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DEVELOPMENT OF DISPLACEMENT CROSS SECTION SET FOR EVALUATING RADIATION DAMAGE BY NEUTRON IRRADIATION IN MATERIALS USED FOR FUSION REACTORS

February 1997

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Development of Displacement Cross Section Set for Evaluating Radiation Damage by Neutron Irradiation in Materials Used for Fusion Reactors

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(Received January 20, 1997)

The displacement cross section set was developed by considering nuclear reaction kinematics in order to evaluate displacement damage as a typical index for radiation damage. This set includes the same kinds of 40 nuclides, and the same energy structures of 42-group and 125-group types as those in FUSION-J3 of the neutron and gamma-ray coupled transport calculation group constant set.

We calculated displacement damages of SS316 and copper for neutron fluence of 1MWa/m² in ITER (International Thermonuclear Fusion Experimental Reactor) . These results were obtained as 10dpa and 13dpa, respectively, which were in good agreement with the values estimated concerning only SS316 and copper in the past.

Keywords: Displacement Cross Section, Radiation Damage, Neutron Irradiation, Fusion Reactor

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核融合炉使用材料の中性子照射損傷評価用弾き出し断面積セットの開発

日本原子力研究所那珂研究所核融合工学部
真木　紘一*・佐藤　聡・川崎　弘光**

（1997年1月20日受理）

照射損傷の代表的指標である弾き出し損傷評価に必要な弾き出し断面積セットを，反応のカイネマティクスを用いて算出した。弾き出し断面積セットに内蔵した核種とエネルギー群構造を核融合炉核計算用群定数セットFUSION-J3と同一とし，それぞれ，40核種，125群と42群の二つのセットを作成した。そのセットを用いて，国際熱核融合実験炉ITERを対象に第一壁中性子フルエンス1MWa/㎡に対して，SS316と銅の弾き出し損傷を算出した結果，それぞれ10 dpa，13dpaが得られ，過去に特定材料として評価された結果とほぼ一致している。以上より，運転中の中性子束の計算結果をベースに，弾き出し損傷まで通して評価できる核融合核計算システムを構築した。

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1. Introduction

Neutrons produced by fusion reaction interact with materials constructing divertor, the first wall and blanket, etc. The secondary neutrons, charged particles and gamma-ray are emitted by interaction with materials. Target nuclides are knocked on by this interaction. When knock on energy for the nuclide is greater than displacement energy, atoms constituting lattice of crystal are displaced from the lattice by knocking on, and pair point defects of vacancies and atoms among the lattice are created. When primary knock-on atom (PKA) energy is much higher than displacement energy, the secondary, the tertiary, ・・・ cascade damages occur. Most of cascade damages vanish in the very short period, but much small number of vacancies leave. These assembling vacancies form voids and occur swelling, and make materials damage together with helium production[1]. In addition to this, material properties become lowered by ionizing around the cascades. A parameter of displacement per atom (dpa) was derived as physical quantity to evaluate material damage with knocked on atoms by Rindhard[2] and Robinson[3].

Main causes of strength property deterioration in structural materials such as stainless steel are displacement damage by knocking on, disturbance of lattice in crystals and ionization by charged particle flying, swelling and deposition of hydrogen and helium in grain boundaries. The parameters to evaluate these damages can be considered as dpa, and helium and hydrogen production. However, damage characteristics are known different from each other in the two cases of same dpa, and helium and hydrogen production, but irradiation with different neutron spectra. Further more in the cases of different using temperature, progressions of damage are different from each other. Therefore, it is the future subjects what method radiation damage should be evaluated by.

In functional materials such as electric insulators, gamma-ray has important effect on radiation damage in addition to dpa, transmutation, and helium and hydrogen production. The electric conductivities and photon absorbing rate during neutron and gamma-ray irradiating are different from those after irradiation by several orders[4]. There is not enough of data base for irradiation information about the functional materials.

T. Ide, etal.[5] estimated PKA energy and displacement cross section by the energy balance method. The energy balance method is the one to calculate PKA energy from the value of (incident energy + Q-value) － (outgoing particle energy). In that method, since only several per cents of derivative between the two large numbers, the first and the second terms, large error occurs to the PKA energy. According to the method by Rindhard and Robinson, Iijima, etal.[6] tried to estimate primary knock on atom energy and displacement cross sections, etc. Considering these back ground, to evaluate dpa as irradiation parameter is necessary for estimate radiation damage in structural and functional materials used in fusion reactors, although radiation damage cannot be perfectly understood. For the purpose of this, dpa cross section set is made to include the same elements and the same group structure as those in fusion neutronic transport cross section set of FUSION-J3[7].

The energies of PKA must be estimated to make the dpa cross section set. In the present

work, the dpa cross sections are calculated by direct method in which PKA energies are computed from secondary neutron, gamma-ray and charged particle energies by momentum and energy conservations.

2. Estimation method of dpa cross section

2.1 definition of dpa cross section

In the method to evaluate displacement damage, the number of displacement times by neutron irradiation is considered as the parameter to indicate irradiation damage. The displacement damage is obtained from the dpa cross section multiplied by neutron flux. The dpa cross section σ_{dpa} is given by Lindhard[2] and Robinson[3] as a function of incident neutron energy E_n as follows,

$$\sigma_{dpa}(E_n) = \frac{0.8}{\varepsilon_d} \cdot \sum_x \int \frac{E_p}{1 + K_L \cdot g(E_P)} \cdot \sigma_x(E_n, E_p)\, dE_p \quad , \tag{2.1}$$

where E_p : the knock on energy in laboratory,

$$K_L = 0.1337 \cdot Z^{2/3} / A^{1/2} \quad , \tag{2.2}$$

the symbols of Z and A are respectively atomic number and mass number.

$$g(E_P) = \varepsilon + 0.40244 \cdot \varepsilon^{3/4} + 3.4008 \cdot \varepsilon^{1/6} \quad , \tag{2.3}$$

$$\varepsilon = 0.01151 \cdot E_p / Z^{2/7}, \tag{2.4}$$

ε_d : the displacement energy ,

σ_x's are neutron reaction cross sections of (n, γ), (n, 2n), (n, p), (n,a), (n,np), (n,d), (n,t), ・・・.

The equation (2.5) can be expressed by averaged knock on energy and integrated cross sections with energy and angle as follows [6],

$$\sigma_{dpa}(E_n) = \frac{0.8}{\varepsilon_d} \cdot \sum_x \frac{\overline{E_p}}{1 + K_L \cdot g(\overline{E_P})} \cdot \overline{\sigma_x(E_n)} \quad , \tag{2.5}$$

where $\overline{E_p}$: the knock on energy averaged with reaction cross sections through energy and angle.

$\overline{\sigma_x(E_n)}$ is a cross section of reaction x integrated with energy and angle.

The last two parameters are given as,

$$\overline{E_p} = \frac{\iint E_p \cdot \sigma_x(E_R, \varepsilon_c, \theta_c)\ d\varepsilon_c\, d\Omega_c}{\iint \sigma_x(E_R, \varepsilon_c, \theta_c)\ d\varepsilon_c\, d\Omega_c} \tag{2.6}$$

$$\overline{\sigma_x(E_n)} = \iint \sigma_x(E_R, \varepsilon_c, \theta_c)\, d\varepsilon_c\, d\Omega_c \tag{2.7}$$

where E_R is relative kinetic energy.

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$$\overline{\sigma_x(E_n)} = \iint \sigma_x(E_R, \varepsilon_c, \theta_c)\, d\varepsilon_c\, d\Omega_c \tag{2.7}$$

where E_R is relative kinetic energy.

From above derivation, displacement damage cross section $\sigma_{dpa}(E_n)$ can be given by eq.(2.5). The knock on energy E_p of a target nuclide and kinetic energy E_c of a emitted charged particle are given by momentum and energy conservations in collision as follows.

$$E_p = \frac{m_2}{M}E_G + \frac{m_1}{M}\varepsilon_c - 2\left\{\frac{m_1 m_2}{M^2} E_G \cdot \varepsilon_c\right\}^{1/2} \mu_c \quad , \tag{2.8}$$

$$E_c = \frac{m_1}{M}E_G + \frac{m_2}{M}\varepsilon_c + 2\left\{\frac{m_1 m_2}{M^2} E_G \cdot \varepsilon_c\right\}^{1/2} \mu_c \quad , \tag{2.9}$$

$$E_p + E_c = E_G + \varepsilon_c \tag{2.10}$$

where M : mass of a compound nuclide,

$$M = m_{01} + m_{02} = m_1 + m_2 \tag{2.11}$$

m_{01} : mass of an incident neutron,

m_{02} : mass of a target nuclide,

m_1 : mass of an outgoing particle,

m_2 : mass of a residual nuclide,

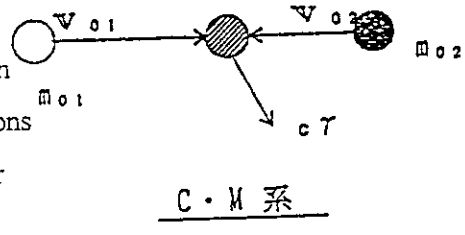
μ_c : cosine of out going angle of the first out going nuclide in center-of-mass system,

$\mu_c = \cos(\theta_c)$,

E_G : kinetic energy in center-of-mass system,

ε_c : kinetic energy of the first out going particle in center-of-mass system.

Kinetic energy of gravity center E_G is presented by incident neutron energy of E_n from kinematics in reaction as shown in Fig.2.1, and energy and momentum conservations as follows. From Fig.2.1, the velocity of the gravity center in laboratory system can be understood to be equal to the target nuclide velocity of v_{02} in center-of-mass system.



The kinetic energy E_G of the gravity center can be therefore represented as,

$$E_G = \frac{1}{2} M \cdot v_{02}^2 \tag{2.12}$$

The incident neutron velocity V_{01} in laboratory system is given from relationship between the velocities in laboratory and center-of-mass systems as,

$$V_{01} = v_{01} + v_{02} \quad ,$$

where v_{01} : the velocity of the incident neutron in center-of-mass system,

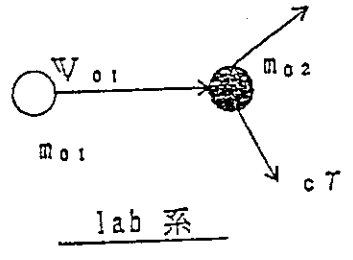


Fig.2.1 Kinematics in laboratory and center-of-mass systems

$\vec{v}_{02}$: the velocity of the target nuclide in center-of-mass system.

Using the relation of $m_{01} \cdot \vec{v}_{01} = m_{02} \cdot \vec{v}_{02}$,

$$\vec{v}_{01} = \frac{m_{01} + m_{02}}{m_{01}} \vec{v}_{02} = \frac{M}{m_{01}} \vec{v}_{02} \quad . \quad (2.13)$$

Applying eq.(2.13), the kinetic energy of the gravity center E_G is obtained as,

$$E_G = \frac{1}{2} M \left\{ \frac{m_{01}}{M} \right\}^2 \vec{v}_{01}^{\,2} = \frac{m_{01}}{M} \left\{ \frac{1}{2} m_{01} \vec{v}_{01}^{\,2} \right\} .$$

Since the incident neutron energy of E_n is given as

$$E_n = \frac{1}{2} m_{01} \vec{v}_{01}^{\,2} \quad ,$$

the relationship between the kinetic energy of the gravity center E_G and the incident neutron energy E_n can be obtained as,

$$E_G = \frac{m_{01}}{M} \cdot E_n \quad . \quad (2.14)$$

2.2 Knock on energy and displacement cross section

Knock on energy of target nuclide by reaction with neutrons needs to be estimated in order to create displacement cross sections. Kinds of neutron reactions are (n, γ) as non-particle emitting reaction, (n, n), (n, n'), (n, 2n), (n, 3n), (n, np), (n, nd), (n, nα), etc. as secondary neutron emitting reactions, and (n, p), (n, 2p), (n, d), (n, t), (n, α), etc. as charged particle emitting reactions. The knock on energies of target nuclides are estimated in accordance with these three categories of the neutron reactions, as follows.

[1] γ -productive capture reaction (n, γ) (radiative capture)

We estimated the displacement cross sections on the basis of the evaluated nuclear data file of JENDL-3[8], which is edited with the format of ENDF/B [9]. According to the format, reaction cross section of (n, γ) is installed in MT=102 of File 3 (neutron cross section). The target nuclide knock on energy E_p can be estimated with momentum and energy conservations for emitted gamma-ray, since no charged particle is emitted in this reaction.

From eq.(2.10),

$$E_p = E_G + \varepsilon_c \quad , \quad (2.15)$$

where E_G is given by incident neutron energy E_n with eq.(2.14).

The knock on energy ε_p of the target nuclide in center-of-mass system is given as follows. Emitted photon momentum p is presented by $p = \varepsilon_\gamma / c$, since the emitted photon energy ε_γ is given by $\varepsilon_\gamma = h \nu$,

where h : Planck constant ($=6.626176 \times 10^{-34}$ J·s),

ν : frequency of photon (s^{-1}).

By momentum conservation between target nuclide and photon,

$$M \cdot v_2 = p = \varepsilon_\gamma / c ,$$

where v_2 : knock on velocity of target nuclide in center-of-mass system,

c : photon velocity in a vacuum.

Applying this equation, knock on energy of target nuclide ε_p in center-of-mass system is obtained as,

$$\varepsilon_p = \frac{1}{2} M \cdot v_2^2 = \frac{M}{2} \left(\frac{\varepsilon_\gamma}{M c} \right)^2 = \frac{\varepsilon_\gamma^2}{2 M c^2} = \frac{\overline{\varepsilon_\gamma^2}}{2 M c^2} Y_\gamma(E_n) , \qquad (2.16)$$

where the symbol of $Y_\gamma(E_n)$ means multiplicity of gamma-ray created by one reaction with neutron having the incident energy of E_n. The value of $Y_\gamma(E_n)$ can be given from File12 in the evaluated nuclear data file of JENDL-3. And the value of $\overline{\varepsilon_\gamma}$ can be read from File15 in JENDL-3.

Installing the equation of eq.(2.16) into eq.(2.15), knock on energy of target nuclide E_p in laboratory system can be expressed as,

$$\overline{E_p} = \overline{E_G} + \frac{\overline{\varepsilon_\gamma^2}}{2 M c^2} Y_\gamma(E_n) . \qquad (2.17)$$

[2] elastic scattering (n, n)

Elastic scattering cross section σ_{nn} is stored in MT=2 of File3(Neutron cross section). The knock on energy of target nuclide E_p in laboratory system is given by the following equation with kinematics of momentum and energy conservation as shown in Fig.2.2.

$$\overline{E_p} = 2 \frac{m_{01} \cdot m_{02}}{M^2} E_n \left(1 - \overline{\mu_c} \right) , \qquad (2.18)$$

where $\overline{\mu_c}$ is the coefficient of Legendre expansion, that is, the coefficient of the equation as,

$$\sigma(E_n, \theta_c) = \sigma(E_n) \sum_{\iota=0}^{L_{max}} \frac{2\iota + 1}{4\pi} B_\iota(E_n) \cdot P_\iota(\cos\theta_c),$$

$\overline{\mu_c} = B_\iota(E_n)$ is given in File 4.

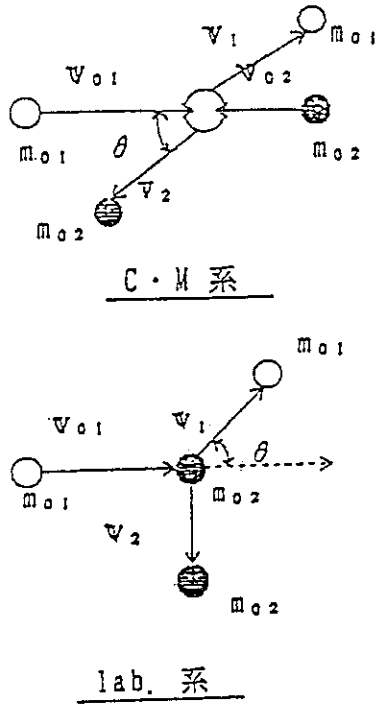


Fig.2.2 Kinematics between center-of-mass and laboratory systems

[3] Inelastic scattering (n, n')

Inelastic scattering cross section $\sigma_{n,n'}$ are stored in positions of MT=51, 52, ・・・, 90 in File 3 (Neutron cross section) from the first excited level to the fortieth excited level. In this reaction, charged particles are not emitted but the secondary neutron and photon are done. Displacement damage is contributed to by knock on energy of target nuclide E_p in laboratory system, which can be estimated by velocity of gravity center, and momentum and energy conservation concerning with secondary neutron and emitted photon.

In this reaction charged particle energy is equal to zero in laboratory system, that is, $E_c = 0$,

since no charged particle is emitted. The knock on energy of target nuclide E_p in laboratory system is therefore given by estimating each excited level energy in laboratory system with separating scattered neutron energy of ε_c in eq.(2.10).

$$E_p = \frac{m_2}{M} E_G + \frac{m_1}{M} \varepsilon_c^{(\lambda)} - 2\left\{\frac{m_1 \cdot m_2}{M^2} E_G \cdot \varepsilon_c^{(\lambda)}\right\}^{1/2} \mu_c^{(\lambda)} . \qquad (2.19)$$

The value of E_G, moving energy of the gravity center, is given by eq.(2.14) as,

$$E_G = \frac{m_{01}}{M} \cdot E_n .$$

The magnitude of $\varepsilon_c^{(\lambda)}$ is given by the scattering neutron energy of the excited level (λ) in center-of-mass system, that is, relative energy E_R, and reaction energy in excited level $Q^{(\lambda)}$ -value as,

$$\varepsilon_c^{(\lambda)} = E_R + Q^{(\lambda)} ,$$

where E_R is expressed by incident neutron energy of E_n as follows,

$$E_R = E_n - E_G = E_n - \frac{m_{01}}{M} \cdot E_n = \frac{m_{02}}{M} E_n . \qquad (2.20)$$

Therefore, $\varepsilon_c^{(\lambda)}$ is given as,

$$\varepsilon_c^{(\lambda)} = \frac{m_{02}}{M} E_n + Q^{(\lambda)} .$$

Inserting this equation and E_G into eq. (2.18), $E_p^{(\lambda)}$ expressed by eq.(2.14) can be obtained as,

$$E_p^{(\lambda)} = \frac{m_2}{M} \cdot \frac{m_{01}}{M} E_n + \frac{m_1}{M} \left\{ \frac{m_{02}}{M} E_n + Q^{(\lambda)} \right\}$$

$$- 2 \frac{m_{01}}{M} \left[\frac{m_{02}}{M} E_n \left\{ \frac{m_{02}}{M} E_n + Q^{(\lambda)} \right\} \right]^{1/2} \mu_c^{(\lambda)} . \qquad (2.21)$$

Inserting eq.(2.20) into the definition equation of dpa cross section of eq.(2.5), dpa cross section can be represented as,

$$\sigma_{dpa}(E_n) = \frac{0.8}{\varepsilon_d} \cdot \sum_{\lambda=51}^{90} \frac{E_p^{(\lambda)}}{1 + K_L \cdot g(E_p^{(\lambda)})} \cdot \sigma_x^{(\lambda)}(E_n) . \qquad (2.22)$$

Where if $\varepsilon_c < 0.0$, $\varepsilon_c = 0$ is applied in this calculation. The value of $\mu_c^{(\lambda)}$ is read from File 4 as the same manner of calculation for displacement cross section due to elastic scattering.

[4] Other reactions

This genre includes all secondary neutron production reactions except elastic and inelastic

scatterings, all proton production reactions, all alpha particle production reactions, and deuterium and tritium production reactions, etc.

(1) Secondary neutron production reaction

The reactions of (n, 2n), (n, 3n), (n, n'α), (n, n'p) and (n, n') are included in this category and set in the positions of MT=16, 17, 22, 28 and 91 (continuum region), respectively, in JENDL-3.

(2) Proton production reaction

The reactions of (n, n'p), (n, p) and (n, 2p) are included in this category and set in the positions of MT=28, 103 and 111, respectively, in JENDL-3.

(3) Alpha particle production reaction

The reactions of (n, n'α), (n, α) and (n, 2α) are included in this category and set in the positions of MT=22, 107 and 108, respectively, in JENDL-3.

The knock on energy $E_p^{(MT)}$ of target nuclide in laboratory system for every reaction of MT number is expressed as,

$$\overline{E_p^{(MT)}} = \left[\frac{m_2}{M} \cdot \frac{m_{01}}{M} E_n + \frac{m_1}{M} Y_{MT} \cdot \overline{\varepsilon_{MT}}\right] , \tag{2.23}$$

where $\overline{\varepsilon_{MT}}$ is the outgoing particle energy in center-of-mass system. In the case of the secondary neutron emission reaction, the emitted neutron energy is represented as,

$$\overline{\varepsilon_n} = \sum_y \overline{\varepsilon_n}^{(y)} \cdot Y_n^{(y)} \cdot \sigma_{n,n'x}(E_n) \Big/ \sum_y Y_n^{(y)} \cdot \sigma_{n,n'x}(E_n) \quad . \tag{2.24}$$

Since normalized neutron spectrum is set in File5 of JENDL-3, the spectrum is used in this formula, where the superscript y is the number in the energy of emitted neutron in every reaction and $Y_n^{(y)}$ means multiplicity in the reaction, for example $Y_n^{(y)}=2$ reaction.

On the other hand, energy spectra of charged particles emitted by the reactions are not installed in JENDL-3. Then we calculated the spectrum averaged energy of $\overline{\varepsilon_x} \cdot \sigma_{n,x\text{-prod}}(E_n)$ (x=p or α) by PEGASUS code[10] in accordance with Iijima's method [6]. In the case of installing imaginary natural nuclide considered isotope ratios in JENDL-3, we used the energy averaged with isotope ratio w_i instead of spectrum as follows.

$$\overline{\varepsilon_x(En)} = \sum_i w_i \cdot \overline{\varepsilon_x}^{(i)}(En) \cdot \sigma_{n,n'x}^{(i)}(E_n) \Big/ \sum w_i \cdot \sigma_{n,n'x}^{(i)}(E_n) \quad , \tag{2.25}$$

where, i＝isotope, x=p, a.

Using knocked on target nuclide energies estimated above in laboratory system, the displacement cross sections can be obtained as,

$$\sigma_{dpa}(E_n) = \frac{0.8}{\varepsilon_d} \cdot \frac{\overline{E_p^{(MT)}}}{1 + K_L \cdot g(\overline{E_p^{(MT)}})} \cdot \overline{\sigma_x^{(MT)}(E_n)} \quad . \tag{2.26}$$

3. Displacement cross section calculation

Neutronic calculation system is required to be able to perform continuously from neutron and gamma-ray flux calculation to dpa calculation. For that purpose, the 40 nuclides and energy group structure in the dpa cross section set should be made the same as those in FUSION-J3. The included 40 nuclides in the set are listed in Table 3.1. We prepared two type energy group structures of the dpa cross section sets, which have the same group structures as those in the FUSION-J3. One is the 42 group structure and the other is 125 group structure. These group structures are shown in Tables 3.2 and 3.3, respectively. The dpa cross sections of the 40 nuclides are illustrated in Figs. 3.1 - 3.40 and in Figs. 3.41 - 3.80 for 42 and 125 group structure sets, respectively. Numerical values of 40 nuclide dpa cross sections are listed in Tables 3.4 and 3.5 for 42 and 125 group structure sets, respectively.

4. Evaluated displacement damage

As described above, the method to evaluating displacement damage is to estimate the number of displacement times given by integrating the value of displacement cross section multiplied by neutron flux with a certain period of neutron irradiating as indexes of irradiation damage. We estimated displacement damage dpa for the materials of SS316 used as structural materials and copper used as cooling tube materials in ITER (International Thermonuclear Experimental Reactor)[11] as the typical materials.

A two dimensional RZ model of ITER is expressed in Fig. 4.1 for neutron and gamma-ray transport calculation. Total neutron flux contour is illustrated in Fig.4.2 calculated by the two dimensional transport code of DOT3.5 [12] with using group constant set of FUSION-J3[7]. The values of dpa contours of SS316 and copper are presented in Figs.4.3 and 4.4, respectively, and the dpa distributions on the mid-plane are illustrated in Fig.4.5 for neutron fluence of 1 MWa/m^2 under the above neutron flux. From these figures, displacement damages of SS316 and copper can be understood as 10dpa and 13dpa, respectively, in agreement with the values estimated concerning with only SS316 and copper in the past [13].

5. Conclusion

Displacement cross section set was developed in order to evaluate displacement damage as typical index for radiation damage for predicting life time of reactor components and developing fusion reactors.

a) Displacement cross sections (dpa cross section) were estimated from primary knock on atom (PKA) energy calculated by momentum and energy conservations with using energy of emitted secondary neutron, gamma-ray and charged particles.

3. Displacement cross section calculation

Neutronic calculation system is required to be able to perform continuously from neutron and gamma-ray flux calculation to dpa calculation. For that purpose, the 40 nuclides and energy group structure in the dpa cross section set should be made the same as those in FUSION-J3. The included 40 nuclides in the set are listed in Table 3.1. We prepared two type energy group structures of the dpa cross section sets, which have the same group structures as those in the FUSION-J3. One is the 42 group structure and the other is 125 group structure. These group structures are shown in Tables 3.2 and 3.3, respectively. The dpa cross sections of the 40 nuclides are illustrated in Figs. 3.1 - 3.40 and in Figs. 3.41 - 3.80 for 42 and 125 group structure sets, respectively. Numerical values of 40 nuclide dpa cross sections are listed in Tables 3.4 and 3.5 for 42 and 125 group structure sets, respectively.

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Displacement cross section set was developed in order to evaluate displacement damage as typical index for radiation damage for predicting life time of reactor components and developing fusion reactors.

a) Displacement cross sections (dpa cross section) were estimated from primary knock on atom (PKA) energy calculated by momentum and energy conservations with using energy of emitted secondary neutron, gamma-ray and charged particles.

b) The displacement cross section set including the same 40 nuclides and two types of energy group structure as those in FUSION-J3 was produced. One is the 42 group structure and the other is 125 group structure.

c) Using this set, displacement damages of SS316 and copper were calculated for neutron fluence of 1MW/m^2 in ITER. These values are respectively 10dpa and 13dpa, and in good agreement with the values evaluated in the past.

Acknowledgment

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Table3.1 Nuclides installed in the dpa cross section set for fusion reactors

No.	Nuclide	No.	Nuclide	No.	Nuclide	No.	Nuclide	No.	Nuclide
1	^{1}H	9	^{11}B	17	Si	25	^{55}Mn	33	Cd
2	^{2}D	10	^{12}C	18	^{31}P	26	Fe	34	W
3	^{3}He	11	^{14}N	19	S	27	Co	35	Pb
4	^{4}He	12	^{16}O	20	K	28	Ni	36	^{209}Bi
5	^{6}Li	13	^{19}F	21	Ca	29	Cu	37	^{232}Th
6	^{7}Li	14	^{23}Na	22	Ti	30	Zr	38	^{235}U
7	^{9}Be	15	Mg	23	^{51}V	31	^{93}Nb	39	^{238}U
8	^{10}B	16	^{27}Al	24	Cr	32	Mo	40	^{239}Pu

Table 3.2 Energy group structure of 42-group dpa cross section set for fusion reactors

No.	En(MeV)		No.	En(MeV)		No.	En(keV)		No.	En(keV)		No.	En(eV)	
1	15.000	13.720	10	5.757	5.099	19	800	566	28	10.00	4.65	37	10.0	4.65
2	13.720	12.549	11	5.099	4.516	20	566	400	29	4.65	2.15	38	4.65	2.15
3	12.549	11.478	12	4.516	4.000	21	400	283	30	2.15	1.00	39	2.15	1.00
4	11.478	10.500	13	4.000	3.162	22	283	200	31	1.00	0.456	40	1.00	0.465
5	10.500	9.314	14	3.162	2.500	23	200	141	32	0.456	0.215	41	0.465	0.215
6	9.314	8.261	15	2.500	1.871	24	141	100	33	0.215	0.100	42	0.215	0.001
7	8.261	7.328	16	1.871	1.400	25	100	46.5	34	0.100	0.0465			
8	7.328	6.500	17	1.400	1.058	26	46.5	21.5	35	0.0465	0.0215			
9	6.500	5.757	18	1.058	0.800	27	21.5	10.0	36	0.0215	0.0100			

Table 3.3 Energy group structure of 125-group dpa cross section set for fusion reactors

No.	En(MeV)		No.	En(MeV)		No.	En(MeV)		No.	En(keV)		No.	En(eV)	
1	16.5	16.2	26	11.2	11.0	51	3.25	3.05	76	267	235	101	7100	5530
2	16.2	16.0	27	11.0	10.8	52	3.05	2.87	77	235	208	102	5530	4310
3	16.0	15.7	28	10.8	10.7	53	2.87	2.69	78	208	183	103	4310	3360
4	15.7	15.5	29	10.7	10.5	54	2.69	2.53	79	183	162	104	3360	2610
5	15.5	15.3	30	10.5	10.3	55	2.53	2.38	80	162	143	105	2610	2040
6	15.3	15.0	31	10.3	10.2	56	2.38	2.23	81	143	126	106	2040	1590
7	15.0	14.8	32	10.2	10.0	57	2.23	2.10	82	126	111	107	1590	1230
8	14.8	14.6	33	10.0	9.34	58	2.10	1.97	83	111	98.0	108	1230	961
9	14.6	14.3	34	9.34	8.83	59	1.97	1.85	84	98.0	86.5	109	961	583
10	14.3	14.1	35	8.83	8.29	60	1.85	1.74	85	86.5	76.4	110	583	354
11	14.1	13.9	36	8.29	7.79	61	1.74	1.53	96	76.4	67.4	111	354	215
12	13.9	13.7	37	7.79	7.32	62	1.53	1.35	87	67.4	59.5	112	215	130
13	13.7	13.5	38	7.32	7.87	63	1.35	1.19	88	59.5	52.5	113	130	78.9
14	13.5	13.3	39	7.87	6.46	64	1.19	1.05	89	52.5	46.3	114	78.9	47.9
15	13.3	13.0	40	6.46	6.07	65	1.05	0.930	90	46.3	40.9	115	47.9	29.0
16	13.0	12.8	41	6.07	5.70	66	0.930	0.821	91	40.9	36.1	116	29.0	17.6
17	12.8	12.6	42	5.70	5.35	67	0.821	0.724	92	36.1	31.8	117	17.6	10.7
18	12.6	12.5	43	5.35	5.03	68	0.724	0.639	93	31.8	28.1	118	10.7	6.48
19	12.5	12.3	44	5.03	4.72	69	0.639	0.564	94	28.1	24.8	119	6.48	3.93
20	12.3	12.1	45	4.72	4.44	70	0.564	0.498	95	24.8	21.9	120	3.93	2.38
21	12.1	11.9	46	4.44	4.17	71	0.498	0.439	96	21.9	19.3	121	2.38	1.45
22	11.9	11.7	47	4.17	3.92	72	0.439	0.388	97	19.3	15.0	122	1.45	8.76
23	11.7	11.5	48	3.92	3.68	73	0.388	0.342	98	15.0	11.7	123	8.76	5.32
24	11.5	11.3	49	3.68	3.46	74	0.342	0.302	99	11.7	9.12	124	5.32	3.22
25	11.3	11.2	50	3.46	3.25	75	0.302	0.267	100	9.12	7.10	125	3.22	1×10^{-5}

Table 3.4 Numerical values of 40 nuclide dpa cross sections in 42 energy group structure constnt set

'DISPLACEMENT RATE NO. 1 OF H-1 IN FUSION-40

4.304E+00	4.682E+00	5.092E+00	5.513E+00	6.050E+00	6.693E+00
7.390E+00	8.129E+00	8.919E+00	9.751E+00	1.063E+01	1.154E+01
1.292E+01	1.494E+01	1.738E+01	2.036E+01	2.373E+01	2.752E+01
3.223E+01	3.841E+01	4.544E+01	5.335E+01	6.174E+01	7.008E+01
8.253E+01	9.819E+01	1.088E+02	1.146E+02	1.176E+02	1.190E+02
1.197E+02	1.200E+02	1.201E+02	1.202E+02	1.203E+02	1.203E+02
1.206E+02	1.208E+02	1.214E+02	1.227E+02	1.254E+02	1.356E+02
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0			

'DISPLACEMENT RATE NO. 2 OF H-2 IN FUSION-40

7.075E+00	7.563E+00	8.159E+00	8.803E+00	9.529E+00	1.031E+01
1.112E+01	1.198E+01	1.289E+01	1.384E+01	1.484E+01	1.585E+01
1.747E+01	1.975E+01	2.195E+01	2.376E+01	2.489E+01	2.547E+01
2.583E+01	2.592E+01	2.589E+01	2.597E+01	2.615E+01	2.626E+01
2.619E+01	2.540E+01	2.299E+01	1.936E+01	1.472E+01	9.912E+00
5.954E+00	3.259E+00	1.675E+00	8.332E-01	4.052E-01	1.943E-01
9.278E-02	4.403E-02	2.083E-02	9.888E-03	4.701E-03	1.581E-03
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0			

'DISPLACEMENT RATE NO. 3 OF HE-3 IN FUSION-40

3.651E+01	3.956E+01	4.267E+01	4.595E+01	4.979E+01	5.442E+01
5.933E+01	6.442E+01	6.976E+01	7.530E+01	8.078E+01	8.563E+01
9.169E+01	9.938E+01	1.046E+02	1.047E+02	9.617E+01	8.998E+01
9.015E+01	9.130E+01	9.027E+01	9.135E+01	9.551E+01	1.011E+02
1.090E+02	1.149E+02	1.085E+02	9.122E+01	6.974E+01	5.021E+01
3.511E+01	2.420E+01	1.667E+01	1.151E+01	7.927E+00	5.462E+00
3.774E+00	2.602E+00	1.792E+00	1.236E+00	8.509E-01	4.861E-01
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0			

'DISPLACEMENT RATE NO. 4 OF HE-4 IN FUSION-40

4.041E+01	4.373E+01	4.720E+01	5.082E+01	5.513E+01	6.028E+01
6.557E+01	7.087E+01	7.613E+01	8.130E+01	8.629E+01	9.119E+01
9.849E+01	1.116E+02	1.369E+02	1.935E+02	2.770E+02	2.321E+02
1.034E+02	5.069E+01	3.517E+01	2.947E+01	2.663E+01	2.470E+01
2.216E+01	1.775E+01	1.280E+01	8.185E+00	4.709E+00	2.504E+00
1.271E+00	6.262E-01	3.026E-01	1.453E-01	6.922E-02	3.278E-02
1.553E-02	7.329E-03	3.452E-03	1.629E-03	7.687E-04	2.528E-04
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0			

'DISPLACEMENT RATE NO. 5 OF LI-6 IN FUSION-40

1.182E+02	1.242E+02	1.301E+02	1.354E+02	1.416E+02	1.484E+02
1.542E+02	1.596E+02	1.653E+02	1.691E+02	1.709E+02	1.721E+02
1.676E+02	1.430E+02	1.107E+02	9.153E+01	8.467E+01	8.824E+01
9.579E+01	1.191E+02	2.079E+02	5.372E+02	1.182E+02	5.404E+01
3.681E+01	2.398E+01	1.443E+01	7.976E+00	4.143E+00	2.075E+00
1.031E+00	5.194E-01	2.807E-01	1.818E-01	1.569E-01	1.782E-01
2.368E-01	3.359E-01	4.878E-01	7.129E-01	1.045E+00	1.853E+00
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0			

'DISPLACEMENT RATE NO. 6 OF LI-7 IN FUSION-40

1.319E+02	1.370E+02	1.424E+02	1.474E+02	1.532E+02	1.600E+02
1.652E+02	1.756E+02	1.915E+02	1.873E+02	2.253E+02	2.263E+02
1.890E+02	1.750E+02	1.553E+02	1.424E+02	1.425E+02	1.208E+02
9.340E+01	8.953E+01	1.445E+02	4.358E+02	6.734E+01	5.464E+01
4.560E+01	3.041E+01	1.801E+01	9.846E+00	5.058E+00	2.518E+00
1.246E+00	6.270E-01	3.403E-01	2.231E-01	1.958E-01	2.250E-01
3.007E-01	4.274E-01	6.212E-01	9.081E-01	1.332E+00	2.361E+00
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0			

'DISPLACEMENT RATE NO. 7 OF BE-9 IN FUSION-40

2.148E+02	2.219E+02	2.278E+02	2.352E+02	2.402E+02	2.425E+02
2.439E+02	2.431E+02	2.521E+02	2.552E+02	2.589E+02	2.687E+02
3.220E+02	5.693E+02	2.915E+02	2.929E+02	4.051E+02	4.819E+02
4.726E+02	4.578E+02	4.613E+02	4.479E+02	4.207E+02	3.815E+02
3.044E+02	1.918E+02	1.069E+02	5.562E+01	2.775E+01	1.351E+01
6.521E+00	3.124E+00	1.495E+00	7.283E-01	3.718E-01	2.157E-01
1.614E-01	1.635E-01	2.056E-01	2.855E-01	4.115E-01	7.247E-01
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0

0.0 0.0 0.0
'DISPLACEMENT RATE NO. 8 OF B-10 IN FUSION-40
3.130E+02 3.233E+02 3.209E+02 3.185E+02 3.153E+02 3.118E+02
3.198E+02 3.275E+02 3.112E+02 2.959E+02 3.344E+02 4.112E+02
3.672E+02 5.632E+02 4.314E+02 4.520E+02 4.581E+02 5.647E+02
6.782E+02 7.750E+02 7.685E+02 7.363E+02 7.018E+02 6.736E+02
6.877E+02 8.097E+02 1.146E+03 1.629E+03 2.392E+03 3.535E+03
5.215E+03 7.685E+03 1.133E+04 1.667E+04 2.448E+04 3.598E+04
5.283E+04 7.755E+04 1.140E+05 1.674E+05 2.459E+05 4.365E+05
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO. 9 OF B-11 IN FUSION-40
3.638E+02 3.436E+02 3.348E+02 3.362E+02 3.230E+02 3.189E+02
3.858E+02 3.689E+02 3.930E+02 3.645E+02 4.490E+02 3.280E+02
4.104E+02 4.711E+02 4.329E+02 5.041E+02 9.328E+02 3.531E+02
4.273E+02 5.590E+02 5.000E+02 4.600E+02 4.074E+02 3.488E+02
2.623E+02 1.518E+02 8.039E+01 4.063E+01 1.994E+01 9.615E+00
4.613E+00 2.197E+00 1.040E+00 4.930E-01 2.329E-01 1.099E-01
5.233E-02 2.542E-02 1.313E-02 7.957E-03 6.366E-03 7.685E-03
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.10 OF C-12 IN FUSION-40
4.300E+02 4.586E+02 4.660E+02 4.292E+02 3.610E+02 3.397E+02
7.408E+02 2.609E+02 3.793E+02 4.085E+02 4.447E+02 7.130E+02
8.931E+02 6.997E+02 5.200E+02 5.675E+02 6.218E+02 6.547E+02
6.647E+02 6.433E+02 5.930E+02 5.225E+02 4.422E+02 3.620E+02
2.584E+02 1.417E+02 7.276E+01 3.618E+01 1.761E+01 8.460E+00
4.057E+00 1.939E+00 9.308E-01 4.608E-01 2.465E-01 1.588E-01
1.377E-01 1.570E-01 2.095E-01 2.973E-01 4.318E-01 7.628E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.11 OF N-14 IN FUSION-40
6.878E+02 6.751E+02 6.379E+02 5.600E+02 5.336E+02 4.757E+02
5.772E+02 3.930E+02 5.963E+02 6.319E+02 4.686E+02 9.298E+02
8.185E+02 5.865E+02 5.975E+02 6.686E+02 4.678E+02 3.537E+02
5.735E+02 5.033E+02 4.914E+02 4.428E+02 3.985E+02 3.312E+02
2.765E+02 1.781E+02 1.000E+02 5.376E+01 2.696E+01 1.349E+01
6.798E+00 3.386E+00 1.661E+00 8.130E-01 4.003E-01 2.117E-01
1.332E-01 1.118E-01 1.249E-01 1.650E-01 2.335E-01 4.083E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.12 OF O-16 IN FUSION-40
8.729E+02 8.482E+02 8.892E+02 8.666E+02 7.034E+02 7.355E+02
7.615E+02 4.817E+02 4.756E+02 5.183E+02 6.726E+02 7.374E+02
1.460E+03 5.759E+02 6.018E+02 8.248E+02 1.020E+03 1.237E+03
7.078E+02 8.742E+02 7.573E+02 5.230E+02 3.903E+02 2.953E+02
1.932E+02 9.823E+01 4.838E+01 2.352E+01 1.131E+01 5.392E+00
2.569E+00 1.218E+00 5.749E-01 2.718E-01 1.281E-01 6.012E-02
2.833E-02 1.333E-02 6.298E-03 3.043E-03 1.558E-03 7.850E-04
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.13 OF F-19 IN FUSION-40
1.327E+03 1.338E+03 1.308E+03 1.273E+03 1.226E+03 1.210E+03
1.093E+03 9.093E+02 8.403E+02 7.683E+02 6.104E+02 6.887E+02
5.875E+02 6.607E+02 5.853E+02 9.996E+02 1.071E+03 8.888E+02
3.921E+02 3.774E+02 9.167E+02 4.578E+02 3.087E+02 4.342E+02
1.791E+02 8.951E+01 4.104E+01 1.984E+01 9.509E+00 4.523E+00
2.152E+00 1.019E+00 4.802E-01 2.268E-01 1.067E-01 5.004E-02
2.353E-02 1.104E-02 5.157E-03 2.417E-03 1.131E-03 3.639E-04
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.14 OF NA-23 IN FUSION-40
1.656E+03 1.543E+03 1.401E+03 1.274E+03 1.064E+03 9.189E+02
8.019E+02 7.826E+02 9.380E+02 8.546E+02 8.711E+02 8.881E+02
9.286E+02 9.781E+02 9.597E+02 8.503E+02 1.045E+03 1.271E+03
1.594E+03 4.991E+02 4.828E+02 7.016E+02 2.878E+02 2.227E+02
1.527E+02 7.974E+01 4.355E+01 3.088E+01 1.379E+02 7.417E+00
1.804E+00 7.743E-01 3.695E-01 1.948E-01 1.234E-01 1.049E-01
1.179E-01 1.561E-01 2.213E-01 3.207E-01 4.690E-01 8.307E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.15 OF MG-0 IN FUSION-40

