88110E-07	2.34195E-07	8.83713E-08	0.0				
6										
	2.64719E-01	3.89153E-01	1.72515E-01	5.24761E-02	1.43581E-02	4.05981E-03	1.48258E-03	5.20137E-04	1.63271E-04	7.09789E-05
	1.58840E-05	4.55002E-06	1.33196E-06	5.50442E-07	1.45026E-07	2.83740E-08				
7										
	7.63220E-02	1.05082E-01	5.22653E-02	1.37116E-02	3.83333E-03	1.30355E-03	5.08024E-04	2.04787E-04	8.48117E-05	4.08101E-05
	1.23558E-05	1.48671E-06	3.77375E-07	1.39142E-07	6.28817E-08	1.34027E-08				
8										
	1.95412E-02	3.72191E-02	2.11921E-02	6.64853E-03	1.02894E-03	2.66407E-04	9.74050E-05	4.31582E-05	1.98659E-05	8.37827E-06
	2.16069E-06	4.89426E-07	1.68074E-07	1.04943E-08	5.97666E-09	0.0				
9										
	9.26623E-03	8.73216E-03	4.50586E-03	2.25654E-03	7.99794E-04	3.13730E-04	1.30723E-04	5.62902E-05	2.84728E-05	5.04456E-06
	5.32631E-07	2.33680E-08	9.67925E-09	2.57762E-09	0.0	0.0				
10										
	5.66504E-03	6.02381E-03	1.98667E-03	5.58594E-04	2.56921E-04	1.19679E-04	5.58096E-05	2.59470E-05	1.20635E-05	4.88397E-06
	0.0	0.0	0.0	0.0	0.0	0.0				
11										
	4.41203E-03	5.16134E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0				
12										
	6.77368E-04	4.04365E-03	2.01669E-03	7.15748E-04	3.34271E-04	1.54044E-04	7.21004E-05	3.28707E-05	1.44266E-05	8.83556E-06
	0.0	0.0	0.0	0.0	0.0	0.0				

Fission products due to fission of ^{235}U with thermal neutrons.

NUCLID = 925FP234 MAT NO = 2505
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	8,58906E+00	0.0	0.0	1,91995E-03	4,52821E+00	4,05893E+00	0.0	3,39016E-01	1,44862E-01	1,69804E-02	0.0
2	8,52427E+00	0.0	0.0	9,06176E-03	4,43458E+00	4,08063E+00	0.0	2,90075E-01	1,32715E-01	8,92878E-02	0.0
3	9,79578E+00	0.0	0.0	2,76238E-02	5,83194E+00	3,93622E+00	0.0	2,69444E-01	1,70425E-01	1,79938E-01	0.0
4	1,12797E+01	0.0	0.0	5,48007E-02	8,42684E+00	2,79802E+00	0.0	2,36798E-01	2,01892E-01	2,58407E-01	0.0
5	1,27607E+01	0.0	0.0	7,46625E-02	1,11004E+01	1,58559E+00	0.0	1,92798E-01	2,94509E-01	2,02345E-01	0.0
6	1,37520E+01	0.0	0.0	9,64073E-02	1,29973E+01	6,58337E-01	0.0	1,53276E-01	3,03195E-01	2,38821E-01	0.0
7	1,50371E+01	0.0	0.0	1,27463E-01	1,47051E+01	2,04132E-01	0.0	1,05915E-01	3,60554E-01	2,38821E-01	0.0
8	1,65424E+01	0.0	0.0	1,75346E-01	1,62956E+01	7,14358E-02	0.0	6,21994E-02	4,09882E-01	2,38821E-01	0.0
9	1,74114E+01	0.0	0.0	2,65352E-01	1,71263E+01	1,97005E-02	0.0	3,48082E-02	3,93633E-01	2,63825E-01	0.0
10	1,81816E+01	0.0	0.0	4,22010E-01	1,77499E+01	9,68072E-03	0.0	1,90244E-02	4,04106E-01	2,65782E-01	0.0
11	2,00934E+01	0.0	0.0	6,60619E-01	1,94275E+01	5,27077E-03	0.0	1,11492E-02	4,43404E-01	2,63739E-01	0.0
12	2,40288E+01	0.0	0.0	1,00862E+00	2,30157E+01	4,44316E-03	0.0	7,22962E-03	5,14530E-01	2,63825E-01	0.0
13	2,57678E+01	0.0	0.0	1,56494E+00	2,42029E+01	0.0	0.0	5,79164E-03	5,41352E-01	2,65782E-01	0.0
14	3,00040E+01	0.0	0.0	2,36844E+00	2,76356E+01	0.0	0.0	5,38270E-03	5,77032E-01	2,63739E-01	0.0
15	3,95941E+01	0.0	0.0	4,39496E+00	3,51951E+01	0.0	0.0	5,27732E-03	6,99405E-01	2,63825E-01	0.0
16	5,88154E+01	0.0	0.0	6,23208E+00	5,05833E+01	0.0	0.0	5,17417E-03	6,07987E-01	2,65782E-01	0.0
17	5,65296E+01	0.0	0.0	1,27746E+01	4,37548E+01	0.0	0.0	5,18054E-03	5,57199E-01	2,63739E-01	0.0
18	3,65926E+01	0.0	0.0	1,50462E+01	2,15524E+01	0.0	0.0	5,43791E-03	5,35570E-01	2,63825E-01	0.0
19	6,19002E+01	0.0	0.0	2,24916E+01	3,94084E+01	0.0	0.0	5,44856E-03	3,62211E-01	2,65782E-01	0.0
20	1,20066E+02	0.0	0.0	4,19177E+01	7,61483E+01	0.0	0.0	5,23057E-03	3,00456E-01	2,63739E-01	0.0
21	1,41866E+02	0.0	0.0	1,00860E+02	4,10579E+01	0.0	0.0	4,92325E-03	4,66266E-01	2,63825E-01	0.0
22	2,93141E+01	0.0	0.0	1,71937E+01	1,21204E+01	0.0	0.0	5,86054E-03	2,67188E-01	2,65782E-01	0.0
23	5,86382E+01	0.0	0.0	4,63807E+01	1,22575E+01	0.0	0.0	5,81389E-03	2,78332E-01	2,63739E-01	0.0
24	6,33492E+01	0.0	0.0	4,86574E+01	1,44918E+01	0.0	0.0	5,77266E-03	3,23277E-01	2,63825E-01	0.0
25	7,03700E+01	0.0	0.0	5,24072E+01	1,79628E+01	0.0	0.0	7,75856E-03	3,92938E-01	2,65782E-01	0.0

NUCLID = 925FP234 MAT NUMBER = 2505 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

J=	1	2	3	4	5	6	7	8	9	10
1										
	1,63033E-03	7,69400E-02	3,96849E-01	1,08881E+00	1,13737E+00	8,65173E-01	3,41596E-01	1,07772E-01	3,27285E-02	7,35615E-03
	5,62124E-04	1,23130E-04	2,68603E-05	3,96838E-06	0.0	0.0				
2										
	2,38396E-02	3,29671E-01	1,00609E+00	1,18540E+00	9,63608E-01	3,96263E-01	1,27001E-01	3,88069E-02	8,81138E-03	8,91915E-04
	1,95984E-04	4,26159E-05	8,38354E-06	0.0	0.0	0.0				
3										
	1,73839E-01	9,73781E-01	1,11862E+00	9,88609E-01	4,55154E-01	1,62736E-01	4,99646E-02	1,15476E-02	1,54260E-03	3,40264E-04
	7,44423E-05	1,59339E-05	1,18375E-06	0.0	0.0	0.0				
4										
	4,86657E-01	9,74848E-01	7,66750E-01	3,57904E-01	1,33861E-01	4,41568E-02	1,02151E-02	3,25398E-03	4,37222E-04	1,04331E-04
	2,25304E-05	3,72496E-06	3,98759E-07	3,93709E-08	0.0	0.0				
5										
	4,06497E-01	7,03737E-01	3,04842E-01	1,15276E-01	3,82630E-02	1,12636E-02	4,24105E-03	1,06298E-03	2,94991E-04	1,00779E-04
	6,56147E-06	1,72729E-06	4,46710E-07	3,05983E-07	1,15460E-07	0.0				
6										
	2,26410E-01	2,76550E-01	1,05174E-01	3,37662E-02	1,07737E-02	3,56364E-03	1,36482E-03	5,07031E-04	1,51121E-04	6,22104E-05
	1,10126E-05	3,06450E-06	4,11131E-07	3,26063E-07	8,99387E-08	5,47691E-09				
7										
	6,26455E-02	9,20798E-02	3,80320E-02	1,66105E-03	2,34677E-03	8,28358E-04	3,15565E-04	1,30677E-04	5,61648E-05	2,75270E-05
	7,04296E-06	1,02643E-06	3,14873E-07	1,16457E-07	5,29388E-08	1,12635E-08				
8										
	1,52297E-02	3,20894E-02	1,86705E-02	4,04975E-03	8,44553E-04	2,04932E-04	8,26259E-05	3,74711E-05	1,71618E-05	7,23845E-06
	1,86766E-06	4,31916E-07	1,63464E-07	1,19354E-09	3,80149E-10	0.0				
9										
	5,92538E-03	6,41662E-03	4,10157E-03	2,09376E-03	6,32173E-04	2,77296E-04	1,19199E-04	5,22029E-05	2,63261E-05	5,41583E-06
	5,53337E-07	5,49160E-09	1,55374E-09	4,13766E-10	0.0	0.0				
10										
	3,26786E-03	4,15110E-03	1,51807E-03	4,01663E-04	1,84815E-04	8,60436E-05	4,01332E-05	1,85518E-05	8,50701E-06	3,95614E-06
	0.0	0.0	0.0	0.0	0.0	0.0				
11										
	2,42911E-03	2,84165E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0				
12										
	3,72935E-04	2,22629E-03	1,11043E-03	3,94065E-04	1,84038E-04	8,46110E-05	3,96959E-05	1,80975E-05	7,94275E-06	4,86454E-06
	0.0	0.0	0.0	0.0	0.0	0.0				

Fission products due to fission of ^{238}U with fission spectrum neutrons.

NUCLID = 928FP237 MAT NO = 2805
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 1

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	8.60460E+00	0.0	0.0	2.41978E-03	4.53776E+00	4.06442E+00	0.0	3.74373E-01	1.40334E-01	1.69804E-02	0.0
2	8.55651E+00	0.0	0.0	1.20846E-02	4.44495E+00	4.09948E+00	0.0	3.14116E-01	1.28744E-01	8.92878E-02	0.0
3	9.83946E+00	0.0	0.0	3.49573E-02	5.84359E+00	3.96091E+00	0.0	2.90726E-01	1.64266E-01	1.79938E-01	0.0
4	1.14044E+01	0.0	0.0	6.64920E-02	8.40984E+00	2.92809E+00	0.0	2.60897E-01	1.92709E-01	2.58407E-01	0.0
5	1.29037E+01	0.0	0.0	9.02066E-02	1.10359E+01	1.77756E+00	0.0	2.19058E-01	2.79546E-01	2.02345E-01	0.0
6	1.38503E+01	0.0	0.0	1.18710E-01	1.29050E+01	9.26570E-01	0.0	1.76128E-01	2.90311E-01	2.38821E-01	0.0
7	1.50928E+01	0.0	0.0	1.67114E-01	1.46790E+01	2.46640E-01	0.0	1.24053E-01	3.48889E-01	2.38821E-01	0.0
8	1.65310E+01	0.0	0.0	2.32745E-01	1.62110E+01	8.72238E-02	0.0	7.33406E-02	3.97195E-01	2.38821E-01	0.0
9	1.73870E+01	0.0	0.0	3.53213E-01	1.70054E+01	2.83724E-02	0.0	4.07787E-02	3.81974E-01	2.63825E-01	0.0
10	1.82111E+01	0.0	0.0	5.57096E-01	1.76364E+01	1.76291E-02	0.0	2.16813E-02	3.93841E-01	2.65782E-01	0.0
11	2.01093E+01	0.0	0.0	8.57957E-01	1.92398E+01	1.15336E-02	0.0	1.22576E-02	4.31666E-01	2.63739E-01	0.0
12	2.38218E+01	0.0	0.0	1.29056E+00	2.25215E+01	9.72259E-03	0.0	7.63614E-03	4.97835E-01	2.63825E-01	0.0
13	2.59399E+01	0.0	0.0	1.97289E+00	2.39670E+01	0.0	0.0	5.86862E-03	5.27259E-01	2.65782E-01	0.0
14	3.04457E+01	0.0	0.0	2.99796E+00	2.74477E+01	0.0	0.0	5.35195E-03	5.73933E-01	2.63739E-01	0.0
15	4.12230E+01	0.0	0.0	5.44595E+00	3.57771E+01	0.0	0.0	5.24482E-03	7.00636E-01	2.63825E-01	0.0
16	5.83322E+01	0.0	0.0	9.23922E+00	4.84330E+01	0.0	0.0	5.15678E-03	6.14436E-01	2.65782E-01	0.0
17	5.60345E+01	0.0	0.0	1.46416E+01	4.13929E+01	0.0	0.0	5.16792E-03	5.66842E-01	2.63739E-01	0.0
18	4.49581E+01	0.0	0.0	2.01766E+01	2.47815E+01	0.0	0.0	5.29648E-03	5.43081E-01	2.63825E-01	0.0
19	7.10498E+01	0.0	0.0	3.00658E+01	4.09838E+01	0.0	0.0	5.36472E-03	3.47009E-01	2.65782E-01	0.0
20	1.60306E+02	0.0	0.0	5.96027E+01	1.00503E+02	0.0	0.0	5.19023E-03	3.21838E-01	2.63739E-01	0.0
21	1.80560E+02	0.0	0.0	1.25277E+02	5.53032E+01	0.0	0.0	4.76962E-03	6.56753E-01	2.63825E-01	0.0
22	3.58896E+01	0.0	0.0	2.36267E+01	1.22629E+01	0.0	0.0	5.70274E-03	2.64884E-01	2.65782E-01	0.0
23	1.06058E+02	0.0	0.0	9.36400E+01	1.24180E+01	0.0	0.0	5.73679E-03	2.73204E-01	2.63739E-01	0.0
24	1.02364E+02	0.0	0.0	8.50700E+01	1.72944E+01	0.0	0.0	5.81154E-03	3.85414E-01	2.63825E-01	0.0
25	1.00182E+02	0.0	0.0	8.30504E+01	1.71319E+01	0.0	0.0	8.10119E-03	3.79145E-01	2.65782E-01	0.0

NUCLID = 928FP237 MAT NUMBER = 2805 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 1 OF 1

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16				
1										
	1.84064E-03	7.74427E-02	3.98723E-01	1.09049E+00	1.13918E+00	8.66203E-01	3.41880E-01	1.07832E-01	3.26721E-02	7.35600E-03
	6.34046E-04	1.38962E-04	3.03030E-05	4.61862E-06	0.0	0.0				
2										
	2.63041E-02	3.28875E-01	1.00105E+00	1.18816E+00	9.73516E-01	4.02421E-01	1.29378E-01	3.95008E-02	8.99199E-03	1.00191E-03
	2.20190E-04	4.81080E-05	9.50273E-06	0.0	0.0	0.0				
3										
	1.62439E-01	9.69804E-01	1.11608E+00	1.00239E+00	4.63147E-01	1.83316E-01	5.00615E-02	1.15964E-02	1.62083E-03	3.57597E-04
	7.82506E-05	1.67485E-05	1.66426E-06	0.0	0.0	0.0				
4										
	5.16787E-01	1.01816E+00	8.12174E-01	3.75580E-01	1.41541E-01	4.68765E-02	1.09783E-02	3.37480E-03	4.73355E-04	1.10374E-04
	2.36299E-05	3.64859E-06	3.32164E-07	2.96317E-08	0.0	0.0				
5										
	4.51602E-01	8.04170E-01	3.34867E-01	1.26820E-01	4.22682E-02	1.19760E-02	4.29643E-03	1.01111E-03	2.58158E-04	7.83681E-05
	9.61374E-06	1.93559E-06	6.47743E-07	2.89025E-07	1.09061E-07	0.0				
6										
	2.59159E-01	3.52868E-01	1.49046E-01	4.59167E-02	1.34475E-02	3.88872E-03	1.45865E-03	5.31789E-04	1.63575E-04	6.96019E-05
	1.44576E-05	4.20063E-06	1.25427E-06	5.25307E-07	1.27958E-07	2.96074E-08				
7										
	7.63030E-02	1.05484E-01	4.80129E-02	1.15645E-02	3.40008E-03	1.14874E-03	4.31584E-04	1.73945E-04	7.29983E-05	3.53541E-05
	1.04931E-05	1.41219E-06	3.95177E-07	1.45936E-07	6.61630E-08	1.41021E-08				
8										
	2.02779E-02	3.86521E-02	2.20465E-02	4.76847E-03	1.03780E-03	2.63381E-04	1.00606E-04	4.50363E-05	2.05968E-05	8.64608E-06
	2.16591E-06	4.67320E-07	1.77477E-07	4.99948E-09	2.59674E-09	0.0				
9										
	1.02912E-02	9.36833E-03	4.76540E-03	2.50472E-03	8.59850E-04	3.32256E-04	1.36543E-04	5.84326E-05	2.90794E-05	5.90314E-06
	6.63729E-07	1.71864E-08	6.49021E-09	1.72636E-09	0.0	0.0				
10										
	6.95624E-03	7.23671E-03	2.35328E-03	5.83633E-04	2.68635E-04	1.24990E-04	5.83137E-05	2.67778E-05	1.20808E-05	6.48775E-06
	0.0	0.0	0.0	0.0	0.0	0.0				
11										
	5.31541E-03	6.21614E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0				
12										
	8.16062E-04	4.87160E-03	2.42986E-03	8.62300E-04	4.02715E-04	1.85585E-04	8.66632E-05	3.96011E-05	1.73804E-05	1.06447E-05
	0.0	0.0	0.0	0.0	0.0	0.0				

Fission products due to fission of ^{239}Pu with thermal neutrons.

NUCLID = 949FP237 MAT NO = 4905
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 2

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	8.86707E+00	0.0	0.0	1.12484E-03	4.89804E+00	3.96791E+00	0.0	4.14486E-01	2.47999E-01	3.73649E-03	0.0
2	8.54622E+00	0.0	0.0	2.96876E-03	4.45485E+00	4.08840E+00	0.0	3.82676E-01	2.26324E-01	1.32440E-02	0.0
3	8.37588E+00	0.0	0.0	7.63398E-03	4.28027E+00	4.08798E+00	0.0	3.40937E-01	2.20484E-01	3.16559E-02	0.0
4	8.66400E+00	0.0	0.0	1.59064E-02	4.52285E+00	4.12524E+00	0.0	3.17056E-01	2.33372E-01	5.76319E-02	0.0
5	9.44637E+00	0.0	0.0	2.79680E-02	5.33388E+00	4.08452E+00	0.0	3.06154E-01	2.57657E-01	8.84748E-02	0.0
6	1.02404E+01	0.0	0.0	4.50856E-02	6.33072E+00	3.86459E+00	0.0	2.96458E-01	3.61073E-01	9.14632E-02	0.0
7	1.10904E+01	0.0	0.0	6.12718E-02	7.65987E+00	3.36927E+00	0.0	2.82820E-01	3.51960E-01	1.26293E-01	0.0
8	1.18319E+01	0.0	0.0	7.54146E-02	9.12422E+00	2.63231E+00	0.0	2.64831E-01	3.80583E-01	1.32114E-01	0.0
9	1.26638E+01	0.0	0.0	8.66353E-02	1.04113E+01	2.16590E+00	0.0	2.44063E-01	5.63154E-01	9.18870E-02	0.0
10	1.32337E+01	0.0	0.0	9.49591E-02	1.15526E+01	1.58614E+00	0.0	2.23681E-01	5.01833E-01	1.10458E-01	0.0
11	1.35602E+01	0.0	0.0	1.07956E-01	1.23009E+01	1.15137E+00	0.0	2.07945E-01	7.29530E-01	8.23092E-02	0.0
12	1.39138E+01	0.0	0.0	1.21326E-01	1.28427E+01	9.49793E-01	0.0	1.93161E-01	8.09926E-01	7.96285E-02	0.0
13	1.41089E+01	0.0	0.0	1.36299E-01	1.33948E+01	5.77783E-01	0.0	1.75872E-01	8.98655E-01	7.68831E-02	0.0
14	1.45309E+01	0.0	0.0	1.57995E-01	1.40102E+01	3.62666E-01	0.0	1.55157E-01	8.47155E-01	8.78220E-02	0.0
15	1.49694E+01	0.0	0.0	1.82730E-01	1.45707E+01	2.15954E-01	0.0	1.34479E-01	1.06047E+00	7.41157E-02	0.0
16	1.53848E+01	0.0	0.0	1.99699E-01	1.50205E+01	1.64593E-01	0.0	1.15894E-01	1.07343E+00	7.68832E-02	0.0
17	1.58799E+01	0.0	0.0	2.25443E-01	1.55424E+01	1.12067E-01	0.0	9.50273E-02	8.80056E-01	9.91197E-02	0.0
18	1.63612E+01	0.0	0.0	2.57947E-01	1.60341E+01	6.91575E-02	0.0	7.64369E-02	1.18442E+00	7.68832E-02	0.0
19	1.68012E+01	0.0	0.0	2.87477E-01	1.64556E+01	5.81378E-02	0.0	6.48732E-02	1.49812E+00	6.28182E-02	0.0
20	1.70404E+01	0.0	0.0	3.26371E-01	1.66725E+01	4.15738E-02	0.0	5.45162E-02	1.08383E+00	8.87124E-02	0.0
21	1.71793E+01	0.0	0.0	3.81692E-01	1.67785E+01	1.90765E-02	0.0	4.40010E-02	1.09934E+00	8.84409E-02	0.0
22	1.73956E+01	0.0	0.0	4.43545E-01	1.69346E+01	1.74147E-02	0.0	3.54615E-02	1.13613E+00	8.66716E-02	0.0
23	1.75950E+01	0.0	0.0	5.14529E-01	1.70629E+01	1.75754E-02	0.0	2.87104E-02	1.12588E+00	8.81807E-02	0.0
24	1.78769E+01	0.0	0.0	5.96249E-01	1.72643E+01	1.63358E-02	0.0	2.32612E-02	1.12673E+00	8.90592E-02	0.0
25	1.85304E+01	0.0	0.0	6.88500E-01	1.78317E+01	1.02192E-02	0.0	1.87973E-02	1.17250E+00	8.85424E-02	0.0
26	1.90735E+01	0.0	0.0	7.91429E-01	1.82731E+01	8.92559E-03	0.0	1.54507E-02	1.19084E+00	8.91168E-02	0.0
27	1.97177E+01	0.0	0.0	9.03348E-01	1.88047E+01	9.63438E-03	0.0	1.29267E-02	1.25272E+00	8.68860E-02	0.0
28	2.05449E+01	0.0	0.0	1.02658E+00	1.95081E+01	1.01709E-02	0.0	1.09546E-02	1.28140E+00	8.77359E-02	0.0
29	2.15553E+01	0.0	0.0	1.16743E+00	2.03776E+01	1.03044E-02	0.0	9.35768E-03	1.32154E+00	8.87124E-02	0.0
30	2.36163E+01	0.0	0.0	1.33135E+00	2.22757E+01	9.29679E-03	0.0	7.88139E-03	1.45030E+00	8.84409E-02	0.0
31	2.42820E+01	0.0	0.0	1.49860E+00	2.27789E+01	4.53177E-03	0.0	6.92667E-03	1.49798E+00	8.66716E-02	0.0
32	2.34847E+01	0.0	0.0	1.69049E+00	2.17942E+01	0.0	0.0	6.27124E-03	1.41183E+00	8.81807E-02	0.0
33	2.54513E+01	0.0	0.0	2.07366E+00	2.33776E+01	0.0	0.0	6.18596E-03	1.60862E+00	8.90592E-02	0.0
34	2.66881E+01	0.0	0.0	2.25851E+00	2.44296E+01	0.0	0.0	5.46163E-03	1.54202E+00	8.85424E-02	0.0
35	2.96041E+01	0.0	0.0	2.57529E+00	2.70288E+01	0.0	0.0	5.31714E-03	1.69377E+00	8.91169E-02	0.0

TO BE CONTINUED

NUCLID = 949FP237 MAT NO = 4905
INFINITE DILUTION CROSS SECTION

PAGE 2 OF 2

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
36	2.88410E+01	0.0	0.0	3.03514E+00	2.58059E+01	0.0	0.0	5.40837E-03	2.23588E+00	8.68860E-02	0.0
37	3.00634E+01	0.0	0.0	3.41364E+00	2.66498E+01	0.0	0.0	5.34446E-03	1.54652E+00	8.77359E-02	0.0
38	3.32295E+01	0.0	0.0	4.43637E+00	2.87931E+01	0.0	0.0	5.28409E-03	2.09220E+00	8.87124E-02	0.0
39	5.08463E+01	0.0	0.0	5.46262E+00	4.53837E+01	0.0	0.0	5.14560E-03	2.43296E+00	8.84409E-02	0.0
40	3.52421E+01	0.0	0.0	6.04065E+00	2.92014E+01	0.0	0.0	5.42236E-03	1.75667E+00	8.66716E-02	0.0
41	6.37000E+01	0.0	0.0	8.81925E+00	5.48807E+01	0.0	0.0	5.17539E-03	3.68639E+00	8.81807E-02	0.0
42	5.38398E+01	0.0	0.0	1.03081E+01	4.35317E+01	0.0	0.0	5.19991E-03	1.96701E+00	8.90592E-02	0.0
43	5.08279E+01	0.0	0.0	1.00962E+01	4.07317E+01	0.0	0.0	5.10227E-03	2.09910E+00	8.85424E-02	0.0
44	5.12132E+01	0.0	0.0	1.11805E+01	4.00327E+01	0.0	0.0	5.07545E-03	1.16507E+00	8.91169E-02	0.0
45	5.02059E+01	0.0	0.0	1.18350E+01	3.83709E+01	0.0	0.0	5.11040E-03	1.55715E+00	8.68860E-02	0.0
46	6.20141E+01	0.0	0.0	1.91450E+01	4.28691E+01	0.0	0.0	5.30190E-03	1.56874E+00	8.77359E-02	0.0
47	4.34241E+01	0.0	0.0	1.74760E+01	2.59481E+01	0.0	0.0	5.41706E-03	1.54818E+00	8.87124E-02	0.0
48	4.54408E+01	0.0	0.0	2.09218E+01	2.45190E+01	0.0	0.0	5.30062E-03	1.57341E+00	8.84408E-02	0.0
49	4.38647E+01	0.0	0.0	2.12560E+01	2.26087E+01	0.0	0.0	5.36783E-03	1.52505E+00	8.66716E-02	0.0
50	1.23140E+02	0.0	0.0	4.66889E+01	7.66508E+01	0.0	0.0	5.32004E-03	1.34647E+00	8.81807E-02	0.0
51	5.33207E+01	0.0	0.0	2.67516E+01	2.65691E+01	0.0	0.0	5.75589E-03	1.53058E+00	8.90592E-02	0.0
52	3.61602E+01	0.0	0.0	2.09532E+01	1.52070E+01	0.0	0.0	5.57104E-03	9.56083E-01	8.85424E-02	0.0
53	4.48193E+01	0.0	0.0	2.38869E+01	2.09324E+01	0.0	0.0	5.31598E-03	1.54920E+00	8.91169E-02	0.0
54	4.20943E+02	0.0	0.0	1.41358E+02	2.79585E+02	0.0	0.0	5.15869E-03	2.32804E+00	8.68860E-02	0.0
55	3.92177E+01	0.0	0.0	2.02048E+01	1.90129E+01	0.0	0.0	5.43943E-03	9.14264E-01	8.77360E-02	0.0
56	1.00156E+02	0.0	0.0	4.38329E+01	5.63229E+01	0.0	0.0	4.68502E-03	2.97727E+00	8.87124E-02	0.0
57	9.35431E+01	0.0	0.0	6.15926E+01	3.19505E+01	0.0	0.0	4.93528E-03	2.24986E+00	8.84409E-02	0.0
58	3.53355E+02	0.0	0.0	2.85874E+02	6.74807E+01	0.0	0.0	4.95095E-03	9.59025E-01	8.66716E-02	0.0
59	4.90722E+01	0.0	0.0	3.62142E+01	1.28580E+01	0.0	0.0	5.60359E-03	7.87486E-01	8.81807E-02	0.0
60	2.61640E+01	0.0	0.0	1.43703E+01	1.17937E+01	0.0	0.0	5.68960E-03	7.72494E-01	8.90592E-02	0.0
61	2.96079E+01	0.0	0.0	1.77438E+01	1.18641E+01	0.0	0.0	5.68923E-03	7.85188E-01	8.85424E-02	0.0
62	3.90659E+01	0.0	0.0	2.70720E+01	1.19939E+01	0.0	0.0	5.69290E-03	7.91317E-01	8.91168E-02	0.0
63	9.52445E+01	0.0	0.0	8.25973E+01	1.26472E+01	0.0	0.0	5.71528E-03	9.05752E-01	8.68860E-02	0.0
64	1.90851E+02	0.0	0.0	1.78355E+02	1.24962E+01	0.0	0.0	5.65868E-03	8.03201E-01	8.77359E-02	0.0
65	1.37645E+02	0.0	0.0	1.24444E+02	1.32009E+01	0.0	0.0	5.56155E-03	7.98217E-01	8.87124E-02	0.0
66	5.52638E+01	0.0	0.0	3.92830E+01	1.59808E+01	0.0	0.0	5.79017E-03	1.07783E+00	8.84409E-02	0.0
67	8.35160E+01	0.0	0.0	5.17696E+01	3.17464E+01	0.0	0.0	6.02745E-03	2.27187E+00	8.66716E-02	0.0
68	5.76354E+01	0.0	0.0	4.30003E+01	1.46351E+01	0.0	0.0	5.53517E-03	9.48823E-01	8.81807E-02	0.0
69	8.25823E+01	0.0	0.0	6.54252E+01	1.71571E+01	0.0	0.0	5.44428E-03	1.08567E+00	8.90592E-02	0.0
70	1.47442E+02	0.0	0.0	1.24870E+02	2.25719E+01	0.0	0.0	1.11140E-02	1.40983E+00	8.85424E-02	0.0

NUCLID = 949FP237 MAT NUMBER = 4905 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 1 OF 4

