NEA/SEN/NSC/WPPR(98)1
JEF/DOC-768

Nuclear Science Committee

Working Party on the Physics of Plutonium Recycling and Innovative Fuel Cycles

Evaluation of ^{242}Pu Data for the Incident Neutron Energy Range 5-20 MeV

December 1998

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Comité des sciences nucléaires

Groupe de travail sur la physique du recyclage du plutonium et des cycles de combustible innovants

Évaluation des données neutroniques du ^{242}Pu dans le domaine énergétique 5-20 MeV

Décembre 1998

Nuclear Energy Agency
Organisation for Economic Co-operation and Development

Agence pour l'énergie nucléaire
Organisation de coopération et de développement économiques

ORGANISATION DE COOPÉRATION ET DE DÉVELOPPEMENT ÉCONOMIQUES

En vertu de l'article 1er de la Convention signée le 14 décembre 1960, à Paris, et entrée en vigueur le 30 septembre 1961, l'Organisation de coopération et de développement économiques (OCDE) a pour objectif de promouvoir des politiques visant :

- à réaliser la plus forte expansion de l'économie et de l'emploi et une progression du niveau de vie dans les pays Membres, tout en maintenant la stabilité financière, et à contribuer ainsi au développement de l'économie mondiale ;
- à contribuer à une saine expansion économique dans les pays Membres, ainsi que les pays non membres, en voie de développement économique ;
- à contribuer à l'expansion du commerce mondial sur une base multilatérale et non discriminatoire conformément aux obligations internationales.

Les pays Membres originaires de l'OCDE sont : l'Allemagne, l'Autriche, la Belgique, le Canada, le Danemark, l'Espagne, les États-Unis, la France, la Grèce, l'Irlande, l'Islande, l'Italie, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni, la Suède, la Suisse et la Turquie. Les pays suivants sont ultérieurement devenus Membres par adhésion aux dates indiquées ci-après : le Japon (28 avril 1964), la Finlande (28 janvier 1969), l'Australie (7 juin 1971), la Nouvelle-Zélande (29 mai 1973), le Mexique (18 mai 1994), la République tchèque (21 décembre 1995), la Hongrie (7 mai 1996), la Pologne (22 novembre 1996) et la Corée (12 décembre 1996). La Commission des Communautés européennes participe aux travaux de l'OCDE (article 13 de la Convention de l'OCDE).

L'AGENCE DE L'OCDE POUR L'ÉNERGIE NUCLÉAIRE

L'Agence de l'OCDE pour l'énergie nucléaire (AEN) a été créée le 1er février 1958 sous le nom d'Agence européenne pour l'énergie nucléaire de l'OECE. Elle a pris sa dénomination actuelle le 20 avril 1972, lorsque le Japon est devenu son premier pays Membre de plein exercice non européen. L'Agence groupe aujourd'hui tous les pays Membres de l'OCDE, à l'exception de la Nouvelle-Zélande et de la Pologne. La Commission des Communautés européennes participe à ses travaux.

L'AEN a pour principal objectif de promouvoir la coopération entre les gouvernements de ses pays participants pour le développement de l'énergie nucléaire en tant que source d'énergie sûre, acceptable du point de vue de l'environnement et économique.

Pour atteindre cet objectif, l'AEN :

- *encourage l'harmonisation des politiques et pratiques réglementaires notamment en ce qui concerne la sûreté des installations nucléaires, la protection de l'homme contre les rayonnements ionisants et la préservation de l'environnement, la gestion des déchets radioactifs, ainsi que la responsabilité civile et l'assurance en matière nucléaire ;*
- *évalue la contribution de l'électronucléaire aux approvisionnements en énergie, en examinant régulièrement les aspects économiques et techniques de la croissance de l'énergie nucléaire et en établissant des prévisions concernant l'offre et la demande de services pour les différentes phases du cycle du combustible nucléaire;*
- *développe les échanges d'information scientifiques et techniques notamment par l'intermédiaire de services communs ;*
- *met sur pied des programmes internationaux de recherche et développement, et des entreprises communes.*

Pour ces activités, ainsi que pour d'autres travaux connexes, l'AEN collabore étroitement avec l'Agence internationale de l'énergie atomique de Vienne, avec laquelle elle a conclu un Accord de coopération, ainsi qu'avec d'autres organisations internationales opérant dans le domaine nucléaire.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original Member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became Members subsequently through accession at the dates indicated hereafter; Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996) and the Republic of Korea (12th December 1996). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full Member. NEA membership today consist of all OECD Member countries, except New Zealand and Poland. The Commission of the European Communities takes part in the work of the Agency.

The primary objective of the NEA is to promote co-operation among the governments of its participating countries in furthering the development of nuclear power as a safe, environmentally acceptable and economic energy source.

This is achieved by:

- *encouraging harmonization of national regulatory policies and practices, with particular reference to the safety of nuclear installations, protection of man against ionising radiation and preservation of the environment, radioactive waste management, and nuclear third party liability and insurance;*
- *assessing the contribution of nuclear power to the overall energy supply by keeping under review the technical and economic aspects of nuclear power growth and forecasting demand and supply for the different phases of the nuclear fuel cycle;*
- *developing exchanges of scientific and technical information particularly through participation in common services;*
- *setting up international research and development programmes and joint undertakings.*

In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has concluded a Co-operation Agreement, as well as with other international organisations in the nuclear field.

AVANT-PROPOS

Un groupe de travail sur la physique du recyclage du plutonium et des cycles de combustible innovants à été constitué par le Comité des sciences nucléaires de l'AEN/OCDE. Ce groupe de travail est chargé de faire le point sur l'état actuel et l'évolution du recyclage du plutonium, ainsi que des actinides mineurs et sur les enjeux concernant l'aval du cycle du combustible nucléaire et l'utilisation optimale du plutonium.

Les résultats des études menées ont été publiés dans la série des rapports *Physique du recyclage du plutonium*.

Plusieurs recommandations importantes ont été formulées, en particulier :

- les méthodes de calcul doivent prendre en compte l'autoprotection des résonances et devraient inclure une protection mutuelle sur l'ensemble du domaine d'énergie pour les nucléides du combustible et de la gaine et pour les principaux produits de fission ;

- des données nucléaires fondamentales d'une qualité suffisante sont nécessaires en particulier pour l'^{238}U et pour les isotopes du plutonium, mais aussi pour les actinides au nombre de masse plus élevé et pour les produits de fission ;

- les multirecyclages du plutonium à des taux de combustion élevés peuvent comporter des limitations dues à l'accumulation de ^{238}Pu et de ^{242}Pu ou bien l'existence d'effets positifs de contre-réactivité sur la vidange complète du réfrigérant en cas de forte teneur en Pu ou d'augmentation de l'accumulation d'actinides majeurs.

Le ^{242}Pu a été identifié comme un des nucléides pour lequel une amélioration des données est nécessaire. Alors que le taux en ^{242}Pu du MOX dans le premier cycle est d'environ 4%, il atteint 20% dans le cinquième cycle dans un réacteur REP exploité dans un mode de recyclage d'auto-génération. Les données améliorées sont nécessaires pour des études sur les cycles du combustible innovants.

Ce rapport décrit une contribution ultérieure à un jeu de sections efficaces améliorées du ^{242}Pu. Un précédent rapport traite du domaine énergétique comprenant la région des résonances non résolues (10 keV) au seuil de la réaction (n.2n) (~6 MeV). Le présent rapport couvre le domaine en énergie de 5 MeV à 20 MeV et les sections efficaces de production des gamma de 10 keV à 20 MeV.

Le domaine énergétique plus élevé traité ici est important pour les effets de contre-réactivité sur la vidange du réfrigérant dans les réacteurs à eau, car le spectre énergétique d'une configuration vidée est beaucoup plus dur. Cela est important aussi pour les applications dans les réacteurs rapides, chargés avec des combustibles MOX, métalliques ou des matrices inertes. Un effort particulier a été fait pour améliorer la section efficace de fission.

Remerciements

Nous souhaitons exprimer notre appréciation pour le soutien financier du gouvernement du Japon pour cette étude.

FOREWORD

The OECD/NEA Nuclear Science Committee has set up a Working Party on Physics of Plutonium Recycling and Innovative Fuel Cycles. It deals with the status and trends of physics issues related to plutonium and minor actinides recycling with respect to both the back-end of the fuel cycle and the optimal utilisation of plutonium.

The results of the studies carried out have been consolidated in the series of reports entitled "Physics of Plutonium Recycling".

Several important recommendations were reached; among these the following:

- the calculational methods have to take into account cross-section resonance shielding, and should include mutual shielding, over the whole energy region for the fuel and cladding nuclides and the major fission products;
- sufficient quality of basic nuclear data is needed, in particular for ^{238}U and the plutonium isotopes, but also for higher actinides and fission products;
- multiple recycling of plutonium with high burn-up can have limitations due to considerations such as the build-up of ^{238}Pu and ^{242}Pu or the existence of positive reactivity feedback effects on complete coolant voiding at high plutonium contents or the increase of the build-up of higher actinides.

^{242}Pu has been identified as one of the nuclides for which improved data is needed. While in a first recycle MOX the content of ^{242}Pu is typically around 4%; it is about 20% in the fifth recycle when operating a PWR in self-generation recycle mode. The improved data is required for innovative fuel cycle studies.

The present report describes a further contribution to an improved cross-section data set for ^{242}Pu. A previous report covers the range from the unresolved resonance region (10 keV) to the (n,2n) reaction threshold (~6 MeV). The present report covers the neutron energy range from 5 MeV to 20 MeV and the gamma production cross-section from 10 keV to 20 MeV.

The higher energy part studied in this work is of importance for reactivity void effects in LWRs because the spectrum of the voided configuration is very hard. It is also important for fast reactor applications, be they loaded with MOX, metal fuel or inert matrix. Particular effort has been devoted to improving the fission cross-section.

Acknowledgement

We wish to express appreciation for the financial contribution the Government of Japan has provided for this study.

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Introduction

This report (representing the continuation of the evaluation [1]) presents the models, procedures and parameters used to calculate the neutron cross-sections, the neutron angular distributions and the neutron energy distributions of ^{242}Pu in the energy range 5-20 MeV.

The neutron interaction with ^{242}Pu in this energy range takes place through direct interaction and compound nucleus mechanism taking account of pre-equilibrium effects.

In the case of a heavy deformed nucleus, the elastic channel being strongly coupled with the other possible channels in the process, the direct interaction has to be treated with the coupled channel method. Thus the ECIS code (PC version) [30], which provides the total cross-section, the direct scattering differential and integrated cross-sections to the levels considered coupled and the neutron transmission coefficients needed in compound nucleus calculations, has been used.

For the compound nucleus mechanism, a statistical treatment was used for fission, neutron elastic and inelastic scattering, radiative capture, (n,2n), (n,3n), (n,4n) cross-sections calculations. The calculations have been performed with a self-made PC version of GNASH code with pre-equilibrium effects [2].

Direct interaction model

The direct interaction was treated with the coupled channel method using our parameterisation of the neutron deformed optical potential for the actinide region [3,4,5]:

$$V = 51.32134 - 24\frac{N-Z}{A} - 0.57E + 0.020E^2 \qquad (1)$$

$$W_D = 5.04567 - 12\frac{N-Z}{A} + 0.40E + 0.001E^2$$

$$V_{sl} = 6.0$$

$$r = 1.256 \qquad a = 0.62$$

$$r_D = 1.26 \qquad a_D = 0.58$$

$$r_{sl} = 1.12 \qquad a_{sl} = 0.50$$

For the ^{242}Pu nucleus the deformation parameters are:

$$\beta_2 = 0.218 \qquad \beta_4 = 0.046 \qquad (2)$$

The levels taken into account in the coupling are the first five levels of the fundamental rotational band (0^+, 2^+, 4^+, 6^+ and 8^+).

The total cross-section, the direct part of elastic cross-section and the transmission coefficients provided by the ECIS-95 code were written in the specific format of the TAPE10 file of GNASH code using our home code FACET10.

The direct contribution to the inelastic cross-sections of the first four discrete levels, provided by the ECIS code are included in TAPE33 file of GNASH code. We increased the dimensions in the GNASH code to ensure a fine energy grid (files TAPE10 and TAPE33).

Compound nucleus model

In the energy range 5-20 MeV of this evaluation it is not necessary to consider the width fluctuation corrections and the subbarrier fission effects [1], as the compound nucleus mechanism is treated with the Hauser-Feshbach statistical model.

After calculation of populations of the first compound nucleus using the Hauser-Feshbach statistical model, corrections for non-equilibrium reaction mechanisms (pre-equilibrium and direct-reaction effects on populations and particle emission spectra) are made. The major part of these contributions is calculated using the exciton pre-equilibrium model as formulated by Kalbach [11,12]. The corrections are applied after the initial Hauser-Feshbach calculation has been done [2,18].

Neutron channels

The neutron transmission coefficients in the continuum level spectrum use the well known Gilbert-Cameron composite formula to describe the level density:

$$\rho_{GC} = \rho(E)\rho(I\pi) \tag{3}$$

$$\rho_T(E) = \frac{1}{T}\exp\left(\frac{E-E_0}{T}\right) \qquad E \le E_m$$

$$\rho_{FG}(E) = \frac{\exp\left(2\sqrt{a(E-\Delta)}\right)}{12\sqrt{2}a^{1/4}\sigma(E-\Delta)^{5/4}} \quad E \ge E_m$$

$$\rho(I\pi) = \frac{2I+1}{4\sigma^2}\exp\left(-\frac{(I+0.5)^2}{2\sigma^2}\right)$$

$$\sigma^2 = 0.0888A^{2/3}\sqrt{a(E-\Delta)}$$

and also to ensure the consistence of the two parts of the evaluation [1] and the present work.

The level density parameter *a* was obtained using for the average level spacings for s-wave resonance at neutron binding energy $B_n(D_0)$ the recommended values [6] and the values from [1], in the relationship:

$$\rho(B_n, I\pi) = \frac{1}{D_0(B_n, I\pi)} \tag{4}$$

for all compound nuclei formed in the interaction: ^{243}Pu, ^{242}Pu, ^{241}Pu, ^{240}Pu, ^{239}Pu.

The values for D_0, B_n, Δ and *a* of these nuclei are given in Table 1. They are input parameters in the GNASH code, which ensures the calculation of the other level density parameters by matching conditions [2].

Concerning the discrete part of the level spectrum of the involved compound nuclei, we used the discrete level schemes data of RIPL, segment no. 2, the recommended file [7] for ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{243}Pu nuclei and the Obninsk file [8] for ^{242}Pu.

The γ transitions and the branching ratios for ^{242}Pu were obtained using our home code CASCAD. All the data concerning level schemes were put into the specific format of TAPE8 file of GNASH code using our home code FACET8.

Gamma channels

The γ-ray transmission coefficients:

$$T_{XL}\left(\varepsilon_\gamma\right) = 2\pi\varepsilon_\gamma^{2L+1} f_{XL}\left(\varepsilon_\gamma\right) \tag{5}$$

(where ε_γ is the gamma-ray energy and *XL* indicates the multipolarity of the γ-ray) use for the energy-dependent gamma ray strength function f_{XL} the Brink-Axel model [2,9], to ensure the consistence of the two parts of the evaluation ([1] and this work):

$$f_{XL}\left(\varepsilon_\gamma\right) = K_{XL}\frac{\sigma_0\varepsilon_\gamma\Gamma_0^2}{\left(\varepsilon_\gamma^2 - E_0^2\right)^2 + \varepsilon_\gamma^2\Gamma_0^2} \tag{6}$$

The giant dipole resonance parameters σ_0, Γ_0, and E_0 were obtained in the manner described as follows.

For E1 transitions we used the global parameterisation of RIPL library [10], double GR hump targets:

$$\begin{aligned} &E_{02} = 50A^{-0.232} \quad (MeV) \\ &ln\frac{E_{02}}{E_{01}} = 0.946\beta \\ &\Gamma_{01} = E_{01}\left(0.283 - 0.263\beta\right) \quad (MeV) \\ &\Gamma_{02} = E_{02}\left(0.35 - 0.14\beta\right) \quad (MeV) \\ &\sigma_{01} = 3.48\frac{A}{\Gamma_{01}} \qquad \sigma_{02} = 1.464\frac{A}{\Gamma_{02}} \quad (mb) \end{aligned} \tag{7}$$

where *A* is the mass number and β is the deformation parameter from [16].

For M1 transitions the parameterisation included into the GNASH code [2] and for E2 transitions the Weisskopf model were used.

The gamma-ray strength function was normalised in order to match low-energy s-wave resonance data. The normalisation constants K_{XL} were obtained by inputting relative contributions of *XL* components p_{XL}:

$$\begin{aligned} &S_0 = 2\pi\frac{\Gamma_{\exp}}{D_0} \\ &p_{XL}S_0 = \sum_{J\Pi}\sum_{j=|J-L|}^{J+L}\int_0^{B_n-E_c} T_{XL}(x)\rho\left(B_n - x, j\pi\right)dx + \sum_k T_{XL}^{(k)}\left(\varepsilon_\gamma\right) \end{aligned} \tag{8}$$

where the $J\Pi$ sum is over the possible compound nucleus states that can be formed with s-wave incident neutron; j run over the spins in the final state (in the continuum), the k sum is over the possible transitions (in the discrete part of spectrum) according to the multi-pole radiation selection rules. B_n is the separation energy of neutron in the compound system and E_c is the energy at which the continuum spectrum shows up.

The parameters Γ_{exp} and D_0 of compound nuclei are in Table 1 [1,6].

Fission channels

We considered the double-humped fission barrier model described by the heights and the curvatures at the saddle points: V_A, $\hbar\omega_A$ and V_B, $\hbar\omega_B$ and of the isomeric well V_I, $\hbar\omega_I$.

At each saddle point and in the isomeric well the transition states are characterised by the energy position ε_f (where $f = A, B, I$) measured from the top of the fundamental barrier and their spins and parities $J\pi$.

In the energy range 5-20 MeV we can neglect the subbarrier effects [1] and consider uncoupled barriers (total damping in the second well). Consequently the total transmission coefficient through the double-humped fission barrier has the well-known expression:

$$T_f\left(E^*, J\pi\right) = \frac{T_A\left(E^*, J\pi\right) T_B\left(E^*, J\pi\right)}{T_A\left(E^*, J\pi\right) + T_B\left(E^*, J\pi\right)} \tag{9}$$

where E^* is the compound nucleus excitation energy.

The fission transmission coefficient through each barrier is expressed by the Hill-Wheeler formula and represents the sum of two terms: the contributions of the discrete part of the transition states spectrum and the contribution of the continuum part of this spectrum:

$$T_f^{dis}\left(E^*, J\pi\right) = \sum_i \frac{1}{1 + \exp\left(-\frac{2\pi}{\hbar\omega_f}\left(E^* - V_f - \varepsilon_f^i\right)\right)} \tag{10}$$

where the i sum is over all transition states with the spin and parity $J\pi$ and the index f represents the barriers A and B respectively.

$$T_f^{cont}\left(E^*, J\pi\right) = \int_{E_f^{cont}}^{\infty} \frac{\rho_f\left(x, J\pi\right) dx}{1 + \exp\left(-\frac{2\pi}{\hbar\omega_f}\left(E^* - V_f - x\right)\right)} \tag{11}$$

where E_f^{cont} is the energy at which the transition states continuum spectrum starts and $\rho_f(x,J\pi)$ is the level density function at each saddle point.

For all compound nuclei formed in the process n + ^{242}Pu, the transition states of the discrete part of the spectrum are rotational states built on intrinsic or vibrational states. Their energies (measured from the top of the fundamental fission barrier) are given by the expression:

$$\varepsilon_f(K,J\pi) = \varepsilon_f(K\pi) + \left(\frac{\hbar^2}{2\Im}\right)_f \left(J(J+1) - K(K+1)\right) \tag{12}$$

with $f = A, B$ and $\varepsilon_f(K\pi)$ the energies of the rotational band heads. This relation was also used for $K = 1/2$, neglecting the Coriolis coupling term.

$(\hbar^2/2\Im)_f$ represent the inertial parameters. The GNASH code was modified in order to consider different values of $(\hbar^2/2\Im)$ at each barrier according to the different deformations of nuclei at each saddle point.

For the most important compound nuclei formed in the interaction the energies of the rotational band heads, their $K\pi$, the heights V_f and the curvatures $\hbar\omega_f$ ($f = A, B$) of the fundamental double-humped barrier and the inertial parameters are given for ^{243}Pu [1] in Table 2, for ^{242}Pu in Table 3 and for ^{240}Pu in Table 4.

The starting point in the choice of fission barrier parameters and of energy position of rotational band heads was the information from segment no. V of the Reference Input Parameter Library [14]. Part of the values of this parameters was modified according to our studies concerning the subbarrier fission (first chance, main compound nucleus) in the processes n + ^{240}Pu, n + ^{239}Pu [15], n + ^{242}Pu [1,17].

In the continuum part of transition states spectrum we used the Gilbert-Cameron level density function multiplied by enhancement factors which take into account the increase of the intrinsic level density by collective effects (vibrational and rotational levels) and the specific asymmetry at each saddle point: axial asymmetry at the first saddle point (A) and mass asymmetry at the second saddle point (B). The energy dependence of the enhancement factors is assumed $f_0E^{1/4}$ (with f_0 input parameters in GNASH code) [2,18], at energies above 15 MeV the enhancement is assumed to saturate, as indicated (approximately) by microscopic calculations [13]. At still higher energies, the enhancement is assumed to decrease to unity (dissipation of collective effects in the level density, the origin of levels assuming to be intrinsic) [18].

Differential cross-sections

The elastic scattering neutron angular distribution and the inelastic scattering neutron angular distributions on the first four discrete levels are the sum of two contributions: the direct interaction part and the compound nucleus part. In the incident neutron energy range 5-20 MeV the most important contribution is the direct part provided by coupled channel calculations with ECIS code, the compound nucleus contribution being negligible.

The inelastic scattering neutron angular distributions on the other discrete levels are calculated with statistical model using our home code GVSDIF3 [2].

Secondary neutron energy distributions

The energy distributions of the neutrons resulting from (n,n′continuum), (n,2n), (n,3n) and (n,4n) reactions are represented by the evaporation spectra. The nuclear temperatures θ are calculated using the level density parameters of ^{242}Pu, ^{241}Pu, ^{240}Pu and ^{239}Pu nuclei as follows:

$$\theta = T(const) \qquad U \le E \le E_m \tag{13}$$
$$\frac{1}{\theta} = \sqrt{\frac{a}{E-\Delta}} - \frac{3}{2(E-\Delta)} \qquad E > E_m$$

where the parameters a and Δ are given in Table 1. The constant temperatures T and the matching energies E_m (between the two level density functions constant temperature and Fermi gas) are given in Table 5 and U represents the threshold energies of the (n,n′continuum), (n,2n), (n,3n) and (n,4n) reactions.

No measurements are available for the induced fission neutron energy spectra of ^{242}Pu. Therefore, the evaluation must be performed using theoretical models.

We adopted the Los Alamos model with the assumption that the cross-section for the inverse process of compound nucleus formation $\sigma_c(\varepsilon)$ is constant [31-34]. The dependence of $\sigma_c(\varepsilon)$ on the centre-of-mass neutron energy ε was however taken into account by numerical simulation as in [33] and [34].

For fission neutron spectra calculation we used a new version [36] of our home code SPECTRUM [1,35] which allows simultaneous calculations of neutron spectrum with the Los Alamos model and the Maxwell model [38,39]. For the Los Alamos model the basic formulae used are:

$$E_f^{tot} = E_L + E_H \qquad \frac{E_L}{E_H} = \frac{A_H}{A_L} \qquad A = A_L + A_H \tag{14}$$

where E_L and E_H are the kinetic energies of the light fission fragment and of the heavy fission fragment respectively. A_L and A_H are the light fragment mass and the heavy fragment mass respectively.

The average kinetic energies/nucleon of the average light fragment and of the average heavy fragment are:

$$E_f^L = \frac{<A_H>}{<A_L>}\frac{<E_f^{tot}>}{A} \qquad E_f^H = \frac{<A_L>}{<A_H>}\frac{<E_f^{tot}>}{A} \tag{15}$$

with the notations <…> representing average quantities.

The maximum temperature of the fission-fragment residual nuclear temperature distribution depends on the neutron incident energy E_n:

$$T_m = \sqrt{\frac{<E_r> + B_n + E_n - <E_f^{tot}>}{a}} \tag{16}$$

where $<E_r>$ is the average energy release in fission, B_n is the neutron binding energy, $<E_f^{tot}>$ is the total average fission-fragment energy and a is the level density parameter.

The fission neutron spectrum of each fragment is given by the relationship:

$$N(E,E_f)=\frac{1}{3\sqrt{E_f T_m}}\left[u_2^{3/2}E_1(u_2)-u_1^{3/2}E_1(u_1)+\gamma(3/2,u_2)-\gamma(3/2,u_1)\right] \tag{17}$$

$$u_{1,2}=\frac{\left(\sqrt{E}\mp\sqrt{E_f}\right)^2}{T_m}$$

$$E_1(u)=\int_u^\infty \frac{e^{-x}}{x}dx \qquad \gamma(a,x)=\int_0^x z^{a-1}e^{-z}dz$$

And the fission neutron spectrum has the expression:

$$N(E)=\frac{1}{2}\left[N(E,E_f^L)+N(E,E_f^H)\right] \tag{18}$$

The input parameters of the home code [36] are the average kinetic energy/nucleon E_f^L of the average light fission fragment, the average kinetic energy/nucleon E_f^H of the average heavy fission fragment and the maximum temperature T_m of the fission-fragment residual nuclear temperature distribution.

The current limitations in calculating the neutron fission spectrum include the insufficient knowledge of these quantities. As a criterion for verifying the adequacy of the input parameters, we used the spontaneous fission neutron spectrum for ^{242}Pu from [37], which is the only available set of experimental data we know of. The procedure is described in [1].

Results and discussion

File MF = 3 – Integrated cross-sections

The total cross-section of the n + ^{242}Pu process, presented in Figure 1, is in good agreement with the experimental data. It is maybe possible to obtain a better agreement of this cross-section with the experimental data by a slight variation of the neutron optical deformed coupled channel potential parameters for this nucleus [4,5]. However, we preferred this parameterisation available for the entire region of actinide nuclei which gives a good agreement of the total cross-sections and also of the differential cross-sections (of course in the energy range where the compound nucleus contribution can be neglected) with the experimental data for many actinide nuclei e-e, e-o, o-o etc. [3,4,5].

A special attention has been focused to the fission cross-section, trying to reproduce as faithfully as possible the trend of the experimental fission cross-section data which are scarce in the energy range above 5, 6 MeV comparatively with the energy range below 5 MeV [20]. Our results concerning the fission cross-section are presented in Figures 2, 3, 4, and 5.

The fundamental double-humped barrier parameters and the transition state discrete spectrum for the compound nuclei formed in the process were established by our studies concerning the subbarrier

fission effects at those nuclei (treated as main compound nuclei and studying the first chance fission) [1,15,17]. These parameters are in good agreement with the statistics [21-27] and the most recent one [14].

Concerning the continuum part of transition states spectrum we used enhancement factors which depend on the excitation energy, taking into account the saddle point asymmetry conditions and the dissipation of collective effects at high excitation energies.

For the other cross-sections of the n + ^{242}Pu process there are not experimental data in the energy range 5-20 MeV but the good agreement of total and fission cross-sections with the experimental data and the self-consistency of the calculations could suggest that the other cross-sections are also correct.

The integrated cross-sections of file MF = 3 [28] of this evaluation: MT = 1 (n,total), MT = 2 (n,Elastic), MT = 4 (n,Inelastic), MT = 16 (n,2n), MT = 17 (n,3n), MT = 37 (n,4n), MT = 18 (n,fission), and also MT = 19, 20, 21 and 38 (first, second, third and fourth fission chances), MT = 51-68 and 91 (inelastic scattering on the first 18 discrete levels and in the continuum), MT = 102 (n,γ) are presented in graphical form in Figures 1-12 and in tabular form in Appendix 1. The tables in Appendix 1 are obtained by processing the files (in ENDF-6 format) with the LISTEF code.

File MF = 4 – Neutron angular distributions

The file MF = 4 of this evaluation contains the angular distributions of the elastically scattered neutrons (MT = 2) and of the inelastically scattered neutrons on the first 18 discrete levels (MT = 51-68).

The angular distributions are expressed, according to the ENDF-6 Formats Manual [28], as normalised probability distributions $f(\mu,E)$ defined by:

$$f(\mu,E)=\frac{2\pi}{\sigma_s(E)}\sigma(\mu,E)=\sum_{l=0}^{NL}\frac{2l+1}{2}a_l(E)P_l(\mu) \tag{19}$$

where E is the energy of the incident neutron in the laboratory system, $\mu = \cos(\theta)$, θ is the scattered angle in the centre of mass system, $\sigma_s(E)$ is the scattering cross-section at energy E for a particular reaction type MT, $\sigma(\mu,E)$ is the differential scattering cross-section in units of barns per steradian, l is the order of the Legendre polynomial, NL is the highest order Legendre polynomial and a_l is the l-th Legendre polynomial coefficient ($a_0 = 1$).

The file MF = 4 provided in this evaluation contains the Legendre polynomial coefficients $a_l(E)$ as function of the incident neutron energy for the sections MT = 2, 51-68. These coefficients were calculated using the differential scattering cross-sections $\sigma(\mu,E)$ provided by ECIS and GVSDIF3 codes and the integrated scattering cross-sections $\sigma_s(E)$ of file MF = 3, with the relationship:

$$a_l(E)=\frac{2\pi}{\sigma_s(E)}\int\sigma(\mu,E)P_l(\mu)\sin(\theta)d\theta \tag{20}$$

Figures 13 and 14 show some examples of differential cross-sections of this evaluation. In Appendix 2 there are some examples of Legendre coefficients and normalised probability distributions $f(\mu,E)$ obtained by processing the MF = 4 file with LISTEF code.

A proof that the specific file format of MF = 3 and MF = 4 was correctly used is the fact that the PREPRO-96 codes (LINEAR, LEGEND, FIXUP, EVALPLOT, etc.) are running.

File MF = 5 – Energy distribution of secondary particles

For neutrons resulting from (n,2n), (n,3n), (n,4n) and (n,n′continuum) reactions we used evaporation spectra (LF = 9). For MT = 16, 17 and 37 it was necessary to give multiple nuclear temperatures (for each neutron in the exit channels): two temperatures in MT = 16 (^{242}Pu and ^{241}Pu nuclei), three temperatures in MT = 17 (^{242}Pu, ^{241}Pu and ^{240}Pu nuclei) and four temperatures in MT = 37 (^{242}Pu, ^{241}Pu, ^{240}Pu and ^{239}Pu nuclei)

For the fission neutron spectrum we used the LF = 12 option (Madland and Nix). The input quantities E_f^L, E_f^H and T_m are given in MT = 18.

Figure 15 shows some examples of neutron fission spectra calculated with these input parameters. The ratios between these spectra and the corresponding Maxwell representations (calculated with the formulae from [38,39]) are given in Figure 16.

These results seem to be in agreement with the general trends of those given for other nuclei in [32-34]; consequently, we consider that our input parameters are adequate [1].

The data of MF = 5 file, in tabular form processed with LISTEF code, are given in Appendix 3.

File 13 – Gamma production cross-sections

In order to evaluate the photon production we adopted the MF = 13 representation, gamma production cross-sections [28].

The recommended representation for (n,n′γ) reaction is photon production cross-section using MT = 4. All discrete gamma rays are given in a series of subsections in decreasing magnitude of gamma-ray energies:

$$E_\gamma = (i \to j) = \varepsilon_i - \varepsilon_j \tag{g.1}$$

where ε_i and ε_j are the energies of the i-th level and j-th level respectively.

In this case we consider only *E*1, *M*1 and *E*2 transitions, the contributions of electric multi-poles with L > 2 and magnetic multi-poles with L > 1 are very small and can be neglected.

According to the multi-pole radiation selection rules:

$$\begin{aligned} &E1\text{: } l \le 1,\ \pi_i\pi_j = -1 \\ &M1 + E2\text{: } l \le 1,\ \pi_i\pi_j = 1 \\ &E2\text{: } 2,\ \pi_i\pi_j = 1 \end{aligned} \tag{g.2}$$

where $l = |I_i - I_j|$ and I_i π_i are the angular momentum and respectively the parity for the level *i*, the probability for a direct transition from level *i* to level *j* is:

$$p_{ij} = \frac{T_{ij}}{\sum_k T_{ik}} \qquad \text{(g.3)}$$

with T_{ij} the gamma-ray transmission coefficient from level *i* to level *j* (relations (5-8)) and the *k* sum is over all possible transitions starting from level *i*.

The population cross-section of level *j* is calculated using the computational expression:

$$\sigma_j = \sigma_j + p_{ij}\sigma_i \qquad \text{(g.4)}$$

in which σ_i is the population cross-section of level *i* and the gamma-ray cross-section (transition from level *i* to level *j*) is given by:

$$\sigma_{ij} = p_{ij}\sigma_i \qquad \text{(g.5)}$$

Using the MT = 4 representation, in the γ-cascade we considered that initially are populated all the levels of ^{242}Pu residual nucleus (MT = 51, 52, 53, … cross-sections) positioned under the neutron incident energy.

The gamma transitions and the branching ratios (transition probabilities) for ^{242}Pu were obtained using our home code CASCAD and are given in the Table 6.

In the same manner we calculated the gamma production cross-sections from (n,2nγ), (n,3nγ) and (n,4nγ) reactions using the level scheme data (γ transitions and branching ratios) of ^{241}Pu, ^{240}Pu et ^{239}Pu nuclei [7] (see Table 6).

Figure 17 shows some examples of gamma-ray production cross-sections from (n,n′γ) reaction, versus incident neutron energy.

Figures 18 and 19 present photon production cross-sections from (n,2nγ) and (n,3nγ) reactions respectively.

The MF = 13 data are given in tabular form in Appendix 4; the tables are obtained by processing the MF = 13 file with the LISTEF utility code.

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TABLES

Table 1. Values for B_n, Δ, D_0, Γ_{exp} and a for selected nuclei

Nucleus	B_n (MeV)	Δ (MeV)	D_0 (eV)	Γ_{exp} (meV)	a (MeV^{-1})
^{239}Pu	5.647	0.61	7.7	34.	27.872
^{240}Pu	6.533	1.04	2.31	39.4	27.05692
^{241}Pu	5.241	0.61	12.4	30.7	28.7154
^{242}Pu	6.30968	1.11	1.2	40.8	27.58925
^{243}Pu	5.03418	0.61	13.5	22.6	29.84438

Table 2. Kπ, the heights V_f and the curvatures $\hbar\omega_f$ (f = A, B) of the fundamental double-humped barrier and the inertial parameters for ^{243}Pu

Parameters of the compound nucleus ^{243}Pu needed in fission calculations

$V_A = 6.035$ MeV $\quad \hbar\omega_A = 0.81$ MeV $\quad \left(\hbar^2/2\Im\right)_A = 5$ KeV

$V_B = 5.540$ MeV $\quad \hbar\omega_B = 0.52$ MeV $\quad \left(\hbar^2/2\Im\right)_B = 2$ KeV

Rotational band heads (the energies are expressed in MeV)

No.	KΠ	ε_A(KΠ)	ε_B(KΠ)	No.	KΠ	ε_A(KΠ)	ε_B(KΠ)
1	3.5+	0.000	0.000	28	3.5-	0.130	0.550
2	0.5+	0.000	0.050	29	0.5+	0.130	0.600
3	0.5-	0.025	0.100	30	4.5+	0.130	0.600
4	3.5-	0.025	0.050	31	0.5+	0.150	0.110
5	0.5-	0.050	0.100	32	1.5+	0.150	0.000
6	1.5-	0.050	0.100	33	0.5-	0.175	0.160
7	1.5+	0.050	0.150	34	1.5-	0.175	0.050
8	2.5+	0.050	0.150	35	0.5-	0.200	0.160
9	2.5-	0.050	0.050	36	1.5-	0.200	0.160
10	4.5-	0.050	0.050	37	1.5+	0.200	0.210
11	1.5+	0.050	0.100	38	2.5+	0.200	0.210
12	5.5+	0.050	0.100	39	0.5-	0.200	0.050
13	0.5+	0.060	0.196	40	2.5-	0.200	0.050
14	1.5+	0.070	0.580	41	0.5+	0.200	0.100
15	2.5+	0.080	0.500	42	3.5+	0.200	0.100
16	0.5-	0.085	0.246	43	1.5+	0.450	0.670
17	1.5-	0.095	0.630	44	3.5+	0.470	0.630
18	2.5-	0.105	0.550	45	1.5-	0.475	0.720
19	0.5-	0.110	0.246	46	3.5-	0.495	0.680
20	1.5-	0.110	0.246	47	0.5-	0.500	0.720
21	1.5+	0.110	0.296	48	2.5-	0.500	0.720
22	2.5+	0.110	0.296	49	0.5+	0.500	0.770
23	0.5-	0.120	0.630	50	3.5+	0.500	0.770
24	2.5-	0.120	0.630	51	2.5-	0.520	0.680
25	0.5+	0.120	0.680	52	4.5-	0.520	0.680
26	3.5+	0.120	0.680	53	1.5+	0.520	0.730
27	1.5-	0.130	0.550	54	5.5+	0.520	0.730

Table 3. Kπ, the heights V_f and the curvatures $\hbar\omega_f$ (f = A, B) of the fundamental double-humped barrier and the inertial parameters for ^{242}Pu

Parameters of compound nucleus ^{242}Pu needed in fission calculations

$V_A = 5.85$ MeV $\quad \hbar\omega_A = 0.90$ MeV $\quad \left(\hbar^2/2\Im\right)_A = 5$ KeV

$V_B = 5.05$ MeV $\quad \hbar\omega_B = 0.60$ MeV $\quad \left(\hbar^2/2\Im\right)_B = 2$ KeV

Rotational band heads (the energies are expressed in MeV)

No.	KΠ	ε_A(KΠ)	ε_B(KΠ)
1	0+	0.000	0.000
2	2+	0.400	0.670
3	0-	0.650	0.000
4	1-	0.720	0.130
5	2-	0.740	0.300

Table 4. Kπ, the heights V_f and the curvatures $\hbar\omega_f$ (f = A, B) of the fundamental double-humped barrier and the inertial parameters for ^{241}Pu

Parameters of the compound nucleus ^{241}Pu needed in fission calculations

$V_A = 6.03$ MeV $\quad \hbar\omega_A = 1.02$ MeV $\quad \left(\hbar^2/2\Im\right)_A = 5$ KeV

$V_B = 5.18$ MeV $\quad \hbar\omega_B = 0.612$ MeV $\quad \left(\hbar^2/2\Im\right)_B = 2$ KeV

Rotational band heads (the energies are expressed in MeV)

No.	KΠ	ε_A(KΠ)	ε_B(KΠ)	No.	KΠ	ε_A(KΠ)	ε_B(KΠ)
1	2.5+	0.000	0.000	28	1.5-	0.250	0.346
2	2.5+	0.000	0.500	29	0.5+	0.350	0.110
3	2.5-	0.025	0.500	30	1.5+	0.350	0.500
4	2.5-	0.025	0.000	31	0.5-	0.350	0.820
5	0.5+	0.050	0.600	32	2.5-	0.350	0.820
6	4.5+	0.050	0.600	33	0.5-	0.375	0.110
7	1.5+	0.050	0.300	34	1.5-	0.375	0.500
8	0.5+	0.050	0.100	35	1.5+	0.400	0.210
9	4.5+	0.050	0.100	36	2.5+	0.400	0.210
10	1.5-	0.075	0.300	37	0.5+	0.400	0.600
11	0.5+	0.100	0.196	38	3.5+	0.400	0.600
12	0.5+	0.100	0.400	39	3.5+	0.470	0.630
13	3.5+	0.100	0.400	40	3.5-	0.495	0.630
14	0.5-	0.125	0.196	41	0.5-	0.500	0.260
15	1.5+	0.150	0.296	42	1.5-	0.500	0.260
16	2.5+	0.150	0.296	43	0.5-	0.500	0.650
17	1.5-	0.150	0.650	44	2.5-	0.500	0.650
18	3.5-	0.150	0.650	45	1.5+	0.520	0.730
19	1.5-	0.150	0.150	46	5.5+	0.520	0.730
20	3.5-	0.150	0.150	47	0.5+	0.600	0.050
21	1.5+	0.200	0.670	48	2.5-	0.620	0.780
22	0.5-	0.200	0.450	49	4.5-	0.620	0.780
23	2.5-	0.200	0.450	50	0.5-	0.625	0.050
24	1.5-	0.225	0.670	51	1.5+	0.650	0.150
25	0.5+	0.250	0.770	52	2.5+	0.650	0.150
26	3.5+	0.250	0.770	53	0.5-	0.750	0.200
27	0.5-	0.250	0.346	54	1.5-	0.750	0.200

Table 5. The constant temperatures T and the matching energies E_m (between the two level density functions constant temperature and Fermi gas)

Nucleus	T (MeV)	E_m (MeV)
^{239}Pu	0.399101	3.737615
^{240}Pu	0.406094	4.165000
^{241}Pu	0.391821	3.732407
^{242}Pu	0.401123	4.229684

Table 6. Gamma transition data

^{242}Pu											
i	ε_i(MeV)	$(I^\pi)_i$		j	P_{ij}	i	ε_i(MeV)	$(I^\pi)_i$		j	P_{ij}
1	0.000000	0+				15	1.064000	4-	→	3	0.997655
2	0.044500	2+	→	1	1.000000				→	8	0.001927
3	0.147200	4+	→	2	1.000000				→	10	0.000389
4	0.305900	6+	→	3	1.000000				→	13	0.000013
5	0.517600	8+	→		1.000000				→	14	0.000016
6	0.779000	10+	→	5	1.000000	16	1.087000	12+	→	6	1.000000
7	0.780000	1-	→	1	0.545318	17	1.102000	2+	→	1	0.018954
			→	2	0.454682				→	2	0.717522
8	0.832000	3-	→	2	0.606321				→	3	0.009255
			→	3	0.393679				→	7	0.126960
			→	7	0.000000				→	8	0.074438
9	0.865000	1-	→	1	0.540932				→	9	0.050170
			→	2	0.459008				→	11	0.000001
			→	7	0.000060				→	12	0.000580
			→	8	0.000000				→	13	0.002121
10	0.927000	5-	→	3	0.668607				→	14	0.000000
			→	4	0.331393	18	1.122000	5-	→	3	0.634522
			→	8	0.000000				→	4	0.364523
11	0.956000	0+	→	2	0.240195				→	8	0.000004
			→	7	0.668251				→	10	0.000596
			→	9	0.091554				→	13	0.000000
12	0.995000	2+	→	1	0.019551				→	14	0.000341
			→	2	0.865523				→	15	0.000015
			→	3	0.008780	19	1.152000	2-	→	2	0.987892
			→	7	0.064233				→	7	0.004485
			→	8	0.027839				→	8	0.002821
			→	9	0.014074				→	9	0.002020
			→	11	0.000000				→	12	0.002509
13	1.019000	3-	→	2	0.585845				→	13	0.000194
			→	3	0.413661				→	15	0.000000
			→	7	0.000001				→	17	0.000080
			→	8	0.000485						
			→	9	0.000000						
			→	10	0.000000						
			→	12	0.000008						
14	1.040000	4+	→	2	0.024622						
			→	3	0.885335						
			→	4	0.005369						
			→	8	0.073009						
			→	10	0.011591						
			→	12	0.000000						
			→	13	0.000074						

Table 6. ***Continued***

^{241}Pu											
i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}	i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}
1	0.000000	2.5+				13	0.335000	4.5+			
2	0.041950	3.5+				14	0.368000	6.5+			
3	0.095690	4.5+				15	0.444000	5.5+			
4	0.161050	5.5+				16	0.499000	6.5+			
5	0.161600	0.5+				17	0.518700	2.5-	→	1	0.80
6	0.170900	1.5+							→	2	0.20
7	0.174940	3.5+	→	1	0.76	18	0.561000	3.5-	→	1	0.67
			→	2	0.22				→	2	0.33
			→	3	0.02	19	0.569000	7.5-			
8	0.223100	2.5+									
9	0.231760	4.5+	→	2	0.57						
			→	3	0.33						

^{240}Pu											
i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}	i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}
1	0.000000	0+				14	0.992200	4+	→	4	0.33
2	0.042824	2+	→	1	1.00				→	7	0.48
3	0.141690	4+	→	2	1.00				→	8	0.19
4	0.294319	6+	→	3	1.00	15	1.001930	3-	→	2	1.00
5	0.497520	8+	→	4	1.00	16	1.030530	3+	→	2	0.74
6	0.597340	1-	→	1	0.38				→	3	0.26
			→	2	0.62	17	1.037520	4-	→	3	0.91
7	0.648850	3-	→	2	0.49				→	7	0.06
			→	3	0.51				→	8	0.03
8	0.742330	5-	→	3	0.13	18	1.041800	12+	→	9	1.00
			→	4	0.87	19	1.076220	4+	→	2	0.29
9	0.747800	10+	→	5	1.00				→	3	0.71
10	0.860710	0+	→	2	0.53	20	1.089450	0+	→	2	1.00
			→	6	0.47	21	1.115530	5-	→	3	0.92
11	0.900320	2+	→	1	0.05				→	4	0.04
			→	2	0.13				→	7	0.04
			→	3	0.32	22	1.131950	2+			
			→	6	0.27	23	1.136970	2+	→	1	0.40
			→	7	0.23				→	2	0.60
12	0.938060	1-	→	1	0.90	24	1.161530	6-	→	4	0.91
			→	2	0.04				→	8	0.09
			→	6	0.04	25	1.177500	3+			
			→	7	0.02	26	1.180200	2+			
13	0.958850	2-	→	2	0.93						
			→	6	0.03						
			→	7	0.04						

Table 6. ***Continued***

^{239}Pu										
i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}	i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}
1	0.000000	0.5+				13	0.434000	4.5-			
2	0.007861	1.5+	→	1	1.00	14	0.462000	5.5+			
3	0.057276	2.5+	→	1	0.54	15	0.469800	0.5-	→	1	0.38
			→	2	0.46				→	2	0.62
4	0.075706	3.5+	→	2	0.83	16	0.487000	5.5-			
			→	3	0.17	17	0.492100	1.5-	→	1	0.35
5	0.163760	4.5+	→	3	0.89				→	2	0.06
			→	4	0.11				→	3	0.59
6	0.192810	5.5+	→	4	1.00	18	0.505500	2.5-	→	2	0.45
7	0.285460	2.5+	→	1	0.03				→	3	0.04
			→	2	0.48				→	4	0.51
			→	3	0.38	19	0.511838	3.5+	→	7	0.74
			→	4	0.11				→	9	0.23
8	0.318100	6.5+	→	5	1.00				→	11	0.03
9	0.330125	3.5+	→	2	0.02	20	0.519200	8.5+	→	8	1.00
			→	3	0.23	21	0.538000	4.5+			
			→	4	0.32	22	0.556100	3.5-	→	3	0.41
			→	5	0.05				→	5	0.59
			→	7	0.38	23	0.565000	4.5+			
10	0.358100	7.5+				24	0.570100	9.5+	→	10	1.00
11	0.387410	4.5+	→	4	0.23	25	0.583000	4.5-			
			→	7	0.10						
			→	9	0.67						
12	0.391586	3.5-	→	3	0.07						
			→	4	0.05						
			→	7	0.85						
			→	9	0.03						

TABLE DES MATIÈRES

Les annexes existent uniquement en version anglaise.

Les figures existent uniquement en version anglaise.

Introduction

Ce travail représente la continuation de l'évaluation [1] des sections neutroniques, des distributions angulaires et énergétiques de l'isotope ^{242}Pu jusqu'aux 20 MeV d'énergie incidente du neutron.

L'interaction du neutron avec le noyau ^{242}Pu dans le domaine énergétique 5-20 MeV se déroule par les mécanismes d'interaction directe et du noyau composé en tenant compte aussi d'effets de pré-équilibre.

En ce qui concerne le traitement de l'interaction directe on a utilisé la méthode des voies couplées (donnée la déformation du noyau ^{242}Pu et le couplage fort entre la voie élastique et les autres voies possibles). Les calculs ont été faits avec le code ECIS (version pour PC [30]), à l'aide duquel on a obtenu la section totale du processus, les contributions de l'interaction directe aux sections de diffusion élastique et inélastique différentielles et intégrales (sur les niveaux considérés dans le couplage) ainsi que les coefficients de transmission des voies neutroniques nécessaires dans les calculs de noyau composé.