1.845E+03 1.533E+03 1.359E+03 1.124E+03 9.817E+02 8.535E+02
7.643E+02 9.360E+02 3.451E+02 9.902E+02 1.141E+03 8.419E+02
8.265E+02 1.305E+03 7.047E+02 1.568E+03 9.740E+02 8.481E+02
1.247E+03 1.072E+03 8.919E+02 1.052E+03 3.416E+02 2.806E+02
3.831E+02 6.629E+01 3.363E+01 1.552E+01 7.458E+00 3.549E+00
1.688E+00 7.989E-01 3.771E-01 1.792E-01 8.611E-02 4.309E-02
2.426E-02 1.728E-02 1.677E-02 2.057E-02 2.831E-02 4.892E-02
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.16 OF AL-27 IN FUSION-40
1.896E+03 1.798E+03 1.689E+03 1.566E+03 1.398E+03 1.222E+03
1.108E+03 1.120E+03 9.974E+02 9.640E+02 1.070E+03 9.566E+02
1.263E+03 9.510E+02 1.183E+03 8.850E+02 9.347E+02 9.407E+02
6.463E+02 5.869E+02 3.709E+02 3.204E+02 4.955E+02 4.963E+02
7.512E+01 3.822E+02 8.123E+00 5.027E+00 2.570E+00 1.255E+00
6.057E-01 2.922E-01 1.444E-01 7.783E-02 5.107E-02 4.556E-02
5.355E-02 7.316E-02 1.062E-01 1.570E-01 2.338E-01 4.259E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.17 OF SI-0 IN FUSION-40
1.874E+03 1.690E+03 1.694E+03 1.559E+03 1.497E+03 1.227E+03
1.386E+03 1.072E+03 7.367E+02 7.559E+02 1.402E+03 1.368E+03
7.987E+02 1.295E+03 9.694E+02 2.950E+03 7.632E+02 9.510E+02
5.266E+02 4.912E+02 4.692E+02 5.749E+02 3.492E+02 4.078E+01
6.496E+01 2.866E+01 1.600E+01 8.034E+00 3.905E+00 1.869E+00
8.930E-01 4.274E-01 2.084E-01 1.088E-01 6.660E-02 5.394E-02
5.865E-02 7.642E-02 1.078E-01 1.558E-01 2.276E-01 4.028E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.18 OF P-31 IN FUSION-40
2.684E+03 2.592E+03 2.535E+03 2.448E+03 2.345E+03 2.124E+03
1.928E+03 1.823E+03 1.711E+03 1.604E+03 1.519E+03 1.458E+03
1.460E+03 1.439E+03 1.460E+03 1.447E+03 1.538E+03 1.433E+03
1.303E+03 3.123E+02 2.804E+02 2.538E+02 1.715E+02 1.344E+02
8.977E+01 4.459E+01 2.179E+01 1.065E+01 5.183E+00 2.498E+00
1.199E+00 5.694E-01 2.685E-01 1.267E-01 5.951E-02 2.788E-02
1.309E-02 6.127E-03 2.859E-03 1.338E-03 6.247E-04 2.005E-04
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.19 OF S-0 IN FUSION-40
2.399E+03 2.386E+03 2.365E+03 2.317E+03 2.173E+03 1.983E+03
1.854E+03 1.761E+03 1.708E+03 1.674E+03 1.685E+03 1.686E+03
1.645E+03 1.599E+03 1.640E+03 8.786E+02 4.606E+02 5.316E+02
1.035E+02 3.411E+02 1.808E+02 2.192E+02 2.288E+02 4.763E+02
8.325E+00 1.585E+01 1.205E+01 9.099E+00 7.452E+00 6.608E+00
6.195E+00 5.995E+00 5.899E+00 5.854E+00 5.833E+00 5.823E+00
5.818E+00 5.818E+00 5.821E+00 5.823E+00 5.823E+00 5.840E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.20 OF K-0 IN FUSION-40
3.513E+03 3.347E+03 3.175E+03 3.051E+03 2.903E+03 2.761E+03
2.610E+03 2.509E+03 2.398E+03 2.273E+03 2.179E+03 2.124E+03
2.104E+03 2.038E+03 1.686E+03 1.217E+03 8.512E+02 5.965E+02
4.179E+02 2.896E+02 2.056E+02 1.514E+02 3.452E+01 3.232E+01
1.625E+01 3.538E+00 3.014E+00 1.734E+00 1.444E+00 9.812E-01
6.295E-01 4.078E-01 3.036E-01 2.777E-01 3.011E-01 3.592E-01
4.466E-01 5.643E-01 7.189E-01 9.166E-01 1.171E+00 1.690E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.21 OF CA-0 IN FUSION-40
3.149E+03 3.007E+03 2.855E+03 2.689E+03 2.492E+03 2.164E+03
1.999E+03 1.962E+03 1.929E+03 1.907E+03 1.803E+03 1.885E+03
2.252E+03 1.268E+03 1.086E+03 1.026E+03 9.674E+02 5.784E+02
3.350E+02 6.547E+01 4.208E+02 5.084E+02 3.066E+02 1.245E+01
1.845E+01 1.874E+01 1.256E+01 7.263E+00 3.796E+00 1.973E+00
9.157E-01 4.427E-01 2.186E-01 1.173E-01 7.577E-02 6.592E-02
7.548E-02 1.008E-01 1.435E-01 2.083E-01 3.045E-01 5.398E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.22 OF TI-0 IN FUSION-40
2.687E+03 2.462E+03 2.226E+03 2.134E+03 2.028E+03 1.912E+03
1.749E+03 1.554E+03 1.338E+03 1.171E+03 1.175E+03 1.106E+03

1.148E+03 8.790E+02 1.184E+03 1.014E+03 6.181E+02 6.770E+02
6.423E+02 3.325E+02 3.579E+02 8.900E+01 5.905E+01 1.300E+02
1.475E+02 5.770E+01 5.269E+02 3.422E+01 1.139E+01 2.881E+00
1.265E+00 6.459E-01 4.118E-01 3.447E-01 3.665E-01 4.726E-01
6.596E-01 9.508E-01 1.388E+00 2.030E+00 2.976E+00 5.276E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.23 OF V-51 IN FUSION-40
2.690E+03 2.621E+03 2.490E+03 2.370E+03 2.225E+03 2.091E+03
1.972E+03 1.866E+03 1.748E+03 1.641E+03 1.526E+03 1.410E+03
1.235E+03 1.183E+03 9.903E+02 9.758E+02 7.469E+02 1.029E+03
6.613E+02 4.938E+02 3.462E+02 4.145E+02 1.577E+02 3.610E+02
1.714E+02 7.982E+01 1.383E+02 1.505E+02 2.177E+01 1.909E+00
1.032E+00 5.249E-01 2.555E-01 1.221E-01 5.767E-02 2.704E-02
1.269E-02 5.936E-03 2.769E-03 1.295E-03 6.041E-04 1.934E-04
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.24 OF CR-0 IN FUSION-40
2.626E+03 2.459E+03 2.312E+03 2.188E+03 2.072E+03 1.981E+03
1.859E+03 1.696E+03 1.485E+03 1.230E+03 1.084E+03 9.782E+02
7.573E+02 7.735E+02 9.243E+02 9.731E+02 7.769E+02 4.682E+02
3.186E+02 5.860E+02 2.331E+02 2.099E+02 2.308E+02 6.333E+01
4.590E+01 1.667E+01 1.237E+01 5.193E+01 1.573E+01 1.674E+00
6.905E-01 4.345E-01 3.717E-01 4.152E-01 5.490E-01 7.809E-01
1.136E+00 1.666E+00 2.447E+00 3.590E+00 5.271E+00 9.354E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.25 OF MN-55 IN FUSION-40
2.682E+03 2.528E+03 2.381E+03 2.234E+03 2.083E+03 1.936E+03
1.786E+03 1.641E+03 1.502E+03 1.350E+03 1.194E+03 1.047E+03
9.419E+02 8.533E+02 7.958E+02 7.861E+02 5.595E+02 5.056E+02
3.589E+02 3.876E+02 2.449E+02 2.060E+02 1.463E+02 2.286E+02
1.505E+02 3.652E+01 7.657E+00 1.859E+02 3.003E+01 1.521E+01
4.500E+00 4.074E+02 9.110E-01 5.959E-01 6.972E-01 9.450E-01
1.344E+00 1.948E+00 2.846E+00 4.164E+00 6.107E+00 1.083E+01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.26 OF FE-0 IN FUSION-40
2.753E+03 2.598E+03 2.448E+03 2.297E+03 2.119E+03 1.899E+03
1.676E+03 1.448E+03 1.165E+03 1.075E+03 1.082E+03 1.056E+03
9.740E+02 9.742E+02 8.809E+02 7.715E+02 7.609E+02 2.424E+02
4.725E+02 3.070E+02 1.296E+02 1.302E+02 2.880E+02 5.997E+01
2.252E+01 7.965E+01 1.606E+01 3.101E+01 5.603E+00 3.547E+00
2.051E+00 1.124E+00 6.333E-01 4.078E-01 3.033E-01 3.317E-01
4.361E-01 6.059E-01 8.991E-01 1.305E+00 1.884E+00 3.471E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.27 OF CO-59 IN FUSION-40
2.845E+03 2.616E+03 2.414E+03 2.210E+03 2.014E+03 1.882E+03
1.757E+03 1.665E+03 1.551E+03 1.428E+03 1.299E+03 1.120E+03
8.542E+02 6.924E+02 6.789E+02 8.117E+02 7.781E+02 5.751E+02
6.350E+02 2.532E+02 3.661E+02 2.697E+02 2.252E+02 3.249E+02
1.310E+02 6.249E+01 6.344E+01 2.195E+01 3.245E+00 5.857E-01
6.171E-01 7.623E-01 6.592E+00 3.410E-01 7.094E-02 2.911E-02
1.327E-02 6.160E-03 2.865E-03 1.339E-03 6.254E-04 2.016E-04
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.28 OF NI-0 IN FUSION-40
2.848E+03 2.708E+03 2.523E+03 2.372E+03 2.250E+03 2.140E+03
1.996E+03 1.850E+03 1.665E+03 1.452E+03 1.298E+03 1.241E+03
1.092E+03 9.141E+02 1.024E+03 7.639E+02 1.012E+03 3.038E+02
5.380E+02 3.044E+02 4.844E+02 4.386E+02 2.959E+02 1.121E+02
1.860E+02 9.739E+01 5.272E+02 2.200E+01 1.861E+01 7.119E+00
3.549E+00 1.801E+00 9.384E-01 5.519E-01 4.163E-01 4.259E-01
5.382E-01 7.498E-01 1.083E+00 1.579E+00 2.313E+00 4.102E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.29 OF CU-0 IN FUSION-40
2.663E+03 2.486E+03 2.338E+03 2.214E+03 2.092E+03 1.981E+03
1.879E+03 1.770E+03 1.646E+03 1.488E+03 1.327E+03 1.167E+03
9.500E+02 7.199E+02 6.657E+02 6.478E+02 6.298E+02 5.800E+02
5.109E+02 4.153E+02 3.373E+02 2.783E+02 2.185E+02 1.885E+02

2.003E+02 6.000E+01 1.498E+01 2.101E+00 4.168E+00 1.750E+00
1.205E+00 6.394E-01 3.687E-01 2.524E-01 2.347E-01 2.856E-01
3.954E-01 5.722E-01 8.391E-01 1.231E+00 1.809E+00 3.210E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.30 OF ZR-0 IN FUSION-40
3.026E+03 2.748E+03 2.522E+03 2.355E+03 2.176E+03 2.019E+03
1.885E+03 1.747E+03 1.588E+03 1.409E+03 1.222E+03 1.078E+03
9.626E+02 8.803E+02 8.478E+02 7.529E+02 6.789E+02 6.464E+02
5.770E+02 4.896E+02 3.793E+02 2.937E+02 3.179E+02 2.250E+02
7.120E+01 3.455E+01 1.404E+01 1.121E+01 3.476E+00 2.386E+00
8.289E-01 4.181E-01 1.956E-01 9.485E-02 4.954E-02 2.988E-02
2.376E-02 2.550E-02 3.314E-02 4.664E-02 6.760E-02 1.193E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.31 OF NB-93 IN FUSION-40
2.672E+03 2.505E+03 2.341E+03 2.218E+03 2.118E+03 2.031E+03
1.923E+03 1.812E+03 1.684E+03 1.528E+03 1.381E+03 1.244E+03
1.083E+03 8.977E+02 7.175E+02 5.806E+02 5.549E+02 6.008E+02
5.631E+02 4.897E+02 4.158E+02 3.346E+02 2.558E+02 1.913E+02
1.215E+02 5.248E+01 2.395E+01 1.153E+01 1.820E+01 1.265E+01
7.049E-01 4.713E-01 1.874E-01 9.404E-02 7.942E-02 4.036E-02
4.302E-02 5.682E-02 8.137E-02 1.188E-01 1.744E-01 3.104E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.32 OF MO-0 IN FUSION-40
2.539E+03 2.351E+03 2.167E+03 2.090E+03 1.932E+03 1.836E+03
1.748E+03 1.665E+03 1.551E+03 1.406E+03 1.256E+03 1.109E+03
9.195E+02 7.499E+02 6.753E+02 6.407E+02 5.882E+02 5.586E+02
5.292E+02 4.491E+02 3.681E+02 2.967E+02 2.268E+02 1.675E+02
1.050E+02 4.750E+01 2.080E+01 8.698E+00 4.856E+00 2.034E+00
8.358E-01 3.593E-01 4.073E-01 2.742E-01 3.826E-01 1.197E-01
1.228E-01 1.743E-01 2.641E-01 3.965E-01 5.902E-01 1.057E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.33 OF CD-0 IN FUSION-40
2.378E+03 2.231E+03 2.053E+03 1.961E+03 1.785E+03 1.663E+03
1.545E+03 1.438E+03 1.325E+03 1.194E+03 1.064E+03 9.320E+02
7.710E+02 6.185E+02 5.423E+02 5.079E+02 4.759E+02 4.283E+02
3.800E+02 3.155E+02 2.511E+02 1.926E+02 1.441E+02 1.054E+02
6.722E+01 3.308E+01 1.634E+01 6.571E+00 3.135E+00 1.161E+00
5.132E-01 5.994E-01 2.707E-01 1.155E-01 6.152E-02 6.620E-02
1.235E-01 4.140E-01 2.429E+00 2.066E+01 3.158E+02 2.031E+03
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.34 OF W-0 IN FUSION-40
1.859E+03 1.699E+03 1.587E+03 1.486E+03 1.374E+03 1.252E+03
1.123E+03 1.019E+03 9.264E+02 8.469E+02 7.728E+02 7.054E+02
6.016E+02 4.663E+02 3.324E+02 2.610E+02 2.329E+02 2.181E+02
1.920E+02 1.655E+02 1.419E+02 1.210E+02 1.016E+02 8.433E+01
6.280E+01 3.839E+01 2.214E+01 2.139E+01 1.876E+00 1.298E+00
1.709E+00 2.579E-01 7.327E+00 7.706E-02 1.438E-01 1.081E+00
1.164E+00 5.409E-01 1.966E-01 2.406E-01 3.322E-01 5.708E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.35 OF PB-0 IN FUSION-40
2.104E+03 2.007E+03 1.919E+03 1.823E+03 1.657E+03 1.441E+03
1.248E+03 1.083E+03 9.392E+02 8.654E+02 7.985E+02 7.229E+02
7.187E+02 6.929E+02 6.656E+02 3.930E+02 3.956E+02 2.582E+02
2.206E+02 1.318E+02 1.406E+02 1.390E+02 9.542E+01 7.452E+01
5.127E+01 2.425E+01 1.321E+01 6.647E+00 3.288E+00 1.563E+00
7.422E-01 3.493E-01 1.650E-01 7.997E-02 4.134E-02 2.513E-02
2.036E-02 2.215E-02 2.896E-02 4.083E-02 5.917E-02 1.046E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.36 OF BI-209 IN FUSION-40
1.949E+03 1.818E+03 1.706E+03 1.614E+03 1.504E+03 1.336E+03
1.181E+03 1.076E+03 9.816E+02 8.870E+02 7.702E+02 6.526E+02
5.772E+02 7.857E+02 6.719E+02 4.966E+02 3.288E+02 2.757E+02
2.438E+02 1.831E+02 1.941E+02 1.362E+02 1.028E+02 9.367E+01
6.443E+01 4.565E+01 3.387E+01 6.132E+00 3.219E+00 1.345E+00
3.080E-01 2.684E-01 1.298E-01 6.140E-02 2.881E-02 1.346E-02

6.317E-03 2.980E-03 1.436E-03 7.444E-04 4.558E-04 3.779E-04
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.37 OF TH-232 IN FUSION-40
1.283E+03 1.219E+03 1.124E+03 1.032E+03 9.139E+02 8.385E+02
7.620E+02 6.148E+02 5.498E+02 5.355E+02 5.083E+02 4.689E+02
3.878E+02 2.801E+02 1.545E+02 5.799E+01 2.237E+01 1.154E+01
1.640E-01 1.417E-01 1.385E-01 1.447E-01 1.488E-01 1.656E-01
1.398E-01 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.38 OF U-235 IN FUSION-40
7.350E+02 7.708E+02 8.304E+02 8.059E+02 7.280E+02 6.593E+02
6.109E+02 6.132E+02 6.506E+02 6.290E+02 5.848E+02 5.430E+02
4.943E+02 4.279E+02 3.464E+02 2.556E+02 1.871E+02 1.519E+02
1.349E+02 1.263E+02 1.170E+02 1.034E+02 8.722E+01 7.113E+01
5.067E+01 2.832E+01 1.447E+01 7.464E+00 3.770E+00 2.174E+00
1.547E+00 1.248E+00 1.863E+00 3.200E-01 2.247E+00 1.256E+00
7.786E-01 8.637E-01 5.917E-01 7.219E-01 4.010E+00 5.845E+00
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.39 OF U-238 IN FUSION-40
1.732E+03 1.588E+03 1.448E+03 1.301E+03 1.191E+03 1.048E+03
8.614E+02 6.381E+02 5.757E+02 5.565E+02 4.943E+02 4.529E+02
4.172E+02 3.690E+02 2.648E+02 1.764E+02 1.728E+02 1.762E+02
1.717E+02 1.546E+02 1.361E+02 1.178E+02 9.958E+01 8.237E+01
5.838E+01 2.987E+01 1.463E+01 7.105E+00 2.534E+00 9.708E-01
1.626E+00 2.316E-01 1.214E-01 8.388E-02 1.856E-01 4.471E-02
6.709E-01 5.215E-02 3.994E-02 4.758E-02 6.431E-02 1.091E-01
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
' DISPLACEMENT RATE NO.40 OF PU-239 IN FUSION-40
4.978E+02 5.392E+02 5.463E+02 5.313E+02 5.208E+02 4.005E+02
4.075E+02 4.040E+02 4.486E+02 4.429E+02 4.229E+02 3.932E+02
3.622E+02 3.213E+02 2.680E+02 2.072E+02 1.654E+02 1.375E+02
1.233E+02 1.175E+02 1.097E+02 9.813E+01 8.397E+01 6.867E+01
4.988E+01 2.716E+01 1.419E+01 7.438E+00 4.072E+00 2.431E+00
6.394E-01 2.990E-01 1.395E-01 6.524E-02 3.044E-02 1.417E-02
6.616E-03 3.082E-03 1.432E-03 6.692E-04 3.116E-04 9.933E-05
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

Table 3.5 Numerical values of 40 nuclide dpa cross sections in 125 energy group structure constnt set

'DISPLACEMENT RATE NO. 1 OF H-1 IN FUSION-J3

3.789E+00	3.848E+00	3.908E+00	3.968E+00	4.028E+00	4.090E+00
4.154E+00	4.217E+00	4.281E+00	4.350E+00	4.417E+00	4.483E+00
4.547E+00	4.612E+00	4.679E+00	4.750E+00	4.820E+00	4.888E+00
4.961E+00	5.037E+00	5.110E+00	5.182E+00	5.255E+00	5.325E+00
5.401E+00	5.478E+00	5.555E+00	5.631E+00	5.710E+00	5.794E+00
5.878E+00	5.960E+00	6.161E+00	6.493E+00	6.840E+00	7.204E+00
7.576E+00	7.967E+00	8.360E+00	8.770E+00	9.202E+00	9.623E+00
1.007E+01	1.053E+01	1.098E+01	1.146E+01	1.197E+01	1.246E+01
1.295E+01	1.347E+01	1.402E+01	1.458E+01	1.510E+01	1.566E+01
1.624E+01	1.684E+01	1.748E+01	1.812E+01	1.875E+01	1.939E+01
2.036E+01	2.178E+01	2.328E+01	2.490E+01	2.660E+01	2.839E+01
3.027E+01	3.225E+01	3.438E+01	3.664E+01	3.899E+01	4.152E+01
4.405E+01	4.669E+01	4.951E+01	5.241E+01	5.553E+01	5.870E+01
6.149E+01	6.437E+01	6.743E+01	7.050E+01	7.378E+01	7.686E+01
7.989E+01	8.299E+01	8.577E+01	8.857E+01	9.138E+01	9.360E+01
9.591E+01	9.822E+01	1.006E+02	1.024E+02	1.041E+02	1.058E+02
1.080E+02	1.103E+02	1.124E+02	1.140E+02	1.153E+02	1.164E+02
1.172E+02	1.179E+02	1.184E+02	1.188E+02	1.191E+02	1.194E+02
1.196E+02	1.199E+02	1.200E+02	1.201E+02	1.202E+02	1.202E+02
1.203E+02	1.203E+02	1.203E+02	1.205E+02	1.207E+02	1.209E+02
1.213E+02	1.219E+02	1.228E+02	1.243E+02	1.307E+02	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0			

'DISPLACEMENT RATE NO. 2 OF H-2 IN FUSION-J3

6.504E+00	6.570E+00	6.637E+00	6.705E+00	6.772E+00	6.839E+00
6.906E+00	6.972E+00	7.050E+00	7.127E+00	7.205E+00	7.291E+00
7.376E+00	7.468E+00	7.559E+00	7.661E+00	7.764E+00	7.865E+00
7.968E+00	8.079E+00	8.186E+00	8.299E+00	8.412E+00	8.523E+00
8.637E+00	8.751E+00	8.864E+00	8.972E+00	9.080E+00	9.196E+00
9.304E+00	9.409E+00	9.676E+00	1.008E+01	1.049E+01	1.090E+01
1.134E+01	1.179E+01	1.226E+01	1.273E+01	1.321E+01	1.370E+01
1.420E+01	1.472E+01	1.524E+01	1.576E+01	1.631E+01	1.690E+01
1.751E+01	1.813E+01	1.875E+01	1.934E+01	1.992E+01	2.048E+01
2.102E+01	2.153E+01	2.203E+01	2.246E+01	2.286E+01	2.324E+01
2.376E+01	2.435E+01	2.478E+01	2.514E+01	2.539E+01	2.556E+01
2.571E+01	2.583E+01	2.592E+01	2.593E+01	2.592E+01	2.589E+01
2.588E+01	2.590E+01	2.591E+01	2.595E+01	2.602E+01	2.610E+01
2.615E+01	2.616E+01	2.621E+01	2.627E+01	2.630E+01	2.629E+01
2.625E+01	2.617E+01	2.612E+01	2.604E+01	2.592E+01	2.584E+01
2.567E+01	2.539E+01	2.508E+01	2.474E+01	2.437E+01	2.396E+01
2.332E+01	2.232E+01	2.118E+01	1.991E+01	1.852E+01	1.703E+01
1.548E+01	1.388E+01	1.229E+01	1.074E+01	9.269E+00	7.898E+00
6.186E+00	4.229E+00	2.802E+00	1.815E+00	1.156E+00	7.280E-01
4.551E-01	2.829E-01	1.751E-01	1.081E-01	6.656E-02	4.095E-02
2.518E-02	1.547E-02	9.513E-03	5.859E-03	2.303E-03	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0			

'DISPLACEMENT RATE NO. 3 OF HE-3 IN FUSION-J3

3.269E+01	3.307E+01	3.348E+01	3.391E+01	3.436E+01	3.483E+01
3.532E+01	3.582E+01	3.633E+01	3.687E+01	3.740E+01	3.792E+01
3.843E+01	3.897E+01	3.953E+01	4.008E+01	4.061E+01	4.113E+01
4.169E+01	4.226E+01	4.281E+01	4.338E+01	4.396E+01	4.453E+01
4.511E+01	4.568E+01	4.628E+01	4.687E+01	4.745E+01	4.805E+01
4.861E+01	4.915E+01	5.059E+01	5.299E+01	5.546E+01	5.801E+01
6.066E+01	6.330E+01	6.600E+01	6.880E+01	7.165E+01	7.446E+01
7.735E+01	8.015E+01	8.289E+01	8.526E+01	8.741E+01	8.954E+01
9.183E+01	9.402E+01	9.612E+01	9.812E+01	9.988E+01	1.015E+02
1.027E+02	1.039E+02	1.047E+02	1.053E+02	1.058E+02	1.059E+02
1.047E+02	1.013E+02	9.727E+01	9.355E+01	9.074E+01	8.972E+01
8.970E+01	9.017E+01	9.086E+01	9.130E+01	9.125E+01	9.091E+01
9.041E+01	9.017E+01	9.040E+01	9.109E+01	9.216E+01	9.362E+01
9.536E+01	9.729E+01	9.932E+01	1.014E+02	1.035E+02	1.055E+02
1.074E+02	1.092E+02	1.109E+02	1.122E+02	1.133E+02	1.142E+02
1.147E+02	1.149E+02	1.148E+02	1.143E+02	1.134E+02	1.122E+02
1.098E+02	1.054E+02	1.002E+02	9.391E+01	8.717E+01	8.012E+01
7.310E+01	6.619E+01	5.960E+01	5.345E+01	4.773E+01	4.253E+01
3.601E+01	2.827E+01	2.219E+01	1.741E+01	1.369E+01	1.073E+01
8.411E+00	6.607E+00	5.185E+00	4.075E+00	3.199E+00	2.510E+00
1.969E+00	1.545E+00	1.213E+00	9.503E-01	5.913E-01	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0

0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO. 4 OF HE-4 IN FUSION-J3
3.590E+01 3.644E+01 3.697E+01 3.750E+01 3.801E+01 3.856E+01
3.913E+01 3.968E+01 4.023E+01 4.080E+01 4.139E+01 4.196E+01
4.252E+01 4.309E+01 4.370E+01 4.432E+01 4.492E+01 4.551E+01
4.609E+01 4.673E+01 4.736E+01 4.798E+01 4.860E+01 4.921E+01
4.986E+01 5.052E+01 5.117E+01 5.179E+01 5.241E+01 5.309E+01
5.376E+01 5.441E+01 5.601E+01 5.873E+01 6.147E+01 6.417E+01
6.696E+01 6.972E+01 7.246E+01 7.520E+01 7.787E+01 8.054E+01
8.315E+01 8.569E+01 8.824E+01 9.075E+01 9.330E+01 9.596E+01
9.867E+01 1.016E+02 1.049E+02 1.087E+02 1.130E+02 1.180E+02
1.237E+02 1.303E+02 1.383E+02 1.474E+02 1.583E+02 1.709E+02
1.934E+02 2.306E+02 2.687E+02 2.860E+02 2.609E+02 2.024E+02
1.448E+02 1.030E+02 7.606E+01 5.917E+01 4.851E+01 4.160E+01
3.699E+01 3.382E+01 3.156E+01 2.990E+01 2.861E+01 2.757E+01
2.670E+01 2.596E+01 2.526E+01 2.461E+01 2.398E+01 2.336E+01
2.272E+01 2.206E+01 2.140E+01 2.072E+01 2.001E+01 1.928E+01
1.852E+01 1.775E+01 1.695E+01 1.616E+01 1.535E+01 1.453E+01
1.335E+01 1.175E+01 1.020E+01 8.743E+00 7.412E+00 6.215E+00
5.162E+00 4.250E+00 3.473E+00 2.819E+00 2.275E+00 1.827E+00
1.333E+00 8.436E-01 5.290E-01 3.296E-01 2.044E-01 1.264E-01
7.795E-02 4.799E-02 2.951E-02 1.812E-02 1.111E-02 6.813E-03
4.177E-03 2.558E-03 1.567E-03 9.604E-04 3.719E-04 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO. 5 OF LI-6 IN FUSION-J3
1.106E+02 1.115E+02 1.125E+02 1.134E+02 1.143E+02 1.152E+02
1.161E+02 1.170E+02 1.179E+02 1.189E+02 1.200E+02 1.210E+02
1.220E+02 1.231E+02 1.241E+02 1.252E+02 1.262E+02 1.273E+02
1.283E+02 1.294E+02 1.304E+02 1.313E+02 1.323E+02 1.332E+02
1.341E+02 1.350E+02 1.359E+02 1.368E+02 1.377E+02 1.387E+02
1.396E+02 1.405E+02 1.429E+02 1.465E+02 1.498E+02 1.528E+02
1.557E+02 1.584E+02 1.613E+02 1.643E+02 1.669E+02 1.688E+02
1.698E+02 1.707E+02 1.711E+02 1.720E+02 1.725E+02 1.716E+02
1.672E+02 1.635E+02 1.579E+02 1.490E+02 1.402E+02 1.307E+02
1.236E+02 1.158E+02 1.098E+02 1.048E+02 1.004E+02 9.659E+01
9.154E+01 8.763E+01 8.518E+01 8.458E+01 8.814E+01 8.936E+01
9.182E+01 9.586E+01 1.012E+02 1.098E+02 1.226E+02 1.425E+02
1.778E+02 2.450E+02 3.801E+02 5.416E+02 4.157E+02 2.197E+02
1.240E+02 8.286E+01 6.293E+01 5.303E+01 4.684E+01 4.250E+01
3.916E+01 3.640E+01 3.397E+01 3.174E+01 2.964E+01 2.768E+01
2.577E+01 2.396E+01 2.220E+01 2.053E+01 1.893E+01 1.739E+01
1.534E+01 1.280E+01 1.057E+01 8.666E+00 7.056E+00 5.711E+00
4.600E+00 3.691E+00 2.952E+00 2.355E+00 1.875E+00 1.492E+00
1.081E+00 6.881E-01 4.456E-01 2.996E-01 2.158E-01 1.727E-01
1.574E-01 1.625E-01 1.842E-01 2.217E-01 2.756E-01 3.481E-01
4.434E-01 5.672E-01 7.277E-01 9.326E-01 1.517E+00 0.0
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'DISPLACEMENT RATE NO. 6 OF LI-7 IN FUSION-J3
1.240E+02 1.249E+02 1.259E+02 1.268E+02 1.277E+02 1.286E+02
1.296E+02 1.306E+02 1.316E+02 1.325E+02 1.334E+02 1.343E+02
1.352E+02 1.361E+02 1.370E+02 1.378E+02 1.388E+02 1.397E+02
1.407E+02 1.417E+02 1.426E+02 1.435E+02 1.444E+02 1.453E+02
1.461E+02 1.470E+02 1.480E+02 1.489E+02 1.497E+02 1.506E+02
1.514E+02 1.523E+02 1.545E+02 1.580E+02 1.612E+02 1.639E+02
1.669E+02 1.730E+02 1.801E+02 1.888E+02 1.953E+02 1.872E+02
2.060E+02 2.225E+02 2.310E+02 2.280E+02 2.131E+02 1.967E+02
1.887E+02 1.851E+02 1.823E+02 1.766E+02 1.740E+02 1.700E+02
1.653E+02 1.601E+02 1.544E+02 1.501E+02 1.469E+02 1.438E+02
1.424E+02 1.448E+02 1.435E+02 1.382E+02 1.297E+02 1.138E+02
1.001E+02 9.329E+01 8.803E+01 8.685E+01 9.094E+01 1.010E+02
1.186E+02 1.737E+02 4.255E+02 6.873E+02 1.619E+02 8.826E+01
6.790E+01 6.335E+01 5.851E+01 5.433E+01 5.258E+01 5.031E+01
4.775E+01 4.521E+01 4.268E+01 4.019E+01 3.774E+01 3.522E+01
3.276E+01 3.038E+01 2.809E+01 2.590E+01 2.382E+01 2.185E+01
1.919E+01 1.593E+01 1.313E+01 1.072E+01 8.688E+00 7.005E+00
5.625E+00 4.501E+00 3.591E+00 2.860E+00 2.274E+00 1.807E+00
1.308E+00 8.308E-01 5.381E-01 3.629E-01 2.630E-01 2.125E-01
1.958E-01 2.042E-01 2.329E-01 2.813E-01 3.504E-01 4.430E-01
5.647E-01 7.224E-01 9.270E-01 1.188E+00 1.933E+00 0.0
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'DISPLACEMENT RATE NO. 7 OF BE-9 IN FUSION-J3

2.105E+02 2.109E+02 2.112E+02 2.113E+02 2.114E+02 2.115E+02
2.128E+02 2.134E+02 2.143E+02 2.157E+02 2.173E+02 2.186E+02
2.200E+02 2.210E+02 2.218E+02 2.228E+02 2.235E+02 2.243E+02
2.256E+02 2.269E+02 2.281E+02 2.294E+02 2.306E+02 2.320E+02
2.333E+02 2.346E+02 2.359E+02 2.370E+02 2.381E+02 2.387E+02
2.391E+02 2.394E+02 2.404E+02 2.422E+02 2.424E+02 2.437E+02
2.427E+02 2.421E+02 2.456E+02 2.502E+02 2.547E+02 2.555E+02
2.542E+02 2.570E+02 2.658E+02 2.792E+02 2.670E+02 2.932E+02
3.239E+02 3.590E+02 4.107E+02 4.943E+02 6.085E+02 4.783E+02
3.836E+02 3.230E+02 2.864E+02 2.675E+02 2.638E+02 2.695E+02
2.928E+02 3.373E+02 3.902E+02 4.418E+02 4.789E+02 4.830E+02
4.356E+02 4.737E+02 6.808E+02 4.595E+02 4.581E+02 4.617E+02
4.619E+02 4.605E+02 4.563E+02 4.493E+02 4.439E+02 4.350E+02
4.220E+02 4.079E+02 3.941E+02 3.794E+02 3.624E+02 3.426E+02
3.218E+02 3.013E+02 2.815E+02 2.623E+02 2.436E+02 2.261E+02
2.088E+02 1.916E+02 1.754E+02 1.601E+02 1.458E+02 1.324E+02
1.146E+02 9.339E+01 7.560E+01 6.085E+01 4.876E+01 3.892E+01
3.097E+01 2.459E+01 1.948E+01 1.540E+01 1.216E+01 9.591E+00
6.857E+00 4.248E+00 2.629E+00 1.629E+00 1.014E+00 6.380E-01
4.115E-01 2.781E-01 2.034E-01 1.671E-01 1.568E-01 1.660E-01
1.915E-01 2.327E-01 2.910E-01 3.683E-01 5.940E-01 0.0
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'DISPLACEMENT RATE NO. 8 OF B-10 IN FUSION-J3

3.137E+02 3.132E+02 3.133E+02 3.138E+02 3.142E+02 3.141E+02
3.137E+02 3.131E+02 3.130E+02 3.137E+02 3.152E+02 3.178E+02
3.207E+02 3.227E+02 3.233E+02 3.230E+02 3.223E+02 3.215E+02
3.211E+02 3.209E+02 3.210E+02 3.211E+02 3.206E+02 3.200E+02
3.194E+02 3.188E+02 3.183E+02 3.181E+02 3.180E+02 3.179E+02
3.175E+02 3.167E+02 3.132E+02 3.098E+02 3.139E+02 3.168E+02
3.237E+02 3.276E+02 3.256E+02 3.162E+02 3.028E+02 2.958E+02
3.017E+02 3.253E+02 3.721E+02 4.092E+02 3.989E+02 3.627E+02
3.691E+02 3.976E+02 4.486E+02 5.202E+02 5.705E+02 5.370E+02
4.714E+02 4.379E+02 4.324E+02 4.453E+02 4.810E+02 4.974E+02
4.528E+02 4.116E+02 4.468E+02 4.902E+02 5.399E+02 5.876E+02
6.338E+02 6.794E+02 7.153E+02 7.546E+02 7.792E+02 7.759E+02
7.718E+02 7.663E+02 7.487E+02 7.407E+02 7.308E+02 7.190E+02
7.055E+02 6.927E+02 6.825E+02 6.763E+02 6.752E+02 6.833E+02
6.872E+02 6.928E+02 7.019E+02 7.161E+02 7.360E+02 7.595E+02
7.866E+02 8.157E+02 8.548E+02 9.050E+02 9.613E+02 1.021E+03
1.112E+03 1.234E+03 1.380E+03 1.560E+03 1.765E+03 2.001E+03
2.269E+03 2.575E+03 2.924E+03 3.319E+03 3.769E+03 4.284E+03
5.119E+03 6.591E+03 8.477E+03 1.091E+04 1.405E+04 1.805E+04
2.319E+04 2.980E+04 3.827E+04 4.917E+04 6.320E+04 8.110E+04
1.042E+05 1.339E+05 1.720E+05 2.209E+05 3.602E+05 0.0
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'DISPLACEMENT RATE NO. 9 OF B-11 IN FUSION-J3

3.674E+02 3.699E+02 3.711E+02 3.714E+02 3.713E+02 3.710E+02
3.701E+02 3.673E+02 3.646E+02 3.621E+02 3.595E+02 3.568E+02
3.549E+02 3.470E+02 3.435E+02 3.475E+02 3.504E+02 3.429E+02
3.371E+02 3.369E+02 3.332E+02 3.292E+02 3.280E+02 3.273E+02
3.299E+02 3.353E+02 3.344E+02 3.214E+02 3.114E+02 3.137E+02
3.280E+02 3.272E+02 3.686E+02 3.049E+02 3.019E+02 3.479E+02
3.493E+02 3.631E+02 3.627E+02 4.245E+02 4.286E+02 2.966E+02
4.330E+02 4.252E+02 3.893E+02 3.316E+02 3.339E+02 3.841E+02
4.109E+02 3.770E+02 4.035E+02 4.457E+02 4.642E+02 5.503E+02
6.261E+02 4.579E+02 4.323E+02 4.424E+02 4.772E+02 5.743E+02
5.040E+02 6.037E+02 1.102E+03 4.753E+02 3.259E+02 3.642E+02
3.948E+02 4.278E+02 4.621E+02 4.853E+02 6.015E+02 7.967E+02
5.148E+02 4.928E+02 4.796E+02 4.650E+02 4.475E+02 4.287E+02
4.093E+02 3.890E+02 3.676E+02 3.459E+02 3.238E+02 3.017E+02
2.802E+02 2.591E+02 2.387E+02 2.192E+02 2.008E+02 1.834E+02
1.670E+02 1.516E+02 1.374E+02 1.242E+02 1.121E+02 1.010E+02
8.658E+01 6.969E+01 5.585E+01 4.458E+01 3.547E+01 2.816E+01
2.230E+01 1.763E+01 1.392E+01 1.098E+01 8.647E+00 6.806E+00
4.853E+00 2.995E+00 1.845E+00 1.135E+00 6.973E-01 4.280E-01
2.626E-01 1.611E-01 9.891E-02 6.092E-02 3.775E-02 2.375E-02
1.536E-02 1.049E-02 7.808E-03 6.575E-03 6.819E-03 0.0
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'DISPLACEMENT RATE NO.10 OF C-12 IN FUSION-J3