GROUP I J= EXIT GROUP ** KK ** KK = I + J - 1

J=	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
1										
	9.53861E-05	3.81477E-03	2.49383E-02	7.47103E-02	1.78977E-01	2.56540E-01	4.65553E-01	6.25929E-01	5.02154E-01	5.83888E-01
	3.50071E-01	2.62484E-01	1.91467E-01	1.55373E-01	9.19405E-02	6.52302E-02	5.45920E-02	2.70305E-02	1.62302E-02	1.37989E-02
	9.59234E-03	6.17522E-03	3.33358E-03	2.84664E-03	4.58828E-04	2.77791E-04	1.63317E-04	9.97899E-05	6.06785E-05	3.62661E-05
	2.14128E-05	1.31401E-05	7.94534E-06	4.72141E-06	2.84000E-06	3.66204E-07	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
2										
	1.42696E-03	1.74228E-02	5.72558E-02	1.53087E-01	2.35923E-01	4.52726E-01	6.38731E-01	5.25968E-01	6.26714E-01	3.80260E-01
	2.87853E-01	2.11360E-01	1.72532E-01	1.02484E-01	7.30628E-02	6.13184E-02	3.04105E-02	1.81936E-02	1.56181E-02	1.07590E-02
	6.89714E-03	3.76833E-03	3.14180E-03	5.93375E-04	3.59579E-04	2.11550E-04	1.29331E-04	7.86747E-05	4.70375E-05	2.77796E-05
	1.70504E-05	1.03113E-05	6.12811E-06	3.68649E-06	1.85490E-06	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
3										
	8.75010E-03	4.66142E-02	1.20695E-01	2.07384E-01	4.20814E-01	6.22391E-01	5.29918E-01	6.47700E-01	4.00876E-01	3.07359E-01
	2.27753E-01	1.87468E-01	1.11981E-01	8.03719E-02	6.77337E-02	3.36798E-02	2.00656E-02	1.74391E-02	1.18820E-02	7.57801E-03
	4.20439E-03	3.40001E-03	7.66321E-04	4.64871E-04	2.73717E-04	1.67441E-04	1.01907E-04	6.09504E-05	3.60068E-05	2.21050E-05
	1.33705E-05	7.94725E-06	4.78134E-06	2.79743E-06	3.15429E-07	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
4										
	2.52354E-02	1.42165E-01	1.86746E-01	3.78447E-01	5.97821E-01	5.28714E-01	6.64539E-01	4.21914E-01	3.29126E-01	2.45224E-01
	2.04004E-01	1.22826E-01	9.09942E-02	7.52902E-02	3.75906E-02	2.23575E-02	1.96306E-02	1.32809E-02	8.44368E-03	4.74244E-03
	3.74748E-03	9.54205E-04	5.79532E-04	3.41540E-04	2.09076E-04	1.27316E-04	7.61801E-05	4.50184E-05	2.76443E-05	1.67243E-05
	9.94225E-06	5.98230E-06	3.50040E-06	1.62611E-06	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
5										
	7.91251E-02	2.35898E-01	3.79799E-01	5.46960E-01	4.86390E-01	6.57338E-01	4.30096E-01	3.46516E-01	2.60955E-01	2.20335E-01
	1.32681E-01	9.90183E-02	8.48660E-02	4.15245E-02	2.46795E-02	2.19084E-02	1.47295E-02	9.34050E-03	5.31375E-03	4.10227E-03
	1.17085E-03	7.12082E-04	4.20098E-04	2.57373E-04	1.56826E-04	9.38834E-05	5.55011E-05	3.40912E-05	2.06293E-05	1.22659E-05
	7.38145E-06	4.31953E-06	2.62994E-06	3.32724E-07	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
6										
	1.07934E-01	4.44971E-01	5.52150E-01	4.62576E-01	6.07031E-01	3.95229E-01	3.21950E-01	2.50352E-01	2.16547E-01	1.46164E-01
	1.12555E-01	9.73474E-02	4.98680E-02	2.87426E-02	2.79921E-02	1.72434E-02	1.08713E-02	6.32794E-03	4.67473E-03	1.61100E-03
	9.81030E-04	5.79363E-04	3.55361E-04	2.16628E-04	1.29743E-04	7.66720E-05	4.71124E-05	2.85220E-05	1.69684E-05	1.02074E-05
	5.97459E-06	3.64341E-06	1.20943E-06	2.97042E-07	9.61623E-08	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
7										
	2.15672E-01	6.35147E-01	4.79159E-01	5.35146E-01	3.53348E-01	2.98326E-01	2.31724E-01	1.98904E-01	1.20916E-01	9.36121E-02
	8.09522E-02	4.16706E-02	2.41970E-02	2.37152E-02	1.46160E-02	9.21157E-03	5.37017E-03	3.96478E-03	1.38823E-03	8.47014E-04
	5.37213E-04	3.31641E-04	2.01911E-04	1.22099E-04	7.42534E-05	4.74420E-05	3.05072E-05	1.83538E-05	1.09592E-05	6.37038E-06
	3.96470E-06	1.80554E-06	6.05611E-07	2.48357E-07	1.35545E-07	9.48535E-08	6.62304E-08	4.76346E-08	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
8										
	2.66514E-01	4.91510E-01	5.79086E-01	3.44938E-01	2.36940E-01	1.72576E-01	1.60661E-01	1.02434E-01	8.06503E-02	7.42651E-02
	3.83858E-02	2.20659E-02	2.18029E-02	1.56436E-02	9.29462E-03	5.67781E-03	3.98413E-03	2.87522E-03	1.08216E-03	7.26706E-04
	4.72179E-04	2.88526E-04	1.72880E-04	1.02169E-04	6.32274E-05	3.88114E-05	2.35266E-05	1.38667E-05	7.97963E-06	4.65486E-06
	2.65559E-06	1.21090E-06	4.62783E-07	1.52152E-07	9.96480E-08	6.72419E-08	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 949FP237 MAT NUMBER = 4905 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 2 OF 4

GROUP I J= EXIT GROUP ** KK ** KK = I + J - 1

J=	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
9										
	1.88824E-01	6.10580E-01	3.49385E-01	2.74528E-01	2.32507E-01	1.81054E-01	1.00394E-01	7.23076E-02	5.74595E-02	2.90279E-02
	1.76299E-02	1.67449E-02	1.10659E-02	6.65159E-03	4.43939E-03	3.72981E-03	3.32376E-03	1.97085E-03	1.63589E-03	1.01434E-03
	6.35280E-04	3.91660E-04	2.36985E-04	1.46316E-04	8.94483E-05	5.17218E-05	3.28915E-05	1.87674E-05	1.12824E-05	7.08239E-06
	3.58879E-06	2.01327E-06	1.34880E-06	9.38508E-07	6.40832E-07	4.95402E-07	3.43323E-07	2.71859E-07	2.37018E-07	1.64427E-07
	1.14279E-07	8.43646E-08	6.29541E-08	4.72844E-08	0.0	0.0	0.0			
10										
	1.94030E-01	3.34795E-01	3.08174E-01	1.95334E-01	1.59151E-01	9.67163E-02	7.97260E-02	8.12534E-02	4.35744E-02	2.52808E-02
	2.52740E-02	1.56199E-02	9.95549E-03	6.21673E-03	3.94655E-03	2.67527E-03	1.89589E-03	8.81552E-04	5.82568E-04	3.78428E-04
	2.36191E-04	1.48739E-04	9.48888E-05	7.01506E-05	4.10850E-05	3.31241E-05	2.79015E-05	1.37787E-05	4.78648E-06	2.50252E-06
	1.37205E-06	7.31226E-07	3.78535E-07	2.37574E-07	1.53478E-07	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
11										
	9.82336E-02	2.03756E-01	2.29901E-01	2.51888E-01	1.20589E-01	7.46001E-02	6.36725E-02	2.59001E-02	1.64345E-02	1.77316E-02
	1.40816E-02	1.03317E-02	6.99248E-03	4.71036E-03	3.63325E-03	2.57707E-03	1.63380E-03	1.50601E-03	9.60974E-04	7.13674E-04
	5.23666E-04	3.34591E-04	2.08470E-04	1.29166E-04	8.95433E-05	6.63201E-05	5.37425E-05	4.33822E-05	2.99435E-05	1.97672E-05
	9.63079E-06	6.26240E-06	4.19895E-06	2.44629E-06	1.47760E-06	9.68604E-07	6.95806E-07	4.81361E-07	2.40671E-07	1.78817E-07
	1.35711E-07	1.01641E-07	8.00356E-08	6.20152E-08	4.95714E-08	4.14584E-08	3.30173E-08			
12										
	7.18947E-02	1.67955E-01	1.45865E-01	1.67576E-01	1.60474E-01	1.03352E-01	4.45503E-02	2.23078E-02	2.05945E-02	1.51075E-02
	1.08827E-02	7.03210E-03	4.75648E-03	3.30676E-03	1.68466E-03	1.09283E-03	4.41455E-04	2.92055E-04	2.30960E-04	1.55200E-04
	9.55891E-05	5.81627E-05	3.48668E-05	2.10662E-05	1.24902E-05	7.65663E-06	4.86148E-06	2.84803E-06	1.59588E-06	1.02372E-06
	6.52695E-07	3.33555E-07	1.89905E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
13										
	2.22893E-02	1.08005E-01	7.52533E-02	4.38437E-02	1.07402E-01	8.31732E-02	5.13896E-02	4.04527E-02	1.66550E-02	1.16275E-02
	7.86904E-03	2.69435E-03	1.61706E-03	1.30466E-03	9.15990E-04	6.50461E-04	4.95353E-04	5.83205E-04	4.70859E-04	3.18237E-04
	2.24103E-04	1.58330E-04	1.09904E-04	8.19598E-05	4.82183E-05	4.83992E-05	4.02856E-05	2.24951E-05	1.11222E-05	7.89889E-06
	6.72738E-06	5.13302E-06	2.19883E-06	1.36734E-06	9.13405E-07	9.08682E-07	7.97464E-07	8.16904E-07	3.72360E-07	7.50260E-08
	8.00551E-08	8.37208E-08	8.15691E-08	8.40611E-09	0.0	0.0	0.0			
14										
	1.74639E-02	6.43139E-02	8.22661E-02	5.86896E-02	1.77739E-02	1.60693E-02	2.61153E-02	2.77918E-02	1.80347E-02	1.27542E-02
	8.73613E-03	4.65669E-03	2.63754E-03	1.72439E-03	1.24456E-03	7.75629E-04	4.91467E-04	3.19789E-04	2.27852E-04	1.73509E-04
	1.19683E-04	8.22560E-05	5.72136E-05	4.10542E-05	3.03136E-05	2.16001E-05	1.44081E-05	1.48102E-05	7.53596E-06	5.65751E-06
	5.63428E-06	5.37996E-06	7.16938E-08	4.68461E-08	2.57667E-08	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
15										
	8.04884E-03	3.59829E-02	6.76280E-02	4.88787E-02	2.00330E-02	1.22141E-02	5.09441E-03	3.74181E-03	2.14854E-03	2.16623E-03
	2.08106E-03	1.96457E-03	1.44981E-03	1.10044E-03	8.41976E-04	6.34970E-04	4.61212E-04	3.65372E-04	2.81442E-04	2.02587E-04
	1.56024E-04	1.17511E-04	9.08994E-05	6.98983E-05	4.97931E-05	3.86146E-05	4.26502E-05	2.52656E-05	1.31757E-05	1.17056E-05
	8.12572E-06	3.49071E-06	2.68631E-06	1.20350E-06	8.02101E-07	5.53648E-07	3.88543E-07	2.72203E-07	1.97614E-07	1.42621E-07
	1.08118E-07	8.42920E-08	6.62132E-08	5.21164E-08	4.31871E-08	0.0	0.0			
16										
	7.24673E-03	3.01330E-02	3.58064E-02	2.31502E-02	3.25746E-02	2.05845E-02	6.72137E-03	3.78816E-03	1.77620E-03	9.94881E-04
	6.56464E-04	2.84459E-04	2.10014E-04	1.61348E-04	1.18825E-04	8.79584E-05	6.87593E-05	5.41388E-05	4.11655E-05	3.36626E-05
	2.54197E-05	1.95193E-05	1.51790E-05	9.78360E-06	1.01206E-05	6.33753E-06	5.14424E-06	5.12545E-06	3.21006E-06	1.51708E-08
	9.57865E-09	5.98462E-09	3.83709E-09	2.34640E-09	1.55342E-09	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 949FP237 MAT NUMBER = 4905 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 3 OF 4

GROUP I	EXIT GROUP ** KK ** KK = I + J - 1									
J=	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
17										
	7.78760E-03	1.03146E-02	1.75277E-02	2.50814E-02	1.43105E-02	9.84907E-03	8.11239E-03	7.04634E-03	5.24569E-03	2.38465E-03
	1.79678E-03	1.30332E-03	8.31641E-04	1.90199E-04	1.08339E-04	6.64387E-05	4.07983E-05	2.41606E-05	1.44324E-05	9.07875E-06
	7.87594E-06	5.52964E-06	3.39383E-06	2.10076E-06	1.15510E-06	7.47644E-07	5.35982E-07	3.00751E-07	1.40717E-07	5.27436E-08
	3.21881E-08	2.13764E-08	1.10966E-08	7.17207E-09	4.87437E-09	3.17068E-09	2.07306E-09	1.39295E-09	1.12904E-09	5.78011E-10
	5.83915E-10	0.0	0.0	0.0	0.0	0.0	0.0			
18										
	3.89327E-03	8.74440E-03	4.02054E-03	1.64195E-02	1.94189E-02	9.14156E-03	2.05510E-03	6.65949E-04	1.07071E-03	7.93823E-04
	5.85811E-04	4.75579E-04	4.55782E-04	3.51404E-04	2.77111E-04	1.95104E-04	1.36796E-04	1.07021E-04	8.01638E-05	6.29030E-05
	5.07444E-05	3.74199E-05	2.79244E-05	2.51898E-05	1.44643E-05	1.74081E-05	9.26926E-06	7.87449E-06	7.61190E-06	4.43628E-06
	1.15317E-06	7.59145E-07	4.47353E-07	4.59549E-07	4.72451E-07	4.99085E-07	2.41589E-08	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
19										
	2.60444E-03	1.06398E-02	2.55759E-03	1.82182E-03	1.15058E-02	1.44081E-02	7.93952E-03	4.29584E-03	9.66967E-04	7.56647E-04
	4.65978E-04	5.64952E-05	3.60671E-05	2.48665E-05	1.94832E-05	1.57735E-05	7.83945E-06	4.02420E-06	2.84146E-06	2.06148E-06
	1.47258E-06	1.06818E-06	8.00661E-07	5.91449E-07	4.47233E-07	3.39637E-07	2.47650E-07	1.86793E-07	1.44985E-07	1.09691E-07
	8.76966E-08	6.17310E-08	5.44146E-08	3.23428E-08	3.30173E-08	2.25070E-08	1.18434E-08	1.22535E-08	1.26955E-08	1.31147E-08
	1.42296E-08	8.49237E-09	0.0	0.0	0.0	0.0	0.0			
20										
	3.10566E-03	8.42587E-03	4.40901E-03	1.16195E-04	9.79421E-04	4.27347E-03	4.35297E-03	4.37964E-03	3.46609E-03	2.47138E-03
	1.77263E-03	1.13616E-03	6.20806E-04	4.81890E-04	3.71507E-04	2.92116E-04	2.15889E-04	1.70230E-04	1.31913E-04	1.02302E-04
	7.53386E-05	5.39644E-05	4.79262E-05	3.74110E-05	2.12514E-05	2.67182E-05	2.55185E-05	6.71205E-06	1.24602E-06	1.21064E-06
	1.24029E-06	1.36285E-07	5.03709E-09	2.12499E-09	2.04781E-09	1.18263E-09	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
21										
	2.93103E-03	5.25731E-03	6.73231E-03	1.37864E-03	4.38936E-05	1.67703E-05	0.0	1.05697E-04	3.23480E-04	5.17389E-04
	4.82325E-04	4.29733E-04	2.90844E-04	1.86532E-04	1.21943E-04	7.96801E-05	5.39354E-05	3.65625E-05	2.56712E-05	1.72166E-05
	1.25478E-05	8.97310E-06	6.66719E-06	5.36478E-06	3.24060E-06	2.61703E-06	2.13389E-06	2.00589E-06	1.71159E-06	9.41362E-08
	6.29425E-08	4.65389E-08	2.85820E-08	2.37483E-08	1.20061E-08	9.45287E-09	9.62805E-09	9.79294E-09	7.68917E-09	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
22										
	3.53466E-03	2.80996E-03	5.58519E-03	4.36838E-03	1.08517E-03	1.09806E-05	8.60597E-06	6.74145E-06	4.86470E-06	1.61019E-07
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
23										
	3.28811E-03	3.34736E-03	1.46229E-03	4.04835E-03	3.69152E-03	1.01132E-03	7.21164E-04	1.23645E-06	8.79185E-07	7.30788E-07
	5.70792E-07	4.38634E-07	3.41078E-07	2.57478E-07	2.01954E-07	1.58321E-07	1.21625E-07	9.23763E-08	7.25599E-08	5.74273E-08
	4.49693E-08	3.33450E-08	2.48542E-08	2.25937E-08	1.12290E-08	1.74536E-08	7.04305E-09	7.00634E-09	7.15670E-09	4.26992E-09
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
24										
	2.70052E-03	4.66784E-03	0.0	2.54787E-04	2.47781E-03	1.99037E-03	1.95085E-03	1.08994E-03	2.73608E-04	2.13334E-04
	1.64359E-04	1.27463E-04	9.64431E-05	7.51220E-05	5.97472E-05	4.55498E-05	3.43896E-05	2.66636E-05	2.18944E-05	1.65075E-05
	1.25610E-05	9.92082E-06	8.67276E-06	3.30037E-06	6.15419E-06	6.03175E-06	1.93699E-06	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 949FP237 MAT NUMBER = 4905 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 4 OF 4

GROUP I	EXIT GROUP ** KK ** KK = I + J - 1									
J=	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
25										
	1.52899E-03	6.40875E-03	2.09221E-04	0.0	0.0	0.0	1.82647E-04	4.28496E-04	3.34584E-04	2.56844E-04
	2.00322E-04	1.50602E-04	1.18719E-04	9.23409E-05	7.10592E-05	5.49735E-05	4.26052E-05	3.35243E-05	2.57778E-05	2.05253E-05
	1.49015E-05	1.10428E-05	9.47542E-06	7.62822E-06	3.49568E-06	6.36477E-06	6.32907E-06	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
26										
	1.64315E-05	6.52880E-03	2.38039E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
27										
	0.0	4.23774E-03	5.39665E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
28										
	0.0	7.87965E-04	6.22114E-03	3.16180E-03	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
29										
	0.0	0.0	2.01445E-03	4.83054E-03	3.45940E-03	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
30										
	0.0	0.0	0.0	3.55396E-04	3.39169E-03	2.63921E-03	1.99277E-03	9.17757E-04	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
31										
	0.0	0.0	0.0	0.0	0.0	0.0	4.76316E-04	9.24524E-04	7.11857E-04	5.42329E-04
	4.27422E-04	3.34055E-04	2.56034E-04	1.99732E-04	1.52090E-04	1.17081E-04	9.14692E-05	7.08172E-05	5.71845E-05	4.23794E-05
	3.29791E-05	2.46986E-05	2.03974E-05	1.50071E-05	8.50945E-06	1.43576E-05	1.25374E-05	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Fission products due to fission of ^{235}U with thermal neutrons.

NUCLID = 925FP234 MAT NO = 2505
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 2

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	8.82988E+00	0.0	0.0	8.62634E-04	4.87420E+00	3.95482E+00	0.0	3.57010E-01	2.71697E-01	3.73649E-03	0.0
2	8.53718E+00	0.0	0.0	2.21720E-03	4.45579E+00	4.07917E+00	0.0	3.31579E-01	2.46153E-01	1.32440E-02	0.0
3	8.34990E+00	0.0	0.0	5.38033E-03	4.28806E+00	4.05646E+00	0.0	3.01324E-01	2.37093E-01	3.16559E-02	0.0
4	8.62738E+00	0.0	0.0	1.10833E-02	4.51999E+00	4.09631E+00	0.0	2.83904E-01	2.48454E-01	5.76319E-02	0.0
5	9.40611E+00	0.0	0.0	2.02774E-02	5.32102E+00	4.06481E+00	0.0	2.74899E-01	2.73704E-01	8.84748E-02	0.0
6	1.01675E+01	0.0	0.0	3.47228E-02	6.32073E+00	3.81207E+00	0.0	2.65228E-01	3.84793E-01	9.14632E-02	0.0
7	1.09442E+01	0.0	0.0	4.88788E-02	7.65681E+00	3.23848E+00	0.0	2.48809E-01	3.76140E-01	1.26293E-01	0.0
8	1.15809E+01	0.0	0.0	6.04455E-02	9.13306E+00	2.38738E+00	0.0	2.27927E-01	4.10400E-01	1.32114E-01	0.0
9	1.24265E+01	0.0	0.0	7.08835E-02	1.04567E+01	1.89894E+00	0.0	2.04989E-01	6.11634E-01	9.18870E-02	0.0
10	1.30410E+01	0.0	0.0	7.78698E-02	1.16565E+01	1.30660E+00	0.0	1.83373E-01	5.46846E-01	1.10458E-01	0.0
11	1.33991E+01	0.0	0.0	8.76355E-02	1.24379E+01	8.73517E-01	0.0	1.67487E-01	7.96487E-01	8.23092E-02	0.0
12	1.37932E+01	0.0	0.0	9.68414E-02	1.29979E+01	6.98422E-01	0.0	1.53926E-01	8.82655E-01	7.96285E-02	0.0
13	1.40185E+01	0.0	0.0	1.05272E-01	1.35269E+01	3.86292E-01	0.0	1.39378E-01	9.71772E-01	7.68831E-02	0.0
14	1.44706E+01	0.0	0.0	1.15962E-01	1.40811E+01	2.73563E-01	0.0	1.22677E-01	9.04538E-01	8.78220E-02	0.0
15	1.49247E+01	0.0	0.0	1.28739E-01	1.46087E+01	1.87305E-01	0.0	1.05981E-01	1.12760E+00	7.41157E-02	0.0
16	1.53755E+01	0.0	0.0	1.39939E-01	1.50945E+01	1.41043E-01	0.0	9.07505E-02	1.13909E+00	7.68832E-02	0.0
17	1.59336E+01	0.0	0.0	1.57141E-01	1.56817E+01	9.47831E-02	0.0	7.39893E-02	9.32483E-01	9.91197E-02	0.0
18	1.64888E+01	0.0	0.0	1.78912E-01	1.62512E+01	5.87048E-02	0.0	5.92940E-02	1.25572E+00	7.68832E-02	0.0
19	1.69860E+01	0.0	0.0	1.98684E-01	1.67371E+01	5.01782E-02	0.0	5.01772E-02	1.58987E+00	6.28182E-02	0.0
20	1.72422E+01	0.0	0.0	2.25381E-01	1.69823E+01	3.44954E-02	0.0	4.22176E-02	1.14853E+00	8.87124E-02	0.0
21	1.73769E+01	0.0	0.0	2.64062E-01	1.71000E+01	1.28582E-02	0.0	3.42998E-02	1.16178E+00	8.84409E-02	0.0
22	1.76196E+01	0.0	0.0	3.07567E-01	1.73005E+01	1.15392E-02	0.0	2.78766E-02	1.20045E+00	8.66716E-02	0.0
23	1.77644E+01	0.0	0.0	3.58461E-01	1.73942E+01	1.17600E-02	0.0	2.29010E-02	1.18333E+00	8.81807E-02	0.0
24	1.79838E+01	0.0	0.0	4.18364E-01	1.75544E+01	1.10205E-02	0.0	1.88840E-02	1.17757E+00	8.90592E-02	0.0
25	1.87919E+01	0.0	0.0	4.88592E-01	1.82970E+01	6.26232E-03	0.0	1.54928E-02	1.23591E+00	8.85424E-02	0.0
26	1.93545E+01	0.0	0.0	5.68138E-01	1.87814E+01	4.91411E-03	0.0	1.29370E-02	1.25545E+00	8.91168E-02	0.0
27	1.99980E+01	0.0	0.0	6.57229E-01	1.93355E+01	5.30435E-03	0.0	1.10624E-02	1.31890E+00	8.68860E-02	0.0
28	2.08157E+01	0.0	0.0	7.56983E-01	2.00531E+01	5.59973E-03	0.0	9.56853E-03	1.34643E+00	8.77359E-02	0.0
29	2.18975E+01	0.0	0.0	8.73529E-01	2.10183E+01	5.67324E-03	0.0	8.31080E-03	1.39179E+00	8.87124E-02	0.0
30	2.47501E+01	0.0	0.0	1.01322E+00	2.37318E+01	5.11848E-03	0.0	7.11290E-03	1.57997E+00	8.84409E-02	0.0
31	2.50331E+01	0.0	0.0	1.14001E+00	2.38906E+01	2.49503E-03	0.0	6.40842E-03	1.59864E+00	8.66716E-02	0.0
32	2.34992E+01	0.0	0.0	1.29583E+00	2.22034E+01	0.0	0.0	5.94984E-03	1.45373E+00	8.81807E-02	0.0
33	2.65856E+01	0.0	0.0	1.62921E+00	2.49564E+01	0.0	0.0	5.91939E-03	1.77768E+00	8.90592E-02	0.0
34	2.72039E+01	0.0	0.0	1.76796E+00	2.54359E+01	0.0	0.0	5.52731E-03	1.63377E+00	8.85424E-02	0.0
35	3.03637E+01	0.0	0.0	2.02644E+00	2.83373E+01	0.0	0.0	5.34082E-03	1.78850E+00	8.91169E-02	0.0

TO BE CONTINUED

NUCLID = 925FP234 MAT NO = 2505
INFINITE DILUTION CROSS SECTION

PAGE 2 OF 2

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
36	2.93795E+01	0.0	0.0	2.41343E+00	2.69661E+01	0.0	0.0	5.46543E-03	2.54102E+00	8.68860E-02	0.0
37	3.02513E+01	0.0	0.0	2.67125E+00	2.75801E+01	0.0	0.0	5.34630E-03	1.61510E+00	8.77359E-02	0.0
38	3.20672E+01	0.0	0.0	3.66468E+00	2.84025E+01	0.0	0.0	5.32723E-03	2.19673E+00	8.87124E-02	0.0
39	5.09589E+01	0.0	0.0	4.36618E+00	4.65927E+01	0.0	0.0	5.11656E-03	2.57119E+00	8.84409E-02	0.0
40	3.56778E+01	0.0	0.0	5.18392E+00	3.04939E+01	0.0	0.0	5.48111E-03	1.86382E+00	8.66716E-02	0.0
41	7.18218E+01	0.0	0.0	7.54567E+00	6.42761E+01	0.0	0.0	5.14118E-03	4.57683E+00	8.81807E-02	0.0
42	5.72278E+01	0.0	0.0	9.23236E+00	4.79954E+01	0.0	0.0	5.22984E-03	1.96465E+00	8.90592E-02	0.0
43	4.74728E+01	0.0	0.0	7.91344E+00	3.95594E+01	0.0	0.0	5.15951E-03	2.05429E+00	8.85424E-02	0.0
44	5.42885E+01	0.0	0.0	9.12411E+00	4.51644E+01	0.0	0.0	5.05625E-03	1.12060E+00	8.91169E-02	0.0
45	5.20948E+01	0.0	0.0	9.53846E+00	4.25563E+01	0.0	0.0	5.08306E-03	1.61780E+00	8.68860E-02	0.0
46	6.31982E+01	0.0	0.0	1.96881E+01	4.35101E+01	0.0	0.0	5.40600E-03	1.65055E+00	8.77359E-02	0.0
47	3.04699E+01	0.0	0.0	1.06430E+01	1.98269E+01	0.0	0.0	5.42880E-03	1.12433E+00	8.87124E-02	0.0
48	3.94049E+01	0.0	0.0	1.66746E+01	2.27303E+01	0.0	0.0	5.41127E-03	1.48072E+00	8.84408E-02	0.0
49	3.99906E+01	0.0	0.0	1.78729E+01	2.21177E+01	0.0	0.0	5.47418E-03	1.58915E+00	8.66716E-02	0.0
50	1.32578E+02	0.0	0.0	4.40462E+01	8.85317E+01	0.0	0.0	5.35209E-03	1.17864E+00	8.81807E-02	0.0
51	2.42952E+01	0.0	0.0	8.32111E+00	1.59741E+01	0.0	0.0	5.65052E-03	8.23519E-01	8.90592E-02	0.0
52	2.93397E+01	0.0	0.0	1.52800E+01	1.40597E+01	0.0	0.0	5.82251E-03	9.22468E-01	8.85424E-02	0.0
53	3.70015E+01	0.0	0.0	1.83870E+01	1.86145E+01	0.0	0.0	5.46021E-03	1.31733E+00	8.91169E-02	0.0
54	2.99217E+02	0.0	0.0	9.75011E+01	2.01716E+02	0.0	0.0	5.17646E-03	1.86124E+00	8.68860E-02	0.0
55	2.70402E+01	0.0	0.0	1.07846E+01	1.62556E+01	0.0	0.0	5.62799E-03	8.69893E-01	8.77360E-02	0.0
56	6.06161E+01	0.0	0.0	2.70881E+01	3.35280E+01	0.0	0.0	4.92548E-03	1.85014E+00	8.87124E-02	0.0
57	7.36761E+01	0.0	0.0	5.11396E+01	2.25365E+01	0.0	0.0	5.21119E-03	1.77500E+00	8.84409E-02	0.0
58	2.94587E+02	0.0	0.0	2.26938E+02	6.76485E+01	0.0	0.0	4.82436E-03	9.36685E-01	8.66716E-02	0.0
59	4.64806E+01	0.0	0.0	3.36413E+01	1.28393E+01	0.0	0.0	5.72843E-03	8.02204E-01	8.81807E-02	0.0
60	2.07332E+01	0.0	0.0	8.99434E+00	1.17389E+01	0.0	0.0	5.83979E-03	7.89155E-01	8.90592E-02	0.0
61	2.08486E+01	0.0	0.0	9.06034E+00	1.17883E+01	0.0	0.0	5.83945E-03	8.01664E-01	8.85424E-02	0.0
62	2.67494E+01	0.0	0.0	1.48037E+01	1.19457E+01	0.0	0.0	5.83127E-03	8.06645E-01	8.91168E-02	0.0
63	5.07075E+01	0.0	0.0	3.83837E+01	1.23238E+01	0.0	0.0	5.82880E-03	8.74687E-01	8.68860E-02	0.0
64	9.88830E+01	0.0	0.0	8.63745E+01	1.25085E+01	0.0	0.0	5.78249E-03	8.40580E-01	8.77359E-02	0.0
65	1.09456E+02	0.0	0.0	9.60848E+01	1.33716E+01	0.0	0.0	5.68894E-03	8.36373E-01	8.87124E-02	0.0
66	3.80748E+01	0.0	0.0	2.46566E+01	1.34182E+01	0.0	0.0	5.78171E-03	9.03968E-01	8.84409E-02	0.0
67	4.19442E+01	0.0	0.0	2.52117E+01	1.67325E+01	0.0	0.0	5.83369E-03	1.16072E+00	8.66716E-02	0.0
68	4.36477E+01	0.0	0.0	2.88657E+01	1.47820E+01	0.0	0.0	5.64233E-03	9.76291E-01	8.81807E-02	0.0
69	6.17158E+01	0.0	0.0	4.46257E+01	1.70901E+01	0.0	0.0	5.54332E-03	1.10003E+00	8.90592E-02	0.0
70	1.05691E+02	0.0	0.0	8.36817E+01	2.20091E+01	0.0	0.0	1.09042E-02	1.39410E+00	8.85424E-02	0.0

NUCLID = 925FP234 MAT NUMBER = 2505 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 1 OF 4

GROUP EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
1	8.75407E-05	3.36547E-03	2.47316E-02	7.32812E-02	1.75457E-01	2.52104E-01	4.59826E-01	6.21280E-01	5.00737E-01	5.84186E-01
	3.51304E-01	2.63878E-01	1.92928E-01	1.56686E-01	9.28895E-02	6.57983E-02	5.51094E-02	2.73252E-02	1.65158E-02	1.38990E-02
	9.78477E-03	6.33749E-03	3.37601E-03	2.96532E-03	3.86802E-04	2.34165E-04	1.37660E-04	8.41092E-05	5.11417E-05	3.05653E-05
	1.80465E-05	1.10741E-05	6.69603E-06	3.97898E-06	2.39340E-06	3.64937E-07	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
2	1.11610E-03	1.65140E-02	5.73120E-02	1.53580E-01	2.35741E-01	4.51872E-01	6.37118E-01	5.24521E-01	6.25161E-01	3.79278E-01
	2.87122E-01	2.11031E-01	1.72214E-01	1.02399E-01	7.28347E-02	6.11387E-02	3.03510E-02	1.82782E-02	1.55206E-02	1.08314E-02
	6.98728E-03	3.76382E-03	3.23389E-03	5.01634E-04	3.03957E-04	1.78814E-04	1.09312E-04	6.64937E-05	3.97535E-05	2.34772E-05
	1.44094E-05	8.71407E-06	5.17877E-06	3.11537E-06	1.22004E-06	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
3	7.37970E-03	4.55300E-02	1.20062E-01	2.09745E-01	4.23451E-01	6.21850E-01	5.26735E-01	6.41430E-01	3.95698E-01	3.02771E-01
	2.24214E-01	1.84253E-01	1.10057E-01	7.87429E-02	6.63260E-02	3.29934E-02	1.97839E-02	1.69972E-02	1.17335E-02	7.53126E-03
	4.11630E-03	3.43644E-03	6.47312E-04	3.92636E-04	2.31166E-04	1.41402E-04	8.60552E-05	5.14677E-05	3.04039E-05	1.86649E-05
	1.12895E-05	6.71025E-06	4.03708E-06	2.36196E-06	3.67676E-07	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
4	2.19517E-02	1.36923E-01	1.91895E-01	3.80528E-01	6.03029E-01	5.29745E-01	6.60602E-01	4.16811E-01	3.23854E-01	2.40529E-01
	1.99490E-01	1.19965E-01	8.88235E-02	7.31534E-02	3.65152E-02	2.18474E-02	1.89610E-02	1.29895E-02	8.30917E-03	4.59730E-03
	3.75010E-03	8.11962E-04	4.93085E-04	2.90568E-04	1.77861E-04	1.08302E-04	6.48002E-05	3.82923E-05	2.35134E-05	1.42250E-05
	8.45632E-06	5.08815E-06	2.97718E-06	1.20630E-06	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
5	7.06975E-02	2.25915E-01	3.89908E-01	5.61656E-01	4.83713E-01	6.52437E-01	4.27183E-01	3.45100E-01	2.58507E-01	2.17397E-01
	1.30425E-01	9.71904E-02	8.31832E-02	4.05245E-02	2.42010E-02	2.12593E-02	1.44456E-02	9.20798E-03	5.16851E-03	4.10437E-03
	1.02777E-03	6.24995E-04	3.68688E-04	2.25862E-04	1.37617E-04	8.23811E-05	4.86997E-05	2.99128E-05	1.81005E-05	1.07621E-05
	6.47644E-06	3.78990E-06	2.30746E-06	3.93003E-07	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
6	1.02633E-01	4.21185E-01	5.58969E-01	4.75036E-01	6.11655E-01	3.86264E-01	3.10524E-01	2.38057E-01	2.04099E-01	1.41438E-01
	1.12832E-01	9.75312E-02	5.03509E-02	2.92424E-02	2.85022E-02	1.75300E-02	1.10783E-02	6.40289E-03	4.80010E-03	1.56055E-03
	9.50036E-04	5.60956E-04	3.44117E-04	2.09722E-04	1.25595E-04	7.41744E-05	4.55780E-05	2.75970E-05	1.64224E-05	9.87494E-06
	5.78037E-06	3.52890E-06	1.34365E-06	4.76229E-07	1.28781E-07	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
7	2.00014E-01	5.83136E-01	4.70894E-01	5.27995E-01	3.50227E-01	2.93192E-01	2.26130E-01	1.91203E-01	1.15821E-01	8.80950E-02
	7.51886E-02	3.84449E-02	2.23399E-02	2.19834E-02	1.35111E-02	8.54987E-03	4.91388E-03	3.72857E-03	1.16325E-03	7.11815E-04
	4.72287E-04	2.92632E-04	1.77533E-04	1.08819E-04	6.72790E-05	4.45102E-05	2.99190E-05	1.81622E-05	1.07475E-05	6.32964E-06
	3.98692E-06	1.94037E-06	8.63344E-07	4.00608E-07	2.29226E-07	1.60410E-07	1.12005E-07	8.05566E-08	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
8	2.37659E-01	4.16439E-01	5.25341E-01	3.22280E-01	2.21548E-01	1.58248E-01	1.50664E-01	9.36809E-02	7.54436E-02	7.07355E-02
	3.62350E-02	2.07440E-02	2.03257E-02	1.47601E-02	8.74528E-03	5.28843E-03	3.74725E-03	2.74887E-03	9.87555E-04	6.65891E-04
	4.33714E-04	2.65050E-04	1.58362E-04	9.37180E-05	5.79217E-05	3.56576E-05	2.19738E-05	1.25960E-05	7.14029E-06	4.19591E-06
	2.51776E-06	1.22322E-06	4.81655E-07	1.41844E-07	9.46720E-08	6.38841E-08	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 925FP234 MAT NUMBER = 2505 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 2 OF 4