Les réactions qui se déroulent par le mécanisme du noyau composé (fission, diffusion élastique et inélastique, capture radiative, (n,2n), (n,3n), (n,4n)) ont été traitées par le modèle statistique. Pour les calculs de modèle statistique on a utilisé le code GNASH qui tient compte aussi du mécanisme intermédiaire (effets de pré-équilibre) [2].

Traitement de l'interaction directe

Le traitement de l'interaction directe par le modèle des voies couplées a été fait en utilisant notre paramétrisation de potentiel optique déformé pour la région des noyaux actinides [3,4,5] :

$$V = 51.32134 - 24\frac{N-Z}{A} - 0.57E + 0.020E^2 \qquad (1)$$

$$W_D = 5.04567 - 12\frac{N-Z}{A} + 0.40E + 0.001E^2$$

$$V_{sl} = 6.0$$

$$r = 1.256 \qquad a = 0.62$$

$$r_D = 1.26 \qquad a_D = 0.58$$

$$r_{sl} = 1.12 \qquad a_{sl} = 0.50$$

Pour le noyau ^{242}Pu les paramètres de déformation sont :

$$\beta_2 = 0.218 \qquad \beta_4 = 0.046 \qquad (2)$$

On a couplé les cinq premiers niveaux de la bande fondamentale de rotation (0^+, 2^+, 4^+, 6^+ et 8^+).

La section totale du processus étudié, la partie directe de la section de diffusion élastique et les coefficients de transmission fournis par le code ECIS-95 ont été préparés dans le format spécifique du fichier TAPE10 du code GNASH à l'aide du notre code FACET10.

Les contributions de l'interaction directe aux sections inélastiques des quatre premiers niveaux, calculées avec le code ECIS, constituent les données du fichier TAPE33 du code GNASH. On a augmenté les dimensions du code GNASH afin d'assurer une grille fine des énergies (fichiers TAPE10 et TAPE33).

Traitement du mécanisme du noyau composé

Dans le domaine énergétique 5-20 MeV de cette évaluation il n'est plus nécessaire de corriger des fluctuations des largeurs des niveaux de considérer les effets sous-barriériques pour la fission [1], c'est pourquoi le modèle statistique utilisé est le classique de Hauser-Feshbach.

Après avoir calculé la population du premier noyau composé en utilisant le modèle Hauser-Feshbach, les corrections des mécanismes de non-équilibre ont été faites (c'est-à-dire les effets de pré-équilibre et de réactions directes aux populations et aux spectres d'émission des particules). La partie majeure de ces contributions est calculée en utilisant le modèle d'exciton de pré-équilibre de Kalbach [11,12]. Les corrections sont faites après les calculs initiaux Hauser-Feshbach [2,18].

Voies neutroniques

Les coefficients de transmission des voies neutroniques de la partie de continuum du spectre utilisent pour la densité de niveaux la formule composite de Gilbert-Cameron :

$$\rho_{GC} = \rho(E)\rho(I\pi) \tag{3}$$

$$\rho_T(E) = \frac{1}{T}\exp\left(\frac{E-E_0}{T}\right) \qquad E \le E_m$$

$$\rho_{FG}(E) = \frac{\exp\left(2\sqrt{a(E-\Delta)}\right)}{12\sqrt{2}a^{1/4}\sigma(E-\Delta)^{5/4}} \quad E \ge E_m$$

$$\rho(I\pi) = \frac{2I+1}{4\sigma^2}\exp\left(-\frac{(I+0.5)^2}{2\sigma^2}\right)$$

$$\sigma^2 = 0.0888A^{2/3}\sqrt{a(E-\Delta)}$$

assurant ainsi la cohérence des deux parties de l'évaluation [1] et celle présente.

Le paramètre *a* de la densité de niveaux a été obtenu en utilisant, pour la distance moyenne entre les niveaux à l'énergie B_n de liaison du neutron pour l'onde s (D_0), les valeurs recommandées [6] et les valeurs de [1], à l'aide de l'expression :

$$\rho(B_n, I\pi) = \frac{1}{D_0(B_n, I\pi)} \tag{4}$$

pour tous les noyaux composés qui se forment dans l'interaction : ^{243}Pu, ^{242}Pu, ^{241}Pu, ^{240}Pu, ^{239}Pu.

Les valeurs D_0, B_n, Δ et *a* de ces noyaux sont données dans le tableau 1. Elles constituent des paramètres d'entrée pour le code GNASH qui assure le calcul des autres paramètres de la fonction densité de niveaux par les conditions de raccord [2].

Pour la partie discrète des spectres des noyaux composés impliqués on a utilisé les données concernant les schémas des niveaux du segment no. 2 de la bibliothèque RIPL : le fichier recommandé [7] pour les noyaux ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{243}Pu et le fichier Obninsk [8] pour le noyau ^{242}Pu.

Les transitions γ et leurs rapports de ramification pour le noyau ^{242}Pu ont été obtenus avec le propre code CASCAD. Toutes les données concernant les schémas de niveaux ont été préparées dans le format spécifique du fichier TAPE8 du code GNASH à l'aide du notre code FACET8.

Voies gamma

Les coefficients de transmission pour les voies de rayonnement γ :

$$T_{XL}\left(\varepsilon_\gamma\right) = 2\pi\varepsilon_\gamma^{2L+1} f_{XL}\left(\varepsilon_\gamma\right) \tag{5}$$

(où ε_γ représente l'énergie γ et *XL* la multipolarité de la transition γ) utilisent pour la fonction de force f_{XL} le modèle Brink-Axel [2,9], pour assurer la cohérence entre les deux parties de l'évaluation ([1] et celle-ci) :

$$f_{XL}\left(\varepsilon_\gamma\right) = K_{XL}\frac{\sigma_0\varepsilon_\gamma\Gamma_0^2}{\left(\varepsilon_\gamma^2 - E_0^2\right)^2 + \varepsilon_\gamma^2\Gamma_0^2} \tag{6}$$

Les paramètres σ_0, Γ_0, E_0 des résonances géantes ont été déterminés de la manière suivante :

Pour les transitions *E*1 on a utilisé la paramétrisation globale de la bibliothèque RIPL [10] pour deux résonances géantes :

$$\begin{aligned} &E_{02} = 50A^{-0.232} \quad (MeV) \\ &ln\frac{E_{02}}{E_{01}} = 0.946\beta \\ &\Gamma_{01} = E_{01}\left(0.283 - 0.263\beta\right) \quad (MeV) \\ &\Gamma_{02} = E_{02}\left(0.35 - 0.14\beta\right) \quad (MeV) \\ &\sigma_{01} = 3.48\frac{A}{\Gamma_{01}} \qquad \sigma_{02} = 1.464\frac{A}{\Gamma_{02}} \quad (mb) \end{aligned} \tag{7}$$

où *A* est le numéro de masse et β représente le paramètre de déformation du [16].

Pour les transitions *M*1 on a utilisé la paramétrisation incluse dans le code GNASH [2] et pour les transitions *E*2 le modèle Weisskopf.

Les constantes K_{XL} ont été déterminées par normalisation pondérée à la fonction de force de l'onde s à B_n :

$$\begin{aligned} &S_0 = 2\pi\frac{\Gamma_{\exp}}{D_0} \\ &p_{XL}S_0 = \sum_{J\Pi}\sum_{j=|J-L|}^{J+L}\int_0^{B_n-E_c} T_{XL}(x)\rho\left(B_n - x, j\pi\right)dx + \sum_k T_{XL}^{(k)}\left(\varepsilon_\gamma\right) \end{aligned} \tag{8}$$

où la somme sur $J\Pi$ couvre tous les états possibles du noyau composé formés avec des neutrons incidents s (l = 0) ; *j* représente les spins des états finals (dans le continuum) et la somme sur *k* couvre les transitions possibles dans la partie discrète du spectre en accord avec les lois de sélection selon le multipole XL.

Les paramètres Γ_{exp} et D_0 des noyaux composés sont donnés dans le tableau 1 [1,6] et les contributions relatives p_{XL} sont des valeurs d'entrée pour le code GNASH.

Voies de fission

On a considéré le modèle de la barrière double de potentiel de fission décrite par les hauteurs et les courbures aux points de selle : V_A, $\hbar\omega_A$ et V_B, $\hbar\omega_B$ et du puits isomère V_I, $\hbar\omega_I$.

À chaque point de selle et au puits isomère les états de transition sont caractérisés par la position énergétique ε_f (où $f = A, B, I$) mesurée de la hauteur de la barrière fondamentale et leurs spins et parités $J\pi$.

Dans le domaine énergétique 5-20 MeV on peut négliger les effets sous-barriériques [1] et considérer le découplage total (dissipation totale dans le deuxième puits). Par conséquent le coefficient de transmission par la barrière double de fission a l'expression bien connue :

$$T_f\left(E^*, J\pi\right) = \frac{T_A\left(E^*, J\pi\right) T_B\left(E^*, J\pi\right)}{T_A\left(E^*, J\pi\right) + T_B\left(E^*, J\pi\right)} \tag{9}$$

où E^* est l'énergie d'excitation du noyau composé.

Le coefficient de transmission de chaque barrière est exprimé par la formule Hill-Wheeler et représente la somme de deux termes : la contribution de la partie discrète du spectre d'états de transition et la partie de continuum de ce spectre :

$$T_f^{dis}\left(E^*, J\pi\right) = \sum_i \frac{1}{1 + \exp\left(-\frac{2\pi}{\hbar\omega_f}\left(E^* - V_f - \varepsilon_f^i\right)\right)} \tag{10}$$

où la somme après *i* couvre tous les états de transition discrets avec le spin et la parité $J\pi$ et l'indice *f* représente la barrière *A* et *B* respectivement.

$$T_f^{cont}\left(E^*, J\pi\right) = \int_{E_f^{cont}}^{\infty} \frac{\rho_f\left(x, J\pi\right) dx}{1 + \exp\left(-\frac{2\pi}{\hbar\omega_f}\left(E^* - V_f - x\right)\right)} \tag{11}$$

où E_f^{cont} représente l'énergie du commencement du spectre continu des états de transition et $\rho_f(x,J\pi)$ est la fonction de la densité de niveaux à chaque point de selle.

Pour tous les noyaux composés, formés dans le processus n + ^{242}Pu, les états de transition de la partie discrète du spectre sont des états de rotation construits sur des états de vibration ou intrinsèques. Leurs énergies (mesurées de la hauteur de la barrière fondamentale) sont données par l'expression :

$$\varepsilon_f(K, J\pi) = \varepsilon_f(K\pi) + \left(\frac{\hbar^2}{2\Im}\right)_f \left(J(J+1) - K(K+1)\right) \tag{12}$$

avec $f = A$, B et $\varepsilon_f(K\pi)$ les énergies des têtes des bandes de rotation. Cette relation a été utilisée aussi pour $K = 1/2$, en négligeant le terme de couplage Coriolis.

$(\hbar^2/2\Im)_f$ représentent les paramètres d'inertie. Le code GNASH a été modifié pour pouvoir considérer des valeurs différentes pour $(\hbar^2/2\Im)$ à chaque barrière étant donné les déformations différentes des noyaux à chaque point de selle.

Pour les noyaux composés les plus importants formés dans cette interaction, les énergies des têtes des bandes de rotation, leurs $K\pi$, ainsi que les hauteurs V_f et les courbures $\hbar\omega_f$ ($f = A$, B) de la double barrière fondamentale et les paramètres d'inertie sont donnés dans le tableau 2 pour ^{243}Pu [1], le tableau 3 pour ^{242}Pu et le tableau 4 pour ^{241}Pu.

Le point de départ du choix des paramètres des barrières de fission ainsi que des positions des têtes des bandes de rotation ont été les informations contenues dans le segment no. V de la Bibliothèque de référence pour paramètres d'entrée [14].

Une partie des valeurs de ces paramètres a été modifiée selon nos études concernant la fission sous-barriérique (première chance, noyau composé principal) pour les processus n + ^{240}Pu, n + ^{239}Pu [15], n + ^{242}Pu [1,17].

Pour la région de continuum des états de transition on a utilisé la densité de niveaux de Gilbert-Cameron multiplié par des facteurs de croissance qui tiennent compte de l'augmentation de la densité des niveaux intrinsèques par les effets collectifs (niveaux de vibration et de rotation) et des asymétries spécifiques à chaque point de selle : asymétrie axiale au premier point de selle (A) et asymétrie de masse au deuxième point de selle (B). La dépendance d'énergie des facteurs de croissance est de la forme $f_0E^{1/4}$ (avec f_0 des paramètres d'entrée pour le code GNASH) [2,18], présentant une saturation à environ 15 MeV (prouvée par les calculs microscopiques [13]) suivie par une décroissance vers l'unité aux énergies plus élevées où on peut considérer la disparition des effets collectifs dans la densité des niveaux (la nature des niveaux est supposée intrinsèque) [18].

Sections différentielles

Les distributions angulaires pour la diffusion élastique et pour les diffusions inélastiques sur les quatre premiers niveaux discrets représentent la somme des deux contributions, c'est-à-dire la partie directe et la partie de noyau composé. Étant donné le domaine d'énergie de cette évaluation, la majeure contribution est celle de l'interaction directe traitée par voies couplées à l'aide du code ECIS, le mécanisme de noyau composé ayant une contribution négligeable.

Les distributions angulaires pour la diffusion inélastique sur les autres niveaux discrets ont été calculées par modèle statistique, utilisant notre code GVSDIF3 [29].

Distributions énergétiques des neutrons

La description des distributions en énergie des neutrons issus des réactions (n,n′continuum), (n,2n), (n,3n) et (n,4n) a été faite en utilisant des spectres d'évaporation. Les températures nucléaires

θ sont calculées à l'aide des paramètres des fonctions des densités des niveaux des noyaux : ^{242}Pu, ^{241}Pu, ^{240}Pu et ^{239}Pu en utilisant les relations :

$$\theta = T(const) \qquad U \le E \le E_m \tag{13}$$
$$\frac{1}{\theta} = \sqrt{\frac{a}{E-\Delta}} - \frac{3}{2(E-\Delta)} \qquad E > E_m$$

où les paramètres a et Δ sont donnés dans le tableau 1. Les températures constantes T et les énergies de raccord (entre les deux fonctions de densité des niveaux, température constante et Fermi-gaz) sont dans le tableau 5 et l'énergie U représente le seuil pour les réactions (n,n′continuum), (n,2n), (n,3n) et (n,4n).

En ce qui concerne le spectre des neutrons de fission il n'y a pas de données sur l'expérience pour la fission induite par neutrons du ^{242}Pu. Par conséquent il faut utiliser des modèles théoriques.

On a utilisé le modèle Los Alamos avec valeur constante de la section $\sigma_c(\varepsilon)$ de formation du noyau composé dans le processus inverse [31-34] mais on a tenu compte malgré tout de la dépendance de la section σ_c versus l'énergie ε dans le système centre de masse par une simulation numérique (cf. [33,34]).

Pour le calcul du spectre de fission on a utilisé une nouvelle version [36] de notre code SPECTRUM [1,35] qui fait simultanément les calculs avec le modèle Los Alamos et le modèle Maxwell [38,39]. Les relations de base utilisées pour le modèle Los Alamos sont les suivantes :

$$E_f^{tot} = E_L + E_H \qquad \frac{E_L}{E_H} = \frac{A_H}{A_L} \qquad A = A_L + A_H \tag{14}$$

où E_L et E_H sont les énergies cinétiques du fragment léger et respectivement lourd et A_L et A_H les masses du fragment léger et lourd.

L'énergie cinétique moyenne par nucléon pour le fragment léger et lourd est :

$$E_f^L = \frac{<A_H>}{<A_L>}\frac{<E_f^{tot}>}{A} \qquad E_f^H = \frac{<A_L>}{<A_H>}\frac{<E_f^{tot}>}{A} \tag{15}$$

les notations <…> représentent les valeurs moyennes.

La température maximale des fragments de fission dépend de l'énergie incidente du neutron E_n selon la relation :

$$T_m = \sqrt{\frac{<E_r> + B_n + E_n - <E_f^{tot}>}{a}} \tag{16}$$

où $<E_r>$ est l'énergie moyenne libérée en fission, B_n est l'énergie de liaison du neutron, $<E_f^{tot}>$ est la valeur moyenne de l'énergie cinétique totale des fragments de fission et a est le paramètre de la fonction densité des niveaux.

Le spectre pour chaque fragment est donné par la relation :

$$N\left(E,E_f\right)=\frac{1}{3\sqrt{E_f T_m}}\left[u_2^{3/2}E_1\left(u_2\right)-u_1^{3/2}E_1\left(u_1\right)+\gamma\left(3/2,u_2\right)-\gamma\left(3/2,u_1\right)\right] \quad (17)$$

$$u_{1,2}=\frac{\left(\sqrt{E}\mp\sqrt{E_f}\right)^2}{T_m}$$

$$E_1(u)=\int_u^\infty\frac{e^{-x}}{x}dx \qquad \gamma(a,x)=\int_0^x z^{a-1}e^{-z}dz$$

Et le spectre de fission a l'expression :

$$N(E)=\frac{1}{2}\left[N\left(E,E_f^L\right)+N\left(E,E_f^H\right)\right] \quad (18)$$

Les paramètres d'entrée pour le code [36] sont les énergies cinétiques moyennes par nucléon pour le fragment léger E_f^L et pour le fragment lourd E_f^H ainsi que la température maximale des fragments de fission T_m.

Le plus important est le choix de ces paramètres ; pour vérifier les nôtres on a utilisé le spectre neutronique de la fission spontanée du ^{242}Pu [37] (les seules données expérimentales trouvées), la procédure étant décrite en [1].

Résultats et discussions

Fichier MF = 3 – Sections intégrales

La section totale du processus n + ^{242}Pu, représentée dans la figure 1, est en accord avec les données de l'expérience. Comme il a déjà été dit en [1], on aurait pu obtenir peut-être une meilleure concordance par une faible variation des paramètres du potentiel déformé de voies couplées [4,5]. Mais on a préféré cette paramétrisation valable pour toute la région des noyaux des actinides qui donne une bonne concordance avec l'expérience de la section totale ainsi que des sections différentielles (aux énergies assez élevées où la contribution du mécanisme du noyau composé peut être négligée) pour plusieurs noyaux actinides p-p, p-i, i-i etc. [3,4,5].

Une attention spéciale a été accordée à la section de fission (figures 2, 3, 4 and 5), en essayant de reproduire le mieux possible l'allure des données expérimentales, qui ne sont pas nombreuses aux énergies au-delà de 5, 6 MeV en comparaison avec les énergies inférieures à 5 MeV [20].

Les paramètres des barrières fondamentales de fission et le spectre discret des états de transition pour les noyaux composés formés dans ce processus ont été établis par nos études concernant les effets de fission sous-barriérique à ces noyaux (traités comme noyaux composés principaux et étudiant la première chance de fission) [1,15,17]. Ces paramètres sont en accord avec les statistiques [21-27] et la bibliothèque de paramètres la plus récente [14].

En ce qui concerne la partie de continuum du spectre des états de transition on a utilisé des facteurs de croissance (qui multiplient la densité des niveaux intrinsèques) dépendant de l'énergie d'excitation, en respectant les conditions d'asymétrie du noyau aux points de selle et la dissipation des effets collectifs aux énergies élevées d'excitation.

Pour les autres sections du processus n + ^{242}Pu il n'y a pas de données expérimentales dans le domaine énergétique 5-20 MeV ; mais la bonne concordance de la section totale et de la section de fission avec les données de l'expérience ainsi que la cohérence des calculs de cette évaluation peuvent conduire au fait que les autres sections sont également correctes.

Les sections du fichier MF = 3 [28] de cette évaluation : MT = 1 (n,total), MT = 2 (n,Elastique), MT = 4 (n,Inélastique), MT = 16 (n,2n), MT = 17 (n,3n), MT = 37 (n,4n), MT = 18 (n,fission), aussi que MT = 19, 20, 21 et 38 (première, deuxième, troisième et quatrième chance de fission), MT = 51-68 et 91 (diffusion inélastique sur les premiers 18 niveaux discrets et continuum), MT = 102 (n,γ) sont représentées en forme graphique dans les figures 1-12 et en forme de tableaux dans l'annexe 1. Les tableaux ont été obtenus par le traitement du fichier en format ENDF-6 à l'aide du code LISTEF.

Fichier MF = 4 – Distributions angulaires neutroniques

Le fichier MF = 4 de cette évaluation contient la distribution angulaire des neutrons diffusés élastiquement (MT = 2) et inélastiquement sur les premiers 18 niveaux discrets (MT = 51-68).

En conformité avec le format ENDF-6 [28], les distributions angulaires sont données comme distributions normalisées de probabilité $f(\mu,E)$:

$$f(\mu,E)=\frac{2\pi}{\sigma_s(E)}\sigma(\mu,E)=\sum_{l=0}^{NL}\frac{2l+1}{2}a_l(E)P_l(\mu) \tag{19}$$

où E représente l'énergie incidente du neutron dans le système laboratoire, $\mu = \cos(\theta)$ avec θ l'angle de diffusion dans le système centre de masse, $\sigma_s(E)$ est la section de diffusion du fichier MF = 3 pour un MT donné, $\sigma(\mu,E)$ est la section différentielle (en barn/sr) et a_l les coefficients du développement en polynômes Legendre (avec $a_0 = 1$ et l allant du *1* jusqu'à *NL*).

Le fichier MF = 4 de cette évaluation contient les coefficients Legendre $a_l(E)$ pour les sections MT = 2, 51-68. Ces coefficients ont été calculés utilisant les sections différentielles $\sigma(\mu,E)$ calculées à l'aide des codes ECIS et GVSDIF3 et les sections $\sigma_s(E)$ du fichier MF = 3, à l'aide de la relation :

$$a_l(E)=\frac{2\pi}{\sigma_s(E)}\int\sigma(\mu,E)P_l(\mu)\sin(\theta)d\theta \tag{20}$$

Les figures 13 et 14 représentent quelques exemples de sections différentielles de cette évaluation. L'annexe 2 contient des exemples de coefficients Legendre et de distributions normalisées de probabilité $f(\mu,E)$ obtenues par le traitement du fichier MF = 4 à l'aide du code LISTEF.

La vérification des fichiers MF = 3 et MF = 4 a été faite par le traitement des fichiers en format ENDF-6 avec les codes PREPRO-96 (LINEAR, LEGEND, FIXUP, EVALPLOT, etc.).

Fichier MF = 5 – Distributions énergétiques des neutrons

Pour les neutrons résultant des réactions (n,2n), (n,3n), (n,4n) et (n,n′continuum) on a utilisé des spectres d'évaporation (LF = 9). Pour les MT = 16, 17 et 37 on a donné plusieurs températures selon

le noyau d'où le neutron s'évapore : deux températures pour MT = 16 (évaporation des neutrons du noyau ^{242}Pu et ^{241}Pu), trois pour MT = 17 (évaporation des neutrons des noyaux ^{242}Pu, ^{241}Pu et ^{240}Pu) et quatre pour MT = 37 (évaporation des neutrons des noyaux ^{242}Pu, ^{241}Pu, ^{240}Pu et ^{239}Pu).

Pour le spectre des neutrons de fission on a utilisé l'option LF = 12 (Madland et Nix), les valeurs d'entrée E_f^L, E_f^H et T_m en fonction de l'énergie incidente E_n étant données au MT = 18.

La figure 15 montre quelques exemples de spectres de fission calculés avec ces paramètres et la figure 16 les rapports entre ces spectres et les spectres Maxwell correspondants (calculés avec les formules de [38,39]). Ces résultats sont en accord avec la tendance des spectres donnés pour d'autres noyaux en [32,33,34] ce qui nous donne confiance dans le choix de nos paramètres d'entrée [1].

L'annexe 3 contient les données du fichier MF = 5 sous forme de tableaux obtenus par le traitement du fichier en format ENDF-6 à l'aide du code LISTEF.

Fichier MF = 13 – Sections de production gamma

Pour l'évaluation de la production de photons on a choisi la représentation MF = 13, sections de production gamma [28].

En ce qui concerne les photons gamma issus de la réaction (n,n′γ) on a utilisé MT = 4, tous les rayons gamma discrets étant donnés en série de sous-sections en ordre de décroissant de leurs énergies :

$$E_\gamma = (i \to j) = \varepsilon_i - \varepsilon_j \tag{g.1}$$

où ε_i et ε_j sont les énergies des niveaux i et j entre lesquels se passe la transition γ.

Dans ce cas on a pris en considération seulement les transitions $E1$, $M1$ et $E2$, les contributions des transitions électriques avec le multipole $L > 2$ et magnétiques avec $L > 1$ sont très petites et peuvent être négligées.

En tenant compte des règles de sélection selon le multipole XL :

$$\begin{aligned} &E1\text{: } l \le 1,\ \pi_i\pi_j = -1 \\ &M1 + E2\text{: } l \le 1,\ \pi_i\pi_j = 1 \\ &E2\text{: } 2,\ \pi_i\pi_j = 1 \end{aligned} \tag{g.2}$$

où $l = |I_i - I_j|$ et I_i π_i sont le moment angulaire et la parité du niveau i, la probabilité d'une transition directe γ du niveau i au niveau j est :

$$p_{ij} = \frac{T_{ij}}{\sum_k T_{ik}} \tag{g.3}$$

où T_{ij} est le coefficient de transmission γ du niveau i au niveau j (relations (5-8)) et la somme sur k couvre toutes les transitions possibles à partir du niveau i.

Alors la section de population du niveau *j* peut être calculée à l'aide de la relation :

$$\sigma_j = \sigma_j + p_{ij}\sigma_i \qquad \text{(g.4)}$$

où σ_i est la section de population du niveau *i* et la section de production gamma (transition du niveau *i* au niveau *j*) est :

$$\sigma_{ij} = p_{ij}\sigma_i \qquad \text{(g.5)}$$

Étant donné le choix de la représentation MT = 4, dans la cascade γ on a considéré peuplés initialement tous les niveaux du noyau ^{242}Pu (sections MT = 51, 52, 53,…) avec les énergies εi sous l'énergie incidente respective.

Pour le noyau ^{242}Pu les transitions gamma possibles avec leurs facteurs de ramification (probabilités de transition) ont été calculées avec notre code CASCAD et sont données dans le tableau 6.

D'une manière similaire on a calculé les sections de production gamma pour les réactions (n,2nγ), (n,3nγ) et (n,4nγ) en utilisant les données concernant les schémas des niveaux (transitions γ, facteurs de ramification) des noyaux ^{241}Pu, ^{240}Pu et ^{239}Pu [7] (voir tableau 6).

La figure 17 montre quelques exemples de sections de production de rayons gamma issus de la réaction (n,n′γ) en fonction de l'énergie incidente du neutron.

Les figures 18 et 19 présentent des sections de production de rayons gamma des réactions (n,2nγ) et (n,3nγ) respectivement toujours en fonction de l'énergie incidente.

L'annexe 4 contient les données du fichier MF = 13 sous forme de tableaux obtenus par le traitement de ce fichier avec le code LISTEF.

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TABLEAUX

Tableau 1. Les valeurs B_n, Δ, D_0, Γ_{exp} et *a* pour certains noyaux

Noyaux	B_n (MeV)	Δ (MeV)	D_0 (eV)	Γ_{exp} (meV)	a (MeV^{-1})
^{239}Pu	5.647	0.61	7.7	34.	27.872
^{240}Pu	6.533	1.04	2.31	39.4	27.05692
^{241}Pu	5.241	0.61	12.4	30.7	28.7154
^{242}Pu	6.30968	1.11	1.2	40.8	27.58925
^{243}Pu	5.03418	0.61	13.5	22.6	29.84438

Tableau 2. Kπ, les hauteurs V_f et les courbures $\hbar\omega_f$ (f = A, B) de la double barrière fondamentale et les paramètres d'inertie pour ^{243}Pu

Paramètres du noyau composé ^{243}Pu nécessaires aux calculs de fission

$V_A = 6.035$ MeV $\quad \hbar\omega_A = 0.81$ MeV $\quad \left(\hbar^2/2\Im\right)_A = 5$ KeV

$V_B = 5.540$ MeV $\quad \hbar\omega_B = 0.52$ MeV $\quad \left(\hbar^2/2\Im\right)_B = 2$ KeV

Têtes des bandes de rotation (les énergies en MeV)

No.	KΠ	ε_A(KΠ)	ε_B(KΠ)	No.	KΠ	ε_A(KΠ)	ε_B(KΠ)
1	3.5+	0.000	0.000	28	3.5-	0.130	0.550
2	0.5+	0.000	0.050	29	0.5+	0.130	0.600
3	0.5-	0.025	0.100	30	4.5+	0.130	0.600
4	3.5-	0.025	0.050	31	0.5+	0.150	0.110
5	0.5-	0.050	0.100	32	1.5+	0.150	0.000
6	1.5-	0.050	0.100	33	0.5-	0.175	0.160
7	1.5+	0.050	0.150	34	1.5-	0.175	0.050
8	2.5+	0.050	0.150	35	0.5-	0.200	0.160
9	2.5-	0.050	0.050	36	1.5-	0.200	0.160
10	4.5-	0.050	0.050	37	1.5+	0.200	0.210
11	1.5+	0.050	0.100	38	2.5+	0.200	0.210
12	5.5+	0.050	0.100	39	0.5-	0.200	0.050
13	0.5+	0.060	0.196	40	2.5-	0.200	0.050
14	1.5+	0.070	0.580	41	0.5+	0.200	0.100
15	2.5+	0.080	0.500	42	3.5+	0.200	0.100
16	0.5-	0.085	0.246	43	1.5+	0.450	0.670
17	1.5-	0.095	0.630	44	3.5+	0.470	0.630
18	2.5-	0.105	0.550	45	1.5-	0.475	0.720
19	0.5-	0.110	0.246	46	3.5-	0.495	0.680
20	1.5-	0.110	0.246	47	0.5-	0.500	0.720
21	1.5+	0.110	0.296	48	2.5-	0.500	0.720
22	2.5+	0.110	0.296	49	0.5+	0.500	0.770
23	0.5-	0.120	0.630	50	3.5+	0.500	0.770
24	2.5-	0.120	0.630	51	2.5-	0.520	0.680
25	0.5+	0.120	0.680	52	4.5-	0.520	0.680
26	3.5+	0.120	0.680	53	1.5+	0.520	0.730
27	1.5-	0.130	0.550	54	5.5+	0.520	0.730

Tableau 3. Kπ, les hauteurs V_f et les courbures $\hbar\omega_f$ (f = A, B) de la double barrière fondamentale et les paramètres d'inertie pour ^{242}Pu

Paramètres du noyau composé ^{242}Pu nécessaires aux calculs de fission

$V_A = 5.85$ MeV $\quad \hbar\omega_A = 0.90$ MeV $\quad \left(\hbar^2/2\Im\right)_A = 5$ KeV

$V_B = 5.05$ MeV $\quad \hbar\omega_B = 0.60$ MeV $\quad \left(\hbar^2/2\Im\right)_B = 2$ KeV

Têtes des bandes de rotation (les énergies en MeV)

No.	KΠ	ε_A(KΠ)	ε_B(KΠ)
1	0+	0.000	0.000
2	2+	0.400	0.670
3	0-	0.650	0.000
4	1-	0.720	0.130
5	2-	0.740	0.300

Tableau 4. Kπ, les hauteurs V_f et les courbures $\hbar\omega_f$ (f = A, B) de la double barrière fondamentale et les paramètres d'inertie pour ^{241}Pu

Paramètres du noyau composé ^{241}Pu nécessaires aux calculs de fission

$V_A = 6.03$ MeV $\quad \hbar\omega_A = 1.02$ MeV $\quad \left(\hbar^2/2\Im\right)_A = 5$ KeV

$V_B = 5.18$ MeV $\quad \hbar\omega_B = 0.612$ MeV $\quad \left(\hbar^2/2\Im\right)_B = 2$ KeV

Têtes des bandes de rotation (les énergies en MeV)

No.	KΠ	ε_A(KΠ)	ε_B(KΠ)	No.	KΠ	ε_A(KΠ)	ε_B(KΠ)
1	2.5+	0.000	0.000	28	1.5-	0.250	0.346
2	2.5+	0.000	0.500	29	0.5+	0.350	0.110
3	2.5-	0.025	0.500	30	1.5+	0.350	0.500
4	2.5-	0.025	0.000	31	0.5-	0.350	0.820
5	0.5+	0.050	0.600	32	2.5-	0.350	0.820
6	4.5+	0.050	0.600	33	0.5-	0.375	0.110
7	1.5+	0.050	0.300	34	1.5-	0.375	0.500
8	0.5+	0.050	0.100	35	1.5+	0.400	0.210
9	4.5+	0.050	0.100	36	2.5+	0.400	0.210
10	1.5-	0.075	0.300	37	0.5+	0.400	0.600
11	0.5+	0.100	0.196	38	3.5+	0.400	0.600
12	0.5+	0.100	0.400	39	3.5+	0.470	0.630
13	3.5+	0.100	0.400	40	3.5-	0.495	0.630
14	0.5-	0.125	0.196	41	0.5-	0.500	0.260
15	1.5+	0.150	0.296	42	1.5-	0.500	0.260
16	2.5+	0.150	0.296	43	0.5-	0.500	0.650
17	1.5-	0.150	0.650	44	2.5-	0.500	0.650
18	3.5-	0.150	0.650	45	1.5+	0.520	0.730
19	1.5-	0.150	0.150	46	5.5+	0.520	0.730
20	3.5-	0.150	0.150	47	0.5+	0.600	0.050
21	1.5+	0.200	0.670	48	2.5-	0.620	0.780
22	0.5-	0.200	0.450	49	4.5-	0.620	0.780
23	2.5-	0.200	0.450	50	0.5-	0.625	0.050
24	1.5-	0.225	0.670	51	1.5+	0.650	0.150
25	0.5+	0.250	0.770	52	2.5+	0.650	0.150
26	3.5+	0.250	0.770	53	0.5-	0.750	0.200
27	0.5-	0.250	0.346	54	1.5-	0.750	0.200

Tableau 5. Les températures constantes T et les énergies de raccord E_m (entre les deux fonctions de densité des niveaux, température constante et Fermi-gaz)

Noyaux	T (MeV)	E_m (MeV)
^{239}Pu	0.399101	3.737615
^{240}Pu	0.406094	4.165000
^{241}Pu	0.391821	3.732407
^{242}Pu	0.401123	4.229684

Tableau 6. Données des transitions gamma

^{242}Pu											
i	ε_i(MeV)	$(I^\pi)_i$		j	P_{ij}	i	ε_i(MeV)	$(I^\pi)_i$		j	P_{ij}
1	0.000000	0+				15	1.064000	4-	→	3	0.997655
2	0.044500	2+	→	1	1.000000				→	8	0.001927
3	0.147200	4+	→	2	1.000000				→	10	0.000389
4	0.305900	6+	→	3	1.000000				→	13	0.000013
5	0.517600	8+	→		1.000000				→	14	0.000016
6	0.779000	10+	→	5	1.000000	16	1.087000	12+	→	6	1.000000
7	0.780000	1-	→	1	0.545318	17	1.102000	2+	→	1	0.018954
			→	2	0.454682				→	2	0.717522
8	0.832000	3-	→	2	0.606321				→	3	0.009255
			→	3	0.393679				→	7	0.126960
			→	7	0.000000				→	8	0.074438
9	0.865000	1-	→	1	0.540932				→	9	0.050170
			→	2	0.459008				→	11	0.000001
			→	7	0.000060				→	12	0.000580
			→	8	0.000000				→	13	0.002121
10	0.927000	5-	→	3	0.668607				→	14	0.000000
			→	4	0.331393	18	1.122000	5-	→	3	0.634522
			→	8	0.000000				→	4	0.364523
11	0.956000	0+	→	2	0.240195				→	8	0.000004
			→	7	0.668251				→	10	0.000596
			→	9	0.091554				→	13	0.000000
12	0.995000	2+	→	1	0.019551				→	14	0.000341
			→	2	0.865523				→	15	0.000015
			→	3	0.008780	19	1.152000	2-	→	2	0.987892
			→	7	0.064233				→	7	0.004485
			→	8	0.027839				→	8	0.002821
			→	9	0.014074				→	9	0.002020
			→	11	0.000000				→	12	0.002509
13	1.019000	3-	→	2	0.585845				→	13	0.000194
			→	3	0.413661				→	15	0.000000
			→	7	0.000001				→	17	0.000080
			→	8	0.000485						
			→	9	0.000000						
			→	10	0.000000						
			→	12	0.000008						
14	1.040000	4+	→	2	0.024622						
			→	3	0.885335						
			→	4	0.005369						
			→	8	0.073009						
			→	10	0.011591						
			→	12	0.000000						
			→	13	0.000074						

Tableau 6. *Suite*

^{241}Pu											
i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}	i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}
1	0.000000	2.5+				13	0.335000	4.5+			
2	0.041950	3.5+				14	0.368000	6.5+			
3	0.095690	4.5+				15	0.444000	5.5+			
4	0.161050	5.5+				16	0.499000	6.5+			
5	0.161600	0.5+				17	0.518700	2.5-	→	1	0.80
6	0.170900	1.5+							→	2	0.20
7	0.174940	3.5+	→	1	0.76	18	0.561000	3.5-	→	1	0.67
			→	2	0.22				→	2	0.33
			→	3	0.02	19	0.569000	7.5-			
8	0.223100	2.5+									
9	0.231760	4.5+	→	2	0.57						
			→	3	0.33						

^{240}Pu											
i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}	i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}
1	0.000000	0+				14	0.992200	4+	→	4	0.33
2	0.042824	2+	→	1	1.00				→	7	0.48
3	0.141690	4+	→	2	1.00				→	8	0.19
4	0.294319	6+	→	3	1.00	15	1.001930	3-	→	2	1.00
5	0.497520	8+	→	4	1.00	16	1.030530	3+	→	2	0.74
6	0.597340	1-	→	1	0.38				→	3	0.26
			→	2	0.62	17	1.037520	4-	→	3	0.91
7	0.648850	3-	→	2	0.49				→	7	0.06
			→	3	0.51				→	8	0.03
8	0.742330	5-	→	3	0.13	18	1.041800	12+	→	9	1.00
			→	4	0.87	19	1.076220	4+	→	2	0.29
9	0.747800	10+	→	5	1.00				→	3	0.71
10	0.860710	0+	→	2	0.53	20	1.089450	0+	→	2	1.00
			→	6	0.47	21	1.115530	5-	→	3	0.92
11	0.900320	2+	→	1	0.05				→	4	0.04
			→	2	0.13				→	7	0.04
			→	3	0.32	22	1.131950	2+			
			→	6	0.27	23	1.136970	2+	→	1	0.40
			→	7	0.23				→	2	0.60
12	0.938060	1-	→	1	0.90	24	1.161530	6-	→	4	0.91
			→	2	0.04				→	8	0.09
			→	6	0.04	25	1.177500	3+			
			→	7	0.02	26	1.180200	2+			
13	0.958850	2-	→	2	0.93						
			→	6	0.03						
			→	7	0.04						

Tableau 6. *Suite*

^{239}Pu										
i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}	i	ε_i(MeV)	$(I^{\pi})_i$		j	P_{ij}
1	0.000000	0.5+				13	0.434000	4.5-			
2	0.007861	1.5+	→	1	1.00	14	0.462000	5.5+			
3	0.057276	2.5+	→	1	0.54	15	0.469800	0.5-	→	1	0.38
			→	2	0.46				→	2	0.62
4	0.075706	3.5+	→	2	0.83	16	0.487000	5.5-			
			→	3	0.17	17	0.492100	1.5-	→	1	0.35
5	0.163760	4.5+	→	3	0.89				→	2	0.06
			→	4	0.11				→	3	0.59
6	0.192810	5.5+	→	4	1.00	18	0.505500	2.5-	→	2	0.45
7	0.285460	2.5+	→	1	0.03				→	3	0.04
			→	2	0.48				→	4	0.51
			→	3	0.38	19	0.511838	3.5+	→	7	0.74
			→	4	0.11				→	9	0.23
8	0.318100	6.5+	→	5	1.00				→	11	0.03
9	0.330125	3.5+	→	2	0.02	20	0.519200	8.5+	→	8	1.00
			→	3	0.23	21	0.538000	4.5+			
			→	4	0.32	22	0.556100	3.5-	→	3	0.41
			→	5	0.05				→	5	0.59
			→	7	0.38	23	0.565000	4.5+			
10	0.358100	7.5+				24	0.570100	9.5+	→	10	1.00
11	0.387410	4.5+	→	4	0.23	25	0.583000	4.5-			
			→	7	0.10						
			→	9	0.67						
12	0.391586	3.5-	→	3	0.07						
			→	4	0.05						
			→	7	0.85						
			→	9	0.03						

FIGURES

Figure 1. n + ^{242}Pu total cross-section in the energy range 0.01-20 MeV, experimental data and this work

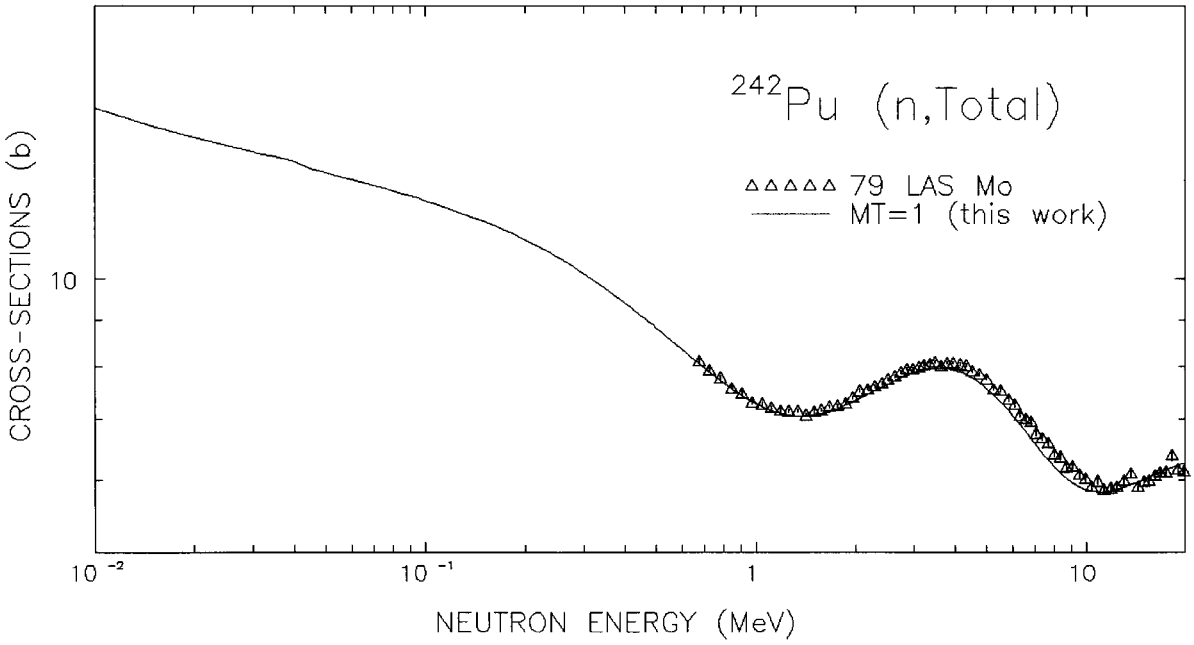


Figure 2. Fission cross-sections of ^{242}Pu in the neutron energy range 0.01-20 MeV, experimental data, ENDF/B-VI and JEF 2.2 evaluations and the present work

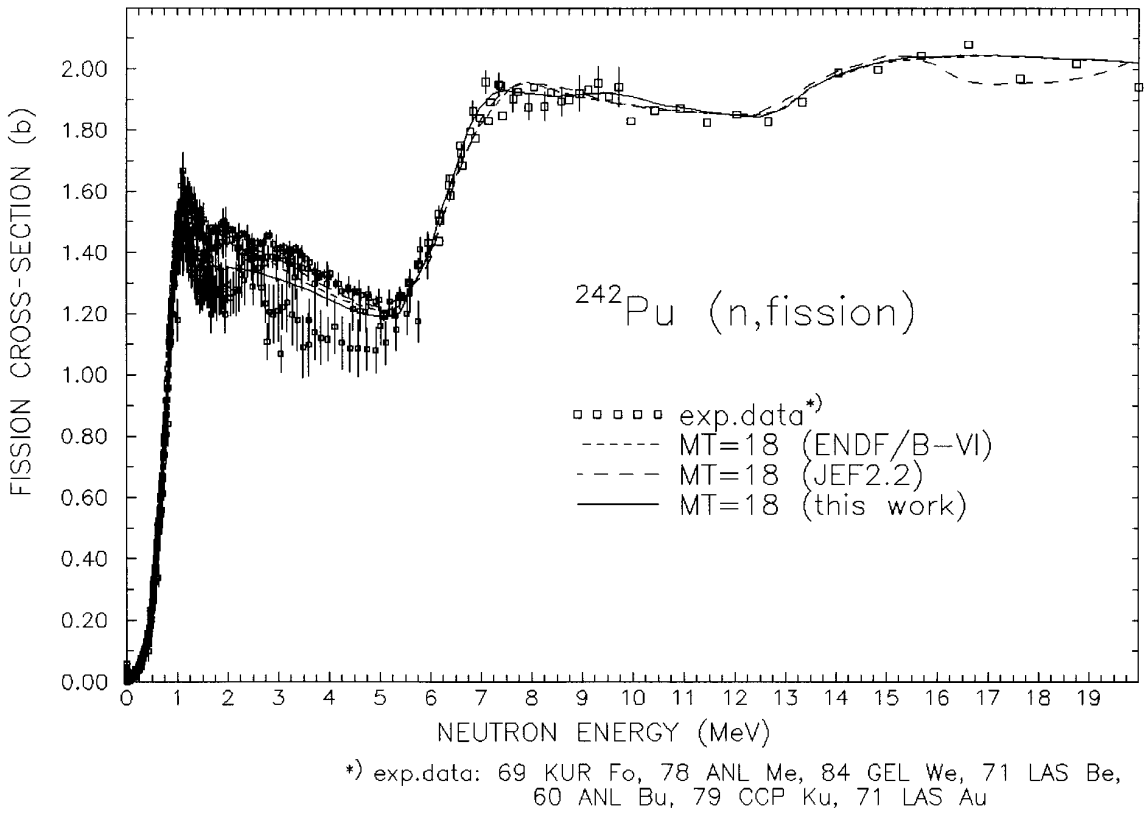


Figure 3. Fission cross-sections of ^{242}Pu in the neutron energy range 5-20 MeV, experimental data, ENDF/B-VI and JEF 2.2 evaluations and the present work

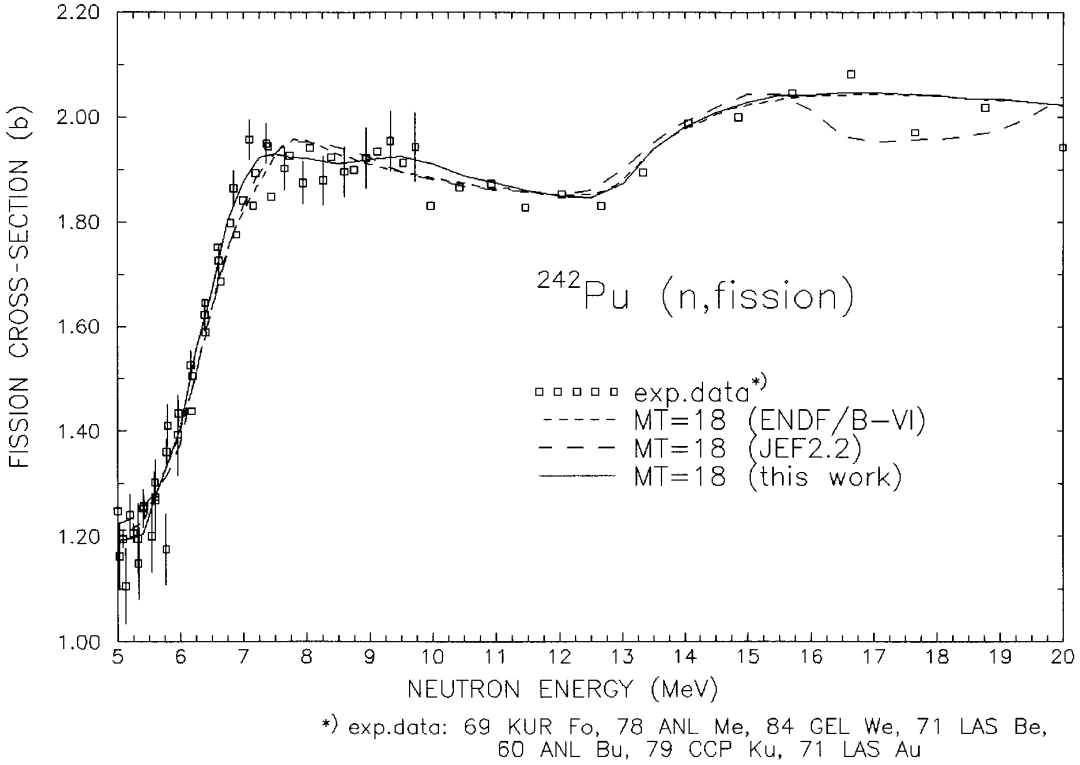


Figure 4. Fission cross-sections of this work and experimental data in the neutron energy range 5-20 MeV