4.960E+02 5.130E+02 5.143E+02 5.030E+02 4.935E+02 4.847E+02
4.723E+02 4.597E+02 4.311E+02 4.321E+02 4.263E+02 4.357E+02
4.566E+02 4.514E+02 4.584E+02 4.564E+02 4.403E+02 4.301E+02
4.322E+02 4.684E+02 4.554E+02 4.206E+02 4.136E+02 4.253E+02
4.280E+02 4.295E+02 4.270E+02 4.058E+02 3.750E+02 3.439E+02
3.367E+02 3.473E+02 3.814E+02 4.025E+02 3.393E+02 6.054E+02
5.723E+02 2.409E+02 2.795E+02 6.093E+02 3.598E+02 3.773E+02
3.830E+02 4.291E+02 5.182E+02 6.943E+02 6.508E+02 7.912E+02
8.960E+02 8.384E+02 6.176E+02 9.665E+02 6.318E+02 5.442E+02
5.173E+02 5.128E+02 5.235E+02 5.271E+02 5.339E+02 5.476E+02
5.675E+02 5.928E+02 6.158E+02 6.346E+02 6.487E+02 6.589E+02
6.642E+02 6.647E+02 6.605E+02 6.525E+02 6.401E+02 6.238E+02
6.046E+02 5.820E+02 5.575E+02 5.307E+02 5.031E+02 4.744E+02
4.448E+02 4.156E+02 3.866E+02 3.582E+02 3.307E+02 3.041E+02
2.787E+02 2.549E+02 2.324E+02 2.114E+02 1.918E+02 1.737E+02
1.569E+02 1.415E+02 1.274E+02 1.146E+02 1.029E+02 9.223E+01
7.856E+01 6.280E+01 5.004E+01 3.976E+01 3.152E+01 2.495E+01
1.971E+01 1.556E+01 1.227E+01 9.663E+00 7.607E+00 5.985E+00
4.267E+00 2.637E+00 1.632E+00 1.013E+00 6.350E-01 4.060E-01
2.700E-01 1.925E-01 1.527E-01 1.382E-01 1.421E-01 1.607E-01
1.931E-01 2.398E-01 3.033E-01 3.860E-01 6.249E-01 0.0
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'DISPLACEMENT RATE NO.11 OF N-14 IN FUSION-J3

6.865E+02 6.853E+02 6.854E+02 6.863E+02 6.871E+02 6.878E+02
6.881E+02 6.867E+02 6.885E+02 6.869E+02 6.853E+02 6.826E+02
6.797E+02 6.774E+02 6.753E+02 6.733E+02 6.710E+02 6.687E+02
6.621E+02 6.520E+02 6.331E+02 6.125E+02 5.912E+02 5.722E+02
5.602E+02 5.540E+02 5.743E+02 6.021E+02 5.922E+02 5.891E+02
5.903E+02 5.685E+02 5.066E+02 4.681E+02 4.690E+02 4.901E+02
5.540E+02 4.629E+02 4.483E+02 5.802E+02 5.318E+02 6.429E+02
6.698E+02 4.624E+02 7.626E+02 8.500E+02 9.174E+02 7.507E+02
8.706E+02 6.483E+02 7.143E+02 7.809E+02 5.344E+02 5.677E+02
5.641E+02 5.827E+02 5.723E+02 5.752E+02 6.075E+02 1.012E+03
6.681E+02 7.140E+02 4.857E+02 8.335E+02 5.155E+02 4.161E+02
4.946E+02 5.757E+02 3.542E+02 4.552E+02 4.955E+02 5.058E+02
4.928E+02 4.945E+02 4.752E+02 4.484E+02 4.337E+02 4.171E+02
4.001E+02 3.791E+02 3.535E+02 3.278E+02 3.135E+02 3.021E+02
2.880E+02 2.745E+02 2.598E+02 2.455E+02 2.309E+02 2.119E+02
1.943E+02 1.779E+02 1.627E+02 1.482E+02 1.348E+02 1.225E+02
1.068E+02 8.830E+01 7.301E+01 5.887E+01 4.716E+01 3.770E+01
3.006E+01 2.391E+01 1.913E+01 1.529E+01 1.221E+01 9.752E+00
7.120E+00 4.553E+00 2.867E+00 1.805E+00 1.138E+00 7.093E-01
4.468E-01 2.889E-01 1.957E-01 1.436E-01 1.184E-01 1.117E-01
1.189E-01 1.377E-01 1.679E-01 2.097E-01 3.350E-01 0.0
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'DISPLACEMENT RATE NO.12 OF O-16 IN FUSION-J3

9.400E+02 9.038E+02 9.243E+02 9.151E+02 8.751E+02 9.302E+02
9.370E+02 9.099E+02 8.807E+02 8.647E+02 8.690E+02 8.969E+02
8.699E+02 8.550E+02 8.510E+02 8.757E+02 8.226E+02 8.204E+02
8.147E+02 8.111E+02 9.176E+02 9.694E+02 9.793E+02 9.249E+02
9.429E+02 9.238E+02 7.527E+02 6.600E+02 7.096E+02 7.483E+02
7.948E+02 7.650E+02 6.898E+02 6.408E+02 5.953E+02 4.776E+02
6.275E+02 5.978E+02 6.169E+02 4.859E+02 6.200E+02 5.721E+02
6.782E+02 7.927E+02 7.082E+02 1.097E+03 7.703E+02 1.400E+03
1.454E+03 1.581E+03 8.943E+02 6.143E+02 5.710E+02 5.408E+02
3.950E+02 2.596E+02 6.230E+02 6.908E+02 1.151E+03 7.187E+02
8.278E+02 8.069E+02 1.230E+03 1.137E+03 2.656E+03 9.093E+02
7.614E+02 7.072E+02 6.679E+02 6.615E+02 1.207E+03 1.824E+03
8.855E+02 6.895E+02 6.022E+02 5.409E+02 4.832E+02 4.318E+02
3.936E+02 3.572E+02 3.231E+02 2.912E+02 2.614E+02 2.349E+02
2.113E+02 1.901E+02 1.707E+02 1.530E+02 1.371E+02 1.227E+02
1.097E+02 9.810E+01 8.760E+01 7.815E+01 6.965E+01 6.202E+01
5.241E+01 4.151E+01 3.281E+01 2.591E+01 2.043E+01 1.610E+01
1.268E+01 9.978E+00 7.846E+00 6.167E+00 4.843E+00 3.802E+00
2.703E+00 1.663E+00 1.022E+00 6.277E-01 3.849E-01 2.358E-01
1.444E-01 8.838E-02 5.407E-02 3.308E-02 2.024E-02 1.239E-02
7.606E-03 4.695E-03 2.934E-03 1.881E-03 9.345E-04 0.0

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'DISPLACEMENT RATE NO.13 OF F-19 IN FUSION-J3

1.378E+03 1.374E+03 1.376E+03 1.378E+03 1.372E+03 1.366E+03
1.353E+03 1.353E+03 1.334E+03 1.341E+03 1.332E+03 1.331E+03
1.337E+03 1.343E+03 1.338E+03 1.329E+03 1.312E+03 1.301E+03
1.309E+03 1.321E+03 1.305E+03 1.291E+03 1.293E+03 1.292E+03
1.300E+03 1.281E+03 1.269E+03 1.269E+03 1.284E+03 1.286E+03
1.267E+03 1.249E+03 1.201E+03 1.210E+03 1.134E+03 1.099E+03
1.101E+03 1.012E+03 8.559E+02 7.992E+02 8.377E+02 8.027E+02
6.909E+02 6.164E+02 6.986E+02 6.924E+02 4.637E+02 5.248E+02
5.367E+02 4.399E+02 5.990E+02 5.633E+02 6.848E+02 8.518E+02
8.068E+02 7.146E+02 6.174E+02 8.591E+02 6.749E+02 6.728E+02
1.003E+03 6.553E+02 1.168E+03 7.323E+02 6.146E+02 6.742E+02
7.441E+02 3.918E+02 1.192E+03 5.475E+02 4.614E+02 7.800E+02
9.326E+02 8.528E+02 9.696E+02 4.672E+02 3.467E+02 3.136E+02
3.071E+02 3.224E+02 3.608E+02 4.502E+02 1.009E+03 8.669E+02
2.545E+02 1.725E+02 1.451E+02 1.380E+02 1.297E+03 1.379E+02
1.028E+02 8.940E+01 8.668E+01 2.164E+02 6.205E+01 5.326E+01
4.455E+01 3.510E+01 2.772E+01 2.186E+01 1.722E+01 1.356E+01
1.067E+01 8.386E+00 6.589E+00 5.175E+00 4.062E+00 3.187E+00
2.265E+00 1.392E+00 8.547E-01 5.243E-01 3.213E-01 1.967E-01
1.204E-01 7.362E-02 4.500E-02 2.749E-02 1.679E-02 1.025E-02
6.253E-03 3.813E-03 2.324E-03 1.416E-03 5.403E-04 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.14 OF NA-23 IN FUSION-J3

1.756E+03 1.741E+03 1.723E+03 1.704E+03 1.693E+03 1.687E+03
1.680E+03 1.674E+03 1.664E+03 1.645E+03 1.622E+03 1.580E+03
1.574E+03 1.561E+03 1.545E+03 1.512E+03 1.459E+03 1.424E+03
1.412E+03 1.407E+03 1.400E+03 1.402E+03 1.335E+03 1.368E+03
1.330E+03 1.290E+03 1.253E+03 1.239E+03 1.253E+03 1.213E+03
1.150E+03 1.106E+03 1.029E+03 9.096E+02 8.984E+02 8.623E+02
8.575E+02 7.594E+02 7.932E+02 8.586E+02 8.157E+02 8.638E+02
9.250E+02 8.227E+02 8.481E+02 9.892E+02 8.330E+02 8.181E+02
1.019E+03 9.421E+02 8.007E+02 9.194E+02 8.879E+02 9.812E+02
1.209E+03 9.900E+02 1.065E+03 1.069E+03 6.001E+02 8.243E+02
8.421E+02 7.741E+02 7.437E+02 9.715E+02 9.390E+02 1.017E+03
1.564E+03 1.572E+03 1.142E+03 5.281E+02 5.619E+02 6.634E+02
5.292E+02 4.803E+02 3.701E+02 4.422E+02 4.225E+02 4.460E+02
2.908E+02 2.637E+02 2.407E+02 2.200E+02 2.005E+02 1.823E+02
1.655E+02 1.505E+02 1.388E+02 1.621E+02 1.262E+02 9.950E+01
8.862E+01 7.964E+01 7.179E+01 6.484E+01 5.865E+01 5.315E+01
4.633E+01 3.926E+01 3.436E+01 3.138E+01 3.119E+01 3.713E+01
6.917E+01 5.400E+02 6.187E+01 1.240E+01 5.431E+00 3.237E+00
1.929E+00 1.080E+00 6.468E-01 4.011E-01 2.581E-01 1.755E-01
1.304E-01 1.094E-01 1.050E-01 1.132E-01 1.319E-01 1.612E-01
2.021E-01 2.563E-01 3.270E-01 4.187E-01 6.802E-01 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.15 OF MG-0 IN FUSION-J3

2.107E+03 2.082E+03 2.054E+03 2.024E+03 1.995E+03 1.967E+03
1.931E+03 1.895E+03 1.859E+03 1.817E+03 1.762E+03 1.680E+03
1.675E+03 1.601E+03 1.537E+03 1.510E+03 1.491E+03 1.447E+03
1.417E+03 1.389E+03 1.348E+03 1.315E+03 1.273E+03 1.243E+03
1.238E+03 1.146E+03 1.101E+03 1.076E+03 1.026E+03 9.886E+02
1.018E+03 1.003E+03 9.257E+02 9.054E+02 9.029E+02 8.748E+02
9.642E+02 7.357E+02 6.338E+02 6.104E+02 8.980E+02 7.467E+02
8.969E+02 1.282E+03 8.134E+02 6.924E+02 6.809E+02 6.364E+02
9.573E+02 8.911E+02 6.014E+02 7.347E+02 7.734E+02 1.818E+03
7.699E+02 1.162E+03 7.047E+02 8.023E+02 1.116E+03 9.402E+02
1.564E+03 1.069E+03 1.016E+03 1.072E+03 8.400E+02 9.641E+02
9.744E+02 1.257E+03 9.707E+02 9.649E+02 1.249E+03 1.171E+03
7.961E+02 1.026E+03 1.376E+03 1.240E+03 6.837E+02 4.370E+02
3.466E+02 3.034E+02 2.823E+02 2.823E+02 3.334E+02 6.486E+02
1.957E+03 3.139E+02 1.466E+02 1.121E+02 9.523E+01 8.345E+01
7.406E+01 6.621E+01 5.962E+01 5.452E+01 5.328E+01 8.743E+01
3.955E+01 2.778E+01 2.172E+01 1.711E+01 1.349E+01 1.063E+01
8.364E+00 6.578E+00 5.170E+00 4.060E+00 3.187E+00 2.500E+00
1.776E+00 1.092E+00 6.703E-01 4.116E-01 2.529E-01 1.558E-01
9.664E-02 6.080E-02 3.938E-02 2.691E-02 2.011E-02 1.700E-02

1.643E-02 1.781E-02 2.087E-02 2.557E-02 4.025E-02 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.16 OF AL-27 IN FUSION-J3

2.043E+03 2.024E+03 2.006E+03 1.989E+03 1.972E+03 1.955E+03
1.938E+03 1.920E+03 1.902E+03 1.888E+03 1.873E+03 1.855E+03
1.838E+03 1.820E+03 1.801E+03 1.782E+03 1.763E+03 1.744E+03
1.725E+03 1.705E+03 1.685E+03 1.664E+03 1.642E+03 1.620E+03
1.599E+03 1.578E+03 1.551E+03 1.522E+03 1.494E+03 1.466E+03
1.441E+03 1.417E+03 1.376E+03 1.246E+03 1.245E+03 1.122E+03
1.124E+03 9.735E+02 9.359E+02 1.017E+03 1.084E+03 9.010E+02
9.493E+02 9.018E+02 9.179E+02 9.733E+02 1.070E+03 1.093E+03
1.180E+03 1.080E+03 1.157E+03 1.007E+03 1.456E+03 1.153E+03
8.037E+02 1.251E+03 1.328E+03 1.166E+03 1.044E+03 8.343E+02
8.779E+02 1.217E+03 8.919E+02 1.022E+03 6.267E+02 1.148E+03
9.602E+02 6.506E+02 6.336E+02 1.029E+03 6.656E+02 8.571E+02
8.923E+02 4.933E+02 7.213E+02 2.535E+02 5.330E+02 3.214E+02
4.693E+02 8.641E+02 2.014E+02 3.925E+02 2.032E+02 5.696E+02
2.556E+02 6.865E+01 5.708E+01 6.040E+01 6.941E+01 9.231E+01
1.926E+02 3.669E+02 1.387E+01 6.464E+00 7.392E+00 8.117E+00
8.285E+00 7.588E+00 6.517E+00 5.438E+00 4.634E+00 3.593E+00
2.865E+00 2.280E+00 1.808E+00 1.431E+00 1.130E+00 8.907E-01
6.368E-01 3.955E-01 2.469E-01 1.563E-01 1.020E-01 7.051E-02
5.358E-02 4.635E-02 4.593E-02 5.096E-02 6.082E-02 7.576E-02
9.641E-02 1.239E-01 1.602E-01 2.076E-01 3.455E-01 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.17 OF SI-0 IN FUSION-J3

2.143E+03 2.112E+03 2.080E+03 2.048E+03 2.017E+03 1.984E+03
1.951E+03 1.917E+03 1.886E+03 1.854E+03 1.822E+03 1.789E+03
1.755E+03 1.722E+03 1.693E+03 1.666E+03 1.644E+03 1.622E+03
1.773E+03 1.713E+03 1.678E+03 1.633E+03 1.666E+03 1.648E+03
1.523E+03 1.497E+03 1.605E+03 1.495E+03 1.468E+03 1.527E+03
1.502E+03 1.538E+03 1.388E+03 1.404E+03 1.394E+03 1.286E+03
1.317E+03 9.600E+02 1.298E+03 1.711E+03 1.153E+03 1.047E+03
1.299E+03 1.196E+03 8.456E+02 1.092E+03 1.300E+03 9.907E+02
9.313E+02 9.646E+02 1.374E+03 6.700E+02 1.006E+03 1.134E+03
1.181E+03 1.097E+03 1.019E+03 6.962E+02 1.133E+03 6.912E+02
2.814E+03 8.459E+02 9.668E+02 7.192E+02 1.139E+03 7.401E+02
5.655E+02 5.269E+02 6.021E+02 6.335E+02 4.879E+02 4.766E+02
4.703E+02 4.724E+02 4.917E+02 5.455E+02 6.870E+02 1.077E+03
4.535E+02 1.323E+01 2.289E+01 4.295E+01 5.467E+01 6.039E+01
6.299E+01 6.548E+01 7.495E+01 8.025E+02 2.427E+01 3.029E+01
3.044E+01 2.864E+01 2.656E+01 2.433E+01 2.214E+01 2.002E+01
1.722E+01 1.388E+01 1.109E+01 8.826E+00 7.001E+00 5.638E+00
4.375E+00 3.448E+00 2.747E+00 2.137E+00 1.679E+00 1.319E+00
9.394E-01 5.805E-01 3.604E-01 2.262E-01 1.453E-01 9.760E-02
7.089E-02 5.771E-02 5.371E-02 5.652E-02 6.500E-02 7.880E-02
9.839E-02 1.244E-01 1.588E-01 2.032E-01 3.299E-01 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.18 OF P-31 IN FUSION-J3

2.865E+03 2.845E+03 2.824E+03 2.802E+03 2.780E+03 2.757E+03
2.735E+03 2.714E+03 2.693E+03 2.672E+03 2.651E+03 2.637E+03
2.623E+03 2.608E+03 2.595E+03 2.586E+03 2.575E+03 2.565E+03
2.555E+03 2.545E+03 2.534E+03 2.519E+03 2.503E+03 2.488E+03
2.473E+03 2.458E+03 2.443E+03 2.429E+03 2.415E+03 2.400E+03
2.387E+03 2.373E+03 2.308E+03 2.193E+03 2.078E+03 1.962E+03
1.902E+03 1.848E+03 1.790E+03 1.732E+03 1.674E+03 1.619E+03
1.569E+03 1.527E+03 1.493E+03 1.462E+03 1.446E+03 1.452E+03
1.460E+03 1.456E+03 1.448E+03 1.441E+03 1.438E+03 1.444E+03
1.456E+03 1.472E+03 1.458E+03 1.449E+03 1.443E+03 1.439E+03
1.447E+03 1.498E+03 1.551E+03 1.506E+03 1.462E+03 1.407E+03
1.357E+03 1.302E+03 1.238E+03 5.136E+02 3.852E+02 2.515E+02
3.014E+02 2.765E+02 2.604E+02 2.397E+02 1.961E+02 2.007E+02
1.701E+02 1.503E+02 1.429E+02 1.331E+02 1.169E+02 1.071E+02
9.858E+01 8.826E+01 7.892E+01 7.049E+01 6.291E+01 5.611E+01
5.000E+01 4.453E+01 3.964E+01 3.503E+01 3.136E+01 2.794E+01
2.361E+01 1.869E+01 1.481E+01 1.171E+01 9.275E+00 7.331E+00
5.801E+00 4.581E+00 3.617E+00 2.853E+00 2.247E+00 1.769E+00
1.261E+00 7.773E-01 4.778E-01 2.931E-01 1.795E-01 1.098E-01

6.715E-02 4.104E-02 2.507E-02 1.530E-02 9.333E-03 5.690E-03
3.468E-03 2.113E-03 1.287E-03 7.833E-04 2.983E-04 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.19 OF S-0 IN FUSION-J3
2.410E+03 2.413E+03 2.414E+03 2.412E+03 2.408E+03 2.402E+03
2.399E+03 2.401E+03 2.402E+03 2.402E+03 2.402E+03 2.400E+03
2.396E+03 2.393E+03 2.389E+03 2.386E+03 2.383E+03 2.381E+03
2.377E+03 2.371E+03 2.366E+03 2.356E+03 2.347E+03 2.339E+03
2.331E+03 2.324E+03 2.309E+03 2.289E+03 2.270E+03 2.250E+03
2.232E+03 2.208E+03 2.136E+03 2.028E+03 1.957E+03 1.889E+03
1.828E+03 1.777E+03 1.749E+03 1.721E+03 1.698E+03 1.681E+03
1.679E+03 1.688E+03 1.701E+03 1.694E+03 1.680E+03 1.665E+03
1.649E+03 1.633E+03 1.617E+03 1.604E+03 1.603E+03 1.622E+03
1.646E+03 1.663E+03 1.639E+03 1.612E+03 1.589E+03 1.570E+03
8.822E+02 7.021E+02 1.331E+03 5.341E+02 6.550E+02 4.207E+02
4.108E+02 1.209E+02 3.144E+02 3.139E+02 3.486E+02 4.102E+02
7.958E+01 2.228E+02 2.480E+02 2.176E+02 2.310E+02 2.553E+02
2.224E+02 2.519E+02 3.157E+02 5.721E+02 1.120E+03 1.461E+02
1.569E+01 8.782E+00 1.155E+01 1.417E+01 1.537E+01 1.613E+01
1.627E+01 1.614E+01 2.205E+01 1.504E+01 1.432E+01 1.368E+01
1.276E+01 1.155E+01 1.055E+01 9.696E+00 8.983E+00 8.404E+00
7.934E+00 7.555E+00 7.251E+00 7.011E+00 6.819E+00 6.667E+00
6.505E+00 6.351E+00 6.256E+00 6.198E+00 6.162E+00 6.140E+00
6.126E+00 6.118E+00 6.113E+00 6.110E+00 6.108E+00 6.110E+00
6.112E+00 6.113E+00 6.114E+00 6.114E+00 6.125E+00 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.20 OF K-0 IN FUSION-J3
3.643E+03 3.639E+03 3.628E+03 3.613E+03 3.597E+03 3.580E+03
3.564E+03 3.547E+03 3.526E+03 3.496E+03 3.466E+03 3.439E+03
3.411E+03 3.382E+03 3.352E+03 3.321E+03 3.291E+03 3.261E+03
3.231E+03 3.200E+03 3.172E+03 3.151E+03 3.129E+03 3.108E+03
3.086E+03 3.064E+03 3.042E+03 3.020E+03 2.997E+03 2.973E+03
2.950E+03 2.928E+03 2.882E+03 2.808E+03 2.730E+03 2.649E+03
2.576E+03 2.531E+03 2.490E+03 2.426E+03 2.358E+03 2.294E+03
2.240E+03 2.193E+03 2.154E+03 2.130E+03 2.122E+03 2.114E+03
2.105E+03 2.096E+03 2.088E+03 2.069E+03 2.020E+03 1.953E+03
1.866E+03 1.774E+03 1.670E+03 1.571E+03 1.464E+03 1.361E+03
1.218E+03 1.044E+03 8.909E+02 7.599E+02 6.457E+02 5.553E+02
4.797E+02 4.171E+02 3.629E+02 3.191E+02 2.806E+02 2.466E+02
2.187E+02 1.948E+02 1.740E+02 1.563E+02 1.398E+02 7.358E+01
3.502E+01 7.913E+01 3.209E+01 5.716E+02 1.534E+01 1.461E+01
1.554E+01 1.645E+01 2.421E+01 6.442E+00 8.883E+00 7.671E+01
3.911E+01 3.571E+00 4.387E+00 9.080E+00 3.000E+00 3.417E+00
5.328E+00 4.476E+00 4.340E+00 1.456E+00 1.979E+00 1.709E+00
1.511E+00 1.373E+00 1.241E+00 1.049E+00 9.277E-01 8.058E-01
6.528E-01 4.877E-01 3.789E-01 3.162E-01 2.884E-01 2.862E-01
3.031E-01 3.355E-01 3.813E-01 4.398E-01 5.108E-01 5.962E-01
6.977E-01 8.177E-01 9.586E-01 1.124E+00 1.534E+00 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.21 OF CA-0 IN FUSION-J3
3.411E+03 3.389E+03 3.358E+03 3.319E+03 3.282E+03 3.244E+03
3.212E+03 3.186E+03 3.160E+03 3.135E+03 3.110E+03 3.086E+03
3.062E+03 3.037E+03 3.011E+03 2.986E+03 2.963E+03 2.939E+03
2.911E+03 2.881E+03 2.851E+03 2.822E+03 2.791E+03 2.761E+03
2.734E+03 2.705E+03 2.680E+03 2.658E+03 2.636E+03 2.605E+03
2.573E+03 2.542E+03 2.430E+03 2.256E+03 2.104E+03 2.011E+03
1.993E+03 1.970E+03 1.960E+03 1.937E+03 1.923E+03 1.908E+03
1.913E+03 1.984E+03 2.018E+03 2.263E+03 2.240E+03 2.310E+03
2.132E+03 1.855E+03 2.009E+03 2.530E+03 2.246E+03 1.775E+03
1.742E+03 2.046E+03 1.178E+03 1.316E+03 1.144E+03 9.850E+02
9.938E+02 5.386E+02 5.815E+02 5.826E+02 5.601E+02 3.162E+02
6.801E+02 3.706E+02 7.560E+02 1.723E+02 1.099E+02 7.397E+01
2.937E+02 2.748E+02 8.226E+01 7.704E+02 2.735E+02 7.152E+00
1.268E+02 2.390E+01 3.390E+02 8.071E+00 2.292E+01 2.029E+01
1.565E+01 1.880E+01 2.053E+01 2.280E+01 2.239E+01 2.022E+01
2.109E+01 1.873E+01 1.816E+01 1.710E+01 1.640E+01 2.016E+01
1.315E+01 1.131E+01 9.549E+00 7.876E+00 6.445E+00 5.247E+00
4.221E+00 3.380E+00 2.697E+00 2.152E+00 1.812E+00 1.344E+00

9.625E-01 5.990E-01 3.742E-01 2.367E-01 1.542E-01 1.060E-01
7.978E-02 6.801E-02 6.627E-02 7.220E-02 8.485E-02 1.042E-01
1.309E-01 1.662E-01 2.123E-01 2.720E-01 4.418E-01 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.22 OF TI-0 IN FUSION-J3

2.935E+03 2.905E+03 2.877E+03 2.848E+03 2.821E+03 2.793E+03
2.763E+03 2.730E+03 2.697E+03 2.665E+03 2.633E+03 2.589E+03
2.547E+03 2.505E+03 2.464E+03 2.422E+03 2.375E+03 2.329E+03
2.291E+03 2.253E+03 2.220E+03 2.203E+03 2.187E+03 2.171E+03
2.155E+03 2.141E+03 2.125E+03 2.108E+03 2.092E+03 2.075E+03
2.060E+03 2.044E+03 2.007E+03 1.952E+03 1.880E+03 1.797E+03
1.702E+03 1.599E+03 1.483E+03 1.371E+03 1.283E+03 1.226E+03
1.174E+03 1.152E+03 1.101E+03 1.104E+03 1.041E+03 1.029E+03
1.137E+03 1.005E+03 8.845E+02 9.629E+02 8.644E+02 1.084E+03
9.967E+02 8.882E+02 9.260E+02 9.245E+02 9.331E+02 8.983E+02
1.030E+03 8.090E+02 4.393E+02 4.504E+02 6.564E+02 7.768E+02
4.213E+02 6.029E+02 1.593E+02 4.345E+02 3.827E+02 1.468E+02
1.937E+02 1.873E+02 1.880E+02 3.491E+02 7.700E+01 2.607E+02
4.070E+01 3.983E+01 1.397E+02 1.405E+02 7.245E+01 1.131E+02
1.030E+02 1.940E+02 2.762E+02 3.269E+02 1.345E+02 1.105E+02
3.860E+02 5.849E+01 1.361E+02 2.510E+02 5.181E+02 4.237E+02
6.436E+02 2.673E+02 9.832E+01 6.729E+01 2.431E+01 1.518E+01
3.240E+01 1.757E+01 4.792E+00 3.415E+00 2.532E+00 1.919E+00
1.332E+00 8.368E-01 5.676E-01 4.276E-01 3.674E-01 3.413E-01
3.568E-01 4.091E-01 4.936E-01 6.134E-01 7.750E-01 9.862E-01
1.260E+00 1.614E+00 2.070E+00 2.656E+00 4.320E+00 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.23 OF V-51 IN FUSION-J3

2.836E+03 2.817E+03 2.802E+03 2.789E+03 2.777E+03 2.764E+03
2.745E+03 2.722E+03 2.698E+03 2.675E+03 2.653E+03 2.645E+03
2.638E+03 2.631E+03 2.622E+03 2.608E+03 2.581E+03 2.554E+03
2.531E+03 2.508E+03 2.483E+03 2.454E+03 2.433E+03 2.412E+03
2.392E+03 2.378E+03 2.356E+03 2.335E+03 2.313E+03 2.290E+03
2.267E+03 2.245E+03 2.203E+03 2.133E+03 2.065E+03 1.999E+03
1.945E+03 1.890E+03 1.829E+03 1.768E+03 1.710E+03 1.656E+03
1.604E+03 1.534E+03 1.491E+03 1.419E+03 1.367E+03 1.288E+03
1.233E+03 1.205E+03 1.182E+03 1.127E+03 1.150E+03 1.176E+03
1.123E+03 1.152E+03 1.092E+03 1.045E+03 1.087E+03 9.811E+02
9.853E+02 8.430E+02 5.274E+02 8.815E+02 6.402E+02 7.522E+02
4.767E+02 6.179E+02 5.236E+02 3.436E+02 3.011E+02 3.860E+02
3.342E+02 3.525E+02 4.084E+02 3.925E+02 1.747E+02 2.213E+02
2.771E+02 3.005E+02 3.240E+02 4.130E+02 4.747E+01 9.743E+01
9.499E+01 2.269E+02 3.997E+02 4.289E+01 2.880E+02 5.825E+01
3.995E+01 8.110E+01 1.526E+02 9.977E+01 1.551E+02 7.493E+01
3.782E+02 3.165E+02 2.509E+02 6.235E+01 2.449E+02 1.395E+02
1.355E+02 7.167E+00 2.971E+00 2.157E+00 1.745E+00 1.434E+00
1.078E+00 7.005E-01 4.449E-01 2.783E-01 1.723E-01 1.061E-01
6.505E-02 3.979E-02 2.431E-02 1.484E-02 9.045E-03 5.513E-03
3.359E-03 2.046E-03 1.245E-03 7.576E-04 2.876E-04 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.24 OF CR-0 IN FUSION-J3

2.863E+03 2.826E+03 2.795E+03 2.766E+03 2.735E+03 2.703E+03
2.681E+03 2.661E+03 2.635E+03 2.609E+03 2.582E+03 2.548E+03
2.513E+03 2.485E+03 2.460E+03 2.432E+03 2.399E+03 2.366E+03
2.344E+03 2.325E+03 2.307E+03 2.285E+03 2.263E+03 2.241E+03
2.220E+03 2.198E+03 2.178E+03 2.160E+03 2.143E+03 2.124E+03
2.106E+03 2.088E+03 2.057E+03 2.013E+03 1.955E+03 1.897E+03
1.820E+03 1.746E+03 1.636E+03 1.545E+03 1.349E+03 1.259E+03
1.180E+03 1.056E+03 9.874E+02 9.482E+02 9.740E+02 8.386E+02
8.534E+02 1.016E+03 9.837E+02 9.413E+02 8.256E+02 8.630E+02
9.633E+02 1.032E+03 8.807E+02 7.513E+02 8.693E+02 1.009E+03
9.443E+02 1.179E+03 7.412E+02 8.376E+02 7.275E+02 6.254E+02
5.195E+02 3.062E+02 1.115E+02 3.217E+02 7.079E+02 6.397E+02
1.678E+02 1.476E+02 2.248E+02 2.015E+02 1.940E+02 2.081E+02
2.234E+02 3.329E+02 4.724E+01 9.073E+01 2.690E+02 1.100E+02
1.988E+01 3.076E+01 4.301E+01 6.501E+01 1.879E+02 1.210E+01
3.948E+01 1.286E+02 2.904E+01 1.532E+01 2.358E+01 1.244E+01
1.182E+01 1.380E+01 2.038E+01 7.292E+01 3.826E+01 3.078E+01

2.972E+01 8.447E+00 3.673E+00 2.114E+00 1.408E+00 1.024E+00
7.217E-01 5.067E-01 4.080E-01 3.729E-01 3.835E-01 4.335E-01
5.214E-01 6.493E-01 8.225E-01 1.051E+00 1.347E+00 1.729E+00
2.220E+00 2.852E+00 3.663E+00 4.703E+00 7.657E+00 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.25 OF MN-55 IN FUSION-J3
2.933E+03 2.900E+03 2.868E+03 2.837E+03 2.807E+03 2.777E+03
2.755E+03 2.723E+03 2.693E+03 2.666E+03 2.638E+03 2.612E+03
2.586E+03 2.559E+03 2.531E+03 2.504E+03 2.480E+03 2.456E+03
2.430E+03 2.403E+03 2.376E+03 2.352E+03 2.327E+03 2.301E+03
2.275E+03 2.248E+03 2.220E+03 2.194E+03 2.168E+03 2.139E+03
2.121E+03 2.102E+03 2.059E+03 1.988E+03 1.897E+03 1.824E+03
1.748E+03 1.672E+03 1.599E+03 1.526E+03 1.451E+03 1.373E+03
1.294E+03 1.214E+03 1.132E+03 1.058E+03 1.005E+03 9.515E+02
9.288E+02 8.576E+02 8.598E+02 8.416E+02 7.995E+02 8.359E+02
8.655E+02 7.714E+02 7.208E+02 7.975E+02 6.694E+02 6.675E+02
7.953E+02 6.956E+02 6.495E+02 5.971E+02 4.402E+02 5.043E+02
3.274E+02 3.854E+02 3.299E+02 2.825E+02 3.950E+02 3.758E+02
2.734E+02 2.508E+02 2.256E+02 2.022E+02 2.176E+02 1.716E+02
1.292E+02 1.459E+02 2.327E+02 1.743E+02 2.179E+02 1.182E+02
3.123E+02 4.085E+02 4.592E+01 4.473E+00 5.595E+01 1.021E+02
1.214E+02 3.192E+01 2.498E+01 2.689E+02 2.217E+01 3.059E+02
3.583E+00 1.379E+01 3.325E+01 3.930E+01 9.246E+00 8.223E+00
1.857E+01 6.089E+01 4.842E+02 4.030E+01 7.886E+00 5.287E+02
4.781E+00 7.361E+00 1.337E+01 1.069E+00 6.340E-01 6.005E-01
6.701E-01 8.012E-01 9.911E-01 1.247E+00 1.584E+00 2.020E+00
2.584E+00 3.314E+00 4.249E+00 5.449E+00 8.868E+00 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.26 OF FE-0 IN FUSION-J3
2.985E+03 2.951E+03 2.924E+03 2.900E+03 2.875E+03 2.849E+03
2.821E+03 2.793E+03 2.763E+03 2.732E+03 2.701E+03 2.680E+03
2.657E+03 2.630E+03 2.599E+03 2.570E+03 2.544E+03 2.519E+03
2.493E+03 2.467E+03 2.444E+03 2.426E+03 2.394E+03 2.360E+03
2.332E+03 2.307E+03 2.282E+03 2.254E+03 2.232E+03 2.206E+03
2.177E+03 2.149E+03 2.078E+03 1.974E+03 1.842E+03 1.744E+03
1.607E+03 1.498E+03 1.363E+03 1.209E+03 1.149E+03 1.095E+03
1.041E+03 1.027E+03 9.572E+02 9.924E+02 1.204E+03 1.178E+03
7.731E+02 9.290E+02 1.121E+03 7.589E+02 9.064E+02 9.187E+02
8.749E+02 8.059E+02 4.546E+02 8.133E+02 5.482E+02 5.021E+02
7.197E+02 9.074E+02 6.608E+02 7.960E+02 3.400E+02 4.611E+02
6.916E+02 4.503E+02 1.715E+02 3.164E+02 1.859E+02 4.304E+02
4.774E+02 4.736E+02 2.329E+02 1.507E+02 5.092E+02 3.147E+02
2.079E+02 1.456E+02 4.275E+01 6.304E+01 7.788E+01 1.012E+02
9.485E+00 4.952E+01 6.382E+01 5.655E+01 5.568E+01 5.859E+01
5.993E+01 8.008E+01 1.889E+02 6.917E+01 3.736E+00 1.079E+01
1.534E+01 1.672E+01 2.129E+01 4.938E+01 2.318E+01 7.256E+00
7.762E+00 5.146E+00 4.456E+00 3.849E+00 3.303E+00 2.825E+00
2.136E+00 1.445E+00 9.766E-01 6.738E-01 4.918E-01 3.748E-01
3.096E-01 3.036E-01 3.441E-01 4.136E-01 4.990E-01 6.282E-01
8.106E-01 1.058E+00 1.326E+00 1.680E+00 2.791E+00 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0
'DISPLACEMENT RATE NO.27 OF CO-59 IN FUSION-J3
3.217E+03 3.172E+03 3.128E+03 3.085E+03 3.042E+03 2.998E+03
2.954E+03 2.911E+03 2.864E+03 2.813E+03 2.774E+03 2.754E+03
2.739E+03 2.668E+03 2.618E+03 2.611E+03 2.549E+03 2.530E+03
2.474E+03 2.445E+03 2.413E+03 2.396E+03 2.315E+03 2.304E+03
2.240E+03 2.220E+03 2.170E+03 2.134E+03 2.113E+03 2.091E+03
2.074E+03 2.057E+03 2.007E+03 1.920E+03 1.844E+03 1.783E+03
1.721E+03 1.693E+03 1.615E+03 1.583E+03 1.488E+03 1.446E+03
1.347E+03 1.310E+03 1.207E+03 1.137E+03 1.041E+03 1.002E+03
8.647E+02 9.002E+02 8.179E+02 7.591E+02 7.469E+02 7.900E+02
6.582E+02 7.347E+02 7.002E+02 6.653E+02 7.395E+02 7.780E+02
8.293E+02 7.052E+02 8.431E+02 7.862E+02 5.939E+02 6.997E+02
7.812E+02 5.761E+02 4.762E+02 5.591E+02 5.527E+02 5.364E+02
4.316E+02 3.256E+02 3.539E+02 2.583E+02 1.999E+02 2.091E+02
1.536E+02 8.191E+01 2.679E+02 2.175E+02 1.537E+02 9.766E+01
3.846E+01 8.271E+01 1.077E+02 7.496E+01 2.862E+01 2.377E+01
6.047E+01 6.461E+01 1.671E+02 6.680E+01 5.745E+01 8.196E+00

7.823E+01 2.811E+01 1.079E+01 8.395E+01 4.185E+01 2.972E+02
1.033E+01 1.344E+00 8.869E-01 5.993E-01 5.864E-01 5.950E-01
6.137E-01 6.653E-01 8.843E-01 3.325E+00 2.437E+00 2.198E-01
8.423E-02 4.468E-02 2.601E-02 1.557E-02 9.418E-03 5.717E-03
3.476E-03 2.115E-03 1.288E-03 7.839E-04 2.989E-04 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.28 OF NI-0 IN FUSION-J3

3.134E+03 3.099E+03 3.061E+03 3.024E+03 2.987E+03 2.952E+03
2.924E+03 2.892E+03 2.860E+03 2.830E+03 2.801E+03 2.776E+03
2.754E+03 2.732E+03 2.711E+03 2.678E+03 2.643E+03 2.614E+03
2.581E+03 2.547E+03 2.517E+03 2.495E+03 2.470E+03 2.443E+03
2.412E+03 2.385E+03 2.363E+03 2.345E+03 2.330E+03 2.313E+03
2.297E+03 2.284E+03 2.254E+03 2.172E+03 2.091E+03 2.046E+03
1.956E+03 1.892E+03 1.804E+03 1.736E+03 1.615E+03 1.496E+03
1.430E+03 1.257E+03 1.252E+03 1.143E+03 1.154E+03 1.128E+03
1.169E+03 1.007E+03 1.071E+03 9.518E+02 9.509E+02 1.154E+03
1.056E+03 8.331E+02 7.519E+02 1.022E+03 9.877E+02 1.209E+03
7.604E+02 6.459E+02 9.644E+02 6.206E+02 6.406E+02 5.517E+02
4.966E+02 5.086E+02 3.238E+02 5.122E+02 4.536E+02 2.632E+02
3.630E+02 1.812E+02 6.306E+02 3.362E+02 2.489E+02 1.884E+02
2.529E+02 7.373E+01 4.908E+01 3.045E+02 7.800E+01 1.122E+02
1.388E+02 2.004E+02 5.420E+02 3.988E+01 6.829E+01 1.008E+02
8.886E+01 9.757E+01 1.334E+02 7.759E+01 9.419E+01 1.153E+02
2.243E+02 1.887E+02 3.525E+01 2.085E+01 2.522E+01 3.884E+01
2.568E+01 1.431E+01 1.033E+01 8.068E+00 6.412E+00 5.073E+00
3.718E+00 2.387E+00 1.539E+00 1.009E+00 6.901E-01 5.114E-01
4.264E-01 4.064E-01 4.358E-01 5.072E-01 6.192E-01 7.762E-01
9.847E-01 1.257E+00 1.610E+00 2.066E+00 3.357E+00 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.29 OF CU-0 IN FUSION-J3