GROUP EXIT GROUP ** KK ** KK = I + J - 1

I	J= 1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
9	1.80492E-01	5.00834E-01	2.95736E-01	2.49377E-01	2.12379E-01	1.64466E-01	9.14915E-02	6.27441E-02	5.26682E-02	2.64662E-02
	1.55938E-02	1.47233E-02	9.92448E-03	5.96817E-03	3.93869E-03	3.33509E-03	3.04561E-03	1.77775E-03	1.50230E-03	9.35415E-04
	5.92120E-04	3.69431E-04	2.24763E-04	1.39754E-04	8.52962E-05	4.90345E-05	3.16237E-05	1.76791E-05	1.08630E-05	7.05547E-06
	3.56845E-06	2.01948E-06	1.39091E-06	1.00204E-06	7.03279E-07	5.66706E-07	4.21241E-07	3.55191E-07	3.09670E-07	2.14829E-07
	1.49309E-07	1.10225E-07	8.22512E-08	6.17784E-08	0.0	0.0	0.0			
10	1.82347E-01	2.71257E-01	2.22877E-01	1.51550E-01	1.33404E-01	8.29122E-02	7.08150E-02	6.99143E-02	3.80112E-02	2.22626E-02
	2.17927E-02	1.36101E-02	8.93335E-03	5.66760E-03	3.70577E-03	2.61023E-03	1.90601E-03	9.45367E-04	6.62030E-04	4.51114E-04
	3.05756E-04	2.03504E-04	1.32841E-04	1.13445E-04	6.60975E-05	5.90970E-05	5.38887E-05	2.15790E-05	2.84443E-06	1.54926E-06
	7.72159E-07	3.15238E-07	1.65891E-07	1.07399E-07	6.73713E-08	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
11	9.06419E-02	1.90255E-01	1.60731E-01	1.49857E-01	8.35544E-02	5.91574E-02	5.12001E-02	2.10748E-02	1.27075E-02	1.37246E-02
	1.11606E-02	8.24576E-03	5.82989E-03	3.99220E-03	3.24498E-03	2.37046E-03	1.50335E-03	1.36312E-03	8.61122E-04	6.58124E-04
	4.93954E-04	3.20466E-04	2.02221E-04	1.27075E-04	8.29402E-05	5.16930E-05	3.62097E-05	2.50335E-05	1.83929E-05	1.35249E-05
	4.41036E-06	3.00743E-06	2.26039E-06	1.08042E-06	5.46106E-07	3.28231E-07	2.44981E-07	1.62552E-07	2.20611E-08	1.63912E-08
	1.24399E-08	9.31693E-09	7.33645E-09	5.68461E-09	4.54396E-09	3.80028E-09	3.02653E-09			
12	6.62848E-02	1.55717E-01	1.30928E-01	1.02967E-01	8.44145E-02	5.82645E-02	3.05216E-02	1.79758E-02	1.59770E-02	1.18426E-02
	8.30375E-03	5.42506E-03	3.66497E-03	2.58794E-03	1.43926E-03	9.81811E-04	3.67033E-04	2.44967E-04	1.88764E-04	1.27051E-04
	7.82894E-05	4.76256E-05	2.85350E-05	1.72550E-05	1.02164E-05	6.26315E-06	3.98331E-06	2.33534E-06	1.36213E-06	8.96614E-07
	5.70574E-07	2.93611E-07	1.63431E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
13	1.80639E-02	9.56724E-02	6.85262E-02	3.98969E-02	6.10075E-02	3.86064E-02	2.14555E-02	1.77272E-02	7.94084E-03	5.44922E-03
	3.92516E-03	1.87451E-03	1.22097E-03	9.88769E-04	7.41745E-04	5.63284E-04	4.46099E-04	5.81288E-04	4.76043E-04	3.21487E-04
	2.31882E-04	1.66028E-04	1.15590E-04	8.82111E-05	4.77850E-05	5.38308E-05	4.67320E-05	2.37548E-05	9.60847E-06	6.70516E-06
	5.70970E-06	4.49264E-06	1.73010E-06	1.09662E-06	7.36449E-07	7.24594E-07	6.00198E-07	6.03282E-07	2.89039E-07	7.96819E-08
	8.50231E-08	8.89162E-08	8.66310E-08	9.70424E-09	0.0	0.0	0.0			
14	1.29003E-02	5.42895E-02	6.76559E-02	5.39536E-02	1.77784E-02	1.29546E-02	1.51516E-02	1.51736E-02	9.09946E-03	5.62315E-03
	3.41279E-03	2.06264E-03	1.17088E-03	7.70675E-04	5.73554E-04	3.49792E-04	2.15959E-04	1.36840E-04	9.17377E-05	6.22123E-05
	4.14658E-05	2.81341E-05	1.91094E-05	1.36041E-05	9.90532E-06	7.05137E-06	4.56496E-06	4.63361E-06	2.30114E-06	1.70738E-06
	1.71683E-06	1.62753E-06	4.56012E-09	2.97967E-09	1.63890E-09	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
15	4.99317E-03	3.22835E-02	5.68913E-02	4.17885E-02	1.84747E-02	1.21683E-02	5.69559E-03	4.20372E-03	2.15037E-03	1.64521E-03
	1.44423E-03	1.39895E-03	1.03582E-03	7.88241E-04	5.91559E-04	4.40292E-04	3.20242E-04	2.44134E-04	1.85400E-04	1.33028E-04
	1.04047E-04	7.92369E-05	6.26247E-05	4.80902E-05	3.19347E-05	2.81366E-05	3.02947E-05	1.79728E-05	7.42489E-06	7.26352E-06
	5.12213E-06	1.90779E-06	1.64579E-06	9.92411E-07	6.61734E-07	4.62446E-07	3.24526E-07	2.27376E-07	1.65099E-07	1.19133E-07
	9.10224E-08	7.09638E-08	5.57436E-08	4.38758E-08	3.63584E-08	0.0	0.0			
16	4.62826E-03	2.63450E-02	3.21277E-02	1.78799E-02	2.72921E-02	1.85802E-02	5.95844E-03	3.44587E-03	1.60103E-03	1.02158E-03
	7.11329E-04	3.40926E-04	2.57535E-04	2.00658E-04	1.52318E-04	1.14161E-04	8.98015E-05	7.11413E-05	5.37611E-05	4.22558E-05
	3.21157E-05	2.49859E-05	1.96322E-05	1.26804E-05	1.32990E-05	8.34421E-06	6.79803E-06	6.80487E-06	4.26912E-06	2.43526E-09
	1.53759E-09	9.60669E-10	6.15941E-10	3.76651E-10	2.49359E-10	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 925FP234 MAT NUMBER = 2505 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 3 OF 4

GROUP I	J= EXIT GROUP ** KK ** KK = I + J - 1									
	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
17										
	5.00514E-03	7.61253E-03	1.67673E-02	2.32239E-02	1.12791E-02	7.64707E-03	6.53002E-03	6.12378E-03	4.54581E-03	2.10449E-03
	1.62034E-03	1.18512E-03	7.57718E-04	1.53548E-04	8.49599E-05	5.20833E-05	3.20467E-05	1.89648E-05	1.13181E-05	7.29761E-06
	7.12783E-06	5.24481E-06	3.21939E-06	1.99208E-06	1.08714E-06	7.18733E-07	5.11676E-07	2.73981E-07	1.32588E-07	5.58150E-08
	3.46485E-08	2.22140E-08	1.28102E-08	8.27962E-09	5.82709E-09	3.66032E-09	2.39319E-09	1.60806E-09	1.30339E-09	6.67270E-10
	6.74086E-10	0.0	0.0	0.0	0.0	0.0	0.0			
18										
	2.47336E-03	5.77889E-03	2.48014E-03	1.59620E-02	1.85920E-02	8.03864E-03	1.73839E-03	2.40624E-04	6.83160E-04	5.24637E-04
	3.92327E-04	3.23217E-04	3.34171E-04	2.58570E-04	2.03952E-04	1.58511E-04	1.20407E-04	9.41767E-05	7.05913E-05	5.53584E-05
	4.46232E-05	3.29884E-05	2.46192E-05	2.21142E-05	1.28116E-05	1.52059E-05	8.28022E-06	6.92231E-06	6.62825E-06	3.87585E-06
	1.09627E-06	7.21685E-07	4.25278E-07	4.36873E-07	4.59138E-07	4.74458E-07	2.29668E-08	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
19										
	1.43391E-03	7.37386E-03	1.35968E-03	1.42944E-03	1.13777E-02	1.37195E-02	7.24498E-03	3.94035E-03	9.78867E-04	7.71361E-04
	4.73629E-04	2.70851E-05	1.71218E-05	1.16762E-05	8.10850E-06	5.66719E-06	2.45315E-06	1.00904E-06	6.30222E-07	4.10729E-07
	2.57220E-07	1.69948E-07	1.12226E-07	6.94897E-08	5.04456E-08	3.64821E-08	2.15849E-08	1.26246E-08	9.30891E-09	6.97693E-09
	5.57799E-09	3.92643E-09	3.46107E-09	2.05718E-09	2.10009E-09	1.43157E-09	7.53305E-10	7.79391E-10	8.07506E-10	8.34169E-10
	9.05083E-10	5.40162E-10	0.0	0.0	0.0	0.0	0.0			
20										
	1.71111E-03	5.89947E-03	2.77319E-03	5.15781E-05	6.42893E-04	4.15914E-03	4.16884E-03	4.10497E-03	3.31558E-03	2.40484E-03
	1.79276E-03	1.13258E-03	5.35116E-04	4.15420E-04	3.20706E-04	2.53054E-04	1.88197E-04	1.50191E-04	1.16412E-04	9.15527E-05
	6.70647E-05	4.77379E-05	4.31410E-05	3.37815E-05	1.90629E-05	2.38836E-05	2.24479E-05	6.29627E-06	1.41177E-06	1.37873E-06
	1.42169E-06	1.52173E-07	2.14064E-09	9.03068E-10	8.10269E-10	5.02589E-10	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
21										
	1.61372E-03	3.73929E-03	4.70953E-03	6.91994E-04	1.94841E-05	7.44420E-06	0.0	5.83313E-05	2.22751E-04	3.42048E-04
	3.29339E-04	3.52053E-04	2.44695E-04	1.63076E-04	1.09779E-04	7.31221E-05	5.10321E-05	3.58067E-05	2.60008E-05	1.78972E-05
	1.33318E-05	9.82123E-06	7.52869E-06	6.16961E-06	3.66525E-06	3.10255E-06	2.50616E-06	2.41905E-06	2.11589E-06	3.40640E-08
	2.16300E-08	1.40960E-08	9.55273E-09	3.81215E-09	1.92726E-09	1.51740E-09	1.54552E-09	1.57199E-09	1.23429E-09	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
22										
	1.94606E-03	1.66174E-03	4.36821E-03	3.00241E-03	5.46919E-04	4.87421E-06	3.82013E-06	2.99248E-06	2.15941E-06	7.14752E-08
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
23										
	1.81031E-03	1.84294E-03	1.25386E-03	3.26653E-03	2.71002E-03	5.10115E-04	3.63759E-04	6.19651E-07	3.90264E-07	3.24391E-07
	2.53370E-07	1.94707E-07	1.51402E-07	1.14293E-07	8.96457E-08	7.02774E-08	5.39885E-08	4.10052E-08	3.22088E-08	2.54916E-08
	1.99615E-08	1.48016E-08	1.10326E-08	1.00292E-08	4.98446E-09	7.74755E-09	3.12636E-09	3.11006E-09	3.17681E-09	1.89539E-09
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
24										
	1.48681E-03	2.56995E-03	0.0	2.18470E-04	2.12462E-03	1.68901E-03	1.51226E-03	8.12280E-04	1.38009E-04	1.07607E-04
	8.29035E-05	6.42929E-05	4.86464E-05	3.78919E-05	3.01368E-05	2.29756E-05	1.73463E-05	1.34493E-05	1.10437E-05	8.32644E-06
	6.33583E-06	5.00411E-06	4.37458E-06	1.66472E-06	3.10420E-06	3.04244E-06	9.77027E-07	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 925FP234 MAT NUMBER = 2505 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 4 OF 4

GROUP I	J= EXIT GROUP ** KK ** KK = I + J - 1									
	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
25										
	8.41809E-04	3.52843E-03	1.15189E-04	0.0	0.0	0.0	1.56613E-04	3.67419E-04	2.86893E-04	2.20234E-04
	1.71768E-04	1.29135E-04	1.01797E-04	7.91788E-05	6.09305E-05	4.71377E-05	3.65324E-05	2.87458E-05	2.21035E-05	1.75997E-05
	1.27775E-05	9.46875E-06	8.12482E-06	6.54091E-06	2.99741E-06	5.45755E-06	5.42694E-06	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
26										
	9.04661E-06	3.59452E-03	1.31056E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
27										
	0.0	2.33315E-03	2.97120E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
28										
	0.0	4.33825E-04	3.42514E-03	1.74077E-03	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
29										
	0.0	0.0	1.10909E-03	2.65952E-03	1.90462E-03	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
30										
	0.0	0.0	0.0	1.95669E-04	1.86734E-03	1.45305E-03	1.09715E-03	5.05284E-04	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
31										
	0.0	0.0	0.0	0.0	0.0	0.0	2.62243E-04	5.09010E-04	3.91923E-04	2.98587E-04
	2.35323E-04	1.83919E-04	1.40963E-04	1.09965E-04	8.37351E-05	6.44605E-05	5.03597E-05	3.89895E-05	3.14837E-05	2.33326E-05
	1.81571E-05	1.35982E-05	1.12301E-05	8.26237E-06	4.68500E-06	7.90478E-06	6.90264E-06	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Fission products due to fission of ^{238}U with fission spectrum neutrons.

NUCLID = 928FP237 MAT NO = 2805
INFINITE DILUTION CROSS SECTION

PAGE 1 OF 2

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
1	8.85462E+00	0.0	0.0	1.07033E-03	4.89110E+00	3.96245E+00	0.0	3.95554E-01	2.56277E-01	3.73649E-03	0.0
2	8.54915E+00	0.0	0.0	2.79969E-03	4.46176E+00	4.08459E+00	0.0	3.65866E-01	2.33555E-01	1.32440E-02	0.0
3	8.37778E+00	0.0	0.0	7.10350E-03	4.29333E+00	4.07735E+00	0.0	3.28117E-01	2.26704E-01	3.16559E-02	0.0
4	8.66126E+00	0.0	0.0	1.48198E-02	4.53276E+00	4.11368E+00	0.0	3.06524E-01	2.38975E-01	5.76319E-02	0.0
5	9.44174E+00	0.0	0.0	2.64209E-02	5.33866E+00	4.07666E+00	0.0	2.96108E-01	2.63454E-01	8.84748E-02	0.0
6	1.02211E+01	0.0	0.0	4.32066E-02	6.32870E+00	3.84918E+00	0.0	2.86484E-01	3.68891E-01	9.14632E-02	0.0
7	1.10395E+01	0.0	0.0	5.92317E-02	7.64921E+00	3.33103E+00	0.0	2.71911E-01	3.59571E-01	1.26293E-01	0.0
8	1.17358E+01	0.0	0.0	7.34075E-02	9.10989E+00	2.55249E+00	0.0	2.52815E-01	3.90186E-01	1.32114E-01	0.0
9	1.25781E+01	0.0	0.0	8.53267E-02	1.04085E+01	2.08424E+00	0.0	2.31012E-01	5.79409E-01	9.18870E-02	0.0
10	1.31747E+01	0.0	0.0	9.43336E-02	1.15755E+01	1.50485E+00	0.0	2.09795E-01	5.17661E-01	1.10458E-01	0.0
11	1.35195E+01	0.0	0.0	1.06505E-01	1.23423E+01	1.07071E+00	0.0	1.93683E-01	7.53893E-01	8.23092E-02	0.0
12	1.38919E+01	0.0	0.0	1.18763E-01	1.29007E+01	8.72415E-01	0.0	1.79084E-01	8.37487E-01	7.96285E-02	0.0
13	1.41043E+01	0.0	0.0	1.31637E-01	1.34552E+01	5.17510E-01	0.0	1.62621E-01	9.27073E-01	7.68831E-02	0.0
14	1.45477E+01	0.0	0.0	1.49133E-01	1.40570E+01	3.41984E-01	0.0	1.43282E-01	8.70263E-01	8.78220E-02	0.0
15	1.50009E+01	0.0	0.0	1.69443E-01	1.46144E+01	2.17059E-01	0.0	1.23975E-01	1.08834E+00	7.41157E-02	0.0
16	1.54390E+01	0.0	0.0	1.84723E-01	1.50876E+01	1.66705E-01	0.0	1.06517E-01	1.10146E+00	7.68832E-02	0.0
17	1.59683E+01	0.0	0.0	2.08094E-01	1.56457E+01	1.14527E-01	0.0	8.70725E-02	9.03053E-01	9.91197E-02	0.0
18	1.64884E+01	0.0	0.0	2.37665E-01	1.61782E+01	7.24879E-02	0.0	6.98629E-02	1.21623E+00	7.68832E-02	0.0
19	1.69608E+01	0.0	0.0	2.64548E-01	1.66341E+01	6.21772E-02	0.0	5.91702E-02	1.53954E+00	6.28182E-02	0.0
20	1.72144E+01	0.0	0.0	3.00276E-01	1.68691E+01	4.49970E-02	0.0	4.96967E-02	1.11343E+00	8.87124E-02	0.0
21	1.73588E+01	0.0	0.0	3.51583E-01	1.69866E+01	2.06462E-02	0.0	4.01612E-02	1.12835E+00	8.84409E-02	0.0
22	1.75923E+01	0.0	0.0	4.09043E-01	1.71640E+01	1.92405E-02	0.0	3.24314E-02	1.16597E+00	8.66716E-02	0.0
23	1.77854E+01	0.0	0.0	4.75523E-01	1.72897E+01	2.01667E-02	0.0	2.63662E-02	1.15353E+00	8.81807E-02	0.0
24	1.80602E+01	0.0	0.0	5.52896E-01	1.74875E+01	1.98458E-02	0.0	2.14761E-02	1.15242E+00	8.90592E-02	0.0
25	1.87821E+01	0.0	0.0	6.42102E-01	1.81271E+01	1.28723E-02	0.0	1.74345E-02	1.20300E+00	8.85424E-02	0.0
26	1.93476E+01	0.0	0.0	7.42624E-01	1.85942E+01	1.07531E-02	0.0	1.44082E-02	1.22193E+00	8.91168E-02	0.0
27	2.00101E+01	0.0	0.0	8.53617E-01	1.91449E+01	1.16071E-02	0.0	1.21446E-02	1.28489E+00	8.68860E-02	0.0
28	2.08579E+01	0.0	0.0	9.77711E-01	1.98679E+01	1.22534E-02	0.0	1.03656E-02	1.31365E+00	8.77359E-02	0.0
29	2.19257E+01	0.0	0.0	1.12152E+00	2.07918E+01	1.24143E-02	0.0	8.89633E-03	1.35633E+00	8.87124E-02	0.0
30	2.42976E+01	0.0	0.0	1.29139E+00	2.29950E+01	1.12003E-02	0.0	7.50277E-03	1.50605E+00	8.84409E-02	0.0
31	2.48665E+01	0.0	0.0	1.45977E+00	2.34013E+01	5.45967E-03	0.0	6.66450E-03	1.54460E+00	8.66716E-02	0.0
32	2.39479E+01	0.0	0.0	1.64888E+00	2.22990E+01	0.0	0.0	6.09676E-03	1.44854E+00	8.81807E-02	0.0
33	2.62940E+01	0.0	0.0	2.03040E+00	2.42636E+01	0.0	0.0	6.08167E-03	1.70015E+00	8.90592E-02	0.0
34	2.75693E+01	0.0	0.0	2.23743E+00	2.53319E+01	0.0	0.0	5.46269E-03	1.60394E+00	8.85424E-02	0.0
35	3.07037E+01	0.0	0.0	2.56520E+00	2.81385E+01	0.0	0.0	5.31092E-03	1.74406E+00	8.91169E-02	0.0

TO BE CONTINUED

NUCLID = 928FP237 MAT NO = 2805
INFINITE DILUTION CROSS SECTION

PAGE 2 OF 2

GROUP	TOTAL	FISSION	NU	CAPTURE	ELASTIC	INELA	N2N	EL MU	EL REMOVAL	FLUX	CHI
36	2.98098E+01	0.0	0.0	3.03430E+00	2.67755E+01	0.0	0.0	5.42302E-03	2.38703E+00	8.68860E-02	0.0
37	3.08087E+01	0.0	0.0	3.40160E+00	2.74071E+01	0.0	0.0	5.32597E-03	1.61996E+00	8.77359E-02	0.0
38	3.35743E+01	0.0	0.0	4.61728E+00	2.89570E+01	0.0	0.0	5.28963E-03	2.09295E+00	8.87124E-02	0.0
39	5.31495E+01	0.0	0.0	5.52451E+00	4.76250E+01	0.0	0.0	5.10589E-03	2.56893E+00	8.84409E-02	0.0
40	3.68580E+01	0.0	0.0	6.21375E+00	3.06442E+01	0.0	0.0	5.42247E-03	1.85165E+00	8.66716E-02	0.0
41	6.75705E+01	0.0	0.0	8.95552E+00	5.86150E+01	0.0	0.0	5.15140E-03	4.07611E+00	8.81807E-02	0.0
42	5.74758E+01	0.0	0.0	1.06809E+01	4.67949E+01	0.0	0.0	5.19697E-03	2.09910E+00	8.90592E-02	0.0
43	5.00080E+01	0.0	0.0	1.00564E+01	3.99516E+01	0.0	0.0	5.11718E-03	2.04692E+00	8.85424E-02	0.0
44	5.23087E+01	0.0	0.0	1.14438E+01	4.08649E+01	0.0	0.0	5.06981E-03	1.16845E+00	8.91169E-02	0.0
45	5.12829E+01	0.0	0.0	1.18936E+01	3.93893E+01	0.0	0.0	5.09186E-03	1.67076E+00	8.68860E-02	0.0
46	6.45245E+01	0.0	0.0	2.06111E+01	4.39134E+01	0.0	0.0	5.32823E-03	1.67627E+00	8.77359E-02	0.0
47	3.95544E+01	0.0	0.0	1.57163E+01	2.38381E+01	0.0	0.0	5.29609E-03	1.30089E+00	8.87124E-02	0.0
48	4.97860E+01	0.0	0.0	2.27983E+01	2.69877E+01	0.0	0.0	5.24379E-03	1.78420E+00	8.84408E-02	0.0
49	4.55674E+01	0.0	0.0	2.20684E+01	2.34990E+01	0.0	0.0	5.35864E-03	1.58718E+00	8.66716E-02	0.0
50	1.41289E+02	0.0	0.0	5.27282E+01	8.85603E+01	0.0	0.0	5.26849E-03	1.30372E+00	8.81807E-02	0.0
51	3.54306E+01	0.0	0.0	1.64006E+01	1.90300E+01	0.0	0.0	5.61779E-03	1.01029E+00	8.90592E-02	0.0
52	3.69320E+01	0.0	0.0	2.12447E+01	1.56873E+01	0.0	0.0	5.59644E-03	9.79792E-01	8.85424E-02	0.0
53	4.83102E+01	0.0	0.0	2.61539E+01	2.21563E+01	0.0	0.0	5.28834E-03	1.55944E+00	8.91169E-02	0.0
54	3.96771E+02	0.0	0.0	1.33408E+02	2.63363E+02	0.0	0.0	5.16189E-03	2.22648E+00	8.68860E-02	0.0
55	3.99197E+01	0.0	0.0	2.11066E+01	1.88131E+01	0.0	0.0	5.46531E-03	9.11565E-01	8.77360E-02	0.0
56	1.05866E+02	0.0	0.0	4.84317E+01	5.74340E+01	0.0	0.0	4.68840E-03	3.00755E+00	8.87124E-02	0.0
57	9.93482E+01	0.0	0.0	6.69165E+01	3.24317E+01	0.0	0.0	4.93533E-03	2.24653E+00	8.84409E-02	0.0
58	3.39889E+02	0.0	0.0	2.63464E+02	7.64249E+01	0.0	0.0	4.80501E-03	9.69539E-01	8.66716E-02	0.0
59	5.25291E+01	0.0	0.0	3.94350E+01	1.30941E+01	0.0	0.0	5.62790E-03	7.98428E-01	8.81807E-02	0.0
60	2.60661E+01	0.0	0.0	1.42344E+01	1.18317E+01	0.0	0.0	5.74268E-03	7.80906E-01	8.90592E-02	0.0
61	2.91989E+01	0.0	0.0	1.73300E+01	1.18689E+01	0.0	0.0	5.74491E-03	7.93146E-01	8.85424E-02	0.0
62	4.06309E+01	0.0	0.0	2.86355E+01	1.19954E+01	0.0	0.0	5.74704E-03	7.97888E-01	8.91168E-02	0.0
63	9.14239E+01	0.0	0.0	7.87593E+01	1.26646E+01	0.0	0.0	5.76541E-03	9.11544E-01	8.68860E-02	0.0
64	1.87008E+02	0.0	0.0	1.74405E+02	1.26031E+01	0.0	0.0	5.69840E-03	8.20646E-01	8.77359E-02	0.0
65	1.80191E+02	0.0	0.0	1.66473E+02	1.37177E+01	0.0	0.0	5.56948E-03	8.06153E-01	8.87124E-02	0.0
66	5.62911E+01	0.0	0.0	4.18564E+01	1.44347E+01	0.0	0.0	5.78838E-03	9.73640E-01	8.84409E-02	0.0
67	6.97105E+01	0.0	0.0	4.58417E+01	2.38688E+01	0.0	0.0	5.96812E-03	1.69324E+00	8.66716E-02	0.0
68	5.94986E+01	0.0	0.0	4.52949E+01	1.42037E+01	0.0	0.0	5.59694E-03	9.32702E-01	8.81807E-02	0.0
69	8.62225E+01	0.0	0.0	6.98971E+01	1.63254E+01	0.0	0.0	5.50541E-03	1.04794E+00	8.90592E-02	0.0
70	1.54745E+02	0.0	0.0	1.33885E+02	2.08600E+01	0.0	0.0	1.18426E-02	1.32423E+00	8.85424E-02	0.0

NUCLID = 928FP237 MAT NUMBER = 2805 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 1 OF 4

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

J=	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
1	9.36410E-05	3.61867E-03	2.47082E-02	7.38766E-02	1.77223E-01	2.54512E-01	4.63068E-01	6.24081E-01	5.01702E-01	5.84232E-01
	3.50727E-01	2.63178E-01	1.92145E-01	1.55983E-01	9.23650E-02	6.55025E-02	5.48368E-02	2.71653E-02	1.63460E-02	1.38526E-02
	9.66872E-03	6.23661E-03	3.35252E-03	2.88883E-03	4.36913E-04	2.64522E-04	1.55515E-04	9.50231E-05	5.77799E-05	3.45337E-05
	2.03899E-05	1.25124E-05	7.56578E-06	4.49586E-06	2.70433E-06	4.02967E-07	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
2	1.31259E-03	1.70746E-02	5.70392E-02	1.52752E-01	2.35319E-01	4.51788E-01	6.37771E-01	5.25439E-01	6.26422E-01	3.80205E-01
	2.87883E-01	2.11486E-01	1.72646E-01	1.02596E-01	7.30963E-02	6.13552E-02	3.04401E-02	1.82500E-02	1.56133E-02	1.08002E-02
	6.93744E-03	3.77348E-03	3.17632E-03	5.65553E-04	3.42718E-04	2.01630E-04	1.23266E-04	7.49852E-05	4.48316E-05	2.64768E-05
	1.62508E-05	9.82776E-06	5.84071E-06	3.51360E-06	1.53141E-06	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
3	8.21855E-03	4.62433E-02	1.20255E-01	2.07707E-01	4.21037E-01	6.21699E-01	5.28737E-01	6.45792E-01	3.99432E-01	3.06134E-01
	2.26850E-01	1.86661E-01	1.11514E-01	7.99658E-02	6.73871E-02	3.35146E-02	2.00090E-02	1.73276E-02	1.18553E-02	7.57651E-03
	4.18382E-03	3.41778E-03	7.29773E-04	4.42698E-04	2.60661E-04	1.59453E-04	9.70454E-05	5.80427E-05	3.42890E-05	2.10504E-05
	1.27326E-05	7.56809E-06	4.55322E-06	2.66396E-06	3.71973E-07	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
4	2.39849E-02	1.39790E-01	1.88842E-01	3.78616E-01	5.98550E-01	5.28495E-01	6.62880E-01	4.20199E-01	3.27472E-01	2.43806E-01
	2.02673E-01	1.22001E-01	9.03784E-02	7.46812E-02	3.72876E-02	2.22199E-02	1.94405E-02	1.32042E-02	8.41131E-03	4.70237E-03
	3.75301E-03	9.10448E-04	5.52954E-04	3.25876E-04	1.99486E-04	1.21476E-04	7.26857E-05	4.29534E-05	2.63762E-05	1.59572E-05
	9.48618E-06	5.70788E-06	3.33983E-06	1.50613E-06	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
5	7.59827E-02	2.31299E-01	3.83435E-01	5.53135E-01	4.85093E-01	6.55011E-01	4.28646E-01	3.45941E-01	2.60145E-01	2.19426E-01
	1.32003E-01	9.84819E-02	8.43819E-02	4.12364E-02	2.45473E-02	2.17209E-02	1.46530E-02	9.30757E-03	5.27302E-03	4.10721E-03
	1.12670E-03	6.85231E-04	4.04258E-04	2.47669E-04	1.50912E-04	9.03434E-05	5.34083E-05	3.28057E-05	1.98515E-05	1.18034E-05
	7.10312E-06	4.15665E-06	2.53078E-06	3.88748E-07	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
6	1.05960E-01	4.34431E-01	5.53445E-01	4.68012E-01	6.10902E-01	3.93591E-01	3.18934E-01	2.46507E-01	2.12995E-01	1.44356E-01
	1.12459E-01	9.72219E-02	4.99719E-02	2.88951E-02	2.81479E-02	1.73312E-02	1.09359E-02	6.35071E-03	4.71490E-03	1.59388E-03
	9.70531E-04	5.73139E-04	3.51569E-04	2.14300E-04	1.28346E-04	7.58290E-05	4.65949E-05	2.82104E-05	1.67848E-05	1.00954E-05
	5.90921E-06	3.60509E-06	1.27786E-06	3.42560E-07	9.72873E-08	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
7	2.10302E-01	6.13454E-01	4.73621E-01	5.33553E-01	3.24228E-01	2.98715E-01	2.31923E-01	1.98372E-01	1.20328E-01	9.25956E-02
	7.98783E-02	4.09208E-02	2.37464E-02	2.33121E-02	1.43545E-02	9.05641E-03	5.26015E-03	3.91292E-03	1.33238E-03	8.14109E-04
	5.19448E-04	3.20896E-04	1.95158E-04	1.18555E-04	7.25679E-05	4.68509E-05	3.06233E-05	1.85371E-05	1.10411E-05	6.43288E-06
	4.02524E-06	1.89620E-06	7.09578E-07	3.01717E-07	1.72522E-07	1.20729E-07	8.42979E-08	6.06292E-08	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
8	2.57700E-01	4.64465E-01	5.55867E-01	3.36021E-01	2.33412E-01	1.68705E-01	1.58301E-01	1.00818E-01	8.01855E-02	7.45246E-02
	3.83002E-02	2.19842E-02	2.16603E-02	1.56612E-02	9.31904E-03	5.69736E-03	3.99704E-03	2.88228E-03	1.08612E-03	7.21012E-04
	4.66337E-04	2.85032E-04	1.70591E-04	1.00968E-04	6.24067E-05	3.83244E-05	2.33730E-05	1.36727E-05	7.82838E-06	4.55677E-06
	2.64204E-06	1.24669E-06	4.68284E-07	1.37293E-07	9.04497E-08	6.10349E-08	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 928FP237 MAT NUMBER = 2805 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 2 OF 4