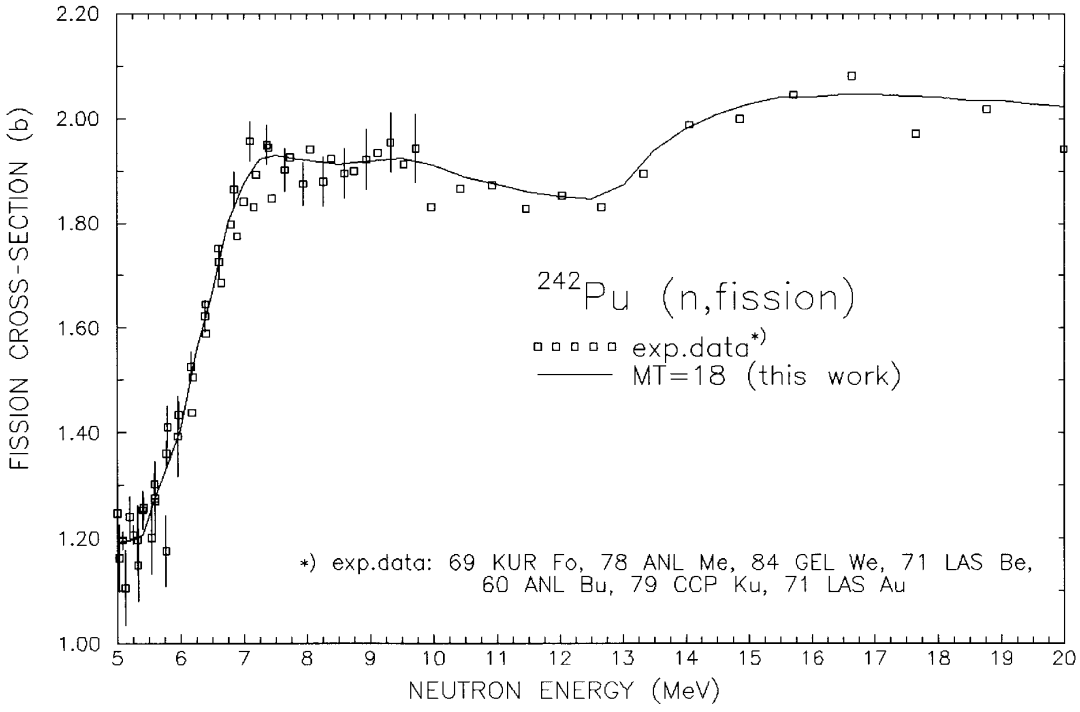


Figure 5. ^{242}Pu fission chances

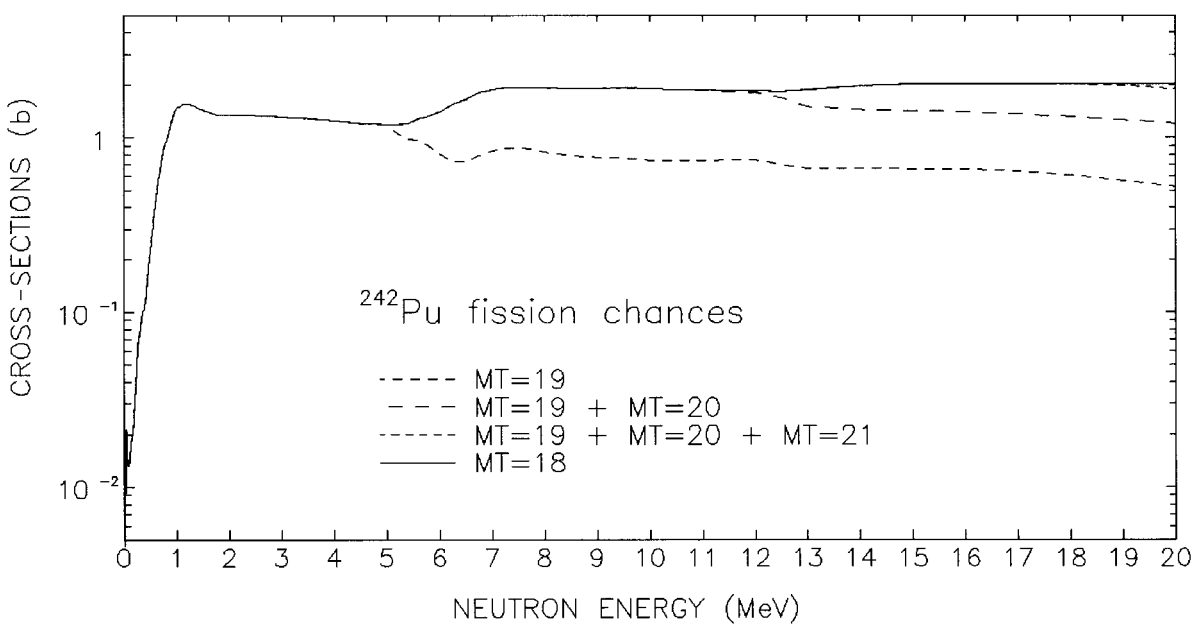


Figure 6. (n,γ) cross-sections of ^{242}Pu in the energy range 0.01-20 MeV, experimental data, ENDF/B-VI and JEF 2.2 evaluations and this work

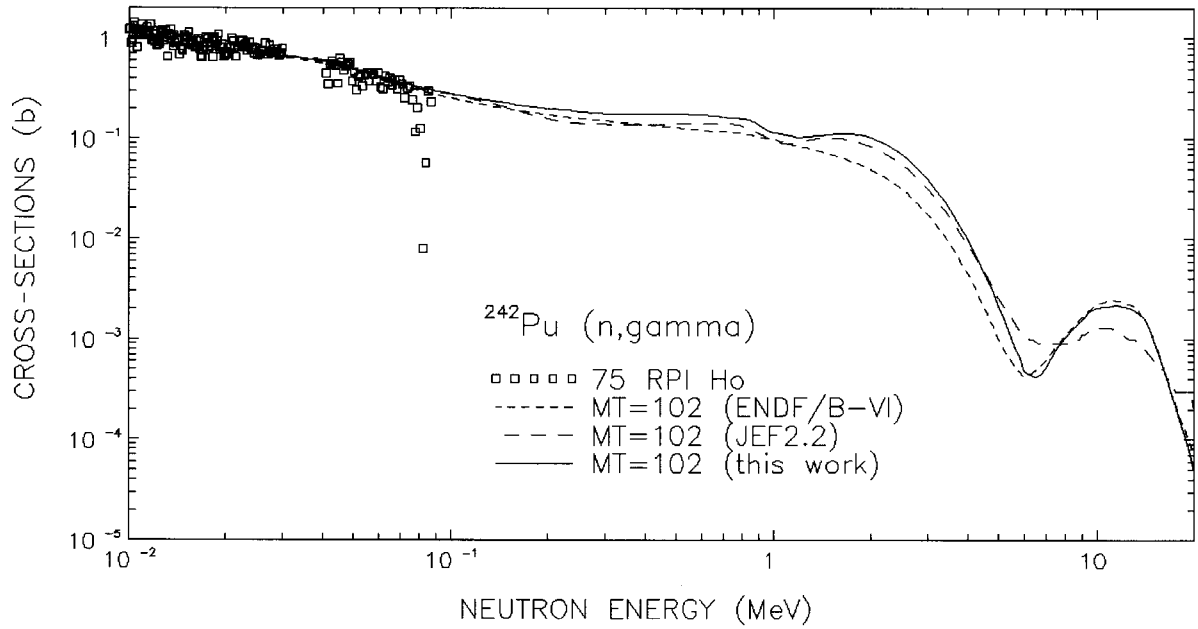


Figure 7. Major cross-sections of n + ^{242}Pu process in the energy range 0.01-20 MeV

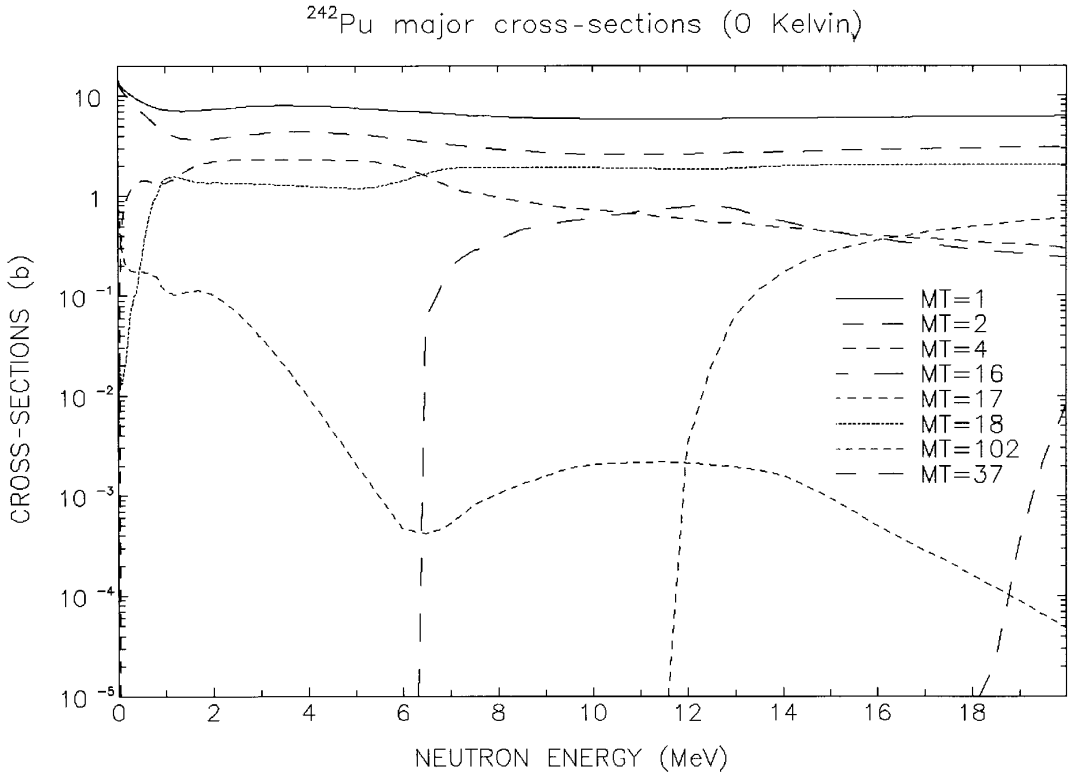


Figure 8. Inelastic cross-sections MT = 51-54 of MF = 3 file

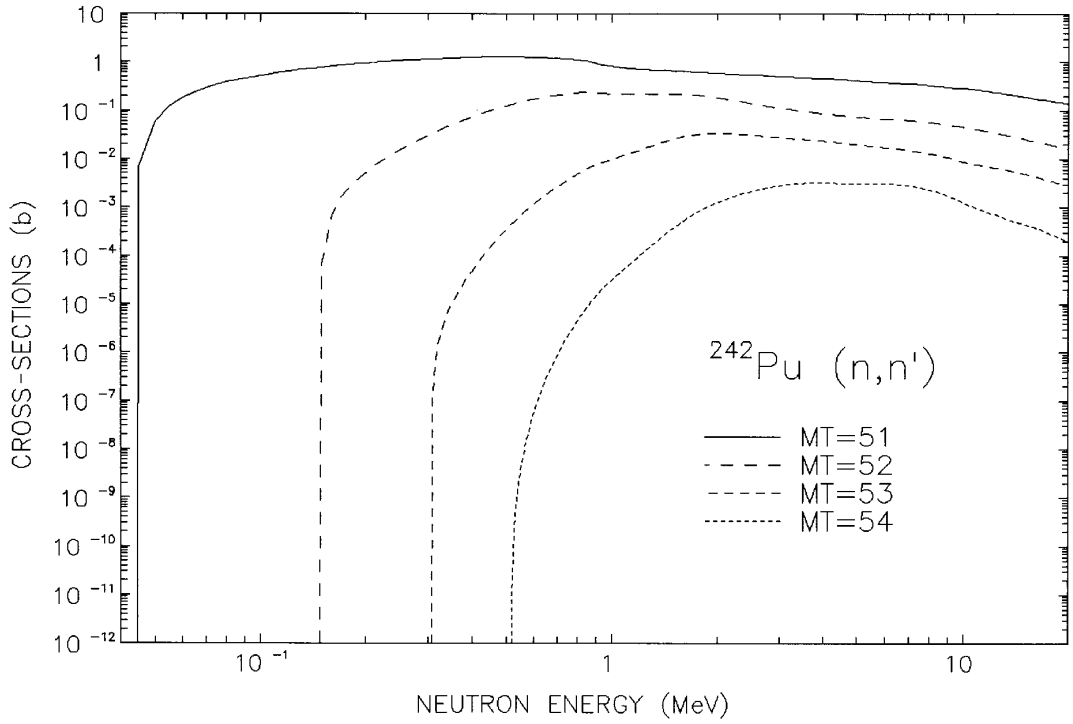


Figure 9. Inelastic cross-sections MT = 55-58 of MF = 3 file

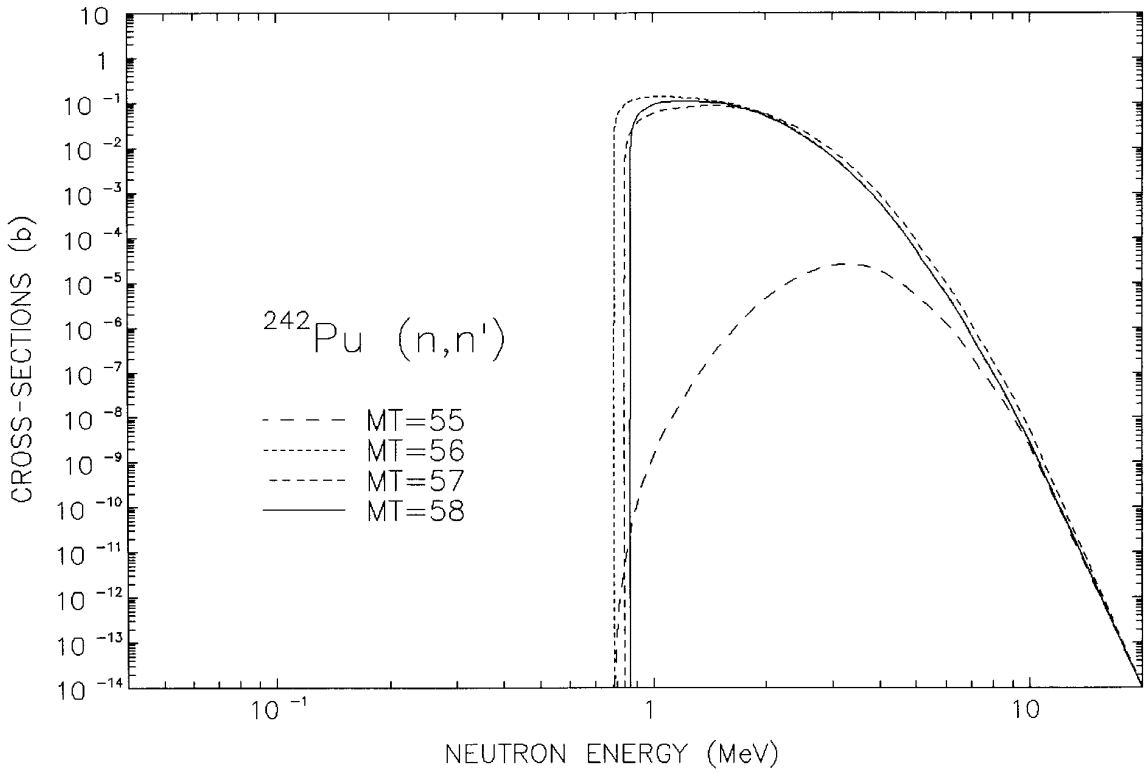


Figure 10. Inelastic cross-sections MT = 59-62 of MF = 3 file

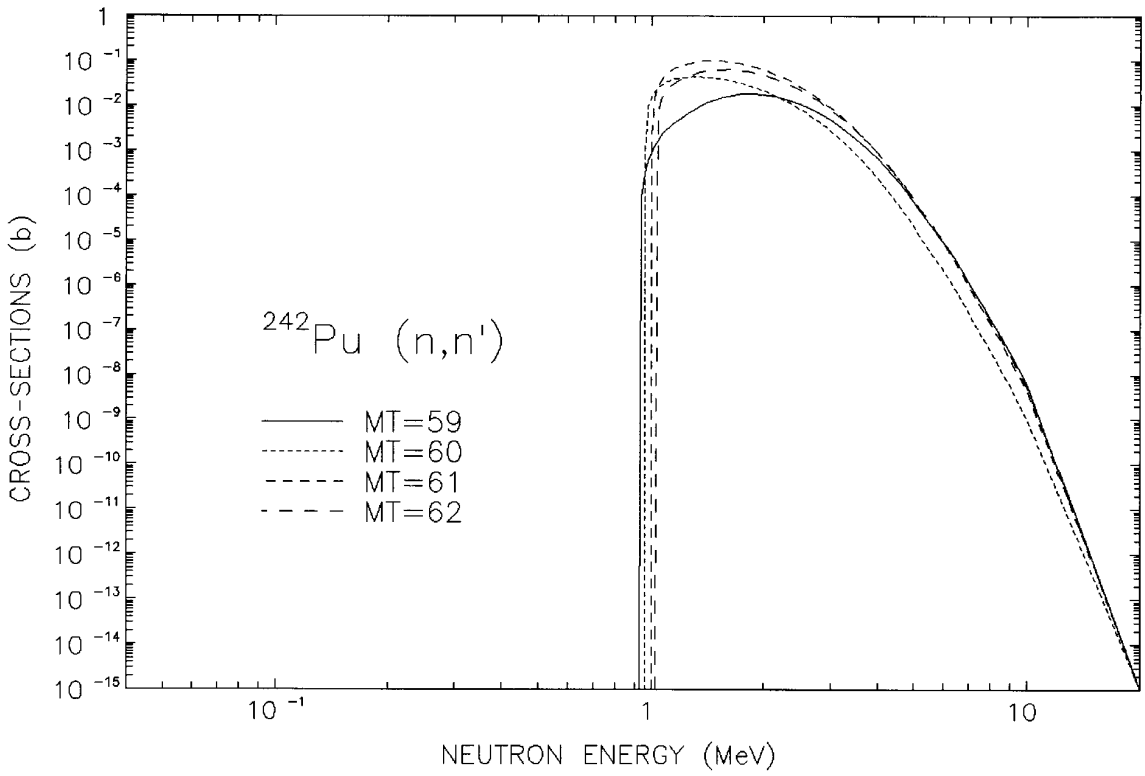


Figure 11. Inelastic cross-sections MT = 63-66 of MF = 3 file

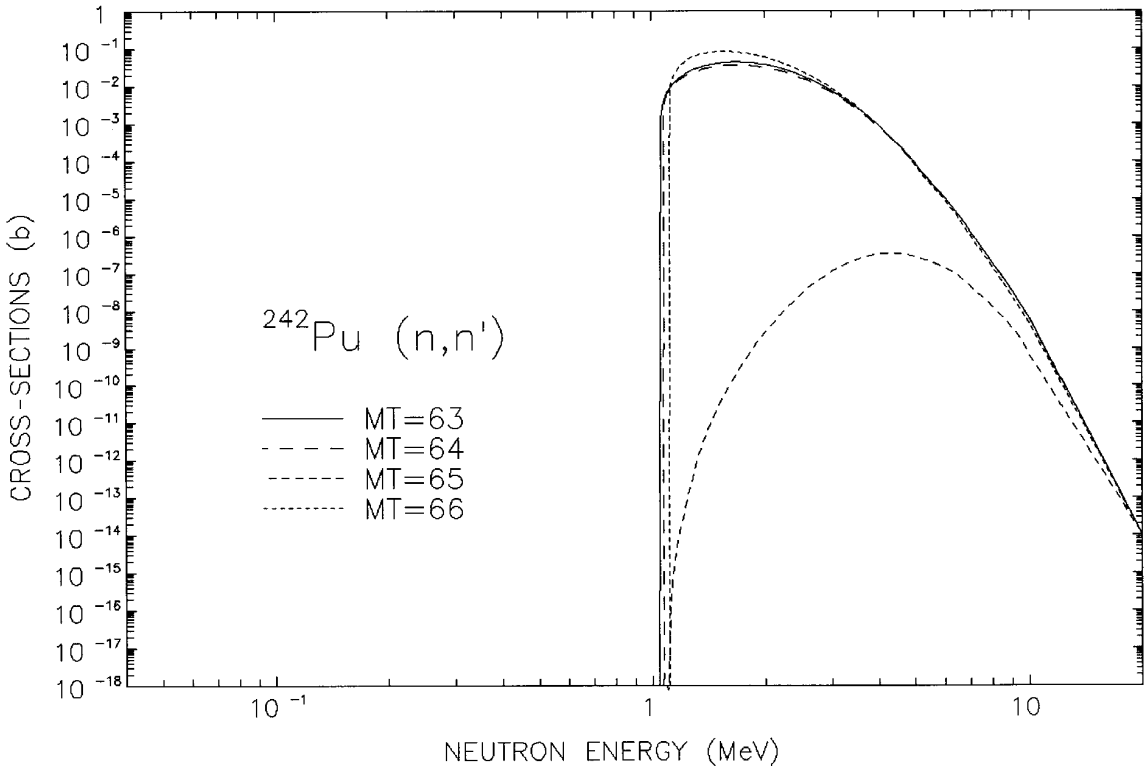


Figure 12. Inelastic cross-sections MT = 67, 68 and 91 of MF = 3 file

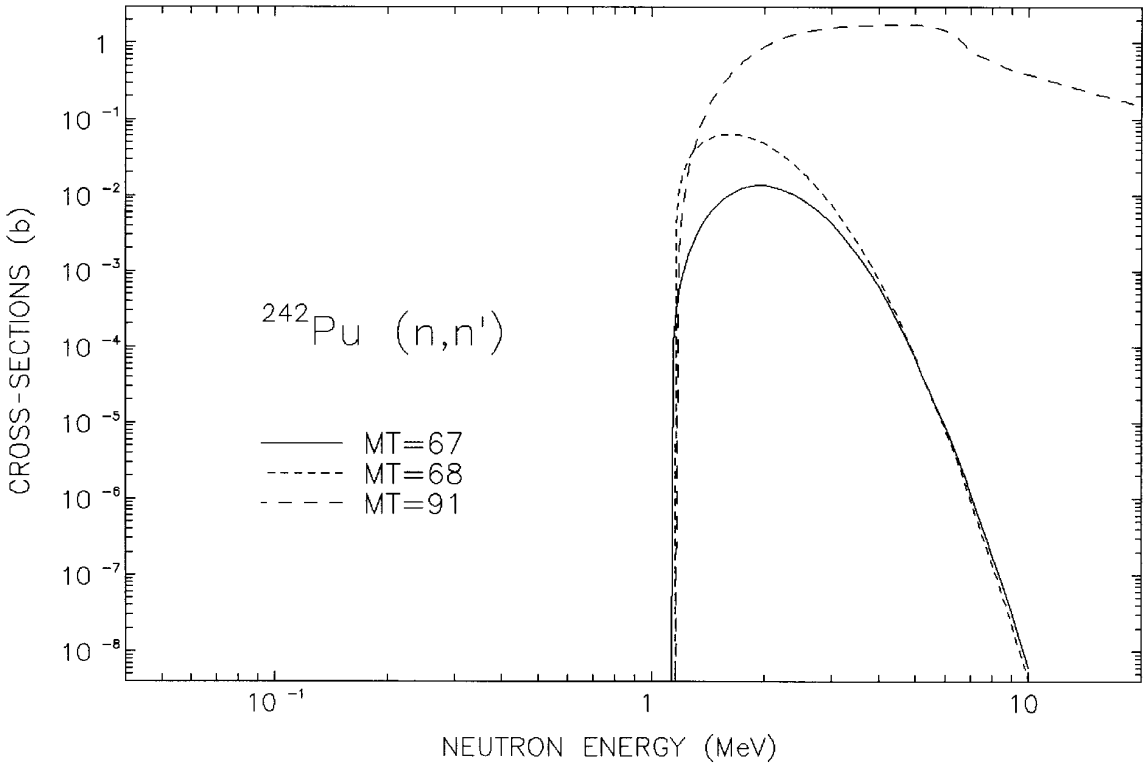


Figure 13. Elastic differential cross-sections at incident neutron energies 6, 10, 15, 20 MeV

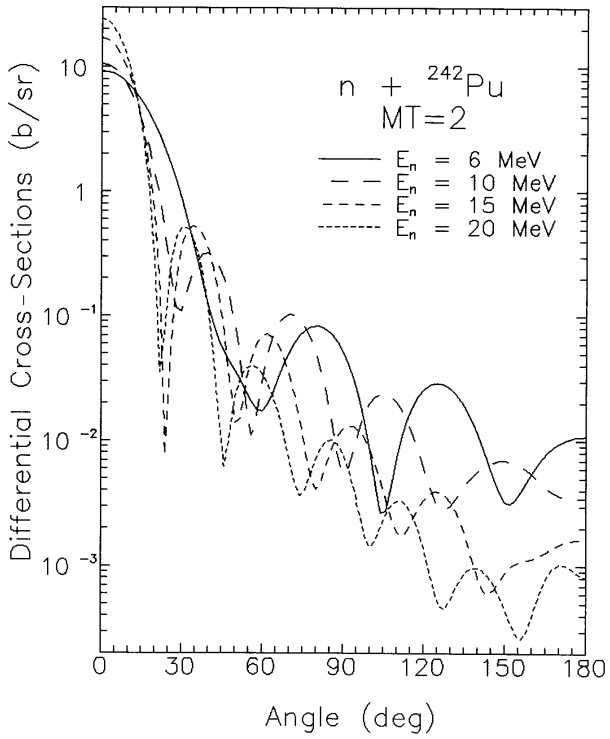


Figure 14. Inelastic differential cross-sections on first discrete level at incident neutron energies 6 and 15 MeV and on third discrete level at incident neutron energy 10 and 20 MeV

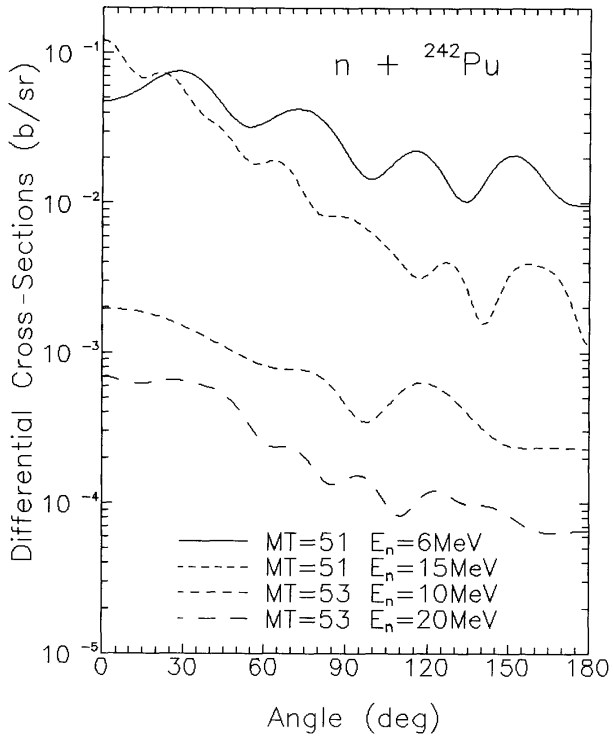


Figure 15. Fission neutron energy spectra

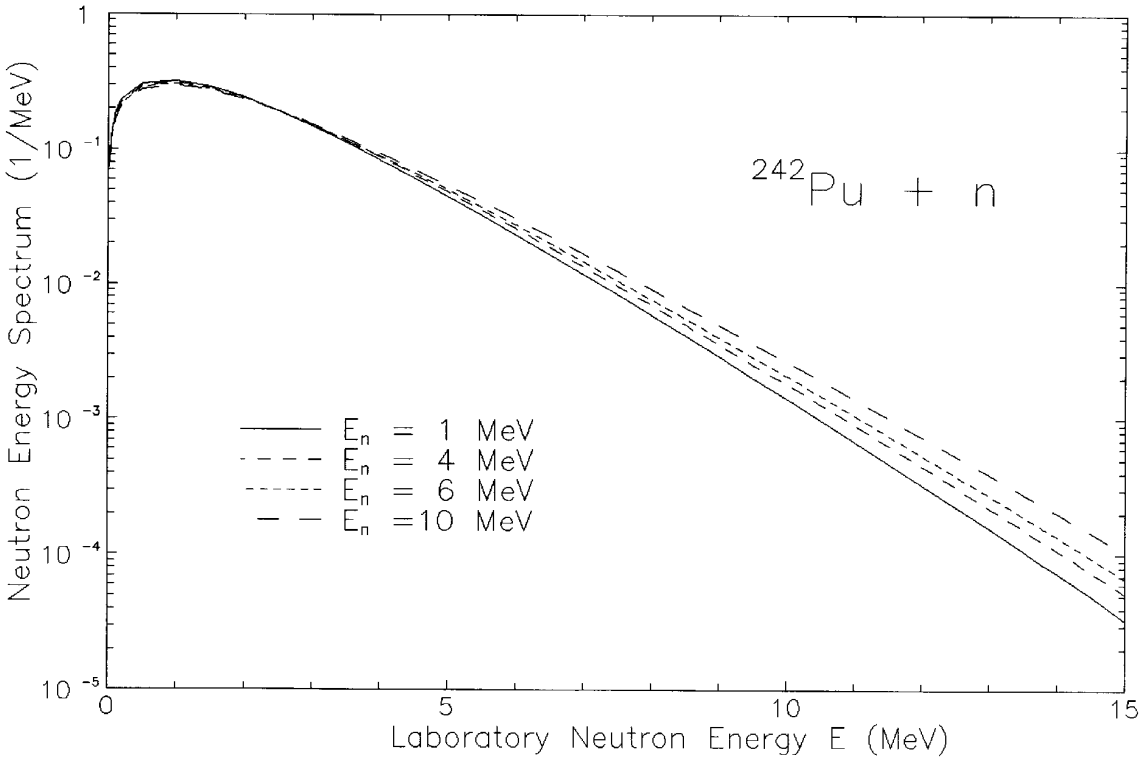


Figure 16. Fission neutron energy spectra, ratios to Maxwellian

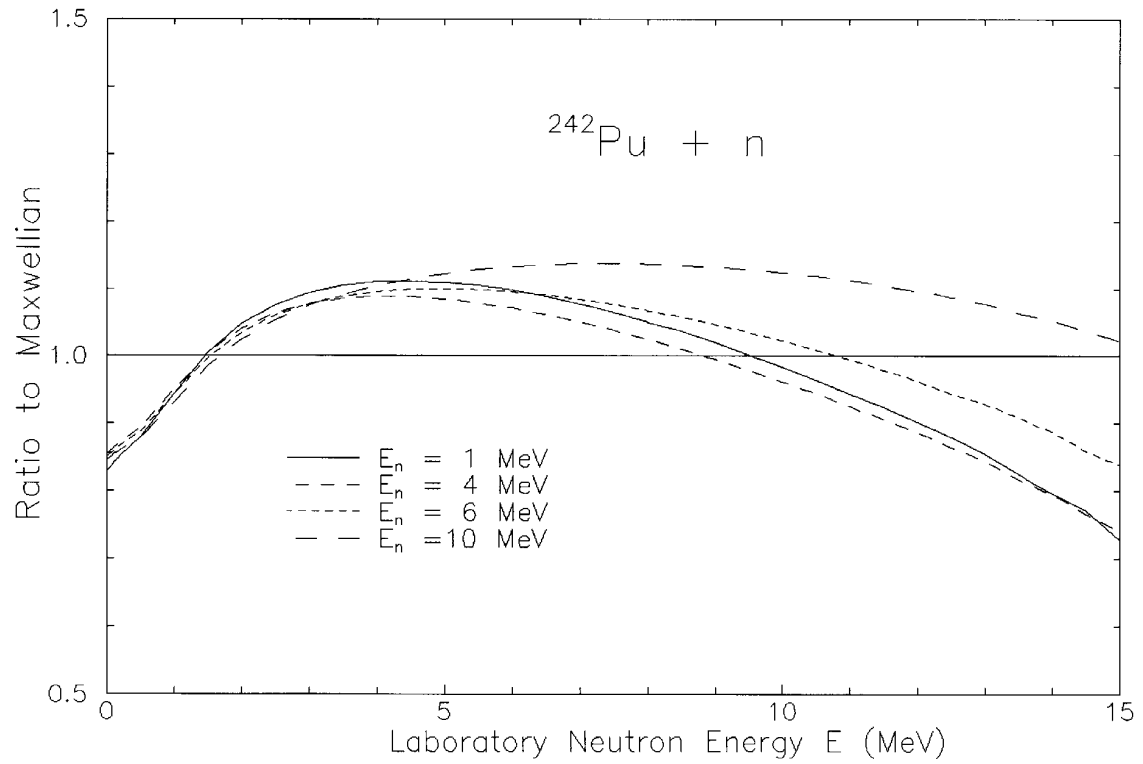


Figure 17. Some gamma production cross-sections versus neutron incident energy, MT = 4 (n,n'γ) reaction

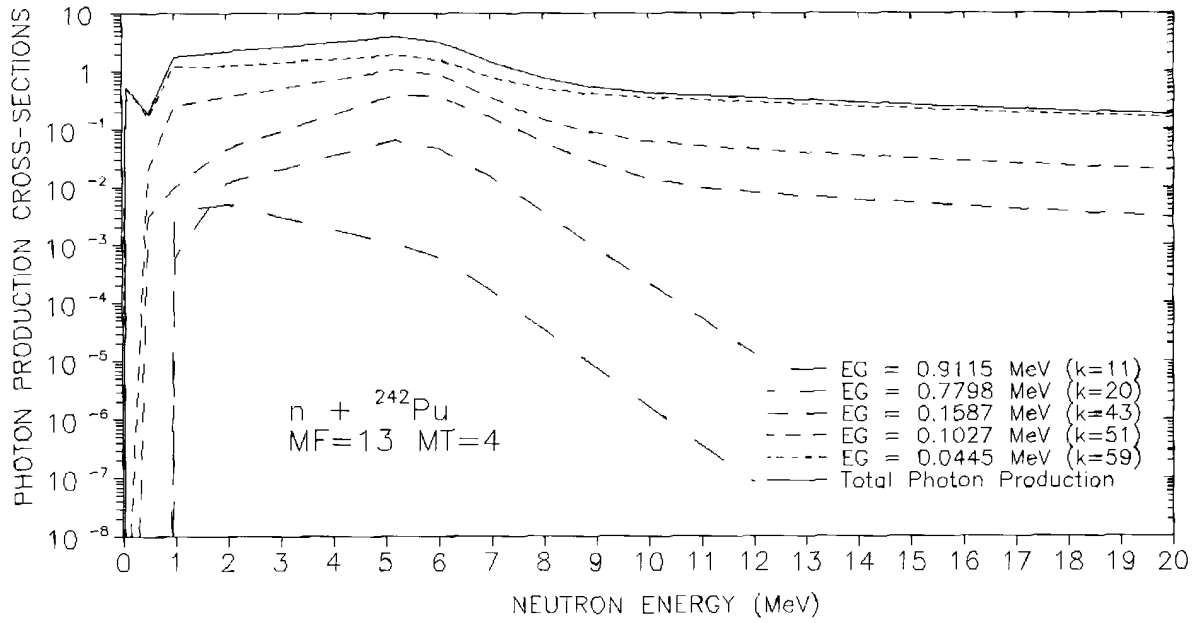


Figure 18. Gamma production cross-sections versus neutron incident energy, MT = 16 (n,2nγ) reaction

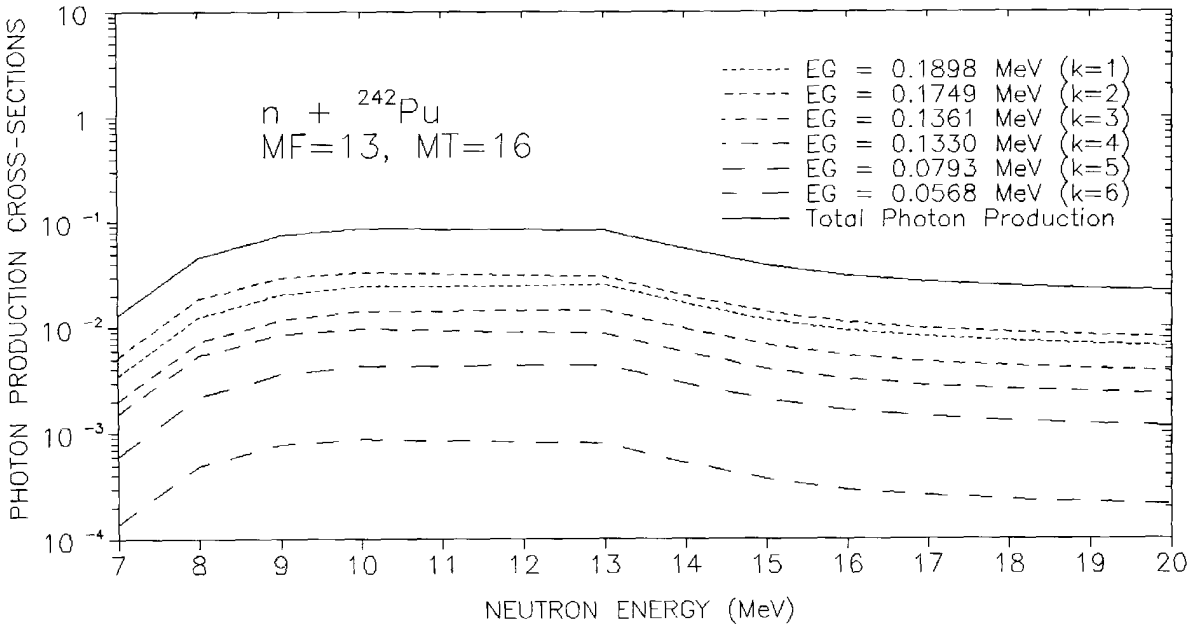
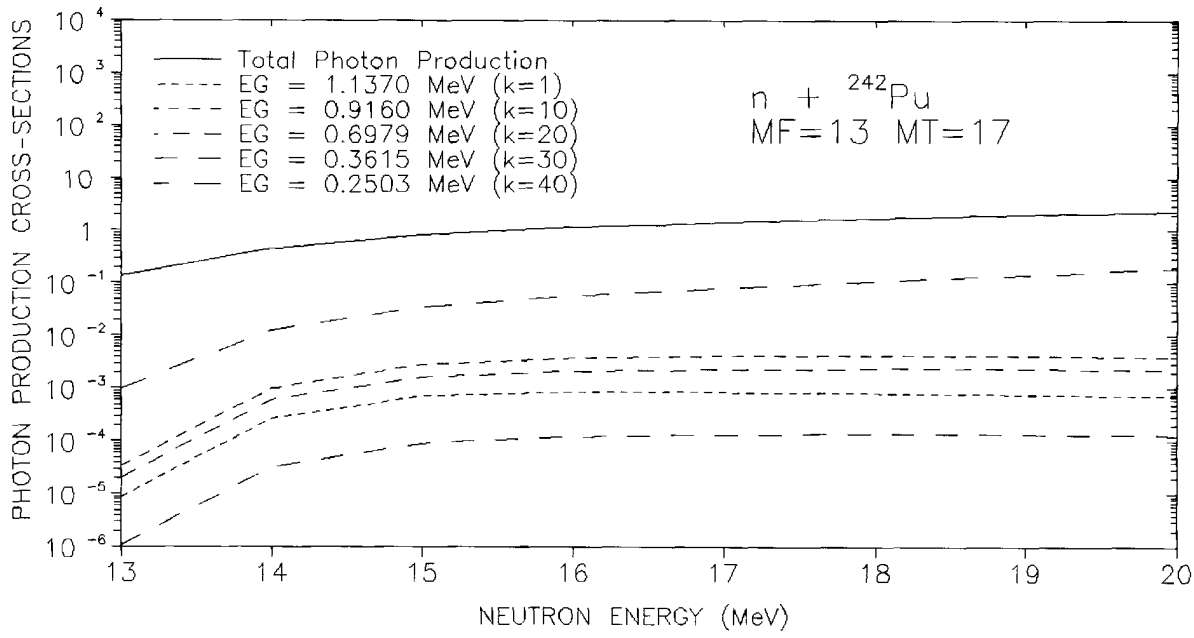


Figure 19. Some gamma production cross-sections versus neutron incident energy, MT = 17 (n,3nγ) reaction



ANNEX 1

File# 3
Reaction Cross-Section

Section (MT)	Reaction type	Reaction Q-value	Intermediate Q-value	Energy points (NP)	Energy range (eV) from	to	Interp. regions (NR)
1	(n,Total)	0.0000E+00	0.0000E+00	180	1.0000E+04	2.0000E+07	1
2	(n,Elastic)	0.0000E+00	0.0000E+00	180	1.0000E+04	2.0000E+07	1
4	(n,Inelastic)	0.0000E+00	-4.4500E+04	174	4.4685E+04	2.0000E+07	1
16	(n,2n)	-6.3096E+06	-6.3096E+06	32	6.3359E+06	2.0000E+07	1
17	(n,3n)	-1.1552E+07	-1.1552E+07	18	1.1600E+07	2.0000E+07	1
18	(n,fission)	2.0136E+08	2.0136E+08	180	1.0000E+04	2.0000E+07	1
19	(n,f)	2.0136E+08	2.0136E+08	180	1.0000E+04	2.0000E+07	1
20	(n,nf)	2.0136E+08	2.0136E+08	37	5.2000E+06	2.0000E+07	1
21	(n,2nf)	2.0136E+08	2.0136E+08	29	7.0000E+06	2.0000E+07	1
37	(n,4n)	-1.8085E+07	-1.8085E+07	5	1.8160E+07	2.0000E+07	1
38	(n,3nf)	2.0136E+08	2.0136E+08	9	1.6000E+07	2.0000E+07	1
51	(n,n′) 1-st level	0.0000E+00	-4.4500E+04	174	4.4685E+04	2.0000E+07	1
52	(n,n′) 2-nd level	0.0000E+00	-1.4720E+05	158	1.4781E+05	2.0000E+07	1
53	(n,n′) 3-rd level	0.0000E+00	-3.0590E+05	142	3.0717E+05	2.0000E+07	1
54	(n,n′) 4-th level	0.0000E+00	-5.1760E+05	123	5.1976E+05	2.0000E+07	1
55	(n,n′) 5-th level	0.0000E+00	-7.7900E+05	78	7.8225E+05	2.0000E+07	1
56	(n,n′) 6-th level	0.0000E+00	-7.8000E+05	78	7.8325E+05	2.0000E+07	1
57	(n,n′) 7-th level	0.0000E+00	-8.3200E+05	73	8.3547E+05	2.0000E+07	1
58	(n,n′) 8-th level	0.0000E+00	-8.6500E+05	70	8.6860E+05	2.0000E+07	1
59	(n,n′) 9-th level	0.0000E+00	-9.2700E+05	65	9.3086E+05	2.0000E+07	1
60	(n,n′)10-th level	0.0000E+00	-9.5600E+05	64	9.5998E+05	2.0000E+07	1
61	(n,n′)11-th level	0.0000E+00	-9.9500E+05	62	9.9915E+05	2.0000E+07	1
62	(n,n′)12-th level	0.0000E+00	-1.0190E+06	60	1.0232E+06	2.0000E+07	1
63	(n,n′)13-th level	0.0000E+00	-1.0400E+06	59	1.0443E+06	2.0000E+07	1
64	(n,n′)14-th level	0.0000E+00	-1.0640E+06	58	1.0684E+06	2.0000E+07	1
65	(n,n′)15-th level	0.0000E+00	-1.0870E+06	57	1.0915E+06	2.0000E+07	1
66	(n,n′)16-th level	0.0000E+00	-1.1020E+06	56	1.1066E+06	2.0000E+07	1
67	(n,n′)17-th level	0.0000E+00	-1.1220E+06	55	1.1267E+06	2.0000E+07	1
68	(n,n′)18-th level	0.0000E+00	-1.1520E+06	54	1.1568E+06	2.0000E+07	1
91	(n,n′) continuum	0.0000E+00	-1.1520E+06	72	1.1568E+06	2.0000E+07	1
102	(n,g)	5.0342E+06	5.0342E+06	180	1.0000E+04	2.0000E+07	1

(n,Total)
Reaction Cross-Section

Interpolation law between energies

Range	Description
1 TO 180	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0000E+04	1.5425E+01	1.5000E+04	1.4750E+01	2.0000E+04	1.4339E+01	2.5000E+04	1.4048E+01	3.0000E+04	1.3824E+01
6	3.5000E+04	1.3640E+01	4.0000E+04	1.3482E+01	4.5000E+04	1.3221E+01	5.0000E+04	1.3094E+01	5.5000E+04	1.2979E+01
11	6.0000E+04	1.2872E+01	6.5000E+04	1.2772E+01	7.0000E+04	1.2678E+01	7.5000E+04	1.2589E+01	8.0000E+04	1.2504E+01
16	8.5000E+04	1.2422E+01	9.0000E+04	1.2343E+01	9.5000E+04	1.2267E+01	1.0000E+05	1.2194E+01	1.1000E+05	1.2053E+01
21	1.2000E+05	1.1919E+01	1.3000E+05	1.1791E+01	1.4000E+05	1.1667E+01	1.5000E+05	1.1576E+01	1.6000E+05	1.1461E+01
26	1.7000E+05	1.1350E+01	1.8000E+05	1.1242E+01	1.9000E+05	1.1137E+01	2.0000E+05	1.1035E+01	2.1000E+05	1.0936E+01
31	2.2000E+05	1.0838E+01	2.3000E+05	1.0743E+01	2.4000E+05	1.0651E+01	2.5000E+05	1.0560E+01	2.6000E+05	1.0471E+01
36	2.7000E+05	1.0385E+01	2.8000E+05	1.0300E+01	2.9000E+05	1.0217E+01	3.0000E+05	1.0136E+01	3.1000E+05	1.0056E+01
41	3.2000E+05	9.9782E+00	3.4000E+05	9.8271E+00	3.5000E+05	9.7539E+00	3.6000E+05	9.6823E+00	3.8000E+05	9.5433E+00
46	3.9000E+05	9.4759E+00	4.0000E+05	9.4099E+00	4.1000E+05	9.3453E+00	4.2000E+05	9.2820E+00	4.3000E+05	9.2200E+00
51	4.4000E+05	9.1593E+00	4.5000E+05	9.0999E+00	4.6000E+05	9.0417E+00	4.7000E+05	8.9847E+00	4.8000E+05	8.9289E+00
56	4.9000E+05	8.8743E+00	5.0000E+05	8.8208E+00	5.1000E+05	8.7684E+00	5.2000E+05	8.7172E+00	5.3000E+05	8.6671E+00
61	5.4000E+05	8.6180E+00	5.5000E+05	8.5701E+00	5.6000E+05	8.5231E+00	5.7000E+05	8.4772E+00	5.8000E+05	8.4322E+00
66	5.9000E+05	8.3883E+00	6.0000E+05	8.3454E+00	6.1000E+05	8.3034E+00	6.2000E+05	8.2623E+00	6.3000E+05	8.2222E+00
71	6.4000E+05	8.1830E+00	6.5000E+05	8.1447E+00	6.6000E+05	8.1073E+00	6.7000E+05	8.0708E+00	6.8000E+05	8.0351E+00
76	6.9000E+05	8.0003E+00	7.0000E+05	7.9663E+00	7.1000E+05	7.9331E+00	7.2000E+05	7.9007E+00	7.3000E+05	7.8692E+00
81	7.4000E+05	7.8384E+00	7.5000E+05	7.8084E+00	7.6000E+05	7.7791E+00	7.7000E+05	7.7506E+00	7.8000E+05	7.7229E+00
86	7.9000E+05	7.6958E+00	8.0000E+05	7.6695E+00	8.1000E+05	7.6439E+00	8.2000E+05	7.6190E+00	8.3000E+05	7.5947E+00
91	8.4000E+05	7.5711E+00	8.5000E+05	7.5482E+00	8.6000E+05	7.5260E+00	8.7000E+05	7.5044E+00	8.8000E+05	7.4834E+00
96	8.9000E+05	7.4630E+00	9.0000E+05	7.4433E+00	9.2000E+05	7.4056E+00	9.4000E+05	7.3702E+00	9.6000E+05	7.3372E+00
101	9.8000E+05	7.3063E+00	1.0000E+06	7.2775E+00	1.0200E+06	7.2508E+00	1.0400E+06	7.2261E+00	1.0600E+06	7.2033E+00
106	1.0800E+06	7.1824E+00	1.1000E+06	7.1633E+00	1.1200E+06	7.1459E+00	1.1400E+06	7.1302E+00	1.1600E+06	7.1161E+00
111	1.1800E+06	7.1036E+00	1.2000E+06	7.0925E+00	1.2500E+06	7.0712E+00	1.3000E+06	7.0580E+00	1.3500E+06	7.0522E+00
116	1.4000E+06	7.0530E+00	1.4500E+06	7.0596E+00	1.5000E+06	7.0714E+00	1.5500E+06	7.0876E+00	1.6000E+06	7.1076E+00
121	1.6500E+06	7.1309E+00	1.7000E+06	7.1569E+00	1.7500E+06	7.1852E+00	1.8000E+06	7.2152E+00	1.8500E+06	7.2466E+00
126	1.9000E+06	7.2791E+00	1.9500E+06	7.3123E+00	2.0000E+06	7.3459E+00	2.2000E+06	7.4799E+00	2.4000E+06	7.6054E+00
131	2.6000E+06	7.7155E+00	2.8000E+06	7.8066E+00	3.0000E+06	7.8770E+00	3.2000E+06	7.9258E+00	3.4000E+06	7.9531E+00
136	3.6000E+06	7.9596E+00	3.8000E+06	7.9465E+00	4.0000E+06	7.9155E+00	4.2000E+06	7.8685E+00	4.4000E+06	7.8076E+00
141	4.6000E+06	7.7349E+00	4.8000E+06	7.6524E+00	5.0000E+06	7.5622E+00	5.2000E+06	7.4670E+00	5.4000E+06	7.3665E+00
146	5.6000E+06	7.2634E+00	5.8000E+06	7.1591E+00	6.0000E+06	7.0549E+00	6.2500E+06	6.9265E+00	6.5000E+06	6.8020E+00
151	6.7500E+06	6.6828E+00	7.0000E+06	6.5701E+00	7.2500E+06	6.4649E+00	7.5000E+06	6.3677E+00	7.7500E+06	6.2790E+00
156	8.0000E+06	6.1990E+00	8.5000E+06	6.0649E+00	9.0000E+06	5.9640E+00	9.5000E+06	5.8933E+00	1.0000E+07	5.8485E+00
161	1.0500E+07	5.8250E+00	1.1000E+07	5.8184E+00	1.1500E+07	5.8247E+00	1.2000E+07	5.8404E+00	1.2500E+07	5.8630E+00
166	1.3000E+07	5.8900E+00	1.3500E+07	5.9199E+00	1.4000E+07	5.9513E+00	1.4500E+07	5.9832E+00	1.5000E+07	6.0150E+00
171	1.5500E+07	6.0463E+00	1.6000E+07	6.0767E+00	1.6500E+07	6.1059E+00	1.7000E+07	6.1336E+00	1.7500E+07	6.1595E+00
176	1.8000E+07	6.1834E+00	1.8500E+07	6.2051E+00	1.9000E+07	6.2244E+00	1.9500E+07	6.2413E+00	2.0000E+07	6.2558E+00