2.949E+03 2.914E+03 2.880E+03 2.846E+03 2.811E+03 2.776E+03
2.742E+03 2.709E+03 2.675E+03 2.641E+03 2.607E+03 2.578E+03
2.549E+03 2.519E+03 2.489E+03 2.460E+03 2.435E+03 2.411E+03
2.385E+03 2.359E+03 2.334E+03 2.313E+03 2.291E+03 2.269E+03
2.247E+03 2.224E+03 2.205E+03 2.187E+03 2.168E+03 2.148E+03
2.129E+03 2.110E+03 2.073E+03 2.014E+03 1.960E+03 1.908E+03
1.851E+03 1.796E+03 1.731E+03 1.667E+03 1.597E+03 1.511E+03
1.433E+03 1.349E+03 1.258E+03 1.179E+03 1.110E+03 1.025E+03
9.456E+02 8.784E+02 8.227E+02 7.694E+02 7.116E+02 7.046E+02
6.873E+02 6.749E+02 6.638E+02 6.541E+02 6.480E+02 6.490E+02
6.478E+02 6.394E+02 6.334E+02 6.193E+02 5.906E+02 5.677E+02
5.419E+02 5.104E+02 4.757E+02 4.415E+02 4.067E+02 3.746E+02
3.493E+02 3.274E+02 3.061E+02 2.848E+02 2.637E+02 2.428E+02
2.205E+02 2.851E+02 2.430E+02 2.015E+02 1.194E+02 2.172E+02
2.907E+02 3.537E+01 7.826E+01 1.509E+02 4.476E+01 6.003E+01
4.828E+01 6.326E+01 7.710E+01 3.926E+01 6.075E+01 2.070E+01
1.516E+01 6.506E+01 1.633E+01 5.555E+01 4.869E+00 1.125E+01
4.297E+00 4.775E+00 4.361E+00 2.288E+00 1.674E+00 1.494E+00
1.234E+00 8.096E-01 5.622E-01 3.912E-01 2.914E-01 2.427E-01
2.324E-01 2.521E-01 2.975E-01 3.679E-01 4.650E-01 5.938E-01
7.613E-01 9.781E-01 1.256E+00 1.613E+00 2.627E+00 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.30 OF ZR-0 IN FUSION-J3

3.428E+03 3.374E+03 3.325E+03 3.278E+03 3.231E+03 3.181E+03
3.133E+03 3.088E+03 3.041E+03 2.995E+03 2.949E+03 2.899E+03
2.850E+03 2.801E+03 2.751E+03 2.704E+03 2.664E+03 2.624E+03
2.584E+03 2.544E+03 2.515E+03 2.485E+03 2.455E+03 2.426E+03
2.397E+03 2.369E+03 2.339E+03 2.312E+03 2.284E+03 2.255E+03
2.228E+03 2.202E+03 2.147E+03 2.065E+03 1.990E+03 1.919E+03
1.852E+03 1.778E+03 1.701E+03 1.617E+03 1.529E+03 1.437E+03
1.339E+03 1.244E+03 1.152E+03 1.088E+03 1.029E+03 9.942E+02
9.607E+02 9.483E+02 9.234E+02 8.935E+02 8.731E+02 8.498E+02
8.391E+02 8.430E+02 8.440E+02 8.143E+02 7.998E+02 7.813E+02
7.529E+02 7.170E+02 6.951E+02 6.701E+02 6.501E+02 6.328E+02
6.039E+02 5.766E+02 5.475E+02 5.173E+02 4.786E+02 4.359E+02
3.978E+02 3.639E+02 3.323E+02 3.026E+02 2.743E+02 2.488E+02
2.681E+02 3.071E+02 3.818E+02 2.290E+02 2.876E+02 1.289E+02
1.152E+02 9.822E+01 2.286E+02 6.321E+01 6.041E+01 6.210E+01

4.010E+01 3.471E+01 4.938E+01 3.360E+01 4.158E+01 2.952E+01
4.804E+01 2.558E+02 1.098E+01 9.883E+00 5.869E+00 1.768E+01
6.109E+00 3.867E+00 2.032E+00 1.860E+00 1.366E+00 1.144E+00
8.546E-01 5.313E-01 6.422E-01 2.130E-01 1.308E-01 8.340E-02
5.460E-02 3.762E-02 2.840E-02 2.426E-02 2.374E-02 2.599E-02
3.067E-02 3.775E-02 4.754E-02 6.043E-02 9.773E-02 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0

'DISPLACEMENT RATE NO.31 OF NB-93 IN FUSION-J3

2.936E+03 2.901E+03 2.865E+03 2.830E+03 2.795E+03 2.760E+03
2.730E+03 2.706E+03 2.681E+03 2.654E+03 2.626E+03 2.597E+03
2.567E+03 2.537E+03 2.507E+03 2.478E+03 2.449E+03 2.420E+03
2.391E+03 2.362E+03 2.335E+03 2.314E+03 2.293E+03 2.271E+03
2.250E+03 2.228E+03 2.210E+03 2.197E+03 2.182E+03 2.167E+03
2.151E+03 2.136E+03 2.094E+03 2.063E+03 2.007E+03 1.952E+03
1.893E+03 1.838E+03 1.771E+03 1.705E+03 1.635E+03 1.551E+03
1.473E+03 1.398E+03 1.324E+03 1.255E+03 1.191E+03 1.134E+03
1.079E+03 1.028E+03 9.787E+02 9.314E+02 8.834E+02 8.375E+02
7.938E+02 7.517E+02 7.110E+02 6.720E+02 6.410E+02 6.141E+02
5.807E+02 5.539E+02 5.529E+02 5.712E+02 5.974E+02 5.994E+02
5.908E+02 5.627E+02 5.328E+02 5.085E+02 4.836E+02 4.585E+02
4.307E+02 4.025E+02 3.736E+02 3.446E+02 3.125E+02 2.837E+02
2.580E+02 2.350E+02 2.106E+02 1.885E+02 1.690E+02 1.500E+02
1.338E+02 1.194E+02 1.032E+02 9.061E+01 7.959E+01 6.909E+01
6.011E+01 5.240E+01 4.575E+01 4.009E+01 3.517E+01 3.088E+01
2.597E+01 2.043E+01 1.601E+01 1.267E+01 8.114E+00 7.153E+00
4.457E+00 4.043E+00 1.930E+00 2.002E+00 1.511E+00 1.225E+00
8.869E-01 5.521E-01 3.236E-01 2.090E-01 2.201E-01 8.335E-02
7.692E-02 4.484E-02 3.995E-02 4.148E-02 4.789E-02 5.873E-02
7.403E-02 9.448E-02 1.212E-01 1.557E-01 2.537E-01 0.0
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0.0 0.0 0.0

'DISPLACEMENT RATE NO.32 OF MO-0 IN FUSION-J3

2.842E+03 2.806E+03 2.771E+03 2.737E+03 2.702E+03 2.667E+03
2.630E+03 2.592E+03 2.554E+03 2.512E+03 2.471E+03 2.440E+03
2.409E+03 2.380E+03 2.352E+03 2.322E+03 2.286E+03 2.252E+03
2.220E+03 2.189E+03 2.163E+03 2.150E+03 2.135E+03 2.122E+03
2.110E+03 2.097E+03 2.075E+03 2.050E+03 2.024E+03 1.998E+03
1.974E+03 1.951E+03 1.912E+03 1.866E+03 1.815E+03 1.771E+03
1.725E+03 1.685E+03 1.630E+03 1.571E+03 1.505E+03 1.427E+03
1.354E+03 1.276E+03 1.191E+03 1.120E+03 1.059E+03 9.856E+02
9.155E+02 8.588E+02 8.118E+02 7.716E+02 7.413E+02 7.156E+02
6.974E+02 6.859E+02 6.732E+02 6.601E+02 6.524E+02 6.446E+02
6.407E+02 6.224E+02 5.949E+02 5.780E+02 5.608E+02 5.576E+02
5.519E+02 5.289E+02 5.028E+02 4.724E+02 4.413E+02 4.102E+02
3.822E+02 3.566E+02 3.311E+02 3.050E+02 2.786E+02 2.537E+02
2.289E+02 2.068E+02 1.847E+02 1.650E+02 1.477E+02 1.315E+02
1.166E+02 1.031E+02 9.101E+01 8.048E+01 6.918E+01 6.066E+01
7.113E+01 4.746E+01 4.168E+01 3.621E+01 2.814E+01 2.479E+01
2.274E+01 1.397E+01 1.193E+01 9.636E+00 8.209E+00 5.860E+00
5.221E+00 3.166E+00 2.764E+00 2.280E+00 2.001E+00 1.119E+00
9.718E-01 1.238E+02 5.937E-01 2.184E-01 1.465E-01 1.845E-01
9.534E-01 1.444E-01 1.278E-01 1.191E-01 1.407E-01 1.815E-01
2.376E-01 3.109E-01 4.049E-01 5.254E-01 8.633E-01 0.0
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0.0 0.0 0.0

'DISPLACEMENT RATE NO.33 OF CD-0 IN FUSION-J3

2.621E+03 2.587E+03 2.557E+03 2.529E+03 2.501E+03 2.472E+03
2.444E+03 2.417E+03 2.388E+03 2.358E+03 2.328E+03 2.303E+03
2.280E+03 2.256E+03 2.232E+03 2.205E+03 2.172E+03 2.140E+03
2.108E+03 2.076E+03 2.049E+03 2.033E+03 2.018E+03 2.003E+03
1.988E+03 1.970E+03 1.946E+03 1.921E+03 1.895E+03 1.869E+03
1.841E+03 1.813E+03 1.757E+03 1.694E+03 1.637E+03 1.575E+03
1.514E+03 1.461E+03 1.402E+03 1.344E+03 1.283E+03 1.213E+03
1.148E+03 1.081E+03 1.009E+03 9.426E+02 8.810E+02 8.222E+02
7.679E+02 7.188E+02 6.740E+02 6.359E+02 6.117E+02 5.897E+02
5.700E+02 5.545E+02 5.402E+02 5.281E+02 5.212E+02 5.139E+02
5.080E+02 4.976E+02 4.816E+02 4.619E+02 4.402E+02 4.179E+02
3.973E+02 3.798E+02 3.624E+02 3.357E+02 3.099E+02 2.868E+02
2.632E+02 2.407E+02 2.189E+02 1.985E+02 1.796E+02 1.623E+02
1.454E+02 1.307E+02 1.164E+02 1.038E+02 9.272E+01 8.291E+01

7.414E+01 6.604E+01 5.888E+01 5.254E+01 4.692E+01 4.167E+01
3.707E+01 3.304E+01 2.948E+01 2.623E+01 2.337E+01 2.083E+01
1.765E+01 1.411E+01 1.135E+01 9.091E+00 4.449E+00 5.658E+00
3.240E+00 2.468E+00 1.684E+00 1.375E+00 8.242E-01 1.351E+00
6.363E-01 3.659E-01 1.844E-01 1.488E-01 1.859E-01 5.738E+00
5.572E-02 8.228E-02 6.651E-02 9.748E-02 1.944E-01 4.820E-01
1.494E+00 5.453E+00 2.336E+01 1.273E+02 3.706E+03 0.0
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'DISPLACEMENT RATE NO.34 OF W-0 IN FUSION-J3
1.987E+03 1.976E+03 1.959E+03 1.940E+03 1.924E+03 1.912E+03
1.897E+03 1.880E+03 1.863E+03 1.850E+03 1.836E+03 1.803E+03
1.769E+03 1.735E+03 1.700E+03 1.670E+03 1.652E+03 1.634E+03
1.617E+03 1.599E+03 1.582E+03 1.564E+03 1.546E+03 1.528E+03
1.511E+03 1.494E+03 1.476E+03 1.458E+03 1.441E+03 1.424E+03
1.408E+03 1.393E+03 1.352E+03 1.292E+03 1.221E+03 1.157E+03
1.087E+03 1.036E+03 9.895E+02 9.412E+02 8.988E+02 8.581E+02
8.190E+02 7.812E+02 7.447E+02 7.109E+02 6.793E+02 6.383E+02
5.992E+02 5.629E+02 5.303E+02 4.963E+02 4.540E+02 4.164E+02
3.831E+02 3.540E+02 3.285E+02 3.067E+02 2.905E+02 2.772E+02
2.610E+02 2.462E+02 2.357E+02 2.278E+02 2.228E+02 2.133E+02
2.026E+02 1.918E+02 1.818E+02 1.723E+02 1.634E+02 1.546E+02
1.461E+02 1.382E+02 1.307E+02 1.231E+02 1.162E+02 1.094E+02
1.022E+02 9.547E+01 8.937E+01 8.358E+01 7.827E+01 7.269E+01
6.719E+01 6.201E+01 5.725E+01 5.285E+01 4.884E+01 4.503E+01
4.156E+01 3.836E+01 3.545E+01 3.274E+01 3.021E+01 2.783E+01
2.479E+01 1.985E+01 1.069E+01 6.203E+00 6.601E+00 5.636E+00
5.460E+00 1.303E+01 1.804E+00 1.938E+00 5.542E+00 1.235E+01
5.563E-01 8.113E-01 3.970E-01 7.437E-01 5.800E-01 8.905E-02
1.354E-01 1.040E+00 4.951E-01 2.551E-01 3.097E-01 3.675E-01
1.979E-01 2.073E-01 2.444E-01 3.002E-01 4.703E-01 0.0
0.0 0.0 0.0 0.0 0.0 0.0
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0.0 0.0 0.0

'DISPLACEMENT RATE NO.35 OF PB-0 IN FUSION-J3
2.261E+03 2.238E+03 2.217E+03 2.197E+03 2.177E+03 2.162E+03
2.145E+03 2.128E+03 2.110E+03 2.092E+03 2.074E+03 2.060E+03
2.044E+03 2.027E+03 2.008E+03 1.989E+03 1.973E+03 1.958E+03
1.944E+03 1.930E+03 1.915E+03 1.898E+03 1.880E+03 1.862E+03
1.847E+03 1.831E+03 1.808E+03 1.782E+03 1.756E+03 1.731E+03
1.708E+03 1.686E+03 1.618E+03 1.502E+03 1.402E+03 1.289E+03
1.209E+03 1.119E+03 1.039E+03 9.611E+02 9.081E+02 8.745E+02
8.321E+02 7.970E+02 7.637E+02 7.274E+02 7.479E+02 7.695E+02
6.992E+02 7.922E+02 7.544E+02 8.183E+02 8.271E+02 8.046E+02
6.738E+02 7.455E+02 6.349E+02 5.931E+02 5.845E+02 4.716E+02
3.946E+02 4.124E+02 3.841E+02 3.503E+02 3.350E+02 2.761E+02
2.475E+02 2.126E+02 2.191E+02 2.429E+02 1.685E+02 1.503E+02
1.710E+02 1.420E+02 1.435E+02 1.876E+02 1.318E+02 1.013E+02
9.585E+01 9.877E+01 7.992E+01 7.736E+01 6.744E+01 6.572E+01
6.108E+01 4.951E+01 4.470E+01 4.027E+01 4.208E+01 3.690E+01
2.545E+01 2.458E+01 2.206E+01 2.017E+01 1.824E+01 1.656E+01
1.432E+01 1.155E+01 9.220E+00 7.237E+00 5.815E+00 4.636E+00
3.682E+00 2.907E+00 2.275E+00 1.802E+00 1.406E+00 1.104E+00
7.815E-01 4.783E-01 2.929E-01 1.799E-01 1.114E-01 7.010E-02
4.558E-02 3.147E-02 2.393E-02 2.071E-02 2.049E-02 2.261E-02
2.677E-02 3.299E-02 4.159E-02 5.293E-02 8.566E-02 0.0
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0.0 0.0 0.0

'DISPLACEMENT RATE NO.36 OF BI-209 IN FUSION-J3
2.154E+03 2.128E+03 2.102E+03 2.077E+03 2.053E+03 2.029E+03
2.005E+03 1.981E+03 1.957E+03 1.934E+03 1.912E+03 1.888E+03
1.865E+03 1.842E+03 1.819E+03 1.797E+03 1.777E+03 1.758E+03
1.739E+03 1.720E+03 1.702E+03 1.686E+03 1.669E+03 1.653E+03
1.637E+03 1.621E+03 1.605E+03 1.590E+03 1.574E+03 1.557E+03
1.541E+03 1.525E+03 1.475E+03 1.389E+03 1.296E+03 1.206E+03
1.158E+03 1.098E+03 1.046E+03 9.970E+02 9.509E+02 9.027E+02
8.460E+02 7.844E+02 7.214E+02 6.618E+02 6.101E+02 5.927E+02
5.762E+02 5.831E+02 6.038E+02 6.620E+02 7.811E+02 7.567E+02
7.264E+02 6.965E+02 6.660E+02 6.313E+02 5.658E+02 5.487E+02
4.995E+02 4.121E+02 3.844E+02 3.289E+02 3.108E+02 2.887E+02
2.487E+02 2.275E+02 2.433E+02 2.189E+02 1.961E+02 2.070E+02
2.047E+02 1.639E+02 1.540E+02 1.482E+02 1.336E+02 1.421E+02

9.347E+01 1.176E+02 7.343E+01 1.241E+02 8.877E+01 6.277E+01
2.714E+01 6.336E+01 4.929E+01 4.620E+01 4.121E+01 3.450E+01
3.454E+01 4.694E+01 2.490E+01 2.218E+01 2.132E+01 1.981E+01
1.902E+01 1.638E+01 6.967E+00 6.574E+00 5.510E+00 3.892E+00
3.502E+00 2.993E+00 4.034E+01 1.445E+00 1.253E+00 1.090E+00
3.446E-01 3.520E-01 2.278E-01 1.416E-01 8.699E-02 5.325E-02
3.252E-02 1.984E-02 1.210E-02 7.382E-03 4.512E-03 2.772E-03
1.721E-03 1.091E-03 7.220E-04 5.141E-04 3.726E-04 0.0
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'DISPLACEMENT RATE NO.37 OF TH-232 IN FUSION-J3

1.386E+03 1.372E+03 1.358E+03 1.345E+03 1.331E+03 1.316E+03
1.303E+03 1.292E+03 1.284E+03 1.280E+03 1.275E+03 1.262E+03
1.249E+03 1.235E+03 1.220E+03 1.205E+03 1.189E+03 1.173E+03
1.156E+03 1.137E+03 1.120E+03 1.105E+03 1.089E+03 1.074E+03
1.057E+03 1.040E+03 1.022E+03 1.005E+03 9.881E+02 9.684E+02
9.486E+02 9.294E+02 9.006E+02 8.501E+02 8.354E+02 7.974E+02
7.245E+02 6.441E+02 5.786E+02 5.518E+02 5.456E+02 5.381E+02
5.284E+02 5.131E+02 4.923E+02 4.722E+02 4.530E+02 4.193E+02
3.858E+02 3.556E+02 3.282E+02 3.014E+02 2.714E+02 2.448E+02
2.160E+02 1.805E+02 1.499E+02 1.236E+02 1.003E+02 8.072E+01
5.806E+01 3.697E+01 2.493E+01 1.602E+01 1.367E+01 9.287E+00
2.964E+00 1.639E-01 1.565E-01 1.474E-01 1.412E-01 1.384E-01
1.381E-01 1.387E-01 1.402E-01 1.437E-01 1.470E-01 1.491E-01
1.489E-01 1.509E-01 1.581E-01 1.669E-01 1.779E-01 1.736E-01
1.570E-01 1.363E-01 1.093E-01 7.169E-02 4.540E-03 0.0
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'DISPLACEMENT RATE NO.38 OF U-235 IN FUSION-J3

8.205E+02 7.942E+02 7.768E+02 7.660E+02 7.566E+02 7.486E+02
7.427E+02 7.387E+02 7.356E+02 7.344E+02 7.368E+02 7.440E+02
7.505E+02 7.569E+02 7.699E+02 7.898E+02 8.114E+02 8.270E+02
8.315E+02 8.323E+02 8.297E+02 8.262E+02 8.219E+02 8.176E+02
8.137E+02 8.087E+02 7.990E+02 7.871E+02 7.752E+02 7.630E+02
7.515E+02 7.399E+02 7.145E+02 6.795E+02 6.442E+02 6.137E+02
6.092E+02 6.081E+02 6.280E+02 6.472E+02 6.494E+02 6.361E+02
6.109E+02 5.894E+02 5.693E+02 5.467E+02 5.241E+02 5.079E+02
4.934E+02 4.774E+02 4.600E+02 4.419E+02 4.220E+02 4.031E+02
3.838E+02 3.632E+02 3.433E+02 3.250E+02 3.035E+02 2.825E+02
2.557E+02 2.243E+02 1.943E+02 1.725E+02 1.579E+02 1.471E+02
1.396E+02 1.349E+02 1.321E+02 1.291E+02 1.254E+02 1.212E+02
1.186E+02 1.150E+02 1.103E+02 1.051E+02 9.924E+01 9.333E+01
8.770E+01 8.218E+01 7.614E+01 7.042E+01 6.552E+01 6.033E+01
5.478E+01 4.999E+01 4.581E+01 4.194E+01 3.830E+01 3.495E+01
3.138E+01 2.829E+01 2.600E+01 2.318E+01 2.068E+01 1.846E+01
1.565E+01 1.246E+01 1.009E+01 8.260E+00 6.529E+00 5.187E+00
4.175E+00 3.366E+00 2.764E+00 2.368E+00 2.065E+00 1.890E+00
1.570E+00 1.160E+00 1.506E+00 1.831E+00 1.732E+00 8.484E-01
6.254E-01 1.219E+01 9.836E-01 5.467E+00 3.917E-01 2.224E+00
8.508E-01 3.437E+00 7.357E-01 1.810E+00 4.659E+00 0.0
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0.0 0.0 0.0

'DISPLACEMENT RATE NO.39 OF U-238 IN FUSION-J3

1.942E+03 1.920E+03 1.903E+03 1.890E+03 1.874E+03 1.856E+03
1.828E+03 1.788E+03 1.747E+03 1.704E+03 1.664E+03 1.642E+03
1.621E+03 1.604E+03 1.589E+03 1.571E+03 1.548E+03 1.525E+03
1.497E+03 1.468E+03 1.441E+03 1.411E+03 1.382E+03 1.352E+03
1.327E+03 1.309E+03 1.292E+03 1.275E+03 1.259E+03 1.242E+03
1.226E+03 1.211E+03 1.165E+03 1.092E+03 1.016E+03 9.237E+02
7.955E+02 6.735E+02 6.030E+02 5.748E+02 5.775E+02 5.654E+02
5.310E+02 5.002E+02 4.745E+02 4.556E+02 4.425E+02 4.298E+02
4.164E+02 4.085E+02 4.019E+02 3.882E+02 3.608E+02 3.340E+02
3.073E+02 2.846E+02 2.610E+02 2.384E+02 2.160E+02 1.961E+02
1.764E+02 1.722E+02 1.730E+02 1.734E+02 1.775E+02 1.750E+02
1.748E+02 1.716E+02 1.658E+02 1.596E+02 1.529E+02 1.463E+02

1.395E+02 1.332E+02 1.266E+02 1.197E+02 1.135E+02 1.075E+02
1.002E+02 9.350E+01 8.783E+01 8.160E+01 7.614E+01 6.974E+01
6.342E+01 5.753E+01 5.231E+01 4.741E+01 4.242E+01 3.749E+01
3.345E+01 2.983E+01 2.658E+01 2.367E+01 2.106E+01 1.873E+01
1.584E+01 1.257E+01 9.999E+00 1.147E+01 5.182E+00 3.101E+00
4.237E+00 2.478E+00 2.010E+00 2.242E+00 1.494E+00 1.224E+00
6.081E-01 3.786E-01 2.575E-01 1.128E-01 5.683E-01 1.978E-01
4.772E-01 1.320E-01 3.493E-02 8.899E-02 1.654E-01 4.844E-02
3.989E-02 4.178E-02 4.824E-02 5.840E-02 9.013E-02 0.0
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'DISPLACEMENT RATE NO.40 OF PU-239 IN FUSION-J3

4.940E+02 4.853E+02 4.801E+02 4.773E+02 4.748E+02 4.724E+02
4.758E+02 4.855E+02 4.948E+02 5.035E+02 5.115E+02 5.190E+02
5.259E+02 5.325E+02 5.389E+02 5.432E+02 5.437E+02 5.445E+02
5.452E+02 5.458E+02 5.459E+02 5.432E+02 5.404E+02 5.377E+02
5.351E+02 5.323E+02 5.318E+02 5.324E+02 5.327E+02 5.333E+02
5.339E+02 5.343E+02 4.907E+02 4.115E+02 4.032E+02 4.100E+02
4.035E+02 3.993E+02 4.196E+02 4.429E+02 4.513E+02 4.446E+02
4.380E+02 4.264E+02 4.102E+02 3.956E+02 3.817E+02 3.715E+02
3.616E+02 3.513E+02 3.405E+02 3.294E+02 3.177E+02 3.058E+02
2.930E+02 2.793E+02 2.657E+02 2.520E+02 2.382E+02 2.253E+02
2.072E+02 1.863E+02 1.691E+02 1.550E+02 1.425E+02 1.331E+02
1.269E+02 1.232E+02 1.200E+02 1.187E+02 1.170E+02 1.148E+02
1.117E+02 1.080E+02 1.039E+02 9.955E+01 9.478E+01 8.987E+01
8.443E+01 7.920E+01 7.342E+01 6.796E+01 6.302E+01 5.844E+01
5.376E+01 4.920E+01 4.499E+01 4.078E+01 3.702E+01 3.354E+01
3.027E+01 2.713E+01 2.430E+01 2.187E+01 1.974E+01 1.782E+01
1.527E+01 1.231E+01 9.852E+00 8.121E+00 6.616E+00 5.481E+00
4.409E+00 3.773E+00 3.260E+00 2.618E+00 2.334E+00 2.123E+00
6.735E-01 4.106E-01 2.502E-01 1.524E-01 9.282E-02 5.650E-02
3.438E-02 2.092E-02 1.273E-02 7.741E-03 4.706E-03 2.861E-03
1.739E-03 1.057E-03 6.433E-04 3.910E-04 1.481E-04 0.0
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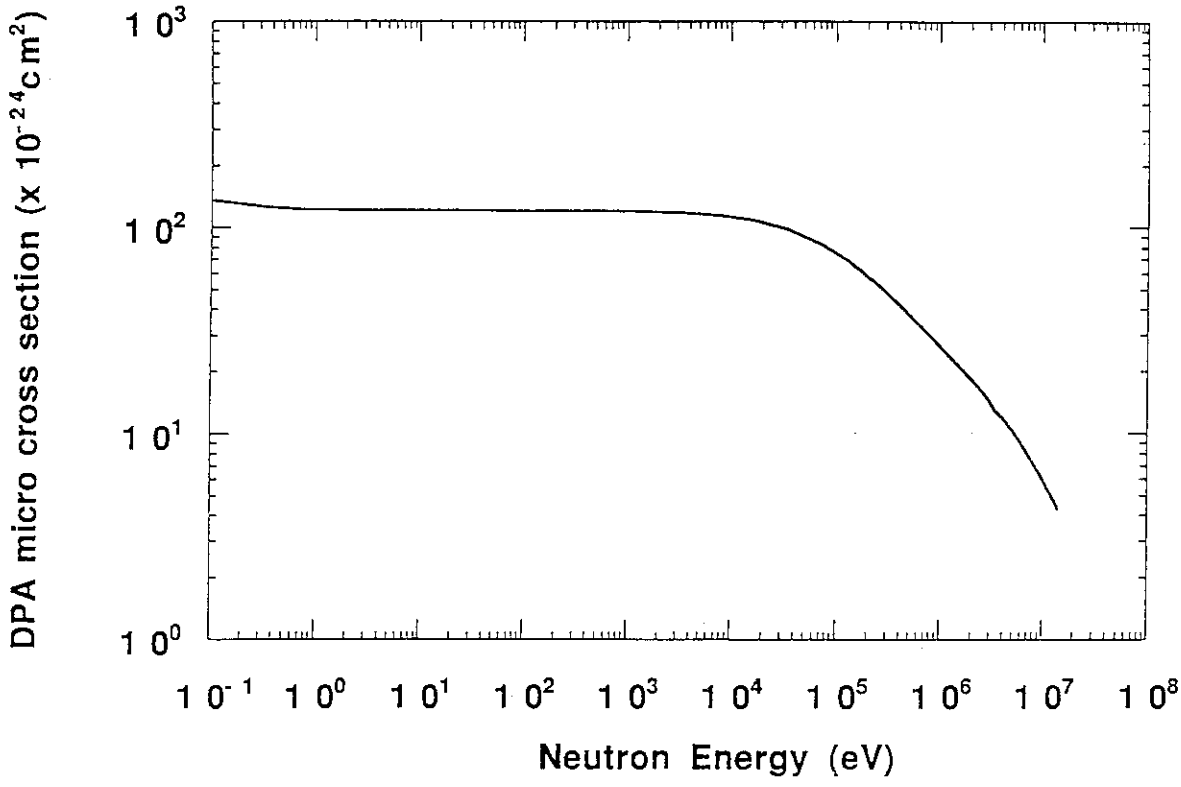

Fig. 3.1 H DPA cross section (FUSION-40)

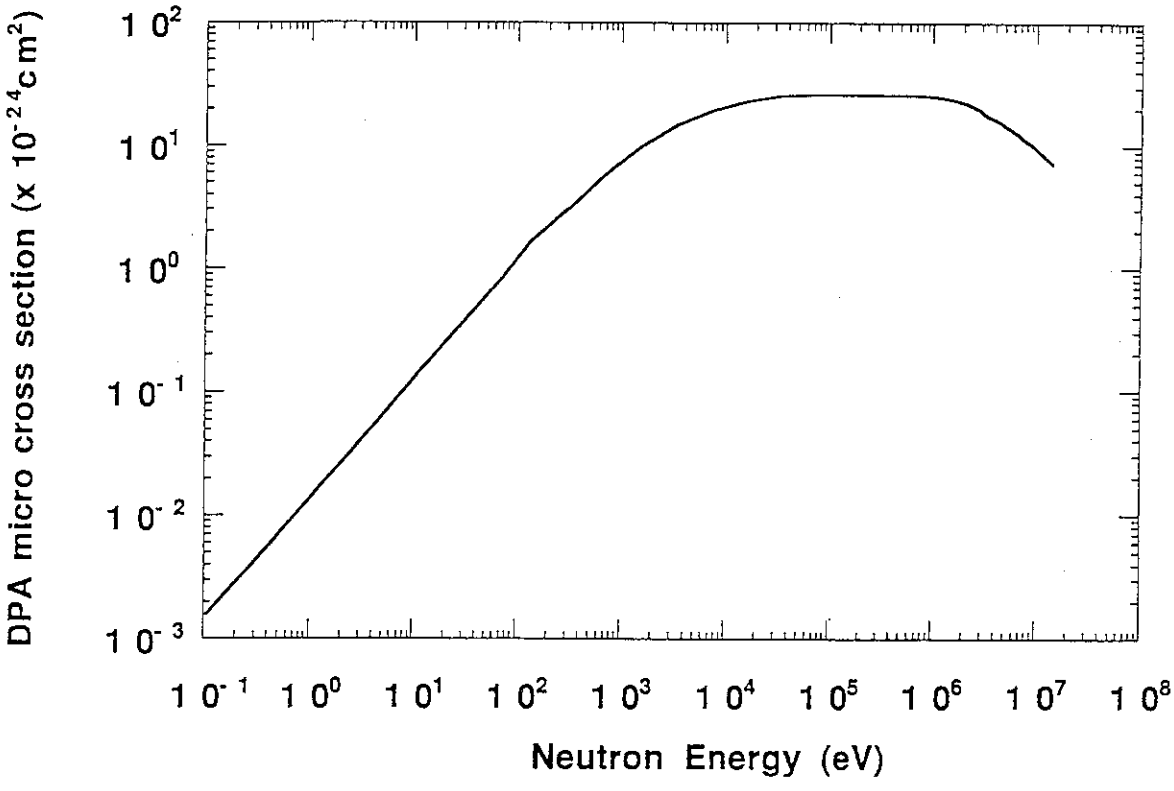

Fig. 3.2 D DPA cross section (FUSION-40)

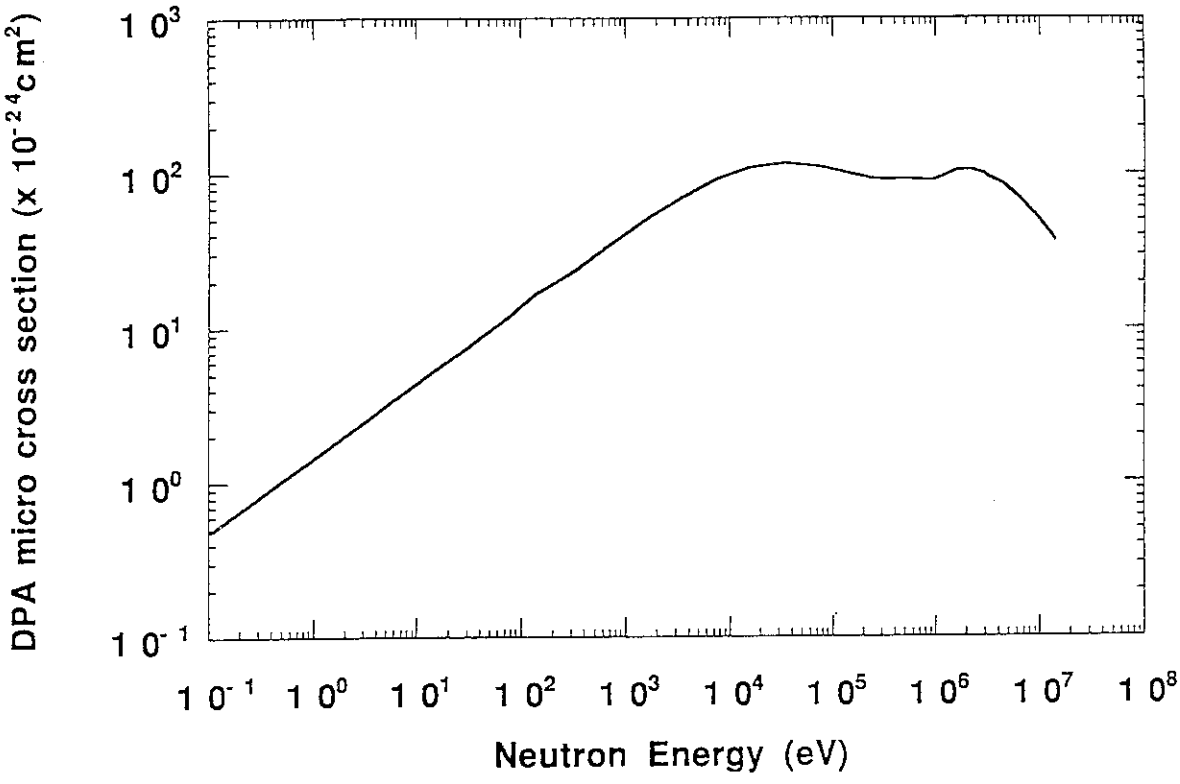

Fig. 3.3 He-3 DPA cross section (FUSION-40)

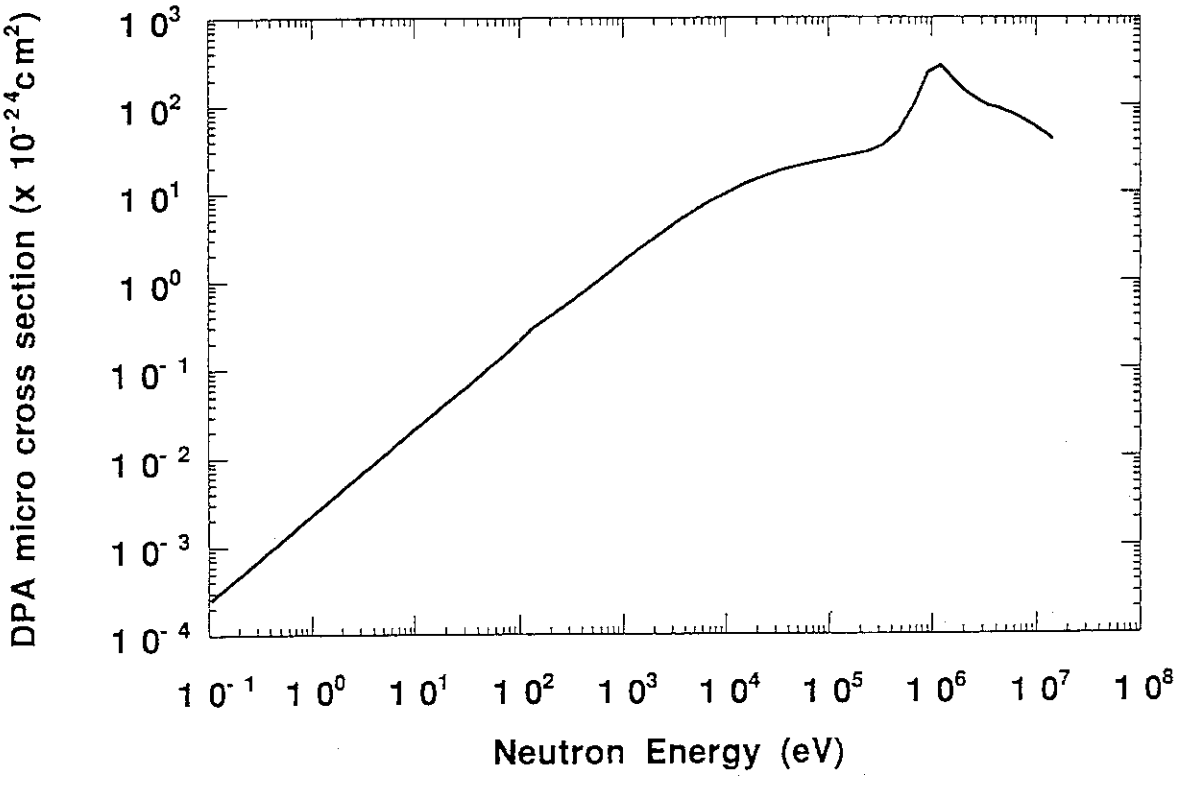

Fig. 3.4 He-4 DPA cross section (FUSION-40)

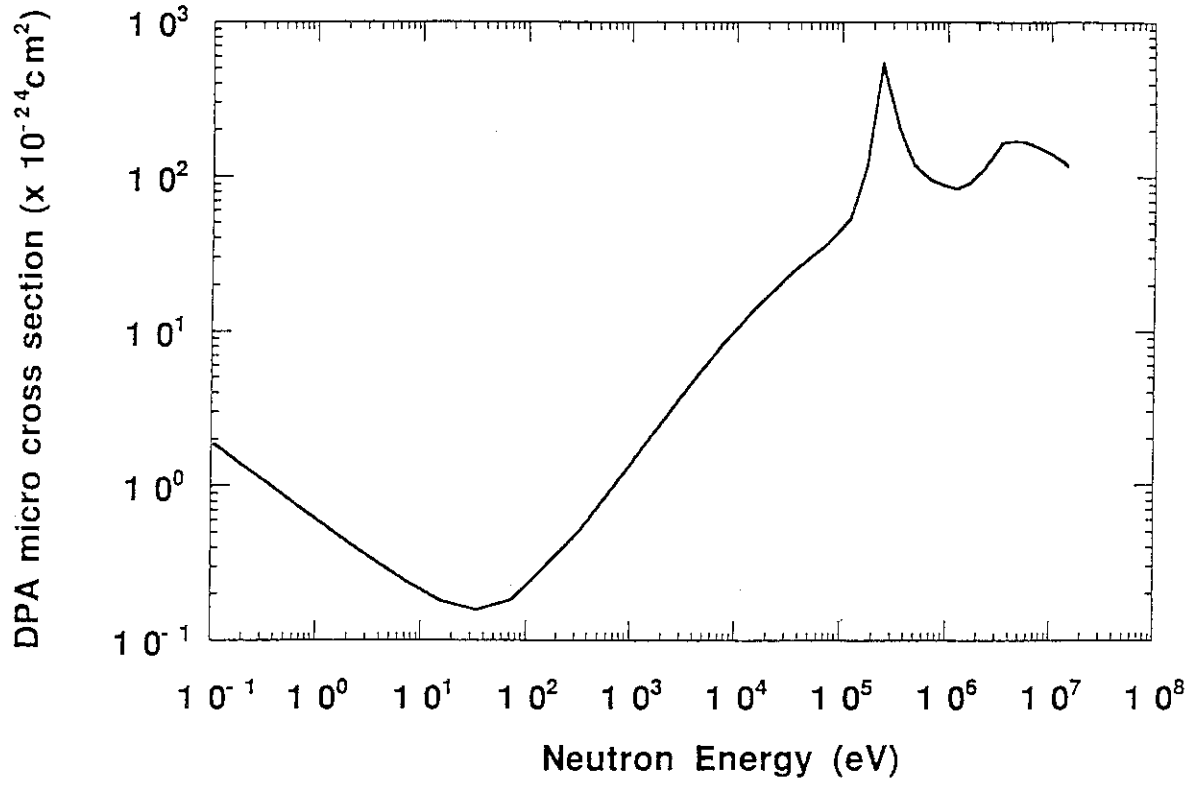

Fig. 3.5 Li-6 DPA cross section (FUSION-40)