GROUP I — EXIT GROUP ** KK ** KK = I + J - 1

J=	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47			
9	1.89951E-01	5.73383E-01	3.32684E-01	2.63732E-01	2.24349E-01	1.75912E-01	9.88441E-02	7.07951E-02	5.75581E-02	2.87383E-02
	1.72805E-02	1.63753E-02	1.08743E-02	6.53555E-03	4.35578E-03	3.60827E-03	3.20215E-03	1.89621E-03	1.58917E-03	9.85743E-04
	6.18901E-04	3.82588E-04	2.31737E-04	1.43111E-04	8.75425E-05	5.05506E-05	3.22540E-05	1.84155E-05	1.10391E-05	6.94661E-06
	3.56041E-06	2.03386E-06	1.38679E-06	9.89856E-07	6.93531E-07	5.52870E-07	4.05347E-07	3.35507E-07	2.92508E-07	2.02923E-07
	1.41034E-07	1.04116E-07	7.76929E-08	5.83547E-08	0.0	0.0	0.0			
10	1.96191E-01	3.15519E-01	2.80045E-01	1.82520E-01	1.52497E-01	9.16498E-02	7.60771E-02	7.75364E-02	4.21010E-02	2.44683E-02
	2.43302E-02	1.50472E-02	9.69909E-03	6.06705E-03	3.86608E-03	2.65398E-03	1.89874E-03	9.03758E-04	6.10139E-04	4.01996E-04
	2.58406E-04	1.65942E-04	1.06766E-04	8.34616E-05	4.87602E-05	4.08364E-05	3.55167E-05	1.58736E-05	3.99726E-06	2.09959E-06
	1.08188E-06	5.45476E-07	2.73651E-07	1.72641E-07	1.10378E-07	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
11	1.00262E-01	2.05076E-01	2.06295E-01	2.14046E-01	1.08760E-01	7.15931E-02	6.25724E-02	2.50542E-02	1.54124E-02	1.62855E-02
	1.29196E-02	9.46234E-03	6.58304E-03	4.49112E-03	3.47580E-03	2.47520E-03	1.55847E-03	1.40831E-03	8.93169E-04	6.67596E-04
	4.92773E-04	3.17180E-04	1.98716E-04	1.23918E-04	8.43913E-05	5.92663E-05	4.62191E-05	3.59768E-05	2.53314E-05	1.72236E-05
	7.46642E-06	4.88267E-06	3.35847E-06	1.88281E-06	1.11371E-06	7.20936E-07	5.19977E-07	3.56484E-07	1.59908E-07	1.18810E-07
	9.01698E-08	6.75329E-08	5.31776E-08	4.12044E-08	3.29365E-08	2.75460E-08	2.19375E-08			
12	7.31612E-02	1.70277E-01	1.42375E-01	1.43849E-01	1.32396E-01	8.52426E-02	3.95129E-02	2.10080E-02	1.96545E-02	1.48089E-02
	1.06701E-02	7.05610E-03	4.84294E-03	3.39524E-03	1.71996E-03	1.09395E-03	4.35377E-04	2.91534E-04	2.29505E-04	1.55029E-04
	9.55296E-05	5.80875E-05	3.48409E-05	2.10498E-05	1.24698E-05	7.65746E-06	4.85748E-06	2.84622E-06	1.62060E-06	1.06328E-06
	6.84812E-07	3.37123E-07	1.94393E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
13	2.29044E-02	1.10022E-01	7.54419E-02	4.25787E-02	9.06072E-02	6.66798E-02	4.02681E-02	3.10514E-02	1.33068E-02	9.23308E-03
	6.33765E-03	2.26282E-03	1.38672E-03	1.14398E-03	8.39851E-04	6.18765E-04	4.77834E-04	6.33967E-04	5.20513E-04	3.50140E-04
	2.47316E-04	1.74275E-04	1.20670E-04	9.00096E-05	5.15067E-05	5.33264E-05	4.49012E-05	2.42442E-05	1.11852E-05	8.01642E-06
	6.73209E-06	5.05433E-06	2.34597E-06	1.46688E-06	9.77387E-07	9.66749E-07	8.42469E-07	8.62525E-07	3.93335E-07	7.98649E-08
	8.52184E-08	8.91205E-08	8.68300E-08	1.10368E-08	0.0	0.0	0.0			
14	1.76123E-02	6.53537E-02	8.01905E-02	5.89276E-02	1.79719E-02	1.48450E-02	2.22121E-02	2.29489E-02	1.46686E-02	1.00053E-02
	6.73327E-03	3.78949E-03	2.12666E-03	1.37846E-03	9.86821E-04	6.08722E-04	3.82668E-04	2.48224E-04	1.73387E-04	1.26165E-04
	8.66136E-05	5.98029E-05	4.16251E-05	3.00454E-05	2.22680E-05	1.59464E-05	1.05558E-05	1.09346E-05	5.53137E-06	4.15167E-06
	4.16569E-06	3.98975E-06	3.11495E-08	2.03537E-08	1.11951E-08	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
15	7.77529E-03	3.71407E-02	6.83212E-02	4.83979E-02	1.99716E-02	1.27423E-02	5.48703E-03	3.92276E-03	2.12731E-03	1.95490E-03
	1.79096E-03	1.88451E-03	1.39606E-03	1.05622E-03	7.92932E-04	5.88065E-04	4.20893E-04	3.22392E-04	2.43492E-04	1.74516E-04
	1.34222E-04	1.01071E-04	7.89002E-05	6.05976E-05	4.23815E-05	3.36398E-05	3.70909E-05	2.18659E-05	1.10822E-05	1.02002E-05
	7.13056E-06	2.99415E-06	2.41821E-06	1.25164E-06	8.34761E-07	5.80041E-07	4.07057E-07	2.85188E-07	2.07060E-07	1.49424E-07
	1.13760E-07	8.86906E-08	6.96683E-08	5.48359E-08	4.54407E-08	0.0	0.0			
16	7.34898E-03	3.08002E-02	3.72553E-02	2.30406E-02	3.20662E-02	2.06931E-02	6.68573E-03	3.85923E-03	1.90082E-03	1.05212E-03
	6.98906E-04	3.17422E-04	2.35822E-04	1.81579E-04	1.34194E-04	9.95196E-05	7.78836E-05	6.13801E-05	4.65004E-05	3.72987E-05
	2.82128E-05	2.17465E-05	1.69818E-05	1.09579E-05	1.14032E-05	7.13844E-06	5.81050E-06	5.80178E-06	3.63337E-06	1.01724E-08
	6.42275E-09	4.01285E-09	2.57287E-09	1.57333E-09	1.04161E-09	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 928FP237 MAT NUMBER = 2805 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 3 OF 4

GROUP I	J=	EXIT GROUP ** KK ** KK = I + J - 1									
		1	2	3	4	5	6	7	8	9	10
		11	12	13	14	15	16	17	18	19	20
		21	22	23	24	25	26	27	28	29	30
		31	32	33	34	35	36	37	38	39	40
		41	42	43	44	45	46	47			
17											
		8.02938E-03	9.87292E-03	1.87940E-02	2.68336E-02	1.42386E-02	9.68896E-03	7.85499E-03	7.02929E-03	5.36917E-03	2.39749E-03
		1.79866E-03	1.30359E-03	8.31583E-04	1.92624E-04	1.10035E-04	6.74865E-05	4.14251E-05	2.45253E-05	1.46649E-05	9.33500E-06
		8.85753E-06	6.43949E-06	3.93065E-06	2.41941E-06	1.36396E-06	8.63667E-07	6.06235E-07	3.50078E-07	1.67222E-07	6.90291E-08
		4.23580E-08	2.78161E-08	1.49439E-08	9.65873E-09	6.56438E-09	4.27001E-09	2.79181E-09	1.87591E-09	1.52050E-09	7.78415E-10
		7.86367E-10	0.0	0.0	0.0	0.0	0.0	0.0			
18											
		4.87957E-03	8.23595E-03	3.31448E-03	1.83118E-02	2.08976E-02	9.37966E-03	2.37068E-03	5.53841E-04	1.00586E-03	7.38906E-04
		5.36890E-04	4.37188E-04	4.25920E-04	3.28627E-04	2.59159E-04	1.93589E-04	1.42605E-04	1.11574E-04	8.35830E-05	6.55557E-05
		5.29193E-05	3.90268E-05	2.91110E-05	2.63058E-05	1.49911E-05	1.82247E-05	9.70106E-06	8.20358E-06	7.89353E-06	4.59367E-06
		1.14744E-06	7.55370E-07	4.45128E-07	4.57264E-07	4.70102E-07	4.96603E-07	2.40387E-08	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
19											
		3.13771E-03	1.11006E-02	1.50428E-03	2.20165E-03	1.33852E-02	1.53466E-02	8.06759E-03	4.47669E-03	1.21972E-03	9.61836E-04
		5.94021E-04	6.30454E-05	4.01518E-05	2.75482E-05	1.99096E-05	1.46589E-05	6.63178E-06	2.95916E-06	1.95762E-06	1.34524E-06
		9.02797E-07	6.28013E-07	4.46477E-07	3.08374E-07	2.29628E-07	1.71462E-07	1.16992E-07	8.25032E-08	6.32050E-08	4.76583E-08
		3.81024E-08	2.68208E-08	2.36420E-08	1.40523E-08	1.43454E-08	9.77881E-09	5.14571E-09	5.32390E-09	5.51595E-09	5.69808E-09
		6.18248E-09	3.68976E-09	0.0	0.0	0.0	0.0	0.0			
20											
		3.74265E-03	9.13586E-03	3.46492E-03	1.06188E-04	1.18353E-03	5.17704E-03	5.02123E-03	4.82637E-03	3.82275E-03	2.70141E-03
		1.93218E-03	1.20913E-03	6.14188E-04	4.76355E-04	3.67014E-04	2.91145E-04	2.17481E-04	1.71244E-04	1.32620E-04	1.02580E-04
		7.56133E-05	5.46705E-05	4.79345E-05	3.74567E-05	2.15619E-05	2.65978E-05	2.49164E-05	7.33337E-06	1.62287E-06	1.57914E-06
		1.62349E-06	1.77139E-07	5.33408E-09	2.25028E-09	2.16855E-09	1.25236E-09	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
21											
		3.53117E-03	6.60149E-03	6.62074E-03	5.47181E-04	4.01135E-05	1.53260E-05	0.0	1.27344E-04	3.91448E-04	6.25547E-04
		5.83560E-04	5.22207E-04	3.53681E-04	2.27071E-04	1.48179E-04	9.60482E-05	6.49580E-05	4.39928E-05	3.08758E-05	2.06790E-05
		1.50589E-05	1.07600E-05	7.99764E-06	6.44457E-06	3.86844E-06	3.13225E-06	2.55517E-06	2.41753E-06	2.06900E-06	8.17578E-08
		5.22109E-08	3.44639E-08	2.16066E-08	1.59239E-08	8.05045E-09	6.33841E-09	6.45587E-09	6.56643E-09	5.15580E-09	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
22											
		4.25839E-03	3.48641E-03	6.92814E-03	4.12808E-03	4.10859E-04	1.00350E-05	7.86482E-06	6.16088E-06	4.44575E-06	1.47152E-07
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
23											
		3.96136E-03	4.03274E-03	2.15733E-03	5.33434E-03	4.02706E-03	3.79206E-04	2.70408E-04	4.99425E-07	8.03470E-07	6.67852E-07
		5.21635E-07	4.00859E-07	3.11704E-07	2.35304E-07	1.84561E-07	1.44686E-07	1.11151E-07	8.44208E-08	6.63111E-08	5.24816E-08
		4.10965E-08	3.04733E-08	2.27138E-08	2.06479E-08	1.02619E-08	1.59505E-08	6.43650E-09	6.40295E-09	6.54036E-09	3.90219E-09
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
24											
		3.25346E-03	5.62360E-03	0.0	3.75889E-04	3.65552E-03	2.88136E-03	2.37784E-03	1.22683E-03	1.02592E-04	7.99920E-05
		6.16282E-05	4.77936E-05	3.61624E-05	2.81678E-05	2.24029E-05	1.70794E-05	1.28948E-05	9.99783E-06	8.20957E-06	6.18965E-06
		4.70989E-06	3.71992E-06	3.25195E-06	1.23751E-06	2.30758E-06	2.26167E-06	7.26295E-07	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			

TO BE CONTINUED

NUCLID = 928FP237 MAT NUMBER = 2805 IPL = 0

TABLE OF INELASTIC MATRICES

PAGE 4 OF 4

GROUP I	J=	EXIT GROUP ** KK ** KK = I + J - 1									
		1	2	3	4	5	6	7	8	9	10
		11	12	13	14	15	16	17	18	19	20
		21	22	23	24	25	26	27	28	29	30
		31	32	33	34	35	36	37	38	39	40
		41	42	43	44	45	46	47			
25											
		1.84206E-03	7.72097E-03	2.52059E-04	0.0	0.0	0.0	2.69460E-04	6.32163E-04	4.93614E-04	3.78925E-04
		2.95536E-04	2.22184E-04	1.75147E-04	1.36231E-04	1.04834E-04	8.11029E-05	6.28558E-05	4.94586E-05	3.80302E-05	3.02812E-05
		2.19843E-05	1.62915E-05	1.39792E-05	1.12540E-05	5.15721E-06	9.38999E-06	9.33732E-06	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
26											
		1.97959E-05	7.86559E-03	2.86778E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
27											
		0.0	5.10544E-03	6.50163E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
28											
		0.0	9.49304E-04	7.49494E-03	3.80919E-03	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
29											
		0.0	0.0	2.42692E-03	5.81960E-03	4.16772E-03	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
30											
		0.0	0.0	0.0	4.28165E-04	4.08615E-03	3.17960E-03	2.40079E-03	1.10567E-03	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
31											
		0.0	0.0	0.0	0.0	0.0	0.0	5.73844E-04	1.11382E-03	8.57612E-04	6.53373E-04
		5.14938E-04	4.02454E-04	3.08458E-04	2.40628E-04	1.83230E-04	1.41054E-04	1.10198E-04	8.53173E-05	6.88932E-05	5.10568E-05
		3.97317E-05	2.97558E-05	2.45738E-05	1.80798E-05	1.02518E-05	1.72974E-05	1.51045E-05	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Appendix 3. Tables of the concentrations at various Burn-up Stages

Appendix 3.1 FP due to ^{239}Pu fission with thermal neutrons

PU-239(THERMAL) PAGE 1

NO	NUCLIDE	NCAT	BURN-UP TIME 1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
1	30ZN 72	2	9.35407E-07	1.03625E-07	5.18796E-08	1.72814E-08	8.63915E-09	4.31924E-09
2	31GA 72	2	1.22845E-07	3.14833E-08	1.57318E-08	5.24035E-09	2.61971E-09	1.30975E-09
3	32GE 72	2	5.45101E-08	9.79036E-07	1.04600E-06	1.09033E-06	1.10140E-06	1.10694E-06
4	32GE 73	1	2.47704E-06	2.47967E-06	2.47805E-06	2.47635E-06	2.47591E-06	2.47572E-06
5	32GE 74	2	5.95692E-06	5.96326E-06	5.95935E-06	5.95527E-06	5.95421E-06	5.95375E-06
6	32GE 76	2	3.07574E-05	3.07901E-05	3.07699E-05	3.07488E-05	3.07434E-05	3.07410E-05
7	32GE 77	1	4.50348E-05	1.95018E-06	9.74452E-07	3.24595E-07	1.62269E-07	8.11281E-08
8	33AS 75	1	1.38895E-05	1.39042E-05	1.38951E-05	1.38856E-05	1.38831E-05	1.38821E-05
9	33AS 76	2	1.62362E-10	1.16209E-13	5.80666E-12	1.93423E-12	9.66943E-13	4.83434E-13
10	33AS 77	1	3.51809E-05	6.68018E-06	3.33791E-06	1.11188E-06	5.55839E-07	2.77898E-07
11	34SE 76	2	5.62591E-11	2.07233E-10	2.12904E-10	2.16626E-10	2.17555E-10	2.18021E-10
12	34SE 77	1	5.83386E-06	7.75158E-05	8.17773E-05	8.45942E-05	8.52973E-05	8.56498E-05
13	34SE 78	2	2.86103E-04	2.86407E-04	2.86219E-04	2.86023E-04	2.85973E-04	2.85951E-04
14	34SE 79	1	2.48005E-04	2.48268E-04	2.48105E-04	2.47935E-04	2.47890E-04	2.47870E-04
15	34SE 80	2	4.78157E-04	4.78666E-04	4.78352E-04	4.78024E-04	4.77940E-04	4.77903E-04
16	35BR 81	1	1.81953E-03	1.32153E-03	1.82033E-03	1.61908E-03	1.81876E-03	1.81862E-03
17	35BR 82	2	2.89369E-05	2.57178E-06	1.28305E-06	4.28056E-07	2.13990E-07	1.06987E-07
18	36KR 82	2	7.34588E-06	3.37496E-05	3.50125E-05	3.58447E-05	3.60523E-05	3.61565E-05
19	36KR 83	1	2.93400E-03	2.93312E-03	2.93120E-03	2.92919E-03	2.92867E-03	2.92845E-03
20	36KR 84	2	4.69635E-03	4.70135E-03	4.69827E-03	4.69505E-03	4.69422E-03	4.69385E-03
21	36KR 85	1	1.51514E-03	1.51293E-03	1.50795E-03	1.49110E-03	1.46753E-03	1.42225E-03
22	36KR 86	2	7.45049E-03	7.45841E-03	7.45352E-03	7.44842E-03	7.44710E-03	7.44652E-03
23	37RB 85	1	4.61885E-03	4.62763E-03	4.62358E-03	4.64123E-03	4.66372E-03	4.70852E-03
24	37RB 86	2	1.34870E-07	8.29235E-08	5.50300E-08	2.05168E-08	1.02694E-08	5.13430E-09
25	37RB 87	1	9.51727E-03	9.52739E-03	9.52115E-03	9.51463E-03	9.51294E-03	9.51221E-03
26	38SR 86	2	2.52044E-09	5.46130E-08	8.24163E-08	1.16835E-07	1.27058E-07	1.32183E-07
27	38SR 88	2	1.35032E-02	1.35176E-02	1.35087E-02	1.34995E-02	1.34971E-02	1.34960E-02
28	38SR 89	1	1.66206E-02	1.38056E-02	1.15228E-02	6.33860E-03	3.45638E-03	1.74230E-03
29	38SR 90	3	2.12735E-02	2.12753E-02	2.12398E-02	2.11395E-02	2.10080E-02	2.07539E-02
30	38SR 91	1	1.09798E-02	4.46270E-04	2.22939E-04	7.42786E-05	3.71327E-05	1.85649E-05
31	39Y 89	1	1.07349E-04	2.74014E-03	5.21194E-03	1.03847E-02	1.32639E-02	1.49767E-02
32	39Y 90	2	6.91498E-07	4.82746E-06	5.17103E-06	5.38010E-06	5.40464E-06	5.36793E-06
33	39Y 91	1	1.29062E-02	1.38778E-02	1.70638E-02	9.92249E-03	5.55911E-03	2.81950E-03
34	39Y 93	1	1.89325E-02	7.85542E-04	3.92514E-04	1.30748E-04	6.53626E-05	3.26788E-05
35	40ZR 90	2	6.24706E-08	1.67821E-05	3.79556E-05	1.23493E-04	2.51221E-04	5.03689E-04
36	40ZR 91	1	5.01004E-04	4.08889E-03	7.11016E-03	1.43834E-02	1.87796E-02	2.15359E-02
37	40ZR 92	2	2.93303E-02	2.93815E-02	2.93622E-02	2.93421E-02	2.93369E-02	2.93347E-02
38	40ZR 93	3	1.89716E-02	3.71591E-02	3.75273E-02	3.77631E-02	3.78217E-02	3.78515E-02
39	40ZR 94	2	4.30829E-02	4.31287E-02	4.31305E-02	4.30709E-02	4.30633E-02	4.30600E-02
40	40ZR 95	1	4.89183E-02	4.20477E-02	3.62679E-02	2.18127E-02	1.25040E-02	6.38605E-03
41	40ZR 96	2	4.94251E-02	4.94777E-02	4.94452E-02	4.94114E-02	4.94026E-02	4.93988E-02
42	40ZR 97	1	3.49107E-02	1.46642E-03	9.32599E-04	3.10653E-04	1.55299E-04	7.76436E-05
43	41NB 95	1	2.69438E-04	5.85554E-03	8.81947E-03	9.86777E-03	6.58201E-03	3.44481E-03
44	42MO 95	3	1.64190E-06	1.23834E-03	4.02193E-03	1.73952E-02	2.99810E-02	3.92323E-02
45	42MO 96	2	3.66742E-05	3.67132E-05	3.66891E-05	3.66640E-05	3.66575E-05	3.66547E-05
46	42MO 97	3	2.10556E-02	5.41595E-02	5.50565E-02	5.56401E-02	5.57856E-02	5.58589E-02
47	42MO 98	2	5.72147E-02	5.72756E-02	5.72360E-02	5.71988E-02	5.71887E-02	5.71843E-02
48	42MO 99	1	5.71609E-02	8.47000E-03	4.33468E-03	1.44390E-03	7.21824E-04	3.60834E-04
49	42MO100	2	6.89106E-02	6.89839E-02	6.89366E-02	6.88914E-02	6.88792E-02	6.88739E-02
50	43TC 99	3	6.64914E-03	5.57993E-02	6.01487E-02	6.30330E-02	6.37530E-02	6.41136E-02

PU-239(THERMAL) PAGE 2

NO	NUCLIDE	NCAT	BURN-UP TIME 1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
51	44RU100	2	1.82418E-05	1.82612E-05	1.82493E-05	1.82368E-05	1.82335E-05	1.82321E-05
52	44RU101	3	6.05670E-02	6.06314E-02	6.05916E-02	6.05501E-02	6.05394E-02	6.05347E-02
53	44RU102	3	6.10400E-02	6.11050E-02	6.10649E-02	6.10231E-02	6.10123E-02	6.10076E-02
54	44RU103	1	6.93229E-02	5.44609E-02	4.33085E-02	2.12392E-02	1.10724E-02	5.54594E-03
55	44RU104	3	6.05167E-02	6.05810E-02	6.05413E-02	6.04998E-02	6.04891E-02	6.04845E-02
56	44RU105	1	1.12184E-02	3.43398E-04	1.91573E-04	6.38141E-05	3.19014E-05	1.59495E-05
57	44RU106	3	4.25943E-02	4.14932E-02	4.03239E-02	3.61333E-02	3.09209E-02	2.32917E-02
58	45RH103	3	6.06291E-04	1.55426E-02	2.65491E-02	4.86705E-02	5.88249E-02	6.43460E-02
59	45RH105	1	3.53211E-02	3.89266E-03	1.94506E-03	6.47908E-04	3.23897E-04	1.61936E-04
60	46PD104	2	3.36631E-07	3.36989E-07	3.36768E-07	3.36537E-07	3.36478E-07	3.36452E-07
61	46PD105	3	7.51344E-03	4.98344E-02	5.19383E-02	5.33262E-02	5.36726E-02	5.38463E-02
62	46PD106	2	8.35001E-05	1.22994E-03	2.37122E-03	6.53265E-03	1.17375E-02	1.93634E-02
63	46PD107	3	3.00592E-02	3.00912E-02	3.00715E-02	3.00509E-02	3.00455E-02	3.00432E-02
64	46PD108	2	2.53267E-02	2.53536E-02	2.53370E-02	2.53196E-02	2.53151E-02	2.53132E-02
65	46PD109	1	8.51618E-03	4.01629E-04	2.00683E-04	6.68484E-05	3.34183E-05	1.67079E-05
66	46PD110	2	7.41049E-03	7.41838E-03	7.41351E-03	7.40844E-03	7.40712E-03	7.40655E-03
67	46PD112	2	7.78726E-04	4.74925E-05	2.37307E-05	7.90481E-06	3.95171E-06	1.97570E-06
68	47AG109	3	5.32239E-03	1.34517E-02	1.36435E-02	1.37679E-02	1.37989E-02	1.38145E-02
69	47AG111	1	2.60862E-03	9.24449E-04	4.90790E-04	1.64126E-04	8.20482E-05	4.10210E-05
70	48CD110	2	1.23594E-07	1.23726E-07	1.23644E-07	1.23560E-07	1.23538E-07	1.23528E-07
71	48CD111	1	1.16666E-04	1.80373E-03	2.23561E-03	2.56040E-03	2.64200E-03	2.68241E-03
72	48CD112	2	3.95440E-04	1.12792E-03	1.15091E-03	1.16593E-03	1.16968E-03	1.17157E-03
73	48CD113	1	8.41741E-04	8.42637E-04	8.42084E-04	8.41508E-04	8.41358E-04	8.41294E-04
74	48CD114	2	5.42923E-04	5.43500E-04	5.43144E-04	5.42772E-04	5.42675E-04	5.42634E-04
75	48CD115	1	3.20984E-04	4.00793E-05	2.00283E-05	6.67153E-06	3.33517E-06	1.66746E-06
76	48CD116	2	3.70031E-04	3.70425E-04	3.70182E-04	3.69929E-04	3.69863E-04	3.69834E-04
77	49IN115	1	4.77845E-05	3.15019E-04	3.33836E-04	3.46283E-04	3.49390E-04	3.50948E-04
78	50SN115	1	2.51629E-06	1.65813E-05	1.75716E-05	1.82268E-05	1.83903E-05	1.84722E-05
79	50SN116	2	6.28786E-07	6.29455E-07	6.29043E-07	6.28612E-07	6.28500E-07	6.28452E-07
80	50SN117	1	3.55149E-04	3.55527E-04	3.55294E-04	3.55050E-04	3.54987E-04	3.54960E-04
81	50SN118	2	3.49794E-04	3.50166E-04	3.49936E-04	3.49697E-04	3.49635E-04	3.49608E-04
82	50SN119	1	3.59303E-04	3.59885E-04	3.59649E-04	3.59403E-04	3.59339E-04	3.59311E-04
83	50SN120	2	3.73524E-04	3.73921E-04	3.73676E-04	3.73420E-04	3.73354E-04	3.73325E-04
84	50SN121	1	3.07431E-04	2.23027E-05	1.11441E-05	3.71214E-06	1.85574E-06	9.27799E-07
85	50SN122	2	4.74657E-04	4.75162E-04	4.74851E-04	4.74526E-04	4.74441E-04	4.74405E-04
86	50SN123	1	5.60263E-04	5.18124E-04	4.78108E-04	3.55314E-04	2.43092E-04	1.38046E-04
87	50SN124	2	6.96328E-04	6.97069E-04	6.96612E-04	6.96135E-04	6.96012E-04	6.95958E-04
88	50SN125	1	9.52633E-04	3.98231E-04	2.20766E-04	7.44301E-05	3.72085E-05	1.86028E-05
89	50SN126	2	1.36986E-03	1.36731E-03	1.36642E-03	1.36548E-03	1.36523E-03	1.36512E-03
90	51SB121	1	1.08521E-04	3.94091E-04	4.04977E-04	4.12124E-04	4.13907E-04	4.14803E-04
91	51SB122	2	3.29381E-07	5.01213E-08	2.50592E-08	8.34733E-09	4.17293E-09	2.08630E-09
92	51SB123	1	3.52685E-06	4.62653E-05	8.59118E-05	2.08319E-04	3.20442E-04	4.25444E-04
93	51SB124	2	8.78460E-04	7.47486E-04	6.37601E-04	3.71678E-04	2.09031E-04	1.06140E-04
94	51SB125	1	1.43345E-04	6.93056E-04	8.60086E-04	9.62985E-04	9.38667E-04	8.48197E-04
95	51SB126	2	7.94934E-04	3.98577E-04	2.36891E-04	8.18439E-05	4.09168E-05	2.04571E-05
96	51SB127	1	4.89879E-03	9.95595E-04	4.99796E-04	1.66488E-04	8.32294E-05	4.16115E-05
97	51SB128	2	4.47412E-04	1.49296E-05	7.45991E-06	2.48493E-06	1.24225E-06	6.21075E-07
98	52TE122	2	4.26062E-06	3.22462E-07	3.47280E-07	3.63737E-07	3.67845E-07	3.69903E-07
99	52TE123	1	0.0	0.0	0.0	0.0	0.0	0.0
100	52TE124	2	5.10004E-06	1.37014E-04	2.46320E-04	5.11637E-04	6.74127E-04	7.76950E-04