(n,Elastic)
Reaction Cross-Section

Interpolation law between energies

Range	Description
1 TO 180	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0000E+04	1.4410E+01	1.5000E+04	1.3875E+01	2.0000E+04	1.3552E+01	2.5000E+04	1.3327E+01	3.0000E+04	1.3152E+01
6	3.5000E+04	1.3005E+01	4.0000E+04	1.2878E+01	4.5000E+04	1.2659E+01	5.0000E+04	1.2527E+01	5.5000E+04	1.2391E+01
11	6.0000E+04	1.2259E+01	6.5000E+04	1.2134E+01	7.0000E+04	1.2013E+01	7.5000E+04	1.1897E+01	8.0000E+04	1.1785E+01
16	8.5000E+04	1.1679E+01	9.0000E+04	1.1579E+01	9.5000E+04	1.1482E+01	1.0000E+05	1.1385E+01	1.1000E+05	1.1199E+01
21	1.2000E+05	1.1021E+01	1.3000E+05	1.0851E+01	1.4000E+05	1.0689E+01	1.5000E+05	1.0568E+01	1.6000E+05	1.0418E+01
26	1.7000E+05	1.0272E+01	1.8000E+05	1.0131E+01	1.9000E+05	9.9942E+00	2.0000E+05	9.8612E+00	2.1000E+05	9.7320E+00
31	2.2000E+05	9.6064E+00	2.3000E+05	9.4841E+00	2.4000E+05	9.3645E+00	2.5000E+05	9.2474E+00	2.6000E+05	9.1331E+00
36	2.7000E+05	9.0218E+00	2.8000E+05	8.9144E+00	2.9000E+05	8.8095E+00	3.0000E+05	8.7073E+00	3.1000E+05	8.6131E+00
41	3.2000E+05	8.5147E+00	3.4000E+05	8.3228E+00	3.5000E+05	8.2305E+00	3.6000E+05	8.1412E+00	3.8000E+05	7.9695E+00
46	3.9000E+05	7.8856E+00	4.0000E+05	7.8023E+00	4.1000E+05	7.7195E+00	4.2000E+05	7.6372E+00	4.3000E+05	7.5552E+00
51	4.4000E+05	7.4745E+00	4.5000E+05	7.3948E+00	4.6000E+05	7.3164E+00	4.7000E+05	7.2394E+00	4.8000E+05	7.1643E+00
56	4.9000E+05	7.0908E+00	5.0000E+05	7.0188E+00	5.1000E+05	6.9475E+00	5.2000E+05	6.8782E+00	5.3000E+05	6.8062E+00
61	5.4000E+05	6.7338E+00	5.5000E+05	6.6617E+00	5.6000E+05	6.5910E+00	5.7000E+05	6.5224E+00	5.8000E+05	6.4563E+00
66	5.9000E+05	6.3924E+00	6.0000E+05	6.3294E+00	6.1000E+05	6.2661E+00	6.2000E+05	6.2021E+00	6.3000E+05	6.1382E+00
71	6.4000E+05	6.0753E+00	6.5000E+05	6.0136E+00	6.6000E+05	5.9533E+00	6.7000E+05	5.8942E+00	6.8000E+05	5.8360E+00
76	6.9000E+05	5.7786E+00	7.0000E+05	5.7216E+00	7.1000E+05	5.6650E+00	7.2000E+05	5.6090E+00	7.3000E+05	5.5539E+00
81	7.4000E+05	5.5007E+00	7.5000E+05	5.4496E+00	7.6000E+05	5.4009E+00	7.7000E+05	5.3542E+00	7.8000E+05	5.3089E+00
86	7.9000E+05	5.2562E+00	8.0000E+05	5.2063E+00	8.1000E+05	5.1578E+00	8.2000E+05	5.1097E+00	8.3000E+05	5.0620E+00
91	8.4000E+05	5.0150E+00	8.5000E+05	4.9670E+00	8.6000E+05	4.9192E+00	8.7000E+05	4.8698E+00	8.8000E+05	4.8184E+00
96	8.9000E+05	4.7697E+00	9.0000E+05	4.7225E+00	9.2000E+05	4.6333E+00	9.4000E+05	4.5520E+00	9.6000E+05	4.4794E+00
101	9.8000E+05	4.4132E+00	1.0000E+06	4.3545E+00	1.0200E+06	4.3003E+00	1.0400E+06	4.2489E+00	1.0600E+06	4.2024E+00
106	1.0800E+06	4.1559E+00	1.1000E+06	4.1126E+00	1.1200E+06	4.0709E+00	1.1400E+06	4.0333E+00	1.1600E+06	4.0088E+00
111	1.1800E+06	3.9734E+00	1.2000E+06	3.9414E+00	1.2500E+06	3.8660E+00	1.3000E+06	3.8108E+00	1.3500E+06	3.7653E+00
116	1.4000E+06	3.7293E+00	1.4500E+06	3.6999E+00	1.5000E+06	3.6781E+00	1.5500E+06	3.6624E+00	1.6000E+06	3.6525E+00
121	1.6500E+06	3.6467E+00	1.7000E+06	3.6460E+00	1.7500E+06	3.6488E+00	1.8000E+06	3.6559E+00	1.8500E+06	3.6659E+00
126	1.9000E+06	3.6793E+00	1.9500E+06	3.6951E+00	2.0000E+06	3.6782E+00	2.2000E+06	3.7813E+00	2.4000E+06	3.8968E+00
131	2.6000E+06	4.0113E+00	2.8000E+06	4.1159E+00	3.0000E+06	4.2048E+00	3.2000E+06	4.2749E+00	3.4000E+06	4.3251E+00
136	3.6000E+06	4.3554E+00	3.8000E+06	4.3666E+00	4.0000E+06	4.3601E+00	4.2000E+06	4.3377E+00	4.4000E+06	4.3009E+00
141	4.6000E+06	4.2517E+00	4.8000E+06	4.1918E+00	5.0000E+06	4.1229E+00	5.2000E+06	4.0478E+00	5.4000E+06	3.9661E+00
146	5.6000E+06	3.8804E+00	5.8000E+06	3.7919E+00	6.0000E+06	3.7021E+00	6.2500E+06	3.5898E+00	6.5000E+06	3.4794E+00
151	6.7500E+06	3.3726E+00	7.0000E+06	3.2708E+00	7.2500E+06	3.1751E+00	7.5000E+06	3.0863E+00	7.7500E+06	3.0049E+00
156	8.0000E+06	2.9314E+00	8.5000E+06	2.8080E+00	9.0000E+06	2.7154E+00	9.5000E+06	2.6511E+00	1.0000E+07	2.6116E+00
161	1.0500E+07	2.5929E+00	1.1000E+07	2.5911E+00	1.1500E+07	2.6025E+00	1.2000E+07	2.6236E+00	1.2500E+07	2.6517E+00
166	1.3000E+07	2.6844E+00	1.3500E+07	2.7198E+00	1.4000E+07	2.7563E+00	1.4500E+07	2.7928E+00	1.5000E+07	2.8286E+00
171	1.5500E+07	2.8630E+00	1.6000E+07	2.8956E+00	1.6500E+07	2.9262E+00	1.7000E+07	2.9546E+00	1.7500E+07	2.9806E+00
176	1.8000E+07	3.0041E+00	1.8500E+07	3.0251E+00	1.9000E+07	3.0435E+00	1.9500E+07	3.0593E+00	2.0000E+07	3.0726E+00

(n,Inelastic)
Reaction Cross-Section

Intermediate state Q-value -4.4500E+04 eV

Interpolation law between energies

Range	Description
1 TO 174	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	4.4685E+04	0.0000E+00	4.5000E+04	6.8234E-03	5.0000E+04	6.0476E-02	5.5000E+04	1.2248E-01	6.0000E+04	1.8229E-01
6	6.5000E+04	2.3743E-01	7.0000E+04	2.8772E-01	7.5000E+04	3.3487E-01	8.0000E+04	3.7925E-01	8.5000E+04	4.1816E-01
11	9.0000E+04	4.5103E-01	9.5000E+04	4.8233E-01	1.0000E+05	5.1486E-01	1.1000E+05	5.7673E-01	1.2000E+05	6.3204E-01
16	1.3000E+05	6.8295E-01	1.4000E+05	7.2996E-01	1.5000E+05	7.6461E-01	1.6000E+05	8.0545E-01	1.7000E+05	8.4379E-01
21	1.8000E+05	8.7968E-01	1.9000E+05	9.1324E-01	2.0000E+05	9.4467E-01	2.1000E+05	9.7424E-01	2.2000E+05	1.0021E+00
26	2.3000E+05	1.0282E+00	2.4000E+05	1.0525E+00	2.5000E+05	1.0750E+00	2.6000E+05	1.0959E+00	2.7000E+05	1.1158E+00
31	2.8000E+05	1.1351E+00	2.9000E+05	1.1542E+00	3.0000E+05	1.1729E+00	3.1000E+05	1.1852E+00	3.2000E+05	1.2024E+00
36	3.4000E+05	1.2339E+00	3.5000E+05	1.2491E+00	3.6000E+05	1.2644E+00	3.8000E+05	1.2949E+00	3.9000E+05	1.3092E+00
41	4.0000E+05	1.3224E+00	4.1000E+05	1.3344E+00	4.2000E+05	1.3451E+00	4.3000E+05	1.3547E+00	4.4000E+05	1.3633E+00
46	4.5000E+05	1.3712E+00	4.6000E+05	1.3785E+00	4.7000E+05	1.3856E+00	4.8000E+05	1.3928E+00	4.9000E+05	1.4003E+00
51	5.0000E+05	1.4077E+00	5.1000E+05	1.4144E+00	5.2000E+05	1.4180E+00	5.3000E+05	1.4217E+00	5.4000E+05	1.4235E+00
56	5.5000E+05	1.4236E+00	5.6000E+05	1.4227E+00	5.7000E+05	1.4219E+00	5.8000E+05	1.4219E+00	5.9000E+05	1.4230E+00
61	6.0000E+05	1.4243E+00	6.1000E+05	1.4248E+00	6.2000E+05	1.4235E+00	6.3000E+05	1.4209E+00	6.4000E+05	1.4171E+00
66	6.5000E+05	1.4128E+00	6.6000E+05	1.4079E+00	6.7000E+05	1.4028E+00	6.8000E+05	1.3975E+00	6.9000E+05	1.3920E+00
71	7.0000E+05	1.3861E+00	7.1000E+05	1.3794E+00	7.2000E+05	1.3722E+00	7.3000E+05	1.3648E+00	7.4000E+05	1.3580E+00
76	7.5000E+05	1.3524E+00	7.6000E+05	1.3480E+00	7.7000E+05	1.3446E+00	7.8000E+05	1.3416E+00	7.9000E+05	1.3563E+00
81	8.0000E+05	1.3651E+00	8.1000E+05	1.3707E+00	8.2000E+05	1.3741E+00	8.3000E+05	1.3748E+00	8.4000E+05	1.3755E+00
86	8.5000E+05	1.3751E+00	8.6000E+05	1.3721E+00	8.7000E+05	1.3722E+00	8.8000E+05	1.3758E+00	8.9000E+05	1.3733E+00
91	9.0000E+05	1.3682E+00	9.2000E+05	1.3530E+00	9.4000E+05	1.3374E+00	9.6000E+05	1.3269E+00	9.8000E+05	1.3281E+00
96	1.0000E+06	1.3330E+00	1.0200E+06	1.3474E+00	1.0400E+06	1.3649E+00	1.0600E+06	1.3842E+00	1.0800E+06	1.3952E+00
101	1.1000E+06	1.4090E+00	1.1200E+06	1.4228E+00	1.1400E+06	1.4395E+00	1.1600E+06	1.4448E+00	1.1800E+06	1.4634E+00
106	1.2000E+06	1.4865E+00	1.2500E+06	1.5536E+00	1.3000E+06	1.6106E+00	1.3500E+06	1.6750E+00	1.4000E+06	1.7298E+00
111	1.4500E+06	1.7891E+00	1.5000E+06	1.8383E+00	1.5500E+06	1.8991E+00	1.6000E+06	1.9450E+00	1.6500E+06	1.9935E+00
116	1.7000E+06	2.0287E+00	1.7500E+06	2.0676E+00	1.8000E+06	2.0935E+00	1.8500E+06	2.1239E+00	1.9000E+06	2.1422E+00
121	1.9500E+06	2.1664E+00	2.0000E+06	2.2122E+00	2.2000E+06	2.2590E+00	2.4000E+06	2.2884E+00	2.6000E+06	2.3056E+00
126	2.8000E+06	2.3143E+00	3.0000E+06	2.3171E+00	3.2000E+06	2.3163E+00	3.4000E+06	2.3131E+00	3.6000E+06	2.3084E+00
131	3.8000E+06	2.3027E+00	4.0000E+06	2.2964E+00	4.2000E+06	2.2899E+00	4.4000E+06	2.2832E+00	4.6000E+06	2.2744E+00
136	4.8000E+06	2.2617E+00	5.0000E+06	2.2445E+00	5.2000E+06	2.2227E+00	5.4000E+06	2.1947E+00	5.6000E+06	2.1065E+00
141	5.8000E+06	2.0292E+00	6.0000E+06	1.9469E+00	6.2500E+06	1.7806E+00	6.5000E+06	1.5957E+00	6.7500E+06	1.4061E+00
146	7.0000E+06	1.2340E+00	7.2500E+06	1.1253E+00	7.5000E+06	1.0714E+00	7.7500E+06	1.0323E+00	8.0000E+06	9.7475E-01
151	8.5000E+06	8.8640E-01	9.0000E+06	8.1201E-01	9.5000E+06	7.5773E-01	1.0000E+07	7.2336E-01	1.0500E+07	6.9249E-01
156	1.1000E+07	6.5583E-01	1.1500E+07	6.1874E-01	1.2000E+07	5.8562E-01	1.2500E+07	5.4137E-01	1.3000E+07	5.3197E-01
161	1.3500E+07	5.0697E-01	1.4000E+07	4.8417E-01	1.4500E+07	4.6226E-01	1.5000E+07	4.4095E-01	1.5500E+07	4.2123E-01
166	1.6000E+07	4.0403E-01	1.6500E+07	3.8943E-01	1.7000E+07	3.7518E-01	1.7500E+07	3.6194E-01	1.8000E+07	3.5042E-01
171	1.8500E+07	3.3917E-01	1.9000E+07	3.2724E-01	1.9500E+07	3.1617E-01	2.0000E+07	3.0727E-01		

(n,2n)
Reaction Cross-Section

Reaction Q-value -6.3096E+06 eV
Intermediate state Q-value -6.3096E+06 eV

Interpolation law between energies

Range	Description
1 TO 32	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	6.3359E+06	0.0000E+00	6.5000E+06	6.0579E-02	6.7500E+06	1.0211E-01	7.0000E+06	1.8910E-01	7.2500E+06	2.4126E-01
6	7.5000E+06	2.8021E-01	7.7500E+06	3.1736E-01	8.0000E+06	3.7134E-01	8.5000E+06	4.5726E-01	9.0000E+06	5.1599E-01
11	9.5000E+06	5.5744E-01	1.0000E+07	5.9991E-01	1.0500E+07	6.4994E-01	1.1000E+07	6.9520E-01	1.1500E+07	7.4167E-01
16	1.2000E+07	7.7570E-01	1.2500E+07	8.0233E-01	1.3000E+07	7.3751E-01	1.3500E+07	6.3808E-01	1.4000E+07	5.5849E-01
21	1.4500E+07	4.9214E-01	1.5000E+07	4.3867E-01	1.5500E+07	4.0432E-01	1.6000E+07	3.7402E-01	1.6500E+07	3.4901E-01
26	1.7000E+07	3.2801E-01	1.7500E+07	3.0969E-01	1.8000E+07	2.9302E-01	1.8500E+07	2.7857E-01	1.9000E+07	2.6571E-01
31	1.9500E+07	2.5447E-01	2.0000E+07	2.4406E-01						

94-Plutonium-242 Material no. 9446 Sub-library no. 10 ENDF/B-VI

(n,3n)
Reaction Cross-Section

Reaction Q-value -1.1552E+07 eV
Intermediate state Q-value -1.1552E+07 eV

Interpolation law between energies

Range	Description
1 TO 18	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.1600E+07	0.0000E+00	1.2000E+07	3.1782E-03	1.2500E+07	1.9126E-02	1.3000E+07	6.2081E-02	1.3500E+07	1.1435E-01
6	1.4000E+07	1.7019E-01	1.4500E+07	2.2707E-01	1.5000E+07	2.7757E-01	1.5500E+07	3.1618E-01	1.6000E+07	3.6113E-01
11	1.6500E+07	3.9535E-01	1.7000E+07	4.3005E-01	1.7500E+07	4.6406E-01	1.8000E+07	4.9495E-01	1.8500E+07	5.2704E-01
16	1.9000E+07	5.5350E-01	1.9500E+07	5.8195E-01	2.0000E+07	6.0045E-01				

(n,fission)
Reaction Cross-Section

Reaction Q-value 2.0136E+08 eV
Intermediate state Q-value 2.0136E+08 eV

Interpolation law between energies

Range	Description
1 TO 180	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0000E+04	7.0587E-03	1.5000E+04	4.6477E-03	2.0000E+04	4.7622E-03	2.5000E+04	5.8780E-03	3.0000E+04	8.2436E-03
6	3.5000E+04	1.2992E-02	4.0000E+04	1.9879E-02	4.5000E+04	2.1345E-02	5.0000E+04	2.0887E-02	5.5000E+04	1.8685E-02
11	6.0000E+04	1.6465E-02	6.5000E+04	1.4881E-02	7.0000E+04	1.4069E-02	7.5000E+04	1.3764E-02	8.0000E+04	1.3501E-02
16	8.5000E+04	1.3315E-02	9.0000E+04	1.3229E-02	9.5000E+04	1.3256E-02	1.0000E+05	1.3408E-02	1.1000E+05	1.4101E-02
21	1.2000E+05	1.5286E-02	1.3000E+05	1.6716E-02	1.4000E+05	1.7981E-02	1.5000E+05	1.8758E-02	1.6000E+05	1.9596E-02
26	1.7000E+05	2.0858E-02	1.8000E+05	2.2882E-02	1.9000E+05	2.5713E-02	2.0000E+05	2.9113E-02	2.1000E+05	3.2673E-02
31	2.2000E+05	3.6279E-02	2.3000E+05	4.0371E-02	2.4000E+05	4.5472E-02	2.5000E+05	5.1723E-02	2.6000E+05	5.8644E-02
36	2.7000E+05	6.5228E-02	2.8000E+05	7.0552E-02	2.9000E+05	7.4272E-02	3.0000E+05	7.7018E-02	3.1000E+05	7.9754E-02
41	3.2000E+05	8.3587E-02	3.4000E+05	9.3790E-02	3.5000E+05	9.8089E-02	3.6000E+05	1.0064E-01	3.8000E+05	1.0271E-01
46	3.9000E+05	1.0480E-01	4.0000E+05	1.0886E-01	4.1000E+05	1.1520E-01	4.2000E+05	1.2366E-01	4.3000E+05	1.3389E-01
51	4.4000E+05	1.4554E-01	4.5000E+05	1.5825E-01	4.6000E+05	1.7152E-01	4.7000E+05	1.8458E-01	4.8000E+05	1.9677E-01
56	4.9000E+05	2.0795E-01	5.0000E+05	2.1883E-01	5.1000E+05	2.3068E-01	5.2000E+05	2.4512E-01	5.3000E+05	2.6345E-01
61	5.4000E+05	2.8561E-01	5.5000E+05	3.1040E-01	5.6000E+05	3.3589E-01	5.7000E+05	3.6022E-01	5.8000E+05	3.8188E-01
66	5.9000E+05	4.0100E-01	6.0000E+05	4.1968E-01	6.1000E+05	4.4067E-01	6.2000E+05	4.6531E-01	6.3000E+05	4.9227E-01
71	6.4000E+05	5.2052E-01	6.5000E+05	5.4909E-01	6.6000E+05	5.7774E-01	6.7000E+05	6.0633E-01	6.8000E+05	6.3501E-01
76	6.9000E+05	6.6401E-01	7.0000E+05	6.9387E-01	7.1000E+05	7.2497E-01	7.2000E+05	7.5691E-01	7.3000E+05	7.8874E-01
81	7.4000E+05	8.1886E-01	7.5000E+05	8.4610E-01	7.6000E+05	8.7026E-01	7.7000E+05	8.9193E-01	7.8000E+05	9.1249E-01
86	7.9000E+05	9.2457E-01	8.0000E+05	9.4014E-01	8.1000E+05	9.5823E-01	8.2000E+05	9.7898E-01	8.3000E+05	1.0029E+00
91	8.4000E+05	1.0275E+00	8.5000E+05	1.0551E+00	8.6000E+05	1.0858E+00	8.7000E+05	1.1163E+00	8.8000E+05	1.1464E+00
96	8.9000E+05	1.1804E+00	9.0000E+05	1.2162E+00	9.2000E+05	1.2891E+00	9.4000E+05	1.3560E+00	9.6000E+05	1.4100E+00
101	9.8000E+05	1.4471E+00	1.0000E+06	1.4741E+00	1.0200E+06	1.4889E+00	1.0400E+06	1.4996E+00	1.0600E+06	1.5049E+00
106	1.0800E+06	1.5214E+00	1.1000E+06	1.5326E+00	1.1200E+06	1.5447E+00	1.1400E+06	1.5509E+00	1.1600E+06	1.5582E+00
111	1.1800E+06	1.5635E+00	1.2000E+06	1.5616E+00	1.2500E+06	1.5478E+00	1.3000E+06	1.5317E+00	1.3500E+06	1.5058E+00
116	1.4000E+06	1.4861E+00	1.4500E+06	1.4618E+00	1.5000E+06	1.4446E+00	1.5500E+06	1.4145E+00	1.6000E+06	1.3972E+00
121	1.6500E+06	1.3778E+00	1.7000E+06	1.3692E+00	1.7500E+06	1.3567E+00	1.8000E+06	1.3547E+00	1.8500E+06	1.3477E+00
126	1.9000E+06	1.3500E+00	1.9500E+06	1.3460E+00	2.0000E+06	1.3527E+00	2.2000E+06	1.3493E+00	2.4000E+06	1.3441E+00
131	2.6000E+06	1.3363E+00	2.8000E+06	1.3266E+00	3.0000E+06	1.3157E+00	3.2000E+06	1.3040E+00	3.4000E+06	1.2915E+00
136	3.6000E+06	1.2782E+00	3.8000E+06	1.2640E+00	4.0000E+06	1.2491E+00	4.2000E+06	1.2336E+00	4.4000E+06	1.2181E+00
141	4.6000E+06	1.2049E+00	4.8000E+06	1.1961E+00	5.0000E+06	1.1926E+00	5.2000E+06	1.1949E+00	5.4000E+06	1.2045E+00
146	5.6000E+06	1.2757E+00	5.8000E+06	1.3373E+00	6.0000E+06	1.4054E+00	6.2500E+06	1.5556E+00	6.5000E+06	1.6659E+00
151	6.7500E+06	1.8015E+00	7.0000E+06	1.8758E+00	7.2500E+06	1.9226E+00	7.5000E+06	1.9291E+00	7.7500E+06	1.9235E+00
156	8.0000E+06	1.9205E+00	8.5000E+06	1.9119E+00	9.0000E+06	1.9190E+00	9.5000E+06	1.9251E+00	1.0000E+07	1.9116E+00
161	1.0500E+07	1.8876E+00	1.1000E+07	1.8741E+00	1.1500E+07	1.8596E+00	1.2000E+07	1.8502E+00	1.2500E+07	1.8464E+00
166	1.3000E+07	1.8721E+00	1.3500E+07	1.9389E+00	1.4000E+07	1.9806E+00	1.4500E+07	2.0077E+00	1.5000E+07	2.0283E+00
171	1.5500E+07	2.0409E+00	1.6000E+07	2.0414E+00	1.6500E+07	2.0455E+00	1.7000E+07	2.0454E+00	1.7500E+07	2.0430E+00
176	1.8000E+07	2.0408E+00	1.8500E+07	2.0351E+00	1.9000E+07	2.0341E+00	1.9500E+07	2.0272E+00	2.0000E+07	2.0231E+00

(n,f)
Reaction Cross-Section

Reaction Q-value 2.0136E+08 eV
Intermediate state Q-value 2.0136E+08 eV

Interpolation law between energies

Range	Description
1 TO 180	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0000E+04	7.0587E-03	1.5000E+04	4.6477E-03	2.0000E+04	4.7622E-03	2.5000E+04	5.8780E-03	3.0000E+04	8.2436E-03
6	3.5000E+04	1.2992E-02	4.0000E+04	1.9879E-02	4.5000E+04	2.1345E-02	5.0000E+04	2.0887E-02	5.5000E+04	1.8685E-02
11	6.0000E+04	1.6465E-02	6.5000E+04	1.4881E-02	7.0000E+04	1.4069E-02	7.5000E+04	1.3764E-02	8.0000E+04	1.3501E-02
16	8.5000E+04	1.3315E-02	9.0000E+04	1.3229E-02	9.5000E+04	1.3256E-02	1.0000E+05	1.3408E-02	1.1000E+05	1.4101E-02
21	1.2000E+05	1.5286E-02	1.3000E+05	1.6716E-02	1.4000E+05	1.7981E-02	1.5000E+05	1.8758E-02	1.6000E+05	1.9596E-02
26	1.7000E+05	2.0858E-02	1.8000E+05	2.2882E-02	1.9000E+05	2.5713E-02	2.0000E+05	2.9113E-02	2.1000E+05	3.2673E-02
31	2.2000E+05	3.6279E-02	2.3000E+05	4.0371E-02	2.4000E+05	4.5472E-02	2.5000E+05	5.1723E-02	2.6000E+05	5.8644E-02
36	2.7000E+05	6.5228E-02	2.8000E+05	7.0552E-02	2.9000E+05	7.4272E-02	3.0000E+05	7.7018E-02	3.1000E+05	7.9754E-02
41	3.2000E+05	8.3587E-02	3.4000E+05	9.3790E-02	3.5000E+05	9.8089E-02	3.6000E+05	1.0064E-01	3.8000E+05	1.0271E-01
46	3.9000E+05	1.0480E-01	4.0000E+05	1.0886E-01	4.1000E+05	1.1520E-01	4.2000E+05	1.2366E-01	4.3000E+05	1.3389E-01
51	4.4000E+05	1.4554E-01	4.5000E+05	1.5825E-01	4.6000E+05	1.7152E-01	4.7000E+05	1.8458E-01	4.8000E+05	1.9677E-01
56	4.9000E+05	2.0795E-01	5.0000E+05	2.1883E-01	5.1000E+05	2.3068E-01	5.2000E+05	2.4512E-01	5.3000E+05	2.6345E-01
61	5.4000E+05	2.8561E-01	5.5000E+05	3.1040E-01	5.6000E+05	3.3589E-01	5.7000E+05	3.6022E-01	5.8000E+05	3.8188E-01
66	5.9000E+05	4.0100E-01	6.0000E+05	4.1968E-01	6.1000E+05	4.4067E-01	6.2000E+05	4.6531E-01	6.3000E+05	4.9227E-01
71	6.4000E+05	5.2052E-01	6.5000E+05	5.4909E-01	6.6000E+05	5.7774E-01	6.7000E+05	6.0633E-01	6.8000E+05	6.3501E-01
76	6.9000E+05	6.6401E-01	7.0000E+05	6.9387E-01	7.1000E+05	7.2497E-01	7.2000E+05	7.5691E-01	7.3000E+05	7.8874E-01
81	7.4000E+05	8.1886E-01	7.5000E+05	8.4610E-01	7.6000E+05	8.7026E-01	7.7000E+05	8.9193E-01	7.8000E+05	9.1249E-01
86	7.9000E+05	9.2457E-01	8.0000E+05	9.4014E-01	8.1000E+05	9.5823E-01	8.2000E+05	9.7898E-01	8.3000E+05	1.0029E+00
91	8.4000E+05	1.0275E+00	8.5000E+05	1.0551E+00	8.6000E+05	1.0858E+00	8.7000E+05	1.1163E+00	8.8000E+05	1.1464E+00
96	8.9000E+05	1.1804E+00	9.0000E+05	1.2162E+00	9.2000E+05	1.2891E+00	9.4000E+05	1.3560E+00	9.6000E+05	1.4100E+00
101	9.8000E+05	1.4471E+00	1.0000E+06	1.4741E+00	1.0200E+06	1.4889E+00	1.0400E+06	1.4996E+00	1.0600E+06	1.5049E+00
106	1.0800E+06	1.5214E+00	1.1000E+06	1.5326E+00	1.1200E+06	1.5447E+00	1.1400E+06	1.5509E+00	1.1600E+06	1.5582E+00
111	1.1800E+06	1.5635E+00	1.2000E+06	1.5616E+00	1.2500E+06	1.5478E+00	1.3000E+06	1.5317E+00	1.3500E+06	1.5058E+00
116	1.4000E+06	1.4861E+00	1.4500E+06	1.4618E+00	1.5000E+06	1.4446E+00	1.5500E+06	1.4145E+00	1.6000E+06	1.3972E+00
121	1.6500E+06	1.3778E+00	1.7000E+06	1.3692E+00	1.7500E+06	1.3567E+00	1.8000E+06	1.3547E+00	1.8500E+06	1.3477E+00
126	1.9000E+06	1.3500E+00	1.9500E+06	1.3460E+00	2.0000E+06	1.3527E+00	2.2000E+06	1.3493E+00	2.4000E+06	1.3441E+00
131	2.6000E+06	1.3363E+00	2.8000E+06	1.3266E+00	3.0000E+06	1.3157E+00	3.2000E+06	1.3040E+00	3.4000E+06	1.2915E+00
136	3.6000E+06	1.2782E+00	3.8000E+06	1.2640E+00	4.0000E+06	1.2491E+00	4.2000E+06	1.2336E+00	4.4000E+06	1.2181E+00
141	4.6000E+06	1.2049E+00	4.8000E+06	1.1961E+00	5.0000E+06	1.1926E+00	5.2000E+06	1.0595E+00	5.4000E+06	9.8378E-01
146	5.6000E+06	9.6670E-01	5.8000E+06	8.9093E-01	6.0000E+06	8.0725E-01	6.2500E+06	7.3580E-01	6.5000E+06	7.2696E-01
151	6.7500E+06	7.8657E-01	7.0000E+06	8.4274E-01	7.2500E+06	8.7368E-01	7.5000E+06	8.7743E-01	7.7500E+06	8.5713E-01
156	8.0000E+06	8.2909E-01	8.5000E+06	7.8717E-01	9.0000E+06	7.7109E-01	9.5000E+06	7.6487E-01	1.0000E+07	7.4234E-01
161	1.0500E+07	7.3593E-01	1.1000E+07	7.4104E-01	1.1500E+07	7.4589E-01	1.2000E+07	7.4984E-01	1.2500E+07	6.9993E-01
166	1.3000E+07	6.6803E-01	1.3500E+07	6.6563E-01	1.4000E+07	6.6598E-01	1.4500E+07	6.6480E-01	1.5000E+07	6.6284E-01
171	1.5500E+07	6.6294E-01	1.6000E+07	6.5746E-01	1.6500E+07	6.5241E-01	1.7000E+07	6.4269E-01	1.7500E+07	6.2791E-01
176	1.8000E+07	6.0935E-01	1.8500E+07	5.8898E-01	1.9000E+07	5.6775E-01	1.9500E+07	5.4574E-01	2.0000E+07	5.2289E-01

(n,nf)
Reaction Cross-Section

Reaction Q-value 2.0136E+08 eV
Intermediate state Q-value 2.0136E+08 eV

Interpolation law between energies

Range	Description
1 TO 37	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	5.2000E+06	1.3540E-01	5.4000E+06	2.2075E-01	5.6000E+06	3.0899E-01	5.8000E+06	4.4638E-01	6.0000E+06	5.9817E-01
6	6.2500E+06	8.1981E-01	6.5000E+06	9.3888E-01	6.7500E+06	1.0149E+00	7.0000E+06	1.0330E+00	7.2500E+06	1.0490E+00
11	7.5000E+06	1.0516E+00	7.7500E+06	1.0663E+00	8.0000E+06	1.0911E+00	8.5000E+06	1.1235E+00	9.0000E+06	1.1451E+00
16	9.5000E+06	1.1558E+00	1.0000E+07	1.1632E+00	1.0500E+07	1.1438E+00	1.1000E+07	1.1226E+00	1.1500E+07	1.0950E+00
21	1.2000E+07	1.0622E+00	1.2500E+07	9.9923E-01	1.3000E+07	8.3831E-01	1.3500E+07	8.1420E-01	1.4000E+07	7.8380E-01
26	1.4500E+07	7.6880E-01	1.5000E+07	7.6133E-01	1.5500E+07	7.5797E-01	1.6000E+07	7.4324E-01	1.6500E+07	7.3092E-01
31	1.7000E+07	7.2096E-01	1.7500E+07	7.1273E-01	1.8000E+07	7.0574E-01	1.8500E+07	6.9944E-01	1.9000E+07	6.9387E-01
36	1.9500E+07	6.8842E-01	2.0000E+07	6.8257E-01						

(n,2nf)
Reaction Cross-Section

Reaction Q-value 2.0136E+08 eV
Intermediate state Q-value 2.0136E+08 eV

Interpolation law between energies

Range	Description
1 TO 29	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	7.0000E+06	1.3145E-13	7.2500E+06	2.5534E-13	7.5000E+06	2.1045E-05	7.7500E+06	2.2549E-05	8.0000E+06	2.9429E-04
6	8.5000E+06	1.2922E-03	9.0000E+06	2.8389E-03	9.5000E+06	4.4766E-03	1.0000E+07	6.0413E-03	1.0500E+07	7.8280E-03
11	1.1000E+07	1.0530E-02	1.1500E+07	1.8762E-02	1.2000E+07	3.8178E-02	1.2500E+07	1.4721E-01	1.3000E+07	3.6577E-01
16	1.3500E+07	4.5911E-01	1.4000E+07	5.3079E-01	1.4500E+07	5.7407E-01	1.5000E+07	6.0416E-01	1.5500E+07	6.2001E-01
21	1.6000E+07	6.4071E-01	1.6500E+07	6.6206E-01	1.7000E+07	6.8113E-01	1.7500E+07	6.9961E-01	1.8000E+07	7.1703E-01
26	1.8500E+07	7.2500E-01	1.9000E+07	7.2764E-01	1.9500E+07	7.1349E-01	2.0000E+07	6.9501E-01		

(n,4n)
Reaction Cross-Section

Reaction Q-value -1.8085E+07 eV
Intermediate state Q-value -1.8085E+07 eV

Interpolation law between energies

Range	Description
1 TO 5	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.8160E+07	0.0000E+00	1.8500E+07	2.2794E-05	1.9000E+07	3.3741E-04	1.9500E+07	2.2104E-03	2.0000E+07	8.2291E-03

(n,3nf)
Reaction Cross-Section

Reaction Q-value 2.0136E+08 eV
Intermediate state Q-value 2.0136E+08 eV

Interpolation law between energies

Range	Description
1 TO 9	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.6000E+07	3.8147E-06	1.6500E+07	1.1516E-04	1.7000E+07	6.6209E-04	1.7500E+07	2.7499E-03	1.8000E+07	8.6260E-03
6	1.8500E+07	2.1700E-02	1.9000E+07	4.4824E-02	1.9500E+07	7.9533E-02	2.0000E+07	1.2266E-01		

(n,n′) 1-st level
Reaction Cross-Section

Intermediate state Q-value -4.4500E+04 eV

Interpolation law between energies

Range	Description
1 TO 174	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	4.4685E+04	0.0000E+00	4.5000E+04	6.8234E-03	5.0000E+04	6.0476E-02	5.5000E+04	1.2248E-01	6.0000E+04	1.8229E-01
6	6.5000E+04	2.3743E-01	7.0000E+04	2.8772E-01	7.5000E+04	3.3487E-01	8.0000E+04	3.7925E-01	8.5000E+04	4.1816E-01
11	9.0000E+04	4.5103E-01	9.5000E+04	4.8233E-01	1.0000E+05	5.1486E-01	1.1000E+05	5.7673E-01	1.2000E+05	6.3204E-01
16	1.3000E+05	6.8295E-01	1.4000E+05	7.2996E-01	1.5000E+05	7.6455E-01	1.6000E+05	8.0478E-01	1.7000E+05	8.4225E-01
21	1.8000E+05	8.7707E-01	1.9000E+05	9.0941E-01	2.0000E+05	9.3948E-01	2.1000E+05	9.6744E-01	2.2000E+05	9.9347E-01
26	2.3000E+05	1.0176E+00	2.4000E+05	1.0397E+00	2.5000E+05	1.0598E+00	2.6000E+05	1.0782E+00	2.7000E+05	1.0953E+00
31	2.8000E+05	1.1116E+00	2.9000E+05	1.1275E+00	3.0000E+05	1.1429E+00	3.1000E+05	1.1516E+00	3.2000E+05	1.1650E+00
36	3.4000E+05	1.1885E+00	3.5000E+05	1.1995E+00	3.6000E+05	1.2104E+00	3.8000E+05	1.2317E+00	3.9000E+05	1.2412E+00
41	4.0000E+05	1.2495E+00	4.1000E+05	1.2566E+00	4.2000E+05	1.2623E+00	4.3000E+05	1.2670E+00	4.4000E+05	1.2707E+00
46	4.5000E+05	1.2737E+00	4.6000E+05	1.2761E+00	4.7000E+05	1.2782E+00	4.8000E+05	1.2803E+00	4.9000E+05	1.2825E+00
51	5.0000E+05	1.2846E+00	5.1000E+05	1.2859E+00	5.2000E+05	1.2841E+00	5.3000E+05	1.2826E+00	5.4000E+05	1.2794E+00
56	5.5000E+05	1.2748E+00	5.6000E+05	1.2696E+00	5.7000E+05	1.2645E+00	5.8000E+05	1.2603E+00	5.9000E+05	1.2570E+00
61	6.0000E+05	1.2539E+00	6.1000E+05	1.2499E+00	6.2000E+05	1.2442E+00	6.3000E+05	1.2374E+00	6.4000E+05	1.2299E+00
66	6.5000E+05	1.2219E+00	6.6000E+05	1.2138E+00	6.7000E+05	1.2055E+00	6.8000E+05	1.1972E+00	6.9000E+05	1.1887E+00
71	7.0000E+05	1.1798E+00	7.1000E+05	1.1704E+00	7.2000E+05	1.1605E+00	7.3000E+05	1.1506E+00	7.4000E+05	1.1413E+00
76	7.5000E+05	1.1330E+00	7.6000E+05	1.1258E+00	7.7000E+05	1.1195E+00	7.8000E+05	1.1135E+00	7.9000E+05	1.1000E+00
81	8.0000E+05	1.0895E+00	8.1000E+05	1.0791E+00	8.2000E+05	1.0682E+00	8.3000E+05	1.0565E+00	8.4000E+05	1.0422E+00
86	8.5000E+05	1.0274E+00	8.6000E+05	1.0118E+00	8.7000E+05	9.9336E-01	8.8000E+05	9.7307E-01	8.9000E+05	9.5388E-01
91	9.0000E+05	9.3502E-01	9.2000E+05	8.9907E-01	9.4000E+05	8.6760E-01	9.6000E+05	8.4219E-01	9.8000E+05	8.2161E-01
96	1.0000E+06	8.0540E-01	1.0200E+06	7.9090E-01	1.0400E+06	7.7732E-01	1.0600E+06	7.6711E-01	1.0800E+06	7.5376E-01
101	1.1000E+06	7.4305E-01	1.1200E+06	7.3130E-01	1.1400E+06	7.2182E-01	1.1600E+06	7.0827E-01	1.1800E+06	6.9903E-01
106	1.2000E+06	6.9270E-01	1.2500E+06	6.8240E-01	1.3000E+06	6.7298E-01	1.3500E+06	6.6461E-01	1.4000E+06	6.5836E-01
111	1.4500E+06	6.5133E-01	1.5000E+06	6.4574E-01	1.5500E+06	6.4016E-01	1.6000E+06	6.3482E-01	1.6500E+06	6.2811E-01
116	1.7000E+06	6.2211E-01	1.7500E+06	6.1505E-01	1.8000E+06	6.0874E-01	1.8500E+06	6.0166E-01	1.9000E+06	5.9543E-01
121	1.9500E+06	5.8867E-01	2.0000E+06	5.8442E-01	2.2000E+06	5.6099E-01	2.4000E+06	5.4240E-01	2.6000E+06	5.2738E-01
126	2.8000E+06	5.1471E-01	3.0000E+06	5.0348E-01	3.2000E+06	4.9315E-01	3.4000E+06	4.8340E-01	3.6000E+06	4.7404E-01
131	3.8000E+06	4.6495E-01	4.0000E+06	4.5605E-01	4.2000E+06	4.4732E-01	4.4000E+06	4.3876E-01	4.6000E+06	4.3041E-01
136	4.8000E+06	4.2233E-01	5.0000E+06	4.1459E-01	5.2000E+06	4.0719E-01	5.4000E+06	4.0026E-01	5.6000E+06	3.9364E-01
141	5.8000E+06	3.8738E-01	6.0000E+06	3.8162E-01	6.2500E+06	3.7487E-01	6.5000E+06	3.6823E-01	6.7500E+06	3.6169E-01
146	7.0000E+06	3.5526E-01	7.2500E+06	3.4891E-01	7.5000E+06	3.4265E-01	7.7500E+06	3.3646E-01	8.0000E+06	3.3034E-01
151	8.5000E+06	3.1816E-01	9.0000E+06	3.0614E-01	9.5000E+06	2.9452E-01	1.0000E+07	2.8355E-01	1.0500E+07	2.7323E-01
156	1.1000E+07	2.6333E-01	1.1500E+07	2.5370E-01	1.2000E+07	2.4423E-01	1.2500E+07	2.3486E-01	1.3000E+07	2.2570E-01
161	1.3500E+07	2.1666E-01	1.4000E+07	2.0784E-01	1.4500E+07	1.9944E-01	1.5000E+07	1.9162E-01	1.5500E+07	1.8433E-01
166	1.6000E+07	1.7754E-01	1.6500E+07	1.7123E-01	1.7000E+07	1.6538E-01	1.7500E+07	1.5995E-01	1.8000E+07	1.5491E-01
171	1.8500E+07	1.5017E-01	1.9000E+07	1.4570E-01	1.9500E+07	1.4154E-01	2.0000E+07	1.3775E-01		