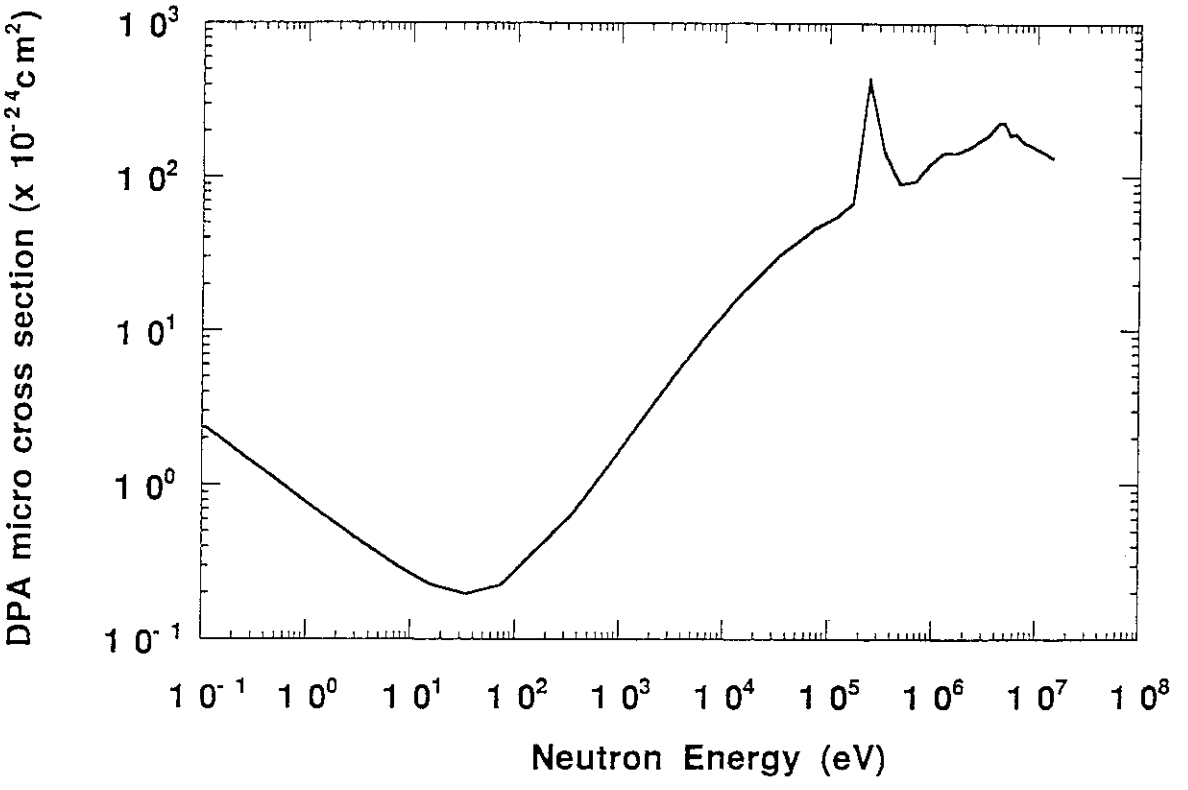

Fig. 3.6 Li-7 DPA cross section (FUSION-40)

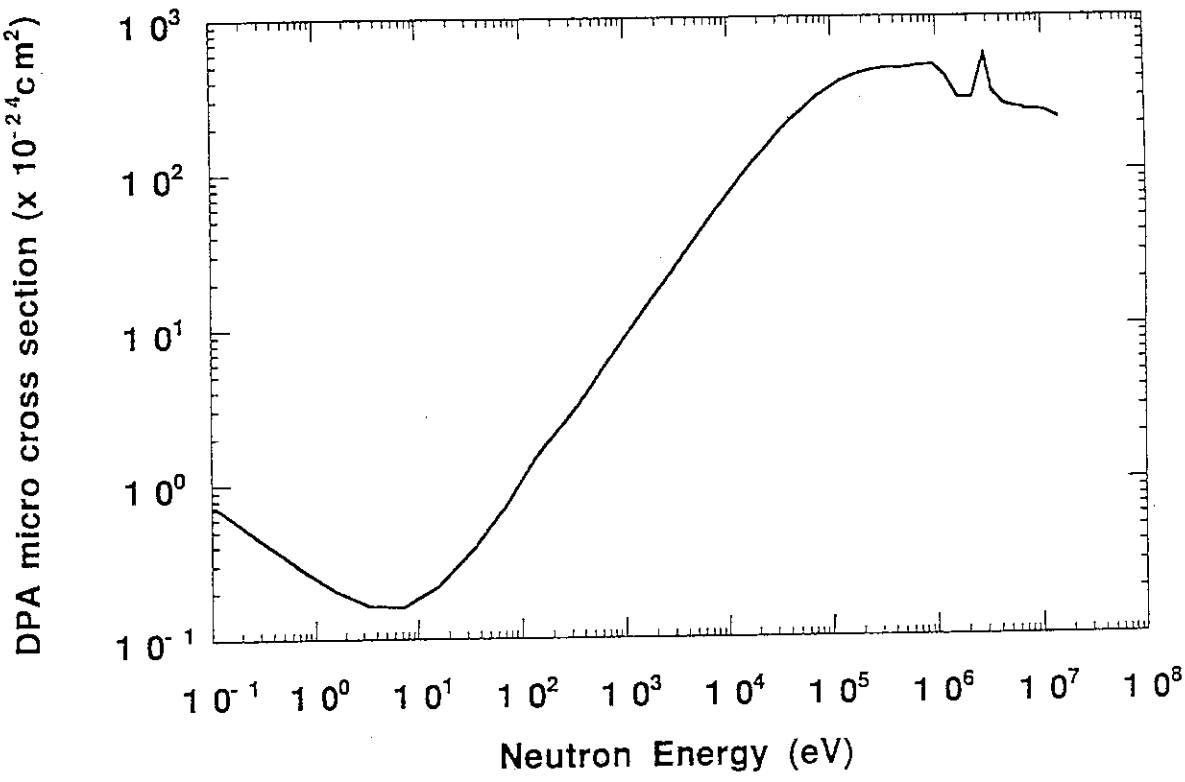

Fig. 3.7 Be DPA cross section (FUSION-40)

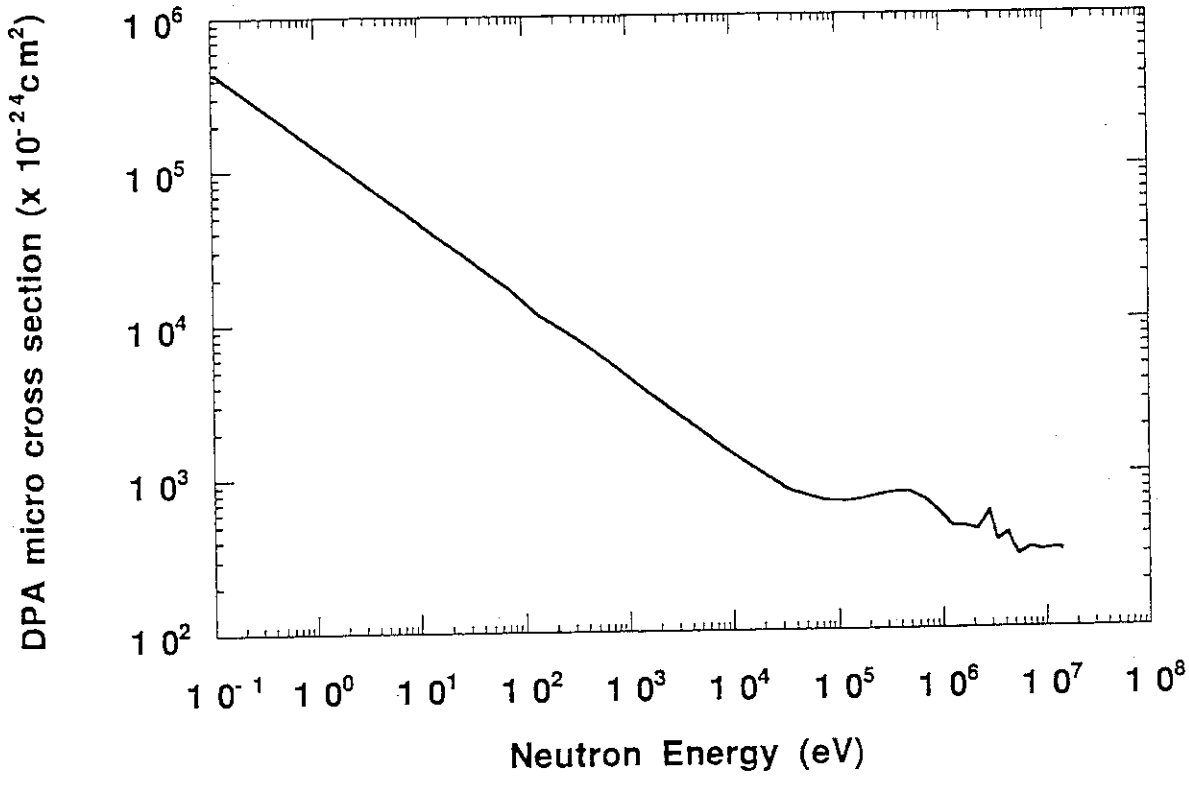

Fig. 3.8 B-10 DPA cross section (FUSION-40)

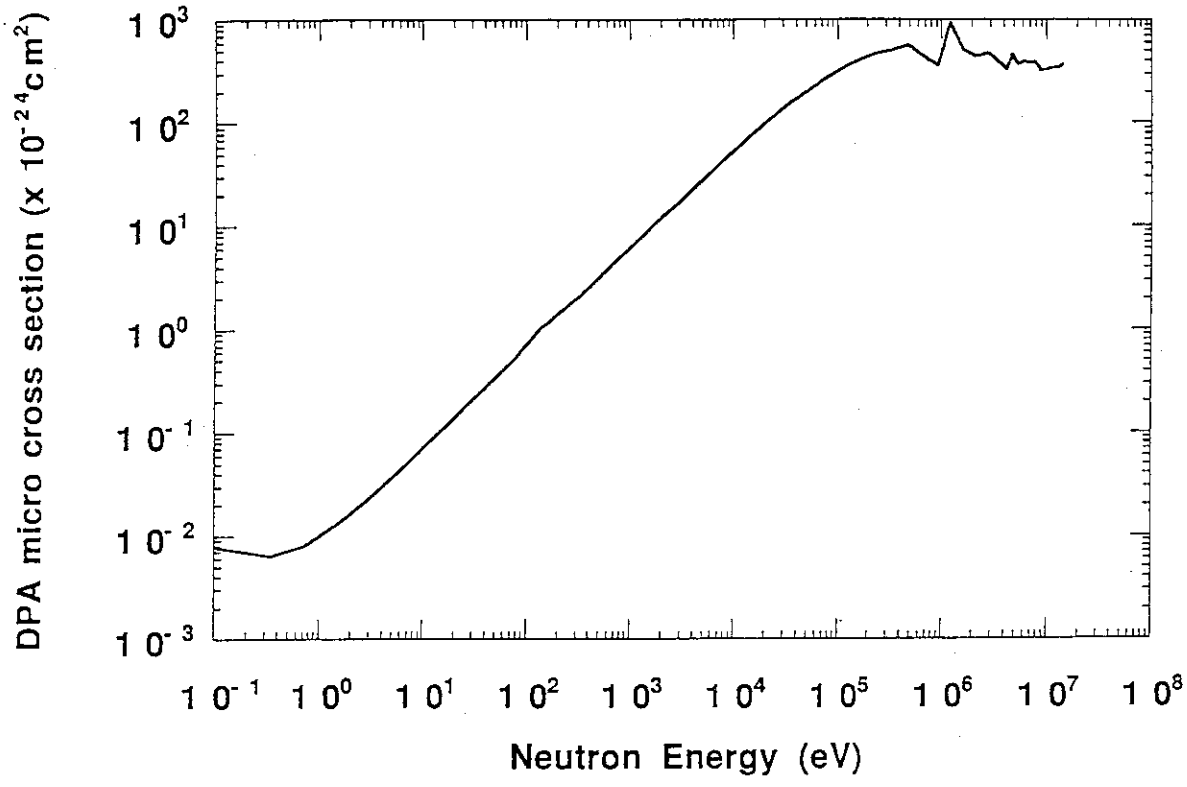

Fig. 3.9 B-11 DPA cross section (FUSION-40)

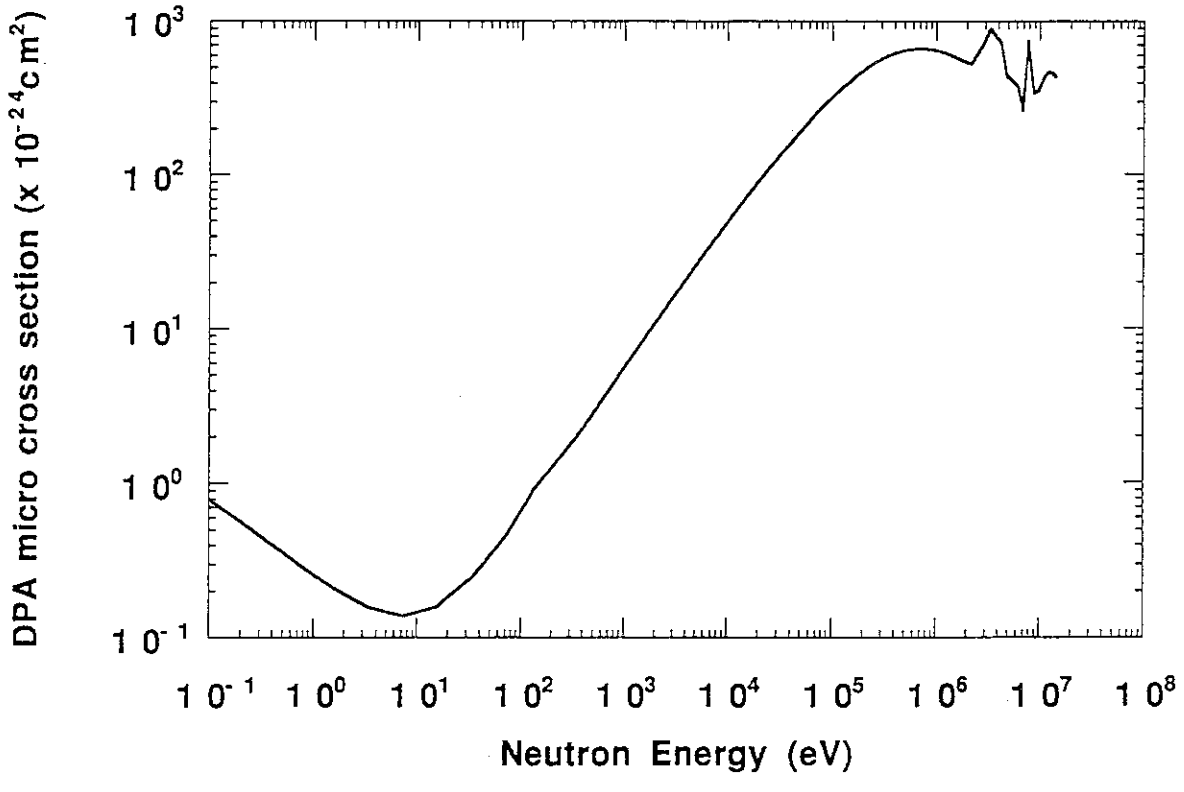

Fig. 3.10 C DPA cross section (FUSION-40)

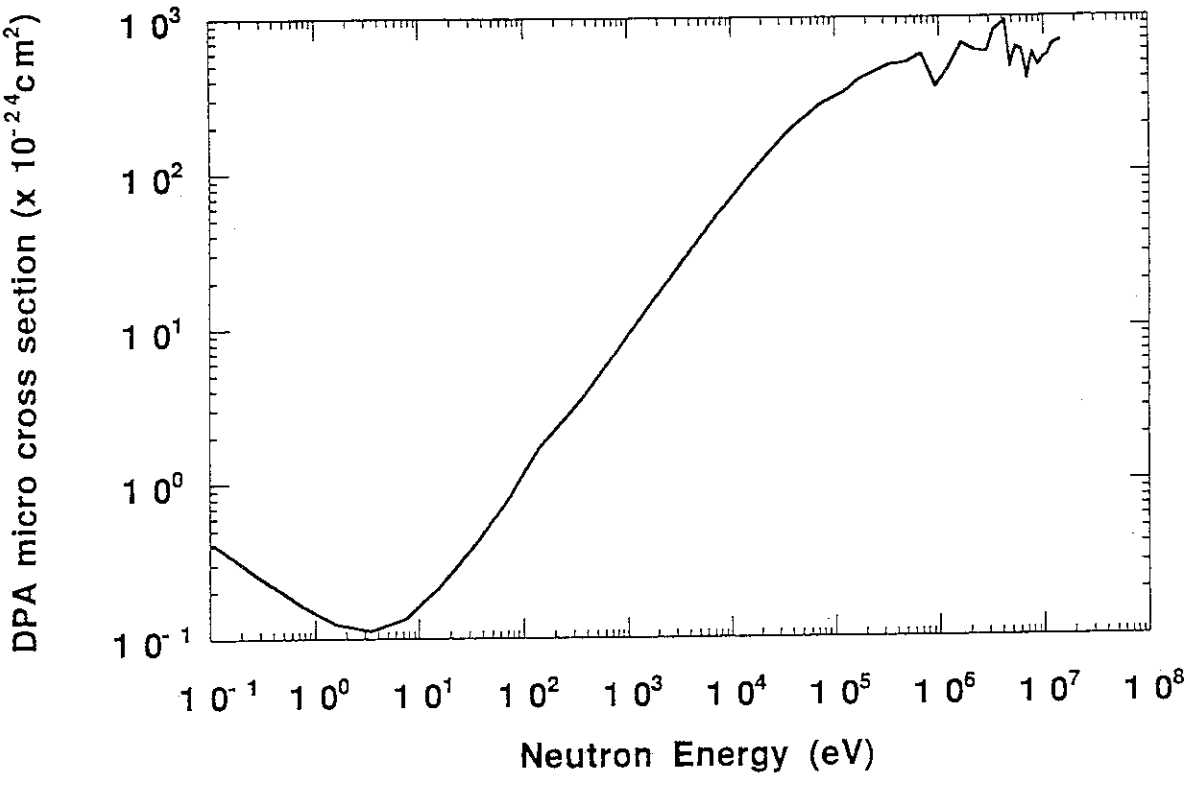

Fig. 3.11 N DPA cross section (FUSION-40)

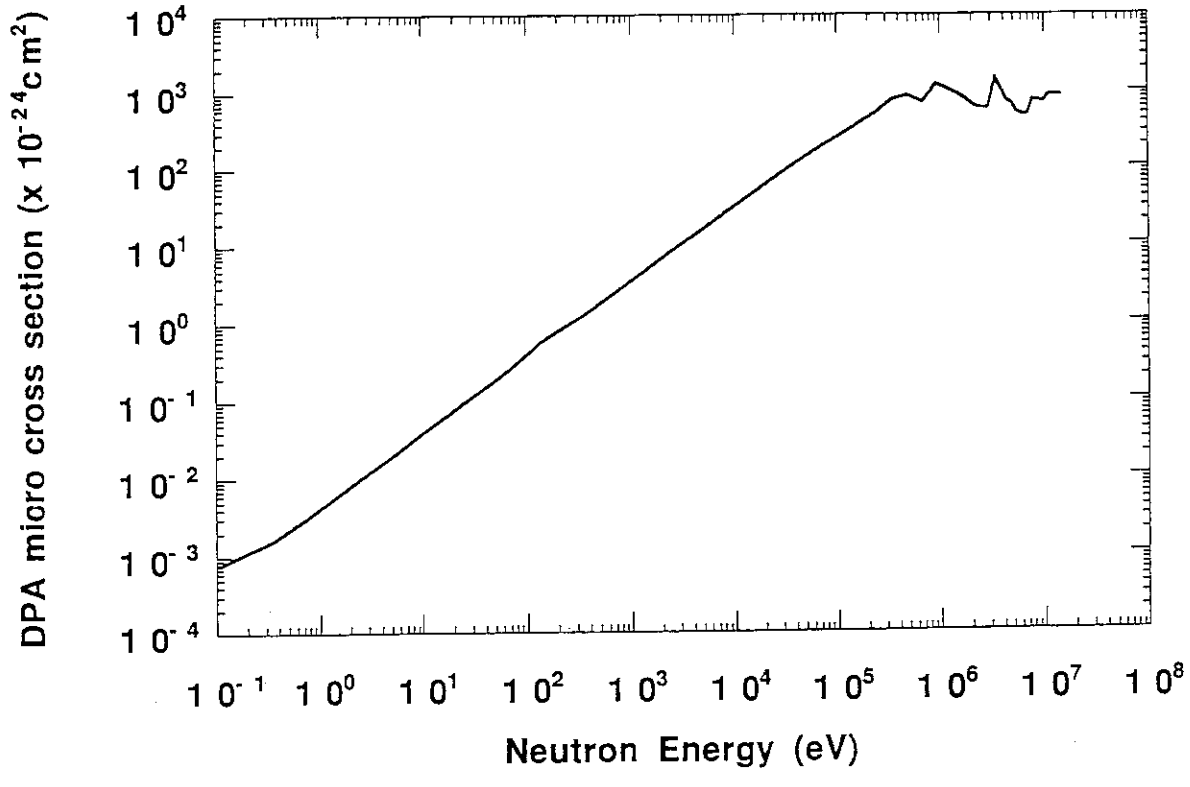

Fig. 3.12 O DPA cross section (FUSION-40)

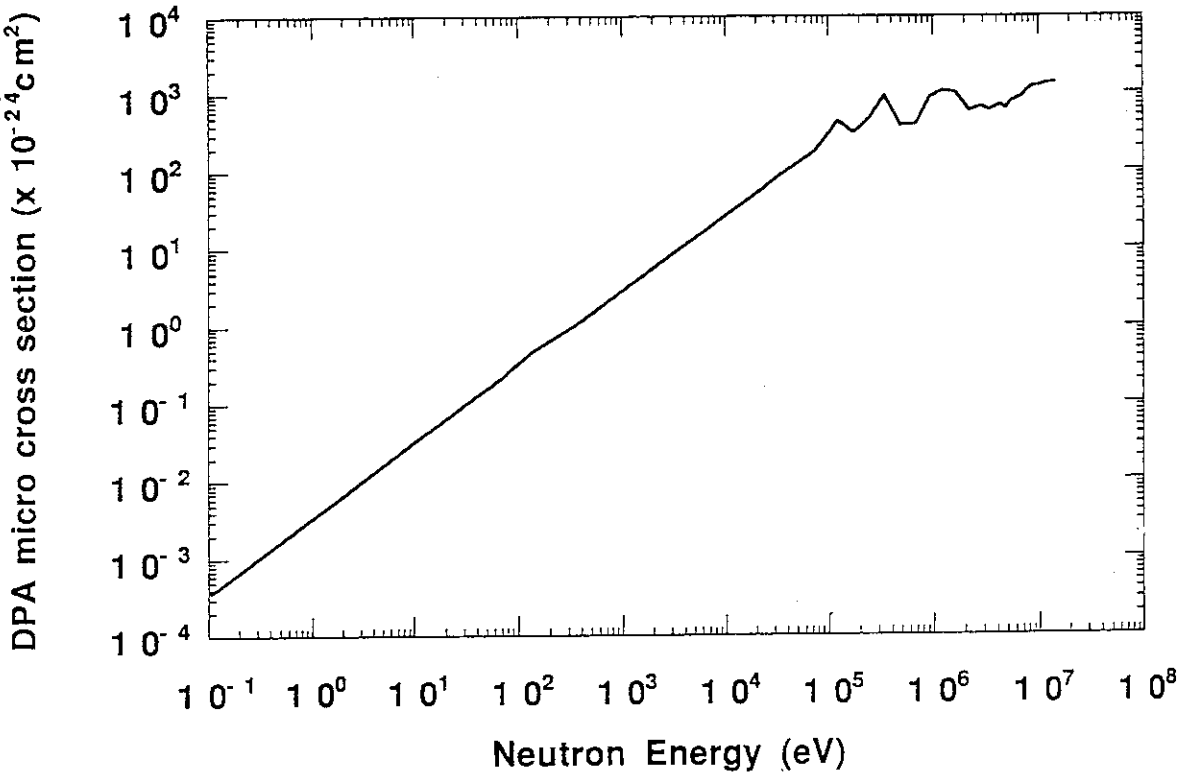

Fig. 3.13 F DPA cross section (FUSION-40)

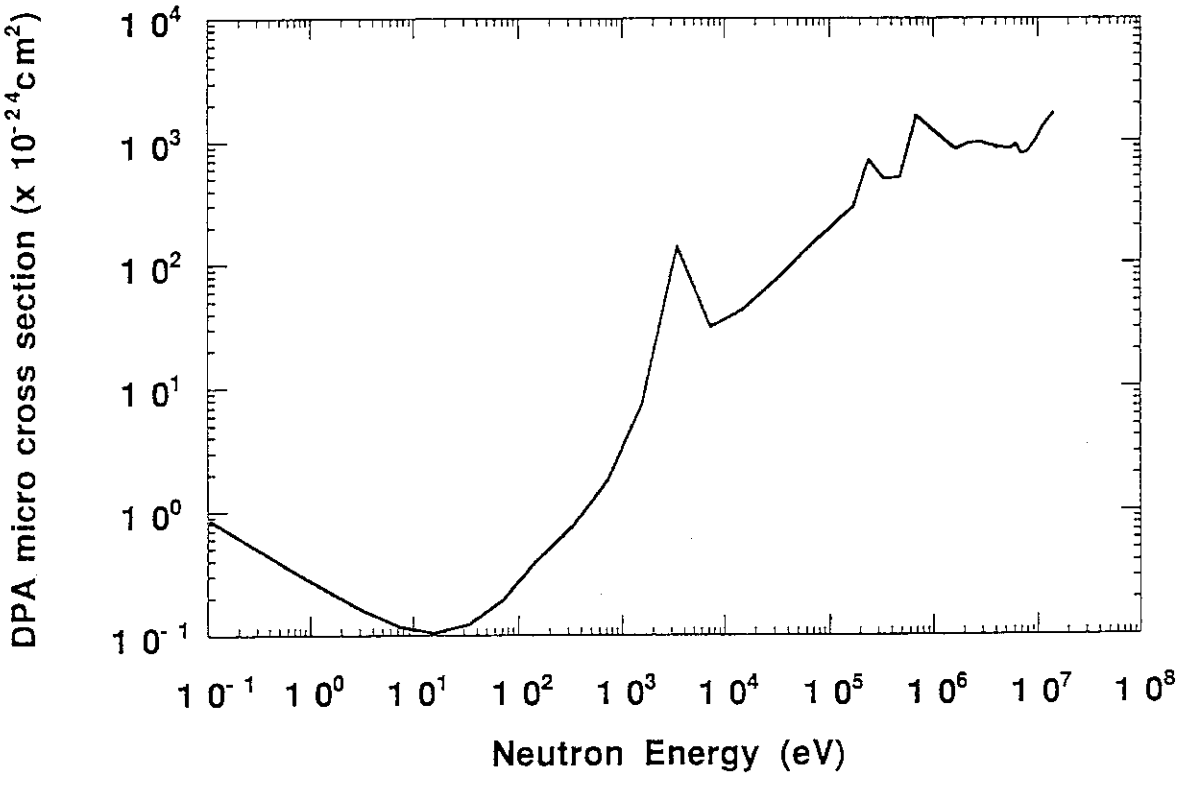

Fig. 3.14 Na DPA cross section (FUSION-40)

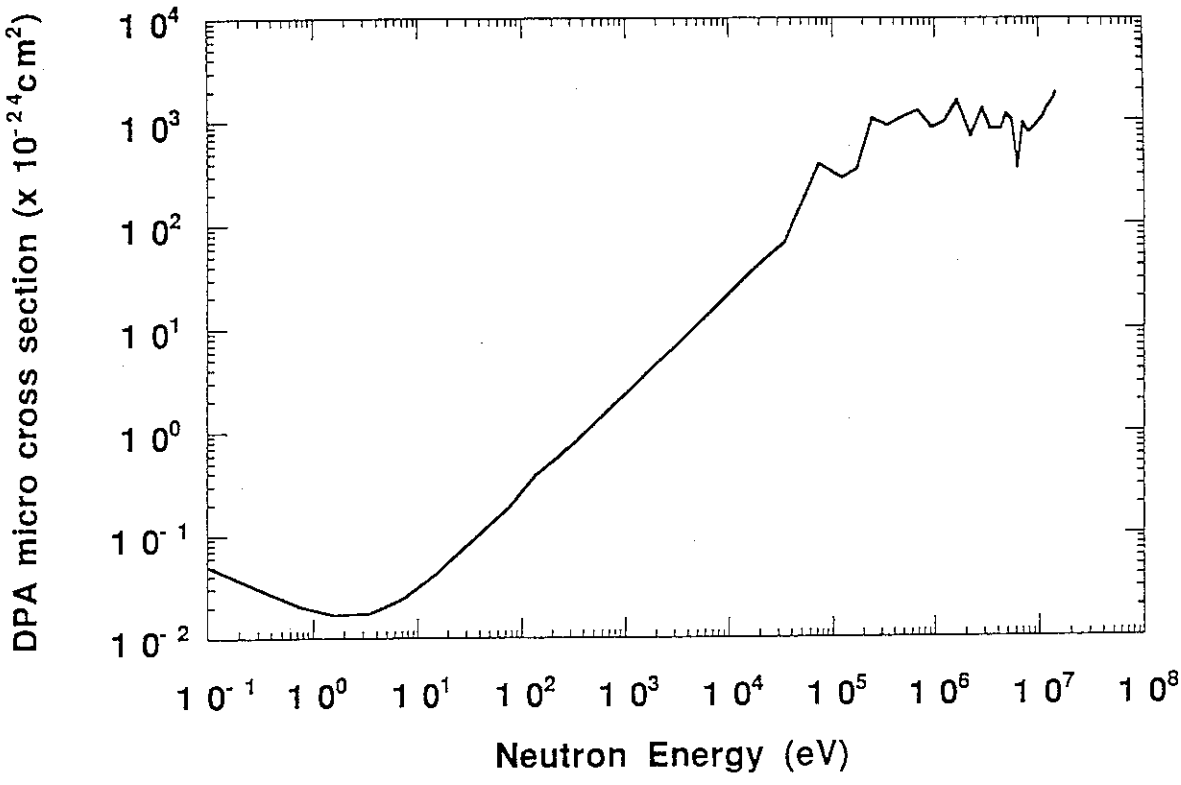

Fig. 3.15 Mg DPA cross section (FUSION-40)

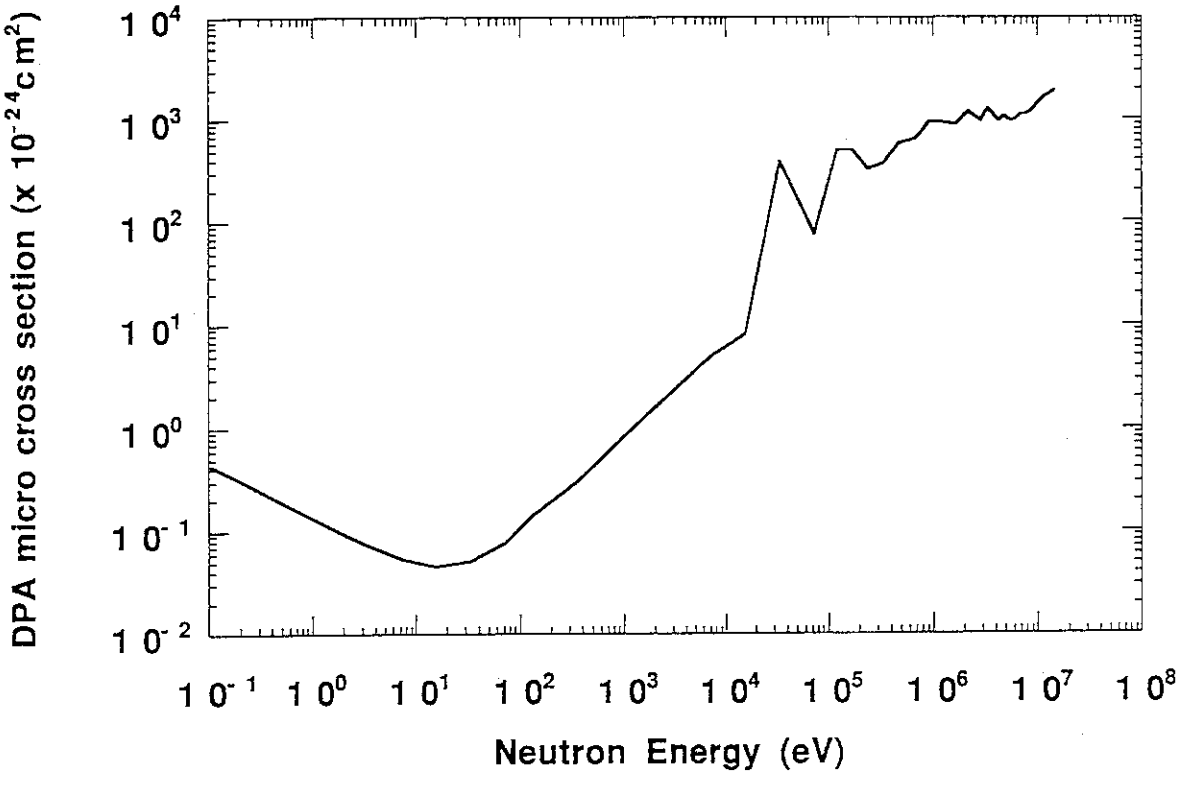

Fig. 3.16 Al DPA cross section (FUSION-40)

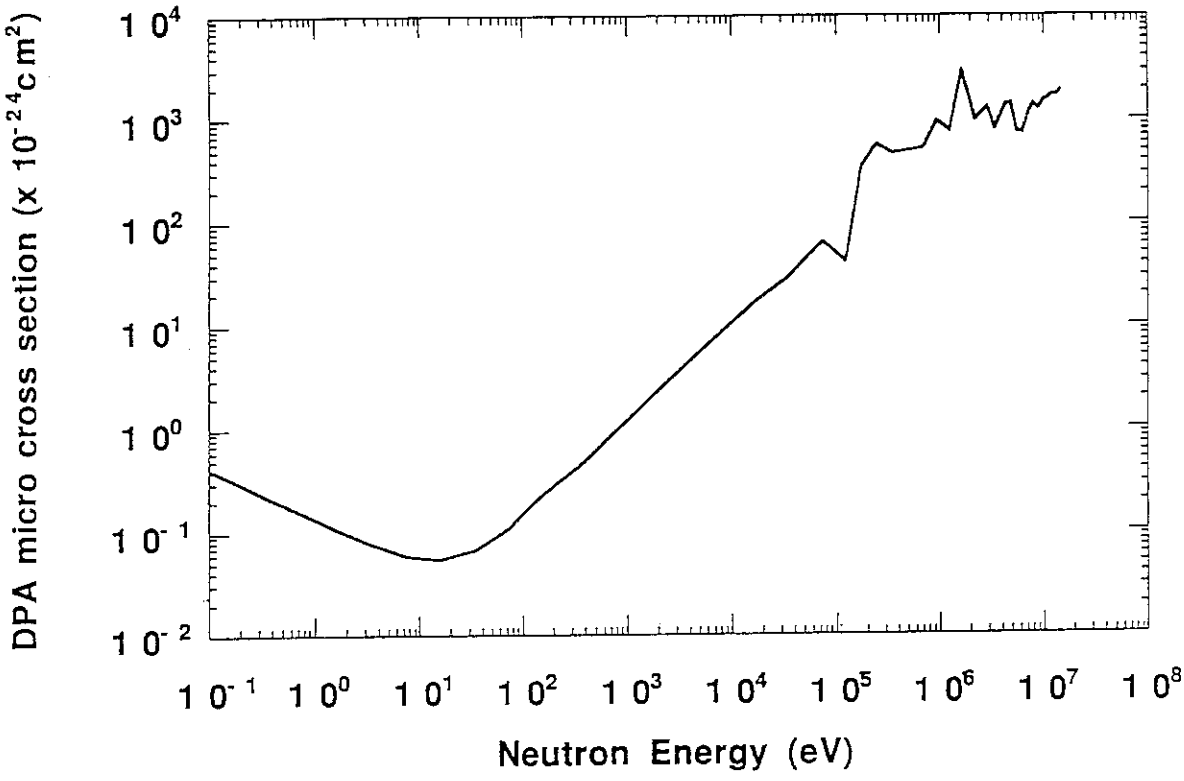

Fig. 3.17 Si DPA cross section (FUSION-40)

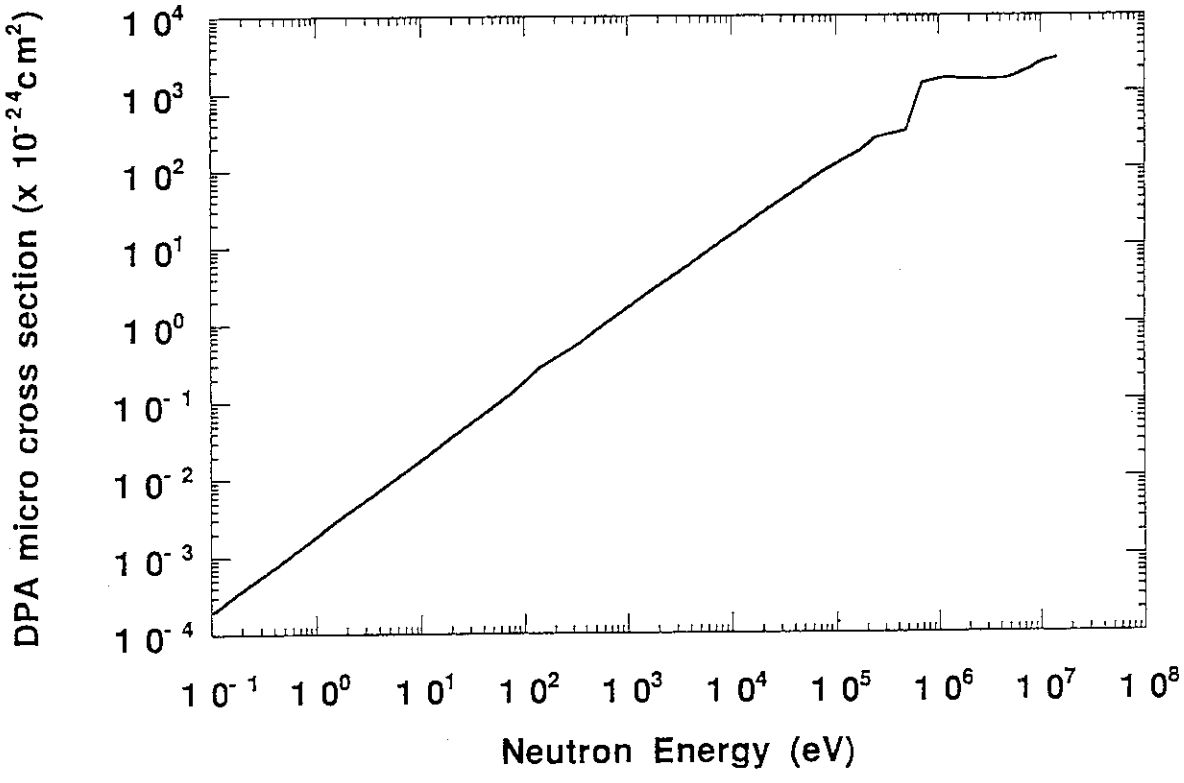

Fig. 3.18 P DPA cross section (FUSION-40)