PU-239(THERMAL) PAGE 3

NO	NUCLIDE	NCAT	BURN-UP TIME 1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
101	52TE125	1	1.48907E-07	4.94785E-06	1.31687E-05	5.18485E-05	1.11125E-04	2.19711E-04
102	52TE126	2	2.31494E-05	4.20378E-04	5.81527E-04	7.36015E-04	7.76799E-04	7.97201E-04
103	52TE127	1	1.90740E-04	8.52040E-05	4.39757E-05	1.56501E-05	8.12165E-06	4.12304E-06
104	52TE128	2	8.01640E-03	8.45788E-03	8.45980E-03	8.45897E-03	8.45872E-03	8.45869E-03
105	52TE129	1	5.88641E-03	2.01354E-04	1.00646E-04	3.35384E-05	1.67668E-05	8.38276E-06
106	52TE130	2	2.68681E-02	2.68967E-02	2.68791E-02	2.68607E-02	2.68559E-02	2.68538E-02
107	52TE131	1	1.55398E-03	5.23787E-05	2.61722E-05	8.71809E-06	4.35827E-06	2.17897E-06
108	52TE132	2	4.59662E-02	7.97258E-03	3.99031E-03	1.32919E-03	6.64480E-04	3.32214E-04
109	53I 127	1	1.19001E-04	3.56087E-03	4.08225E-03	4.59275E-03	4.84726E-03	5.04059E-03
110	53I 129	3	1.08577E-02	1.66070E-02	1.67295E-02	1.68447E-02	1.68833E-02	1.69034E-02
111	53I 130	2	2.60527E-05	1.17706E-06	5.88142E-07	1.95913E-07	9.79391E-08	4.89658E-08
112	53I 131	1	3.15581E-02	1.39370E-02	7.50802E-03	2.51577E-03	1.25766E-03	6.28782E-04
113	53I 133	1	4.82266E-02	2.94259E-03	1.47033E-03	4.89774E-04	2.44844E-04	1.22412E-04
114	53I 135	1	2.23826E-02	8.14922E-04	4.07194E-04	1.35638E-04	6.78071E-05	3.39010E-05
115	54XE128	2	1.54077E-06	1.54241E-06	1.54140E-06	1.54034E-06	1.54007E-06	1.53995E-06
116	54XE130	2	2.13921E-05	4.63182E-05	4.68760E-05	4.72357E-05	4.73253E-05	4.73706E-05
117	54XE131	3	1.29915E-03	2.46949E-02	3.13046E-02	3.64075E-02	3.76930E-02	3.83361E-02
118	54XE132	2	5.81211E-03	4.38608E-02	4.78691E-02	5.04347E-02	5.10902E-02	5.14185E-02
119	54XE133	1	1.94500E-02	1.69938E-02	8.68962E-03	2.89586E-03	1.44767E-03	7.23780E-04
120	54XE134	2	7.24461E-02	7.25232E-02	7.24756E-02	7.24260E-02	7.24131E-02	7.24076E-02
121	54XE135	1	2.62690E-02	1.33704E-05	6.68081E-04	2.22541E-04	1.11251E-04	5.56212E-05
122	54XE136	2	6.57131E-02	6.57830E-02	6.57399E-02	6.56948E-02	6.56832E-02	6.56781E-02
123	55CS133	3	8.95168E-04	4.87083E-02	5.84398E-02	6.51671E-02	6.68480E-02	6.76891E-02
124	55CS134	3	7.63817E-07	7.54452E-07	7.43625E-07	7.03662E-07	6.49510E-07	5.57371E-07
125	55CS135	3	2.37699E-02	7.03465E-02	7.13757E-02	7.20431E-02	7.22094E-02	7.22934E-02
126	55CS136	2	9.81612E-04	5.03427E-04	3.02357E-04	1.04993E-04	5.24908E-05	2.62434E-05
127	55CS137	3	6.55224E-02	6.55319E-02	6.54268E-02	6.51345E-02	6.47540E-02	6.40196E-02
128	56BA134	2	3.53647E-10	1.05322E-08	2.08578E-08	6.02970E-08	1.14314E-07	2.06394E-07
129	56BA136	2	2.72543E-05	5.06513E-04	7.06921E-04	9.03593E-04	9.55916E-04	9.82086E-04
130	56BA137	1	5.57812E-06	6.57512E-05	1.27832E-04	3.75285E-04	7.44124E-04	1.47349E-03
131	56BA138	2	5.70746E-02	5.71353E-02	5.70979E-02	5.70588E-02	5.70487E-02	5.70443E-02
132	56BA140	2	5.35838E-02	2.72384E-02	1.62915E-02	5.64554E-03	2.82244E-03	1.41111E-03
133	57LA139	1	5.65758E-02	5.86381E-02	5.85997E-02	5.85595E-02	5.85492E-02	5.85447E-02
134	57LA140	2	2.90826E-06	2.91129E-06	2.90931E-06	2.90704E-06	2.90611E-06	2.90506E-06
135	58CE140	2	1.90057E-04	2.44676E-02	3.66943E-02	4.86843E-02	5.18675E-02	5.34595E-02
136	58CE141	1	5.64246E-02	4.23962E-02	3.24658E-02	1.47510E-02	7.54236E-03	3.77285E-03
137	58CE142	2	4.98989E-02	4.99519E-02	4.99192E-02	4.98850E-02	4.98762E-02	4.98723E-02
138	58CE143	1	3.46706E-02	2.92205E-03	1.46007E-03	4.86355E-04	2.43135E-04	1.21556E-04
139	58CE144	3	3.77756E-02	3.65093E-02	3.51973E-02	3.05995E-02	2.51556E-02	1.78007E-02
140	59PR141	1	3.35905E-03	1.74510E-02	2.73422E-02	4.50160E-02	5.22141E-02	5.59790E-02
141	59PR142	2	1.95204E-06	1.12393E-09	5.61599E-10	1.87071E-10	9.35191E-11	4.67560E-11
142	59PR143	1	9.01088E-03	2.17765E-02	1.35917E-02	4.77678E-03	2.38824E-03	1.19403E-03
143	59PR145	1	1.02835E-02	3.65798E-04	1.82779E-04	6.08847E-05	3.04370E-05	1.52173E-05
144	60ND142	2	9.66254E-09	2.80900E-08	2.86332E-08	2.89877E-08	2.90761E-08	2.91206E-08
145	60ND143	3	1.03228E-03	2.00628E-02	2.96802E-02	3.94382E-02	4.20621E-02	4.33744E-02
146	60ND144	3	7.82433E-05	1.38305E-03	2.67212E-03	7.24405E-03	1.26812E-02	2.00332E-02
147	60ND145	3	1.99632E-02	2.99131E-02	3.00762E-02	3.01774E-02	3.02025E-02	3.02154E-02
148	60ND146	2	2.48781E-02	2.49045E-02	2.48882E-02	2.48712E-02	2.48666E-02	2.48648E-02
149	60ND147	1	1.89439E-02	8.83841E-03	5.09468E-03	1.73805E-03	8.68882E-04	4.34407E-04
150	60ND148	2	1.66325E-02	1.66502E-02	1.66393E-02	1.66279E-02	1.66250E-02	1.66237E-02

PU-239(THERMAL) PAGE 4

NO	NUCLIDE	NCAT	BURN-UP TIME 1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
151	60ND150	2	0.0	0.0	0.0	0.0	0.0	0.0
152	61PM147	3	5.82327E-04	1.06212E-02	1.41658E-02	1.67578E-02	1.65016E-02	1.49441E-02
153	61PM148	2	4.12855E-06	1.11927E-06	5.71160E-07	1.90342E-07	9.51543E-08	4.75735E-08
154	61PM149	1	1.10421E-02	1.37420E-03	6.86706E-04	2.28745E-04	1.14352E-04	5.71717E-05
155	61PM151	1	5.81173E-03	4.32945E-04	2.16331E-04	7.20609E-05	3.60240E-05	1.80106E-05
156	62SM147	3	1.39833E-07	6.75323E-05	2.53845E-04	1.02514E-03	2.14697E-03	4.13747E-03
157	62SM148	2	2.73957E-07	3.26792E-06	3.63314E-06	4.21094E-06	4.30535E-06	4.35259E-06
158	62SM149	3	1.44338E-03	1.11246E-02	1.18039E-02	1.22533E-02	1.23655E-02	1.24217E-02
159	62SM150	2	1.00098E-02	1.00004E-02	1.00139E-02	1.00070E-02	1.00052E-02	1.00045E-02
160	62SM151	3	1.66104E-03	7.24575E-03	7.45463E-03	7.58382E-03	7.60349E-03	7.59102E-03
161	62SM152	2	5.77236E-03	5.77850E-03	5.77472E-03	5.77076E-03	5.76974E-03	5.76929E-03
162	62SM153	1	3.24544E-03	3.63298E-04	1.81535E-04	6.04701E-05	3.02297E-05	1.51137E-05
163	62SM154	2	2.72216E-03	2.72506E-03	2.72327E-03	2.72141E-03	2.72093E-03	2.72072E-03
164	62SM156	2	2.87107E-04	1.15479E-05	5.77618E-06	1.92207E-06	9.60867E-07	4.80396E-07
165	63EU153	3	6.05209E-04	3.49145E-03	3.67068E-03	3.78911E-03	3.81867E-03	3.83349E-03
166	63EU154	2	3.05249E-05	3.05049E-05	3.04307E-05	3.01946E-05	2.98702E-05	2.92432E-05
167	63EU155	3	2.07119E-03	2.04217E-03	2.00922E-03	1.88784E-03	1.72509E-03	1.45366E-03
168	63EU156	2	5.24025E-04	4.41933E-04	2.77507E-04	9.87086E-05	4.93576E-05	2.46770E-05
169	63EU157	1	4.36371E-04	2.18676E-05	1.09366E-05	3.64305E-06	1.82120E-06	9.10531E-07
170	64GD155	1	2.11272E-06	3.33330E-05	6.49262E-05	1.84889E-04	3.47264E-04	6.18540E-04
171	64GD156	2	1.65893E-05	3.75121E-04	5.44781E-04	7.26861E-04	7.77026E-04	8.02124E-04
172	64GD157	1	3.20455E-04	7.35744E-04	7.46198E-04	7.52973E-04	7.54661E-04	7.55513E-04
173	64GD158	2	4.21732E-04	4.27181E-04	4.21904E-04	4.21615E-04	4.21540E-04	4.21508E-04
174	64GD159	1	1.43095E-04	7.91729E-06	3.95605E-06	1.31778E-06	6.58775E-07	3.29361E-07
175	64GD160	2	9.81368E-05	9.82432E-05	9.81788E-05	9.81116E-05	9.80942E-05	9.80866E-05
176	65TB159	1	8.19293E-05	2.17347E-04	2.21160E-04	2.23644E-04	2.24264E-04	2.24576E-04
177	65TB160	2	1.75257E-05	1.55143E-05	1.33871E-05	8.37084E-06	4.92621E-06	2.54025E-06
178	65TB161	1	4.19715E-05	1.39340E-05	7.30436E-06	2.43900E-06	1.21928E-06	6.09595E-07
179	66DY160	2	3.75205E-07	2.60556E-06	4.52108E-06	9.52505E-06	1.29665E-05	1.53511E-05
180	66DY161	1	5.20313E-06	3.12887E-05	3.78887E-05	4.27231E-05	4.39348E-05	4.45410E-05
181	66DY162	2	0.0	0.0	0.0	0.0	0.0	0.0
182	66DY163	1	0.0	0.0	0.0	0.0	0.0	0.0
183	66DY164	2	0.0	0.0	0.0	0.0	0.0	0.0
184	67HO165	1	0.0	0.0	0.0	0.0	0.0	0.0
185	43TC799	1	7.63607E-04	1.13034E-04	5.45133E-05	1.88249E-05	9.41077E-06	4.70502E-06
186	48CD815	1	0.0	0.0	0.0	0.0	0.0	0.0
187	52TE823	1	0.0	0.0	0.0	0.0	0.0	0.0
188	52TE825	1	1.07929E-07	1.16579E-06	2.59971E-06	6.66631E-06	8.73591E-06	9.14053E-06
189	52TE827	1	6.36445E-05	6.36115E-04	6.48304E-04	4.95822E-04	3.31167E-04	1.83048E-04
190	52TE829	1	1.49726E-04	1.45331E-04	1.10624E-04	5.08850E-05	2.60863E-05	1.30506E-05
191	52TE831	1	4.59153E-03	3.59949E-04	1.79856E-04	5.99111E-05	2.99502E-05	1.49740E-05
192	61PM848	1	0.0	0.0	0.0	0.0	0.0	0.0
193	34SE 82	2	1.62761E-03	1.62935E-03	1.62828E-03	1.62716E-03	1.62687E-03	1.62675E-03

Appendix 3. 2 FP due to ^{235}Pu fission with thermal neutrons

U-235(THERMAL) PAGE 1

NO	NUCLIDE	NCAT	BURN-UP TIME 1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
1	30ZN 72	2	1.99184E-07	2.21009E-08	1.10424E-08	3.67788E-09	1.83856E-09	9.19189E-10
2	31GA 72	2	2.61473E-08	6.70175E-09	3.34845E-09	1.11527E-09	5.57519E-10	2.78732E-10
3	32GE 72	2	1.16024E-08	2.06405E-07	2.22638E-07	2.32048E-07	2.34396E-07	2.35571E-07
4	32GE 73	1	1.03971E-06	1.04091E-06	1.04013E-06	1.03930E-06	1.03909E-06	1.03899E-06
5	32GE 74	2	3.40905E-06	3.41298E-05	3.41041E-06	3.40772E-06	3.40701E-06	3.40668E-06
6	32GE 76	2	3.52202E-05	3.52608E-05	3.52342E-05	3.52064E-05	3.51991E-05	3.51957E-05
7	32GE 77	1	4.80948E-05	2.08288E-06	1.04065E-06	3.46611E-07	1.73269E-07	8.66262E-08
8	33AS 75	1	1.20784E-05	1.20924E-05	1.20833E-05	1.20737E-05	1.20712E-05	1.20700E-05
9	33AS 76	2	5.30115E-11	3.79460E-12	1.89587E-12	6.31457E-13	3.15663E-13	1.57816E-13
10	33AS 77	1	3.75655E-05	7.13416E-06	3.56440E-06	1.18720E-06	5.93475E-07	2.96708E-07
11	34SE 76	2	1.83687E-11	6.76679E-11	6.95127E-11	7.07208E-11	7.10217E-11	7.11726E-11
12	34SE 77	1	8.23415E-06	8.27834E-05	8.73260E-05	9.03247E-05	9.10727E-05	9.14471E-05
13	34SE 78	2	2.03393E-04	2.03628E-04	2.03474E-04	2.03314E-04	2.03272E-04	2.03252E-04
14	34SE 79	1	5.50697E-04	5.51332E-04	5.50916E-04	5.50480E-04	5.50364E-04	5.50307E-04
15	34SE 80	2	9.47044E-04	9.48137E-04	9.47422E-04	9.46674E-04	9.46477E-04	9.46385E-04
16	35BR 81	1	1.96636E-03	1.96863E-03	1.96715E-03	1.96559E-03	1.96519E-03	1.96499E-03
17	35BR 82	2	5.07929E-07	4.51464E-08	2.25562E-08	7.51279E-09	3.75562E-09	1.87762E-09
18	36KR 82	2	1.42620E-07	6.06153E-07	6.24252E-07	6.42782E-07	6.46404E-07	6.48218E-07
19	36KR 83	1	5.35248E-03	5.35865E-03	5.35461E-03	5.35038E-03	5.34927E-03	5.34875E-03
20	36KR 84	2	9.97835E-03	9.98986E-03	9.98232E-03	9.97444E-03	9.97237E-03	9.97139E-03
21	36KR 85	1	3.06148E-03	3.05722E-03	3.04885E-03	3.01249E-03	2.96477E-03	2.87323E-03
22	36KR 86	2	1.93723E-02	1.93946E-02	1.93800E-02	1.93647E-02	1.93607E-02	1.93588E-02
23	37RB 85	1	1.02991E-02	1.03188E-02	1.03191E-02	1.03429E-02	1.03878E-02	1.04781E-02
24	37RB 86	2	1.08050E-05	6.64396E-06	4.40466E-06	1.64350E-06	8.22606E-07	4.11263E-07
25	37RB 87	1	2.55470E-02	2.55765E-02	2.55572E-02	2.55370E-02	2.55317E-02	2.55292E-02
26	38SR 86	2	1.27163E-06	5.44062E-06	7.67280E-06	1.04284E-05	1.12468E-05	1.16570E-05
27	38SR 88	2	3.64818E-02	3.65239E-02	3.64764E-02	3.64676E-02	3.64600E-02	3.64564E-02
28	38SR 89	1	4.74142E-02	3.97196E-02	3.31486E-02	1.82329E-02	9.94192E-03	5.01143E-03
29	38SR 90	3	5.93348E-02	5.93451E-02	5.92403E-02	5.89543E-02	5.85857E-02	5.78760E-02
30	38SR 91	1	2.73600E-02	1.11214E-03	5.55648E-04	1.85070E-04	9.25158E-05	4.62534E-05
31	39Y 89	1	3.07683E-04	8.45782E-03	1.49925E-02	2.98702E-02	3.81511E-02	4.30769E-02
32	39Y 90	2	5.82701E-06	1.40338E-05	1.47065E-05	1.50987E-05	1.51194E-05	1.49931E-05
33	39Y 91	1	3.03261E-02	4.79810E-02	4.11969E-02	2.39575E-02	1.34222E-02	6.80743E-03
34	39Y 93	1	3.20142E-02	1.32844E-03	6.63721E-04	2.21066E-04	1.10510E-04	5.52435E-05
35	40ZR 90	2	7.02837E-07	5.06758E-05	1.10007E-04	3.48730E-04	7.04966E-04	1.40903E-03
36	40ZR 91	1	1.47201E-03	1.01332E-02	1.74292E-02	3.49924E-02	4.56080E-02	5.22632E-02
37	40ZR 92	2	5.99075E-02	5.99766E-02	5.99314E-02	5.98841E-02	5.98716E-02	5.98658E-02
38	40ZR 93	3	3.20964E-02	6.28561E-02	6.34725E-02	6.38645E-02	6.39617E-02	6.40107E-02
39	40ZR 94	2	6.45217E-02	6.45961E-02	6.45474E-02	6.44964E-02	6.44830E-02	6.44767E-02
40	40ZR 95	1	6.46711E-02	5.57069E-02	4.80449E-02	2.88928E-02	1.65621E-02	8.45841E-03
41	40ZR 96	2	6.28273E-02	6.26998E-02	6.28524E-02	6.28028E-02	6.27897E-02	6.27836E-02
42	40ZR 97	1	3.74369E-02	2.02305E-03	1.01076E-03	3.36654E-04	1.68292E-04	8.41378E-05
43	41NB 95	1	3.57324E-04	7.75691E-03	1.16826E-02	1.30703E-02	8.71795E-03	4.56261E-03
44	42MO 95	3	4.42284E-04	2.06243E-03	5.76933E-03	2.34821E-02	4.01515E-02	5.24041E-02
45	42MO 96	2	5.13857E-06	5.14450E-06	5.14062E-06	5.13656E-06	5.13549E-06	5.13499E-06
46	42MO 97	3	2.16145E-02	5.74969E-02	5.84643E-02	5.90915E-02	5.92475E-02	5.93258E-02
47	42MO 98	2	5.79176E-02	5.79845E-02	5.79407E-02	5.78950E-02	5.78830E-02	5.78773E-02
48	42MO 99	1	5.43472E-02	6.24396E-03	4.12127E-03	1.37267E-03	6.86193E-04	3.43063E-04
49	42MO100	2	6.28704E-02	6.29429E-02	6.28954E-02	6.28458E-02	6.28327E-02	6.28266E-02
50	43TC 99	3	6.32281E-03	5.30584E-02	5.71465E-02	5.99245E-02	6.06071E-02	6.09486E-02

U-235(THERMAL) PAGE 2

NO	NUCLIDE	NCAT	BURN-UP TIME 1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
51	44RU100	2	1.24945E-06	1.25109E-06	1.25015E-06	1.24916E-06	1.24890E-06	1.24878E-06
52	44RU101	3	5.09975E-02	5.10563E-02	5.10178E-02	5.09775E-02	5.09669E-02	5.09620E-02
53	44RU102	3	4.20855E-02	4.21341E-02	4.21023E-02	4.20691E-02	4.20603E-02	4.20562E-02
54	44RU103	1	3.07764E-02	2.41805E-02	1.92270E-02	9.42825E-03	4.91498E-03	2.46175E-03
55	44RU104	3	1.83271E-02	1.83483E-02	1.83344E-02	1.83199E-02	1.83161E-02	1.83143E-02
56	44RU105	1	2.55803E-03	8.67473E-05	4.33609E-05	1.44356E-05	7.21629E-06	3.60779E-06
57	44RU106	3	3.90496E-03	3.80436E-03	3.69679E-03	3.31225E-03	2.83436E-03	2.13498E-03
58	45RH103	3	2.69130E-04	6.90084E-03	1.18309E-02	2.16051E-02	2.61119E-02	2.85621E-02
59	45RH105	1	5.78342E-03	6.82096E-04	3.40791E-04	1.13507E-04	5.67419E-05	2.83682E-05
60	46PD104	2	9.95698E-10	9.96846E-10	9.96094E-10	9.95308E-10	9.95101E-10	9.95004E-10
61	46PD105	3	1.14898E-03	8.71252E-03	9.09008E-03	9.33879E-03	9.40081E-03	9.43186E-03
62	46PD106	2	3.77432E-06	1.08883E-04	2.13505E-04	5.94953E-04	1.07204E-03	1.77103E-03
63	46PD107	3	1.91221E-03	1.91441E-03	1.91297E-03	1.91146E-03	1.91106E-03	1.91088E-03
64	46PD108	2	7.04494E-04	7.05307E-04	7.04775E-04	7.04219E-04	7.04072E-04	7.04003E-04
65	46PD109	1	1.68764E-04	7.95976E-06	3.97688E-06	1.32458E-06	6.62152E-07	3.31044E-07
66	46PD110	2	2.00174E-04	2.00405E-04	2.00254E-04	2.00096E-04	2.00054E-04	2.00035E-04
67	46PD112	2	8.08012E-05	4.92830E-06	2.46229E-06	8.20116E-07	4.09973E-07	2.04966E-07
68	47AG109	3	1.05456E-04	2.66577E-04	2.70352E-04	2.72788E-04	2.73394E-04	2.73698E-04
69	47AG111	1	1.74448E-04	6.18267E-05	3.28205E-05	1.09744E-05	5.48606E-06	2.74276E-06
70	48CD110	2	1.37181E-10	1.37340E-10	1.37236E-10	1.37128E-10	1.37099E-10	1.37086E-10
71	48CD111	1	7.80179E-06	1.20633E-04	1.49501E-04	1.71204E-04	1.76654E-04	1.79380E-04
72	48CD112	2	4.69133E-05	1.22934E-04	1.25303E-04	1.26844E-04	1.27228E-04	1.27421E-04
73	48CD113	1	1.27973E-04	1.28121E-04	1.28024E-04	1.27923E-04	1.27897E-04	1.27884E-04
74	48CD114	2	1.29424E-04	1.29573E-04	1.29476E-04	1.29373E-04	1.29347E-04	1.29334E-04
75	48CD115	1	9.09978E-05	1.13631E-05	5.67777E-06	1.89110E-06	9.45352E-07	4.72630E-07
76	48CD116	2	1.10709E-04	1.10637E-04	1.10753E-04	1.10666E-04	1.10643E-04	1.10632E-04
77	49IN115	1	1.36713E-05	8.94398E-05	9.47452E-05	9.82835E-05	9.91612E-05	9.96005E-05
78	50SN115	1	7.21584E-07	4.70940E-06	4.98969E-06	5.17486E-06	5.22105E-06	5.24417E-06
79	50SN116	2	4.63871E-08	6.64406E-08	6.64056E-08	6.63690E-08	4.63593E-08	4.63548E-08
80	50SN117	1	1.60975E-04	1.61161E-04	1.61039E-04	1.60912E-04	1.60879E-04	1.60863E-04
81	50SN118	2	1.47619E-04	1.47789E-04	1.47678E-04	1.47561E-04	1.47531E-04	1.47516E-04
82	50SN119	1	1.26153E-04	1.26299E-04	1.26204E-04	1.26104E-04	1.26078E-04	1.26066E-04
83	50SN120	2	1.30713E-04	1.30864E-04	1.30765E-04	1.30662E-04	1.30635E-04	1.30622E-04
84	50SN121	1	1.33183E-04	9.66269E-06	4.82770E-06	1.60796E-06	8.03815E-07	4.01868E-07
85	50SN122	2	1.50707E-04	1.50881E-04	1.50767E-04	1.50648E-04	1.50617E-04	1.50602E-04
86	50SN123	1	2.38722E-04	2.20786E-04	2.03714E-04	1.51378E-04	1.03564E-04	5.88100E-05
87	50SN124	2	1.78460E-04	1.78666E-04	1.78531E-04	1.78391E-04	1.78354E-04	1.78336E-04
88	50SN125	1	2.40321E-04	1.00473E-04	5.58924E-05	1.87744E-05	9.38526E-06	4.69217E-06
89	50SN126	2	5.02840E-04	5.03920E-04	5.03040E-04	5.02643E-04	5.02537E-04	5.02486E-04
90	51SB121	1	4.50072E-05	1.68733E-04	1.73439E-04	1.76513E-04	1.77280E-04	1.77664E-04
91	51SB122	2	2.20512E-08	3.35375E-09	1.67681E-09	5.58428E-10	2.79156E-10	1.39564E-10
92	51SB123	1	8.71768E-07	1.96832E-05	3.59745E-05	8.81217E-05	1.35886E-04	1.80616E-04
93	51SB124	2	1.19296E-07	1.01219E-07	8.65603E-08	5.04687E-08	2.83827E-08	1.44117E-08
94	51SB125	1	1.27149E-05	1.51617E-04	1.93996E-04	2.20883E-04	2.16055E-04	1.95549E-04
95	51SB126	2	1.94975E-05	9.77705E-06	5.81039E-06	2.00734E-06	1.00360E-06	5.01835E-07
96	51SB127	1	1.06784E-03	2.17087E-04	1.08969E-04	3.62950E-05	1.81437E-05	9.07098E-06
97	51SB128	2	2.32005E-04	7.74242E-06	3.86829E-06	1.28841E-06	6.44073E-07	3.22005E-07
98	52TE122	2	2.84192E-09	2.15680E-08	2.32264E-08	2.43249E-08	2.45990E-08	2.47362E-08
99	52TE123	1	0.0	0.0	0.0	0.0	0.0	0.0
100	52TE124	2	6.90414E-10	1.86062E-08	3.34481E-08	6.94710E-08	9.15321E-08	1.05491E-07

U-235(THERMAL) PAGE 3

NO	NUCLIDE	NCAT	BURN-UP TIME 1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
101	52TE125	1	5.87641E-09	1.01873E-06	2.88249E-06	1.17762E-05	2.54524E-05	5.05269E-05
102	52TE126	2	5.66681E-07	1.03104E-05	1.42621E-05	1.80498E-05	1.90503E-05	1.95518E-05
103	52TE127	1	4.06656E-05	1.92999E-05	1.02764E-05	3.91866E-06	2.10649E-06	1.08410E-06
104	52TE128	2	3.79402E-03	4.02293E-03	4.02376E-03	4.02316E-03	4.02297E-03	4.02290E-03
105	52TE129	1	2.39204E-03	8.18337E-05	4.08863E-05	1.36181E-05	6.80765E-06	3.40349E-06
106	52TE130	2	2.00410E-02	2.00641E-02	2.00490E-02	2.00331E-02	2.00290E-02	2.00270E-02
107	52TE131	1	1.20566E-03	4.03852E-05	2.01174E-05	6.72048E-06	3.35954E-06	1.67961E-06
108	52TE132	2	3.70076E-02	6.41934E-03	3.21259E-03	1.07002E-03	5.34899E-04	2.67423E-04
109	53I 127	1	2.48146E-05	7.94560E-04	9.27454E-04	1.09626E-03	1.20131E-03	1.28653E-03
110	53I 129	3	6.13437E-03	8.45485E-03	8.48967E-03	8.51076E-03	8.51603E-03	8.51872E-03
111	53I 130	2	1.75289E-06	7.92025E-08	3.95714E-08	1.31800E-08	6.58865E-09	3.29401E-09
112	53I 131	1	2.42158E-02	9.92482E-03	5.33933E-03	1.78873E-03	8.94180E-04	4.47046E-04
113	53I 133	1	4.75835E-02	2.90357E-03	1.45069E-03	4.83182E-04	2.41541E-04	1.20759E-04
114	53I 135	1	2.36277E-02	8.60334E-04	4.29842E-04	1.43168E-04	7.15690E-05	3.57810E-05
115	54XE128	2	3.81897E-07	3.82337E-07	3.82049E-07	3.81747E-07	3.81668E-07	3.81631E-07
116	54XE130	2	1.43122E-06	3.10859E-06	3.14081E-06	3.16969E-06	3.17562E-06	3.17860E-06
117	54XE131	3	1.00541E-03	1.76991E-02	2.23552E-02	2.59115E-02	2.68122E-02	2.72626E-02
118	54XE132	2	4.25532E-03	3.48912E-02	3.80668E-02	4.01768E-02	4.07033E-02	4.09668E-02
119	54XE133	1	1.91736E-02	1.67629E-02	8.57069E-03	2.85593E-03	1.42767E-03	7.13764E-04
120	54XE134	2	7.19188E-02	7.20017E-02	7.19474E-02	7.18907E-02	7.18757E-02	7.18687E-02
121	54XE135	1	2.34591E-02	1.24105E-03	6.20059E-04	2.06523E-04	1.03240E-04	5.16150E-05
122	54XE136	2	6.12036E-02	6.12742E-02	6.12280E-02	6.11796E-02	6.11669E-02	6.11609E-02
123	55CS133	3	6.82862E-04	4.80515E-02	5.76455E-02	6.42744E-02	6.59302E-02	6.67583E-02
124	55CS134	3	1.42894E-07	1.41155E-07	1.39115E-07	1.31625E-07	1.21492E-07	1.04255E-07
125	55CS135	3	2.01553E-02	6.52183E-02	6.62190E-02	6.68661E-02	6.70270E-02	6.71078E-02
126	55CS136	2	6.59766E-05	3.38396E-05	2.03220E-05	7.05605E-06	3.52753E-06	1.76359E-06
127	55CS137	3	6.22594E-02	6.22741E-02	6.21680E-02	6.18838E-02	6.15205E-02	6.68215E-02
128	56BA134	2	6.61974E-11	1.97053E-09	3.90202E-09	1.12790E-08	2.13826E-08	3.86055E-08
129	56BA136	2	3.90395E-06	3.61216E-05	4.95864E-05	6.27972E-05	6.63112E-05	6.80683E-05
130	56BA137	1	1.83924E-05	7.55896E-05	1.34562E-04	3.69642E-04	7.20049E-04	1.41296E-03
131	56BA138	2	6.74581E-02	6.75359E-02	6.74850E-02	6.74317E-02	6.74177E-02	6.74111E-02
132	56BA140	2	6.13140E-02	3.11707E-02	1.86415E-02	6.45925E-03	3.22914E-03	1.61441E-03
133	57LA139	1	6.58687E-02	6.59447E-02	6.58450E-02	6.58430E-02	6.58293E-02	6.58228E-02
134	57LA140	2	5.52846E-08	5.53471E-08	5.53040E-08	5.52551E-08	5.52358E-08	5.52147E-08
135	58CE140	2	2.46315E-04	2.81567E-02	4.21511E-02	5.58693E-02	5.95106E-02	6.13313E-02
136	58CE141	1	5.82827E-02	4.37964E-02	3.35347E-02	1.52351E-02	7.78964E-03	3.89647E-03
137	58CE142	2	5.95560E-02	5.96247E-02	5.95797E-02	5.95327E-02	5.95203E-02	5.95145E-02
138	58CE143	1	4.65526E-02	3.92382E-03	1.96043E-03	6.52961E-04	3.26412E-04	1.63190E-04
139	58CE144	3	5.43746E-02	5.25563E-02	5.06627E-02	4.40400E-02	3.62039E-02	2.56182E-02
140	59PR141	1	3.74896E-04	1.49288E-02	2.51462E-02	4.33995E-02	5.08328E-02	5.47203E-02
141	59PR142	2	6.64031E-10	3.82367E-11	1.91039E-11	6.36294E-12	3.18081E-12	1.59025E-12
142	59PR143	1	1.24308E-02	2.94167E-02	1.83557E-02	6.45019E-03	3.22480E-03	1.61224E-03
143	59PR145	1	1.34390E-02	4.78090E-04	2.38865E-04	7.95587E-05	3.97711E-05	1.98836E-05
144	60ND142	2	3.26693E-10	9.55632E-10	9.74016E-10	9.85973E-10	9.88949E-10	9.90442E-10
145	60ND143	3	9.33196E-04	2.66452E-02	3.96244E-02	5.27900E-02	5.63295E-02	5.80994E-02
146	60ND144	3	1.02828E-04	1.98402E-03	3.83643E-03	1.04161E-02	1.82409E-02	2.88213E-02
147	60ND145	3	2.60848E-02	3.90913E-02	3.93007E-02	3.94286E-02	3.94604E-02	3.94764E-02
148	60ND146	2	2.99814E-02	3.00160E-02	2.99934E-02	2.99697E-02	2.99635E-02	2.99605E-02
149	60ND147	1	2.18730E-02	1.02059E-02	5.88237E-03	2.00656E-03	1.00309E-03	5.01494E-04
150	60ND148	2	1.69043E-02	1.69238E-02	1.69110E-02	1.68977E-02	1.68941E-02	1.68925E-02