(n,n′) 2-nd level
Reaction Cross-Section

Intermediate state Q-value -1.4720E+05 eV

Interpolation law between energies

Range	Description
1 TO 158	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.4781E+05	0.0000E+00	1.5000E+05	6.4174E-05	1.6000E+05	6.6733E-04	1.7000E+05	1.5405E-03	1.8000E+05	2.6078E-03
6	1.9000E+05	3.8324E-03	2.0000E+05	5.1896E-03	2.1000E+05	6.8049E-03	2.2000E+05	8.6086E-03	2.3000E+05	1.0612E-02
11	2.4000E+05	1.2807E-02	2.5000E+05	1.5192E-02	2.6000E+05	1.7770E-02	2.7000E+05	2.0535E-02	2.8000E+05	2.3486E-02
16	2.9000E+05	2.6631E-02	3.0000E+05	2.9981E-02	3.1000E+05	3.3573E-02	3.2000E+05	3.7341E-02	3.4000E+05	4.5403E-02
21	3.5000E+05	4.9647E-02	3.6000E+05	5.4023E-02	3.8000E+05	6.3191E-02	3.9000E+05	6.7965E-02	4.0000E+05	7.2830E-02
26	4.1000E+05	7.7743E-02	4.2000E+05	8.2666E-02	4.3000E+05	8.7601E-02	4.4000E+05	9.2495E-02	4.5000E+05	9.7384E-02
31	4.6000E+05	1.0229E-01	4.7000E+05	1.0725E-01	4.8000E+05	1.1232E-01	4.9000E+05	1.1750E-01	5.0000E+05	1.2279E-01
36	5.1000E+05	1.2813E-01	5.2000E+05	1.3343E-01	5.3000E+05	1.3857E-01	5.4000E+05	1.4346E-01	5.5000E+05	1.4806E-01
41	5.6000E+05	1.5239E-01	5.7000E+05	1.5654E-01	5.8000E+05	1.6066E-01	5.9000E+05	1.6490E-01	6.0000E+05	1.6925E-01
46	6.1000E+05	1.7363E-01	6.2000E+05	1.7788E-01	6.3000E+05	1.8189E-01	6.4000E+05	1.8559E-01	6.5000E+05	1.8899E-01
51	6.6000E+05	1.9212E-01	6.7000E+05	1.9508E-01	6.8000E+05	1.9797E-01	6.9000E+05	2.0081E-01	7.0000E+05	2.0355E-01
56	7.1000E+05	2.0614E-01	7.2000E+05	2.0859E-01	7.3000E+05	2.1093E-01	7.4000E+05	2.1329E-01	7.5000E+05	2.1575E-01
61	7.6000E+05	2.1833E-01	7.7000E+05	2.2103E-01	7.8000E+05	2.2378E-01	7.9000E+05	2.2592E-01	8.0000E+05	2.2812E-01
66	8.1000E+05	2.3020E-01	8.2000E+05	2.3212E-01	8.3000E+05	2.3384E-01	8.4000E+05	2.3427E-01	8.5000E+05	2.3454E-01
71	8.6000E+05	2.3463E-01	8.7000E+05	2.3417E-01	8.8000E+05	2.3314E-01	8.9000E+05	2.3187E-01	9.0000E+05	2.3033E-01
76	9.2000E+05	2.2678E-01	9.4000E+05	2.2327E-01	9.6000E+05	2.2057E-01	9.8000E+05	2.1897E-01	1.0000E+06	2.1828E-01
81	1.0200E+06	2.1770E-01	1.0400E+06	2.1698E-01	1.0600E+06	2.1691E-01	1.0800E+06	2.1528E-01	1.1000E+06	2.1494E-01
86	1.1200E+06	2.1402E-01	1.1400E+06	2.1357E-01	1.1600E+06	2.1132E-01	1.1800E+06	2.1038E-01	1.2000E+06	2.1047E-01
91	1.2500E+06	2.1200E-01	1.3000E+06	2.1361E-01	1.3500E+06	2.1439E-01	1.4000E+06	2.1541E-01	1.4500E+06	2.1514E-01
96	1.5000E+06	2.1488E-01	1.5500E+06	2.1397E-01	1.6000E+06	2.1280E-01	1.6500E+06	2.1014E-01	1.7000E+06	2.0745E-01
101	1.7500E+06	2.0362E-01	1.8000E+06	1.9991E-01	1.8500E+06	1.9532E-01	1.9000E+06	1.9102E-01	1.9500E+06	1.8608E-01
106	2.0000E+06	1.8241E-01	2.2000E+06	1.6311E-01	2.4000E+06	1.4619E-01	2.6000E+06	1.3215E-01	2.8000E+06	1.2080E-01
111	3.0000E+06	1.1171E-01	3.2000E+06	1.0442E-01	3.4000E+06	9.8501E-02	3.6000E+06	9.3624E-02	3.8000E+06	8.9526E-02
116	4.0000E+06	8.6020E-02	4.2000E+06	8.2980E-02	4.4000E+06	8.0323E-02	4.6000E+06	7.7995E-02	4.8000E+06	7.5956E-02
121	5.0000E+06	7.4170E-02	5.2000E+06	7.2595E-02	5.4000E+06	7.1190E-02	5.6000E+06	7.0014E-02	5.8000E+06	6.8889E-02
126	6.0000E+06	6.7761E-02	6.2500E+06	6.6346E-02	6.5000E+06	6.4932E-02	6.7500E+06	6.3519E-02	7.0000E+06	6.2106E-02
131	7.2500E+06	6.0694E-02	7.5000E+06	5.9282E-02	7.7500E+06	5.7871E-02	8.0000E+06	5.6460E-02	8.5000E+06	5.3645E-02
136	9.0000E+06	5.0845E-02	9.5000E+06	4.8062E-02	1.0000E+07	4.5300E-02	1.0500E+07	4.2716E-02	1.1000E+07	4.0397E-02
141	1.1500E+07	3.8237E-02	1.2000E+07	3.6130E-02	1.2500E+07	3.4051E-02	1.3000E+07	3.2073E-02	1.3500E+07	3.0207E-02
146	1.4000E+07	2.8490E-02	1.4500E+07	2.6930E-02	1.5000E+07	2.5516E-02	1.5500E+07	2.4244E-02	1.6000E+07	2.3110E-02
151	1.6500E+07	2.2069E-02	1.7000E+07	2.1082E-02	1.7500E+07	2.0160E-02	1.8000E+07	1.9310E-02	1.8500E+07	1.8518E-02
156	1.9000E+07	1.7769E-02	1.9500E+07	1.7076E-02	2.0000E+07	1.6450E-02				

(n,n′) 3-rd level
Reaction Cross-Section

Intermediate state Q-value -3.0590E+05 eV

Interpolation law between energies

Range	Description
1 TO 142	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	3.0717E+05	0.0000E+00	3.1000E+05	1.5327E-07	3.2000E+05	1.4302E-06	3.4000E+05	6.1690E-06	3.5000E+05	9.6232E-06
6	3.6000E+05	1.3949E-05	3.8000E+05	2.6923E-05	3.9000E+05	3.5959E-05	4.0000E+05	4.7127E-05	4.1000E+05	6.0583E-05
11	4.2000E+05	7.6791E-05	4.3000E+05	9.6085E-05	4.4000E+05	1.1868E-04	4.5000E+05	1.4488E-04	4.6000E+05	1.7494E-04
16	4.7000E+05	2.0915E-04	4.8000E+05	2.4785E-04	4.9000E+05	2.9143E-04	5.0000E+05	3.4031E-04	5.1000E+05	3.9505E-04
21	5.2000E+05	4.5620E-04	5.3000E+05	5.2367E-04	5.4000E+05	5.9781E-04	5.5000E+05	6.7846E-04	5.6000E+05	7.6523E-04
26	5.7000E+05	8.5784E-04	5.8000E+05	9.5612E-04	5.9000E+05	1.0603E-03	6.0000E+05	1.1709E-03	6.1000E+05	1.2885E-03
31	6.2000E+05	1.4138E-03	6.3000E+05	1.5469E-03	6.4000E+05	1.6875E-03	6.5000E+05	1.8354E-03	6.6000E+05	1.9901E-03
36	6.7000E+05	2.1514E-03	6.8000E+05	2.3187E-03	6.9000E+05	2.4916E-03	7.0000E+05	2.6689E-03	7.1000E+05	2.8500E-03
41	7.2000E+05	3.0348E-03	7.3000E+05	3.2240E-03	7.4000E+05	3.4190E-03	7.5000E+05	3.6231E-03	7.6000E+05	3.8384E-03
46	7.7000E+05	4.0664E-03	7.8000E+05	4.3066E-03	7.9000E+05	4.5585E-03	8.0000E+05	4.8193E-03	8.1000E+05	5.0894E-03
51	8.2000E+05	5.3693E-03	8.3000E+05	5.6591E-03	8.4000E+05	5.9174E-03	8.5000E+05	6.1859E-03	8.6000E+05	6.4623E-03
56	8.7000E+05	6.7359E-03	8.8000E+05	7.0006E-03	8.9000E+05	7.2539E-03	9.0000E+05	7.4947E-03	9.2000E+05	7.9367E-03
61	9.4000E+05	8.3279E-03	9.6000E+05	8.7115E-03	9.8000E+05	9.1339E-03	1.0000E+06	9.6136E-03	1.0200E+06	1.0132E-02
66	1.0400E+06	1.0640E-02	1.0600E+06	1.1155E-02	1.0800E+06	1.1601E-02	1.1000E+06	1.2109E-02	1.1200E+06	1.2653E-02
71	1.1400E+06	1.3254E-02	1.1600E+06	1.3670E-02	1.1800E+06	1.4194E-02	1.2000E+06	1.4807E-02	1.2500E+06	1.6502E-02
76	1.3000E+06	1.8360E-02	1.3500E+06	2.0167E-02	1.4000E+06	2.2062E-02	1.4500E+06	2.3797E-02	1.5000E+06	2.5525E-02
81	1.5500E+06	2.7139E-02	1.6000E+06	2.8705E-02	1.6500E+06	2.9940E-02	1.7000E+06	3.1091E-02	1.7500E+06	3.1912E-02
86	1.8000E+06	3.2663E-02	1.8500E+06	3.3101E-02	1.9000E+06	3.3500E-02	1.9500E+06	3.3625E-02	2.0000E+06	3.3864E-02
91	2.2000E+06	3.3097E-02	2.4000E+06	3.1658E-02	2.6000E+06	3.0156E-02	2.8000E+06	2.8831E-02	3.0000E+06	2.7714E-02
96	3.2000E+06	2.6752E-02	3.4000E+06	2.5884E-02	3.6000E+06	2.5064E-02	3.8000E+06	2.4268E-02	4.0000E+06	2.3484E-02
101	4.2000E+06	2.2714E-02	4.4000E+06	2.1963E-02	4.6000E+06	2.1240E-02	4.8000E+06	2.0552E-02	5.0000E+06	1.9909E-02
106	5.2000E+06	1.9297E-02	5.4000E+06	1.8751E-02	5.6000E+06	1.8265E-02	5.8000E+06	1.7798E-02	6.0000E+06	1.7339E-02
111	6.2500E+06	1.6769E-02	6.5000E+06	1.6202E-02	6.7500E+06	1.5637E-02	7.0000E+06	1.5073E-02	7.2500E+06	1.4511E-02
116	7.5000E+06	1.3950E-02	7.7500E+06	1.3390E-02	8.0000E+06	1.2830E-02	8.5000E+06	1.1722E-02	9.0000E+06	1.0661E-02
121	9.5000E+06	9.6850E-03	1.0000E+07	8.8300E-03	1.0500E+07	8.1434E-03	1.1000E+07	7.6133E-03	1.1500E+07	7.1891E-03
126	1.2000E+07	6.8200E-03	1.2500E+07	6.4614E-03	1.3000E+07	6.1065E-03	1.3500E+07	5.7666E-03	1.4000E+07	5.4500E-03
131	1.4500E+07	5.1500E-03	1.5000E+07	4.8571E-03	1.5500E+07	4.5756E-03	1.6000E+07	4.3100E-03	1.6500E+07	4.0634E-03
136	1.7000E+07	3.8362E-03	1.7500E+07	3.6284E-03	1.8000E+07	3.4400E-03	1.8500E+07	3.2715E-03	1.9000E+07	3.1227E-03
141	1.9500E+07	2.9925E-03	2.0000E+07	2.8800E-03						

(n,n′) 4-th level
Reaction Cross-Section

Intermediate state Q-value -5.1760E+05 eV

Interpolation law between energies

Range	Description
1 TO 123	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	5.1976E+05	0.0000E+00	5.2000E+05	1.3195E-11	5.3000E+05	3.4630E-10	5.4000E+05	1.3584E-09	5.5000E+05	3.4526E-09
6	5.6000E+05	7.1704E-09	5.7000E+05	1.2970E-08	5.8000E+05	2.1840E-08	5.9000E+05	3.5528E-08	6.0000E+05	5.3014E-08
11	6.1000E+05	7.8813E-08	6.2000E+05	1.1117E-07	6.3000E+05	1.5319E-07	6.4000E+05	2.0556E-07	6.5000E+05	2.6989E-07
16	6.6000E+05	3.4989E-07	6.7000E+05	4.4554E-07	6.8000E+05	5.5984E-07	6.9000E+05	6.9498E-07	7.0000E+05	8.5392E-07
21	7.1000E+05	1.0406E-06	7.2000E+05	1.2546E-06	7.3000E+05	1.5047E-06	7.4000E+05	1.7903E-06	7.5000E+05	2.1137E-06
26	7.6000E+05	2.4774E-06	7.7000E+05	2.8844E-06	7.8000E+05	3.3363E-06	7.9000E+05	3.8392E-06	8.0000E+05	4.3960E-06
31	8.1000E+05	5.0191E-06	8.2000E+05	5.7102E-06	8.3000E+05	6.4757E-06	8.4000E+05	7.3149E-06	8.5000E+05	8.2342E-06
36	8.6000E+05	9.2345E-06	8.7000E+05	1.0320E-05	8.8000E+05	1.1493E-05	8.9000E+05	1.2755E-05	9.0000E+05	1.4110E-05
41	9.2000E+05	1.7091E-05	9.4000E+05	2.0179E-05	9.6000E+05	2.3527E-05	9.8000E+05	2.7149E-05	1.0000E+06	3.1075E-05
46	1.0200E+06	3.5390E-05	1.0400E+06	4.0188E-05	1.0600E+06	4.5537E-05	1.0800E+06	5.1372E-05	1.1000E+06	5.7802E-05
51	1.1200E+06	6.4960E-05	1.1400E+06	7.2554E-05	1.1600E+06	7.9329E-05	1.1800E+06	8.8095E-05	1.2000E+06	9.7951E-05
56	1.2500E+06	1.2769E-04	1.3000E+06	1.6239E-04	1.3500E+06	2.0416E-04	1.4000E+06	2.5500E-04	1.4500E+06	3.1099E-04
61	1.5000E+06	3.7542E-04	1.5500E+06	4.4524E-04	1.6000E+06	5.2415E-04	1.6500E+06	6.0695E-04	1.7000E+06	6.9696E-04
66	1.7500E+06	7.8659E-04	1.8000E+06	8.8264E-04	1.8500E+06	9.7645E-04	1.9000E+06	1.0759E-03	1.9500E+06	1.1710E-03
71	2.0000E+06	1.2692E-03	2.2000E+06	1.6461E-03	2.4000E+06	1.9921E-03	2.6000E+06	2.3005E-03	2.8000E+06	2.5689E-03
76	3.0000E+06	2.7960E-03	3.2000E+06	2.9768E-03	3.4000E+06	3.1065E-03	3.6000E+06	3.1852E-03	3.8000E+06	3.2188E-03
81	4.0000E+06	3.2177E-03	4.2000E+06	3.1948E-03	4.4000E+06	3.1628E-03	4.6000E+06	3.1324E-03	4.8000E+06	3.1106E-03
86	5.0000E+06	3.1005E-03	5.2000E+06	3.1016E-03	5.4000E+06	3.1142E-03	5.6000E+06	3.1260E-03	5.8000E+06	3.1370E-03
91	6.0000E+06	3.1342E-03	6.2500E+06	3.0982E-03	6.5000E+06	3.0308E-03	6.7500E+06	2.9380E-03	7.0000E+06	2.8261E-03
96	7.2500E+06	2.7012E-03	7.5000E+06	2.5694E-03	7.7500E+06	2.4370E-03	8.0000E+06	2.3101E-03	8.5000E+06	2.0400E-03
101	9.0000E+06	1.7440E-03	9.5000E+06	1.4610E-03	1.0000E+07	1.2300E-03	1.0500E+07	1.0600E-03	1.1000E+07	9.2865E-04
106	1.1500E+07	8.2798E-04	1.2000E+07	7.5000E-04	1.2500E+07	6.8001E-04	1.3000E+07	6.1266E-04	1.3500E+07	5.5398E-04
111	1.4000E+07	5.1000E-04	1.4500E+07	4.7557E-04	1.5000E+07	4.4198E-04	1.5500E+07	4.0989E-04	1.6000E+07	3.8000E-04
116	1.6500E+07	3.5151E-04	1.7000E+07	3.2342E-04	1.7500E+07	2.9613E-04	1.8000E+07	2.7000E-04	1.8500E+07	2.4606E-04
121	1.9000E+07	2.2491E-04	1.9500E+07	2.0631E-04	2.0000E+07	1.9000E-04				

(n,n′) 5-th level
Reaction Cross-Section

Intermediate state Q-value -7.7900E+05 eV

Interpolation law between energies

Range	Description
1 TO 78	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	7.8225E+05	0.0000E+00	7.9000E+05	2.1837E-14	8.0000E+05	1.5591E-13	8.1000E+05	5.7112E-13	8.2000E+05	1.4867E-12
6	8.3000E+05	3.2070E-12	8.4000E+05	6.1899E-12	8.5000E+05	1.1089E-11	8.6000E+05	1.8440E-11	8.7000E+05	3.1561E-11
11	8.8000E+05	4.9314E-11	8.9000E+05	7.1619E-11	9.0000E+05	1.0195E-10	9.2000E+05	2.0458E-10	9.4000E+05	3.6658E-10
16	9.6000E+05	5.9532E-10	9.8000E+05	8.9294E-10	1.0000E+06	1.3323E-09	1.0200E+06	2.0039E-09	1.0400E+06	2.8906E-09
21	1.0600E+06	4.0337E-09	1.0800E+06	5.4733E-09	1.1000E+06	7.2857E-09	1.1200E+06	9.5607E-09	1.1400E+06	1.2365E-08
26	1.1600E+06	1.5397E-08	1.1800E+06	1.9491E-08	1.2000E+06	2.4549E-08	1.2500E+06	4.3843E-08	1.3000E+06	7.2414E-08
31	1.3500E+06	1.1376E-07	1.4000E+06	1.7431E-07	1.4500E+06	2.5695E-07	1.5000E+06	3.6983E-07	1.5500E+06	5.1587E-07
36	1.6000E+06	7.0844E-07	1.6500E+06	9.4756E-07	1.7000E+06	1.2493E-06	1.7500E+06	1.6023E-06	1.8000E+06	2.0311E-06
41	1.8500E+06	2.5148E-06	1.9000E+06	3.0881E-06	1.9500E+06	3.7151E-06	2.0000E+06	4.4113E-06	2.2000E+06	7.9496E-06
46	2.4000E+06	1.2351E-05	2.6000E+06	1.7018E-05	2.8000E+06	2.1216E-05	3.0000E+06	2.4266E-05	3.2000E+06	2.5774E-05
51	3.4000E+06	2.5664E-05	3.6000E+06	2.4103E-05	3.8000E+06	2.1514E-05	4.0000E+06	1.8382E-05	4.2000E+06	1.5118E-05
56	4.4000E+06	1.2035E-05	4.6000E+06	9.3362E-06	4.8000E+06	7.1017E-06	5.0000E+06	5.3218E-06	5.2000E+06	3.8879E-06
61	5.4000E+06	2.9584E-06	5.6000E+06	2.1563E-06	5.8000E+06	1.6351E-06	6.0000E+06	1.2321E-06	6.2500E+06	8.4911E-07
66	6.5000E+06	5.6480E-07	6.7500E+06	3.6257E-07	7.0000E+06	2.3210E-07	7.2500E+06	1.5191E-07	7.5000E+06	1.0130E-07
71	7.7500E+06	6.9185E-08	8.0000E+06	4.7580E-08	8.5000E+06	2.2566E-08	9.0000E+06	1.0615E-08	9.5000E+06	4.9779E-09
76	1.0000E+07	2.3722E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00				

(n,n′) 6-th level
Reaction Cross-Section

Intermediate state Q-value -7.8000E+05 eV

Interpolation law between energies

Range	Description
1 TO 78	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	7.8325E+05	0.0000E+00	7.9000E+05	2.5808E-02	8.0000E+05	4.2669E-02	8.1000E+05	5.6305E-02	8.2000E+05	6.8409E-02
6	8.3000E+05	7.8805E-02	8.4000E+05	8.8058E-02	8.5000E+05	9.6293E-02	8.6000E+05	1.0339E-01	8.7000E+05	1.0904E-01
11	8.8000E+05	1.1335E-01	8.9000E+05	1.1702E-01	9.0000E+05	1.1999E-01	9.2000E+05	1.2436E-01	9.4000E+05	1.2751E-01
16	9.6000E+05	1.3033E-01	9.8000E+05	1.3253E-01	1.0000E+06	1.3479E-01	1.0200E+06	1.3659E-01	1.0400E+06	1.3758E-01
21	1.0600E+06	1.3859E-01	1.0800E+06	1.3787E-01	1.1000E+06	1.3723E-01	1.1200E+06	1.3537E-01	1.1400E+06	1.3424E-01
26	1.1600E+06	1.3161E-01	1.1800E+06	1.2981E-01	1.2000E+06	1.2847E-01	1.2500E+06	1.2633E-01	1.3000E+06	1.2295E-01
31	1.3500E+06	1.1895E-01	1.4000E+06	1.1506E-01	1.4500E+06	1.1024E-01	1.5000E+06	1.0571E-01	1.5500E+06	1.0093E-01
36	1.6000E+06	9.6026E-02	1.6500E+06	9.0404E-02	1.7000E+06	8.5093E-02	1.7500E+06	7.9285E-02	1.8000E+06	7.3918E-02
41	1.8500E+06	6.8254E-02	1.9000E+06	6.3137E-02	1.9500E+06	5.7885E-02	2.0000E+06	5.4192E-02	2.2000E+06	3.7006E-02
46	2.4000E+06	2.4617E-02	2.6000E+06	1.6051E-02	2.8000E+06	1.0302E-02	3.0000E+06	6.5316E-03	3.2000E+06	4.1034E-03
51	3.4000E+06	2.5607E-03	3.6000E+06	1.5904E-03	3.8000E+06	9.8450E-04	4.0000E+06	6.0809E-04	4.2000E+06	3.7502E-04
56	4.4000E+06	2.3108E-04	4.6000E+06	1.4260E-04	4.8000E+06	8.8289E-05	5.0000E+06	5.4894E-05	5.2000E+06	3.1042E-05
61	5.4000E+06	2.0368E-05	5.6000E+06	1.2969E-05	5.8000E+06	8.6612E-06	6.0000E+06	5.8144E-06	6.2500E+06	3.5100E-06
66	6.5000E+06	2.0626E-06	6.7500E+06	1.1807E-06	7.0000E+06	6.8009E-07	7.2500E+06	4.0293E-07	7.5000E+06	2.4456E-07
71	7.7500E+06	1.5279E-07	8.0000E+06	9.6581E-08	8.5000E+06	3.9303E-08	9.0000E+06	1.6181E-08	9.5000E+06	6.7709E-09
76	1.0000E+07	2.9248E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00				

(n,n′) 7-th level
Reaction Cross-Section

Intermediate state Q-value -8.3200E+05 eV

Interpolation law between energies

Range	Description
1 TO 73	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	8.3547E+05	0.0000E+00	8.4000E+05	5.0094E-03	8.5000E+05	1.0667E-02	8.6000E+05	1.5780E-02	8.7000E+05	2.0684E-02
6	8.8000E+05	2.5047E-02	8.9000E+05	2.8983E-02	9.0000E+05	3.2744E-02	9.2000E+05	3.9210E-02	9.4000E+05	4.4665E-02
11	9.6000E+05	4.9569E-02	9.8000E+05	5.4172E-02	1.0000E+06	5.8421E-02	1.0200E+06	6.1982E-02	1.0400E+06	6.5124E-02
16	1.0600E+06	6.8240E-02	1.0800E+06	7.0022E-02	1.1000E+06	7.2476E-02	1.1200E+06	7.3580E-02	1.1400E+06	7.4678E-02
21	1.1600E+06	7.5044E-02	1.1800E+06	7.5966E-02	1.2000E+06	7.7059E-02	1.2500E+06	8.0135E-02	1.3000E+06	8.2275E-02
26	1.3500E+06	8.3484E-02	1.4000E+06	8.4437E-02	1.4500E+06	8.4253E-02	1.5000E+06	8.3919E-02	1.5500E+06	8.2921E-02
31	1.6000E+06	8.1626E-02	1.6500E+06	7.9227E-02	1.7000E+06	7.6760E-02	1.7500E+06	7.3460E-02	1.8000E+06	7.0261E-02
36	1.8500E+06	6.6442E-02	1.9000E+06	6.2882E-02	1.9500E+06	5.8900E-02	2.0000E+06	5.5835E-02	2.2000E+06	4.1146E-02
41	2.4000E+06	2.9138E-02	2.6000E+06	2.0006E-02	2.8000E+06	1.3406E-02	3.0000E+06	8.8152E-03	3.2000E+06	5.7148E-03
46	3.4000E+06	3.6656E-03	3.6000E+06	2.3325E-03	3.8000E+06	1.4753E-03	4.0000E+06	9.2901E-04	4.2000E+06	5.8296E-04
51	4.4000E+06	3.6488E-04	4.6000E+06	2.2839E-04	4.8000E+06	1.4325E-04	5.0000E+06	9.0139E-05	5.2000E+06	5.1794E-05
56	5.4000E+06	3.4302E-05	5.6000E+06	2.2034E-05	5.8000E+06	1.4838E-05	6.0000E+06	1.0036E-05	6.2500E+06	6.1115E-06
61	6.5000E+06	3.6209E-06	6.7500E+06	2.0890E-06	7.0000E+06	1.2119E-06	7.2500E+06	7.2275E-07	7.5000E+06	4.4143E-07
66	7.7500E+06	2.7742E-07	8.0000E+06	1.7635E-07	8.5000E+06	7.2478E-08	9.0000E+06	3.0087E-08	9.5000E+06	1.2680E-08
71	1.0000E+07	5.5117E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00				

(n,n′) 8-th level
Reaction Cross-Section

Intermediate state Q-value -8.6500E+05 eV

Interpolation law between energies

Range	Description
1 TO 70	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	8.6860E+05	0.0000E+00	8.7000E+05	8.2212E-03	8.8000E+05	2.4219E-02	8.9000E+05	3.4306E-02	9.0000E+05	4.2617E-02
6	9.2000E+05	5.5638E-02	9.4000E+05	6.5899E-02	9.6000E+05	7.4412E-02	9.8000E+05	8.1512E-02	1.0000E+06	8.7912E-02
11	1.0200E+06	9.3432E-02	1.0400E+06	9.7897E-02	1.0600E+06	1.0191E-01	1.0800E+06	1.0417E-01	1.1000E+06	1.0606E-01
16	1.1200E+06	1.0664E-01	1.1400E+06	1.0751E-01	1.1600E+06	1.0694E-01	1.1800E+06	1.0685E-01	1.2000E+06	1.0698E-01
21	1.2500E+06	1.0780E-01	1.3000E+06	1.0694E-01	1.3500E+06	1.0506E-01	1.4000E+06	1.0291E-01	1.4500E+06	9.9653E-02
26	1.5000E+06	9.6423E-02	1.5500E+06	9.2768E-02	1.6000E+06	8.8846E-02	1.6500E+06	8.4123E-02	1.7000E+06	7.9574E-02
31	1.7500E+06	7.4463E-02	1.8000E+06	6.9683E-02	1.8500E+06	6.4555E-02	1.9000E+06	5.9887E-02	1.9500E+06	5.5046E-02
36	2.0000E+06	5.1652E-02	2.2000E+06	3.5517E-02	2.4000E+06	2.3748E-02	2.6000E+06	1.5552E-02	2.8000E+06	1.0021E-02
41	3.0000E+06	6.3747E-03	3.2000E+06	4.0161E-03	3.4000E+06	2.5120E-03	3.6000E+06	1.5630E-03	3.8000E+06	9.6900E-04
46	4.0000E+06	5.9924E-04	4.2000E+06	3.6994E-04	4.4000E+06	2.2814E-04	4.6000E+06	1.4089E-04	4.8000E+06	8.7297E-05
51	5.0000E+06	5.4312E-05	5.2000E+06	3.0733E-05	5.4000E+06	2.0177E-05	5.6000E+06	1.2853E-05	5.8000E+06	8.5875E-06
56	6.0000E+06	5.7672E-06	6.2500E+06	3.4827E-06	6.5000E+06	2.0472E-06	6.7500E+06	1.1726E-06	7.0000E+06	6.7563E-07
61	7.2500E+06	4.0031E-07	7.5000E+06	2.4298E-07	7.7500E+06	1.5180E-07	8.0000E+06	9.5958E-08	8.5000E+06	3.9048E-08
66	9.0000E+06	1.6078E-08	9.5000E+06	6.7309E-09	1.0000E+07	2.9088E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00

(n,n′) 9-th level
Reaction Cross-Section

Intermediate state Q-value -9.2700E+05 eV

Interpolation law between energies

Range	Description
1 TO 65	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	9.3086E+05	0.0000E+00	9.4000E+05	8.7567E-05	9.6000E+05	3.1473E-04	9.8000E+05	5.8560E-04	1.0000E+06	9.0653E-04
6	1.0200E+06	1.2717E-03	1.0400E+06	1.6692E-03	1.0600E+06	2.0886E-03	1.0800E+06	2.5200E-03	1.1000E+06	2.9735E-03
11	1.1200E+06	3.4459E-03	1.1400E+06	3.9655E-03	1.1600E+06	4.3930E-03	1.1800E+06	4.8888E-03	1.2000E+06	5.4068E-03
16	1.2500E+06	6.8111E-03	1.3000E+06	8.3410E-03	1.3500E+06	9.8336E-03	1.4000E+06	1.1348E-02	1.4500E+06	1.2718E-02
21	1.5000E+06	1.4039E-02	1.5500E+06	1.5207E-02	1.6000E+06	1.6299E-02	1.6500E+06	1.7077E-02	1.7000E+06	1.7736E-02
26	1.7500E+06	1.8081E-02	1.8000E+06	1.8335E-02	1.8500E+06	1.8296E-02	1.9000E+06	1.8209E-02	1.9500E+06	1.7870E-02
31	2.0000E+06	1.7595E-02	2.2000E+06	1.5128E-02	2.4000E+06	1.2148E-02	2.6000E+06	9.2672E-03	2.8000E+06	6.7927E-03
36	3.0000E+06	4.8252E-03	3.2000E+06	3.3451E-03	3.4000E+06	2.2757E-03	3.6000E+06	1.5256E-03	3.8000E+06	1.0108E-03
41	4.0000E+06	6.6365E-04	4.2000E+06	4.3250E-04	4.4000E+06	2.8018E-04	4.6000E+06	1.8095E-04	4.8000E+06	1.1679E-04
46	5.0000E+06	7.5440E-05	5.2000E+06	4.4648E-05	5.4000E+06	3.0215E-05	5.6000E+06	1.9806E-05	5.8000E+06	1.3592E-05
51	6.0000E+06	9.3534E-06	6.2500E+06	5.8087E-06	6.5000E+06	3.5050E-06	6.7500E+06	2.0579E-06	7.0000E+06	1.2132E-06
56	7.2500E+06	7.3418E-07	7.5000E+06	4.5464E-07	7.7500E+06	2.8948E-07	8.0000E+06	1.8631E-07	8.5000E+06	7.8288E-08
61	9.0000E+06	3.3127E-08	9.5000E+06	1.4196E-08	1.0000E+07	6.2589E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00

(n,n′) 10-th level
Reaction Cross-Section

Intermediate state Q-value -9.5600E+05 eV

Interpolation law between energies

Range	Description
1 TO 64	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	9.5998E+05	0.0000E+00	9.6000E+05	8.2674E-04	9.8000E+05	9.5465E-03	1.0000E+06	1.5370E-02	1.0200E+06	2.0392E-02
6	1.0400E+06	2.4749E-02	1.0600E+06	2.8575E-02	1.0800E+06	3.1790E-02	1.1000E+06	3.4344E-02	1.1200E+06	3.6451E-02
11	1.1400E+06	3.8468E-02	1.1600E+06	3.9321E-02	1.1800E+06	4.0159E-02	1.2000E+06	4.1046E-02	1.2500E+06	4.2730E-02
16	1.3000E+06	4.3190E-02	1.3500E+06	4.2924E-02	1.4000E+06	4.2314E-02	1.4500E+06	4.1109E-02	1.5000E+06	3.9809E-02
21	1.5500E+06	3.8286E-02	1.6000E+06	3.6625E-02	1.6500E+06	3.4651E-02	1.7000E+06	3.2751E-02	1.7500E+06	3.0639E-02
26	1.8000E+06	2.8671E-02	1.8500E+06	2.6578E-02	1.9000E+06	2.4680E-02	1.9500E+06	2.2720E-02	2.0000E+06	2.1425E-02
31	2.2000E+06	1.4879E-02	2.4000E+06	1.0070E-02	2.6000E+06	6.6586E-03	2.8000E+06	4.3091E-03	3.0000E+06	2.7376E-03
36	3.2000E+06	1.7140E-03	3.4000E+06	1.0619E-03	3.6000E+06	6.5318E-04	3.8000E+06	3.9992E-04	4.0000E+06	2.4422E-04
41	4.2000E+06	1.4896E-04	4.4000E+06	9.0851E-05	4.6000E+06	5.5548E-05	4.8000E+06	3.4116E-05	5.0000E+06	2.1064E-05
46	5.2000E+06	1.1793E-05	5.4000E+06	7.6927E-06	5.6000E+06	4.8706E-06	5.8000E+06	3.2359E-06	6.0000E+06	2.1624E-06
51	6.2500E+06	1.2988E-06	6.5000E+06	7.6007E-07	6.7500E+06	4.3401E-07	7.0000E+06	2.4955E-07	7.2500E+06	1.4760E-07
56	7.5000E+06	8.9484E-08	7.7500E+06	5.5862E-08	8.0000E+06	3.5291E-08	8.5000E+06	1.4346E-08	9.0000E+06	5.8989E-09
61	9.5000E+06	2.4641E-09	1.0000E+07	1.0611E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00		

(n,n′) 11-th level
Reaction Cross-Section

Intermediate state Q-value -9.9500E+05 eV

Interpolation law between energies

Range	Description
1 TO 62	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	9.9915E+05	0.0000E+00	1.0000E+06	2.2373E-03	1.0200E+06	1.4999E-02	1.0400E+06	2.5559E-02	1.0600E+06	3.5179E-02
6	1.0800E+06	4.3794E-02	1.1000E+06	5.1824E-02	1.1200E+06	5.8607E-02	1.1400E+06	6.4726E-02	1.1600E+06	6.9121E-02
11	1.1800E+06	7.3457E-02	1.2000E+06	7.7672E-02	1.2500E+06	8.6622E-02	1.3000E+06	9.2466E-02	1.3500E+06	9.6103E-02
16	1.4000E+06	9.8510E-02	1.4500E+06	9.8971E-02	1.5000E+06	9.8741E-02	1.5500E+06	9.7519E-02	1.6000E+06	9.5604E-02
21	1.6500E+06	9.2376E-02	1.7000E+06	8.8998E-02	1.7500E+06	8.4673E-02	1.8000E+06	8.0462E-02	1.8500E+06	7.5601E-02
26	1.9000E+06	7.1072E-02	1.9500E+06	6.6143E-02	2.0000E+06	6.2614E-02	2.2000E+06	4.4969E-02	2.4000E+06	3.1197E-02
31	2.6000E+06	2.1072E-02	2.8000E+06	1.3921E-02	3.0000E+06	9.0299E-03	3.2000E+06	5.7738E-03	3.4000E+06	3.6523E-03
36	3.6000E+06	2.2922E-03	3.8000E+06	1.4304E-03	4.0000E+06	8.8910E-04	4.2000E+06	5.5113E-04	4.4000E+06	3.4101E-04
41	4.6000E+06	2.1114E-04	4.8000E+06	1.3108E-04	5.0000E+06	8.1676E-05	5.2000E+06	4.5997E-05	5.4000E+06	3.0189E-05
46	5.6000E+06	1.9223E-05	5.8000E+06	1.2837E-05	6.0000E+06	8.6173E-06	6.2500E+06	5.2014E-06	6.5000E+06	3.0569E-06
51	6.7500E+06	1.7523E-06	7.0000E+06	1.0111E-06	7.2500E+06	5.9976E-07	7.5000E+06	3.6458E-07	7.7500E+06	2.2816E-07
56	8.0000E+06	1.4448E-07	8.5000E+06	5.8983E-08	9.0000E+06	2.4344E-08	9.5000E+06	1.0213E-08	1.0000E+07	4.4201E-09
61	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00						

(n,n′) 12-th level
Reaction Cross-Section

Intermediate state Q-value -1.0190E+06 eV

Interpolation law between energies

Range	Description
1 TO 60	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0232E+06	0.0000E+00	1.0400E+06	7.3874E-03	1.0600E+06	1.2910E-02	1.0800E+06	1.7589E-02	1.1000E+06	2.2191E-02
6	1.1200E+06	2.6135E-02	1.1400E+06	2.9732E-02	1.1600E+06	3.2779E-02	1.1800E+06	3.5800E-02	1.2000E+06	3.8686E-02
11	1.2500E+06	4.5322E-02	1.3000E+06	5.0557E-02	1.3500E+06	5.4563E-02	1.4000E+06	5.7914E-02	1.4500E+06	6.0062E-02
16	1.5000E+06	6.1754E-02	1.5500E+06	6.2656E-02	1.6000E+06	6.3090E-02	1.6500E+06	6.2431E-02	1.7000E+06	6.1505E-02
21	1.7500E+06	5.9722E-02	1.8000E+06	5.7852E-02	1.8500E+06	5.5320E-02	1.9000E+06	5.2874E-02	1.9500E+06	4.9961E-02
26	2.0000E+06	4.7706E-02	2.2000E+06	3.6043E-02	2.4000E+06	2.6008E-02	2.6000E+06	1.8141E-02	2.8000E+06	1.2324E-02
31	3.0000E+06	8.1986E-03	3.2000E+06	5.3655E-03	3.4000E+06	3.4678E-03	3.6000E+06	2.2201E-03	3.8000E+06	1.4111E-03
36	4.0000E+06	8.9205E-04	4.2000E+06	5.6160E-04	4.4000E+06	3.5250E-04	4.6000E+06	2.2117E-04	4.8000E+06	1.3902E-04
41	5.0000E+06	8.7641E-05	5.2000E+06	5.0467E-05	5.4000E+06	3.3476E-05	5.6000E+06	2.1533E-05	5.8000E+06	1.4518E-05
46	6.0000E+06	9.8309E-06	6.2500E+06	5.9928E-06	6.5000E+06	3.5529E-06	6.7500E+06	2.0524E-06	7.0000E+06	1.1924E-06
51	7.2500E+06	7.1130E-07	7.5000E+06	4.3453E-07	7.7500E+06	2.7313E-07	8.0000E+06	1.7364E-07	8.5000E+06	7.1373E-08
56	9.0000E+06	2.9634E-08	9.5000E+06	1.2504E-08	1.0000E+07	5.4410E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00

(n,n′) 13-th level
Reaction Cross-Section

Intermediate state Q-value -1.0400E+06 eV

Interpolation law between energies

Range	Description
1 TO 59	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0443E+06	0.0000E+00	1.0600E+06	1.4275E-03	1.0800E+06	3.7332E-03	1.1000E+06	6.0817E-03	1.1200E+06	8.6408E-03
6	1.1400E+06	1.1177E-02	1.1600E+06	1.3454E-02	1.1800E+06	1.5692E-02	1.2000E+06	1.7934E-02	1.2500E+06	2.3247E-02
11	1.3000E+06	2.7958E-02	1.3500E+06	3.1811E-02	1.4000E+06	3.5211E-02	1.4500E+06	3.7769E-02	1.5000E+06	3.9883E-02
16	1.5500E+06	4.1450E-02	1.6000E+06	4.2643E-02	1.6500E+06	4.2987E-02	1.7000E+06	4.3080E-02	1.7500E+06	4.2495E-02
21	1.8000E+06	4.1788E-02	1.8500E+06	4.0535E-02	1.9000E+06	3.9287E-02	1.9500E+06	3.7626E-02	2.0000E+06	3.6364E-02
26	2.2000E+06	2.8910E-02	2.4000E+06	2.1848E-02	2.6000E+06	1.5857E-02	2.8000E+06	1.1126E-02	3.0000E+06	7.5938E-03
31	3.2000E+06	5.0720E-03	3.4000E+06	3.3329E-03	3.6000E+06	2.1637E-03	3.8000E+06	1.3920E-03	4.0000E+06	8.8942E-04
36	4.2000E+06	5.6539E-04	4.4000E+06	3.5799E-04	4.6000E+06	2.2635E-04	4.8000E+06	1.4322E-04	5.0000E+06	9.0802E-05
41	5.2000E+06	5.2304E-05	5.4000E+06	3.4811E-05	5.6000E+06	2.2460E-05	5.8000E+06	1.5184E-05	6.0000E+06	1.0306E-05
46	6.2500E+06	6.3003E-06	6.5000E+06	3.7465E-06	6.7500E+06	2.1717E-06	7.0000E+06	1.2666E-06	7.2500E+06	7.5859E-07
51	7.5000E+06	4.6540E-07	7.7500E+06	2.9386E-07	8.0000E+06	1.8768E-07	8.5000E+06	7.7829E-08	9.0000E+06	3.2570E-08
56	9.5000E+06	1.3837E-08	1.0000E+07	6.0555E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00		

(n,n′) 14-th level
Reaction Cross-Section

Intermediate state Q-value -1.0640E+06 eV

Interpolation law between energies

Range	Description
1 TO 58	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0684E+06	0.0000E+00	1.0800E+06	2.9726E-03	1.1000E+06	5.6588E-03	1.1200E+06	7.9526E-03	1.1400E+06	1.0110E-02
6	1.1600E+06	1.1933E-02	1.1800E+06	1.3703E-02	1.2000E+06	1.5473E-02	1.2500E+06	1.9535E-02	1.3000E+06	2.3113E-02
11	1.3500E+06	2.6052E-02	1.4000E+06	2.8693E-02	1.4500E+06	3.0747E-02	1.5000E+06	3.2548E-02	1.5500E+06	3.3888E-02
16	1.6000E+06	3.5012E-02	1.6500E+06	3.5459E-02	1.7000E+06	3.5701E-02	1.7500E+06	3.5373E-02	1.8000E+06	3.4931E-02
21	1.8500E+06	3.4010E-02	1.9000E+06	3.3074E-02	1.9500E+06	3.1767E-02	2.0000E+06	3.0733E-02	2.2000E+06	2.4604E-02
26	2.4000E+06	1.8672E-02	2.6000E+06	1.3616E-02	2.8000E+06	9.6174E-03	3.0000E+06	6.6210E-03	3.2000E+06	4.4655E-03
31	3.4000E+06	2.9637E-03	3.6000E+06	1.9427E-03	3.8000E+06	1.2611E-03	4.0000E+06	8.1244E-04	4.2000E+06	5.2031E-04
36	4.4000E+06	3.3171E-04	4.6000E+06	2.1109E-04	4.8000E+06	1.3440E-04	5.0000E+06	8.5730E-05	5.2000E+06	4.9840E-05
41	5.4000E+06	3.3370E-05	5.6000E+06	2.1656E-05	5.8000E+06	1.4720E-05	6.0000E+06	1.0042E-05	6.2500E+06	6.1738E-06
46	6.5000E+06	3.6887E-06	6.7500E+06	2.1465E-06	7.0000E+06	1.2558E-06	7.2500E+06	7.5384E-07	7.5000E+06	4.6319E-07
51	7.7500E+06	2.9275E-07	8.0000E+06	1.8709E-07	8.5000E+06	7.7613E-08	9.0000E+06	3.2480E-08	9.5000E+06	1.3801E-08
56	1.0000E+07	6.0414E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00				

(n,n′) 15-th level
Reaction Cross-Section

Intermediate state Q-value -1.0870E+06 eV

Interpolation law between energies

Range	Description
1 TO 57	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0915E+06	0.0000E+00	1.1000E+06	7.4632E-19	1.1200E+06	2.0558E-16	1.1400E+06	1.3120E-15	1.1600E+06	4.1263E-15
6	1.1800E+06	1.1194E-14	1.2000E+06	2.2125E-14	1.2500E+06	1.4456E-13	1.3000E+06	6.3863E-13	1.3500E+06	2.2865E-12
11	1.4000E+06	5.7460E-12	1.4500E+06	1.3268E-11	1.5000E+06	2.7200E-11	1.5500E+06	5.1930E-11	1.6000E+06	9.1132E-11
16	1.6500E+06	1.5475E-10	1.7000E+06	2.5390E-10	1.7500E+06	4.0014E-10	1.8000E+06	6.1108E-10	1.8500E+06	9.2475E-10
21	1.9000E+06	1.3503E-09	1.9500E+06	1.8966E-09	2.0000E+06	2.5601E-09	2.2000E+06	7.8841E-09	2.4000E+06	1.8627E-08
26	2.6000E+06	3.8975E-08	2.8000E+06	6.9638E-08	3.0000E+06	1.0945E-07	3.2000E+06	1.5544E-07	3.4000E+06	2.0408E-07
31	3.6000E+06	2.5003E-07	3.8000E+06	2.8905E-07	4.0000E+06	3.1764E-07	4.2000E+06	3.3310E-07	4.4000E+06	3.3526E-07
36	4.6000E+06	3.2547E-07	4.8000E+06	3.0619E-07	5.0000E+06	2.8037E-07	5.2000E+06	2.3694E-07	5.4000E+06	2.1400E-07
41	5.6000E+06	1.8196E-07	5.8000E+06	1.6024E-07	6.0000E+06	1.3845E-07	6.2500E+06	1.1131E-07	6.5000E+06	8.4994E-08
46	6.7500E+06	6.1906E-08	7.0000E+06	4.4396E-08	7.2500E+06	3.1935E-08	7.5000E+06	2.3136E-08	7.7500E+06	1.7007E-08
51	8.0000E+06	1.2491E-08	8.5000E+06	6.6498E-09	9.0000E+06	3.4537E-09	9.5000E+06	1.7673E-09	1.0000E+07	6.3681E-10
56	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00						

(n,n′) 16-th level
Reaction Cross-Section

Intermediate state Q-value -1.1020E+06 eV

Interpolation law between energies

Range	Description
1 TO 56	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.1066E+06	0.0000E+00	1.1200E+06	7.9588E-03	1.1400E+06	1.6038E-02	1.1600E+06	2.3042E-02	1.1800E+06	2.9893E-02
6	1.2000E+06	3.6330E-02	1.2500E+06	5.0662E-02	1.3000E+06	6.1752E-02	1.3500E+06	6.9720E-02	1.4000E+06	7.5549E-02
11	1.4500E+06	7.9041E-02	1.5000E+06	8.1320E-02	1.5500E+06	8.2239E-02	1.6000E+06	8.2143E-02	1.6500E+06	8.0575E-02
16	1.7000E+06	7.8593E-02	1.7500E+06	7.5540E-02	1.8000E+06	7.2396E-02	1.8500E+06	6.8510E-02	1.9000E+06	6.4795E-02
21	1.9500E+06	6.0611E-02	2.0000E+06	5.7628E-02	2.2000E+06	4.1907E-02	2.4000E+06	2.9319E-02	2.6000E+06	1.9951E-02
26	2.8000E+06	1.3276E-02	3.0000E+06	8.6710E-03	3.2000E+06	5.5775E-03	3.4000E+06	3.5451E-03	3.6000E+06	2.2334E-03
31	3.8000E+06	1.3978E-03	4.0000E+06	8.7079E-04	4.2000E+06	5.4070E-04	4.4000E+06	3.3504E-04	4.6000E+06	2.0770E-04
36	4.8000E+06	1.2909E-04	5.0000E+06	8.0508E-05	5.2000E+06	4.5405E-05	5.4000E+06	2.9817E-05	5.6000E+06	1.9001E-05
41	5.8000E+06	1.2696E-05	6.0000E+06	8.5266E-06	6.2500E+06	5.1493E-06	6.5000E+06	3.0270E-06	6.7500E+06	1.7356E-06
46	7.0000E+06	1.0022E-06	7.2500E+06	5.9459E-07	7.5000E+06	3.6144E-07	7.7500E+06	2.2619E-07	8.0000E+06	1.4324E-07
51	8.5000E+06	5.8475E-08	9.0000E+06	2.4135E-08	9.5000E+06	1.0132E-08	1.0000E+07	4.3881E-09	1.0000E+07	0.0000E+00
56	2.0000E+07	0.0000E+00								

(n,n′) 17-th level
Reaction Cross-Section

Intermediate state Q-value -1.1220E+06 eV

Interpolation law between energies

Range	Description
1 TO 55	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.1267E+06	0.0000E+00	1.1400E+06	1.1299E-04	1.1600E+06	3.1141E-04	1.1800E+06	5.4496E-04	1.2000E+06	8.2294E-04
6	1.2500E+06	1.6595E-03	1.3000E+06	2.6889E-03	1.3500E+06	3.8232E-03	1.4000E+06	5.0479E-03	1.4500E+06	6.2723E-03
11	1.5000E+06	7.5191E-03	1.5500E+06	8.7065E-03	1.6000E+06	9.8657E-03	1.6500E+06	1.0831E-02	1.7000E+06	1.1703E-02
16	1.7500E+06	1.2338E-02	1.8000E+06	1.2880E-02	1.8500E+06	1.3179E-02	1.9000E+06	1.3405E-02	1.9500E+06	1.3410E-02
21	2.0000E+06	1.3419E-02	2.2000E+06	1.2149E-02	2.4000E+06	1.0117E-02	2.6000E+06	7.9432E-03	2.8000E+06	5.9616E-03
26	3.0000E+06	4.3179E-03	3.2000E+06	3.0402E-03	3.4000E+06	2.0936E-03	3.6000E+06	1.4170E-03	3.8000E+06	9.4619E-04
31	4.0000E+06	6.2509E-04	4.2000E+06	4.0947E-04	4.4000E+06	2.6646E-04	4.6000E+06	1.7276E-04	4.8000E+06	1.1189E-04
36	5.0000E+06	7.2489E-05	5.2000E+06	4.3041E-05	5.4000E+06	2.9186E-05	5.6000E+06	1.9175E-05	5.8000E+06	1.3184E-05
41	6.0000E+06	9.0876E-06	6.2500E+06	5.6543E-06	6.5000E+06	3.4156E-06	6.7500E+06	2.0083E-06	7.0000E+06	1.1867E-06
46	7.2500E+06	7.1883E-07	7.5000E+06	4.4536E-07	7.7500E+06	2.8369E-07	8.0000E+06	1.8265E-07	8.5000E+06	7.6790E-08
51	9.0000E+06	3.2506E-08	9.5000E+06	1.3953E-08	1.0000E+07	6.1611E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00