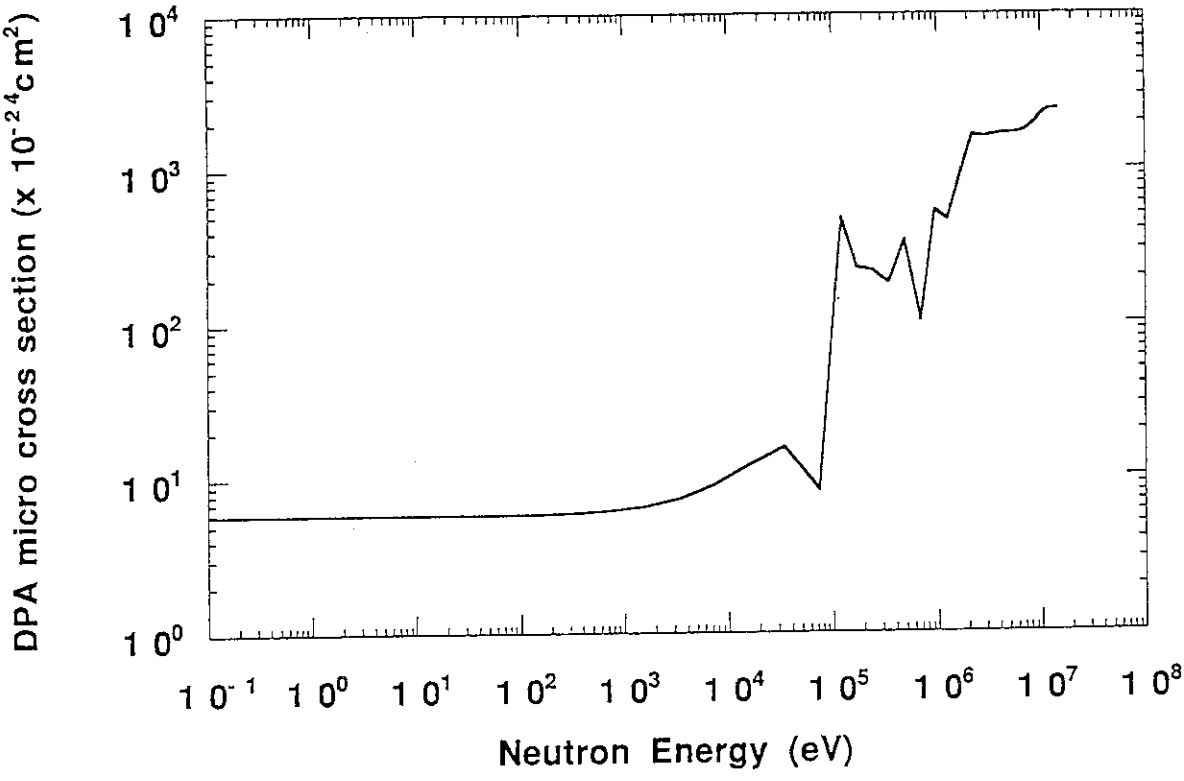

Fig. 3.19 S DPA cross section (FUSION-40)

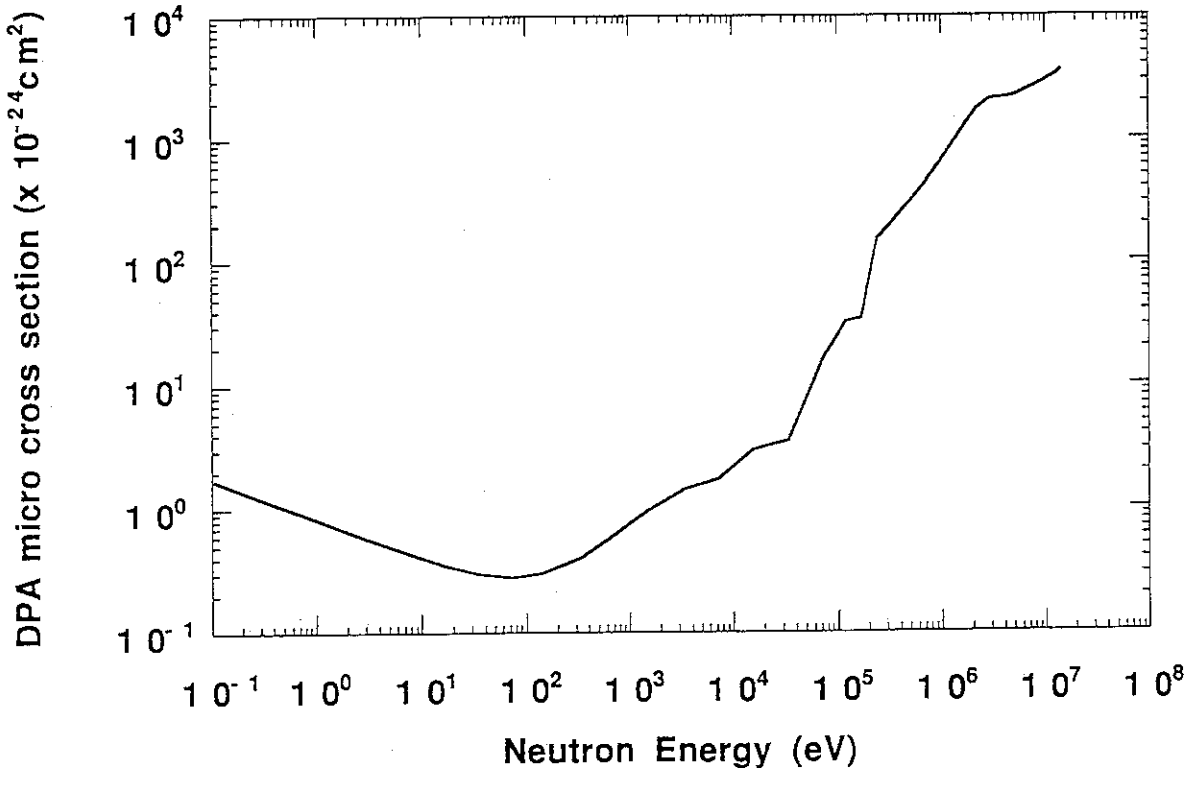

Fig. 3.20 K DPA cross section (FUSION-40)

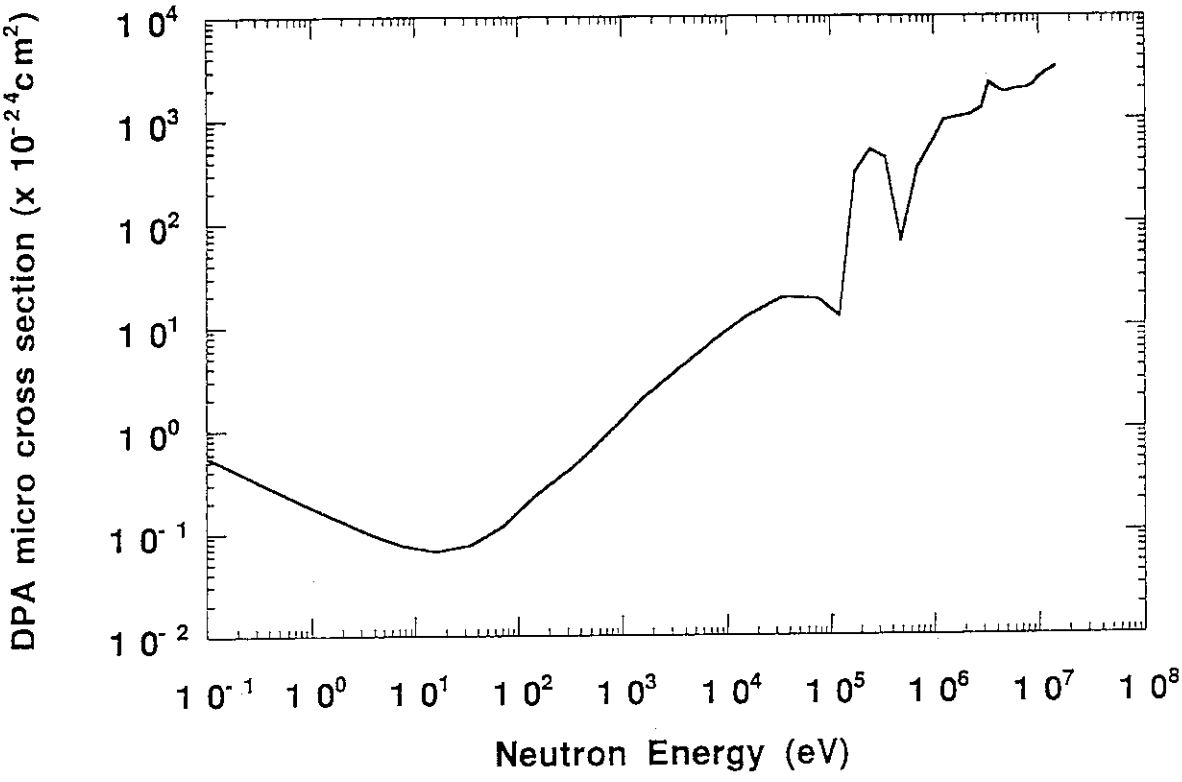

Fig. 3.21 Ca DPA cross section (FUSION-40)

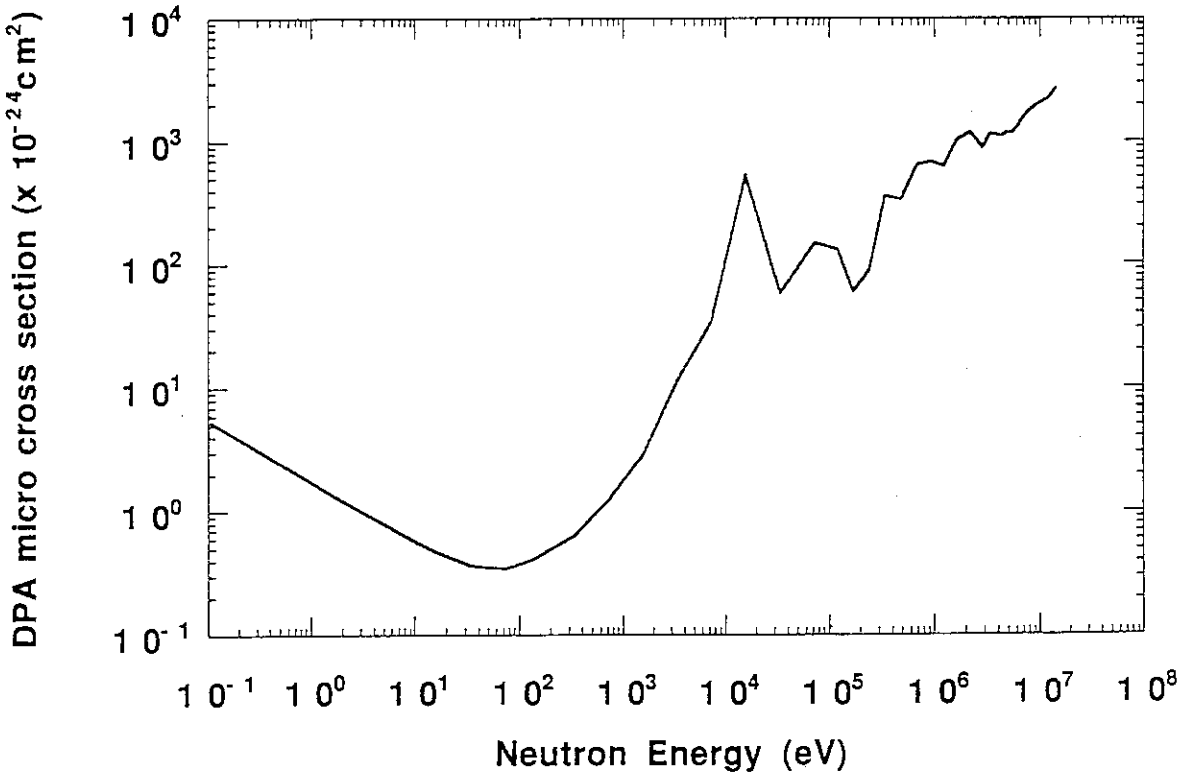

Fig. 3.22 Ti DPA cross section (FUSION-40)

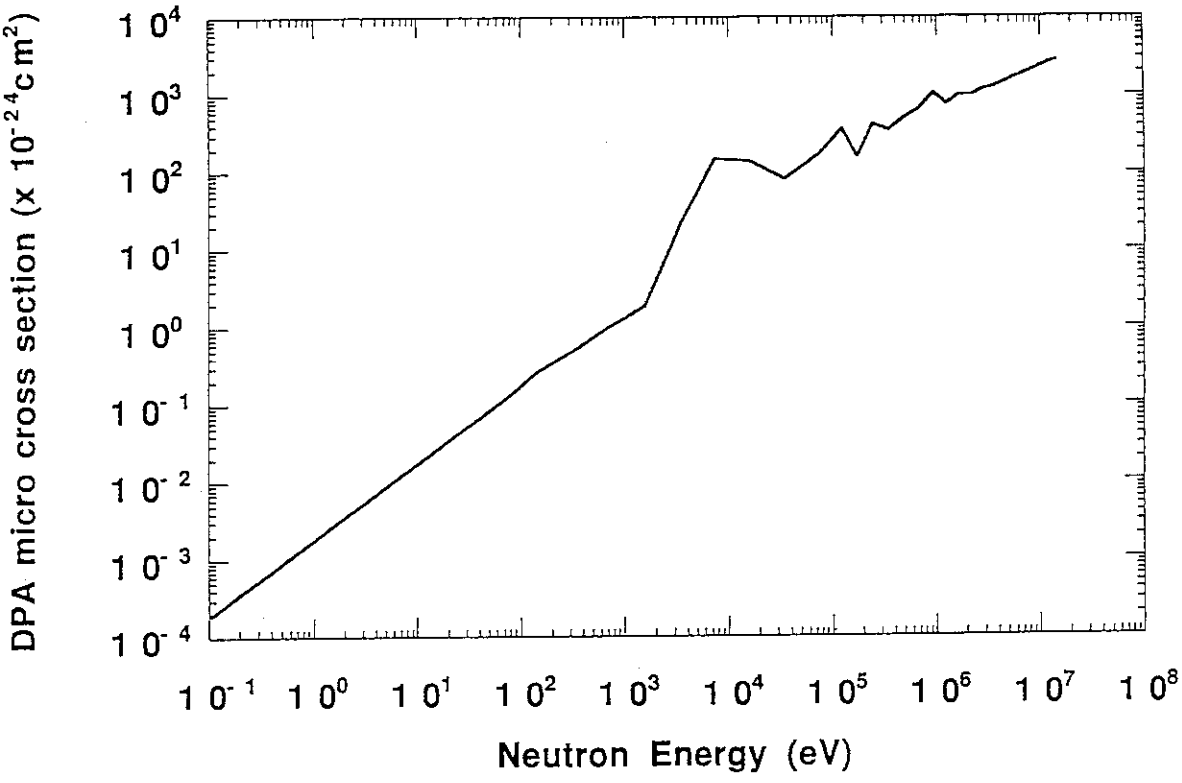

Fig. 3.23 V DPA cross section (FUSION-40)

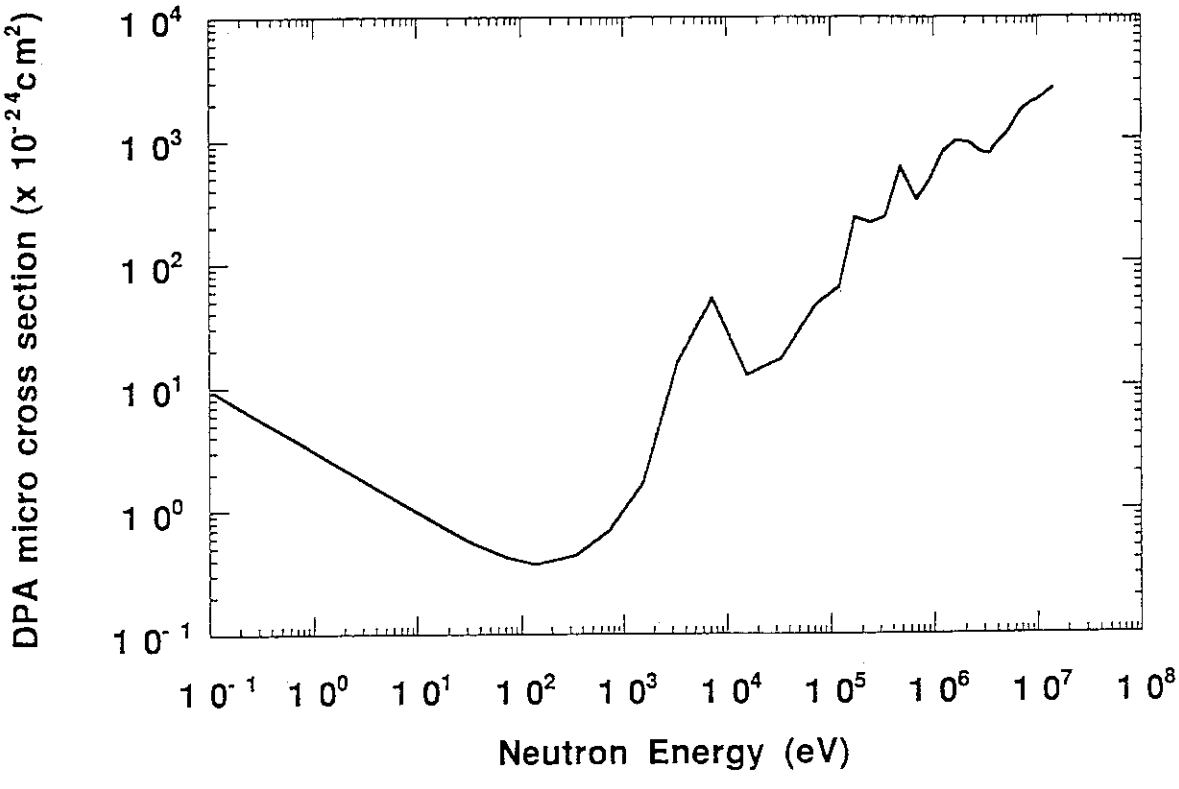

Fig. 3.24 Cr DPA cross section (FUSION-40)

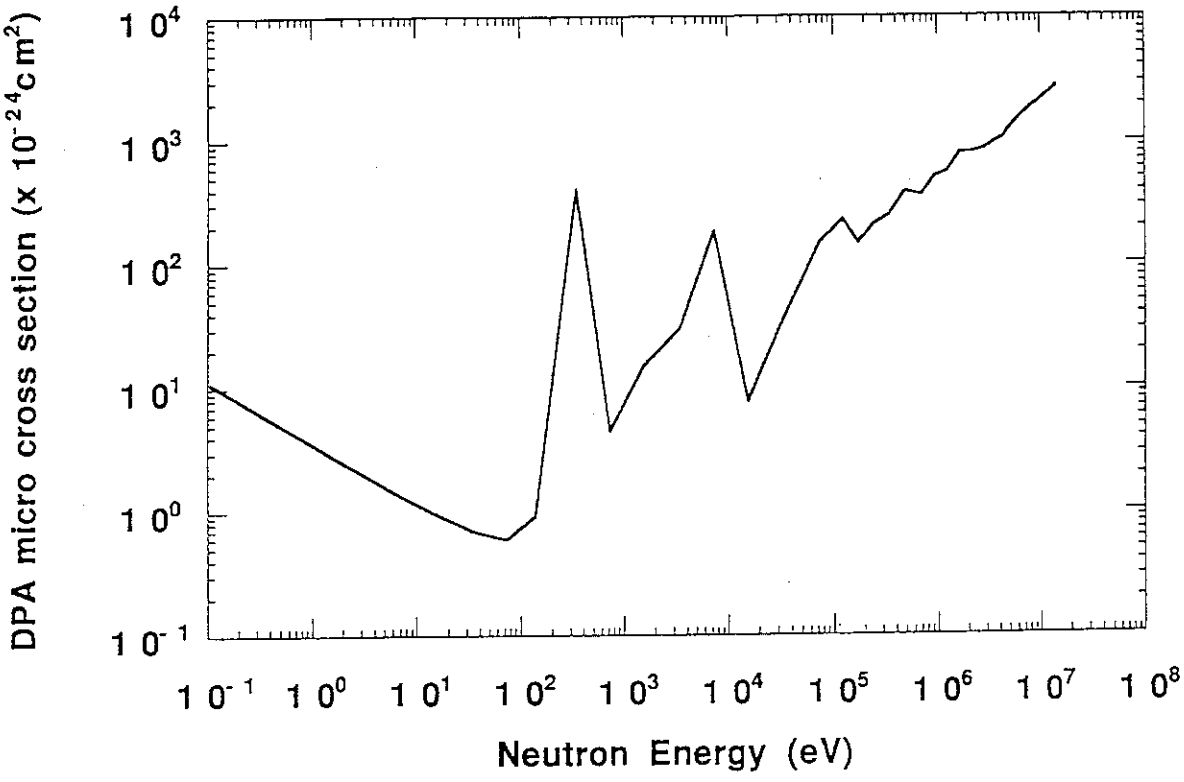

Fig. 3.25 Mn DPA cross section (FUSION-40)

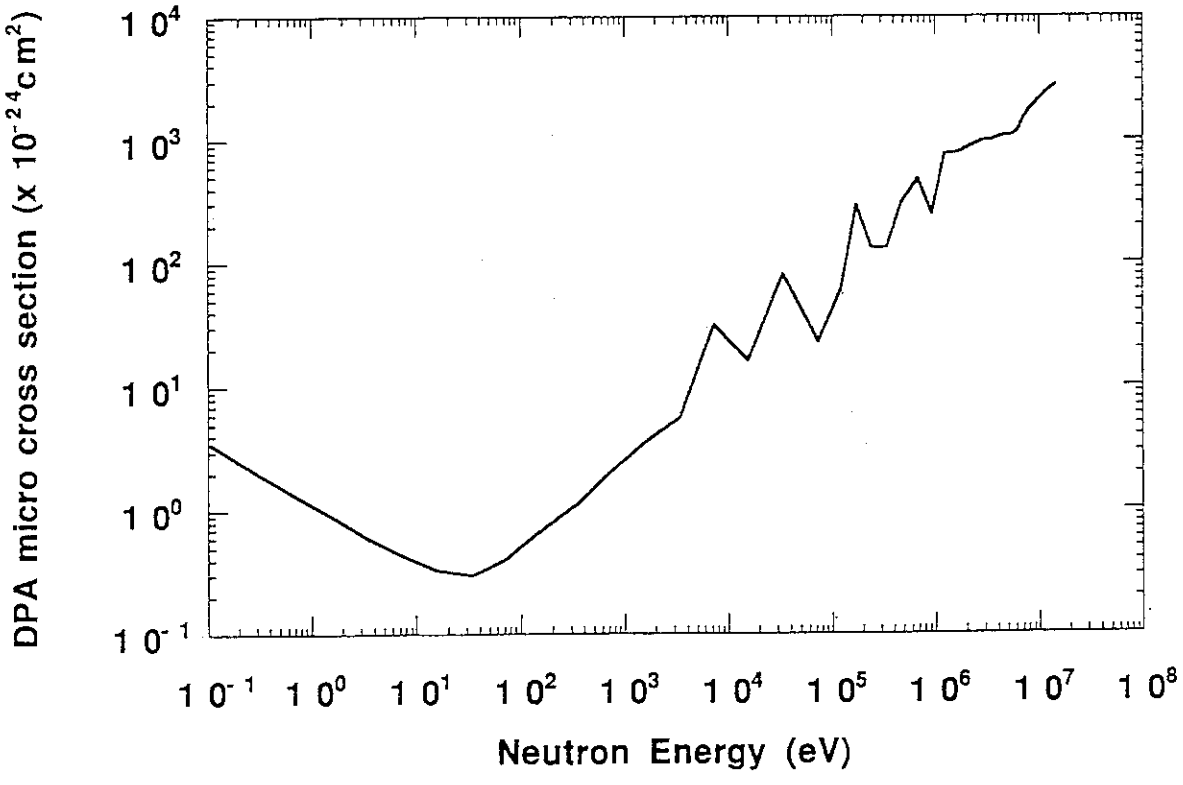

Fig. 3.26 Fe DPA cross section (FUSION-40)

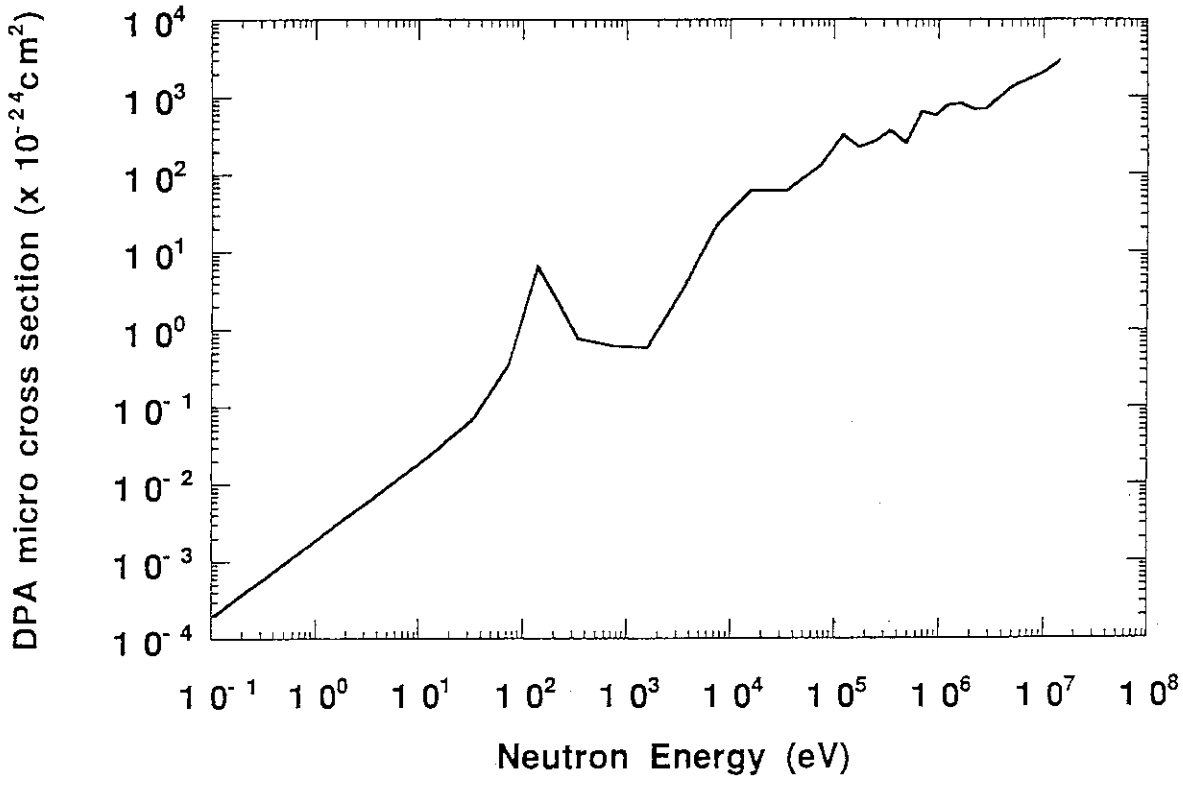

Fig. 3.27 Co DPA cross section (FUSION-40)

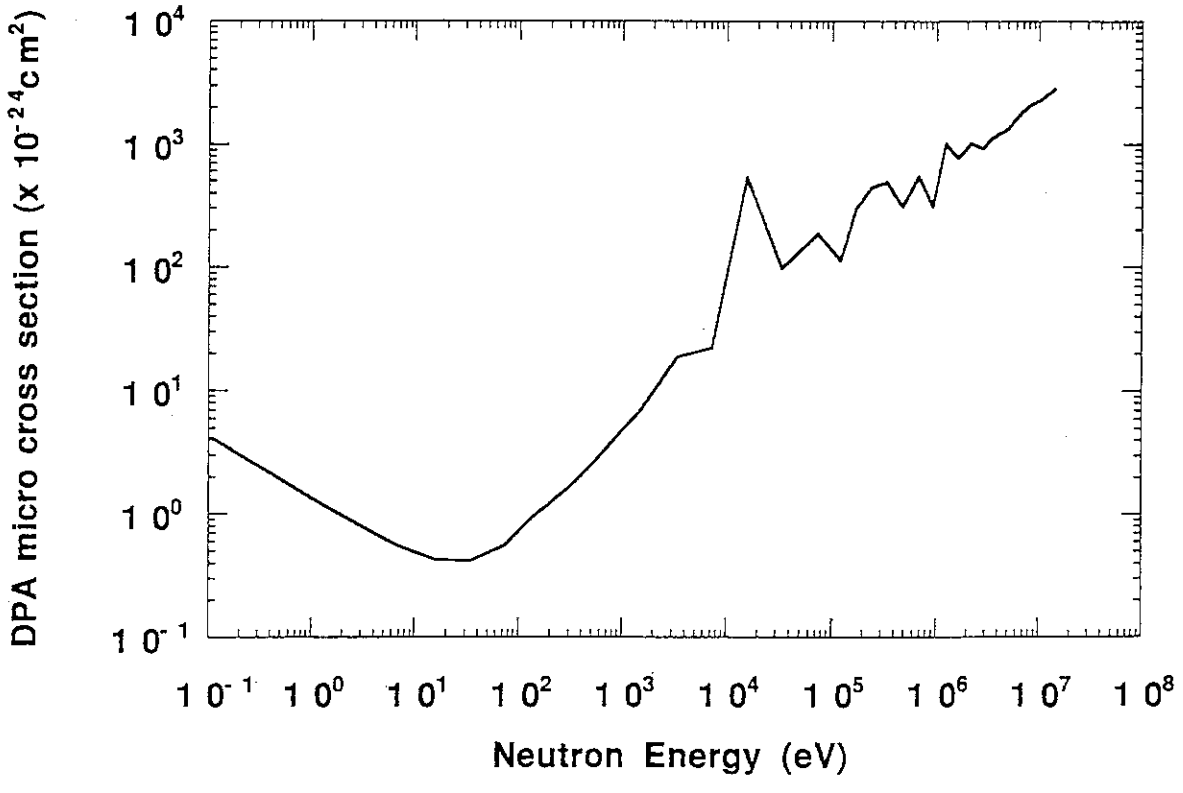

Fig. 3.28 Ni DPA cross section (FUSION-40)

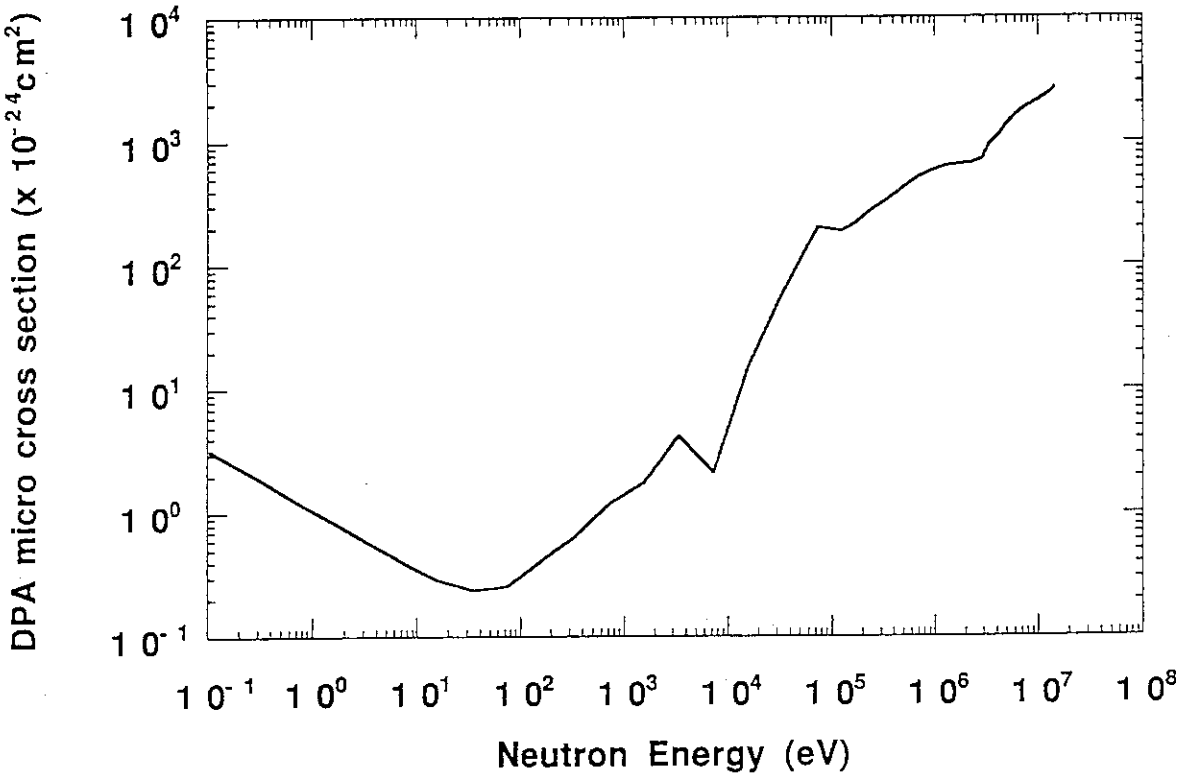

Fig. 3.29 Cu DPA cross section (FUSION-40)

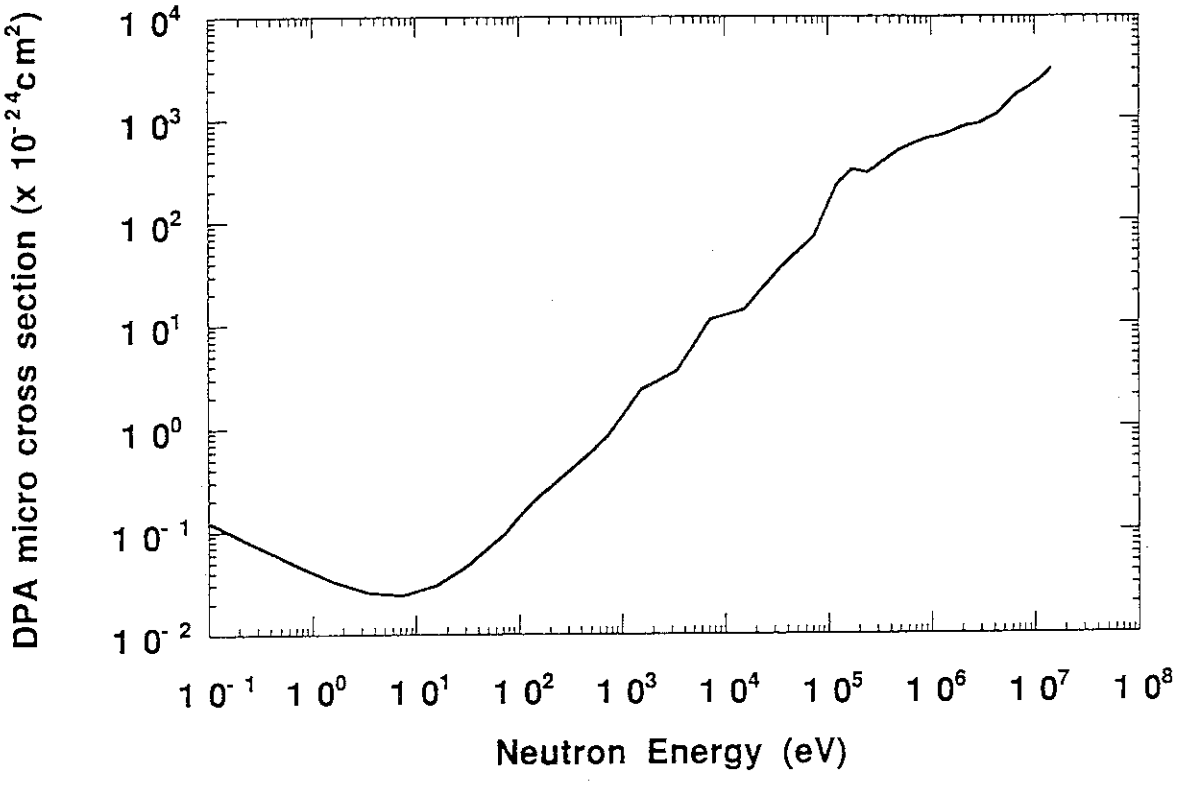

Fig. 3.30 Zr DPA cross section (FUSION-40)

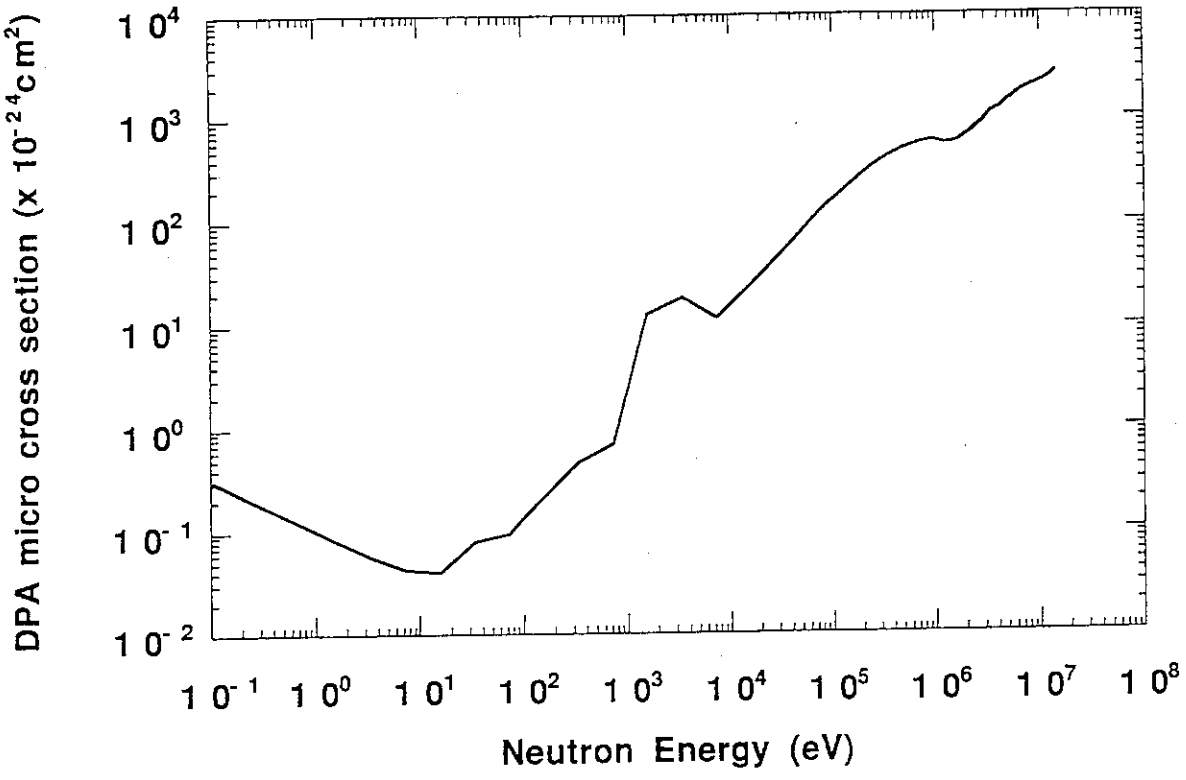

Fig. 3.31 Nb DPA cross section (FUSION-40)

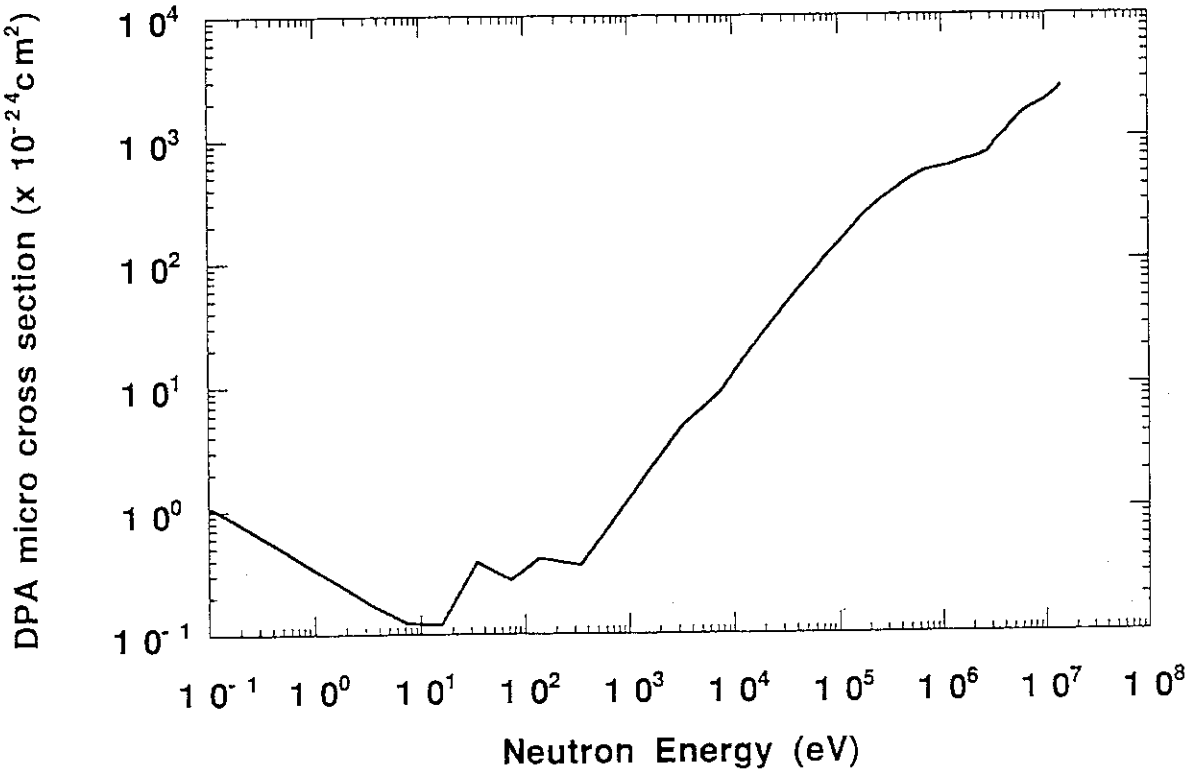

Fig. 3.32 Mo DPA cross section (FUSION-40)