U-235(THERMAL) PAGE 4

NO	NUCLIDE	NCAT	BURN-UP TIME 1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
151	60ND150	2	0.0	0.0	0.0	0.0	0.0	0.0
152	61PM147	3	6.71843E-04	1.22540E-02	1.63786E-02	1.93462E-02	1.90499E-02	1.72515E-02
153	61PM148	2	1.11732E-06	3.02940E-07	1.54574E-07	5.15071E-08	2.57482E-08	1.28728E-08
154	61PM149	1	9.47660E-03	1.17949E-03	5.89350E-04	1.96295E-04	9.81270E-05	4.90587E-05
155	61PM151	1	3.20629E-03	2.38876E-04	1.19348E-04	3.97512E-05	1.98715E-05	9.93477E-06
156	62SM147	3	1.61266E-07	1.01070E-04	2.93081E-04	1.18348E-03	2.47851E-03	4.77631E-03
157	62SM148	2	8.23436E-08	8.98110E-07	1.04557E-06	1.14769E-06	1.17320E-06	1.18596E-06
158	62SM149	3	1.23086E-03	9.54032E-03	1.01224E-02	1.05070E-02	1.06029E-02	1.06509E-02
159	62SM150	2	6.49721E-03	6.50471E-03	6.49980E-03	6.49467E-03	6.49332E-03	6.49269E-03
160	62SM151	3	1.01870E-03	3.98977E-03	4.10473E-03	4.17547E-03	4.18621E-03	4.17928E-03
161	62SM152	2	2.64845E-03	2.65150E-03	2.64950E-03	2.64741E-03	2.64686E-03	2.64660E-03
162	62SM153	1	1.27656E-03	1.42912E-04	7.14038E-05	2.37825E-05	1.18888E-05	5.94381E-06
163	62SM154	2	7.10622E-04	7.11442E-04	7.10906E-04	7.10344E-04	7.10197E-04	7.10127E-04
164	62SM156	2	5.64355E-05	2.27013E-06	1.13421E-06	3.77771E-07	1.88846E-07	9.44138E-08
165	63EU153	3	3.59150E-04	1.49468E-03	1.56495E-03	1.61128E-03	1.62284E-03	1.62862E-03
166	63EU154	2	1.69943E-06	1.65846E-06	1.65417E-06	1.68084E-06	1.66273E-06	1.62780E-06
167	63EU155	3	3.32521E-04	3.27892E-04	3.22569E-04	3.03050E-04	2.76917E-04	2.33340E-04
168	63EU156	2	7.53976E-05	7.15751E-05	4.49918E-05	1.60063E-05	8.00348E-06	4.00135E-06
169	63EU157	1	3.84935E-05	1.93094E-06	9.64744E-07	3.21328E-07	1.60630E-07	8.03073E-08
170	64GD155	1	1.86757E-07	5.15934E-06	1.02714E-05	2.95274E-05	5.55914E-05	9.91354E-05
171	64GD156	2	1.54992E-06	5.96914E-05	8.72100E-05	1.16947E-04	1.25111E-04	1.29194E-04
172	64GD157	1	2.57463E-05	6.23829E-05	6.33006E-05	6.38933E-05	6.40407E-05	6.41147E-05
173	64GD158	2	4.28036E-05	4.28510E-05	4.28187E-05	4.27849E-05	4.27760E-05	4.27718E-05
174	64GD159	1	7.16484E-06	3.96476E-07	1.98089E-07	6.59774E-08	3.29819E-08	1.64893E-08
175	64GD160	2	3.30908E-06	3.31290E-06	3.31040E-06	3.30779E-06	3.30710E-06	3.30677E-06
176	65TB159	1	3.75199E-06	1.05329E-05	1.07231E-05	1.08466E-05	1.08773E-05	1.08927E-05
177	65TB160	2	4.28816E-09	3.74743E-09	3.27550E-09	2.04793E-09	1.20516E-09	6.21443E-10
178	65TB161	1	7.99194E-07	2.65346E-07	1.39084E-07	4.64366E-08	2.32135E-08	1.16056E-08
179	66DY160	2	5.06373E-11	5.96368E-10	1.06502E-09	2.28916E-09	3.13103E-09	3.71433E-09
180	66DY161	1	4.45646E-08	5.79386E-07	7.05011E-07	7.96992E-07	8.20040E-07	8.31566E-07
181	66DY162	2	0.0	0.0	0.0	0.0	0.0	0.0
182	66DY163	1	0.0	0.0	0.0	0.0	0.0	0.0
183	66DY164	2	0.0	0.0	0.0	0.0	0.0	0.0
184	67HO165	1	0.0	0.0	0.0	0.0	0.0	0.0
185	43TC799	1	6.69050E-04	1.07482E-04	5.37323E-05	1.78966E-05	8.94646E-06	4.47279E-06
186	48CD815	1	0.0	0.0	0.0	0.0	0.0	0.0
187	52TE823	1	0.0	0.0	0.0	0.0	0.0	0.0
188	52TE825	1	7.54875E-09	2.34521E-07	5.79154E-07	1.51717E-06	2.00517E-06	2.10501E-06
189	52TE827	1	2.56893E-04	3.60872E-04	3.44069E-04	2.53194E-04	1.67820E-04	9.25568E-05
190	52TE829	1	1.77218E-06	1.34081E-06	1.03330E-06	4.75248E-07	2.43629E-07	1.21862E-07
191	52TE831	1	1.30802E-03	1.02551E-04	5.12366E-05	1.70654E-05	8.53092E-06	4.26504E-06
192	61PM848	1	0.0	0.0	0.0	0.0	0.0	0.0
193	34SE 82	2	2.43540E-03	2.43821E-03	2.43637E-03	2.43445E-03	2.43394E-03	2.43371E-03

Appendix 3.3 FP due to ^{238}Pu fission with thermal neutrons

U-238(FISSION SPECT) PAGE 1

NO	NUCLIDE	NCAT	1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
					BURN-UP TIME			
1	30ZN 72	2	3.65443E-08	4.05489E-09	2.02606E-09	6.74853E-10	3.37362E-10	1.68667E-10
2	31GA 72	2	4.79724E-09	1.22958E-09	6.14375E-10	2.04640E-10	1.02301E-10	5.11462E-11
3	32GE 72	2	2.12868E-09	3.82364E-08	4.08496E-08	4.25785E-08	4.30100E-08	4.32263E-08
4	32GE 73	1	2.87803E-07	2.88138E-07	2.87934E-07	2.87722E-07	2.87667E-07	2.87643E-07
5	32GE 74	2	9.79328E-07	9.80469E-07	9.79776E-07	9.79053E-07	9.78866E-07	9.78786E-07
6	32GE 76	2	9.78329E-06	9.79469E-06	9.78777E-06	9.78054E-06	9.77867E-06	9.77788E-06
7	32GE 77	1	1.98458E-05	8.59488E-07	4.29440E-07	1.43041E-07	7.15069E-08	3.57505E-08
8	33AS 75	1	3.45823E-06	3.46226E-06	3.45981E-06	3.45725E-06	3.45660E-06	3.45631E-06
9	33AS 76	2	4.96502E-13	3.55403E-14	1.77576E-14	5.91483E-15	2.95685E-15	1.47831E-15
10	33AS 77	1	1.54977E-05	2.94355E-06	1.47074E-06	4.89885E-07	2.44896E-07	1.22438E-07
11	34SE 76	2	1.72040E-13	6.33378OE-13	6.51090E-13	6.62439E-13	6.65269E-13	6.66693E-13
12	34SE 77	1	2.57173E-06	3.41564E-05	3.60324E-05	3.72716E-05	3.75809E-05	3.77361E-05
13	34SE 78	2	1.42632E-04	1.42798E-04	1.42697E-04	1.42592E-04	1.42565E-04	1.42553E-04
14	34SE 79	1	4.10698E-04	4.11177E-04	4.10586E-04	4.10582E-04	4.10502E-04	4.10467E-04
15	34SE 80	2	8.82085E-04	8.83113E-04	8.82488E-04	8.81837E-04	8.81669E-04	8.81597E-04
16	35BR 81	1	1.58917E-03	1.59102E-03	1.58990E-03	1.58872E-03	1.58842E-03	1.58829E-03
17	35BR 82	2	2.53462E-09	2.25288E-10	1.12565E-10	3.74938E-11	1.87433E-11	9.37091E-12
18	36KR 82	2	6.43197E-10	2.95623E-09	3.06671E-09	3.13943E-09	3.15758E-09	3.16669E-09
19	36KR 83	1	4.12111E-03	4.12591E-03	4.12300E-03	4.11995E-03	4.11917E-03	4.11883E-03
20	36KR 84	2	8.49206E-03	8.50195E-03	8.49594E-03	8.48967E-03	8.48805E-03	8.48736E-03
21	36KR 85	1	1.86426E-03	1.86169E-03	1.85546E-03	1.83463E-03	1.80560E-03	1.74986E-03
22	36KR 86	2	1.36327E-02	1.36485E-02	1.36369E-02	1.36288E-02	1.36262E-02	1.36251E-02
23	37RB 85	1	6.27673E-03	6.28879E-03	6.28926E-03	6.30407E-03	6.33155E-03	6.38661E-03
24	37RB 86	2	1.48124E-09	9.10845E-10	6.04428E-10	2.25336E-10	1.12787E-10	5.63891E-11
25	37RB 87	1	1.41516E-02	1.41680E-02	1.41580E-02	1.41476E-02	1.41449E-02	1.41437E-02
26	38SR 86	2	2.76822E-11	5.99878E-10	9.05228E-10	1.28320E-09	1.39547E-09	1.45174E-09
27	38SR 88	2	1.67646E-02	1.67842E-02	1.67723E-02	1.67599E-02	1.67567E-02	1.67554E-02
28	38SR 89	1	2.99443E-02	2.48752E-02	2.07610E-02	1.14198E-02	6.22706E-03	3.13893E-03
29	38SR 90	3	3.27971E-02	3.28031E-02	3.27468E-02	3.25903E-02	3.23872E-02	3.19953E-02
30	38SR 91	1	2.15376E-02	8.75476E-04	4.37428E-04	1.45702E-04	7.28370E-05	3.64155E-05
31	39Y 89	1	1.92633E-04	5.29682E-03	9.38972E-03	1.87086E-02	2.38957E-02	2.69813E-02
32	39Y 90	2	4.10030E-06	7.38536E-06	8.19352E-06	8.36801E-06	8.36891E-06	8.29388E-06
33	39Y 91	1	2.33922E-02	3.73633E-02	3.20853E-02	1.86609E-02	1.04553E-02	5.30265E-03
34	39Y 93	1	2.41039E-02	1.00021E-03	4.99754E-04	1.66462E-04	8.32149E-05	4.16041E-05
35	40ZR 90	2	1.42282E-05	4.26193E-05	7.54715E-05	2.07474E-04	4.04418E-04	7.93651E-04
36	40ZR 91	1	9.58724E-05	6.83933E-03	1.25235E-02	2.62064E-02	3.44765E-02	3.96617E-02
37	40ZR 92	2	3.90707E-02	3.91162E-02	3.90886E-02	3.90597E-02	3.90523E-02	3.90491E-02
38	40ZR 93	3	2.41415E-02	4.73614E-02	4.77677E-02	4.80654E-02	4.81394E-02	4.81771E-02
39	40ZR 94	2	5.13785E-02	5.14384E-02	5.14020E-02	5.13641E-02	5.13543E-02	5.13501E-02
40	40ZR 95	1	5.54618E-02	4.77747E-02	4.12056E-02	2.47811E-02	1.42054E-02	7.25496E-03
41	40ZR 96	2	5.49124E-02	5.49768E-02	5.49379E-02	5.48973E-02	5.48869E-02	5.48824E-02
42	40ZR 97	1	3.69125E-02	1.97365E-03	9.86126E-04	3.28466E-04	1.64202E-04	8.20941E-05
43	41NB 95	1	2.87570E-04	6.63787E-03	1.00083E-02	1.12050E-02	7.47475E-03	3.91210E-03
44	42MO 95	3	1.84573E-06	1.40365E-03	4.56283E-03	1.97494E-02	3.40448E-02	4.45533E-02
45	42MO 96	2	4.18713E-06	4.19201E-06	4.18904E-06	4.18595E-06	4.18515E-06	4.18481E-06
46	42MO 97	3	2.26633E-02	5.76716E-02	5.86170E-02	5.92306E-02	5.93836E-02	5.94608E-02
47	42MO 98	2	6.02286E-02	6.02988E-02	6.02561E-02	6.02116E-02	6.02002E-02	6.01953E-02
48	42MO 99	1	5.68789E-02	8.62809E-03	4.31350E-03	1.43677E-03	7.18250E-04	3.59096E-04
49	42MO100	2	6.36730E-02	6.37472E-02	6.37021E-02	6.36551E-02	6.36430E-02	6.36378E-02
50	43TC 99	3	6.61500E-03	5.55282E-02	5.98536E-02	6.27203E-02	6.34359E-02	6.37944E-02

U-238(FISSION SPECT) PAGE 2

NO	NUCLIDE	NCAT	1 DAY	30 DAYS	60 DAYS	180 DAYS	360 DAYS	720 DAYS
					BURN-UP TIME			
51	44RU100	2	3.43764E-08	3.44165E-08	3.43921E-08	3.43667E-08	3.43602E-08	3.43574E-08
52	44RU101	3	6.37285E-02	6.38028E-02	6.37577E-02	6.37106E-02	6.36985E-02	6.36933E-02
53	44RU102	3	6.37287E-02	6.38029E-02	6.37578E-02	6.37107E-02	6.36986E-02	6.36934E-02
54	44RU103	1	6.33539E-02	4.97767E-02	3.95615E-02	1.94104E-02	1.01189E-02	5.06831E-03
55	44RU104	3	4.50651E-02	4.51176E-02	4.50958E-02	4.50525E-02	4.50439E-02	4.50402E-02
56	44RU105	1	6.91114E-03	2.36219E-04	1.18026E-04	3.93129E-05	1.96527E-05	9.82555E-06
57	44RU106	3	2.83011E-02	2.75724E-02	2.67940E-02	2.40081E-02	2.05446E-02	1.54755E-02
58	45RH103	3	5.54000E-04	1.42057E-02	2.43556E-02	4.44795E-02	5.37589E-02	5.88043E-02
59	45RH105	1	2.05110E-02	2.26297E-03	1.14218E-03	3.80445E-04	1.90186E-04	9.50854E-05
60	46PD104	2	6.87148E-11	6.87948E-11	6.87462E-11	6.86954E-11	6.86824E-11	6.86768E-11
61	46PD105	3	4.85445E-03	2.97920E-02	3.10312E-02	3.18478E-02	3.20516E-02	3.21539E-02
62	46PD106	2	3.16185E-05	7.73607E-04	1.55193E-03	4.31666E-03	7.77502E-03	1.28418E-02
63	46PD107	3	1.30603E-02	1.30755E-02	1.30663E-02	1.30567E-02	1.30542E-02	1.30531E-02
64	46PD108	2	6.40826E-03	6.41573E-03	6.41120E-03	6.40646E-03	6.40524E-03	6.40472E-03
65	46PD109	1	1.64783E-03	7.77209E-05	3.88330E-05	1.29348E-05	6.46616E-06	3.23281E-06
66	46PD110	2	1.41771E-03	1.41936E-03	1.41836E-03	1.41731E-03	1.41704E-03	1.41692E-03
67	46PD112	2	6.11753E-04	3.75130E-05	1.86433E-05	6.20985E-06	3.10434E-06	1.55204E-06
68	47AG109	3	1.05297E-03	2.62623E-03	2.66321E-03	2.68711E-03	2.69307E-03	2.69608E-03
69	47AG111	1	9.84694E-04	3.48994E-04	1.85271E-04	6.19534E-05	3.09708E-05	1.54841E-05
70	48CD110	2	4.33034E-12	4.33543E-12	4.33236E-12	4.32916E-12	4.32834E-12	4.32798E-12
71	48CD111	1	4.40383E-05	6.86937E-04	6.43931E-04	9.66489E-04	9.97276E-04	1.01268E-03
72	48CD112	2	2.73980E-04	8.49451E-04	8.67494E-04	8.79273E-04	8.82210E-04	8.83690E-04
73	48CD113	1	5.46026E-04	5.46662E-04	5.46275E-04	5.45872E-04	5.45768E-04	5.45723E-04
74	48CD114	2	4.20302E-04	4.20791E-04	4.20494E-04	4.20183E-04	4.20103E-04	4.20069E-04
75	48CD115	1	4.60534E-04	5.75102E-05	2.87373E-05	9.57203E-06	4.78510E-06	2.39236E-06
76	48CD116	2	3.77311E-04	3.77751E-04	3.77484E-04	3.77205E-04	3.77133E-04	3.77102E-04
77	49IN115	1	6.83655E-05	4.51828E-04	4.78804E-04	4.96637E-04	5.01088E-04	5.03320E-04
78	50SN115	1	3.59670E-06	2.37789E-05	2.51987E-05	2.61373E-05	2.63716E-05	2.64891E-05
79	50SN116	2	2.09856E-09	2.10101E-09	2.09952E-09	2.09797E-09	2.09757E-09	2.09740E-09
80	50SN117	1	4.00935E-04	4.01402E-04	4.01118E-04	4.00822E-04	4.00746E-04	4.00713E-04
81	50SN118	2	3.68928E-04	3.69358E-04	3.69097E-04	3.68824E-04	3.68754E-04	3.68724E-04
82	50SN119	1	3.69431E-04	3.69861E-04	3.69600E-04	3.69327E-04	3.69256E-04	3.69226E-04
83	50SN120	2	3.70436E-04	3.70867E-04	3.70605E-04	3.70332E-04	3.70261E-04	3.70231E-04
84	50SN121	1	2.81235E-04	2.04044E-05	1.01950E-05	3.39582E-06	1.69759E-06	8.48723E-07
85	50SN122	2	3.85476E-04	3.85925E-04	3.85652E-04	3.85367E-04	3.85294E-04	3.85262E-04
86	50SN123	1	4.18891E-04	3.47424E-04	3.57484E-04	2.65656E-04	1.81749E-04	1.03210E-04
87	50SN124	2	4.63672E-04	4.64212E-04	4.63884E-04	4.63541E-04	4.63453E-04	4.63415E-04
88	50SN125	1	1.08655E-03	4.54260E-04	2.51814E-04	8.48932E-05	4.24386E-05	2.12176E-05
89	50SN126	2	6.35714E-04	6.36454E-04	6.36004E-04	6.35534E-04	6.35412E-04	6.35358E-04
90	51SB121	1	9.47173E-05	3.55986E-04	3.65929E-04	3.72451E-04	3.74077E-04	3.74895E-04
91	51SB122	2	4.89531E-10	7.44534E-11	3.72225E-11	1.23984E-11	6.19800E-12	3.09875E-12
92	51SB123	1	1.17110E-06	3.31271E-05	6.27703E-05	1.54288E-04	2.38115E-04	3.16619E-04
93	51SB124	2	4.66975E-08	3.97392E-08	3.38955E-08	1.97577E-08	1.11116E-08	5.64214E-09
94	51SB125	1	4.09130E-05	6.69083E-04	8.60917E-04	9.83209E-04	9.62325E-04	8.71253E-04
95	51SB126	2	1.83924E-06	9.22397E-07	5.48278E-07	1.89558E-07	9.48741E-08	4.75421E-08
96	51SB127	1	9.17573E-04	1.86563E-04	9.36512E-05	3.11947E-05	1.55944E-05	7.79656E-06
97	51SB128	2	2.11618E-04	7.06215E-06	3.52858E-06	1.17532E-06	5.87550E-07	2.93751E-07
98	52TE122	2	6.30899E-11	4.78811E-10	5.15691E-10	5.40067E-10	5.46162E-10	5.49216E-10
99	52TE123	1	0.0	0.0	0.0	0.0	0.0	0.0
100	52TE124	2	2.70257E-10	7.28331E-09	1.30938E-08	2.71969E-08	3.58340E-06	4.12997E-08

U-238(FISSION SPECT) PAGE 3

NO	NUCLIDE	NCAT	1 DAY	30 DAYS	BURN-UP TIME 60 DAYS	180 DAYS	360 DAYS	720 DAYS
101	52TE125	1	1.02230E-08	4.44694E-06	1.27234E-05	5.23236E-05	1.13261E-04	2.29010E-04
102	52TE126	2	5.94808E-08	9.78712E-07	1.35167E-06	1.70971E-06	1.80512E-06	1.85447E-06
103	52TE127	1	3.77456E-03	1.71739E-04	8.83940E-05	3.15952E-05	1.64352E-05	8.35131E-06
104	52TE128	2	2.88520E-03	3.09336E-03	3.09470E-03	3.09477E-03	3.09477E-03	3.09481E-03
105	52TE129	1	1.91924E-03	6.65688E-05	3.35172E-05	1.12566E-05	5.63151E-06	2.81558E-06
106	52TE130	2	1.46821E-02	1.46992E-02	1.46888E-02	1.46779E-02	1.46751E-02	1.46739E-02
107	52TE131	1	1.75084E-03	5.35439E-05	2.92513E-05	9.74322E-06	4.87068E-06	2.43514E-06
108	52TE132	2	4.77132E-02	8.27645E-03	4.14218E-03	1.37971E-03	6.89724E-04	3.44834E-04
109	53I 127	1	4.25773E-03	8.64405E-03	8.94904E-03	9.49577E-03	9.90555E-03	1.02525E-02
110	53I 129	3	3.22649E-03	5.42360E-03	5.69211E-03	6.14532E-03	6.33058E-03	6.42795E-03
111	53I 130	2	1.78244E-08	8.95383E-10	4.02407E-10	1.34037E-10	6.70055E-11	3.35000E-11
112	53I 131	1	3.24962E-02	1.31009E-02	7.04600E-03	2.36054E-03	1.18005E-03	5.89975E-04
113	53I 133	1	4.53401E-02	2.76608E-03	1.38206E-03	4.60347E-04	2.30130E-04	1.15055E-04
114	53I 135	1	2.10214E-02	7.65458E-04	3.82458E-04	1.27392E-04	6.36839E-05	3.18393E-05
115	54XE128	2	7.87460E-11	7.88377E-11	7.87820E-11	7.87238E-11	7.87088E-11	7.87024E-11
116	54XE130	2	1.45534E-08	3.16101E-08	3.19902E-08	3.22346E-08	3.22955E-08	3.23264E-08
117	54XE131	3	1.36367E-03	2.34183E-02	2.95159E-02	3.42200E-02	3.54050E-02	3.59978E-02
118	54XE132	2	5.52716E-03	4.50260E-02	4.91226E-02	5.18457E-02	5.25256E-02	5.28661E-02
119	54XE133	1	1.84754E-02	1.60271E-02	8.19479E-03	2.73081E-03	1.36514E-03	6.82516E-04
120	54XE134	2	7.52470E-02	7.53346E-02	7.52614E-02	7.52258E-02	7.52115E-02	7.52053E-02
121	54XE135	1	1.97685E-02	1.96015E-03	5.29701E-04	1.76437E-04	8.82016E-05	4.40972E-05
122	54XE136	2	6.75042E-02	6.75628E-02	6.75350E-02	6.74852E-02	6.74723E-02	6.74668E-02
123	55CS133	3	8.53955E-04	4.59516E-02	5.51222E-02	6.14601E-02	6.30437E-02	6.38361E-02
124	55CS134	3	1.01885E-09	1.06644E-09	9.91944E-10	9.38586E-10	8.66344E-10	7.43462E-10
125	55CS135	3	2.58595E-02	6.39019E-02	6.57682E-02	6.63272E-02	6.64665E-02	6.65370E-02
126	55CS136	2	1.11512E-04	5.71956E-05	3.43497E-05	1.19273E-05	5.96291E-06	2.98121E-06
127	55CS137	3	5.94751E-02	5.94898E-02	5.93914E-02	5.91228E-02	5.87767E-02	5.81098E-02
128	56BA134	2	4.71985E-13	1.40500E-11	2.78229E-11	8.04277E-11	1.52476E-10	2.75295E-10
129	56BA136	2	3.00928E-06	5.74593E-05	8.02241E-05	1.02562E-04	1.08505E-04	1.11477E-04
130	56BA137	1	2.29613E-06	5.69184E-05	1.13271E-04	3.37881E-04	6.72669E-04	1.33470E-03
131	56BA138	2	5.91475E-02	5.92164E-02	5.91745E-02	5.91308E-02	5.91196E-02	5.91148E-02
132	56BA140	2	5.78488E-02	2.94094E-02	1.75691E-02	6.09489E-03	3.04704E-03	1.52340E-03
133	57LA139	1	5.31303E-02	5.31922E-02	5.31546E-02	5.31154E-02	5.31052E-02	5.31009E-02
134	57LA140	2	8.19437E-10	8.20373E-10	8.19774E-10	8.19091E-10	8.18818E-10	8.18518E-10
135	58CE140	2	1.97159E-04	2.63770E-02	3.95744E-02	5.25155E-02	5.59510E-02	5.76693E-02
136	58CE141	1	5.40896E-02	4.06461E-02	3.11240E-02	1.41406E-02	7.23016E-03	3.61666E-03
137	58CE142	2	4.69391E-02	4.69938E-02	4.69606E-02	4.69259E-02	4.69170E-02	4.69131E-02
138	58CE143	1	3.58296E-02	3.02003E-03	1.50595E-03	5.02612E-04	2.51258E-04	1.25619E-04
139	58CE144	3	4.53393E-02	4.38236E-02	4.22467E-02	3.67260E-02	3.01918E-02	2.13643E-02
140	59PR141	1	3.47707E-04	1.36547E-02	2.33362E-02	4.02814E-02	4.71815E-02	5.07905E-02
141	59PR142	2	2.69381E-14	1.55119E-15	7.75044E-16	2.58157E-16	1.29054E-16	6.45218E-17
142	59PR143	1	9.30187E-03	2.25013E-02	1.40435E-02	4.93530E-03	2.46746E-03	1.23363E-03
143	59PR145	1	1.26927E-02	4.51545E-04	2.25613E-04	7.51487E-05	3.75672E-05	1.87821E-05
144	60ND142	2	1.33343E-14	3.87681E-14	3.95158E-14	4.00029E-14	4.01243E-14	4.01856E-14
145	60ND143	3	1.62804E-04	1.98256E-02	2.97625E-02	3.98436E-02	4.25541E-02	4.39099E-02
146	60ND144	3	5.52562E-05	1.62384E-03	3.16863E-03	8.65578E-03	1.51813E-02	2.40051E-02
147	60ND145	3	2.46360E-02	3.69206E-02	3.71201E-02	3.72430E-02	3.72735E-02	3.72893E-02
148	60ND146	2	3.36426E-02	3.38622E-02	3.38582E-02	3.38332E-02	3.38268E-02	3.38240E-02
149	60ND147	1	2.48542E-02	1.15971E-02	6.68451E-03	2.28030E-03	1.13995E-03	5.69927E-04
150	60ND148	2	2.11447E-02	2.11693E-02	2.11544E-02	2.11387E-02	2.11347E-02	2.11330E-02

U-238(FISSION SPECT) PAGE 4

NO	NUCLIDE	NCAT	1 DAY	30 DAYS	BURN-UP TIME 60 DAYS	180 DAYS	360 DAYS	720 DAYS
151	60ND150	2	0.0	0.0	0.0	0.0	0.0	0.0
152	61PM147	3	7.82389E-04	1.39545E-02	1.86306E-02	2.20032E-02	2.16658E-02	1.96204E-02
153	61PM148	2	1.01174E-09	2.74181E-10	1.39906E-10	4.66219E-11	2.33065E-11	1.16523E-11
154	61PM149	1	1.62769E-02	2.32592E-03	1.01233E-03	3.37194E-04	1.68565E-04	8.42755E-05
155	61PM151	1	7.01905E-03	5.22942E-04	2.61286E-04	8.70311E-05	4.35073E-05	2.17519E-05
156	62SM147	3	7.26202E-05	1.87566E-04	4.05917E-04	1.41852E-03	2.89135E-03	5.50466E-03
157	62SM148	2	6.80206E-11	8.06337E-10	9.39848E-10	1.03233E-09	1.05544E-09	1.06701E-09
158	62SM149	3	2.14318E-03	1.64157E-02	1.74162E-02	1.80777E-02	1.82429E-02	1.83257E-02
159	62SM150	2	1.28446E-02	1.28598E-02	1.28507E-02	1.28412E-02	1.28387E-02	1.28377E-02
160	62SM151	3	2.22300E-03	8.72919E-03	8.98129E-03	9.13664E-03	9.16033E-03	9.14532E-03
161	62SM152	2	5.84065E-03	5.84746E-03	5.84333E-03	5.83901E-03	5.83790E-03	5.83742E-03
162	62SM153	1	3.44091E-03	3.85219E-04	1.92478E-04	6.41119E-05	3.20499E-05	1.60236E-05
163	62SM154	2	2.44671E-03	2.44956E-03	2.44783E-03	2.44602E-03	2.44556E-03	2.44536E-03
164	62SM156	2	3.48906E-04	1.40350E-05	7.01255E-06	2.33579E-06	1.16767E-06	5.83789E-07
165	63EU153	3	6.36885E-04	3.69733E-03	3.88718E-03	4.01253E-03	4.04382E-03	4.05951E-03
166	63EU154	2	3.29754E-08	3.29571E-08	3.28753E-08	3.26184E-08	3.22676E-08	3.15901E-08
167	63EU155	3	1.38881E-03	1.36949E-03	1.34732E-03	1.26586E-03	1.15672E-03	9.74713E-04
168	63EU156	2	3.92091E-04	4.01471E-04	2.52542E-04	8.98635E-05	4.49344E-05	2.24654E-05
169	63EU157	1	2.30437E-04	1.15395E-05	5.77567E-06	1.92380E-06	9.61716E-07	4.80820E-07
170	64GD155	1	6.95867E-07	2.16316E-05	4.28179E-05	1.23254E-04	2.32129E-04	4.14025E-04
171	64GD156	2	6.86991E-06	3.33232E-04	4.88655E-04	6.55457E-04	7.01412E-04	7.24404E-04
172	64GD157	1	1.48523E-04	3.67842E-04	3.73358E-04	3.76930E-04	3.77820E-04	3.78270E-04
173	64GD158	2	1.73940E-04	1.74143E-04	1.74020E-04	1.73891E-04	1.73856E-04	1.73844E-04
174	64GD159	1	5.80656E-05	3.21329E-06	1.60551E-06	5.34774E-07	2.67336E-07	1.33657E-07
175	64GD160	2	3.39867E-05	3.40263E-05	3.40022E-05	3.39771E-05	3.39707E-05	3.39679E-05
176	65TB159	1	2.94744E-05	8.44287E-05	8.59745E-05	8.69806E-05	8.72313E-05	8.73579E-05
177	65TB160	2	4.55493E-08	3.98061E-08	3.47948E-08	2.17558E-08	1.28030E-08	6.60199E-09
178	65TB161	1	1.88700E-05	6.26523E-06	3.26413E-06	1.09655E-06	5.48169E-07	2.74062E-07
179	66DY160	2	2.19300E-10	6.01562E-09	1.09347E-08	2.39999E-08	3.29440E-08	3.91413E-08
180	66DY161	1	9.56423E-07	1.35843E-05	1.65513E-05	1.87243E-05	1.92689E-05	1.95414E-05
181	66DY162	2	0.0	0.0	0.0	0.0	0.0	0.0
182	66DY163	1	0.0	0.0	0.0	0.0	0.0	0.0
183	66DY164	2	0.0	0.0	0.0	0.0	0.0	0.0
184	67HO165	1	0.0	0.0	0.0	0.0	0.0	0.0
185	43TC799	1	7.00086E-04	1.12486E-04	5.62365E-05	1.87317E-05	9.36404E-06	4.68164E-06
186	48CD815	1	0.0	0.0	0.0	0.0	0.0	0.0
187	52TE823	1	0.0	0.0	0.0	0.0	0.0	0.0
188	52TE825	1	1.95720E-09	1.00276E-06	2.54364E-06	6.73653E-06	8.92261E-06	9.37476E-06
189	52TE827	1	1.73171E-03	1.69166E-03	1.55637E-03	1.12001E-03	7.38957E-04	4.07018E-04
190	52TE829	1	1.38384E-03	1.04701E-03	8.06921E-04	3.71147E-04	1.90267E-04	9.51874E-05
191	52TE831	1	1.00305E-03	7.86414E-05	3.92929E-05	1.30880E-05	6.54274E-06	3.27110E-06
192	61PM848	1	0.0	0.0	0.0	0.0	0.0	0.0
193	34SE 82	2	2.64322E-03	2.64630E-03	2.64443E-03	2.64247E-03	2.64197E-03	2.64175E-03

Appendix 4. User's Guides for Driving the Present System

User's guides to drive the JNDC FP Fast Reactor Constants System are given in this section. Some of programs have been developed for more general purposes, and only limited functions are used for the present system. In such cases, descriptions are limited to the necessary parts.

Appendix 4. 1 PROF-GROUCH-G-II

The PROF-GROUCH-G-II code system is a very large computer code system which produces multi-group constants for diffusion and S_n calculations automatically from a nuclear data library of the ENDF/B format. Only a small subsystem is used for the production of FP group constants. As it is not feasible to describe the whole system of PROF-GROUCH-G-II in this section, the description is limited to the necessary subsystem. In the input specifications, some values are fixed without explanation. For further information, the full manual[1] of the PROF-GROUCH-G-II should be consulted.

The process flow was already illustrated in **Fig. 2**, and a brief description was given in section 2. 2 for each step, i.e., SPTG4Z2T, XTABZ2 and LISTA. Actual data treatment and input specifications will be described for each step in this section.

A. 4. 1. 1 SPTG4Z2T

(1) Outline

This is the main part of the PROF-GROUCH-G-II code system. This code is a combination of the PROF-GROUCH-G code[2] and the SUPERTOG code[3], and has been polished by their refinement. A set of fine group constants is obtained from a nuclear data file with the format of ENDF/B up to version 4. Only limited parts of this code are used for FP group constants. An interrelation among data files is shown in **Fig. A. 1**. Nuclear data with the ENDF/B format are read from a tape of logical unit number 8 and the resultant fine-group constants are written on a tape of logical unit number 9 sequentially in binary form.