(n,n′) 18-th level
Reaction Cross-Section

Intermediate state Q-value -1.1520E+06 eV

Interpolation law between energies

Range	Description
1 TO 54	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.1568E+06	0.0000E+00	1.1600E+06	3.5480E-03	1.1800E+06	1.1132E-02	1.2000E+06	1.7043E-02	1.2500E+06	2.9639E-02
6	1.3000E+06	3.9678E-02	1.3500E+06	4.7503E-02	1.4000E+06	5.3496E-02	1.4500E+06	5.7509E-02	1.5000E+06	6.0507E-02
11	1.5500E+06	6.2342E-02	1.6000E+06	6.3292E-02	1.6500E+06	6.2976E-02	1.7000E+06	6.2215E-02	1.7500E+06	6.0482E-02
16	1.8000E+06	5.8559E-02	1.8500E+06	5.5920E-02	1.9000E+06	5.3319E-02	1.9500E+06	5.0233E-02	2.0000E+06	4.7998E-02
21	2.2000E+06	3.5562E-02	2.4000E+06	2.5141E-02	2.6000E+06	1.7219E-02	2.8000E+06	1.1522E-02	3.0000E+06	7.5709E-03
26	3.2000E+06	4.9031E-03	3.4000E+06	3.1390E-03	3.6000E+06	1.9920E-03	3.8000E+06	1.2557E-03	4.0000E+06	7.8751E-04
31	4.2000E+06	4.9203E-04	4.4000E+06	3.0662E-04	4.6000E+06	1.9109E-04	4.8000E+06	1.1937E-04	5.0000E+06	7.4816E-05
36	5.2000E+06	4.2710E-05	5.4000E+06	2.8192E-05	5.6000E+06	1.8056E-05	5.8000E+06	1.2121E-05	6.0000E+06	8.1770E-06
41	6.2500E+06	4.9629E-06	6.5000E+06	2.9296E-06	6.7500E+06	1.6854E-06	7.0000E+06	9.7595E-07	7.2500E+06	5.8020E-07
46	7.5000E+06	3.5314E-07	7.7500E+06	2.2119E-07	8.0000E+06	1.4016E-07	8.5000E+06	5.7271E-08	9.0000E+06	2.3662E-08
51	9.5000E+06	9.9502E-09	1.0000E+07	4.3179E-09	1.0000E+07	0.0000E+00	2.0000E+07	0.0000E+00		

(n,n′) continuum
Reaction Cross-Section

Intermediate state Q-value -1.1520E+06 eV

Interpolation law between energies

Range	Description
1 TO 72	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.1568E+06	0.0000E+00	1.1600E+06	9.4737E-09	1.1800E+06	1.8595E-03	1.2000E+06	5.5415E-03	1.2500E+06	2.2045E-02
6	1.3000E+06	4.3579E-02	1.3500E+06	8.5836E-02	1.4000E+06	1.2319E-01	1.4500E+06	1.8016E-01	1.5000E+06	2.2959E-01
11	1.5500E+06	2.9844E-01	1.6000E+06	3.5712E-01	1.6500E+06	4.3159E-01	1.7000E+06	4.9365E-01	1.7500E+06	5.6968E-01
16	1.8000E+06	6.3151E-01	1.8500E+06	7.0561E-01	1.9000E+06	7.6458E-01	1.9500E+06	8.3467E-01	2.0000E+06	9.1306E-01
21	2.2000E+06	1.1323E+00	2.4000E+06	1.3041E+00	2.6000E+06	1.4323E+00	2.8000E+06	1.5248E+00	3.0000E+06	1.5900E+00
26	3.2000E+06	1.6359E+00	3.4000E+06	1.6680E+00	3.6000E+06	1.6906E+00	3.8000E+06	1.7068E+00	4.0000E+06	1.7188E+00
31	4.2000E+06	1.7281E+00	4.4000E+06	1.7355E+00	4.6000E+06	1.7394E+00	4.8000E+06	1.7384E+00	5.0000E+06	1.7319E+00
36	5.2000E+06	1.7200E+00	5.4000E+06	1.7011E+00	5.6000E+06	1.6213E+00	5.8000E+06	1.5519E+00	6.0000E+06	1.4769E+00
41	6.2500E+06	1.3195E+00	6.5000E+06	1.1433E+00	6.7500E+06	9.6233E-01	7.0000E+06	7.9868E-01	7.2500E+06	6.9845E-01
46	7.5000E+06	6.5294E-01	7.7500E+06	6.2217E-01	8.0000E+06	5.7281E-01	8.5000E+06	5.0083E-01	9.0000E+06	4.4262E-01
51	9.5000E+06	4.0400E-01	1.0000E+07	3.8445E-01	1.0500E+07	3.6734E-01	1.1000E+07	3.4356E-01	1.1500E+07	3.1879E-01
56	1.2000E+07	2.9769E-01	1.2500E+07	2.6532E-01	1.3000E+07	2.6748E-01	1.3500E+07	2.5379E-01	1.4000E+07	2.4188E-01
61	1.4500E+07	2.3026E-01	1.5000E+07	2.1851E-01	1.5500E+07	2.0767E-01	1.6000E+07	1.9869E-01	1.6500E+07	1.9171E-01
66	1.7000E+07	1.8456E-01	1.7500E+07	1.7790E-01	1.8000E+07	1.7249E-01	1.8500E+07	1.6696E-01	1.9000E+07	1.6043E-01
71	1.9500E+07	1.5435E-01	2.0000E+07	1.5000E-01						

(n,g)
Reaction Cross-Section

Reaction Q-value 5.0342E+06 eV
Intermediate state Q-value 5.0342E+06 eV

Interpolation law between energies

Range	Description
1 TO 180	Y LINEAR IN X

CROSS-SECTIONS

Index	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns	Energy eV	Sigma Barns
1	1.0000E+04	1.0078E+00	1.5000E+04	8.7086E-01	2.0000E+04	7.8182E-01	2.5000E+04	7.1541E-01	3.0000E+04	6.6386E-01
6	3.5000E+04	6.2194E-01	4.0000E+04	5.8483E-01	4.5000E+04	5.3400E-01	5.0000E+04	4.8602E-01	5.5000E+04	4.4642E-01
11	6.0000E+04	4.1379E-01	6.5000E+04	3.8635E-01	7.0000E+04	3.6316E-01	7.5000E+04	3.4328E-01	8.0000E+04	3.2621E-01
16	8.5000E+04	3.1196E-01	9.0000E+04	3.0015E-01	9.5000E+04	2.8971E-01	1.0000E+05	2.8005E-01	1.1000E+05	2.6370E-01
21	1.2000E+05	2.5079E-01	1.3000E+05	2.4033E-01	1.4000E+05	2.3181E-01	1.5000E+05	2.2438E-01	1.6000E+05	2.1827E-01
26	1.7000E+05	2.1290E-01	1.8000E+05	2.0815E-01	1.9000E+05	2.0391E-01	2.0000E+05	2.0014E-01	2.1000E+05	1.9676E-01
31	2.2000E+05	1.9375E-01	2.3000E+05	1.9102E-01	2.4000E+05	1.8847E-01	2.5000E+05	1.8610E-01	2.6000E+05	1.8391E-01
36	2.7000E+05	1.8200E-01	2.8000E+05	1.8044E-01	2.9000E+05	1.7926E-01	3.0000E+05	1.7839E-01	3.1000E+05	1.7763E-01
41	3.2000E+05	1.7706E-01	3.4000E+05	1.7608E-01	3.5000E+05	1.7579E-01	3.6000E+05	1.7571E-01	3.8000E+05	1.7605E-01
46	3.9000E+05	1.7625E-01	4.0000E+05	1.7636E-01	4.1000E+05	1.7633E-01	4.2000E+05	1.7617E-01	4.3000E+05	1.7593E-01
51	4.4000E+05	1.7559E-01	4.5000E+05	1.7522E-01	4.6000E+05	1.7489E-01	4.7000E+05	1.7468E-01	4.8000E+05	1.7466E-01
56	4.9000E+05	1.7485E-01	5.0000E+05	1.7516E-01	5.1000E+05	1.7549E-01	5.2000E+05	1.7555E-01	5.3000E+05	1.7537E-01
61	5.4000E+05	1.7485E-01	5.5000E+05	1.7408E-01	5.6000E+05	1.7322E-01	5.7000E+05	1.7245E-01	5.8000E+05	1.7194E-01
66	5.9000E+05	1.7174E-01	6.0000E+05	1.7169E-01	6.1000E+05	1.7157E-01	6.2000E+05	1.7121E-01	6.3000E+05	1.7065E-01
71	6.4000E+05	1.6994E-01	6.5000E+05	1.6912E-01	6.6000E+05	1.6821E-01	6.7000E+05	1.6730E-01	6.8000E+05	1.6641E-01
76	6.9000E+05	1.6553E-01	7.0000E+05	1.6463E-01	7.1000E+05	1.6364E-01	7.2000E+05	1.6262E-01	7.3000E+05	1.6161E-01
81	7.4000E+05	1.6077E-01	7.5000E+05	1.6019E-01	7.6000E+05	1.5988E-01	7.7000E+05	1.5982E-01	7.8000E+05	1.5990E-01
86	7.9000E+05	1.5875E-01	8.0000E+05	1.5794E-01	8.1000E+05	1.5711E-01	8.2000E+05	1.5612E-01	8.3000E+05	1.5495E-01
91	8.4000E+05	1.5316E-01	8.5000E+05	1.5111E-01	8.6000E+05	1.4886E-01	8.7000E+05	1.4603E-01	8.8000E+05	1.4271E-01
96	8.9000E+05	1.3950E-01	9.0000E+05	1.3629E-01	9.2000E+05	1.3015E-01	9.4000E+05	1.2485E-01	9.6000E+05	1.2082E-01
101	9.8000E+05	1.1784E-01	1.0000E+06	1.1588E-01	1.0200E+06	1.1422E-01	1.0400E+06	1.1266E-01	1.0600E+06	1.1185E-01
106	1.0800E+06	1.0999E-01	1.1000E+06	1.0902E-01	1.1200E+06	1.0744E-01	1.1400E+06	1.0652E-01	1.1600E+06	1.0431E-01
111	1.1800E+06	1.0327E-01	1.2000E+06	1.0301E-01	1.2500E+06	1.0391E-01	1.3000E+06	1.0504E-01	1.3500E+06	1.0613E-01
116	1.4000E+06	1.0785E-01	1.4500E+06	1.0891E-01	1.5000E+06	1.1039E-01	1.5500E+06	1.1160E-01	1.6000E+06	1.1281E-01
121	1.6500E+06	1.1283E-01	1.7000E+06	1.1297E-01	1.7500E+06	1.1196E-01	1.8000E+06	1.1112E-01	1.8500E+06	1.0919E-01
126	1.9000E+06	1.0753E-01	1.9500E+06	1.0489E-01	2.0000E+06	1.0283E-01	2.2000E+06	9.0140E-02	2.4000E+06	7.6220E-02
131	2.6000E+06	6.2577E-02	2.8000E+06	5.0160E-02	3.0000E+06	3.9443E-02	3.2000E+06	3.0544E-02	3.4000E+06	2.3358E-02
136	3.6000E+06	1.7679E-02	3.8000E+06	1.3266E-02	4.0000E+06	9.8829E-03	4.2000E+06	7.3181E-03	4.4000E+06	5.3922E-03
141	4.6000E+06	3.9641E-03	4.8000E+06	2.9139E-03	5.0000E+06	2.1443E-03	5.2000E+06	1.5808E-03	5.4000E+06	1.1678E-03
146	5.6000E+06	8.6460E-04	5.8000E+06	6.4157E-04	6.0000E+06	4.7700E-04	6.2500E+06	4.4212E-04	6.5000E+06	4.2023E-04
151	6.7500E+06	4.5301E-04	7.0000E+06	5.2011E-04	7.2500E+06	6.5002E-04	7.5000E+06	8.0000E-04	7.7500E+06	9.2110E-04
156	8.0000E+06	1.0501E-03	8.5000E+06	1.2982E-03	9.0000E+06	1.5612E-03	9.5000E+06	1.8999E-03	1.0000E+07	2.0498E-03
161	1.0500E+07	2.1000E-03	1.1000E+07	2.1509E-03	1.1500E+07	2.1721E-03	1.2000E+07	2.1200E-03	1.2500E+07	2.0402E-03
166	1.3000E+07	1.9498E-03	1.3500E+07	1.8002E-03	1.4000E+07	1.5800E-03	1.4500E+07	1.2497E-03	1.5000E+07	9.5020E-04
171	1.5500E+07	7.0230E-04	1.6000E+07	5.0120E-04	1.6500E+07	3.8012E-04	1.7000E+07	2.8123E-04	1.7500E+07	2.1985E-04
176	1.8000E+07	1.5998E-04	1.8500E+07	1.2014E-04	1.9000E+07	8.9850E-05	1.9500E+07	6.5120E-05	2.0000E+07	4.8036E-05

ANNEX 2

File# 4
Emitted Neutron Angular Distributions

Section (MT)	Reaction type	Reference frame (LCT)	Energy points (NE)	Energy range (eV) from	Energy range (eV) to	Interp. regions (NR)	Data form (LTT)	Angular points - NP or order - NL MIN	Angular points - NP or order - NL MAX
2	(n,Elastic)	C.M.	43	1.0000E+04	2.0000E+07	1	LEGENDRE	1	20
16	(n,2n)	LAB					ISOTROPIC		
17	(n,3n)	LAB					ISOTROPIC		
18	(n,fission)	LAB					ISOTROPIC		
19	(n,f)	LAB					ISOTROPIC		
20	(n,nf)	LAB					ISOTROPIC		
21	(n,2nf)	LAB					ISOTROPIC		
37	(n,4n)	LAB					ISOTROPIC		
38	(n,3nf)	LAB					ISOTROPIC		
51	(n,n') 1-st level	C.M.	43	4.4685E+04	2.0000E+07	1	LEGENDRE	1	20
52	(n,n') 2-nd level	C.M.	41	1.4781E+05	2.0000E+07	1	LEGENDRE	1	20
53	(n,n') 3-rd level	C.M.	39	3.0717E+05	2.0000E+07	1	LEGENDRE	1	20
54	(n,n') 4-th level	C.M.	38	5.1976E+05	2.0000E+07	1	LEGENDRE	1	20
55	(n,n') 5-th level	C.M.	12	7.8225E+05	1.0000E+07	1	LEGENDRE	1	18
56	(n,n') 6-th level	C.M.	12	7.8325E+05	1.0000E+07	1	LEGENDRE	1	18
57	(n,n') 7-th level	C.M.	12	8.3547E+05	1.0000E+07	1	LEGENDRE	1	18
58	(n,n') 8-th level	C.M.	12	8.6860E+05	1.0000E+07	1	LEGENDRE	1	18
59	(n,n') 9-th level	C.M.	12	9.3086E+05	1.0000E+07	1	LEGENDRE	1	18
60	(n,n')10-th level	C.M.	11	9.5998E+05	9.0000E+06	1	LEGENDRE	1	18
61	(n,n')11-th level	C.M.	12	9.9915E+05	1.0000E+07	1	LEGENDRE	1	18
62	(n,n')12-th level	C.M.	11	1.0232E+06	1.0000E+07	1	LEGENDRE	1	18
63	(n,n')13-th level	C.M.	11	1.0443E+06	1.0000E+07	1	LEGENDRE	1	18
64	(n,n')14-th level	C.M.	11	1.0684E+06	1.0000E+07	1	LEGENDRE	1	18
65	(n,n')15-th level	C.M.	11	1.0915E+06	1.0000E+07	1	LEGENDRE	1	18
66	(n,n')16-th level	C.M.	11	1.1066E+06	1.0000E+07	1	LEGENDRE	1	18
67	(n,n')17-th level	C.M.	11	1.1267E+06	1.0000E+07	1	LEGENDRE	1	18
68	(n,n')18-th level	C.M.	11	1.1568E+06	1.0000E+07	1	LEGENDRE	1	18
91	(n,n') continuum	LAB					ISOTROPIC		

(n,Elastic)
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 6.0000E+00 MeV
15 LEGENDRE COEFFICIENTS were used in the reconstruction

1	8.6862E-01	2	7.4954E-01	3	6.4096E-01	4	5.2272E-01	5	3.9866E-01	6	2.7220E-01	7	1.7162E-01	8	1.1342E-01
9	6.6928E-02	10	2.9488E-02	11	1.0204E-02	12	2.8065E-03	13	6.1507E-04	14	1.6583E-04				

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	1.5594E+01	9.7500E-01	1.0492E+01	9.5000E-01	6.9319E+00	9.2500E-01	4.4908E+00	9.0000E-01	2.8498E+00
6	8.7500E-01	1.7713E+00	8.5000E-01	1.0807E+00	8.2500E-01	6.5150E-01	8.0000E-01	3.9364E-01	7.7500E-01	2.4438E-01
11	7.5000E-01	1.6110E-01	7.2500E-01	1.1579E-01	7.0000E-01	9.0796E-02	6.7500E-01	7.5648E-02	6.5000E-01	6.4676E-02
16	6.2500E-01	5.5286E-02	6.0000E-01	4.6721E-02	5.7500E-01	3.9205E-02	5.5000E-01	3.3370E-02	5.2500E-01	2.9892E-02
21	5.0000E-01	2.9291E-02	4.7500E-01	3.1822E-02	4.5000E-01	3.7454E-02	4.2500E-01	4.5892E-02	4.0000E-01	5.6622E-02
26	3.7500E-01	6.8976E-02	3.5000E-01	8.2195E-02	3.2500E-01	9.5497E-02	3.0000E-01	1.0813E-01	2.7500E-01	1.1941E-01
31	2.5000E-01	1.2876E-01	2.2500E-01	1.3575E-01	2.0000E-01	1.4008E-01	1.7500E-01	1.4161E-01	1.5000E-01	1.4031E-01
36	1.2500E-01	1.3633E-01	1.0000E-01	1.2989E-01	7.5000E-02	1.2132E-01	5.0000E-02	1.1102E-01	2.5000E-02	9.9448E-02
41	3.9116E-07	8.7069E-02	-2.5000E-02	7.4361E-02	-5.0000E-02	6.1782E-02	-7.5000E-02	4.9758E-02	-1.0000E-01	3.8663E-02
46	-1.2500E-01	2.8815E-02	-1.5000E-01	2.0462E-02	-1.7500E-01	1.3782E-02	-2.0000E-01	8.8765E-03	-2.2500E-01	5.7756E-03
51	-2.5000E-01	4.4388E-03	-2.7500E-01	4.7612E-03	-3.0000E-01	6.5804E-03	-3.2500E-01	9.6845E-03	-3.5000E-01	1.3822E-02
56	-3.7500E-01	1.8710E-02	-4.0000E-01	2.4048E-02	-4.2500E-01	2.9525E-02	-4.5000E-01	3.4832E-02	-4.7500E-01	3.9674E-02
61	-5.0000E-01	4.3781E-02	-5.2500E-01	4.6918E-02	-5.5000E-01	4.8897E-02	-5.7500E-01	4.9587E-02	-6.0000E-01	4.8926E-02
66	-6.2500E-01	4.6925E-02	-6.5000E-01	4.3677E-02	-6.7500E-01	3.9357E-02	-7.0000E-01	3.4217E-02	-7.2500E-01	2.8582E-02
71	-7.5000E-01	2.2830E-02	-7.7500E-01	1.7366E-02	-8.0000E-01	1.2592E-02	-8.2500E-01	8.8655E-03	-8.5000E-01	6.4565E-03
76	-8.7500E-01	5.5080E-03	-9.0000E-01	6.0090E-03	-9.2500E-01	7.7999E-03	-9.5000E-01	1.0633E-02	-9.7500E-01	1.4323E-02
81	-1.0000E+00	1.9038E-02								

94-Plutonium-242 Material no. 9446 Sub-library no. 10 ENDF/B-VI

(n,Elastic)
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 8.0000E+00 MeV
17 LEGENDRE COEFFICIENTS were used in the reconstruction

1	8.5925E-01	2	7.3665E-01	3	6.4340E-01	4	5.5253E-01	5	4.5412E-01	6	3.5462E-01	7	2.6126E-01	8	1.9799E-01
9	1.5265E-01	10	9.8405E-02	11	4.9546E-02	12	1.9147E-02	13	5.9566E-03	14	1.7536E-03	15	4.7659E-04	16	1.7050E-04

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	2.0222E+01	9.7500E-01	1.1557E+01	9.5000E-01	6.3162E+00	9.2500E-01	3.2904E+00	9.0000E-01	1.6490E+00
6	8.7500E-01	8.3494E-01	8.5000E-01	4.8535E-01	8.2500E-01	3.7228E-01	8.0000E-01	3.5985E-01	7.7500E-01	3.7315E-01
11	7.5000E-01	3.7617E-01	7.2500E-01	3.5644E-01	7.0000E-01	3.1461E-01	6.7500E-01	2.5761E-01	6.5000E-01	1.9434E-01
16	6.2500E-01	1.3320E-01	6.0000E-01	8.0786E-02	5.7500E-01	4.1394E-02	5.5000E-01	1.7066E-02	5.2500E-01	7.8734E-03
21	5.0000E-01	1.2360E-02	4.7500E-01	2.8025E-02	4.5000E-01	5.1776E-02	4.2500E-01	8.0330E-02	4.0000E-01	1.1053E-01
26	3.7500E-01	1.3957E-01	3.5000E-01	1.6517E-01	3.2500E-01	1.8565E-01	3.0000E-01	1.9994E-01	2.7500E-01	2.0754E-01
31	2.5000E-01	2.0849E-01	2.2500E-01	2.0328E-01	2.0000E-01	1.9270E-01	1.7500E-01	1.7779E-01	1.5000E-01	1.5972E-01
36	1.2500E-01	1.3969E-01	1.0000E-01	1.1886E-01	7.5000E-02	9.8292E-02	5.0000E-02	7.8898E-02	2.5000E-02	6.1414E-02
41	3.9116E-07	4.6385E-02	-2.5000E-02	3.4161E-02	-5.0000E-02	2.4910E-02	-7.5000E-02	1.8630E-02	-1.0000E-01	1.5179E-02
46	-1.2500E-01	1.4294E-02	-1.5000E-01	1.5624E-02	-1.7500E-01	1.8755E-02	-2.0000E-01	2.3239E-02	-2.2500E-01	2.8616E-02
51	-2.5000E-01	3.4433E-02	-2.7500E-01	4.0269E-02	-3.0000E-01	4.5741E-02	-3.2500E-01	5.0524E-02	-3.5000E-01	5.4353E-02
56	-3.7500E-01	5.7033E-02	-4.0000E-01	5.8439E-02	-4.2500E-01	5.8519E-02	-4.5000E-01	5.7286E-02	-4.7500E-01	5.4819E-02
61	-5.0000E-01	5.1249E-02	-5.2500E-01	4.6754E-02	-5.5000E-01	4.1546E-02	-5.7500E-01	3.5862E-02	-6.0000E-01	2.9951E-02
66	-6.2500E-01	2.4072E-02	-6.5000E-01	1.8479E-02	-6.7500E-01	1.3428E-02	-7.0000E-01	9.1644E-03	-7.2500E-01	5.9274E-03
71	-7.5000E-01	3.9342E-03	-7.7500E-01	3.3620E-03	-8.0000E-01	4.3110E-03	-8.2500E-01	6.7460E-03	-8.5000E-01	1.0419E-02
76	-8.7500E-01	1.4784E-02	-9.0000E-01	1.8934E-02	-9.2500E-01	2.1624E-02	-9.5000E-01	2.1496E-02	-9.7500E-01	1.7693E-02
81	-1.0000E+00	1.1166E-02								

(n,Elastic)
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 1.0000E+01 MeV
19 LEGENDRE COEFFICIENTS were used in the reconstruction

1 8.6317E-01	2 7.2949E-01	3 6.3011E-01	4 5.5330E-01	5 4.8002E-01	6 4.0767E-01	7 3.3823E-01	8 2.7859E-01
9 2.3424E-01	10 1.8400E-01	11 1.1962E-01	12 6.1989E-02	13 2.6613E-02	14 9.9982E-03	15 3.2054E-03	16 9.7010E-04
17 3.3962E-04	18 1.8507E-04						

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	2.5395E+01	9.7500E-01	1.2047E+01	9.5000E-01	5.0891E+00	9.2500E-01	1.8175E+00	9.0000E-01	5.4342E-01
6	8.7500E-01	2.5025E-01	8.5000E-01	3.5708E-01	8.2500E-01	5.5715E-01	8.0000E-01	7.0955E-01	7.7500E-01	7.6819E-01
11	7.5000E-01	7.3641E-01	7.2500E-01	6.3921E-01	7.0000E-01	5.0707E-01	6.7500E-01	3.6739E-01	6.5000E-01	2.4077E-01
16	6.2500E-01	1.4007E-01	6.0000E-01	7.1160E-02	5.7500E-01	3.4283E-02	5.5000E-01	2.5778E-02	5.2500E-01	3.9637E-02
21	5.0000E-01	6.8851E-02	4.7500E-01	1.0644E-01	4.5000E-01	1.4616E-01	4.2500E-01	1.8295E-01	4.0000E-01	2.1311E-01
26	3.7500E-01	2.3433E-01	3.5000E-01	2.4557E-01	3.2500E-01	2.4683E-01	3.0000E-01	2.3896E-01	2.7500E-01	2.2341E-01
31	2.5000E-01	2.0197E-01	2.2500E-01	1.7657E-01	2.0000E-01	1.4916E-01	1.7500E-01	1.2153E-01	1.5000E-01	9.5220E-02
36	1.2500E-01	7.1495E-02	1.0000E-01	5.1281E-02	7.5000E-02	3.5171E-02	5.0000E-02	2.3437E-02	2.5000E-02	1.6052E-02
41	3.9116E-07	1.2730E-02	-2.5000E-02	1.2974E-02	-5.0000E-02	1.6130E-02	-7.5000E-02	2.1436E-02	-1.0000E-01	2.8089E-02
46	-1.2500E-01	3.5291E-02	-1.5000E-01	4.2305E-02	-1.7500E-01	4.8497E-02	-2.0000E-01	5.3371E-02	-2.2500E-01	5.6587E-02
51	-2.5000E-01	5.7972E-02	-2.7500E-01	5.7517E-02	-3.0000E-01	5.5354E-02	-3.2500E-01	5.1735E-02	-3.5000E-01	4.6993E-02
56	-3.7500E-01	4.1505E-02	-4.0000E-01	3.5654E-02	-4.2500E-01	2.9801E-02	-4.5000E-01	2.4254E-02	-4.7500E-01	1.9260E-02
61	-5.0000E-01	1.4994E-02	-5.2500E-01	1.1566E-02	-5.5000E-01	9.0265E-03	-5.7500E-01	7.3777E-03	-6.0000E-01	6.5818E-03
66	-6.2500E-01	6.5645E-03	-6.5000E-01	7.2157E-03	-6.7500E-01	8.3876E-03	-7.0000E-01	9.8969E-03	-7.2500E-01	1.1535E-02
71	-7.5000E-01	1.3092E-02	-7.7500E-01	1.4394E-02	-8.0000E-01	1.5339E-02	-8.2500E-01	1.5926E-02	-8.5000E-01	1.6222E-02
76	-8.7500E-01	1.6274E-02	-9.0000E-01	1.5946E-02	-9.2500E-01	1.4790E-02	-9.5000E-01	1.2261E-02	-9.7500E-01	8.9128E-03
81	-1.0000E+00	9.9205E-03								

(n,Elastic)
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 1.5000E+01 MeV
21 LEGENDRE COEFFICIENTS were used in the reconstruction

1 9.1988E-01	2 8.1547E-01	3 7.1609E-01	4 6.2974E-01	5 5.5709E-01	6 4.9582E-01	7 4.4188E-01	8 3.9294E-01
9 3.4613E-01	10 2.9978E-01	11 2.4838E-01	12 1.8778E-01	13 1.2598E-01	14 7.4868E-02	15 3.9339E-02	16 1.8297E-02
17 7.5874E-03	18 2.8664E-03	19 1.1064E-03	20 5.1738E-04				

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	3.7755E+01	9.7500E-01	1.2714E+01	9.5000E-01	3.0551E+00	9.2500E-01	2.6829E-01	9.0000E-01	9.7690E-02
6	8.7500E-01	6.0059E-01	8.5000E-01	1.0231E+00	8.2500E-01	1.1730E+00	8.0000E-01	1.0870E+00	7.7500E-01	8.6665E-01
11	7.5000E-01	6.0702E-01	7.2500E-01	3.7271E-01	7.0000E-01	1.9646E-01	6.7500E-01	8.6384E-02	6.5000E-01	3.5084E-02
16	6.2500E-01	2.7621E-02	6.0000E-01	4.7278E-02	5.7500E-01	7.9131E-02	5.5000E-01	1.1181E-01	5.2500E-01	1.3797E-01
21	5.0000E-01	1.5392E-01	4.7500E-01	1.5884E-01	4.5000E-01	1.5387E-01	4.2500E-01	1.4126E-01	4.0000E-01	1.2365E-01
26	3.7500E-01	1.0357E-01	3.5000E-01	8.3152E-02	3.2500E-01	6.4015E-02	3.0000E-01	4.7231E-02	2.7500E-01	3.3408E-02
31	2.5000E-01	2.2785E-02	2.2500E-01	1.5334E-02	2.0000E-01	1.0840E-02	1.7500E-01	8.9642E-03	1.5000E-01	9.2789E-03
36	1.2500E-01	1.1295E-02	1.0000E-01	1.4482E-02	7.5000E-02	1.8287E-02	5.0000E-02	2.2170E-02	2.5000E-02	2.5639E-02
41	3.9116E-07	2.8289E-02	-2.5000E-02	2.9840E-02	-5.0000E-02	3.0158E-02	-7.5000E-02	2.9264E-02	-1.0000E-01	2.7318E-02
46	-1.2500E-01	2.4586E-02	-1.5000E-01	2.1392E-02	-1.7500E-01	1.8068E-02	-2.0000E-01	1.4899E-02	-2.2500E-01	1.2091E-02
51	-2.5000E-01	9.7560E-03	-2.7500E-01	7.9150E-03	-3.0000E-01	6.5235E-03	-3.2500E-01	5.5069E-03	-3.5000E-01	4.7970E-03
56	-3.7500E-01	4.3593E-03	-4.0000E-01	4.2008E-03	-4.2500E-01	4.3578E-03	-4.5000E-01	4.8634E-03	-4.7500E-01	5.7077E-03
61	-5.0000E-01	6.8030E-03	-5.2500E-01	7.9700E-03	-5.5000E-01	8.9566E-03	-5.7500E-01	9.4916E-03	-6.0000E-01	9.3644E-03
66	-6.2500E-01	8.5055E-03	-6.5000E-01	7.0392E-03	-6.7500E-01	5.2779E-03	-7.0000E-01	3.6388E-03	-7.2500E-01	2.4979E-03
71	-7.5000E-01	2.0250E-03	-7.7500E-01	2.0811E-03	-8.0000E-01	2.2629E-03	-8.2500E-01	2.1370E-03	-8.5000E-01	1.5982E-03
76	-8.7500E-01	1.1186E-03	-9.0000E-01	1.5154E-03	-9.2500E-01	2.9651E-03	-9.5000E-01	3.8009E-03	-9.7500E-01	1.9951E-03
81	-1.0000E+00	7.6569E-03								

(n,n′) 1-st level
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 6.0000E+00 MeV
15 LEGENDRE COEFFICIENTS were used in the reconstruction

1	2.8003E-01	2	7.8060E-02	3	7.1992E-03	4	1.0386E-02	5	8.6093E-03	6	-1.5832E-02	7	-3.5221E-02	8	-3.8141E-02
9	1.0511E-02	10	8.0678E-03	11	-1.9472E-03	12	5.4740E-03	13	5.0651E-04	14	2.4530E-04				

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	7.8421E-01	9.7500E-01	9.2769E-01	9.5000E-01	1.0727E+00	9.2500E-01	1.1818E+00	9.0000E-01	1.2404E+00
6	8.7500E-01	1.2481E+00	8.5000E-01	1.2123E+00	8.2500E-01	1.1441E+00	8.0000E-01	1.0555E+00	7.7500E-01	9.5762E-01
11	7.5000E-01	8.5974E-01	7.2500E-01	7.6901E-01	7.0000E-01	6.9039E-01	6.7500E-01	6.2677E-01	6.5000E-01	5.7935E-01
16	6.2500E-01	5.4794E-01	6.0000E-01	5.3132E-01	5.7500E-01	5.2760E-01	5.5000E-01	5.3444E-01	5.2500E-01	5.4935E-01
21	5.0000E-01	5.6981E-01	4.7500E-01	5.9343E-01	4.5000E-01	6.1805E-01	4.2500E-01	6.4175E-01	4.0000E-01	6.6292E-01
26	3.7500E-01	6.8026E-01	3.5000E-01	6.9277E-01	3.2500E-01	6.9971E-01	3.0000E-01	7.0063E-01	2.7500E-01	6.9532E-01
31	2.5000E-01	6.8379E-01	2.2500E-01	6.6629E-01	2.0000E-01	6.4323E-01	1.7500E-01	6.1520E-01	1.5000E-01	5.8296E-01
36	1.2500E-01	5.4741E-01	1.0000E-01	5.0954E-01	7.5000E-02	4.7044E-01	5.0000E-02	4.3127E-01	2.5000E-02	3.9317E-01
41	3.9116E-07	3.5731E-01	-2.5000E-02	3.2475E-01	-5.0000E-02	2.9648E-01	-7.5000E-02	2.7331E-01	-1.0000E-01	2.5586E-01
46	-1.2500E-01	2.4452E-01	-1.5000E-01	2.3942E-01	-1.7500E-01	2.4039E-01	-2.0000E-01	2.4697E-01	-2.2500E-01	2.5840E-01
51	-2.5000E-01	2.7366E-01	-2.7500E-01	2.9149E-01	-3.0000E-01	3.1043E-01	-3.2500E-01	3.2894E-01	-3.5000E-01	3.4542E-01
56	-3.7500E-01	3.5838E-01	-4.0000E-01	3.6647E-01	-4.2500E-01	3.6863E-01	-4.5000E-01	3.6420E-01	-4.7500E-01	3.5297E-01
61	-5.0000E-01	3.3529E-01	-5.2500E-01	3.1207E-01	-5.5000E-01	2.8480E-01	-5.7500E-01	2.5552E-01	-6.0000E-01	2.2667E-01
66	-6.2500E-01	2.0097E-01	-6.5000E-01	1.8117E-01	-6.7500E-01	1.6978E-01	-7.0000E-01	1.6871E-01	-7.2500E-01	1.7895E-01
71	-7.5000E-01	2.0019E-01	-7.7500E-01	2.3050E-01	-8.0000E-01	2.6616E-01	-8.2500E-01	3.0168E-01	-8.5000E-01	3.3012E-01
76	-8.7500E-01	3.4389E-01	-9.0000E-01	3.3626E-01	-9.2500E-01	3.0376E-01	-9.5000E-01	2.4979E-01	-9.7500E-01	1.8983E-01
81	-1.0000E+00	1.5874E-01								

(n,n′) 1-st level
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 8.0000E+00 MeV
17 LEGENDRE COEFFICIENTS were used in the reconstruction

1	3.3079E-01	2	8.9353E-02	3	2.5385E-03	4	-8.7640E-03	5	-1.7219E-02	6	-2.7593E-02	7	-3.2546E-02	8	-4.4814E-02	
9	-1.1288E-02	10	-1.4386E-02	11	4.5665E-03	12	1.5453E-02	13	1.1954E-03	14	2.1595E-03	15	7.8535E-04	16	1.6694E-04	

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	3.3972E-01	9.7500E-01	7.2157E-01	9.5000E-01	1.0956E+00	9.2500E-01	1.3608E+00	9.0000E-01	1.4922E+00
6	8.7500E-01	1.5048E+00	8.5000E-01	1.4300E+00	8.2500E-01	1.3031E+00	8.0000E-01	1.1551E+00	7.7500E-01	1.0099E+00
11	7.5000E-01	8.8355E-01	7.2500E-01	7.8462E-01	7.0000E-01	7.1583E-01	6.7500E-01	6.7552E-01	6.5000E-01	6.5923E-01
16	6.2500E-01	6.6099E-01	6.0000E-01	6.7440E-01	5.7500E-01	6.9344E-01	5.5000E-01	7.1293E-01	5.2500E-01	7.2883E-01
21	5.0000E-01	7.3837E-01	4.7500E-01	7.4000E-01	4.5000E-01	7.3325E-01	4.2500E-01	7.1859E-01	4.0000E-01	6.9712E-01
26	3.7500E-01	6.7043E-01	3.5000E-01	6.4036E-01	3.2500E-01	6.0874E-01	3.0000E-01	5.7734E-01	2.7500E-01	5.4761E-01
31	2.5000E-01	5.2071E-01	2.2500E-01	4.9736E-01	2.0000E-01	4.7790E-01	1.7500E-01	4.6225E-01	1.5000E-01	4.4998E-01
36	1.2500E-01	4.4039E-01	1.0000E-01	4.3259E-01	7.5000E-02	4.2559E-01	5.0000E-02	4.1840E-01	2.5000E-02	4.1015E-01
41	3.9116E-07	4.0014E-01	-2.5000E-02	3.8794E-01	-5.0000E-02	3.7342E-01	-7.5000E-02	3.5677E-01	-1.0000E-01	3.3851E-01
46	-1.2500E-01	3.1941E-01	-1.5000E-01	3.0048E-01	-1.7500E-01	2.8283E-01	-2.0000E-01	2.6761E-01	-2.2500E-01	2.5585E-01
51	-2.5000E-01	2.4839E-01	-2.7500E-01	2.4572E-01	-3.0000E-01	2.4795E-01	-3.2500E-01	2.5469E-01	-3.5000E-01	2.6510E-01
56	-3.7500E-01	2.7783E-01	-4.0000E-01	2.9120E-01	-4.2500E-01	3.0323E-01	-4.5000E-01	3.1185E-01	-4.7500E-01	3.1514E-01
61	-5.0000E-01	3.1150E-01	-5.2500E-01	2.9995E-01	-5.5000E-01	2.8029E-01	-5.7500E-01	2.5331E-01	-6.0000E-01	2.2084E-01
66	-6.2500E-01	1.8579E-01	-6.5000E-01	1.5192E-01	-6.7500E-01	1.2357E-01	-7.0000E-01	1.0519E-01	-7.2500E-01	1.0064E-01
71	-7.5000E-01	1.1245E-01	-7.7500E-01	1.4098E-01	-8.0000E-01	1.8360E-01	-8.2500E-01	2.3418E-01	-8.5000E-01	2.8292E-01
76	-8.7500E-01	3.1712E-01	-9.0000E-01	3.2314E-01	-9.2500E-01	2.9027E-01	-9.5000E-01	2.1730E-01	-9.7500E-01	1.2272E-01
81	-1.0000E+00	5.9977E-02								

(n,n′) 1-st level
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 1.0000E+01 MeV
19 LEGENDRE COEFFICIENTS were used in the reconstruction

1	3.9434E-01	2	1.3138E-01	3	2.4459E-02	4	-5.7173E-03	5	-2.2844E-02	6	-3.8353E-02	7	-3.8851E-02	8	-5.2186E-02
9	-2.5420E-02	10	-1.2257E-02	11	1.0680E-02	12	1.0614E-02	13	1.7856E-03	14	8.4527E-03	15	4.0522E-03	16	1.2481E-03
17	5.4309E-04	18	1.3078E-04												

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	4.9724E-01	9.7500E-01	8.1492E-01	9.5000E-01	1.3050E+00	9.2500E-01	1.6707E+00	9.0000E-01	1.8352E+00
6	8.7500E-01	1.8221E+00	8.5000E-01	1.6898E+00	8.2500E-01	1.4978E+00	8.0000E-01	1.2927E+00	7.7500E-01	1.1052E+00
11	7.5000E-01	9.5124E-01	7.2500E-01	8.3576E-01	7.0000E-01	7.5684E-01	6.7500E-01	7.0871E-01	6.5000E-01	6.8420E-01
16	6.2500E-01	6.7622E-01	6.0000E-01	6.7861E-01	5.7500E-01	6.8642E-01	5.5000E-01	6.9591E-01	5.2500E-01	7.0437E-01
21	5.0000E-01	7.0990E-01	4.7500E-01	7.1122E-01	4.5000E-01	7.0750E-01	4.2500E-01	6.9825E-01	4.0000E-01	6.8329E-01
26	3.7500E-01	6.6275E-01	3.5000E-01	6.3702E-01	3.2500E-01	6.0680E-01	3.0000E-01	5.7307E-01	2.7500E-01	5.3704E-01
31	2.5000E-01	5.0008E-01	2.2500E-01	4.6368E-01	2.0000E-01	4.2930E-01	1.7500E-01	3.9826E-01	1.5000E-01	3.7169E-01
36	1.2500E-01	3.5038E-01	1.0000E-01	3.3474E-01	7.5000E-02	3.2473E-01	5.0000E-02	3.1993E-01	2.5000E-02	3.1949E-01
41	3.9116E-07	3.2226E-01	-2.5000E-02	3.2685E-01	-5.0000E-02	3.3178E-01	-7.5000E-02	3.3562E-01	-1.0000E-01	3.3709E-01
46	-1.2500E-01	3.3522E-01	-1.5000E-01	3.2942E-01	-1.7500E-01	3.1956E-01	-2.0000E-01	3.0600E-01	-2.2500E-01	2.8953E-01
51	-2.5000E-01	2.7130E-01	-2.7500E-01	2.5273E-01	-3.0000E-01	2.3531E-01	-3.2500E-01	2.2045E-01	-3.5000E-01	2.0929E-01
56	-3.7500E-01	2.0252E-01	-4.0000E-01	2.0029E-01	-4.2500E-01	2.0210E-01	-4.5000E-01	2.0684E-01	-4.7500E-01	2.1288E-01
61	-5.0000E-01	2.1824E-01	-5.2500E-01	2.2086E-01	-5.5000E-01	2.1891E-01	-5.7500E-01	2.1113E-01	-6.0000E-01	1.9718E-01
66	-6.2500E-01	1.7782E-01	-6.5000E-01	1.5508E-01	-6.7500E-01	1.3215E-01	-7.0000E-01	1.1306E-01	-7.2500E-01	1.0214E-01
71	-7.5000E-01	1.0314E-01	-7.7500E-01	1.1830E-01	-8.0000E-01	1.4721E-01	-8.2500E-01	1.8591E-01	-8.5000E-01	2.2643E-01
76	-8.7500E-01	2.5709E-01	-9.0000E-01	2.6429E-01	-9.2500E-01	2.3628E-01	-9.5000E-01	1.6992E-01	-9.7500E-01	8.1297E-02
81	-1.0000E+00	2.1565E-02								

(n,n′) 1-st level
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 1.5000E+01 MeV
21 LEGENDRE COEFFICIENTS were used in the reconstruction

1	5.4709E-01	2	2.7126E-01	3	1.2607E-01	4	7.0281E-02	5	3.2458E-02	6	1.1944E-02	7	-2.6241E-03	8	-1.1102E-02
9	-7.9125E-03	10	-2.6115E-03	11	1.2361E-02	12	7.3718E-03	13	2.8508E-03	14	6.4165E-03	15	9.4911E-03	16	1.3862E-02
17	1.2617E-02	18	5.8862E-03	19	3.0561E-03	20	1.1143E-03								

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	3.9496E+00	9.7500E-01	2.2824E+00	9.5000E-01	2.3209E+00	9.2500E-01	2.4003E+00	9.0000E-01	2.2279E+00
6	8.7500E-01	1.9181E+00	8.5000E-01	1.6158E+00	8.2500E-01	1.3924E+00	8.0000E-01	1.2519E+00	7.7500E-01	1.1644E+00
11	7.5000E-01	1.0955E+00	7.2500E-01	1.0223E+00	7.0000E-01	9.3740E-01	6.7500E-01	8.4536E-01	6.5000E-01	7.5694E-01
16	6.2500E-01	6.8306E-01	6.0000E-01	6.3103E-01	5.7500E-01	6.0288E-01	5.5000E-01	5.9563E-01	5.2500E-01	6.0276E-01
21	5.0000E-01	6.1615E-01	4.7500E-01	6.2794E-01	4.5000E-01	6.3189E-01	4.2500E-01	6.2416E-01	4.0000E-01	6.0355E-01
26	3.7500E-01	5.7112E-01	3.5000E-01	5.2969E-01	3.2500E-01	4.8304E-01	3.0000E-01	4.3523E-01	2.7500E-01	3.8999E-01
31	2.5000E-01	3.5025E-01	2.2500E-01	3.1793E-01	2.0000E-01	2.9387E-01	1.7500E-01	2.7786E-01	1.5000E-01	2.6889E-01
36	1.2500E-01	2.6536E-01	1.0000E-01	2.6537E-01	7.5000E-02	2.6699E-01	5.0000E-02	2.6849E-01	2.5000E-02	2.6854E-01
41	3.9116E-07	2.6625E-01	-2.5000E-02	2.6128E-01	-5.0000E-02	2.5375E-01	-7.5000E-02	2.4414E-01	-1.0000E-01	2.3316E-01
46	-1.2500E-01	2.2157E-01	-1.5000E-01	2.1003E-01	-1.7500E-01	1.9898E-01	-2.0000E-01	1.8858E-01	-2.2500E-01	1.7873E-01
51	-2.5000E-01	1.6911E-01	-2.7500E-01	1.5937E-01	-3.0000E-01	1.4923E-01	-3.2500E-01	1.3868E-01	-3.5000E-01	1.2807E-01
56	-3.7500E-01	1.1810E-01	-4.0000E-01	1.0975E-01	-4.2500E-01	1.0409E-01	-4.5000E-01	1.0201E-01	-4.7500E-01	1.0391E-01
61	-5.0000E-01	1.0944E-01	-5.2500E-01	1.1742E-01	-5.5000E-01	1.2589E-01	-5.7500E-01	1.3237E-01	-6.0000E-01	1.3444E-01
66	-6.2500E-01	1.3031E-01	-6.5000E-01	1.1944E-01	-6.7500E-01	1.0300E-01	-7.0000E-01	8.3845E-02	-7.2500E-01	6.6100E-02
71	-7.5000E-01	5.4154E-02	-7.7500E-01	5.1378E-02	-8.0000E-01	5.8866E-02	-8.2500E-01	7.4738E-02	-8.5000E-01	9.4490E-02
76	-8.7500E-01	1.1257E-01	-9.0000E-01	1.2471E-01	-9.2500E-01	1.2954E-01	-9.5000E-01	1.2670E-01	-9.7500E-01	1.0836E-01
81	-1.0000E+00	4.2226E-02								

(n,n′) 1-st level
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 2.0000E+01 MeV
21 LEGENDRE COEFFICIENTS were used in the reconstruction

1	6.4075E-01	2	3.7076E-01	3	2.1212E-01	4	1.3412E-01	5	9.1189E-02	6	6.6498E-02	7	5.0334E-02	8	3.7445E-02
9	3.0387E-02	10	2.5636E-02	11	2.4216E-02	12	2.1648E-02	13	1.2255E-02	14	-1.8475E-03	15	-9.6291E-03	16	-2.2316E-03
17	1.1152E-02	18	1.9874E-02	19	2.0563E-02	20	1.3199E-02								