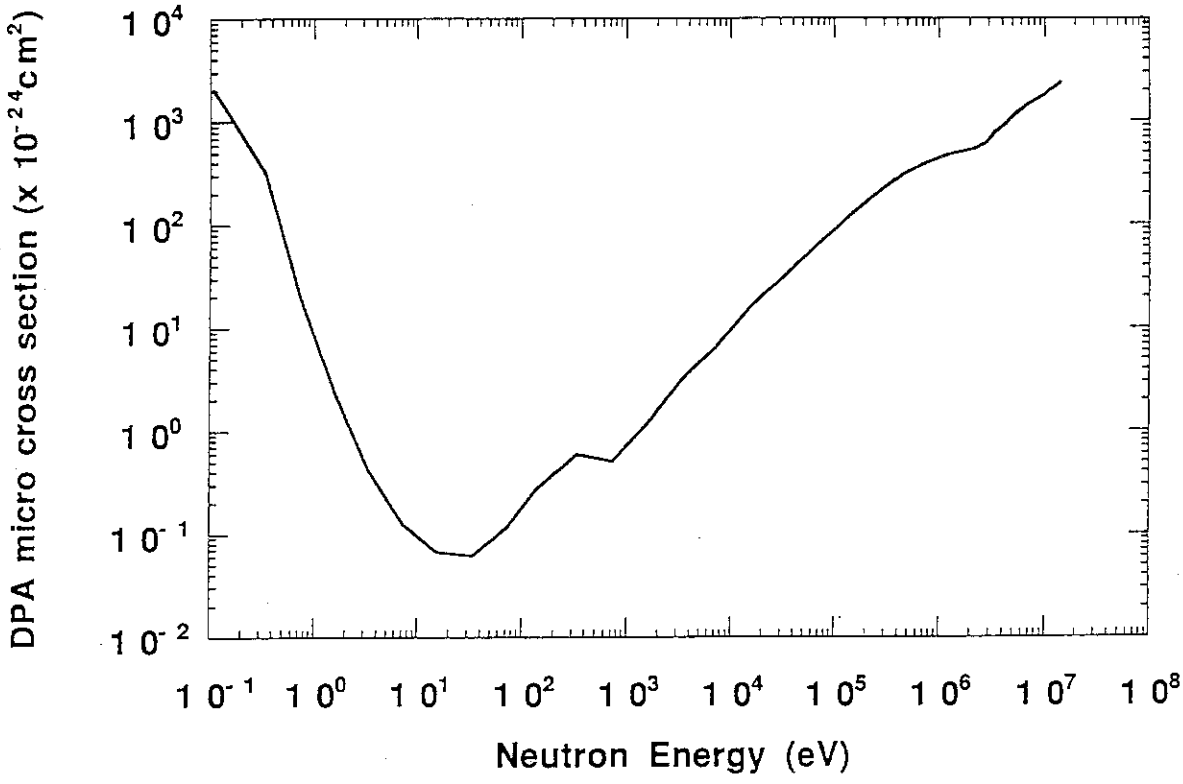

Fig. 3.33 Cd DPA cross section (FUSION-40)

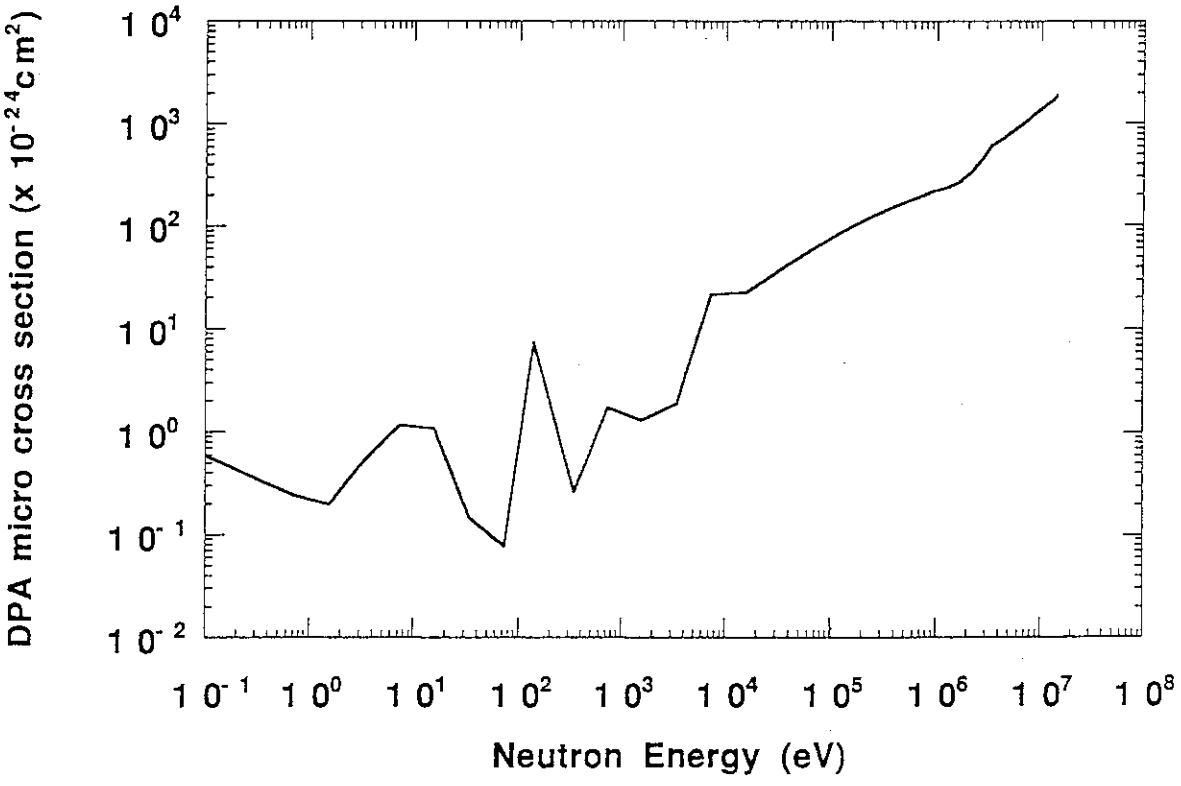

Fig. 3.34 W DPA cross section (FUSION-40)

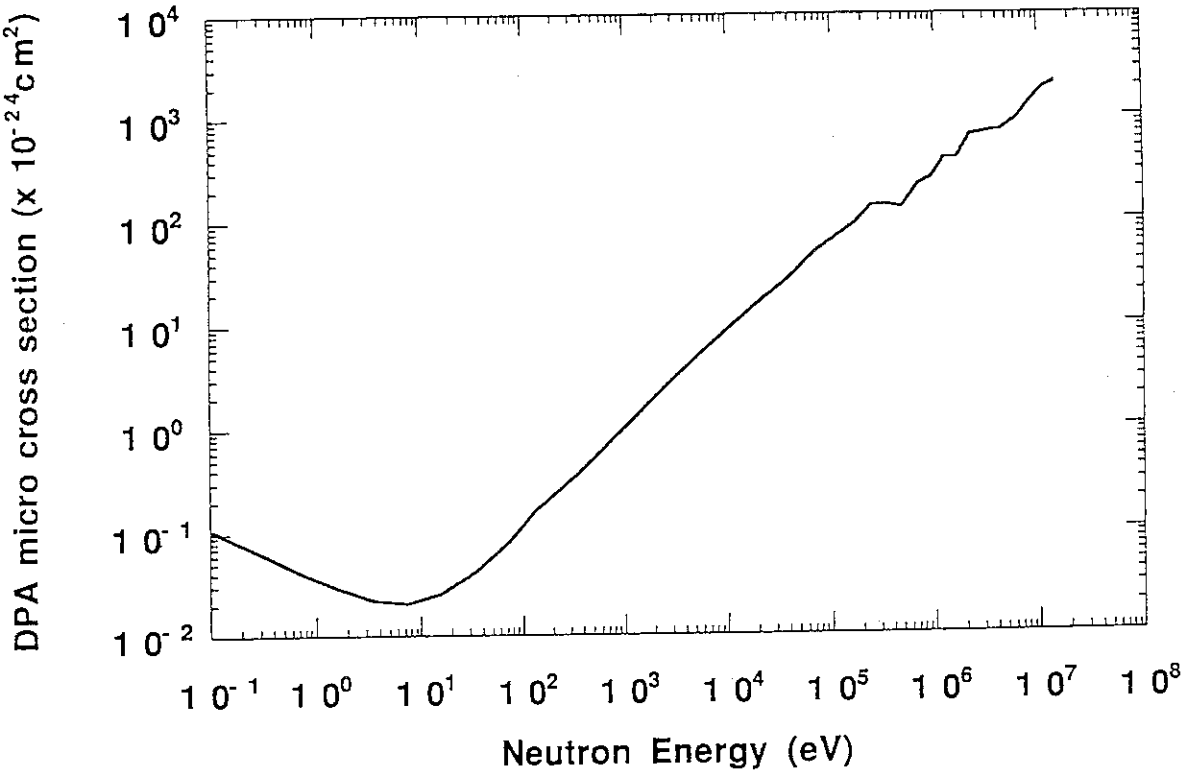

Fig. 3.35 Pb DPA cross section (FUSION-40)

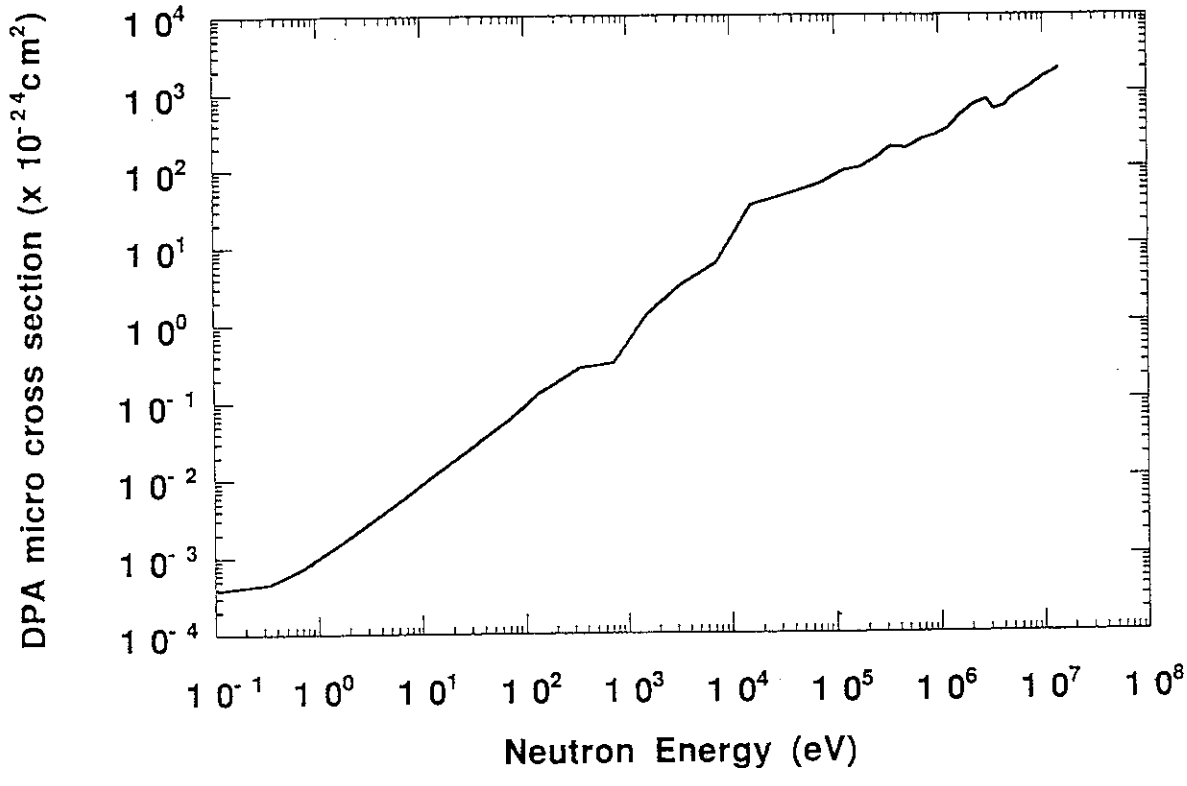

Fig. 3.36 Bi DPA cross section (FUSION-40)

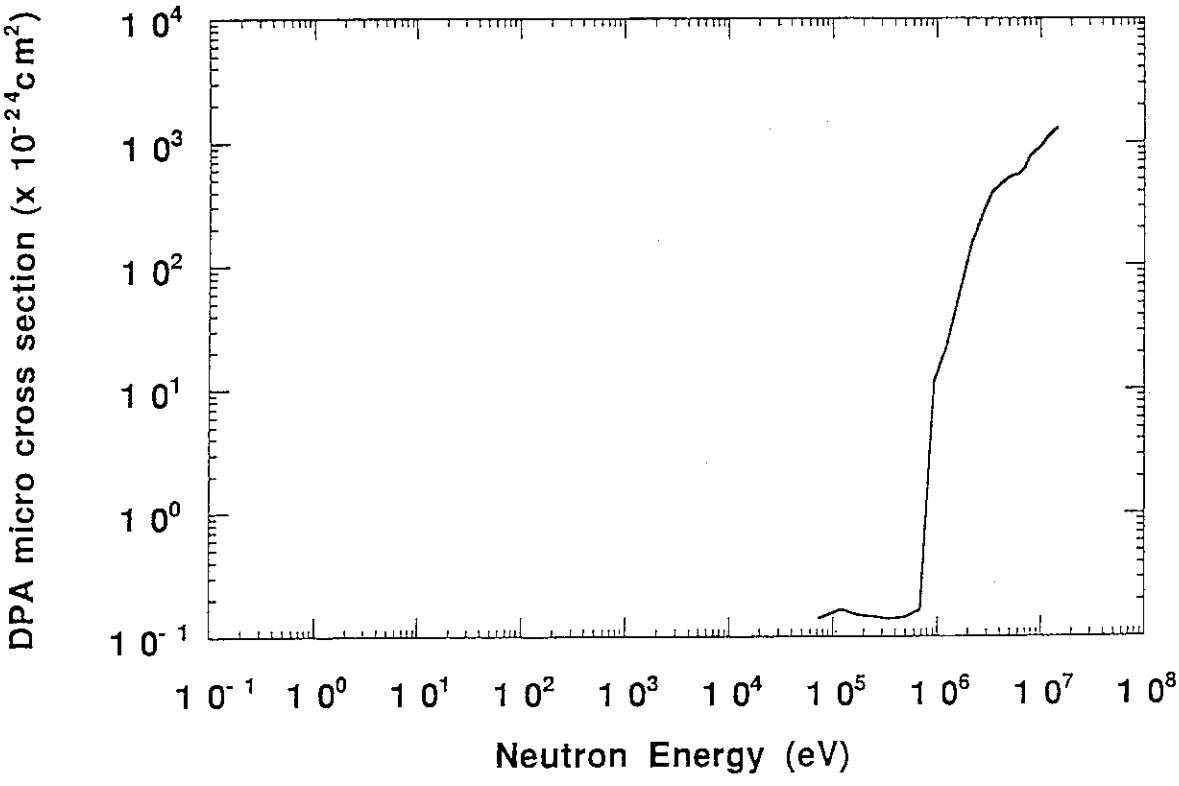

Fig. 3.37 Th DPA cross section (FUSION-40)

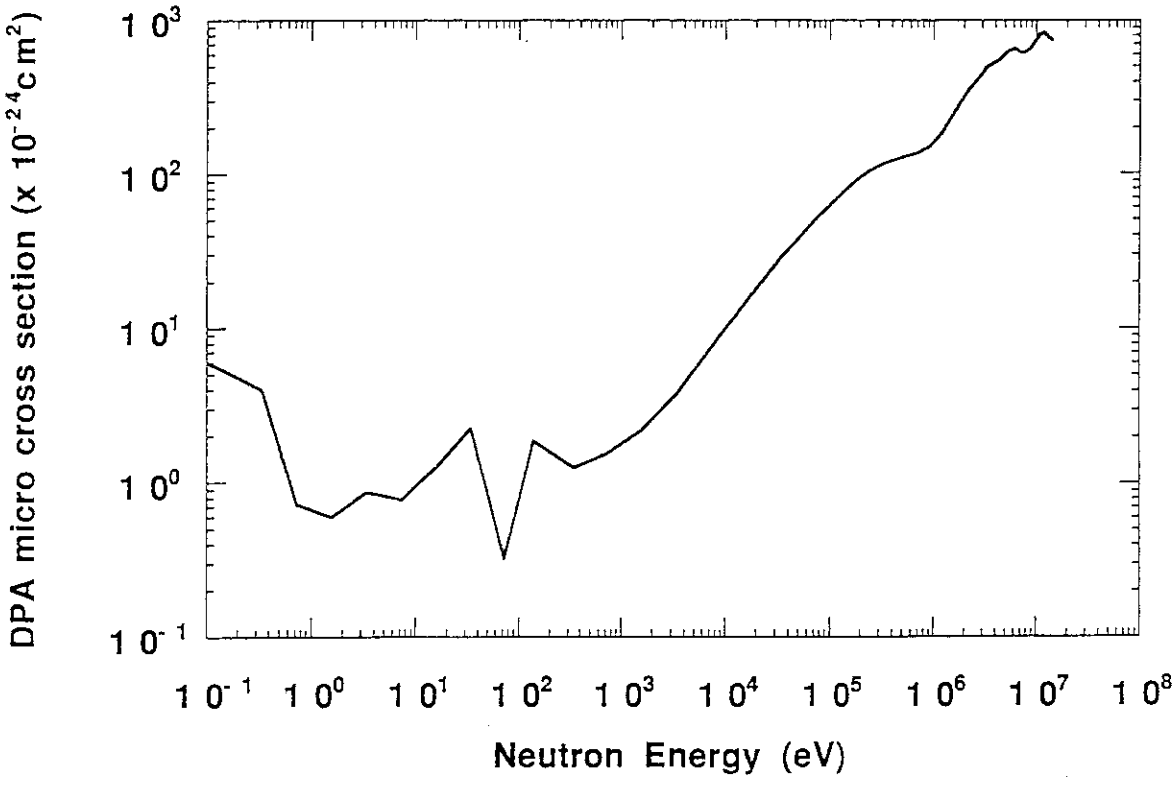

Fig. 3.38 U-235 DPA cross section (FUSION-40)

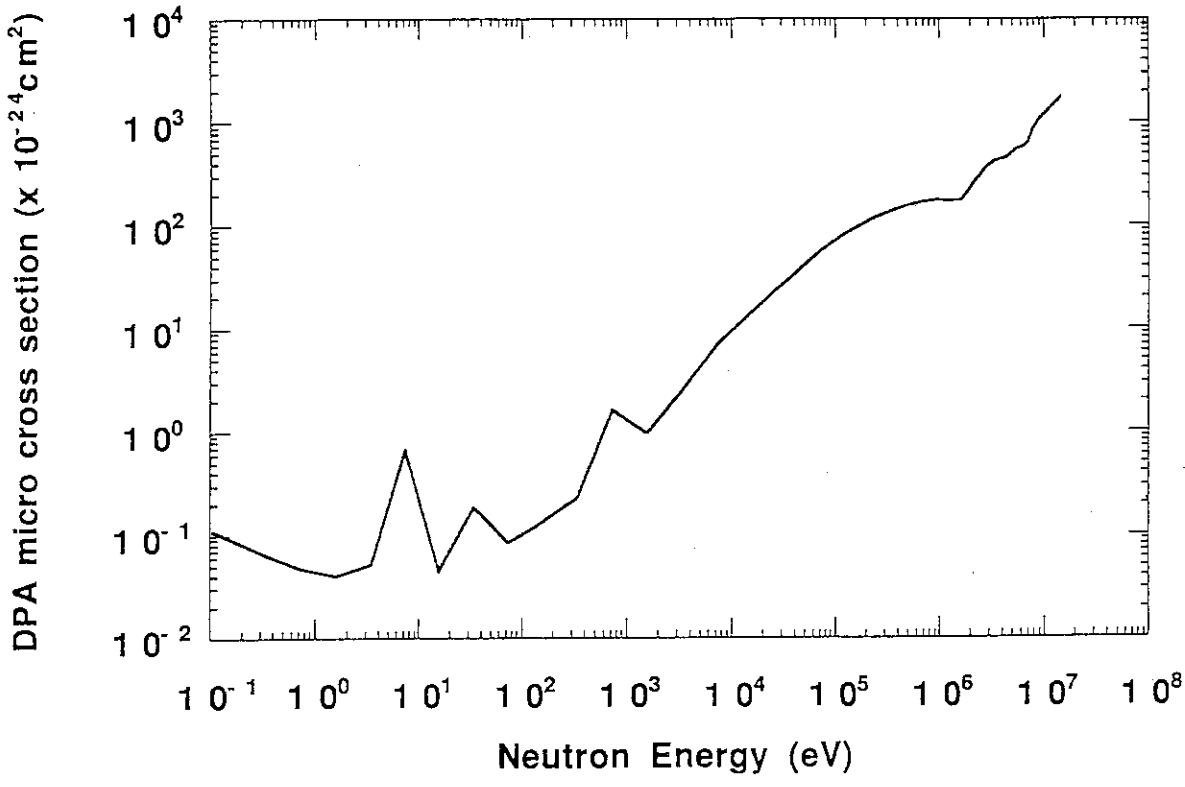

Fig. 3.39 U-238 DPA cross section (FUSION-40)

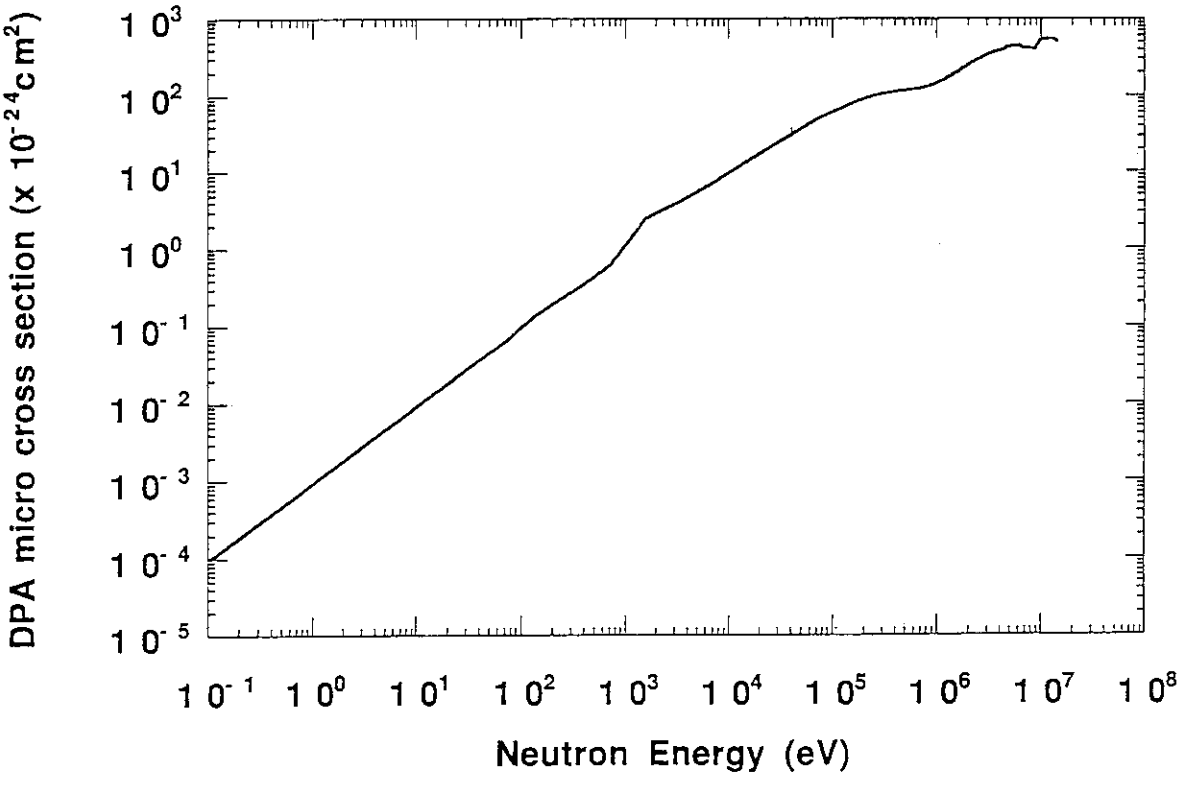

Fig. 3.40 Pu DPA cross section (FUSION-40)

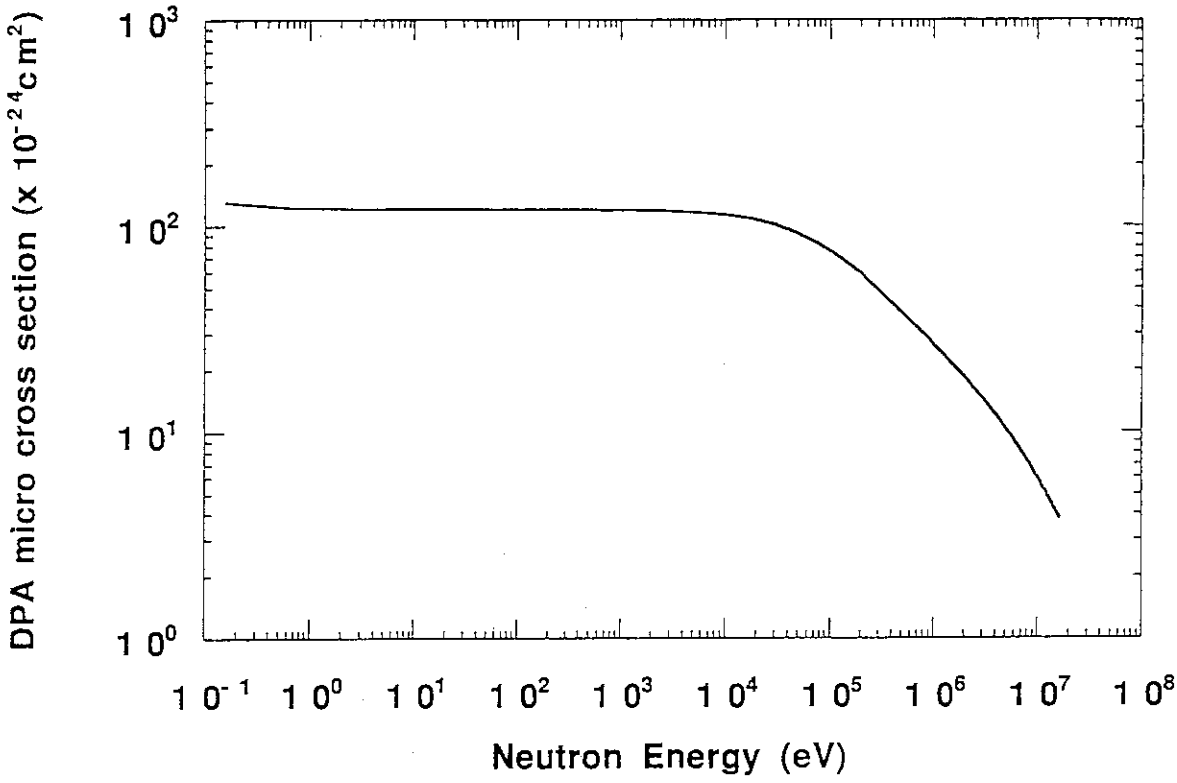

Fig. 3.41 H DPA cross section (FUSION-J3)

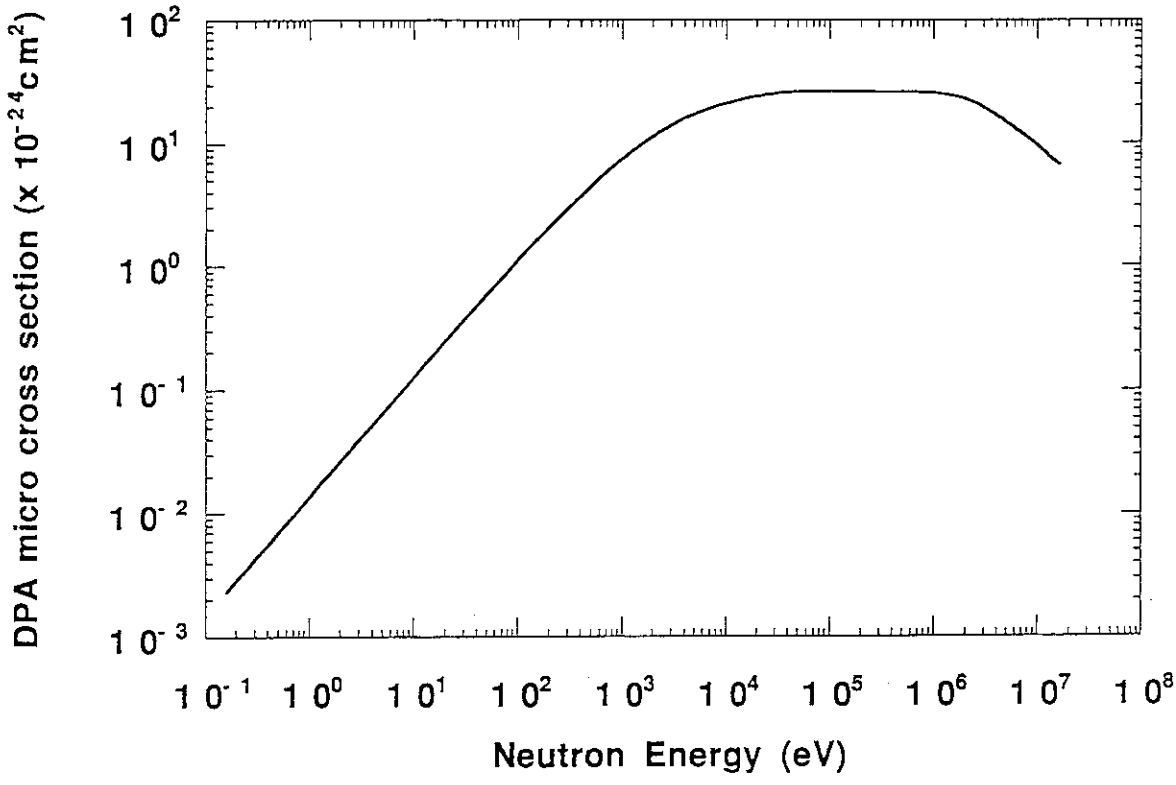

Fig. 3.42 D DPA cross section (FUSION-J3)

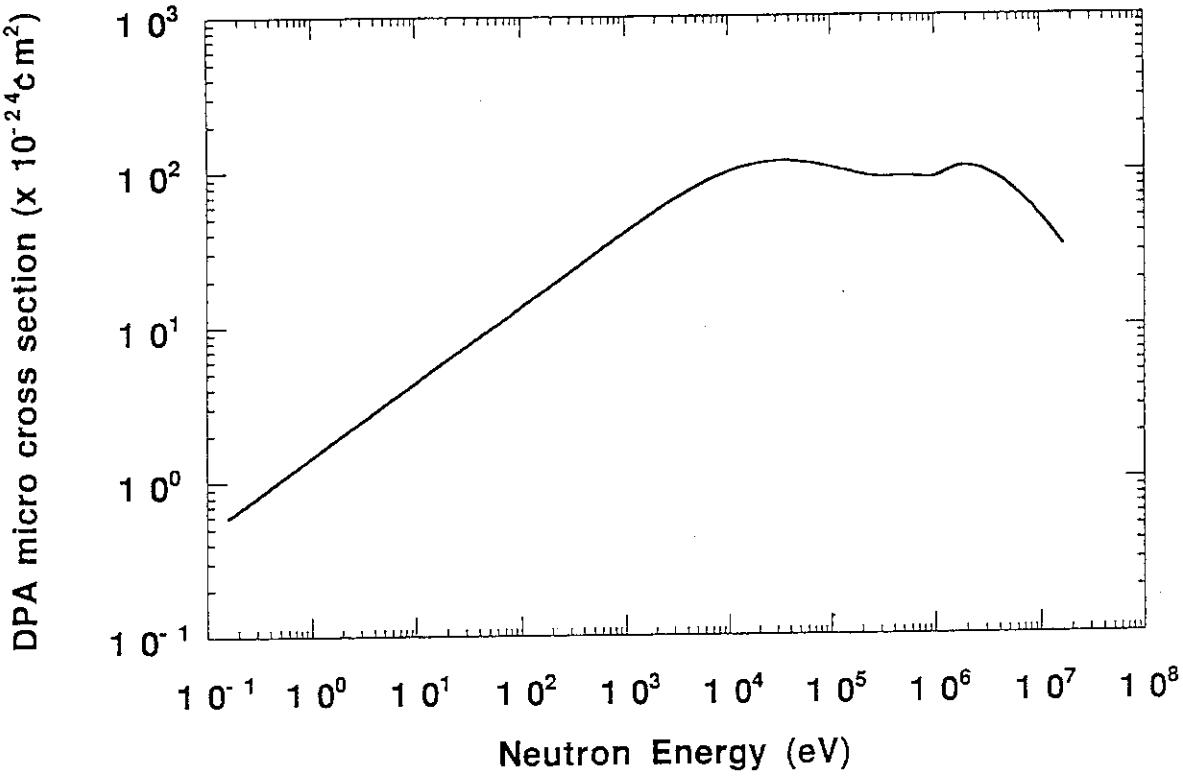

Fig. 3.43 He-3 DPA cross section (FUSION-J3)

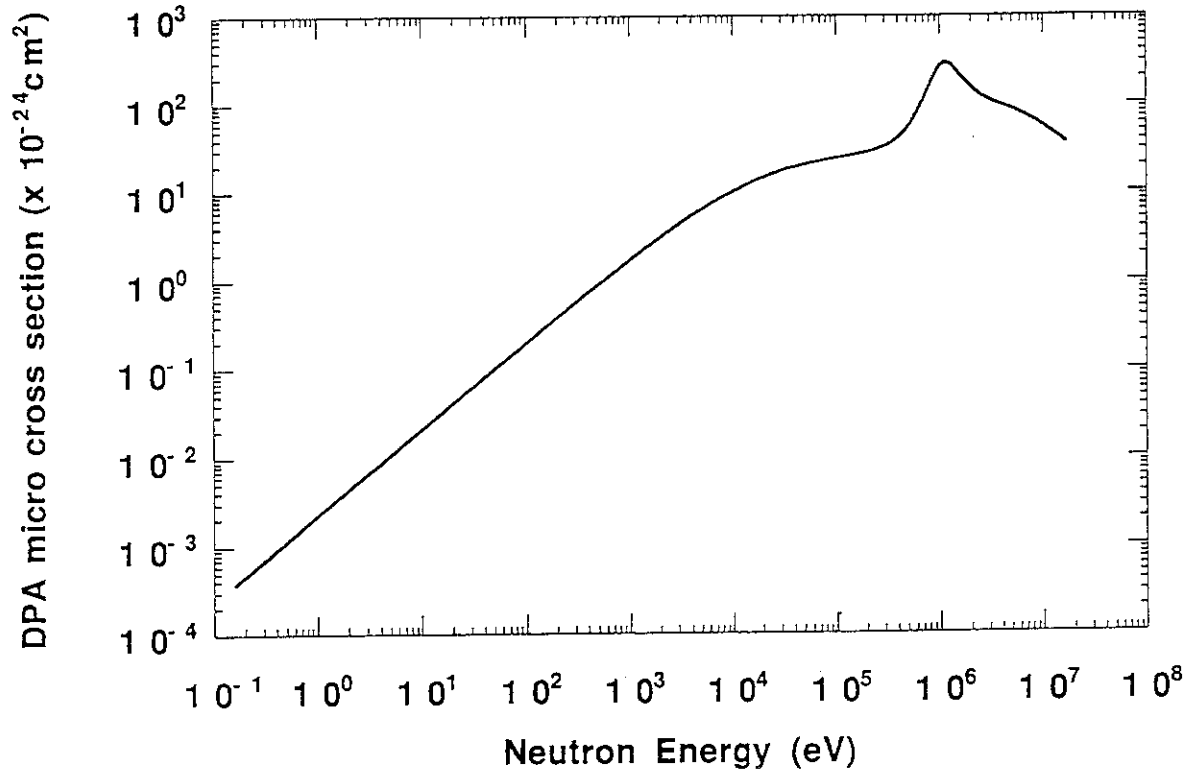

Fig. 3.44 He-4 DPA cross section (FUSION-J3)

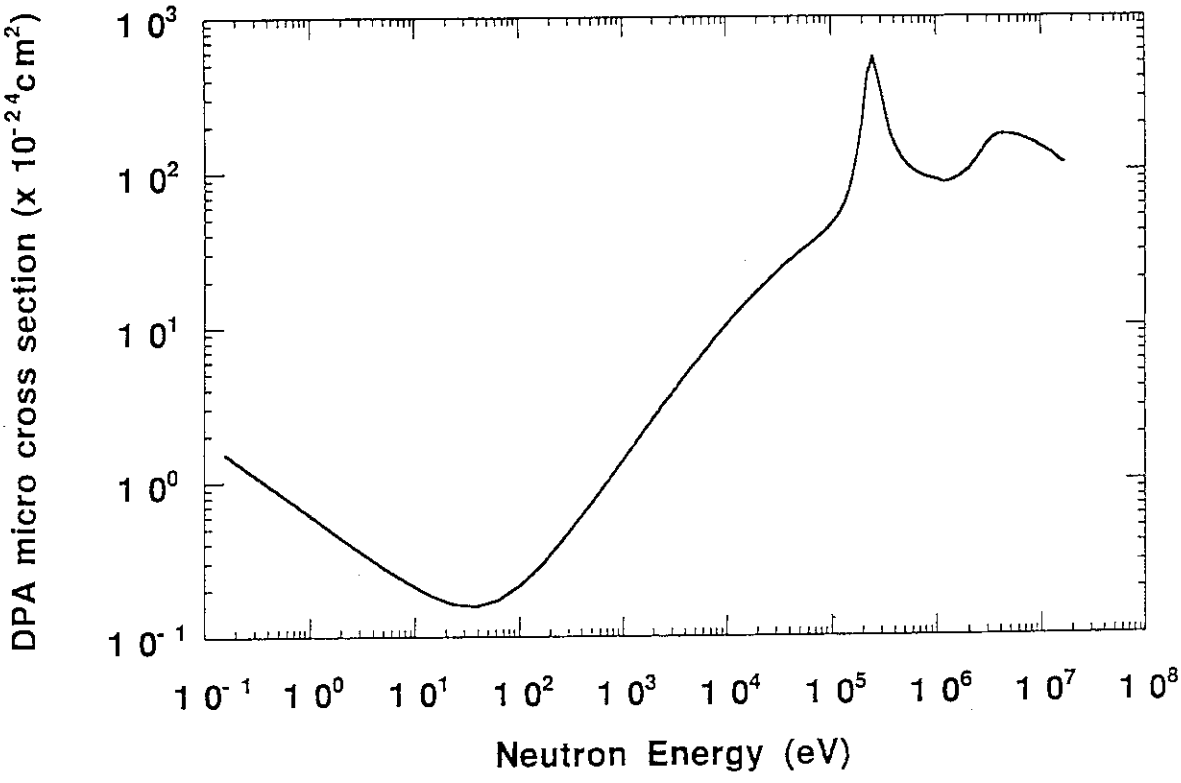

Fig. 3.45 Li-6 DPA cross section (FUSION-J3)