(2) Input Specifications

The description on input cards is limited only to the case of JNDC FP group constants, where cross sections are calculated only for an infinitely dilute system and more than one nuclide is processed successively in one job.

#0 (8I5) NO1, NO2, NO3, NO4, NO5, NO6, NO7, NO8

Fixed Parameters

NO1=NO2=NO3=NO6=NO7=0

NO4=8

NO5=100

NO8=6

The following cards are repeated when more than one nuclide is processed in one job.

#1 (4I5, 4E10. 0, 2I5)

INALL, MATNO, LORDER, IREW, SIGP, AJIN, RFACT, SFACT, KCHECK, MUOP

1) Hasegawa, A. and Katsuragi, S.: PROF-GROUCH-G-II, to be published.
2) Tone, T. and Katsuragi, S.: PROF-GROUCH-G, JAERI 1192 (1970).
3) Wright, R. Q. *et al.*: SUPERTOG, ORNL-TM-2679 (1969).

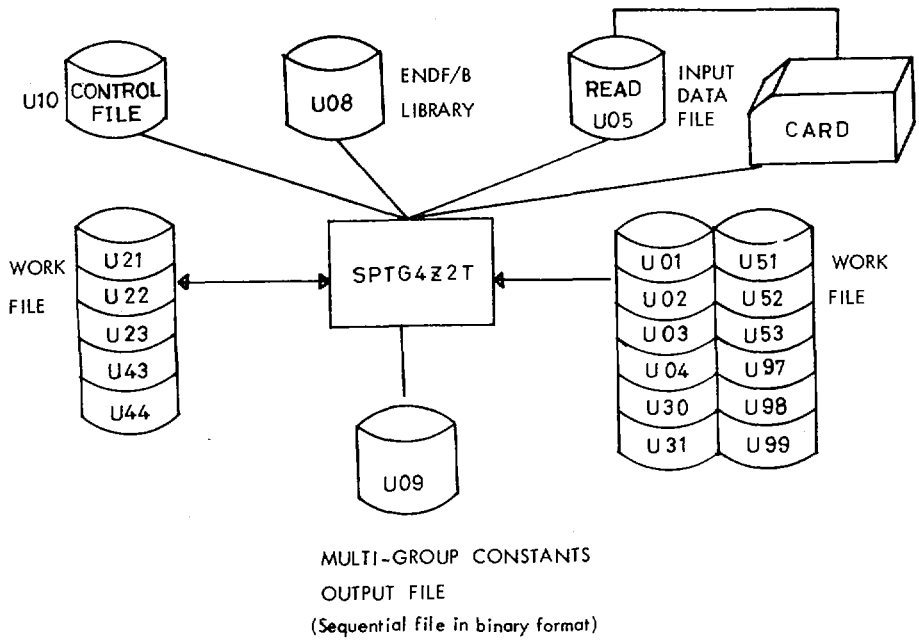

Fig. A.1 Interrelation of data files in SPTG4Z2T.

- INALL Col. 1-5
  - =−1: All input cards are necessary. This is for the first case.
  - =−2: Only cards #1 and #11 are read. This option can be used for the succeeding cases.
- MATNO Col. 6-10

  Material number in the nuclear data file with the ENDF/B format for the nuclide to be processed.
- LORDER Col. 11-15

  Order of P_n for elastic scattering (≤10). In the present processing, LORDER=3 was used.
- IREW Col. 16-20
  - =1: For the first case. ENDF/B tape is rewound
  - =0: For the succeeding cases. ENDF/B tape is not rewound.
- SIGP Col. 21-30
  - =1.0E10 (Admixture cross section for an infinitely dilute system.)
- AJIN Col. 31-40
  - =10
- RFACT Col. 41-50
  - =blank
- SFACT Col. 51-60
  - =blank
- KCHECK Col. 61-65
  - =0 (Check prints are skipped.)
- MUOP Col. 66-70
  - =1 (When anisotropy is small for elastic scattering, angular distribution is treated as isotropic one in C.M.S..)

#11 (A8, 4X, 2I6, E12.5, 6I6)

NUCLIDE, NSEQN, NSIG0, SIG0, IOUT1, IOUTN, ING, IFG, IT, IPL

- NUCLIDE Col. 1-8

  Nuclide identification (Z, symbol of the element, A; I3, A2, I3) like "␣46PD105". In the

case of meta-stable state nuclide, add 700 to A. For example ␣43TC799 for ^{99m}Tc.

- NSEQN Col. 13-18
  =blank
- NSIG0 Col. 19-24
  =1 (Number of the admixture cross sections.)
- SIG0 Col. 25-36
  =1.0E+10
- IOUT1 Col. 37-42
  =−1 (Detailed output on the disk of logical unit number 9.)
- IOUTN Col. 43-48
  =blank
- ING Col. 49-54
  =1 (Initial energy group number for processing.)
- IFG Col. 55-60
  =MAXG in #2 card. (Number of multi-group=70.)
- IT Col. 61-66
  =1
- IPL Col. 67-72
  =LORDER in #1 card.

#2 (9I5) IDTAP, MODE, MCODE, MAXG, IEU, IW, ISPEC, IRES, IPUN

- IDTAP Col. 1-5
  Identification number of ENDF/B tape. When IDTAP does not coincide with the number in the tape label, a warning message will be printed but process will be continued.
- MODE Col. 6-10
  =2 (ENDF/B tape is in BCD mode.)
- MCODE Col. 11-15
  =2 (Multi-group code is GAM-II.)
- MAXG Col. 16-20 Number of multi-groups.
- IEU Col. 21-25
  =3 (Energy structure must be given in #5 cards.)
- IW Col. 26-30
  =3 (Weighting spectrum must be given in #4 cards.)
- ISPEC Col. 31-35
  =0 (No spectrum calculation.)
- IRES Col. 36-40
  =1 (Option for resolved resonance data)
- IPUN Col. 41-45
  =0 (No card out-put.)

#3 (5I5) LINK1, LINK2, LINK3, LINK4, LINK5

Options desired for this run. (0=no, 1=yes)

- LINK1 Col. 1-5 Resonance calculation.
- LINK2 Col. 6-10 Smooth cross section.
- LINK3 Col. 11-15 Elastic scattering.
- LINK4 Col. 16-20 Inelastic scattering.
- LINK5 Col. 21-25 (n, 2n) scattering.

#4 Cards (#41, #42, #43)

This set of cards consists of the desired weighting function as tabulated data as well as the

interpolation scheme used with these tabulated points. The weighting function must be given from low to high in energy. The format of the card is the same as for the standard ENDF/B tape TAB1 records.[4)]

#41 (44X, 2I11) N1, N2

- N1 Col. 45–55 Number of interpolation ranges.
- N2 Col. 56–66 Number of weighting function points.

#42 (6I11) (NBT(I), JNT(I), I=1, N1)

- NBT(I) Last point number in the I-th interpolation range.
- JNT(I) Interpolation scheme for the I-th range. See the manual of ENDF/B.[4)]

#43 (6E11.4) (BLOK3(I), BLOK4(I), I=1, N2)

- BLOK3(I) The I-th energy point.
- BLOK4(I) Weight at this energy point.

BLOK3(1)≦the lowest energy in group structure,
BLOK3(N2)≧the highest energy in group structure.

#5 Cards (#51)

This set of cards gives the desired group structure. The energy breakpoints of the structure are given from low to high in energy.

#51 (6E11.4) (XX(I), I=1, MAXG), XX(MAXG+1)

- XX(I) The lower energy limit of the I-th energy group.
- XX(MAXG+1) The upper energy limit of the highest energy group.

A.4.1.2 XTABZ2

(1) Outline

This is a utility code for the data file obtained in the previous step "SPTG4Z2T". This code has following functions using the sequential files of fine group constants.

(1) Collapsing the constants from fine group to coarse group.
(2) Tabulation of fine and coarse group constants.
(3) Production of fine and coarse group sequential file in binary form for the next step of updating the cross sections.
(4) Production of fine and coarse group constants with the standard format of the JNDC Group Constants in EBCDIC form. They are stored on tapes of logical unit numbers 2 and 3 respectively.

The interrelation of the data files is illustrated in **Fig. A. 2.**

(2) Input Specifications

Description is limited to the case of FP data processing.

#1 (24I3)

IN, KP, NCASE, NCNDX, ISG, ITS, ICONT, IFPOUT, IOFP1, IOFP2, ISKPC, IPROP, INELN

- IN=1 Col. 1–3 Logical unit number of INFILE.
- KP=0 Col. 4–6
- NCASE Col. 7–9
  =1
- NCNDX Col. 10–12 Option for collapsing.
  =−1: No collapsing.
  =0: Standard collapsing from 70 to 25 as the JAERI-Fast set.
  >0: Collapsing to any group structure defined in #2 cards.

4) Drake, M. K.: Data Formats and Procedures for the ENDF Neutron Cross Section Library, BNL-50274 (1970).

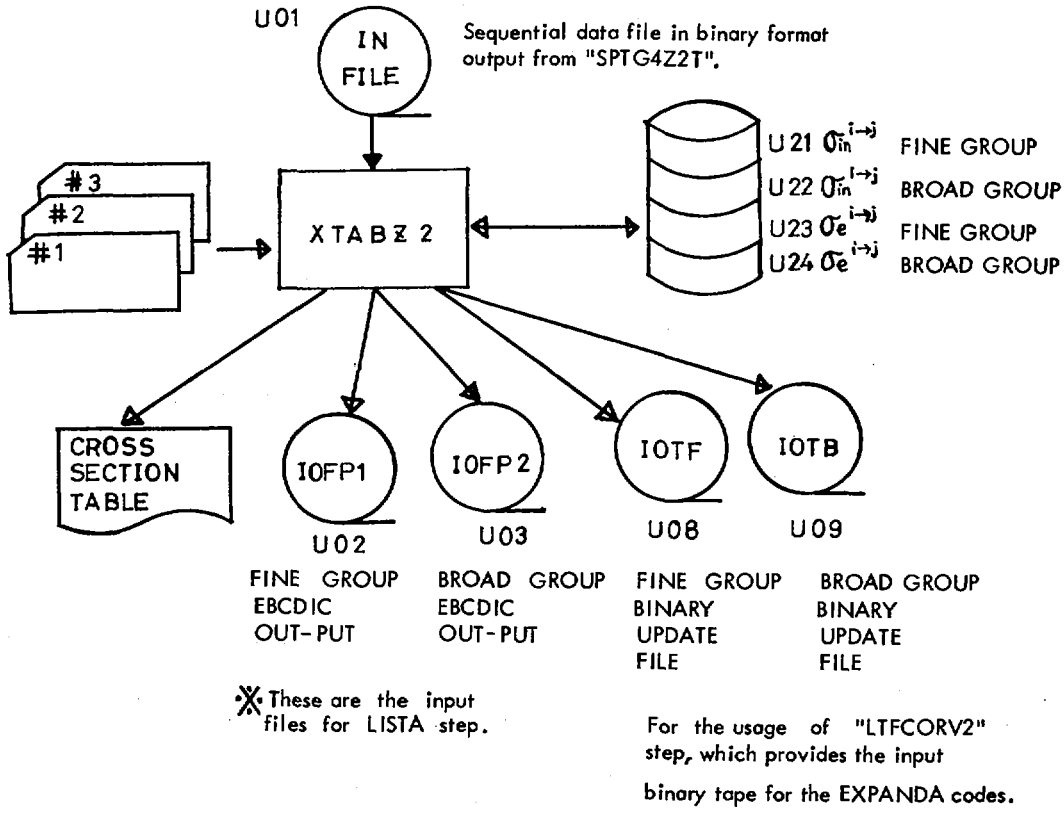

Fig. A.2 Interrelation of data files in XTABZ2.

- ISG=0 Col. 13-15
- ITS=0 Col. 16-18
- ICONT Col. 19-21
  =1 (Option for processing more than one nuclide in a time.)
- IFPOUT Col. 22-24
  =1 (Option for production of fine and coarse group constants with the standard format of the JNDC Group Constants.)
- IOFP1 Col. 25-27
  =2 (Logical unit number for fine group constants with the standard format of the JNDC Group Constants.)
- IOFP2 Col. 28-30
  =3 (Logical unit number for coarse group constants with the standard format of the JNDC Group Constants.)
- ISKPC=0 Col. 31-33
- IPROP Col. 34-36 Print option for cross section table.
  =−1: All outputs are printed out.
  ≠−1: Only one-dimensional cross sections in an infinitely dilute system are printed out.
- INELN Col. 37-39 Option for inelastic matrices.
  =30 (The maximum matrix length for exit group.)

#2 (24I3) (IX(J), J=1, NCNDX)

This card is necessary only for the case of NCNDX>0.

Lower energy boundary group numbers in fine group structure are given for each coarse group.

For example, in the following collapsing,

coarse group	fine group
1	1～ 2
2	3～ 4
·	·
·	·
·	·
25	67～70,

underlined numbers should be assigned for (IX(J), J=1, NCNDX).

(3) Format Specification for Outputs on the Data File of "FPOUT"

This is the standard format of the JNDC Group Constants. For each nuclide, following one set of data is stored in EBCDIC card image form on a tape;

ONE SET OF GROUP CONSTANTS FOR A FP NUCLIDE			(NUCLID, MAT, NREAC)	A8, 2I4
	ONE DIMENSIONAL DATA	NREAC	('FLUX', MT, ING, IFG)	A8, 3I4
			(DATA(I), I=ING, IFG)	6E12.5
			('TOTAL', MT, ING, IFG)	A8, 3I4
			(DATA(I), I=ING, IFG)	6E12.5
			·	
			·	
			·	
			('MU', MT, ING, IFG)	A8, 3I4
			(DATA(I), I=ING, IFG)	6E12.5
	TWO DIMENSIONAL DATA		('INELA␣MATRIX')	3A4
			('MATRIX␣I', MT, IMX, JMX)	A8, 3I4
		IMX	(DM(1, J), J=1, JMX)	6E12.5
			(DM(2, J), J=1, JMX)	6E12.5
			·	
			·	
			·	
			(DM(IMX, J), J=1, JMX)	6E12.5
			(BLANK CARD: TRAILER RECORD)	80H

,

where the data lists in the parentheses are output in one write statement according to the format specified on the right. The meaning of data lists is as follows:

A. ONE DIMENSIONAL DATA

NUCLID	: A8	:	Nuclide identification in literal. For example '␣50SN121' for $^{121}_{50}$Sn
MAT	: I4	:	Material (nuclide) identification number. (MAT number in JENDL-1.)
NREAC	: I4	:	Number of one dimensional data (reactions) for this nuclide. For FP nuclides, NREAC=7 should be specified. The details are listed in TABLE A. 1.
'FLUX␣␣␣␣' 'TOTAL␣␣␣' etc	: A8	:	Reaction identification in literal.
MT	: I4	:	Reaction identification number; the details are given in TABLE A. 1.
ING	: I4	:	Initial group number for data given.
IFG	: I4	:	Final group number for data given. IFG≧ING

DATA : 6E12.5 : One dimensional data for each reaction specified by MT.

TABLE A.1 Dictionary for reaction identification and reaction identification number (MT)

ORDER	REACTION	REACTION ID NUMBER (MT)
1	'FLUX '	999
2	'TOTAL '	1
3	'CAPTURE '	102
4	'ELASTIC '	2
5	'INELA'	4
6	'ELA. REMO'	992
7	'MU '	993

B. TWO DIMENSIONAL DATA

MT : I4 : 400, for inelastic matrix.

IMX : I4 : The maximum group number of i for which the transfer element $\sigma_{in}{}^{i\to k}$ is not equal to zero.

JMX : I4 : The maximum group number of j for which the transfer element $\sigma_{in}{}^{i\to i+j-1}$ is not equal to zero, where self-scattering is assigned as $j=1$ and only down scatterings are allowed.

DM(I, J) Transfer element for $\sigma^{I\to I+J-1}$

$1\leqq J\leqq$JMX, $1\leqq I\leqq$IMX

A. 4. 1. 3 LISTA

(1) Outline

It often occurs that the computation process is performed by parts because of the limit of computing time. In such a case, more than one file is obtained from XTABZ2 for the same group structure. The LISTA code accumulates several data files and makes one file. Interrelation of the data files are shown in **Fig. A. 3**. It is possible to add the data after other data already written on the tape of logical unit number IOUT. The data on the output tape are written with the standard format of the JNDC Group Constants.

(2) Input Specifications

#1 (10I3) INMX, IOUT, IOPT, IWRT

∘ INMX Col. 1-3 Number of data files to be combined. (INMX≦4)

File definition statement is necessary for logical unit number 1 to INMX in JCL.

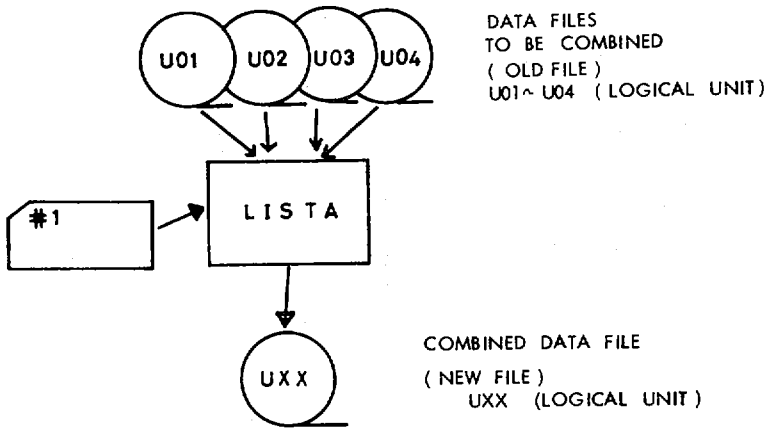

Fig. A. 3 Interrelation of data files in LISTA

- IOUT — Col. 4-6 Logical unit number for output new data file. (IOUT≧8)
- IOPT — Col. 7-9 Option for new tape.
  - =−1 or 0: Output tape is a new tape and this is the first writing on this tape.
  - =1: Adding new data after the data already written on the output tape.
- IWRT — Col. 10-12 Print option for the data on logical unit number "IOUT".
  - =0: Print-out.
  - ≠0: No print-out.

A. 4. 1. 4 An Example of Job Control Language and Input Data

a) Example of "SPTG4Z2T" step.

This is an input example for processing six FP nuclides (Xe-131, Cs-133, Cs-135, Cs-137, Ce-144 and Nd-147) sequentially in one step. In this case, the processing is intended in one step. The evaluated nuclear data of these nuclides are stored in the file of logical unit number 8 with the order described in the parenthesis. The tape assigned to the logical unit number 9 is the output tape from this SPTG4Z2T step, and the processed multi-group constants are written on this tape which is passed to the next step.

b) Example of "XTABZ2" step.

This is an input example for collapsing and tabulation of cross sections from the data file passed from the previous step. In this case, 2 nuclides are tabulated.

c) Example of "LISTA" step.

This is an input example for accumulation of data files specified by logical unit number 1 to 4. Final output data are obtained on a file designated by logical unit number 8.

```
....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

a) ¥ NO  K201,                                                          /
                                                                   T,5/TIME  60
                                                                   P,0/PCH    0
                                                                   C,4/CORE 200
   #      SPTG4Z2T  ------------//////////////////////////////////////
   #PRUN  SPTG4Z2T,J2585,SPTG4Z2T,SIZE=14,OUT=500 <------┐
   ¥DISK  F01,TRK=500                                    └─PROGRAM LIBRARY
   ¥DISK  F02,TRK=500
   ¥DISK  F03,TRK=500
   ¥DISK  F04,TRK=500
   ¥TAPE  F08,J2608,FFPDATAF,OLD,001736 <---- EVALUATED NUCLEAR DATA FILE  ( ENDF/B )
   ¥TAPE  F09,J2585,FPX2,NEW,001962     <---- MULTI GROUP CONSTANTS OUTPUT FILE.
   ¥DISK  F10                                                          ( BINARY SEQUENTIAL )
   ¥DISK  F21
   ¥DISK  F22
   ¥DISK  F23
   ¥DISK  F30,TRK=500
   ¥DISK  F31,TRK=500
   ¥DISK  F43
   ¥DISK  F44
   ¥DISK  F51
   ¥DISK  F52,,60
   ¥DISK  F53
   ¥DISK  F97,TRK=500
   ¥DISK  F98,TRK=500
   ¥DISK  F99,TRK=500
   ¥DATA
       0    0    0    8  100    0    0    6                                          #0
      -1 5431    3    1 1,0   +15  0,        0,        0,                 1         #1
    54XE131         17      1 1,0     +15    -1     0     1    70     1     9       #11
     901    2    2   70    3    3    0    1    0                                    #2
       1    1    1    1    1                                                         #3
                                                          2          35              #41 ┐
            15          5          35          5                                    #42 │
    1,0    -1  3,44546    0,5        0,689091   1,0        3,44546-1      W 1      #43 │
    5,0        6,89091-2  1,0    +1  3,44546-2  5,0    +1  6,89091-3      W 2          │
    1,0    +2  3,44546-3  5,0    +2  6,89091-4  1,0    +3  3,44546-4      W 3          │
    5,0    +3  6,89091-5  1,0    +4  3,44546-5  5,0    +4  6,89091-6      W 4          │
    1,0    +5  3,44546-6  5,0    +5  6,89091-7  1,0    +6  3,44546-7      W 5          ├ #4
    2,0    +6  2,37568-7  3,0    +6  1,38510-7  4,0    +6  7,47288-8      W 6          │
    5,0    +6  3,84524-8  6,0    +6  1,91453-8  7,0    +6  9,30017-9      W 7          │
    8,0    +6  4,43090-9  9,0    +6  2,07793-9  1,0    +7  9,6170-10      W 8          │
    1,1    +7  4,4011-10  1,2    +7 1,99461-10  1,3    +7 8,96287-11      W 9          │
    1,4    +7 3,99716-11  1,5    +7 1,77060-11  1,6    +7 7,79541-12      W10          │
    1,7    +7 3,41315-12  1,8    +7 1,48689-12  1,9    +7 6,44747-13      W11          │
    2,0    +7 2,78384-13  2,1    +7 1,19724-13                            W12          ┘
```

```
0.215      0.278      0.360      0.465      0.598      0.773                          #51
1.000      1.29       1.66       2.15       2.78       3.6
4.65       5.98       7.73       10.00      12.9       16.6
21.5       27.8       36.0       46.5       59.8       77.3
100.       129.       166.       215.       278.       360.
465.       598.       773.       1000.      1.29     +3  1.66   +3
2.15     +32.78     +33.60     +34.65     +35.98     +37.73     +3
1.00     +41.29     +41.66     +42.15     +42.78     +43.60     +4
4.65     +45.98     +47.73     +41.00     +51.20     +51.50     +5                  } #5
2.00     +52.50     +53.10     +54.00     +55.00     +56.30     +5
8.00     +51.10     +61.40     +61.90     +62.50     +63.10     +6
4.00     +65.10     +66.50     +68.30     +61.05     +7
  -2 5533    3    0 1.0   +15  0.       0.       0.                1              #1
 55CS133        18     1 1.0    +15   -1     0     1    70     1     9             #11
  -2 5535    3    0 1.0   +15  0.       0.       0.                1              #1
 55CS135        19     1 1.0    +15   -1     0     1    70     1     9             #11
  -2 5537    3    0 1.0   +15  0.       0.       0.                1              .
 55CS137        20     1 1.0    +15   -1     0     1    70     1     9             .
  -2 5844    3    0 1.0   +15  0.       0.       0.                1              .
 58CE144        21     1 1.0    +15   -1     0     1    70     1     9             .
  -2 6043    3    0 1.0   +15  0.       0.       0.                1              .
 60ND143        22     1 1.0    +15   -1     0     1    70     1     9             .
* JEND
```

b)

```
* NO  K202.
                                                                  /
                                                          T.2/TIME   5
                                                          W.1/PAGE  80
                                                          C.2/CORE 128
                                                          P.0/PCH    0
                                                             /XTABZ2
*GJOB    0XX2585.HASEGAWA.A.431.01
*   XTABZ2  CODE    JCL AND  INPUT DATA  EXAMPLE
*PRUN    XTABZ2.J2585.XTABZ2          ←PROGRAM LIBRARY
*TAPE    F01.J2585.FPX1.OLD.001764    ←PASSED FROM PREVIOUS STEP ( F09 OUTPUT OF SPTG4Z2T STEP )
*DISKTN F02.J2585.FPX1C70.TRK=60      ←FINE GROUP CONSTANTS OUTPUT FILE
*DISKTN F03.J2585.FPX1C25.TRK=25      ←COARSE GROUP CONSTANTS OUTPUT FILE
*DATA
  1  0  1  0  0  0  1  1  2  3
  1  0  1  0  0  0  1  1  2  3
  1  0  1  0  0  0  1  1  2  3
* JEND
```

c)

```
* NO  K203.
                                                                  /
                                                          P.0/PCH    0
                                                          T.3/TIME   5
                                                          W.3/PAGE 240
                                                          C.1/CORE  64
                                                             /LISTA
*GJOB    0XX2585.HASEGAWA.A.431.01
*     LISTA    CODE    JCL  AND  INPUT  DATA  EXAMPLE
*PRUN    LISTA.J2585.LISTA                    ← PROGRAM LIBRARY
*DISKTO1  F01.J2585.FPX1C25                   } PASSED FROM PREVIOUS STEP
*DISKTO1   F02.J2585.FPX2C25                  }      ( F02, or, F03 OUTPUT OF XTABZ2 STEP )
*DISKTO1    F03.J2585.FPX3C25                 }
*DISKTO1   F04.J2585.FPX4C25                  }
*DISKTN    F08.J2585.FPX25.TRK=100            → FINAL OUTPUT
*DATA
  4  8  0  0
* JEND
```

Appendix 4. 2 REPLACE

A. 4. 2. 1 Outline

The REPLACE code was developed in order to replace the cross section data of some materials on the old library tape by those of the corresponding materials, obtained by the PROF-GROUCH-G-II code, and then to make a new library tape.

Four units for tapes and/or disks are required to run the code. No. 1 unit is used as a tape or disk unit for the new data obtained by the PROF-GROUCH-G-II code, No. 2 unit is used as a scratch unit for recording the new data temporarily, No. 3 unit is used as a tape unit for the old library, and No. 4 unit is used as an output tape unit for the new library. It should be noted that all the materials on the tape or disk of logical unit No. 1 are processed without any selection.

A. 4. 2. 2 Input Specifications

#1 (6I4) LIB, NOC, JSTEP, L, IOPT, MULT

∘ LIB		Col. 1-4	New library number.
∘ NOC		Col. 5-8	Number of comment cards.
∘ JSTEP	=0	Cal. 9-12	Job step.
∘ L	=4	Col. 13-16	Logical unit number of the new library tape.
∘ IOPT		Col. 17-20	Option for print out.
=−1:		All the materials are printed out.	
=0:		No print-out.	
>0:		IOPT materials specified in #4 cards are printed out.	
∘ MULT		Col. 21-24	Specification of multi-file.
=0:		Usual case	
=1:		The END FILE mark will be checked by computer system.	

#2 (20A4) (H(I), I=1, 15)

∘ H Col. 1-60 Label of the new library.

#3 (20A4) (H(I), I=16, IH); IH=NOC*20+15

∘ H Comments. Write them on NOC cards.
Not necessary if NOC=O.

#4 (20I4) (IOM(I), I=1, IOPT)

These cards are required when IOPT>0

∘ IOM Number of the order on the library for materials to be printed out.
The order of nuclides on the tape is shown in TABLE A. 2.

A. 4. 2. 3 Data Format of JNDC FP Fast Reactor Constants Library

The library consists of a heading information and 193 sets of material data.

I. Heading Information

Heading information consists of control data, a label of the library, comments, energy group boundaries, the weighting fluxes and a list of materials.

(1) (5I4, 15A4) LIB, NOC, NG, NMAT, NOH, (H(I), I=1, 15)

LIB : Library No.
NOC : Number of comment cards.
NG : Number of groups.
NMAT : Number of materials.
NOH : Number of heading information cards, including this card (1) itself.
H : Label of the library.

(2) (20A4) (H(I), I=16, IH); IH=NOC*20+15

H : Comments. Written on NOC cards. Ignored if NOC is equal to 0.

(3) (6A4/(6E12.5)) (ICM(I), I=1, 6), (EN(I), I=1, NGG): NGG=NG+1

ICM : Title, 'ENERGY GROUP BOUNDARIES'
EN : Boundary energies of the groups.

(4) (A8, 3I4/(1P6E12.5)) RT, IRN, NF, NL, (SX(I), I=NF, NL)

RT : Title, 'FLUX'.
IRN : Reaction type No., =999.
NF : Group No. of the first group, =1.
NL : Group No. of the last group, =25 or 70.
SX : Weighting flux.

(5) (11A4/(5(3X, A2, I3, A8))) (ICM(I), I=7, 17), (JND(I), NUM(I), ATM(I), I=1, NMAT)

ICM : Title, 'LIST OF MATERIALS (**DENOTES THE JNDC DATA)'
JND : Asterisks for the JNDC data, or blank for the other data.

NUM : Material No. in the order on the library tape.

ATM : Material identification.

(I3, A 2, I3) NZ, NUC, NA ; where NZ is a Z number, NUC is an element symbol, and NA is an A number.

For example, '␣55 CS 133', '␣53 I ␣131'.

In the case of meta-stable state nuclides the NA is increased by 700.

II. Material Data

This data block is repeated for 193 times. The format of these data resembles that of the JNDC Group Constants except that the weighting fluxes do not exist and that the mark for material separation is different.

(1) (20 A 4) (IS, I=1, 20)

IS : Asterisks for material separation,'***⋯*' (80 asterisks).

(2) (A 8, 2 I 4) ATM, MAT, N 1

ATM : Material identification. See I. (5).

MAT : A number assigned to a material.

(2 I 2) NZ, NA1 ; where NZ is a Z number and NA 1 is a number of the last two figures at an A number.

For example, 5531 for '55 CS 131' and 5227 for '52 TE 827'.

N 1 : Number of one dimensional data sets, =6.

(3) (A 8, 3 I 4/(1 P 6 E 12. 5)) RT, IRN, NF, NL, (SIG(I), I=NF, NL)

RT : Title, 'TOTAL' for σ_t,
'CAPTURE' for σ_c,
'ELASTIC' for σ_{el},
'INELA' for σ_{in},
'ELA. REMO' for $\sigma_{el.r}$,
'MU' for μ_L.

IRN : Reaction type No. ;
1, 102, 2, 4, 992, and 993 for σ_t, σ_c, σ_{el}, σ_{in}, $\sigma_{el.r}$ and μ_L respectively.

NF : Group No. of the first group, =1.

NL : Group No. of the last group, =25 or 70.

SIG : σ_t, σ_c, σ_{el}, σ_{in}, $\sigma_{el.r}$ or μ_L.

Records of this type are repeated for N 1 times according to each reaction from σ_t to μ_L.

(4) (3 A 4/A 8, 3 I 4) (IRT(I), I=1, 3), RT, IRN, NL, NJ

IRT : Title, 'INELA MATRIX'.

RT : Title, 'MATRIX I'.

IRN : Reaction type No., =400.

NL : Last group No. of non-zero σ_{in}'s.

NJ : Maximum slowing down group number in the σ_{in} matrix (slowing down to the same group is assigned to 1).

(5) (1 P 6 E 12. 5) (SIGI(I, K), K=1, NJ) ; I=1, NL

SIGI : $\sigma_{in}{}^{i\to j}$, I=i, K=$j-i+1$.

Records of this type are repeated for NL times according to each group.

A. 4. 2. 4 An Example of the Library

A list of the data stored in the JNDC FP Fast Reactor Constants Library is shown in TABLE A. 2. In this case only a few materials' data are shown for convenience.