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	7.6575E+00	9.7500E-01	3.7666E+00	9.5000E-01	3.0843E+00	9.2500E-01	2.5114E+00	9.0000E-01	1.8917E+00
6	8.7500E-01	1.5059E+00	8.5000E-01	1.4196E+00	8.2500E-01	1.4994E+00	8.0000E-01	1.5692E+00	7.7500E-01	1.5188E+00
11	7.5000E-01	1.3331E+00	7.2500E-01	1.0670E+00	7.0000E-01	8.0132E-01	6.7500E-01	6.0370E-01	6.5000E-01	5.0777E-01
16	6.2500E-01	5.0977E-01	6.0000E-01	5.7843E-01	5.7500E-01	6.7041E-01	5.5000E-01	7.4533E-01	5.2500E-01	7.7605E-01
21	5.0000E-01	7.5292E-01	4.7500E-01	6.8239E-01	4.5000E-01	5.8196E-01	4.2500E-01	4.7340E-01	4.0000E-01	3.7662E-01
26	3.7500E-01	3.0523E-01	3.5000E-01	2.6466E-01	3.2500E-01	2.5254E-01	3.0000E-01	2.6088E-01	2.7500E-01	2.7908E-01
31	2.5000E-01	2.9694E-01	2.2500E-01	3.0690E-01	2.0000E-01	3.0535E-01	1.7500E-01	2.9254E-01	1.5000E-01	2.7177E-01
36	1.2500E-01	2.4782E-01	1.0000E-01	2.2544E-01	7.5000E-02	2.0797E-01	5.0000E-02	1.9667E-01	2.5000E-02	1.9067E-01
41	3.9116E-07	1.8751E-01	-2.5000E-02	1.8408E-01	-5.0000E-02	1.7767E-01	-7.5000E-02	1.6685E-01	-1.0000E-01	1.5186E-01
46	-1.2500E-01	1.3457E-01	-1.5000E-01	1.1796E-01	-1.7500E-01	1.0517E-01	-2.0000E-01	9.8615E-02	-2.2500E-01	9.9169E-02
51	-2.5000E-01	1.0583E-01	-2.7500E-01	1.1585E-01	-3.0000E-01	1.2543E-01	-3.2500E-01	1.3075E-01	-3.5000E-01	1.2901E-01
56	-3.7500E-01	1.1940E-01	-4.0000E-01	1.0340E-01	-4.2500E-01	8.4507E-02	-4.5000E-01	6.7314E-02	-4.7500E-01	5.6116E-02
61	-5.0000E-01	5.3492E-02	-5.2500E-01	5.9300E-02	-5.5000E-01	7.0476E-02	-5.7500E-01	8.1870E-02	-6.0000E-01	8.7979E-02
66	-6.2500E-01	8.5103E-02	-6.5000E-01	7.3156E-02	-6.7500E-01	5.6252E-02	-7.0000E-01	4.1481E-02	-7.2500E-01	3.5892E-02
71	-7.5000E-01	4.2647E-02	-7.7500E-01	5.8197E-02	-8.0000E-01	7.2708E-02	-8.2500E-01	7.5174E-02	-8.5000E-01	6.2066E-02
76	-8.7500E-01	4.4243E-02	-9.0000E-01	4.2864E-02	-9.2500E-01	6.6509E-02	-9.5000E-01	7.9819E-02	-9.7500E-01	3.0430E-02
81	-1.0000E+00	1.3327E-01								

(n,n′) 5-th level
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 6.0000E+00 MeV
15 LEGENDRE COEFFICIENTS were used in the reconstruction

1	4.5223E-08	2	5.2500E-02	3	2.1877E-08	4	-9.3799E-03	5	2.5352E-09	6	-2.5216E-03	7	4.3270E-09	8	-3.7786E-03
9	3.2170E-10	10	-1.6203E-03	11	1.0335E-08	12	1.9459E-06	13	-1.3539E-08	14	2.7093E-06				

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	5.2358E-01	9.7500E-01	5.7102E-01	9.5000E-01	5.9624E-01	9.2500E-01	6.0634E-01	9.0000E-01	6.0667E-01
6	8.7500E-01	6.0108E-01	8.5000E-01	5.9233E-01	8.2500E-01	5.8225E-01	8.0000E-01	5.7205E-01	7.7500E-01	5.6240E-01
11	7.5000E-01	5.5364E-01	7.2500E-01	5.4585E-01	7.0000E-01	5.3897E-01	6.7500E-01	5.3284E-01	6.5000E-01	5.2726E-01
16	6.2500E-01	5.2204E-01	6.0000E-01	5.1698E-01	5.7500E-01	5.1195E-01	5.5000E-01	5.0682E-01	5.2500E-01	5.0154E-01
21	5.0000E-01	4.9607E-01	4.7500E-01	4.9041E-01	4.5000E-01	4.8460E-01	4.2500E-01	4.7870E-01	4.0000E-01	4.7277E-01
26	3.7500E-01	4.6689E-01	3.5000E-01	4.6113E-01	3.2500E-01	4.5558E-01	3.0000E-01	4.5030E-01	2.7500E-01	4.4534E-01
31	2.5000E-01	4.4076E-01	2.2500E-01	4.3659E-01	2.0000E-01	4.3286E-01	1.7500E-01	4.2957E-01	1.5000E-01	4.2674E-01
36	1.2500E-01	4.2437E-01	1.0000E-01	4.2244E-01	7.5000E-02	4.2096E-01	5.0000E-02	4.1991E-01	2.5000E-02	4.1928E-01
41	3.9116E-07	4.1907E-01	-2.5000E-02	4.1928E-01	-5.0000E-02	4.1991E-01	-7.5000E-02	4.2096E-01	-1.0000E-01	4.2244E-01
46	-1.2500E-01	4.2437E-01	-1.5000E-01	4.2674E-01	-1.7500E-01	4.2957E-01	-2.0000E-01	4.3286E-01	-2.2500E-01	4.3659E-01
51	-2.5000E-01	4.4076E-01	-2.7500E-01	4.4534E-01	-3.0000E-01	4.5030E-01	-3.2500E-01	4.5558E-01	-3.5000E-01	4.6113E-01
56	-3.7500E-01	4.6689E-01	-4.0000E-01	4.7277E-01	-4.2500E-01	4.7870E-01	-4.5000E-01	4.8460E-01	-4.7500E-01	4.9041E-01
61	-5.0000E-01	4.9607E-01	-5.2500E-01	5.0154E-01	-5.5000E-01	5.0682E-01	-5.7500E-01	5.1195E-01	-6.0000E-01	5.1698E-01
66	-6.2500E-01	5.2204E-01	-6.5000E-01	5.2726E-01	-6.7500E-01	5.3284E-01	-7.0000E-01	5.3897E-01	-7.2500E-01	5.4585E-01
71	-7.5000E-01	5.5364E-01	-7.7500E-01	5.6240E-01	-8.0000E-01	5.7205E-01	-8.2500E-01	5.8225E-01	-8.5000E-01	5.9233E-01
76	-8.7500E-01	6.0108E-01	-9.0000E-01	6.0667E-01	-9.2500E-01	6.0634E-01	-9.5000E-01	5.9624E-01	-9.7500E-01	5.7102E-01
81	-1.0000E+00	5.2358E-01								

(n,n′) 5-th level
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 8.0000E+00 MeV
17 LEGENDRE COEFFICIENTS were used in the reconstruction

1	6.2121E-08	2	1.5627E-02	3	1.5465E-08	4	-6.5430E-03	5	1.2224E-08	6	1.5903E-03	7	5.7839E-09	8	-5.1614E-03
9	-1.2529E-09	10	-2.9302E-03	11	9.7501E-09	12	1.5981E-06	13	-1.2682E-08	14	2.2376E-06	15	2.3721E-09	16	2.9566E-06

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	4.4542E-01	9.7500E-01	5.0611E-01	9.5000E-01	5.3619E-01	9.2500E-01	5.4662E-01	9.0000E-01	5.4541E-01
6	8.7500E-01	5.3822E-01	8.5000E-01	5.2886E-01	8.2500E-01	5.1975E-01	8.0000E-01	5.1225E-01	7.7500E-01	5.0698E-01
11	7.5000E-01	5.0402E-01	7.2500E-01	5.0315E-01	7.0000E-01	5.0393E-01	6.7500E-01	5.0585E-01	6.5000E-01	5.0840E-01
16	6.2500E-01	5.1109E-01	6.0000E-01	5.1354E-01	5.7500E-01	5.1542E-01	5.5000E-01	5.1652E-01	5.2500E-01	5.1673E-01
21	5.0000E-01	5.1599E-01	4.7500E-01	5.1433E-01	4.5000E-01	5.1185E-01	4.2500E-01	5.0867E-01	4.0000E-01	5.0493E-01
26	3.7500E-01	5.0081E-01	3.5000E-01	4.9646E-01	3.2500E-01	4.9204E-01	3.0000E-01	4.8768E-01	2.7500E-01	4.8351E-01
31	2.5000E-01	4.7962E-01	2.2500E-01	4.7607E-01	2.0000E-01	4.7290E-01	1.7500E-01	4.7016E-01	1.5000E-01	4.6783E-01
36	1.2500E-01	4.6590E-01	1.0000E-01	4.6438E-01	7.5000E-02	4.6322E-01	5.0000E-02	4.6241E-01	2.5000E-02	4.6194E-01
41	3.9116E-07	4.6178E-01	-2.5000E-02	4.6194E-01	-5.0000E-02	4.6241E-01	-7.5000E-02	4.6322E-01	-1.0000E-01	4.6438E-01
46	-1.2500E-01	4.6590E-01	-1.5000E-01	4.6783E-01	-1.7500E-01	4.7016E-01	-2.0000E-01	4.7290E-01	-2.2500E-01	4.7607E-01
51	-2.5000E-01	4.7962E-01	-2.7500E-01	4.8351E-01	-3.0000E-01	4.8768E-01	-3.2500E-01	4.9204E-01	-3.5000E-01	4.9646E-01
56	-3.7500E-01	5.0081E-01	-4.0000E-01	5.0493E-01	-4.2500E-01	5.0867E-01	-4.5000E-01	5.1185E-01	-4.7500E-01	5.1433E-01
61	-5.0000E-01	5.1599E-01	-5.2500E-01	5.1673E-01	-5.5000E-01	5.1652E-01	-5.7500E-01	5.1542E-01	-6.0000E-01	5.1354E-01
66	-6.2500E-01	5.1109E-01	-6.5000E-01	5.0840E-01	-6.7500E-01	5.0585E-01	-7.0000E-01	5.0393E-01	-7.2500E-01	5.0315E-01
71	-7.5000E-01	5.0402E-01	-7.7500E-01	5.0698E-01	-8.0000E-01	5.1225E-01	-8.2500E-01	5.1975E-01	-8.5000E-01	5.2886E-01
76	-8.7500E-01	5.3822E-01	-9.0000E-01	5.4541E-01	-9.2500E-01	5.4662E-01	-9.5000E-01	5.3619E-01	-9.7500E-01	5.0611E-01
81	-1.0000E+00	4.4542E-01								

(n,n′) 5-th level
Emitted Neutron Angular Distributions

Reconstructed Angular Distribution in the CENTER OF MASS System at 1.0000E+01 MeV
19 LEGENDRE COEFFICIENTS were used in the reconstruction

1	4.3905E-08	2	-1.0491E-02	3	2.3482E-08	4	-6.4642E-04	5	1.0224E-08	6	7.6280E-04	7	9.8493E-09	8	-2.2566E-03
9	4.1824E-09	10	-2.2909E-03	11	1.2095E-08	12	1.6098E-06	13	-1.2819E-08	14	2.2461E-06	15	3.2735E-09	16	2.9440E-06
17	-2.0727E-09	18	3.7751E-06													

F(MU)=(sum over L) (0.5*(2L+1)*F(L,E)*P(L,MU))

Index	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)	MU	F (MU)
1	1.0000E+00	4.3276E-01	9.7500E-01	4.7008E-01	9.5000E-01	4.8821E-01	9.2500E-01	4.9431E-01	9.0000E-01	4.9366E-01
6	8.7500E-01	4.8994E-01	8.5000E-01	4.8555E-01	8.2500E-01	4.8191E-01	8.0000E-01	4.7975E-01	7.7500E-01	4.7930E-01
11	7.5000E-01	4.8047E-01	7.2500E-01	4.8298E-01	7.0000E-01	4.8647E-01	6.7500E-01	4.9054E-01	6.5000E-01	4.9482E-01
16	6.2500E-01	4.9898E-01	6.0000E-01	5.0277E-01	5.7500E-01	5.0601E-01	5.5000E-01	5.0859E-01	5.2500E-01	5.1047E-01
21	5.0000E-01	5.1167E-01	4.7500E-01	5.1226E-01	4.5000E-01	5.1233E-01	4.2500E-01	5.1200E-01	4.0000E-01	5.1139E-01
26	3.7500E-01	5.1064E-01	3.5000E-01	5.0985E-01	3.2500E-01	5.0912E-01	3.0000E-01	5.0853E-01	2.7500E-01	5.0812E-01
31	2.5000E-01	5.0792E-01	2.2500E-01	5.0792E-01	2.0000E-01	5.0812E-01	1.7500E-01	5.0848E-01	1.5000E-01	5.0894E-01
36	1.2500E-01	5.0947E-01	1.0000E-01	5.0999E-01	7.5000E-02	5.1045E-01	5.0000E-02	5.1082E-01	2.5000E-02	5.1106E-01
41	3.9116E-07	5.1114E-01	-2.5000E-02	5.1106E-01	-5.0000E-02	5.1082E-01	-7.5000E-02	5.1045E-01	-1.0000E-01	5.0999E-01
46	-1.2500E-01	5.0947E-01	-1.5000E-01	5.0894E-01	-1.7500E-01	5.0848E-01	-2.0000E-01	5.0812E-01	-2.2500E-01	5.0792E-01
51	-2.5000E-01	5.0792E-01	-2.7500E-01	5.0812E-01	-3.0000E-01	5.0853E-01	-3.2500E-01	5.0912E-01	-3.5000E-01	5.0985E-01
56	-3.7500E-01	5.1064E-01	-4.0000E-01	5.1139E-01	-4.2500E-01	5.1200E-01	-4.5000E-01	5.1233E-01	-4.7500E-01	5.1226E-01
61	-5.0000E-01	5.1167E-01	-5.2500E-01	5.1047E-01	-5.5000E-01	5.0859E-01	-5.7500E-01	5.0601E-01	-6.0000E-01	5.0277E-01
66	-6.2500E-01	4.9898E-01	-6.5000E-01	4.9482E-01	-6.7500E-01	4.9054E-01	-7.0000E-01	4.8647E-01	-7.2500E-01	4.8298E-01
71	-7.5000E-01	4.8047E-01	-7.7500E-01	4.7930E-01	-8.0000E-01	4.7975E-01	-8.2500E-01	4.8191E-01	-8.5000E-01	4.8555E-01
76	-8.7500E-01	4.8994E-01	-9.0000E-01	4.9366E-01	-9.2500E-01	4.9431E-01	-9.5000E-01	4.8821E-01	-9.7500E-01	4.7009E-01
81	-1.0000E+00	4.3276E-01								

MT = 2					
L/E	6.00	8.00	10.00	15.00	20.00
1	8.68621E-01	8.59251E-01	8.63169E-01	9.19883E-01	9.51728E-01
2	7.49542E-01	7.36649E-01	7.29487E-01	8.15466E-01	8.82024E-01
3	6.40956E-01	6.43397E-01	6.30112E-01	7.16086E-01	8.06152E-01
4	5.22719E-01	5.52529E-01	5.53297E-01	6.29744E-01	7.29894E-01
5	3.98662E-01	4.54118E-01	4.80018E-01	5.57092E-01	6.56492E-01
6	2.72203E-01	3.54615E-01	4.07670E-01	4.95818E-01	5.88890E-01
7	1.71619E-01	2.61259E-01	3.38230E-01	4.41877E-01	5.27417E-01
8	1.13417E-01	1.97991E-01	2.78587E-01	3.92938E-01	4.71264E-01
9	6.69275E-02	1.52647E-01	2.34240E-01	3.46132E-01	4.18721E-01
10	2.94877E-02	9.84049E-02	1.84001E-01	2.99781E-01	3.68042E-01
11	1.02041E-02	4.95463E-02	1.19617E-01	2.48381E-01	3.17340E-01
12	2.80649E-03	1.91470E-02	6.19888E-02	1.87776E-01	2.65009E-01
13	6.15072E-04	5.95655E-03	2.66134E-02	1.25978E-01	2.09717E-01
14	1.65826E-04	1.75360E-03	9.99820E-03	7.48679E-02	1.54709E-01
15		4.76589E-04	3.20537E-03	3.93390E-02	1.06317E-01
16		1.70500E-04	9.70100E-04	1.82965E-02	6.78583E-02
17			3.39624E-04	7.58744E-03	3.96580E-02
18			1.85069E-04	2.86635E-03	2.08853E-02
19				1.10636E-03	9.93233E-03
20				5.17382E-04	4.36333E-03
MT = 51					
L/E	6.00	8.00	10.00	15.00	20.00
1	2.80032E-01	3.30794E-01	3.94335E-01	5.47090E-01	6.40755E-01
2	7.80598E-02	8.93529E-02	1.31380E-01	2.71263E-01	3.70757E-01
3	7.19920E-03	2.53851E-03	2.44590E-02	1.26073E-01	2.12124E-01
4	1.03864E-02	-8.76398E-03	-5.71734E-03	7.02813E-02	1.34125E-01
5	8.60930E-03	-1.72187E-02	-2.28444E-02	3.24576E-02	9.11888E-02
6	-1.58324E-02	-2.75928E-02	-3.83526E-02	1.19443E-02	6.64979E-02
7	-3.52215E-02	-3.25462E-02	-3.88507E-02	-2.62410E-03	5.03343E-02
8	-3.81407E-02	-4.48136E-02	-5.21863E-02	-1.11017E-02	3.74453E-02
9	1.05110E-02	-1.12876E-02	-2.54197E-02	-7.91248E-03	3.03869E-02
10	8.06777E-03	-1.43863E-02	-1.22565E-02	-2.61148E-03	2.56362E-02
11	-1.94725E-03	4.56655E-03	1.06799E-02	1.23608E-02	2.42165E-02
12	5.47396E-03	1.54528E-02	1.06136E-02	7.37176E-03	2.16484E-02
13	5.06510E-04	1.19537E-03	1.78562E-03	2.85078E-03	1.22554E-02
14	2.45303E-04	2.15947E-03	8.45268E-03	6.41650E-03	-1.84748E-03
15		7.85353E-04	4.05224E-03	9.49107E-03	-9.62905E-03
16		1.66945E-04	1.24810E-03	1.38620E-02	-2.23156E-03
17			5.43094E-04	1.26172E-02	1.11515E-02
18			1.30784E-04	5.88622E-03	1.98741E-02
19				3.05614E-03	2.05633E-02
20				1.11426E-03	1.31986E-02
MT = 55					
L/E	6.00	8.00	10.00	15.00	20.00
1	4.52232E-08	6.21212E-08	4.39047E-08		
2	5.25001E-02	1.56269E-02	-1.04911E-02		
3	2.18765E-08	1.54649E-08	2.34822E-08		
4	-9.37990E-03	-6.54300E-03	-6.46418E-04		
5	2.53515E-09	1.22237E-08	1.02236E-08		
6	-2.52160E-03	1.59026E-03	7.62804E-04		
7	4.32700E-09	5.78390E-09	9.84934E-09		
8	-3.77856E-03	-5.16137E-03	-2.25658E-03		
9	3.21699E-10	-1.25293E-09	4.18236E-09		
10	-1.62032E-03	-2.93023E-03	-2.29095E-03		
11	1.03349E-08	9.75011E-09	1.20948E-08		
12	1.94594E-06	1.59810E-06	1.60984E-06		
13	-1.35387E-08	-1.26824E-08	-1.28186E-08		
14	2.70932E-06	2.23760E-06	2.24614E-06		
15		2.37210E-09	3.27350E-09		
16		2.95663E-06	2.94399E-06		
17			-2.07271E-09		
18			3.77511E-06		

ANNEX 3

File# 5
Emitted Neutron Energy Distributions

Section (MT)	Reaction type	Distribution law (LF)	Incident energies (NP)	Energy range (eV) from	to	Interp. regions (NR)	Points for emitted function (NE)	(NF)	Cut-off energy (eV) (U)
16	(n,2n)	EVAPORATION(9)	2	6.3359E+06	2.0000E+07	1	15	0	6.3359E+06
		EVAPORATION(9)	2	6.3359E+06	2.0000E+07	1	15	0	6.3359E+06
17	(n,3n)	EVAPORATION(9)	2	1.1600E+07	2.0000E+07	1	10	0	1.1600E+07
		EVAPORATION(9)	2	1.1600E+07	2.0000E+07	1	10	0	1.1600E+07
		EVAPORATION(9)	2	1.1600E+07	2.0000E+07	1	10	0	1.1600E+07
18	(n,fission)	MADLAND-NIX(12)	2	1.0000E+04	2.0000E+07	1	27	0	0.0000E+00
37	(n,4n)	EVAPORATION(9)	2	1.8160E+07	2.0000E+07	1	3	0	1.8160E+07
		EVAPORATION(9)	2	1.8160E+07	2.0000E+07	1	3	0	1.8160E+07
		EVAPORATION(9)	2	1.8160E+07	2.0000E+07	1	3	0	1.8160E+07
		EVAPORATION(9)	2	1.8160E+07	2.0000E+07	1	3	0	1.8160E+07
91	(n,n′) continuum	EVAPORATION(9)	2	1.1568E+06	2.0000E+07	1	20	0	1.1568E+06

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(n,2n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 6.3359E+06 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	6.3359E+06	5.0000E-01	2.0000E+07	5.0000E-01

Interpolation law between energies

Range	Description
1 TO 15	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	6.3359E+06	4.9628E+05	7.0000E+06	5.2255E+05	8.0000E+06	5.5955E+05	9.0000E+06	5.9404E+05	1.0000E+07	6.2647E+05
6	1.1000E+07	6.5716E+05	1.2000E+07	6.8636E+05	1.3000E+07	7.1428E+05	1.4000E+07	7.4107E+05	1.5000E+07	7.6685E+05
11	1.6000E+07	7.9173E+05	1.7000E+07	8.1580E+05	1.8000E+07	8.3914E+05	1.9000E+07	8.6180E+05	2.0000E+07	8.8384E+05

(n,2n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 6.3359E+06 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	6.3359E+06	5.0000E-01	2.0000E+07	5.0000E-01

Interpolation law between energies

Range	Description
1 TO 15	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	6.3359E+06	3.9182E+05	7.0000E+06	3.9182E+05	8.0000E+06	3.9182E+05	9.0000E+06	3.9182E+05	1.0000E+07	3.9182E+05
6	1.1000E+07	4.3554E+05	1.2000E+07	4.7824E+05	1.3000E+07	5.1707E+05	1.4000E+07	5.5292E+05	1.5000E+07	5.8639E+05
11	1.6000E+07	6.1788E+05	1.7000E+07	6.4772E+05	1.8000E+07	6.7614E+05	1.9000E+07	7.0332E+05	2.0000E+07	7.2941E+05

(n,3n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 1.1600E+07 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.1600E+07	3.3333E-01	2.0000E+07	3.3333E-01

Interpolation law between energies

Range	Description
1 TO 10	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	1.1600E+07	6.7483E+05	1.2000E+07	6.8636E+05	1.3000E+07	7.1428E+05	1.4000E+07	7.4107E+05	1.5000E+07	7.6685E+05
6	1.6000E+07	7.9173E+05	1.7000E+07	8.1580E+05	1.8000E+07	8.3914E+05	1.9000E+07	8.6180E+05	2.0000E+07	8.8384E+05

(n,3n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 1.1600E+07 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.1600E+07	3.3333E-01	2.0000E+07	3.3333E-01

Interpolation law between energies

Range	Description
1 TO 10	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	1.1600E+07	4.6167E+05	1.2000E+07	4.7824E+05	1.3000E+07	5.1707E+05	1.4000E+07	5.5292E+05	1.5000E+07	5.8639E+05
6	1.6000E+07	6.1788E+05	1.7000E+07	6.4772E+05	1.8000E+07	6.7614E+05	1.9000E+07	7.0332E+05	2.0000E+07	7.2941E+05

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(n,3n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 1.1600E+07 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.1600E+07	3.3333E-01	2.0000E+07	3.3333E-01

Interpolation law between energies

Range	Description
1 TO 10	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	1.1600E+07	4.0609E+05	1.2000E+07	4.0609E+05	1.3000E+07	4.0609E+05	1.4000E+07	4.0609E+05	1.5000E+07	4.0609E+05
6	1.6000E+07	4.1732E+05	1.7000E+07	4.6480E+05	1.8000E+07	5.0738E+05	1.9000E+07	5.4632E+05	2.0000E+07	5.8241E+05

(n,fission)
Emitted Neutron Energy Distributions

MADLAND-NIX FISSION spectrum, TM(E)
Maximum energy of the secondary particle is 0.0000E+00 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.0000E+04	1.0000E+00	2.0000E+07	1.0000E+00

Interpolation law between energies

Range	Description
1 TO 27	Y LINEAR IN X

Average Light Fragment KINETIC ENERGY 9.7383E+05 eV
Average Heavy Fragment KINETIC ENERGY 5.2711E+05 eV

Index	eV eV	TM (E) eV	eV eV	TM (E) eV	eV eV	TM (E) eV	eV eV	TM (E) eV	eV eV	TM (E) eV
1	1.0000E+04	1.0333E+06	5.0000E+05	1.0430E+06	1.0000E+06	1.0528E+06	1.5000E+06	1.0625E+06	2.0000E+06	1.0722E+06
6	2.5000E+06	1.0817E+06	3.0000E+06	1.0912E+06	3.5000E+06	1.1006E+06	4.0000E+06	1.1099E+06	4.5000E+06	1.1191E+06
11	5.0000E+06	1.1283E+06	5.5000E+06	1.1374E+06	6.0000E+06	1.1464E+06	7.0000E+06	1.1642E+06	8.0000E+06	1.1817E+06
16	9.0000E+06	1.1990E+06	1.0000E+07	1.2160E+06	1.1000E+07	1.2328E+06	1.2000E+07	1.2494E+06	1.3000E+07	1.2658E+06
21	1.4000E+07	1.2819E+06	1.5000E+07	1.2979E+06	1.6000E+07	1.3137E+06	1.7000E+07	1.3292E+06	1.8000E+07	1.3446E+06
26	1.9000E+07	1.3598E+06	2.0000E+07	1.3749E+06						

(n,4n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 1.8160E+07 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.8160E+07	2.5000E-01	2.0000E+07	2.5000E-01

Interpolation law between energies

Range	Description
1 TO 3	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	1.8160E+07	8.4282E+05	1.9000E+07	8.6180E+05	2.0000E+07	8.8384E+05

(n,4n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 1.8160E+07 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.8160E+07	2.5000E-01	2.0000E+07	2.5000E-01

Interpolation law between energies

Range	Description
1 TO 3	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	1.8160E+07	6.8058E+05	1.9000E+07	7.0332E+05	2.0000E+07	7.2941E+05

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(n,4n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 1.8160E+07 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.8160E+07	2.5000E-01	2.0000E+07	2.5000E-01

Interpolation law between energies

Range	Description
1 TO 3	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	1.8160E+07	5.1385E+05	1.9000E+07	5.4632E+05	2.0000E+07	5.8241E+05

(n,4n)
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 1.8160E+07 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.8160E+07	2.5000E-01	2.0000E+07	2.5000E-01

Interpolation law between energies

Range	Description
1 TO 3	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	1.8160E+07	3.9910E+05	1.9000E+07	3.9910E+05	2.0000E+07	3.9910E+05

(n,n′) continuum
Emitted Neutron Energy Distributions

SIMPLE EVAPORATION spectrum, THETA = THETA(E)
Maximum energy of the secondary particle is 1.1568E+06 eV

Interpolation law between energies

Range	Description
1 TO 2	Y LINEAR IN X

Index	Energy eV	P(E)	Energy eV	P(E)
1	1.1568E+06	1.0000E+00	2.0000E+07	1.0000E+00

Interpolation law between energies

Range	Description
1 TO 20	Y LINEAR IN X

Index	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV	Energy eV	Theta (E) eV
1	1.1568E+06	4.0112E+05	2.0000E+06	4.0112E+05	4.2297E+06	4.0112E+05	4.5000E+06	4.1395E+05	5.0000E+06	4.3810E+05
6	6.0000E+06	4.8238E+05	7.0000E+06	5.2255E+05	8.0000E+06	5.5955E+05	9.0000E+06	5.9404E+05	1.0000E+07	6.2647E+05
11	1.1000E+07	6.5716E+05	1.2000E+07	6.8636E+05	1.3000E+07	7.1428E+05	1.4000E+07	7.4107E+05	1.5000E+07	7.6685E+05
16	1.6000E+07	7.9173E+05	1.7000E+07	8.1580E+05	1.8000E+07	8.3914E+05	1.9000E+07	8.6180E+05	2.0000E+07	8.8384E+05

ANNEX 4

File# 13
Photon Cross-Sections (Neutron Induced)

Section (MT)	Reaction type	Photon energy (MeV) (EG)	Source level (MeV) (ES)	Energy points (NP)	Energy range (eV) from	to	Interp. regions (NR)
4	(n,Inelastic)	1.1075E+00	1.1520E+00	12	4.4685E+04	2.0000E+07	1
		1.1020E+00	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		1.0575E+00	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		9.9550E-01	1.0400E+00	12	4.4685E+04	2.0000E+07	1
		9.9500E-01	9.9500E-01	13	4.4685E+04	2.0000E+07	1
		9.7480E-01	1.1220E+00	12	4.4685E+04	2.0000E+07	1
		9.7450E-01	1.0190E+00	12	4.4685E+04	2.0000E+07	1
		9.5480E-01	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		9.5050E-01	9.9500E-01	13	4.4685E+04	2.0000E+07	1
		9.1680E-01	1.0640E+00	12	4.4685E+04	2.0000E+07	1
		9.1150E-01	9.5600E-01	13	4.4685E+04	2.0000E+07	1
		8.9280E-01	1.0400E+00	12	4.4685E+04	2.0000E+07	1
		8.7180E-01	1.0190E+00	12	4.4685E+04	2.0000E+07	1
		8.6500E-01	8.6500E-01	13	4.4685E+04	2.0000E+07	1
		8.4780E-01	9.9500E-01	13	4.4685E+04	2.0000E+07	1
		8.2050E-01	8.6500E-01	13	4.4685E+04	2.0000E+07	1
		8.1610E-01	1.1220E+00	12	4.4685E+04	2.0000E+07	1
		7.8750E-01	8.3200E-01	13	4.4685E+04	2.0000E+07	1
		7.8000E-01	7.8000E-01	13	4.4685E+04	2.0000E+07	1
		7.7980E-01	9.2700E-01	13	4.4685E+04	2.0000E+07	1
		7.3550E-01	7.8000E-01	13	4.4685E+04	2.0000E+07	1
		7.3410E-01	1.0400E+00	12	4.4685E+04	2.0000E+07	1
		6.8480E-01	8.3200E-01	13	4.4685E+04	2.0000E+07	1
		6.2110E-01	9.2700E-01	13	4.4685E+04	2.0000E+07	1
		3.7200E-01	1.1520E+00	12	4.4685E+04	2.0000E+07	1
		3.2200E-01	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		3.2000E-01	1.1520E+00	12	4.4685E+04	2.0000E+07	1
		3.0800E-01	1.0870E+00	12	4.4685E+04	2.0000E+07	1
		2.9000E-01	1.1220E+00	12	4.4685E+04	2.0000E+07	1
		2.8700E-01	1.1520E+00	12	4.4685E+04	2.0000E+07	1
		2.7000E-01	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		2.6140E-01	7.7900E-01	13	4.4685E+04	2.0000E+07	1
		2.3900E-01	1.0190E+00	12	4.4685E+04	2.0000E+07	1
		2.3700E-01	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		2.3200E-01	1.0640E+00	12	4.4685E+04	2.0000E+07	1
		2.1500E-01	9.9500E-01	13	4.4685E+04	2.0000E+07	1
		2.1170E-01	5.1760E-01	15	4.4685E+04	2.0000E+07	1
		2.0800E-01	1.0400E+00	12	4.4685E+04	2.0000E+07	1
		1.9500E-01	1.1220E+00	12	4.4685E+04	2.0000E+07	1
		1.8700E-01	1.0190E+00	12	4.4685E+04	2.0000E+07	1
		1.7600E-01	9.5600E-01	13	4.4685E+04	2.0000E+07	1
		1.6300E-01	9.9500E-01	13	4.4685E+04	2.0000E+07	1
		1.5870E-01	3.0590E-01	16	4.4685E+04	2.0000E+07	1
		1.5700E-01	1.1520E+00	12	4.4685E+04	2.0000E+07	1
		1.4600E-01	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		1.3700E-01	1.0640E+00	12	4.4685E+04	2.0000E+07	1
		1.3300E-01	1.1520E+00	12	4.4685E+04	2.0000E+07	1
		1.3000E-01	9.9500E-01	13	4.4685E+04	2.0000E+07	1
		1.1300E-01	1.0400E+00	12	4.4685E+04	2.0000E+07	1

Section (MT)	Reaction type	Photon energy (MeV) (EG)	Source level (MeV) (ES)	Energy points (NP)	Energy range (eV) from	to	Interp. regions (NR)
		1.0700E-01	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		1.0270E-01	1.4720E-01	16	4.4685E+04	2.0000E+07	1
		9.1000E-02	9.5600E-01	13	4.4685E+04	2.0000E+07	1
		8.5000E-02	8.6500E-01	13	4.4685E+04	2.0000E+07	1
		8.3000E-02	1.1020E+00	12	4.4685E+04	2.0000E+07	1
		8.2000E-02	1.1220E+00	12	4.4685E+04	2.0000E+07	1
		5.8000E-02	1.1220E+00	12	4.4685E+04	2.0000E+07	1
		5.0000E-02	1.1520E+00	12	4.4685E+04	2.0000E+07	1
		4.5000E-02	1.0640E+00	12	4.4685E+04	2.0000E+07	1
		4.4500E-02	4.4500E-02	18	4.4685E+04	2.0000E+07	1
		2.4000E-02	1.0190E+00	12	4.4685E+04	2.0000E+07	1
		2.4000E-02	1.0640E+00	12	4.4685E+04	2.0000E+07	1
		2.1000E-02	1.0400E+00	12	4.4685E+04	2.0000E+07	1
16	(n,2n)	1.8980E-01	2.3180E-01	13	6.3359E+06	2.0000E+07	1
		1.7490E-01	1.7490E-01	13	6.3359E+06	2.0000E+07	1
		1.3610E-01	2.3180E-01	13	6.3359E+06	2.0000E+07	1
		1.3300E-01	1.7490E-01	13	6.3359E+06	2.0000E+07	1
		7.9300E-02	1.7490E-01	13	6.3359E+06	2.0000E+07	1
		5.6800E-02	2.3180E-01	13	6.3359E+06	2.0000E+07	1
17	(n,3n)	1.1370E+00	1.1370E+00	9	1.1600E+07	2.0000E+07	1
		1.0941E+00	1.1370E+00	9	1.1600E+07	2.0000E+07	1
		1.0466E+00	1.0895E+00	9	1.1600E+07	2.0000E+07	1
		1.0334E+00	1.0762E+00	9	1.1600E+07	2.0000E+07	1
		9.8770E-01	1.0305E+00	9	1.1600E+07	2.0000E+07	1
		9.7380E-01	1.1155E+00	9	1.1600E+07	2.0000E+07	1
		9.5910E-01	1.0019E+00	9	1.1600E+07	2.0000E+07	1
		9.3810E-01	9.3810E-01	9	1.1600E+07	2.0000E+07	1
		9.3450E-01	1.0762E+00	9	1.1600E+07	2.0000E+07	1
		9.1600E-01	9.5890E-01	9	1.1600E+07	2.0000E+07	1
		9.0030E-01	9.0030E-01	9	1.1600E+07	2.0000E+07	1
		8.9580E-01	1.0375E+00	9	1.1600E+07	2.0000E+07	1
		8.9520E-01	9.3810E-01	9	1.1600E+07	2.0000E+07	1
		8.8880E-01	1.0305E+00	9	1.1600E+07	2.0000E+07	1
		8.6720E-01	1.1615E+00	9	1.1600E+07	2.0000E+07	1
		8.5750E-01	9.0030E-01	9	1.1600E+07	2.0000E+07	1
		8.2120E-01	1.1155E+00	9	1.1600E+07	2.0000E+07	1
		8.1790E-01	8.6070E-01	9	1.1600E+07	2.0000E+07	1
		7.5860E-01	9.0030E-01	9	1.1600E+07	2.0000E+07	1
		6.9790E-01	9.9220E-01	9	1.1600E+07	2.0000E+07	1
		6.0600E-01	6.4890E-01	9	1.1600E+07	2.0000E+07	1
		6.0060E-01	7.4230E-01	9	1.1600E+07	2.0000E+07	1
		5.9730E-01	5.9730E-01	9	1.1600E+07	2.0000E+07	1
		5.5450E-01	5.9730E-01	9	1.1600E+07	2.0000E+07	1
		5.0720E-01	6.4890E-01	9	1.1600E+07	2.0000E+07	1
		4.6670E-01	1.1155E+00	9	1.1600E+07	2.0000E+07	1
		4.4800E-01	7.4230E-01	9	1.1600E+07	2.0000E+07	1
		4.1920E-01	1.1615E+00	9	1.1600E+07	2.0000E+07	1
		3.8870E-01	1.0375E+00	9	1.1600E+07	2.0000E+07	1
		3.6150E-01	9.5890E-01	9	1.1600E+07	2.0000E+07	1
		3.4330E-01	9.9220E-01	9	1.1600E+07	2.0000E+07	1
		3.4070E-01	9.3810E-01	9	1.1600E+07	2.0000E+07	1
		3.1000E-01	9.5890E-01	9	1.1600E+07	2.0000E+07	1
		3.0300E-01	9.0030E-01	9	1.1600E+07	2.0000E+07	1
		2.9520E-01	1.0375E+00	9	1.1600E+07	2.0000E+07	1
		2.9400E-01	1.0418E+00	9	1.1600E+07	2.0000E+07	1

Section (MT)	Reaction type	Photon energy (MeV) (EG)	Source level (MeV) (ES)	Energy points (NP)	Energy range (eV) from	to	Interp. regions (NR)
		2.8920E-01	9.3810E-01	9	1.1600E+07	2.0000E+07	1
		2.6340E-01	8.6070E-01	9	1.1600E+07	2.0000E+07	1
		2.5150E-01	9.0030E-01	9	1.1600E+07	2.0000E+07	1
		2.5030E-01	7.4780E-01	9	1.1600E+07	2.0000E+07	1
		2.4990E-01	9.9220E-01	9	1.1600E+07	2.0000E+07	1
		2.0320E-01	4.9750E-01	9	1.1600E+07	2.0000E+07	1
		1.5260E-01	2.9430E-01	9	1.1600E+07	2.0000E+07	1
		9.8900E-02	1.4170E-01	9	1.1600E+07	2.0000E+07	1
		4.2800E-02	4.2800E-02	9	1.1600E+07	2.0000E+07	1
37	(n,4n)	4.9880E-01	5.5610E-01	3	1.8160E+07	2.0000E+07	1
		4.9760E-01	5.0550E-01	3	1.8160E+07	2.0000E+07	1
		4.9210E-01	4.9210E-01	3	1.8160E+07	2.0000E+07	1
		4.8420E-01	4.9210E-01	3	1.8160E+07	2.0000E+07	1
		4.6980E-01	4.6980E-01	3	1.8160E+07	2.0000E+07	1
		4.6190E-01	4.6980E-01	3	1.8160E+07	2.0000E+07	1
		4.4820E-01	5.0550E-01	3	1.8160E+07	2.0000E+07	1
		4.3480E-01	4.9210E-01	3	1.8160E+07	2.0000E+07	1
		4.2980E-01	5.0550E-01	3	1.8160E+07	2.0000E+07	1
		3.9230E-01	5.5610E-01	3	1.8160E+07	2.0000E+07	1
		3.3430E-01	3.9160E-01	3	1.8160E+07	2.0000E+07	1
		3.2230E-01	3.3010E-01	4	1.8160E+07	2.0000E+07	1
		3.1590E-01	3.9160E-01	3	1.8160E+07	2.0000E+07	1
		3.1170E-01	3.8740E-01	3	1.8160E+07	2.0000E+07	1
		2.8550E-01	2.8550E-01	4	1.8160E+07	2.0000E+07	1
		2.7760E-01	2.8550E-01	4	1.8160E+07	2.0000E+07	1
		2.7280E-01	3.3010E-01	4	1.8160E+07	2.0000E+07	1
		2.5440E-01	3.3010E-01	4	1.8160E+07	2.0000E+07	1
		2.2820E-01	2.8550E-01	4	1.8160E+07	2.0000E+07	1
		2.2640E-01	5.1180E-01	3	1.8160E+07	2.0000E+07	1
		2.1200E-01	5.7010E-01	3	1.8160E+07	2.0000E+07	1
		2.0980E-01	2.8550E-01	4	1.8160E+07	2.0000E+07	1
		2.0110E-01	5.1920E-01	3	1.8160E+07	2.0000E+07	1
		1.8170E-01	5.1180E-01	3	1.8160E+07	2.0000E+07	1
		1.6640E-01	3.3010E-01	4	1.8160E+07	2.0000E+07	1
		1.5430E-01	3.1810E-01	4	1.8160E+07	2.0000E+07	1
		1.2440E-01	5.1180E-01	3	1.8160E+07	2.0000E+07	1
		1.1710E-01	1.9280E-01	4	1.8160E+07	2.0000E+07	1
		1.0650E-01	1.6380E-01	4	1.8160E+07	2.0000E+07	1
		1.0610E-01	3.9160E-01	3	1.8160E+07	2.0000E+07	1
		1.0200E-01	3.8740E-01	3	1.8160E+07	2.0000E+07	1
		8.8100E-02	1.6380E-01	4	1.8160E+07	2.0000E+07	1
		6.7800E-02	7.5700E-02	4	1.8160E+07	2.0000E+07	1
		6.1500E-02	3.9160E-01	3	1.8160E+07	2.0000E+07	1
		5.7300E-02	3.8740E-01	3	1.8160E+07	2.0000E+07	1
		5.7300E-02	5.7300E-02	4	1.8160E+07	2.0000E+07	1
		4.9400E-02	5.7300E-02	4	1.8160E+07	2.0000E+07	1
		4.4700E-02	3.3010E-01	4	1.8160E+07	2.0000E+07	1
		1.8400E-02	7.5700E-02	4	1.8160E+07	2.0000E+07	1
		7.9000E-03	7.9000E-03	4	1.8160E+07	2.0000E+07	1

(n,Inelastic)
Photon Cross-Sections (Neutron Induced)

Total photon production cross-section

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.5000E+05	0.6048E-01	0.1000E+06	0.5149E+00	0.5000E+06	0.1799E+00	0.1000E+07	0.1779E+01
0.2000E+07	0.2166E+01	0.5200E+07	0.3942E+01	0.6000E+07	0.3269E+01	0.7000E+07	0.1459E+01	0.8000E+07	0.7463E+00
0.9000E+07	0.5192E+00	0.1000E+08	0.4255E+00	0.1100E+08	0.3762E+00	0.1200E+08	0.3415E+00	0.1400E+08	0.2832E+00
0.1600E+08	0.2382E+00	0.1800E+08	0.2049E+00	0.2000E+08	0.1801E+00				

k = 1 Photon Energy 0.1107E+01 MeV Level Energy 0.1152E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.4742E-01	0.5200E+07	0.2511E-01	0.6000E+07	0.1517E-01	0.7000E+07	0.3992E-02
0.8000E+07	0.8483E-03	0.9000E+07	0.1856E-03	0.1000E+08	0.4003E-04	0.1100E+08	0.8876E-05	0.1200E+08	0.2060E-05
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 2 Photon Energy 0.1102E+01 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.1092E-02	0.5200E+07	0.3612E-03	0.6000E+07	0.2110E-03	0.7000E+07	0.5482E-04
0.8000E+07	0.1162E-04	0.9000E+07	0.2545E-05	0.1000E+08	0.5486E-06	0.1100E+08	0.1217E-06	0.1200E+08	0.2824E-07
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 3 Photon Energy 0.1058E+01 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.4135E-01	0.5200E+07	0.1367E-01	0.6000E+07	0.7987E-02	0.7000E+07	0.2076E-02
0.8000E+07	0.4398E-03	0.9000E+07	0.9633E-04	0.1000E+08	0.2077E-04	0.1100E+08	0.4605E-05	0.1200E+08	0.1069E-05
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 4 Photon Energy 0.9955E+00 MeV Level Energy 0.1040E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.8955E-03	0.5200E+07	0.9188E-03	0.6000E+07	0.5813E-03	0.7000E+07	0.1652E-03
0.8000E+07	0.3781E-04	0.9000E+07	0.8730E-05	0.1000E+08	0.1992E-05	0.1100E+08	0.4613E-06	0.1200E+08	0.1108E-06
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 5 Photon Energy 0.9950E+00 MeV Level Energy 0.9950E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.4374E-04	0.2000E+07	0.1227E-02	0.5200E+07	0.4951E-03	0.6000E+07	0.2902E-03
0.7000E+07	0.7557E-04	0.8000E+07	0.1603E-04	0.9000E+07	0.3513E-05	0.1000E+08	0.7578E-06	0.1100E+08	0.1682E-06
0.1200E+08	0.3906E-07	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 6 Photon Energy 0.9748E+00 MeV Level Energy 0.1122E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.8515E-02	0.5200E+07	0.3088E-01	0.6000E+07	0.2230E-01	0.7000E+07	0.7115E-02
0.8000E+07	0.1762E-02	0.9000E+07	0.4320E-03	0.1000E+08	0.1065E-03	0.1100E+08	0.2544E-04	0.1200E+08	0.6255E-05
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 7 Photon Energy 0.9745E+00 MeV Level Energy 0.1019E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.2803E-01	0.5200E+07	0.3087E-01	0.6000E+07	0.1905E-01	0.7000E+07	0.5123E-02
0.8000E+07	0.1118E-02	0.9000E+07	0.2489E-03	0.1000E+08	0.5492E-04	0.1100E+08	0.1243E-04	0.1200E+08	0.2932E-05
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 8 Photon Energy 0.9548E+00 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.5334E-03	0.5200E+07	0.1764E-03	0.6000E+07	0.1030E-03	0.7000E+07	0.2677E-04
0.8000E+07	0.5673E-05	0.9000E+07	0.1243E-05	0.1000E+08	0.2679E-06	0.1100E+08	0.5940E-07	0.1200E+08	0.1379E-07
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 9 Photon Energy 0.9505E+00 MeV Level Energy 0.9950E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.1936E-02	0.2000E+07	0.5433E-01	0.5200E+07	0.2192E-01	0.6000E+07	0.1285E-01
0.7000E+07	0.3345E-02	0.8000E+07	0.7097E-03	0.9000E+07	0.1555E-03	0.1000E+08	0.3355E-04	0.1100E+08	0.7445E-05
0.1200E+08	0.1729E-05	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 10 Photon Energy 0.9168E+00 MeV Level Energy 0.1064E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.3066E-01	0.5200E+07	0.5559E-01	0.6000E+07	0.3660E-01	0.7000E+07	0.1056E-01
0.8000E+07	0.2429E-02	0.9000E+07	0.5625E-03	0.1000E+08	0.1286E-03	0.1100E+08	0.2979E-04	0.1200E+08	0.7155E-05
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 11 Photon Energy 0.9115E+00 MeV Level Energy 0.9560E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.3692E-02	0.2000E+07	0.5146E-02	0.5200E+07	0.1034E-02	0.6000E+07	0.6280E-03
0.7000E+07	0.1670E-03	0.8000E+07	0.3547E-04	0.9000E+07	0.7886E-05	0.1000E+08	0.1672E-05	0.1100E+08	0.3648E-06
0.1200E+08	0.8339E-07	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 12 Photon Energy 0.8928E+00 MeV Level Energy 0.1040E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.3220E-01	0.5200E+07	0.3304E-01	0.6000E+07	0.2090E-01	0.7000E+07	0.5939E-02
0.8000E+07	0.1359E-02	0.9000E+07	0.3139E-03	0.1000E+08	0.7162E-04	0.1100E+08	0.1659E-04	0.1200E+08	0.3983E-05
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 13 Photon Energy 0.8718E+00 MeV Level Energy 0.1019E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.1979E-01	0.5200E+07	0.2180E-01	0.6000E+07	0.1345E-01	0.7000E+07	0.3617E-02
0.8000E+07	0.7895E-03	0.9000E+07	0.1757E-03	0.1000E+08	0.3878E-04	0.1100E+08	0.8775E-05	0.1200E+08	0.2071E-05
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 14 Photon Energy 0.8650E+00 MeV Level Energy 0.8650E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.4833E-01	0.2000E+07	0.3110E-01	0.5200E+07	0.1956E-01	0.6000E+07	0.1236E-01
0.7000E+07	0.3246E-02	0.8000E+07	0.6850E-03	0.9000E+07	0.1505E-03	0.1000E+08	0.3210E-04	0.1100E+08	0.7049E-05
0.1200E+08	0.1621E-05	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 15 Photon Energy 0.8478E+00 MeV Level Energy 0.9950E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.1964E-04	0.2000E+07	0.5511E-03	0.5200E+07	0.2224E-03	0.6000E+07	0.1303E-03
0.7000E+07	0.3394E-04	0.8000E+07	0.7200E-05	0.9000E+07	0.1578E-05	0.1000E+08	0.3403E-06	0.1100E+08	0.7552E-07
0.1200E+08	0.1754E-07	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 16 Photon Energy 0.8205E+00 MeV Level Energy 0.8650E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.4101E-01	0.2000E+07	0.2639E-01	0.5200E+07	0.1660E-01	0.6000E+07	0.1049E-01
0.7000E+07	0.2754E-02	0.8000E+07	0.5813E-03	0.9000E+07	0.1277E-03	0.1000E+08	0.2724E-04	0.1100E+08	0.5981E-05
0.1200E+08	0.1376E-05	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 17 Photon Energy 0.8161E+00 MeV Level Energy 0.1122E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.4891E-02	0.5200E+07	0.1774E-01	0.6000E+07	0.1281E-01	0.7000E+07	0.4087E-02
0.8000E+07	0.1012E-02	0.9000E+07	0.2482E-03	0.1000E+08	0.6116E-04	0.1100E+08	0.1461E-04	0.1200E+08	0.3593E-05
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 18 Photon Energy 0.7875E+00 MeV Level Energy 0.8320E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.3546E-01	0.2000E+07	0.3926E-01	0.5200E+07	0.6082E-01	0.6000E+07	0.3957E-01
0.7000E+07	0.1066E-01	0.8000E+07	0.2335E-02	0.9000E+07	0.5217E-03	0.1000E+08	0.1155E-03	0.1100E+08	0.2618E-04
0.1200E+08	0.6189E-05	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 19 Photon Energy 0.7800E+00 MeV Level Energy 0.7800E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.7919E-01	0.2000E+07	0.4367E-01	0.5200E+07	0.2788E-01	0.6000E+07	0.1806E-01
0.7000E+07	0.4749E-02	0.8000E+07	0.1004E-02	0.9000E+07	0.2209E-03	0.1000E+08	0.4718E-04	0.1100E+08	0.1037E-04
0.1200E+08	0.2387E-05	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 20 Photon Energy 0.7798E+00 MeV Level Energy 0.9270E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.6061E-03	0.2000E+07	0.1206E-01	0.5200E+07	0.6367E-01	0.6000E+07	0.4682E-01
0.7000E+07	0.1494E-01	0.8000E+07	0.3711E-02	0.9000E+07	0.9135E-03	0.1000E+08	0.2263E-03	0.1100E+08	0.5422E-04
0.1200E+08	0.1336E-04	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 21 Photon Energy 0.7355E+00 MeV Level Energy 0.7800E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.6602E-01	0.2000E+07	0.3641E-01	0.5200E+07	0.2325E-01	0.6000E+07	0.1506E-01
0.7000E+07	0.3960E-02	0.8000E+07	0.8372E-03	0.9000E+07	0.1842E-03	0.1000E+08	0.3934E-04	0.1100E+08	0.8646E-05
0.1200E+08	0.1991E-05	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 22 Photon Energy 0.7341E+00 MeV Level Energy 0.1040E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.1953E-03	0.5200E+07	0.2003E-03	0.6000E+07	0.1268E-03	0.7000E+07	0.3602E-04
0.8000E+07	0.8244E-05	0.9000E+07	0.1904E-05	0.1000E+08	0.4343E-06	0.1100E+08	0.1006E-06	0.1200E+08	0.2416E-07
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 23 Photon Energy 0.6848E+00 MeV Level Energy 0.8320E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.2302E-01	0.2000E+07	0.2549E-01	0.5200E+07	0.3949E-01	0.6000E+07	0.2570E-01
0.7000E+07	0.6921E-02	0.8000E+07	0.1516E-02	0.9000E+07	0.3387E-03	0.1000E+08	0.7497E-04	0.1100E+08	0.1700E-04
0.1200E+08	0.4019E-05	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 24 Photon Energy 0.6211E+00 MeV Level Energy 0.9270E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.3004E-03	0.2000E+07	0.5977E-02	0.5200E+07	0.3156E-01	0.6000E+07	0.2321E-01
0.7000E+07	0.7403E-02	0.8000E+07	0.1839E-02	0.9000E+07	0.4528E-03	0.1000E+08	0.1122E-03	0.1100E+08	0.2687E-04
0.1200E+08	0.6622E-05	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 25 Photon Energy 0.3720E+00 MeV Level Energy 0.1152E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.2153E-03	0.5200E+07	0.1140E-03	0.6000E+07	0.6885E-04	0.7000E+07	0.1812E-04
0.8000E+07	0.3851E-05	0.9000E+07	0.8428E-06	0.1000E+08	0.1817E-06	0.1100E+08	0.4029E-07	0.1200E+08	0.9351E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 26 Photon Energy 0.3220E+00 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.7317E-02	0.5200E+07	0.2420E-02	0.6000E+07	0.1413E-02	0.7000E+07	0.3672E-03
0.8000E+07	0.7782E-04	0.9000E+07	0.1705E-04	0.1000E+08	0.3675E-05	0.1100E+08	0.8149E-06	0.1200E+08	0.1891E-06
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 27 Photon Energy 0.3200E+00 MeV Level Energy 0.1152E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.1354E-03	0.5200E+07	0.7170E-04	0.6000E+07	0.4331E-04	0.7000E+07	0.1140E-04
0.8000E+07	0.2422E-05	0.9000E+07	0.5301E-06	0.1000E+08	0.1143E-06	0.1100E+08	0.2535E-07	0.1200E+08	0.5881E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 28 Photon Energy 0.3080E+00 MeV Level Energy 0.1087E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.2560E-08	0.5200E+07	0.1335E-03	0.6000E+07	0.3796E-03	0.7000E+07	0.6501E-03
0.8000E+07	0.6030E-03	0.9000E+07	0.4682E-03	0.1000E+08	0.2462E-03	0.1100E+08	0.1071E-03	0.1200E+08	0.4105E-04
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 29 Photon Energy 0.2900E+00 MeV Level Energy 0.1122E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.5368E-07	0.5200E+07	0.1947E-06	0.6000E+07	0.1406E-06	0.7000E+07	0.4485E-07
0.8000E+07	0.1111E-07	0.9000E+07	0.2723E-08	0.1000E+08	0.6711E-09	0.1100E+08	0.1604E-09	0.1200E+08	0.3943E-10
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 30 Photon Energy 0.2870E+00 MeV Level Energy 0.1152E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.9696E-04	0.5200E+07	0.5134E-04	0.6000E+07	0.3101E-04	0.7000E+07	0.8162E-05
0.8000E+07	0.1735E-05	0.9000E+07	0.3796E-06	0.1000E+08	0.8184E-07	0.1100E+08	0.1815E-07	0.1200E+08	0.4212E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 31 Photon Energy 0.2700E+00 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.4290E-02	0.5200E+07	0.1419E-02	0.6000E+07	0.8286E-03	0.7000E+07	0.2153E-03
0.8000E+07	0.4563E-04	0.9000E+07	0.9993E-05	0.1000E+08	0.2154E-05	0.1100E+08	0.4778E-06	0.1200E+08	0.1109E-06
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 32 Photon Energy 0.2614E+00 MeV Level Energy 0.7790E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.1332E-08	0.2000E+07	0.4414E-05	0.5200E+07	0.4643E-02	0.6000E+07	0.9813E-02
0.7000E+07	0.8532E-02	0.8000E+07	0.4596E-02	0.9000E+07	0.2244E-02	0.1000E+08	0.9051E-03	0.1100E+08	0.3281E-03
0.1200E+08	0.1110E-03	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 33 Photon Energy 0.2390E+00 MeV Level Energy 0.1019E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.4784E-07	0.5200E+07	0.5270E-07	0.6000E+07	0.3253E-07	0.7000E+07	0.8744E-08
0.8000E+07	0.1909E-08	0.9000E+07	0.4248E-09	0.1000E+08	0.9375E-10	0.1100E+08	0.2121E-10	0.1200E+08	0.5005E-11
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 34 Photon Energy 0.2370E+00 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.2891E-02	0.5200E+07	0.9562E-03	0.6000E+07	0.5585E-03	0.7000E+07	0.1451E-03
0.8000E+07	0.3075E-04	0.9000E+07	0.6735E-05	0.1000E+08	0.1452E-05	0.1100E+08	0.3220E-06	0.1200E+08	0.7474E-07
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 35 Photon Energy 0.2320E+00 MeV Level Energy 0.1064E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.5922E-04	0.5200E+07	0.1074E-03	0.6000E+07	0.7069E-04	0.7000E+07	0.2040E-04
0.8000E+07	0.4692E-05	0.9000E+07	0.1086E-05	0.1000E+08	0.2484E-06	0.1100E+08	0.5754E-07	0.1200E+08	0.1382E-07
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 36 Photon Energy 0.2150E+00 MeV Level Energy 0.9950E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.1437E-03	0.2000E+07	0.4032E-02	0.5200E+07	0.1627E-02	0.6000E+07	0.9534E-03
0.7000E+07	0.2483E-03	0.8000E+07	0.5267E-04	0.9000E+07	0.1154E-04	0.1000E+08	0.2490E-05	0.1100E+08	0.5525E-06
0.1200E+08	0.1283E-06	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 37 Photon Energy 0.2117E+00 MeV Level Energy 0.5176E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.3108E-04	0.2000E+07	0.1274E-02	0.5200E+07	0.7426E-01	0.6000E+07	0.8559E-01
0.7000E+07	0.4815E-01	0.8000E+07	0.1975E-01	0.9000E+07	0.8077E-02	0.1000E+08	0.3353E-02	0.1100E+08	0.1594E-02
0.1200E+08	0.9541E-03	0.1400E+08	0.5100E-03	0.1600E+08	0.3800E-03	0.1800E+08	0.2700E-03	0.2000E+08	0.1900E-03

k = 38 Photon Energy 0.2080E+00 MeV Level Energy 0.1040E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.2655E-02	0.5200E+07	0.2724E-02	0.6000E+07	0.1724E-02	0.7000E+07	0.4898E-03
0.8000E+07	0.1121E-03	0.9000E+07	0.2589E-04	0.1000E+08	0.5906E-05	0.1100E+08	0.1368E-05	0.1200E+08	0.3285E-06
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 39 Photon Energy 0.1950E+00 MeV Level Energy 0.1122E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.7998E-05	0.5200E+07	0.2900E-04	0.6000E+07	0.2094E-04	0.7000E+07	0.6683E-05
0.8000E+07	0.1655E-05	0.9000E+07	0.4057E-06	0.1000E+08	0.1000E-06	0.1100E+08	0.2389E-07	0.1200E+08	0.5875E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 40 Photon Energy 0.1870E+00 MeV Level Energy 0.1019E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.2320E-04	0.5200E+07	0.2556E-04	0.6000E+07	0.1578E-04	0.7000E+07	0.4241E-05
0.8000E+07	0.9256E-06	0.9000E+07	0.2060E-06	0.1000E+08	0.4547E-07	0.1100E+08	0.1029E-07	0.1200E+08	0.2428E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 41 Photon Energy 0.1760E+00 MeV Level Energy 0.9560E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.1027E-01	0.2000E+07	0.1432E-01	0.5200E+07	0.2876E-02	0.6000E+07	0.1747E-02
0.7000E+07	0.4647E-03	0.8000E+07	0.9867E-04	0.9000E+07	0.2194E-04	0.1000E+08	0.4652E-05	0.1100E+08	0.1015E-05
0.1200E+08	0.2320E-06	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 42 Photon Energy 0.1630E+00 MeV Level Energy 0.9950E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.6228E-04	0.2000E+07	0.1747E-02	0.5200E+07	0.7051E-03	0.6000E+07	0.4132E-03
0.7000E+07	0.1076E-03	0.8000E+07	0.2283E-04	0.9000E+07	0.5002E-05	0.1000E+08	0.1079E-05	0.1100E+08	0.2395E-06
0.1200E+08	0.5561E-07	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 43 Photon Energy 0.1587E+00 MeV Level Energy 0.3059E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.5000E+06	0.3070E-02	0.1000E+07	0.9945E-02	0.2000E+07	0.4620E-01	0.5200E+07	0.3797E+00
0.6000E+07	0.3694E+00	0.7000E+07	0.1599E+00	0.8000E+07	0.5894E-01	0.9000E+07	0.2570E-01	0.1000E+08	0.1382E-01
0.1100E+08	0.9612E-02	0.1200E+08	0.7876E-02	0.1400E+08	0.5960E-02	0.1600E+08	0.4690E-02	0.1800E+08	0.3710E-02
0.2000E+08	0.3070E-02								

k = 44 Photon Energy 0.1570E+00 MeV Level Energy 0.1152E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.1204E-03	0.5200E+07	0.6377E-04	0.6000E+07	0.3852E-04	0.7000E+07	0.1014E-04
0.8000E+07	0.2154E-05	0.9000E+07	0.4715E-06	0.1000E+08	0.1017E-06	0.1100E+08	0.2254E-07	0.1200E+08	0.5231E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 45 Photon Energy 0.1460E+00 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.5763E-07	0.5200E+07	0.1906E-07	0.6000E+07	0.1113E-07	0.7000E+07	0.2893E-08
0.8000E+07	0.6130E-09	0.9000E+07	0.1343E-09	0.1000E+08	0.2894E-10	0.1100E+08	0.6418E-11	0.1200E+08	0.1490E-11
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 46 Photon Energy 0.1370E+00 MeV Level Energy 0.1064E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.1196E-04	0.5200E+07	0.2167E-04	0.6000E+07	0.1427E-04	0.7000E+07	0.4117E-05
0.8000E+07	0.9472E-06	0.9000E+07	0.2193E-06	0.1000E+08	0.5014E-07	0.1100E+08	0.1161E-07	0.1200E+08	0.2790E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 47 Photon Energy 0.1330E+00 MeV Level Energy 0.1152E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.9312E-05	0.5200E+07	0.4931E-05	0.6000E+07	0.2978E-05	0.7000E+07	0.7839E-06
0.8000E+07	0.1666E-06	0.9000E+07	0.3645E-07	0.1000E+08	0.7860E-08	0.1100E+08	0.1743E-08	0.1200E+08	0.4045E-09
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 48 Photon Energy 0.1300E+00 MeV Level Energy 0.9950E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.3149E-04	0.2000E+07	0.8834E-03	0.5200E+07	0.3564E-03	0.6000E+07	0.2089E-03
0.7000E+07	0.5440E-04	0.8000E+07	0.1154E-04	0.9000E+07	0.2529E-05	0.1000E+08	0.5455E-06	0.1100E+08	0.1211E-06
0.1200E+08	0.2812E-07	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 49 Photon Energy 0.1130E+00 MeV Level Energy 0.1040E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.4216E-03	0.5200E+07	0.4325E-03	0.6000E+07	0.2737E-03	0.7000E+07	0.7776E-04
0.8000E+07	0.1780E-04	0.9000E+07	0.4110E-05	0.1000E+08	0.9377E-06	0.1100E+08	0.2172E-06	0.1200E+08	0.5215E-07
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 50 Photon Energy 0.1070E+00 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.3343E-04	0.5200E+07	0.1105E-04	0.6000E+07	0.6456E-05	0.7000E+07	0.1678E-05
0.8000E+07	0.3555E-06	0.9000E+07	0.7787E-07	0.1000E+08	0.1679E-07	0.1100E+08	0.3723E-08	0.1200E+08	0.8640E-09
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 51 Photon Energy 0.1027E+00 MeV Level Energy 0.1472E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.5000E+06	0.1952E-01	0.1000E+07	0.2519E+00	0.2000E+07	0.3584E+00	0.5200E+07	0.1047E+01
0.6000E+07	0.8821E+00	0.7000E+07	0.3524E+00	0.8000E+07	0.1459E+00	0.9000E+07	0.8369E-01	0.1000E+08	0.6078E-01
0.1100E+08	0.5040E-01	0.1200E+08	0.4410E-01	0.1400E+08	0.3445E-01	0.1600E+08	0.2780E-01	0.1800E+08	0.2302E-01
0.2000E+08	0.1952E-01								

k = 52 Photon Energy 0.9100E-01 MeV Level Energy 0.9560E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.1407E-02	0.2000E+07	0.1962E-02	0.5200E+07	0.3940E-03	0.6000E+07	0.2394E-03
0.7000E+07	0.6367E-04	0.8000E+07	0.1352E-04	0.9000E+07	0.3006E-05	0.1000E+08	0.6374E-06	0.1100E+08	0.1391E-06
0.1200E+08	0.3179E-07	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 53 Photon Energy 0.8500E-01 MeV Level Energy 0.8650E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.1000E+07	0.5361E-05	0.2000E+07	0.3449E-05	0.5200E+07	0.2170E-05	0.6000E+07	0.1371E-05
0.7000E+07	0.3600E-06	0.8000E+07	0.7599E-07	0.9000E+07	0.1669E-07	0.1000E+08	0.3561E-08	0.1100E+08	0.7818E-09
0.1200E+08	0.1798E-09	0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00				

k = 54 Photon Energy 0.8300E-01 MeV Level Energy 0.1102E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.1222E-03	0.5200E+07	0.4042E-04	0.6000E+07	0.2361E-04	0.7000E+07	0.6135E-05
0.8000E+07	0.1300E-05	0.9000E+07	0.2848E-06	0.1000E+08	0.6139E-07	0.1100E+08	0.1361E-07	0.1200E+08	0.3160E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 55 Photon Energy 0.8200E-01 MeV Level Energy 0.1122E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.4576E-05	0.5200E+07	0.1659E-04	0.6000E+07	0.1198E-04	0.7000E+07	0.3824E-05
0.8000E+07	0.9468E-06	0.9000E+07	0.2321E-06	0.1000E+08	0.5722E-07	0.1100E+08	0.1367E-07	0.1200E+08	0.3361E-08
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 56 Photon Energy 0.5800E-01 MeV Level Energy 0.1122E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.2013E-06	0.5200E+07	0.7300E-06	0.6000E+07	0.5271E-06	0.7000E+07	0.1682E-06
0.8000E+07	0.4165E-07	0.9000E+07	0.1021E-07	0.1000E+08	0.2517E-08	0.1100E+08	0.6014E-09	0.1200E+08	0.1479E-09
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 57 Photon Energy 0.5000E-01 MeV Level Energy 0.1152E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.3840E-05	0.5200E+07	0.2033E-05	0.6000E+07	0.1228E-05	0.7000E+07	0.3232E-06
0.8000E+07	0.6870E-07	0.9000E+07	0.1503E-07	0.1000E+08	0.3241E-08	0.1100E+08	0.7188E-09	0.1200E+08	0.1668E-09
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 58 Photon Energy 0.4500E-01 MeV Level Energy 0.1064E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.3995E-06	0.5200E+07	0.7243E-06	0.6000E+07	0.4769E-06	0.7000E+07	0.1376E-06
0.8000E+07	0.3166E-07	0.9000E+07	0.7330E-08	0.1000E+08	0.1676E-08	0.1100E+08	0.3882E-09	0.1200E+08	0.9324E-10
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 59 Photon Energy 0.4450E-01 MeV Level Energy 0.4450E-01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.5000E+05	0.6048E-01	0.1000E+06	0.5149E+00	0.5000E+06	0.1573E+00	0.1000E+07	0.1205E+01
0.2000E+07	0.1222E+01	0.5200E+07	0.1884E+01	0.6000E+07	0.1558E+01	0.7000E+07	0.7857E+00	0.8000E+07	0.4930E+00
0.9000E+07	0.3935E+00	0.1000E+08	0.3451E+00	0.1100E+08	0.3139E+00	0.1200E+08	0.2884E+00	0.1400E+08	0.2423E+00
0.1600E+08	0.2053E+00	0.1800E+08	0.1779E+00	0.2000E+08	0.1573E+00				

k = 60 Photon Energy 0.2400E-01 MeV Level Energy 0.1019E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.3827E-06	0.5200E+07	0.8915E-06	0.6000E+07	0.5870E-06	0.7000E+07	0.1694E-06
0.8000E+07	0.3896E-07	0.9000E+07	0.9021E-08	0.1000E+08	0.2062E-08	0.1100E+08	0.4777E-09	0.1200E+08	0.1148E-09
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 61 Photon Energy 0.2400E-01 MeV Level Energy 0.1064E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.4917E-06	0.5200E+07	0.4216E-06	0.6000E+07	0.2602E-06	0.7000E+07	0.6995E-07
0.8000E+07	0.1527E-07	0.9000E+07	0.3398E-08	0.1000E+08	0.7500E-09	0.1100E+08	0.1697E-09	0.1200E+08	0.4004E-10
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

k = 62 Photon Energy 0.2100E-01 MeV Level Energy 0.1040E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.4469E+05	0.0000E+00	0.2000E+07	0.2691E-05	0.5200E+07	0.2761E-05	0.6000E+07	0.1747E-05	0.7000E+07	0.4964E-06
0.8000E+07	0.1136E-06	0.9000E+07	0.2624E-07	0.1000E+08	0.5986E-08	0.1100E+08	0.1386E-08	0.1200E+08	0.3330E-09
0.1200E+08	0.0000E+00	0.2000E+08	0.0000E+00						

(n,2n)
Photon Cross-Sections (Neutron Induced)

Total photon production cross-section

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.6336E+07	0.0000E+00	0.7000E+07	0.1297E-01	0.8000E+07	0.4627E-01	0.9000E+07	0.7454E-01	0.1000E+08	0.8688E-01
0.1300E+08	0.8383E-01	0.1400E+08	0.5561E-01	0.1500E+08	0.3899E-01	0.1600E+08	0.3083E-01	0.1700E+08	0.2703E-01
0.1800E+08	0.2484E-01	0.1900E+08	0.2331E-01	0.2000E+08	0.2205E-01				

k = 1 Photon Energy 0.1898E+00 MeV Level Energy 0.2318E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.6336E+07	0.0000E+00	0.7000E+07	0.3465E-02	0.8000E+07	0.1244E-01	0.9000E+07	0.2044E-01	0.1000E+08	0.2451E-01
0.1300E+08	0.2508E-01	0.1400E+08	0.1675E-01	0.1500E+08	0.1176E-01	0.1600E+08	0.9283E-02	0.1700E+08	0.8111E-02
0.1800E+08	0.7433E-02	0.1900E+08	0.6963E-02	0.2000E+08	0.6578E-02				

k = 2 Photon Energy 0.1749E+00 MeV Level Energy 0.1749E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.6336E+07	0.0000E+00	0.7000E+07	0.5236E-02	0.8000E+07	0.1857E-01	0.9000E+07	0.2940E-01	0.1000E+08	0.3335E-01
0.1300E+08	0.3026E-01	0.1400E+08	0.1992E-01	0.1500E+08	0.1395E-01	0.1600E+08	0.1106E-01	0.1700E+08	0.9729E-02
0.1800E+08	0.8966E-02	0.1900E+08	0.8434E-02	0.2000E+08	0.7991E-02				

k = 3 Photon Energy 0.1361E+00 MeV Level Energy 0.2318E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.6336E+07	0.0000E+00	0.7000E+07	0.2006E-02	0.8000E+07	0.7204E-02	0.9000E+07	0.1183E-01	0.1000E+08	0.1419E-01
0.1300E+08	0.1452E-01	0.1400E+08	0.9700E-02	0.1500E+08	0.6808E-02	0.1600E+08	0.5374E-02	0.1700E+08	0.4696E-02
0.1800E+08	0.4303E-02	0.1900E+08	0.4031E-02	0.2000E+08	0.3808E-02				

k = 4 Photon Energy 0.1330E+00 MeV Level Energy 0.1749E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.6336E+07	0.0000E+00	0.7000E+07	0.1516E-02	0.8000E+07	0.5376E-02	0.9000E+07	0.8509E-02	0.1000E+08	0.9653E-02
0.1300E+08	0.8761E-02	0.1400E+08	0.5767E-02	0.1500E+08	0.4038E-02	0.1600E+08	0.3200E-02	0.1700E+08	0.2816E-02
0.1800E+08	0.2595E-02	0.1900E+08	0.2441E-02	0.2000E+08	0.2313E-02				

k = 5 Photon Energy 0.7930E-01 MeV Level Energy 0.1749E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.6336E+07	0.0000E+00	0.7000E+07	0.1378E-03	0.8000E+07	0.4887E-03	0.9000E+07	0.7736E-03	0.1000E+08	0.8775E-03
0.1300E+08	0.7964E-03	0.1400E+08	0.5243E-03	0.1500E+08	0.3671E-03	0.1600E+08	0.2909E-03	0.1700E+08	0.2560E-03
0.1800E+08	0.2359E-03	0.1900E+08	0.2219E-03	0.2000E+08	0.2103E-03				

k = 6 Photon Energy 0.5680E-01 MeV Level Energy 0.2318E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.6336E+07	0.0000E+00	0.7000E+07	0.6079E-03	0.8000E+07	0.2183E-02	0.9000E+07	0.3586E-02	0.1000E+08	0.4300E-02
0.1300E+08	0.4401E-02	0.1400E+08	0.2939E-02	0.1500E+08	0.2063E-02	0.1600E+08	0.1629E-02	0.1700E+08	0.1423E-02
0.1800E+08	0.1304E-02	0.1900E+08	0.1222E-02	0.2000E+08	0.1154E-02				

(n,3n)
Photon Cross-Sections (Neutron Induced)

Total photon production cross-section

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1378E+00	0.1400E+08	0.4484E+00	0.1500E+08	0.8261E+00	0.1600E+08	0.1151E+01
0.1700E+08	0.1434E+01	0.1800E+08	0.1724E+01	0.1900E+08	0.2012E+01	0.2000E+08	0.2291E+01		

k = 1 Photon Energy 0.1137E+01 MeV Level Energy 0.1137E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.8735E-05	0.1400E+08	0.2699E-03	0.1500E+08	0.7075E-03	0.1600E+08	0.8528E-03
0.1700E+08	0.8388E-03	0.1800E+08	0.8022E-03	0.1900E+08	0.7628E-03	0.2000E+08	0.7093E-03		

k = 2 Photon Energy 0.1094E+01 MeV Level Energy 0.1137E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1310E-04	0.1400E+08	0.4049E-03	0.1500E+08	0.1061E-02	0.1600E+08	0.1279E-02
0.1700E+08	0.1258E-02	0.1800E+08	0.1203E-02	0.1900E+08	0.1144E-02	0.2000E+08	0.1064E-02		

k = 3 Photon Energy 0.1047E+01 MeV Level Energy 0.1089E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.5445E-05	0.1400E+08	0.1544E-03	0.1500E+08	0.3694E-03	0.1600E+08	0.4082E-03
0.1700E+08	0.3713E-03	0.1800E+08	0.3329E-03	0.1900E+08	0.3054E-03	0.2000E+08	0.2806E-03		

k = 4 Photon Energy 0.1033E+01 MeV Level Energy 0.1076E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1441E-04	0.1400E+08	0.4465E-03	0.1500E+08	0.1196E-02	0.1600E+08	0.1536E-02
0.1700E+08	0.1629E-02	0.1800E+08	0.1668E-02	0.1900E+08	0.1663E-02	0.2000E+08	0.1592E-02		

k = 5 Photon Energy 0.9877E+00 MeV Level Energy 0.1031E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.3118E-04	0.1400E+08	0.9471E-03	0.1500E+08	0.2513E-02	0.1600E+08	0.3213E-02
0.1700E+08	0.3391E-02	0.1800E+08	0.3443E-02	0.1900E+08	0.3401E-02	0.2000E+08	0.3231E-02		

k = 6 Photon Energy 0.9738E+00 MeV Level Energy 0.1115E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.4887E-04	0.1400E+08	0.1632E-02	0.1500E+08	0.5162E-02	0.1600E+08	0.7634E-02
0.1700E+08	0.8992E-02	0.1800E+08	0.9910E-02	0.1900E+08	0.1036E-01	0.2000E+08	0.1022E-01		

k = 7 Photon Energy 0.9591E+00 MeV Level Energy 0.1002E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.4458E-04	0.1400E+08	0.1390E-02	0.1500E+08	0.4036E-02	0.1600E+08	0.5550E-02
0.1700E+08	0.6167E-02	0.1800E+08	0.6437E-02	0.1900E+08	0.6435E-02	0.2000E+08	0.6144E-02		

k = 8 Photon Energy 0.9381E+00 MeV Level Energy 0.9381E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2105E-04	0.1400E+08	0.6035E-03	0.1500E+08	0.1607E-02	0.1600E+08	0.2065E-02
0.1700E+08	0.2173E-02	0.1800E+08	0.2168E-02	0.1900E+08	0.2105E-02	0.2000E+08	0.1981E-02		

k = 9 Photon Energy 0.9345E+00 MeV Level Energy 0.1076E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.3528E-04	0.1400E+08	0.1093E-02	0.1500E+08	0.2927E-02	0.1600E+08	0.3759E-02
0.1700E+08	0.3989E-02	0.1800E+08	0.4085E-02	0.1900E+08	0.4073E-02	0.2000E+08	0.3899E-02		

k = 10 Photon Energy 0.9160E+00 MeV Level Energy 0.9589E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.3353E-04	0.1400E+08	0.1003E-02	0.1500E+08	0.2806E-02	0.1600E+08	0.3761E-02
0.1700E+08	0.4099E-02	0.1800E+08	0.4209E-02	0.1900E+08	0.4161E-02	0.2000E+08	0.3949E-02		

k = 11 Photon Energy 0.9003E+00 MeV Level Energy 0.9003E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2013E-05	0.1400E+08	0.5765E-04	0.1500E+08	0.1437E-03	0.1600E+08	0.1745E-03
0.1700E+08	0.1777E-03	0.1800E+08	0.1748E-03	0.1900E+08	0.1687E-03	0.2000E+08	0.1579E-03		

k = 12 Photon Energy 0.8958E+00 MeV Level Energy 0.1038E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.4846E-04	0.1400E+08	0.1556E-02	0.1500E+08	0.4713E-02	0.1600E+08	0.6725E-02
0.1700E+08	0.7726E-02	0.1800E+08	0.8314E-02	0.1900E+08	0.8522E-02	0.2000E+08	0.8286E-02		

k = 13 Photon Energy 0.8952E+00 MeV Level Energy 0.9381E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.9354E-06	0.1400E+08	0.2682E-04	0.1500E+08	0.7140E-04	0.1600E+08	0.9177E-04
0.1700E+08	0.9658E-04	0.1800E+08	0.9636E-04	0.1900E+08	0.9356E-04	0.2000E+08	0.8803E-04		

k = 14 Photon Energy 0.8888E+00 MeV Level Energy 0.1031E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1095E-04	0.1400E+08	0.3328E-03	0.1500E+08	0.8830E-03	0.1600E+08	0.1129E-02
0.1700E+08	0.1191E-02	0.1800E+08	0.1210E-02	0.1900E+08	0.1195E-02	0.2000E+08	0.1135E-02		

k = 15 Photon Energy 0.8672E+00 MeV Level Energy 0.1161E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.4752E-04	0.1400E+08	0.1693E-02	0.1500E+08	0.5962E-02	0.1600E+08	0.9676E-02
0.1700E+08	0.1211E-01	0.1800E+08	0.1401E-01	0.1900E+08	0.1517E-01	0.2000E+08	0.1536E-01		

k = 16 Photon Energy 0.8575E+00 MeV Level Energy 0.9003E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.5234E-05	0.1400E+08	0.1499E-03	0.1500E+08	0.3736E-03	0.1600E+08	0.4538E-03
0.1700E+08	0.4619E-03	0.1800E+08	0.4544E-03	0.1900E+08	0.4385E-03	0.2000E+08	0.4105E-03		

k = 17 Photon Energy 0.8212E+00 MeV Level Energy 0.1115E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2125E-05	0.1400E+08	0.7096E-04	0.1500E+08	0.2244E-03	0.1600E+08	0.3319E-03
0.1700E+08	0.3910E-03	0.1800E+08	0.4309E-03	0.1900E+08	0.4504E-03	0.2000E+08	0.4445E-03		

k = 18 Photon Energy 0.8179E+00 MeV Level Energy 0.8607E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1166E-04	0.1400E+08	0.1496E-03	0.1500E+08	0.3089E-03	0.1600E+08	0.3346E-03
0.1700E+08	0.3104E-03	0.1800E+08	0.2848E-03	0.1900E+08	0.2648E-03	0.2000E+08	0.2444E-03		

k = 19 Photon Energy 0.7586E+00 MeV Level Energy 0.9003E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1288E-04	0.1400E+08	0.3689E-03	0.1500E+08	0.9196E-03	0.1600E+08	0.1117E-02
0.1700E+08	0.1137E-02	0.1800E+08	0.1119E-02	0.1900E+08	0.1079E-02	0.2000E+08	0.1011E-02		

k = 20 Photon Energy 0.6979E+00 MeV Level Energy 0.9922E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2039E-04	0.1400E+08	0.6162E-03	0.1500E+08	0.1630E-02	0.1600E+08	0.2106E-02
0.1700E+08	0.2267E-02	0.1800E+08	0.2346E-02	0.1900E+08	0.2352E-02	0.2000E+08	0.2257E-02		

k = 21 Photon Energy 0.6060E+00 MeV Level Energy 0.6489E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.3690E-03	0.1400E+08	0.3080E-02	0.1500E+08	0.6919E-02	0.1600E+08	0.9099E-02
0.1700E+08	0.1017E-01	0.1800E+08	0.1068E-01	0.1900E+08	0.1072E-01	0.2000E+08	0.1028E-01		

k = 22 Photon Energy 0.6006E+00 MeV Level Energy 0.7423E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1019E-03	0.1400E+08	0.8926E-03	0.1500E+08	0.2280E-02	0.1600E+08	0.3320E-02
0.1700E+08	0.4022E-02	0.1800E+08	0.4498E-02	0.1900E+08	0.4734E-02	0.2000E+08	0.4692E-02		

k = 23 Photon Energy 0.5973E+00 MeV Level Energy 0.5973E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1494E-03	0.1400E+08	0.1061E-02	0.1500E+08	0.2097E-02	0.1600E+08	0.2548E-02
0.1700E+08	0.2674E-02	0.1800E+08	0.2676E-02	0.1900E+08	0.2605E-02	0.2000E+08	0.2456E-02		

k = 24 Photon Energy 0.5545E+00 MeV Level Energy 0.5973E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2438E-03	0.1400E+08	0.1731E-02	0.1500E+08	0.3422E-02	0.1600E+08	0.4157E-02
0.1700E+08	0.4363E-02	0.1800E+08	0.4366E-02	0.1900E+08	0.4250E-02	0.2000E+08	0.4008E-02		

k = 25 Photon Energy 0.5072E+00 MeV Level Energy 0.6489E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.3840E-03	0.1400E+08	0.3206E-02	0.1500E+08	0.7202E-02	0.1600E+08	0.9470E-02
0.1700E+08	0.1058E-01	0.1800E+08	0.1111E-01	0.1900E+08	0.1116E-01	0.2000E+08	0.1070E-01		

k = 26 Photon Energy 0.4667E+00 MeV Level Energy 0.1115E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2125E-05	0.1400E+08	0.7096E-04	0.1500E+08	0.2244E-03	0.1600E+08	0.3319E-03
0.1700E+08	0.3910E-03	0.1800E+08	0.4309E-03	0.1900E+08	0.4504E-03	0.2000E+08	0.4445E-03		

k = 27 Photon Energy 0.4480E+00 MeV Level Energy 0.7423E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.6823E-03	0.1400E+08	0.5974E-02	0.1500E+08	0.1526E-01	0.1600E+08	0.2221E-01
0.1700E+08	0.2692E-01	0.1800E+08	0.3010E-01	0.1900E+08	0.3168E-01	0.2000E+08	0.3140E-01		

k = 28 Photon Energy 0.4192E+00 MeV Level Energy 0.1161E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.4699E-05	0.1400E+08	0.1674E-03	0.1500E+08	0.5896E-03	0.1600E+08	0.9570E-03
0.1700E+08	0.1198E-02	0.1800E+08	0.1385E-02	0.1900E+08	0.1500E-02	0.2000E+08	0.1519E-02		

k = 29 Photon Energy 0.3887E+00 MeV Level Energy 0.1038E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.3195E-05	0.1400E+08	0.1026E-03	0.1500E+08	0.3107E-03	0.1600E+08	0.4434E-03
0.1700E+08	0.5094E-03	0.1800E+08	0.5481E-03	0.1900E+08	0.5619E-03	0.2000E+08	0.5463E-03		

k = 30 Photon Energy 0.3615E+00 MeV Level Energy 0.9589E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1082E-05	0.1400E+08	0.3237E-04	0.1500E+08	0.9053E-04	0.1600E+08	0.1213E-03
0.1700E+08	0.1322E-03	0.1800E+08	0.1358E-03	0.1900E+08	0.1342E-03	0.2000E+08	0.1274E-03		

k = 31 Photon Energy 0.3433E+00 MeV Level Energy 0.9922E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2966E-04	0.1400E+08	0.8963E-03	0.1500E+08	0.2370E-02	0.1600E+08	0.3063E-02
0.1700E+08	0.3297E-02	0.1800E+08	0.3412E-02	0.1900E+08	0.3420E-02	0.2000E+08	0.3283E-02		

k = 32 Photon Energy 0.3407E+00 MeV Level Energy 0.9381E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.9354E-06	0.1400E+08	0.2682E-04	0.1500E+08	0.7140E-04	0.1600E+08	0.9177E-04
0.1700E+08	0.9658E-04	0.1800E+08	0.9636E-04	0.1900E+08	0.9356E-04	0.2000E+08	0.8803E-04		

k = 33 Photon Energy 0.3100E+00 MeV Level Energy 0.9589E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1442E-05	0.1400E+08	0.4316E-04	0.1500E+08	0.1207E-03	0.1600E+08	0.1618E-03
0.1700E+08	0.1763E-03	0.1800E+08	0.1810E-03	0.1900E+08	0.1790E-03	0.2000E+08	0.1698E-03		

k = 34 Photon Energy 0.3030E+00 MeV Level Energy 0.9003E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1087E-04	0.1400E+08	0.3113E-03	0.1500E+08	0.7759E-03	0.1600E+08	0.9425E-03
0.1700E+08	0.9594E-03	0.1800E+08	0.9438E-03	0.1900E+08	0.9107E-03	0.2000E+08	0.8526E-03		

k = 35 Photon Energy 0.2952E+00 MeV Level Energy 0.1038E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1598E-05	0.1400E+08	0.5131E-04	0.1500E+08	0.1554E-03	0.1600E+08	0.2217E-03
0.1700E+08	0.2547E-03	0.1800E+08	0.2741E-03	0.1900E+08	0.2809E-03	0.2000E+08	0.2732E-03		

k = 36 Photon Energy 0.2940E+00 MeV Level Energy 0.1042E+01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2044E-04	0.1400E+08	0.3454E-02	0.1500E+08	0.1395E-01	0.1600E+08	0.2369E-01
0.1700E+08	0.3406E-01	0.1800E+08	0.4955E-01	0.1900E+08	0.7191E-01	0.2000E+08	0.1044E+00		

k = 37 Photon Energy 0.2892E+00 MeV Level Energy 0.9381E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.4677E-06	0.1400E+08	0.1341E-04	0.1500E+08	0.3570E-04	0.1600E+08	0.4589E-04
0.1700E+08	0.4829E-04	0.1800E+08	0.4818E-04	0.1900E+08	0.4678E-04	0.2000E+08	0.4401E-04		

k = 38 Photon Energy 0.2634E+00 MeV Level Energy 0.8607E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1034E-04	0.1400E+08	0.1326E-03	0.1500E+08	0.2740E-03	0.1600E+08	0.2967E-03
0.1700E+08	0.2753E-03	0.1800E+08	0.2526E-03	0.1900E+08	0.2348E-03	0.2000E+08	0.2168E-03		

k = 39 Photon Energy 0.2515E+00 MeV Level Energy 0.9003E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.9260E-05	0.1400E+08	0.2652E-03	0.1500E+08	0.6609E-03	0.1600E+08	0.8029E-03
0.1700E+08	0.8172E-03	0.1800E+08	0.8040E-03	0.1900E+08	0.7758E-03	0.2000E+08	0.7263E-03		

k = 40 Photon Energy 0.2503E+00 MeV Level Energy 0.7478E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.9839E-03	0.1400E+08	0.1266E-01	0.1500E+08	0.3511E-01	0.1600E+08	0.5726E-01
0.1700E+08	0.7949E-01	0.1800E+08	0.1077E+00	0.1900E+08	0.1432E+00	0.2000E+08	0.1883E+00		

k = 41 Photon Energy 0.2499E+00 MeV Level Energy 0.9922E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.1174E-04	0.1400E+08	0.3548E-03	0.1500E+08	0.9383E-03	0.1600E+08	0.1213E-02
0.1700E+08	0.1305E-02	0.1800E+08	0.1351E-02	0.1900E+08	0.1354E-02	0.2000E+08	0.1300E-02		

k = 42 Photon Energy 0.2032E+00 MeV Level Energy 0.4975E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.3574E-02	0.1400E+08	0.2914E-01	0.1500E+08	0.6974E-01	0.1600E+08	0.1120E+00
0.1700E+08	0.1531E+00	0.1800E+08	0.1989E+00	0.1900E+08	0.2484E+00	0.2000E+08	0.3011E+00		

k = 43 Photon Energy 0.1526E+00 MeV Level Energy 0.2943E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.2471E-01	0.1400E+08	0.8019E-01	0.1500E+08	0.1468E+00	0.1600E+08	0.2108E+00
0.1700E+08	0.2698E+00	0.1800E+08	0.3303E+00	0.1900E+08	0.3887E+00	0.2000E+08	0.4421E+00		

k = 44 Photon Energy 0.9890E-01 MeV Level Energy 0.1417E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.4654E-01	0.1400E+08	0.1297E+00	0.1500E+08	0.2161E+00	0.1600E+08	0.2913E+00
0.1700E+08	0.3573E+00	0.1800E+08	0.4227E+00	0.1900E+08	0.4827E+00	0.2000E+08	0.5334E+00		

k = 45 Photon Energy 0.4280E-01 MeV Level Energy 0.4280E-01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1160E+08	0.0000E+00	0.1300E+08	0.5950E-01	0.1400E+08	0.1619E+00	0.1500E+08	0.2631E+00	0.1600E+08	0.3446E+00
0.1700E+08	0.4128E+00	0.1800E+08	0.4790E+00	0.1900E+08	0.5381E+00	0.2000E+08	0.5860E+00		

(n,4n)
Photon Cross-Sections (Neutron Induced)

Total photon production cross-section

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.4994E-04	0.1900E+08	0.7243E-03	0.2000E+08	0.1683E-01		

k = 1 Photon Energy 0.4988E+00 MeV Level Energy 0.5561E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.3533E-06	0.2000E+08	0.2941E-04				

k = 2 Photon Energy 0.4976E+00 MeV Level Energy 0.5055E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.3522E-06	0.2000E+08	0.2801E-04				

k = 3 Photon Energy 0.4921E+00 MeV Level Energy 0.4921E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.2007E-06	0.2000E+08	0.1567E-04				

k = 4 Photon Energy 0.4842E+00 MeV Level Energy 0.4921E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.3441E-07	0.2000E+08	0.2687E-05				

k = 5 Photon Energy 0.4698E+00 MeV Level Energy 0.4698E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.1228E-06	0.2000E+08	0.9364E-05				

k = 6 Photon Energy 0.4619E+00 MeV Level Energy 0.4698E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.2004E-06	0.2000E+08	0.1528E-04				

k = 7 Photon Energy 0.4482E+00 MeV Level Energy 0.5055E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.3131E-07	0.2000E+08	0.2490E-05				

k = 8 Photon Energy 0.4348E+00 MeV Level Energy 0.4921E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.3383E-06	0.2000E+08	0.2642E-04				

k = 9 Photon Energy 0.4298E+00 MeV Level Energy 0.5055E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.3992E-06	0.2000E+08	0.3174E-04				

k = 10 Photon Energy 0.3923E+00 MeV Level Energy 0.5561E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.5084E-06	0.2000E+08	0.4232E-04				

k = 11 Photon Energy 0.3343E+00 MeV Level Energy 0.3916E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.1090E-06	0.2000E+08	0.7775E-05				

k = 12 Photon Energy 0.3223E+00 MeV Level Energy 0.3301E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.4683E-08	0.1900E+08	0.1076E-06	0.2000E+08	0.5037E-05		

k = 13 Photon Energy 0.3159E+00 MeV Level Energy 0.3916E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.7789E-07	0.2000E+08	0.5554E-05				

k = 14 Photon Energy 0.3117E+00 MeV Level Energy 0.3874E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.4180E-06	0.2000E+08	0.3328E-04				

k = 15 Photon Energy 0.2855E+00 MeV Level Energy 0.2855E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.2155E-07	0.1900E+08	0.3928E-06	0.2000E+08	0.1383E-04		

k = 16 Photon Energy 0.2776E+00 MeV Level Energy 0.2855E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.3448E-06	0.1900E+08	0.6285E-05	0.2000E+08	0.2212E-03		

k = 17 Photon Energy 0.2728E+00 MeV Level Energy 0.3301E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.5385E-07	0.1900E+08	0.1237E-05	0.2000E+08	0.5792E-04		

k = 18 Photon Energy 0.2544E+00 MeV Level Energy 0.3301E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.7492E-07	0.1900E+08	0.1721E-05	0.2000E+08	0.8058E-04		

k = 19 Photon Energy 0.2282E+00 MeV Level Energy 0.2855E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.2730E-06	0.1900E+08	0.4975E-05	0.2000E+08	0.1751E-03		

k = 20 Photon Energy 0.2264E+00 MeV Level Energy 0.5118E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.6354E-06	0.2000E+08	0.5487E-04				

k = 21 Photon Energy 0.2120E+00 MeV Level Energy 0.5701E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.4225E-05	0.2000E+08	0.3918E-03				

k = 22 Photon Energy 0.2098E+00 MeV Level Energy 0.2855E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.7902E-07	0.1900E+08	0.1440E-05	0.2000E+08	0.5069E-04		

k = 23 Photon Energy 0.2011E+00 MeV Level Energy 0.5192E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.4049E-05	0.2000E+08	0.3453E-03				

k = 24 Photon Energy 0.1817E+00 MeV Level Energy 0.5118E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.1975E-06	0.2000E+08	0.1705E-04				

k = 25 Photon Energy 0.1664E+00 MeV Level Energy 0.3301E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.1171E-07	0.1900E+08	0.2689E-06	0.2000E+08	0.1259E-04		

k = 26 Photon Energy 0.1543E+00 MeV Level Energy 0.3181E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.1316E-05	0.1900E+08	0.2395E-04	0.2000E+08	0.8910E-03		

k = 27 Photon Energy 0.1244E+00 MeV Level Energy 0.5118E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)

0.1816E+08 0.0000E+00 0.1900E+08 0.2576E-07 0.2000E+08 0.2224E-05

k = 28 Photon Energy 0.1171E+00 MeV Level Energy 0.1928E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.5253E-05	0.1900E+08	0.7069E-04	0.2000E+08	0.1310E-02		

k = 29 Photon Energy 0.1065E+00 MeV Level Energy 0.1638E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.5160E-05	0.1900E+08	0.7553E-04	0.2000E+08	0.1809E-02		

k = 30 Photon Energy 0.1061E+00 MeV Level Energy 0.3916E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.1324E-05	0.2000E+08	0.9441E-04				

k = 31 Photon Energy 0.1020E+00 MeV Level Energy 0.3874E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.1817E-06	0.2000E+08	0.1447E-04				

k = 32 Photon Energy 0.8810E-01 MeV Level Energy 0.1638E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.6378E-06	0.1900E+08	0.9336E-05	0.2000E+08	0.2236E-03		

k = 33 Photon Energy 0.6780E-01 MeV Level Energy 0.7570E-01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.8568E-05	0.1900E+08	0.1173E-03	0.2000E+08	0.2278E-02		

k = 34 Photon Energy 0.6150E-01 MeV Level Energy 0.3916E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.4673E-07	0.2000E+08	0.3332E-05				

k = 35 Photon Energy 0.5730E-01 MeV Level Energy 0.3874E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1900E+08	0.1218E-05	0.2000E+08	0.9695E-04				

k = 36 Photon Energy 0.5730E-01 MeV Level Energy 0.5730E-01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.5576E-05	0.1900E+08	0.7971E-04	0.2000E+08	0.1777E-02		

k = 37 Photon Energy 0.4940E-01 MeV Level Energy 0.5730E-01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.4750E-05	0.1900E+08	0.6790E-04	0.2000E+08	0.1514E-02		

k = 38 Photon Energy 0.4470E-01 MeV Level Energy 0.3301E+00 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.8897E-07	0.1900E+08	0.2043E-05	0.2000E+08	0.9569E-04		

k = 39 Photon Energy 0.1840E-01 MeV Level Energy 0.7570E-01 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.1755E-05	0.1900E+08	0.2403E-04	0.2000E+08	0.4666E-03		

k = 40 Photon Energy 0.7900E-02 MeV Level Energy 0.7900E-02 MeV

E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)	E(eV)	σ(b)
0.1816E+08	0.0000E+00	0.1850E+08	0.1597E-04	0.1900E+08	0.2223E-03	0.2000E+08	0.4573E-02		