TABLE A.2 JNDC FP Fast Reactor Constants Library. Order of 193 nuclides is as the list of materials in the heading information.

```
   5  24  25 193  77JNDC-FP-2, 25 GROUPS, 193 MATERIALS
COMMENTS
  THE JNDC'S DATA-2(1) WERE PROCESSED BY Y.KIKUCHI,ET.AL.(2),
  THE GROUP CONSTANTS OBTAINED WERE COMPILED FOR THIS LIBRARY BY H.NISHIMURA,
  JAERI, ON 28 AUG,1975,
  THE JNDC'S CONSTANTS CONSIST OF 28 PRINCIPAL NUCLIDES AND OTHER BACKGROUND
  DATA CONSIST OF THE COOK'S CONSTANTS(3,4) EXCEPT SE-82 WHICH WAS TAKEN FROM
  THE UK LIBRARY.  IN THE COOK'S CONSTANTS, MU AND ELASTIC REMOVAL CROSS
  SECTIONS WERE TREATED SIMPLY AS FOLLOWS,
      MU=2/3A,
      ELAS.REMOV.=XI*SIGS/DU, XI=2/(A+2/3).
  ORDER OF REACTIONS IS AS FOLLOWS,
  1, MATERIAL IDENTIFICATION
  2, TOTAL
  3, CAPTURE
  4, ELASTIC
  5, INELASTIC
  6, ELASTIC REMOVAL
  7, MU
  8, INELASTIC MATRIX
  REFERENCES
  (1) JNDC, TO BE PUBLISHED,
  (2) Y.KIKUCHI,ET.AL., TO BE PUBLISHED,
  (3) J.L.COOK, AAEC/TM-549 (1969)
  (4) Y.KIKUCHI,ET.AL., JAERI-M-5492 (1973)
ENERGY GROUP BOUNDARIES
 0.10500E+08 0.65000E+07 0.40000E+07 0.25000E+07 0.14000E+07 0.80000E+06
 0.40000E+06 0.20000E+06 0.10000E+06 0.46500E+05 0.21500E+05 0.10000E+05
 0.46500E+04 0.21500E+04 0.10000E+04 0.46500E+03 0.21500E+03 0.10000E+03
 0.46500E+02 0.21500E+02 0.10000E+02 0.46500E+01 0.21500E+01 0.10000E+01
 0.46500E+00 0.21500E+00
FLUX      999   1  25
 1.69804E-02 8.92878E-02 1.79938E-01 2.58407E-01 2.02345E-01 2.38821E-01
 2.38821E-01 2.38821E-01 2.63825E-01 2.65782E-01 2.63739E-01 2.63825E-01
 2.65782E-01 2.63739E-01 2.63825E-01 2.65782E-01 2.63739E-01 2.63825E-01
 2.65782E-01 2.63739E-01 2.63825E-01 2.65782E-01 2.63739E-01 2.63825E-01
 2.65782E-01
LIST OF MATERIALS (** DENOTES THE JNDC DATA)
       1 30ZN 72        2 31GA 72        3 32GE 72        4 32GE 73        5 32GE 74
       6 32GE 76        7 32GE 77        8 33AS 75        9 33AS 76       10 33AS 77
      11 34SE 76       12 34SE 77       13 34SE 78       14 34SE 79       15 34SE 80
      16 35BR 81       17 35BR 82       18 36KR 82       19 36KR 83       20 36KR 84
      21 36KR 85       22 36KR 86       23 37RB 85       24 37RB 86       25 37RB 87
      26 38SR 86       27 38SR 88       28 38SR 89    ** 29 38SR 90       30 38SR 91
      31 39Y  89       32 39Y  90       33 39Y  91       34 39Y  93       35 40ZR 90
      36 40ZR 91       37 40ZR 92    ** 38 40ZR 93       39 40ZR 94       40 40ZR 95
      41 40ZR 96       42 40ZR 97       43 41NB 95    ** 44 42MO 95       45 42MO 96
   ** 46 42MO 97       47 42MO 98       48 42MO 99       49 42MO100    ** 50 43TC 99
      51 44RU100    ** 52 44RU101    ** 53 44RU102       54 44RU103    ** 55 44RU104
      56 44RU105    ** 57 44RU106    ** 58 45RH103       59 45RH105       60 46PD104
   ** 61 46PD105       62 46PD106    ** 63 46PD107       64 46PD108       65 46PD109
      66 46PD110       67 46PD112    ** 68 47AG109       69 47AG111       70 48CD110
      71 48CD111       72 48CD112       73 48CD113       74 48CD114       75 48CD115
      76 48CD116       77 49IN115       78 50SN115       79 50SN116       80 50SN117
      81 50SN118       82 50SN119       83 50SN120       84 50SN121       85 50SN122
      86 50SN123       87 50SN124       88 50SN125       89 50SN126       90 51SB121
      91 51SB122       92 51SB123       93 51SB124       94 51SB125       95 51SB126
      96 51SB127       97 51SB128       98 52TE122       99 52TE123      100 52TE124
     101 52TE125      102 52TE126      103 52TE127      104 52TE128      105 52TE129
     106 52TE130      107 52TE131      108 52TE132      109 53I 127    **110 53I 129
     111 53I 130      112 53I 131      113 53I 133      114 53I 135      115 54XE128
     116 54XE130    **117 54XE131      118 54XE132      119 54XE133      120 54XE134
     121 54XE135      122 54XE136    **123 55CS133      124 55CS134    **125 55CS135
     126 55CS136    **127 55CS137      128 56BA134      129 56BA136      130 56BA137
     131 56BA138      132 56BA140      133 57LA139      134 57LA140      135 58CE140
     136 58CE141      137 58CE142      138 58CE143    **139 58CE144      140 59PR141
     141 59PR142      142 59PR143      143 59PR145      144 60ND142    **145 60ND143
   **146 60ND144    **147 60ND145      148 60ND146      149 60ND147      150 60ND148
     151 60ND150    **152 61PM147      153 61PM148      154 61PM149      155 61PM151
   **156 62SM147      157 62SM148    **158 62SM149      159 62SM150    **160 62SM151
     161 62SM152      162 62SM153      163 62SM154      164 62SM156    **165 63EU153
     166 63EU154    **167 63EU155      168 63EU156      169 63EU157      170 64GD155
     171 64GD156      172 64GD157      173 64GD158      174 64GD159      175 64GD160
     176 65TB159      177 65TB160      178 65TB161      179 66DY160      180 66DY161
     181 66DY162      182 66DY163      183 66DY164      184 67HO165      185 43TC799
     186 48CD815      187 52TE823      188 52TE825      189 52TE827      190 52TE829
     191 52TE831      192 61PM848      193 34SE 82
*****************************************************************************
 30ZN 723072   6
TOTAL     1   1  25
 3.99282E+00 3.81772E+00 3.55310E+00 3.57991E+00 4.20276E+00 5.25603E+00
 5.43092E+00 5.37769E+00 5.62964E+00 6.35962E+00 7.48878E+00 9.15050E+00
 4.82750E+00 4.72307E+00 4.72141E+00 4.72081E+00 4.72070E+00 4.72091E+00
 4.72133E+00 4.72206E+00 4.72305E+00 4.72465E+00 4.72700E+00 4.73043E+00
 4.73553E+00
CAPTURE  102   1  25
 1.29281E-04 5.69506E-04 1.17801E-03 1.25567E-03 1.52965E-03 3.29292E-03
 4.46552E-03 5.00387E-03 5.99754E-03 7.65395E-03 1.06716E-02 1.43662E-02
 1.76686E-04 2.06847E-04 3.20964E-04 4.86622E-04 7.28073E-04 1.07684E-03
 1.58830E-03 2.32985E-03 3.41845E-03 5.02938E-03 7.38105E-03 1.08262E-02
 1.59083E-02
ELASTIC     2   1  25
 2.30265E+00 1.99318E+00 1.73135E+00 2.04527E+00 3.07417E+00 4.57950E+00
 5.14212E+00 5.30123E+00 5.62363E+00 6.35199E+00 7.47812E+00 9.13498E+00
 4.82708E+00 4.72287E+00 4.72109E+00 4.72031E+00 4.72000E+00 4.71983E+00
 4.71973E+00 4.71970E+00 4.71961E+00 4.71960E+00 4.71960E+00 4.71960E+00
 4.71961E+00
INELA       4   1  25
 1.68953E+00 1.82400E+00 1.82077E+00 1.47670E+00 1.05354E+00 4.30591E-01
 0.0         0.0         0.0         0.0         0.0         0.0
 0.0         0.0         0.0         0.0         0.0         0.0
 0.0         0.0         0.0         0.0         0.0         0.0
 0.0
ELA.REMO 992   1  25
 1.32150E-01 1.12991E-01 1.01386E-01 9.70853E-02 1.51193E-01 1.81839E-01
 2.04179E-01 2.10497E-01 2.02136E-01 2.26634E-01 2.68881E-01 3.28347E-01
 1.72226E-01 1.69814E-01 1.69695E-01 1.68417E-01 1.69711E-01 1.69649E-01
 1.68396E-01 1.69700E-01 1.69641E-01 1.68392E-01 1.69697E-01 1.69641E-01
 1.68392E-01
MU        993   1  25
 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03
 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03
 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03
 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03 9.25926E-03
 9.25926E-03
INELA MATRIX
MATRIX I 400   6  10
 0.0         2.19859E-02 1.42063E-01 4.36335E-01 4.85380E-01 3.82216E-01
 1.53901E-01 4.90454E-02 1.52210E-02 3.38244E-03
 5.46653E-03 1.54885E-01 4.75588E-01 5.30254E-01 4.17279E-01 1.67640E-01
 5.28432E-02 1.63996E-02 3.64436E-03 0.0
 7.27580E-02 5.00212E-01 5.56599E-01 4.38367E-01 1.76436E-01 5.63875E-02
 1.63706E-02 3.63790E-03 0.0         0.0
 2.74666E-01 5.36042E-01 4.20859E-01 1.69821E-01 5.46379E-02 1.62437E-02
 2.95340E-03 1.47670E-03 0.0         0.0
 3.17851E-01 4.65199E-01 1.87343E-01 5.99918E-02 1.78923E-02 4.20995E-03
 1.05249E-03 0.0         0.0         0.0
 2.03442E-01 1.57754E-01 5.04296E-02 1.46547E-02 3.44818E-03 8.62044E-04
 0.0         0.0         0.0         0.0
*****************************************************************************
 31GA 723172   6
```

Appendix 4. 3 FP-S and FPYD

The concentrations of the 193 FP nuclides are calculated with a combination of the FP-S and FPYD codes. The FP-S code solves β-decay chains and calculates atom numbers of 427 nuclides at various burn-up stages. The FPYD code renormalizes these atom numbers and gives the concentrations of the 193 nuclides.

A. 4. 3. 1 FP-S

(1) Outline

The program FP-S calculates the atom number of each fission-product nuclide for the arbitrary irradiation history and cooling time by using Bateman's equation and its integrated form repeatedly. The transmutation through the neutron capture reaction is not considered in the program. The results are stored on the disk or tape of logical unit number 10 in binary form.

This code has been developed for more general use and only limited functions are used for the present purpose. For further information the manual of FP-S[1] should be consulted.

(2) Library

A library of nuclear data has been compiled, including half-lives, decay schemes, disintegration energies, and fission yields. 427 fission-product nuclides are included in the library, 127 of which are stable nuclides.

Decay data including half-lives, decay schemes, and disintegration energies are obtained from Lederer *et al.*[2] and supplemented by Nuclear Data Sheets. Fission yields are obtained from the recommendation by Meek and Rider[3]. The data by Meek and Rider consist of thermal-neutron fission yields of ^{235}U, ^{239}Pu, ^{241}Pu and ^{233}U, fission yields of ^{235}U, ^{238}U, ^{239}Pu and ^{232}Th for fast-neutron-induced fission, and those of ^{235}U and ^{238}U for 14 MeV-neutron-induced fission. All of these are compiled in the library of FP-S.

(3) Input Specifications

#1 card specifies number of cases to be run in one job and the cards set #2~#6 must be repeated for each case.

#1 (I6) ICASE

Number of calculational cases.

#2 (18A 4) (THEME(I), I=1, 18)

Title of the calculational case.

#3 (9I5) KTYPE, ITB, IT, IDATA, IDCH, ISPC, INDT, ITOP, IDISK

- KTYPE Col. 1-5
  =0
- ITB Col. 6-10
  =1 Number of time steps of irradiation history.
- IT Col. 11-15
  Number of times to calculate atom number of each fission product.
- IDATA Col. 16-20
  =1
- IDCH Col. 21-25
  =0

1) Tasaka, K. and Sasamoto, N.: FP-S, JAERI 1198 (1970).
2) Lederer, C. M., Hollander, J. M. and Perlman, I.: "Table of Isotopes", Sixth Edition, John Wiley and Sons, Inc. New York, London, Sydney, 1968.
3) Meek, M. E. and Rider, B. F.: Compilation of Fission Product Yields, NEDO-12154 (1972).

∘ ISPC Col. 26–30
=0

∘ INDT Col. 31–35 Option for print out.
=0 Print the atom number and activity of each FP, and their summation.
=1 No print out.

∘ ITOP Col. 36–40
=0

∘ IDISK Col. 41–45
=0 No effect.
=1 Write the atom number and disintegration rate of each FP on a tape or disk of logical unit number 10.

#4 (10E 8.4) (GX(I), I=1, 10)

Fraction of each fission type for averaging the fission yields.

GX(1) : ^{235}U (th)
GX(2) : ^{235}U (fast)
GX(3) : ^{235}U (14 MeV)
GX(4) : ^{238}U (fast)
GX(5) : ^{238}U (14 MeV)
GX(6) : ^{239}Pu (th)
GX(7) : ^{239}Pu (fast)
GX(8) : ^{241}Pu (th)
GX(9) : ^{233}U (th)
GX(10) : ^{232}Th (fast)

To obtain atom numbers due to thermal fission of ^{235}U, GX(1)=1.0, and GX(2)=...GX(10)=0.0.

#5 (5E 10.5) (TBIN(I, J), J=1, 4), PWR(I)

Repeat ITB times (1 for the present purpose).

∘ TBIN(I, J) : Length of the I-th time step.

TBIN(I, 1) : (day)
TBIN(I, 2) : (hr)
TBIN(I, 3) : (min)
TBIN(I, 4) : (sec)

TBND(I) =TBIN(I, 1)×86400+TBIN(I, 2)×3600
+TBIN(I, 3)×60 +TBIN(I, 4) (sec)

∘ PWR(I) Col. 41–50

Power of the I-th time step (W).

For the present purpose the assumption of constant power is sufficient. Therefore ITB was set to 1. TBIN must be set so that TBND is longer than the longest burn-up time. PWR(1) can be set to an arbitrary positive value.

#6 (4E 10.5) (TMIN(I, J), J=1, 4)

Repeat IT times.

∘ TMIN(I, J) : Time to calculate the atom number of each FP.

TMIN(I, 1) : (day)
TMIN(I, 2) : (hr)
TMIN(I, 3) : (min)
TMIN(I, 4) : (sec)

TIME(I) =TMIN(I, 1)×86400+TMIN(I, 2)×3600
+TMIN(I, 3)×60 +TMIN(I, 4) (sec)

A. 4. 3. 2 FPYD

(1) Outline

The FPYD code renormalizes the atom numbers of 427 nuclides to the concentrations of 193 nuclides. The atom number of a nuclide other than the 193 nuclides is added to that of the daughter nuclide. This assumes that the cross section is the same for these two nuclides. The error due to this approximation is expected small, since most of these nuclides other than the 193 nuclides are short-lived, and therefore their atom densities are relatively small in advanced burn-up stages.

Three tapes or disks are necessary. A tape of logical unit number 3 is the output of FP-S and the results are stored on a tape of logical unit number 4. A disk of logical unit number 2 is used as a scratch one.

The resulting concentrations are normalized to 2., i.e., per fission.

(2) Input Specifications

♯1 (215) NMF, NFP

- NMF Col. 1–5 Number of cases calculated in FP-S (ICASE). In the present calculation, this is the number of mother fissile nuclides considered.
- NFP=193 Col. 6–10 Number of FP nuclides.

♯2 (T 73, A 8, T 1, 4 I 5, F 10. 5, 8 I 5)

AX(K), NI(K), NCAT(K), NM, NB, FB, (NMAT(I), I=1, NM)

♯2 card is repeated for NFP times (K=1, NFP)

- AX(K) Col. 73–80 Nuclide identification like "␣44Ru 101". See TABLE A. 2.
- NI(K)=K Col. 1–5 Number of order in the library for the nuclide.
- NCAT(K) Col. 6–10 Category number.

  You can specify some nuclides from others by giving a special category number to them. The FPLUMP code has an option to lump only the nuclides of a specified category.
- NM Col. 11–15 Number of nuclides which the K-th FP nuclide represents, including the K-th nuclide itself.
- NB Col. 16–20 Number of nuclides on which the branching ratio is taken into account.
- FB Col. 21–30 Branching ratio. Default means 1.
- (NMAT(I), I=1, NM)

  Numbers of order on the output of FP-S for the nuclides which the K-th nuclide represents. For the first NB nuclides, the branching ratio is considered.

  NB and FB are complicated. As an example, a case of A=85 chain is shown below,

$$\begin{array}{ccccccc} & & & & {}^{m}\mathrm{Kr}(38) & \searrow 77\% & \\ \mathrm{As} & \rightarrow & \mathrm{Se} & \rightarrow & \mathrm{Br} \quad 23\% \downarrow & & \mathrm{Rb}(307),\ \mathrm{K}=23 \\ (18) & & (25) & & (31) \quad {}^{g}\mathrm{Kr}(39),\ \mathrm{K}=21 & \nearrow & \end{array}$$

  In the 193 nuclides, only ^{85g}Kr and ^{85}Rb are contained. Their orders in the library are 21 and 23 respectively. Numbers in the parentheses are the order of 427 nuclides in the output of FP-S.

  For ^{85g}Kr (K=21), NM=5 (including ^{85g}Kr), NB=4 (from As to ^{85m}Kr), FB=0. 23, and NMAT(I)=18, 25, 31, 38 and 39.

  For ^{85}Rb (K=23), NM=5 (including ^{85}Rb), NB=4 (from As to ^{85m}Kr), FB=0. 77, and NMAT(I)=18, 25, 31, 38, and 307.

  Then the atom number of ^{85g}Kr is calculated as

$$N(^{85g}\mathrm{Kr})=0.23\ (N(18)+N(25)+N(31)+N(38))+N(39).$$

  where N(18), ...N(39) are the atom numbers calculated with the FP-S code.

The set of #3 and #4 cards is repeated for NMF times.

#3 (2I5, 5A4) IFF, NT, (TYPE(K), K=1, 5)

∘ IFF Col. 1–5

Identification of mother fissile nuclide from which FP nuclides are born. The following are recommended as the standard :

U-233 : 923
U-235 : 925
U-238 : 928
Pu-239 : 949
Pu-240 : 940
Pu-241 : 941.

∘ NT Col. 6–10 Number of burn-up stages (≤6).

∘ (TYPE(K), K=1, 5) Col. 11–30 Description of the mother nuclide.

#4 (15A4) ((DAY(K, I), K=1, 3), I=1, NT)

∘ (DAY(K, I), K=1, 3) Description of the I-th burn-up stage.

(3) Output

The outputs of FPYD are stored on a tape of logical unit number 4 in binary form as;

```
NMF, NFP
NMF times:
  IFF, NT, (TYPE(K), K=1, 5)
  J=1, NT:
    (DAY(K, J), K=1, 3)
    (NI(K), NCAT(K), DN(K), AX(K), K=1, NFP)
```

where DN(K) is the concentration of the K-th nuclide, and one line is written with one write statement.

Tables of the concentrations are printed out for each mother nuclide. They are shown in Appendix 3.

(4) Sample input

Input data for the present work are shown below. In this case, FP nuclides are categorized to three as;

NCAT=3 for the 28 nuclides,
=2 for the other even-A nuclides,
=1 for the other odd-A nuclides.

Sample Input of FPYD

```
....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

*LIEDRUN
*DISK    F02
*TAPE  F03,J2925,FP427,OLD,001304
*TAPE F04,J2925,FPYD3,NEW,001350
*DATA
    3  193
    1    2    1                  1                                        30ZN 72
    2    2    1                  2                                        31GA 72
    3    2    1                290                                        32GE 72
    4    1    3                  3    7  291                             32GE 73
    5    2    2                  4  292                                   32GE 74
    6    2    2                  6  295                                   32GE 76
    7    1    1                  9                                        32GE 77
    8    1    3                  5    8  294                             33AS 75
    9    2    1                 12                                        33AS 76
   10    1    1                 13                                        33AS 77
   11    2    1                296                                        34SE 76
   12    1    2                 19  297                                   34SE 77
   13    2    3                 10   14  298                             34SE 78
   14    1    3                 15   20   21                             34SE 79
   15    2    2                 16  300                                   34SE 80
   16    1    3                 17   22  302                             35BR 81
   17    2    1                 28                                        35BR 82
   18    2    1                303                                        36KR 82
   19    1    4                 23   29   37  304                        36KR 83
   20    2    3                 24   30  305                             36KR 84
   21    1    5    4   0,23     18   25   31   38   39                   36KR 85
   22    2    2                 32  308                                   36KR 86
   23    1    5    4   0,77     18   25   31   38  307                   37RB 85
   24    2    1                 50                                        37RB 86
   25    1    4                 26   33   40  310                        37RB 87
   26    2    1                309                                        38SR 86
   27    2    4                 34   41   51  312                        38SR 88
   28    1    4                 35   42   52   59                        38SR 89
   29    3    4                 36   43   53   60                        38SR 90
   30    1    3                 44   54   61                             38SR 91
   31    1    1                313                                        39Y  89
   32    2    1                 66                                        39Y  90
   33    1    2                 67   68                                   39Y  91
   34    1    4                 46   56   63   70                        39Y  93
   35    2    1                314                                        40ZR 90
   36    1    1                315                                        40ZR 91
   37    2    5                 45   55   62   69  316                   40ZR 92
   38    3    1                 74                                        40ZR 93
   39    2    5                 47   57   64   71  318                   40ZR 94
   40    1    5                 48   58   65   72   75                   40ZR 95
   41    2    2                 73  321                                   40ZR 96
   42    1    1                 76                                        40ZR 97
   43    1    2                 80   81                                   41NB 95
   44    3    1                320                                        42MO 95
   45    2    2                 82  322                                   42MO 96
   46    3    3                 83   84  323                             42MO 97
   47    2    3                 77   85  324                             42MO 98
   48    1    2                 86   89                                   42MO 99
   49    2    2                 87  327                                   42MO100
```

```
....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

  50   3   1                97                                          43TC 99
  51   2   2                98  328                                     44RU100
  52   3   4                88   90   99  329                           44RU101
  53   3   3                91  100  330                                44RU102
  54   1   3                92  101  106                                44RU103
  55   3   3                93  102  332                                44RU104
  56   1   3                94  103  107                                44RU105
  57   3   2               104  108                                     44RU106
  58   3   2               111  331                                     45RH103
  59   1   2               113  114                                     45RH105
  60   2   2               112  333                                     46PD104
  61   3   1               334                                          46PD105
  62   2   2               115  335                                     46PD106
  63   3   4               105  109  116  120                           46PD107
  64   2   3               110  117  337                                46PD108
  65   1   2               118  121                                     46PD109
  66   2   2               119  340                                     46PD110
  67   2   1               123                                          46PD112
  68   3   1               339                                          47AG109
  69   1   3               122  129  130                                47AG111
  70   2   2               128  341                                     48CD110
  71   1   1               342                                          48CD111
  72   2   2               131  343                                     48CD112
  73   1   3               124  132  344                                48CD113
  74   2   3               125  133  346                                48CD114
  75   1   3               126  134  138                                48CD115
  76   2   2               135  350                                     48CD116
  77   1   2    1   0,95   144  348                                     49IN115
  78   1   2    1   0,05   144  349                                     50SN115
  79   2   2               145  351                                     50SN116
  80   1   4               136  139  146  352                           50SN117
  81   2   3               140  147  353                                50SN118
  82   1   5               141  148  149  155  354                      50SN119
  83   2   2               150  355                                     50SN120
  84   1   3               142  151  156                                50SN121
  85   2   2               152  357                                     50SN122
  86   1   2               153  157                                     50SN123
  87   2   2               154  360                                     50SN124
  88   1   1               158                                          50SN125
  89   2   1               159                                          50SN126
  90   1   1               356                                          51SB121
  91   2   1               166                                          51SB122
  92   1   1               359                                          51SB123
  93   2   1               167                                          51SB124
  94   1   1               168                                          51SB125
  95   2   2               169  170                                     51SB126
  96   1   2               160  171                                     51SB127
  97   2   2               161  172                                     51SB128
  98   2   1               358                                          52TE122
  99   1   0                                                            52TE123
 100   2   1               361                                          52TE124
 101   1   1               362                                          52TE125
 102   2   1               363                                          52TE126
 103   1   1               181                                          52TE127
 104   2   1               366                                          52TE128
```

```
....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

105     1     3                 183  162  173                                52TE129
106     2     3                 163  174  369                                52TE130
107     1     3                 185  175  164                                52TE131
108     2     3                 165  176  186                                52TE132
109     1     1                 365                                         531 127
110     3     1                 193                                         531 129
111     2     1                 194                                         531 130
112     1     1                 195                                         531 131
113     1     4                 177  187  188  197                          531 133
114     1     3                 178  190  199                               531 135
115     2     2                 192  367                                    54XE128
116     2     1                 370                                         54XE130
117     3     2                 204  371                                    54XE131
118     2     2                 196  372                                    54XE132
119     1     2                 205  206                                    54XE133
120     2     3                 189  198  375                               54XE134
121     1     2                 207  208                                    54XE135
122     2     2                 200  378                                    54XE136
123     3     1                 374                                         55CS133
124     3     1                 218                                         55CS134
125     3     1                 219                                         55CS135
126     2     1                 220                                         55CS136
127     3     3                 201  209  221                               55CS137
128     2     1                 376                                         56BA134
129     2     2                 229  379                                    56BA136
130     1     2                 230  380                                    56BA137
131     2     4                 202  210  222  381                          56BA138
132     2     3                 212  224  232                               56BA140
133     1     5                 203  211  223  231  384                     57LA139
134     2     1                 287                                         57LA140
135     2     1                 385                                         58CE140
136     1     5                 213  225  233  238  242                     58CE141
137     2     5                 214  226  234  239  387                     58CE142
138     1     5                 215  227  235  240  243                     58CE143
139     3     5                 216  228  236  241  244                     58CE144
140     1     1                 386                                         59PR141
141     2     1                 249                                         59PR142
142     1     1                 250                                         59PR143
143     1     2                 245  252                                    59PR145
144     2     1                 388                                         60ND142
145     3     1                 389                                         60ND143
146     3     2                 251  390                                    60ND144
147     3     1                 391                                         60ND145
148     2     3                 246  253  392                               60ND146
149     1     3                 247  254  257                               60ND147
150     2     3                 248  255  395                               60ND148
151     2     0                                                             60ND150
152     3     1                 261                                         61PM147
153     2     1                 262                                         61PM148
154     1     3                 256  258  263                               61PM149
155     1     2                 259  265                                    61PM151
156     3     1                 394                                         62SM147
157     2     1                 396                                         62SM148
158     3     1                 397                                         62SM149
159     2     2                 264  398                                    62SM150
```

```
....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

  160    3    1                270                                        62SM151
  161    2    2                266  401                                   62SM152
  162    1    2                267  271                                   62SM153
  163    2    2                268  404                                   62SM154
  164    2    1                273                                        62SM156
  165    3    1                403                                        63EU153
  166    2    1                277                                        63EU154
  167    3    2                272  278                                   63EU155
  168    2    1                279                                        63EU156
  169    1    2                274  280                                   63EU157
  170    1    1                406                                        64GD155
  171    2    1                407                                        64GD156
  172    1    1                408                                        64GD157
  173    2    2                281  409                                   64GD158
  174    1    2                282  285                                   64GD159
  175    2    2                283  412                                   64GD160
  176    1    1                411                                        65TB159
  177    2    1                288                                        65TB160
  178    1    2                286  289                                   65TB161
  179    2    1                413                                        66DY160
  180    1    1                414                                        66DY161
  181    2    0                                                           66DY162
  182    1    0                                                           66DY163
  183    2    0                                                           66DY164
  184    1    0                                                           67HO165
  185    1    1                 96                                        43TC799
  186    1    0                                                           48CD815
  187    1    0                                                           52TE823
  188    1    1                179                                        52TE825
  189    1    1                180                                        52TE827
  190    1    1                182                                        52TE829
  191    1    1                184                                        52TE831
  192    1    0                                                           61PM848
  193    2    2                426  427                                   34SE 82
  949    6PU-239(THERMAL)
1 DAY       30 DAYS     60 DAYS     180 DAYS    360 DAYS    720 DAYS
  925    6U-235(THERMAL)
1 DAY       30 DAYS     60 DAYS     180 DAYS    360 DAYS    720 DAYS
  928    6U-238(FISSION SPECT)
1 DAY       30 DAYS     60 DAYS     180 DAYS    360 DAYS    720 DAYS
```

Appendix 4. 4 FPLUMP

A. 4. 4. 1 General Description

The FPLUMP code lumps cross sections of 193 nuclides using their concentrations as weights. The total, elastic, inelastic, capture and elastic removal cross sections are lumped as

$$\bar{\sigma}_x = \sum_{i=1}^{193} y_i \sigma_x{}^i$$

where y_i is the concentration of the i-th nuclide. As for μ_L-value, the lumped value is defined as

$$\bar{\mu}_L = \sum_{i=1}^{193} y_i \mu_L{}^i \sigma_{el}{}^i / \bar{\sigma}_{el}$$

The inelastic matrices are lumped as

$$\bar{\sigma}_{in}(g \to g') = \sum_{i=1}^{193} y_i \sigma_{in}{}^i (g \to g')$$

and the maximum group where the inelastic scattering occurs and the maximum group number for which the down scattering is allowed are automatically determined.

As for the concentration, the data provided by the FP-S and FPYD system are used as the standard process. You can lump only the desired nuclides, by specifying NCAT which were given in the FPYD code. It is also possible to provide the concentrations as card input.

It should be noted that the lumped cross section is microscopic cross section of fission products per one fission event, since the concentrations are normalized to two. Therefore a pseudo fission product has a mass and cross sections almost twice as much as those of the individual FP nuclide.

A. 4. 4. 2 Input Specifications

Only #1 card is required for the standard procedure, and the remaining cards are required when the concentrations are given as card input.

#1 (3 I 4, 17A4) NINPT, NC, NOUT, TITL

∘ NINPT Col. 1-4

≤0 : Concentrations are read from a tape of logical unit number 3.

>0 : Concentrations are given as cards.

∘ NC Col. 5-8

>0 : The nuclides with NCAT=NC are lumped.

=0 : All the nuclides are lumped.

NC is set to 0, when NINPT>0.

∘ NOUT Col. 9-12

≠0 : Editing the lumped cross sections on a tape of logical unit number 8.

=0 : No editing.

∘ TITL Col. 13-80 Title of the job

The following cards are repeated when NINPT>0, according to each fissile nuclide from which the FP nuclides are born.

#2 (2 I 4, 5 A 4) IFF, NT, (TYPE(K), K=1, 5)

∘ IFF Col. 1-4

Identification of mother fissile nuclides from which the FP nuclides are born. The following are recommended as the standard:

U-235 : 925
U-238 : 928
Pu-239 : 949
Pu-240 : 940
Pu-241 : 941

∘ NT Col. 5-8

Number of burn-up stages considered.

(NT≤6)

∘ (TYPE(K), K=1, 5) Col. 9-28

Description of mother fissile nuclide.

#3 (18 A 4) ((BRNUP(K, J), K=1, 3), J=1, NT)

Description of each burn-up stage.

The #4 cards are repeated for 193 times. The order of nuclides must coincide with that in the library.

#4 (T 61, I 10, 2 X, A 8, T 1, 6 E 10. 5) NIN, AXC, (DNX(J), J=1, NT)

∘ NIN Col. 61-70

Number of order in the library for this nuclide. See TABLE A. 2.

∘ AXC Col. 73-80

Nuclide identification (Z, symbol of the element, A; I3, A2, I3) like "␣ 46PD 105". This must be the same as in TABLE A. 2.

∘ (DNX(J), J=1, NT) Col. 1-60

Concentration of the NIN-th nuclide at the burn-up stage J.

A. 4. 4. 3 Auxiliary Memories

In the unit of logical number 4 the tape of the JNDC FP Fast Reactor Constants Library is set, in which the group constants of 25 and 70 group structure are stored separately with multi-file system. The concentrations are read from the tape or disk of logical unit number 3. When

the concentrations are given in card form, they are temporarily stored in the disk of logical unit number 3.

The lumped cross sections of 25 and 70 group structures are written on the disks of logical unit numbers 1 and 2 respectively, then they are edited on a tape of logical unit number 8 with the multi-file system.

A. 4. 4. 4 Output

The standard format of the JNDC FP Group Constants is used for the lumped group constants, since the lumped cross sections are treated as those of a nuclide. The atomic number of the pseudo FP nuclide is defined by considering the mother fissile nuclide as

925 : FP of ^{235}U fission
928 : FP of ^{238}U fission
949 : FP of ^{239}Pu fission
940 : FP of ^{240}Pu fission
941 : FP of ^{241}Pu fission

The mass number of a pseudo nuclide corresponds to the mass of total fission products per fission.