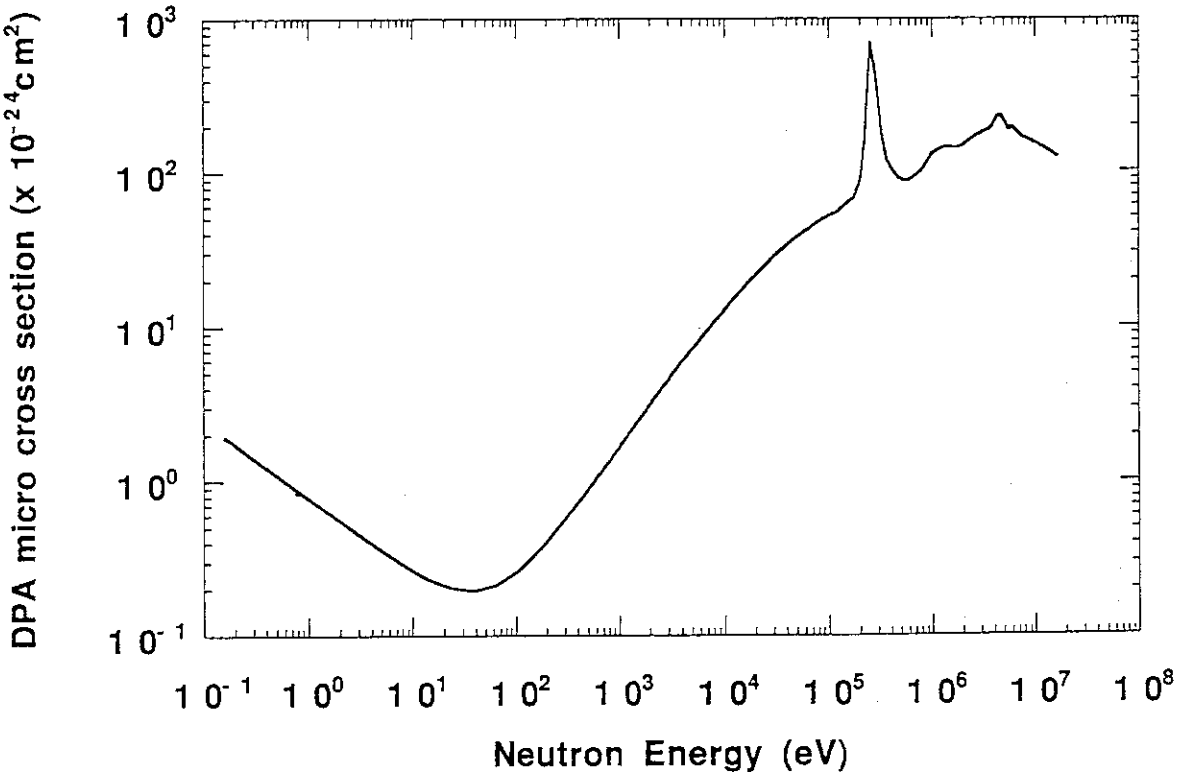

Fig. 3.46 Li-7 DPA cross section (FUSION-J3)

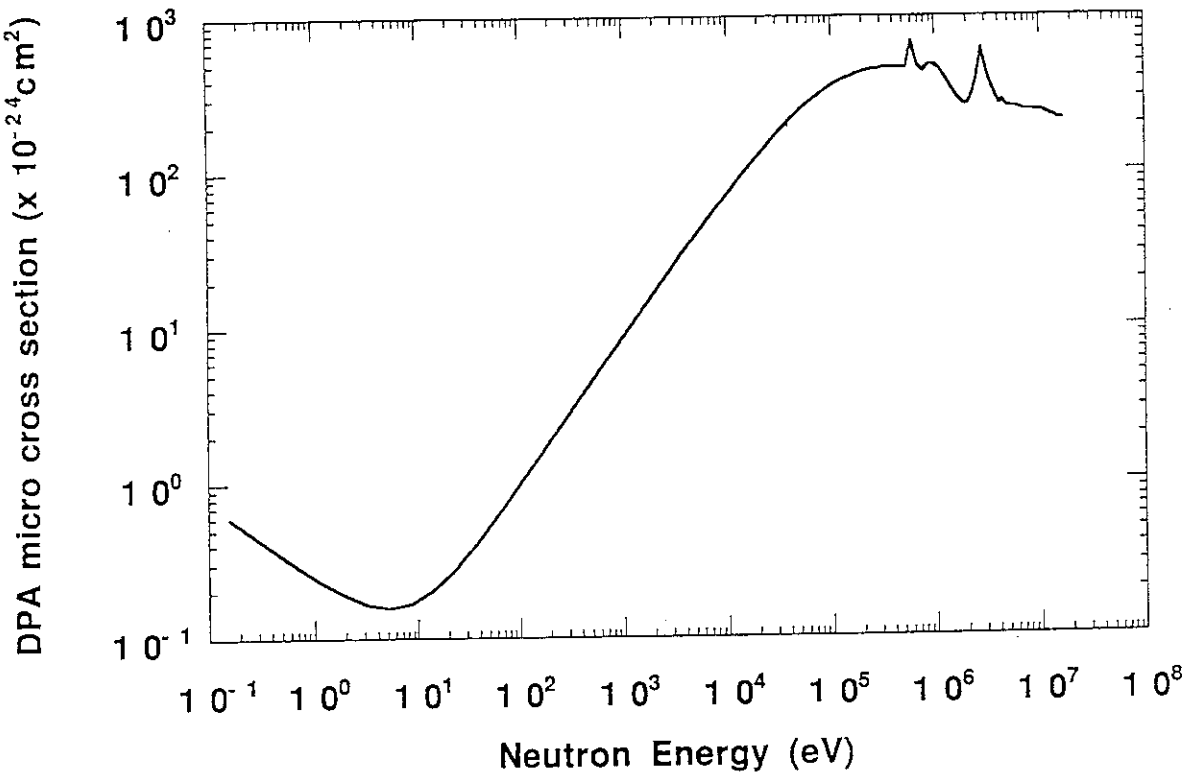

Fig. 3.47 Be DPA cross section (FUSION-J3)

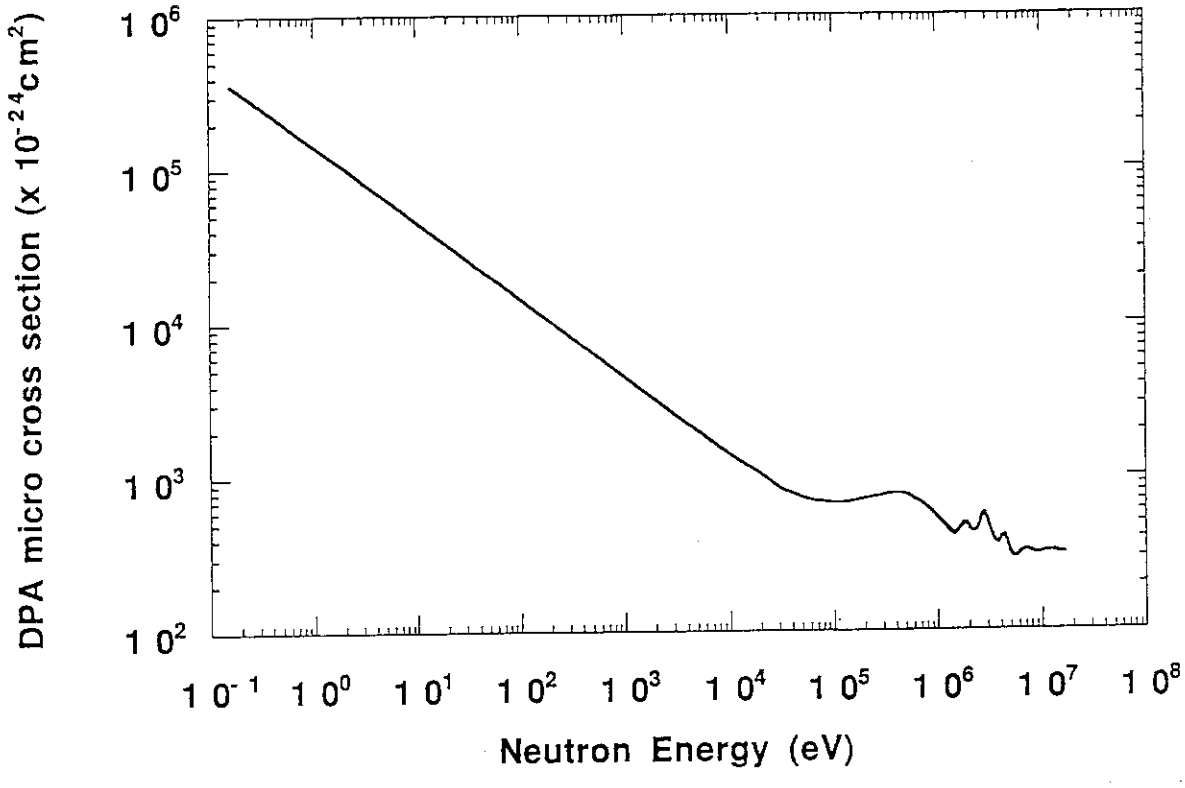

Fig. 3.48 B-10 DPA cross section (FUSION-J3)

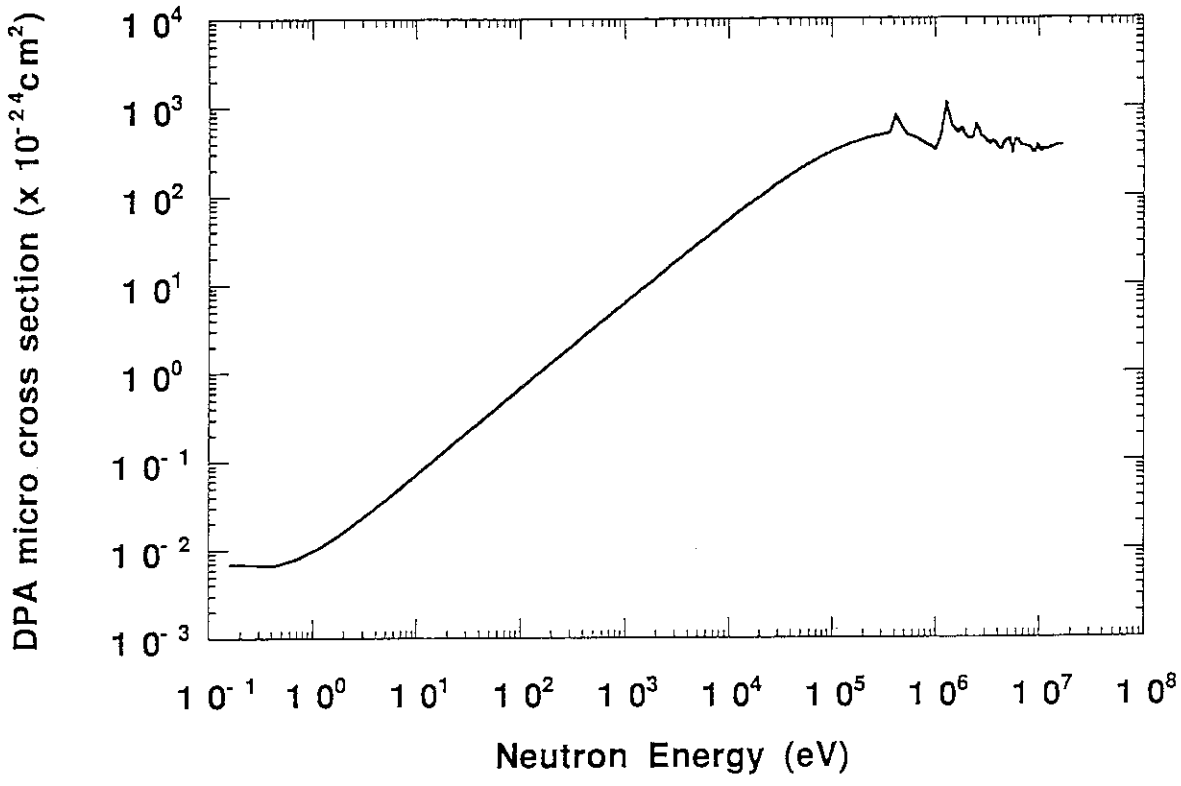

Fig. 3.49 B-11 DPA cross section (FUSION-J3)

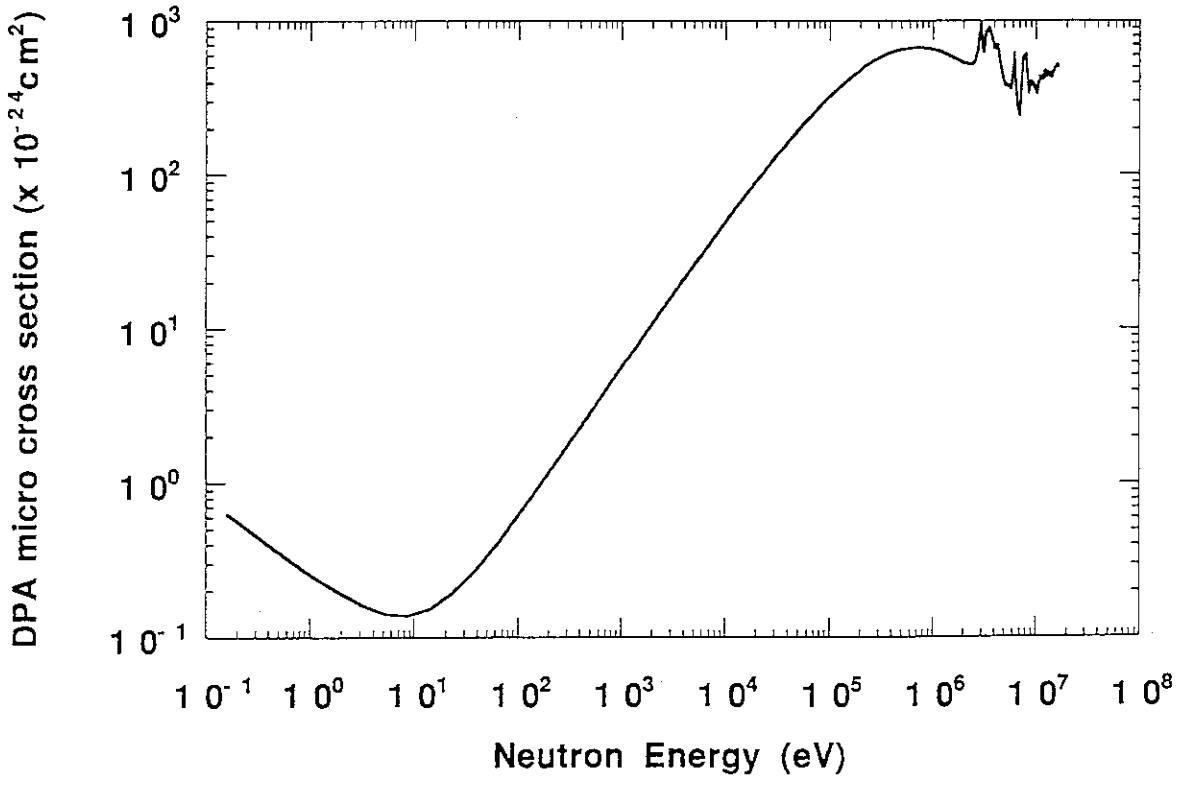

Fig. 3.50 C DPA cross section (FUSION-J3)

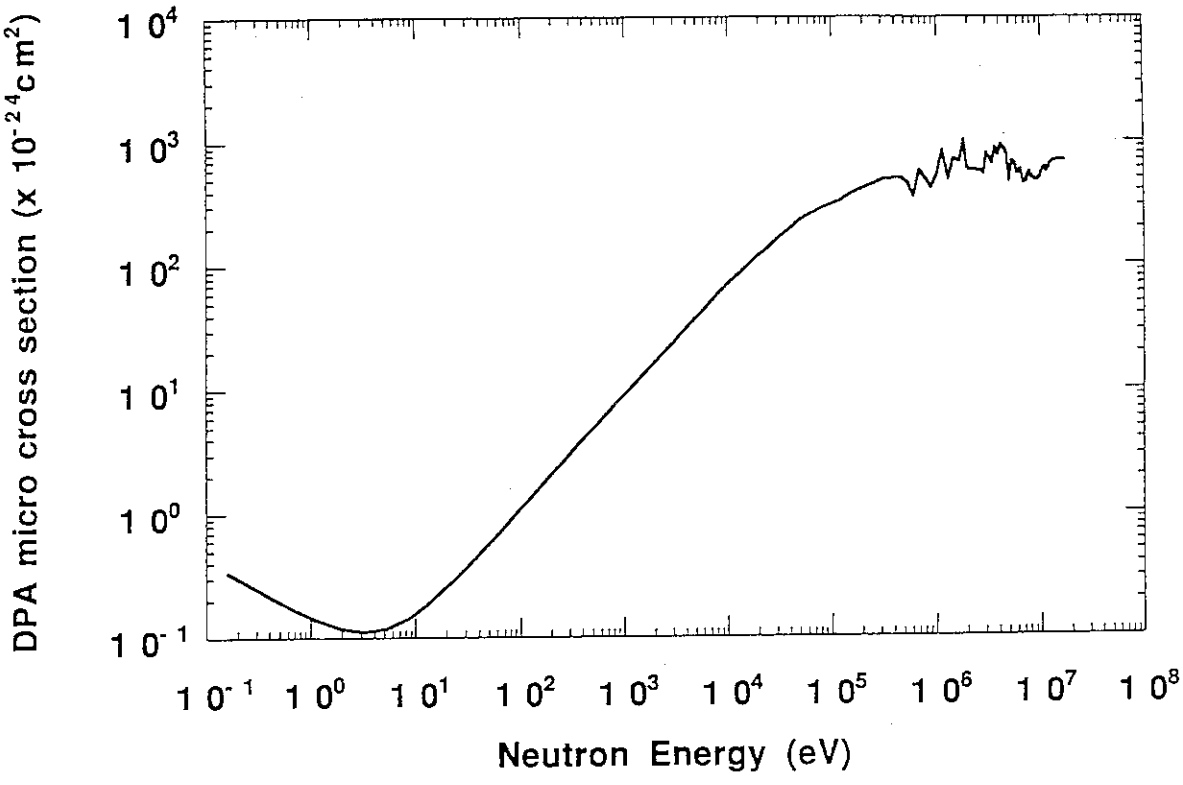

Fig. 3.51 N DPA cross section (FUSION-J3)

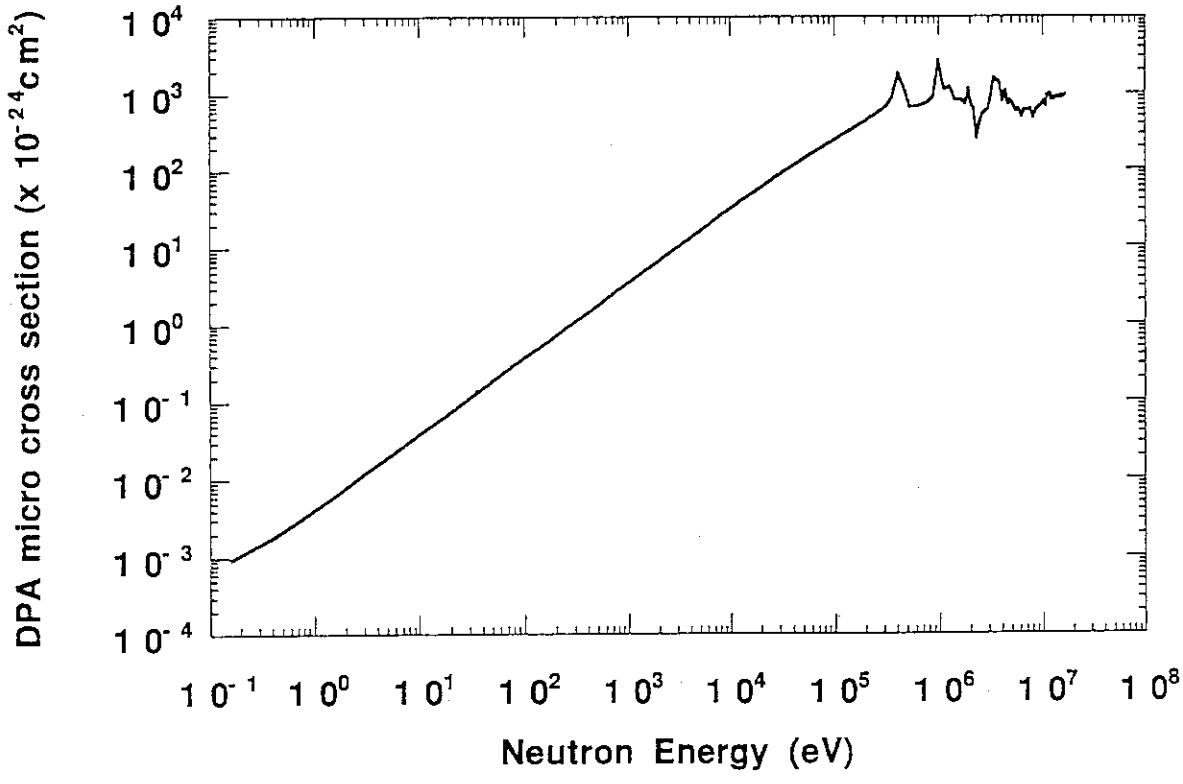

Fig. 3.52 O DPA cross section (FUSION-J3)

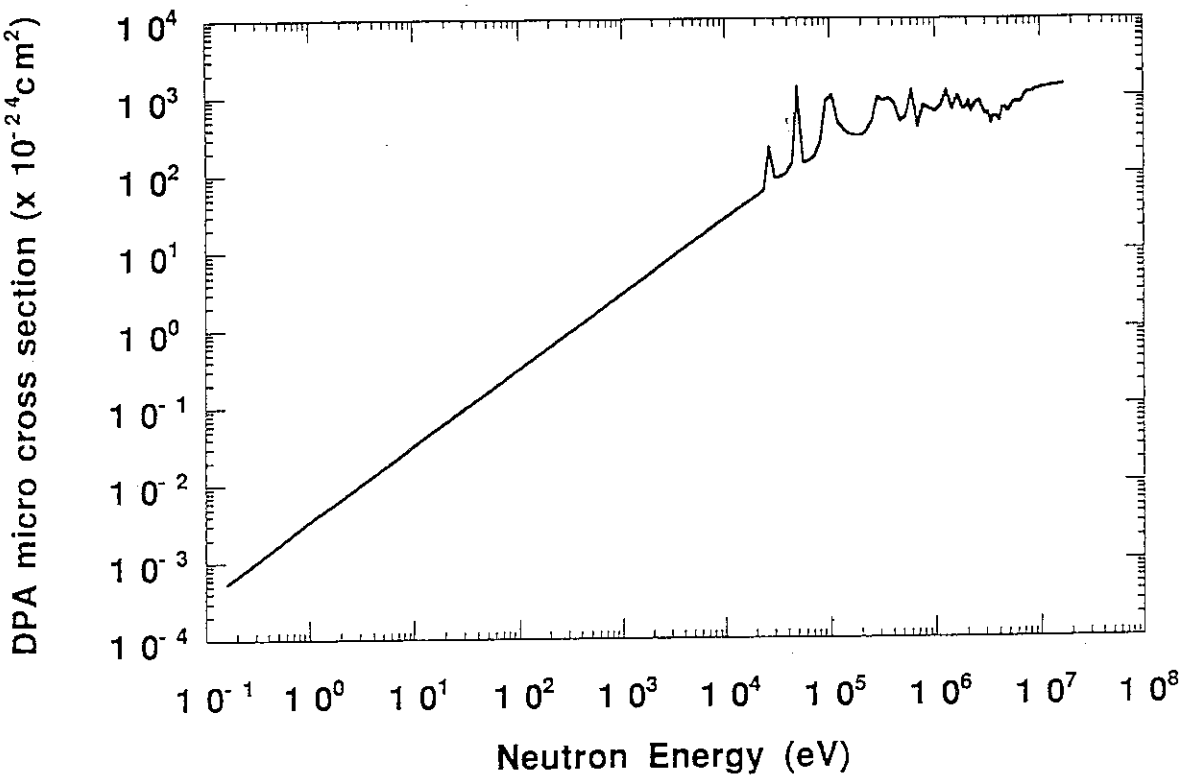

Fig. 3.53 F DPA cross section (FUSION-J3)

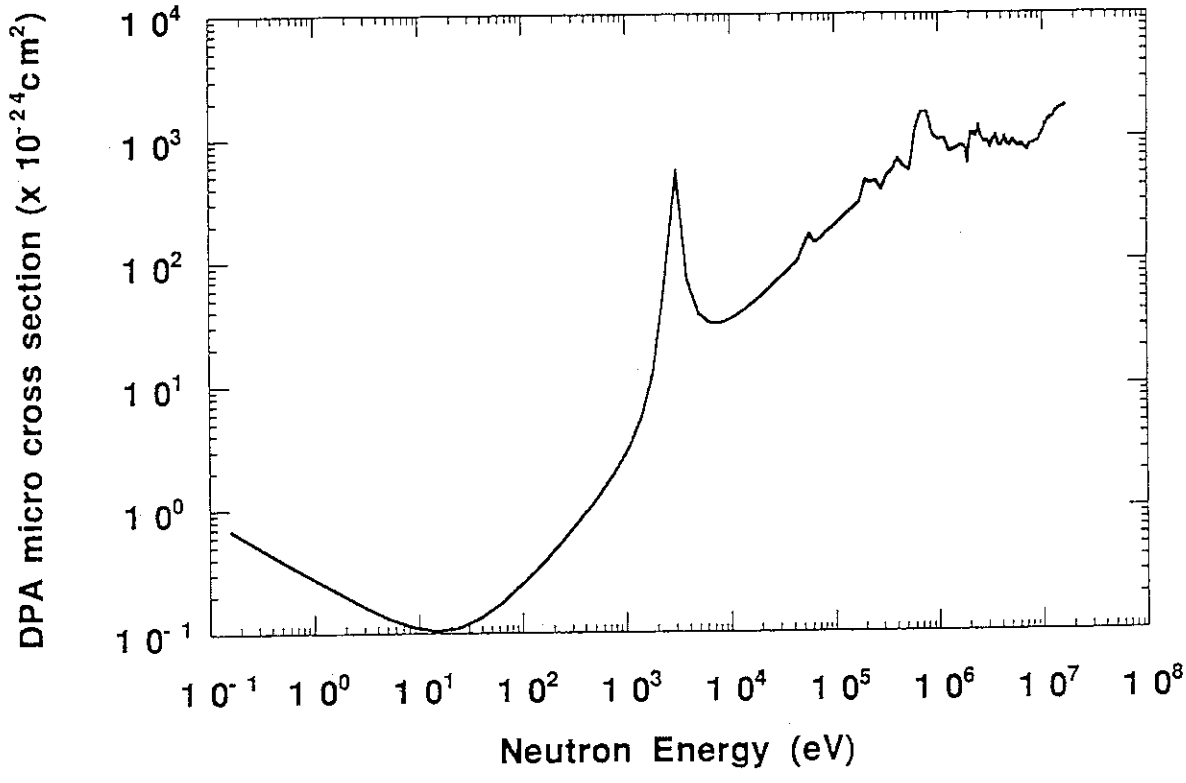

Fig. 3.54 Na DPA cross section (FUSION-J3)

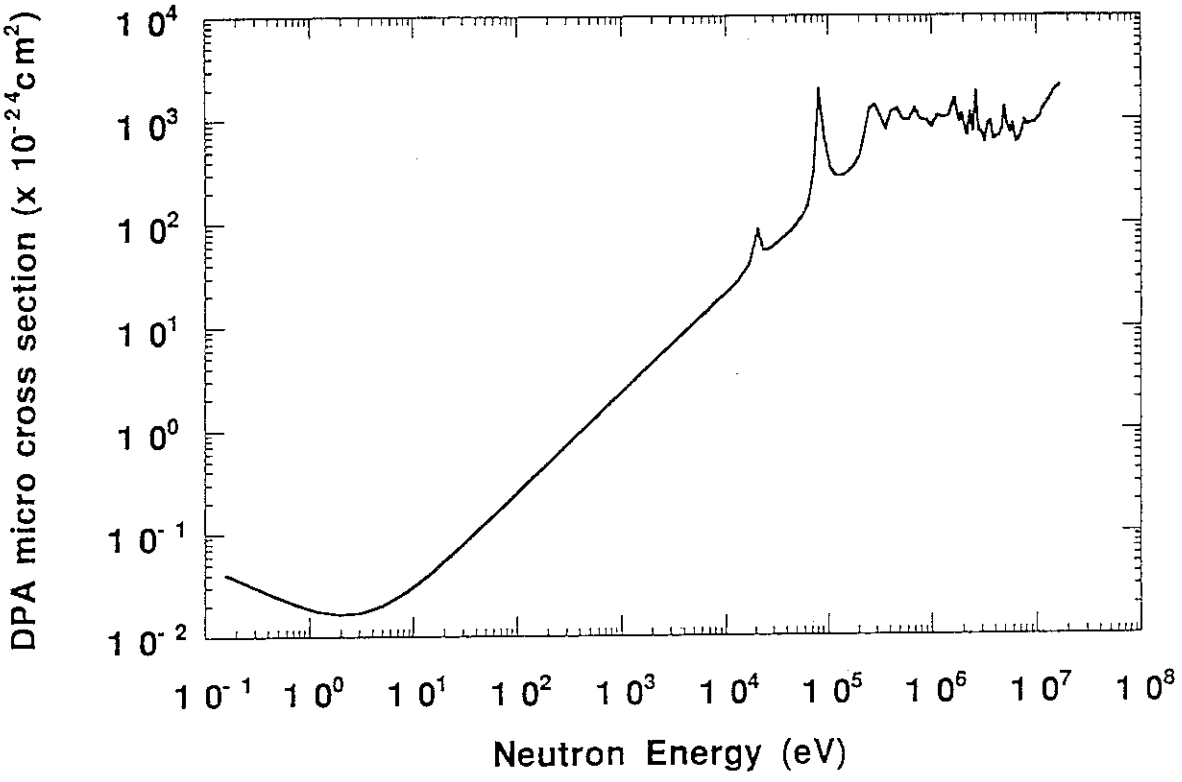

Fig. 3.55 Mg DPA cross section (FUSION-J3)

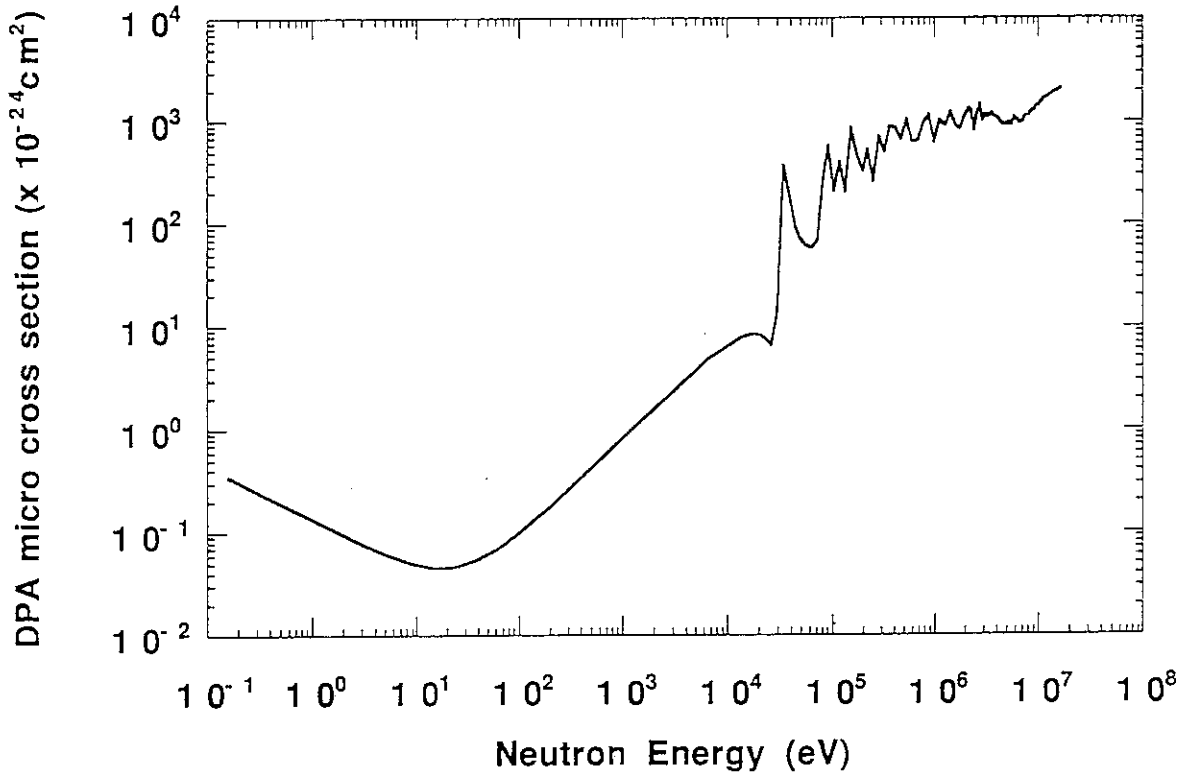

Fig. 3.56 Al DPA cross section (FUSION-J3)

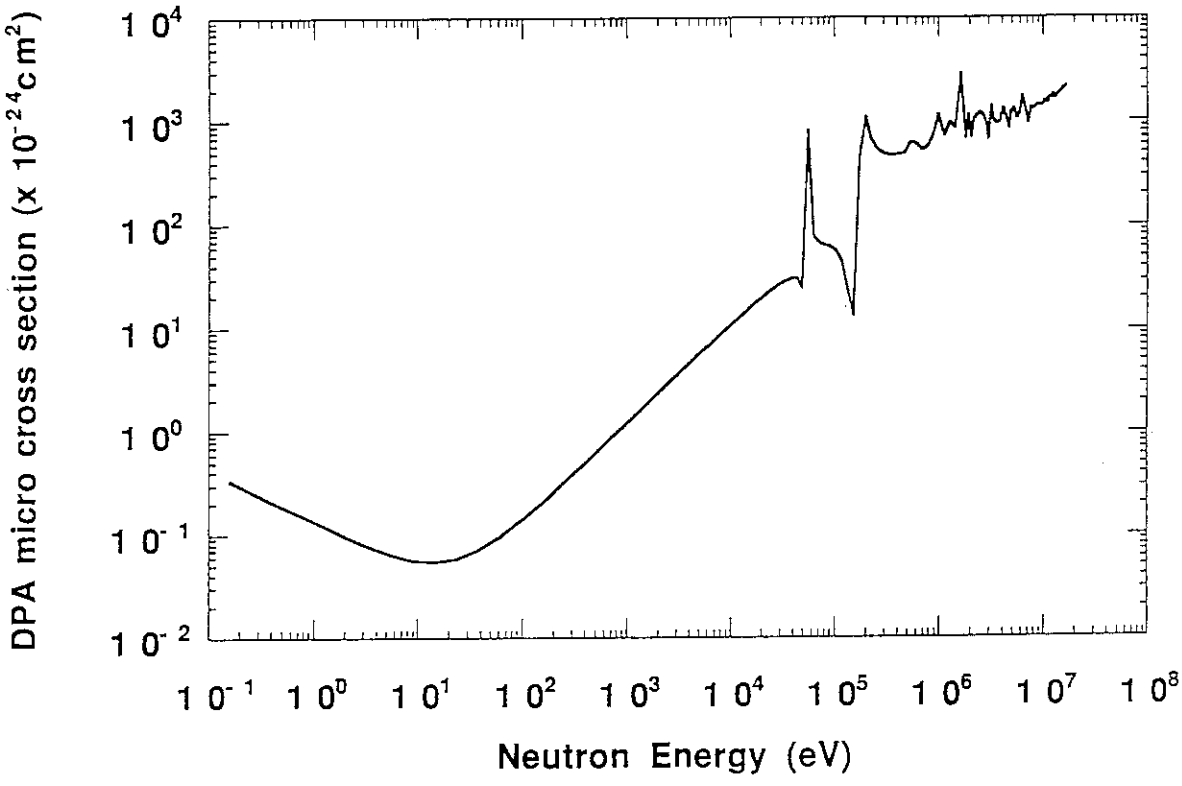

Fig. 3.57 Si DPA cross section (FUSION-J3)

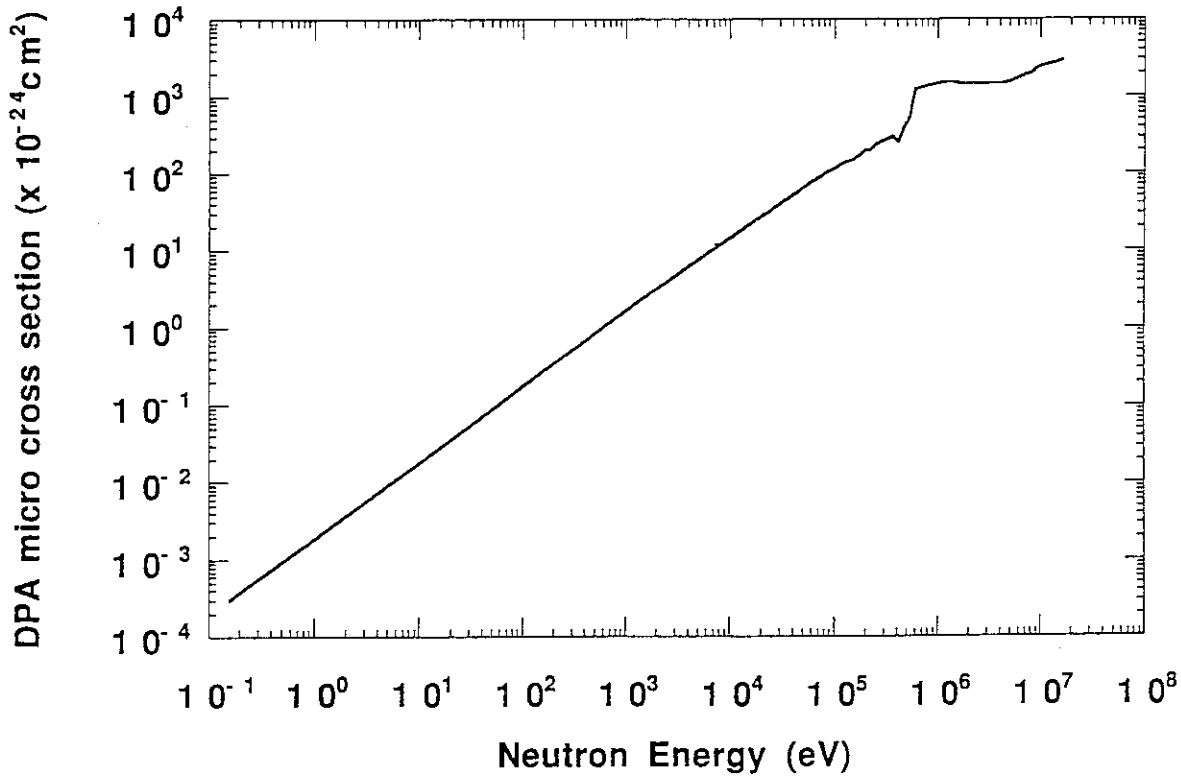

Fig. 3.58 P DPA cross section (FUSION-J3)

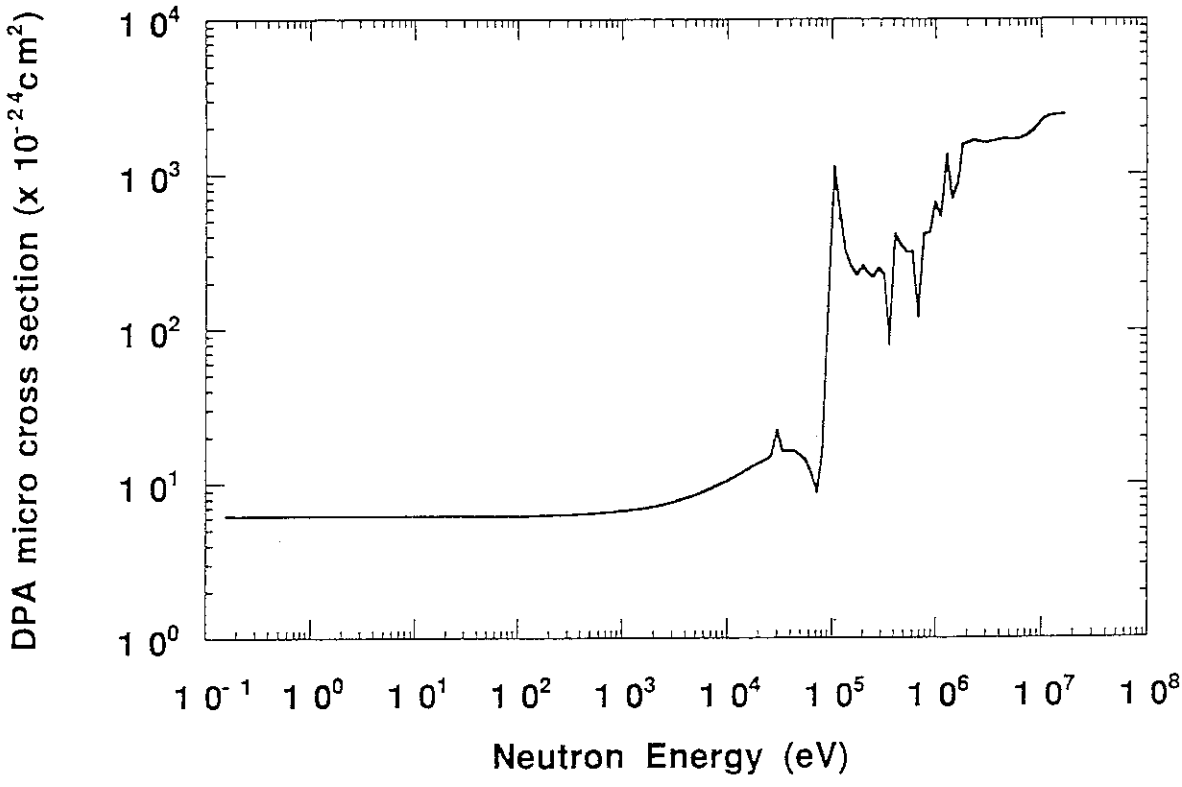

Fig. 3.59 S DPA cross section (FUSION-J3)

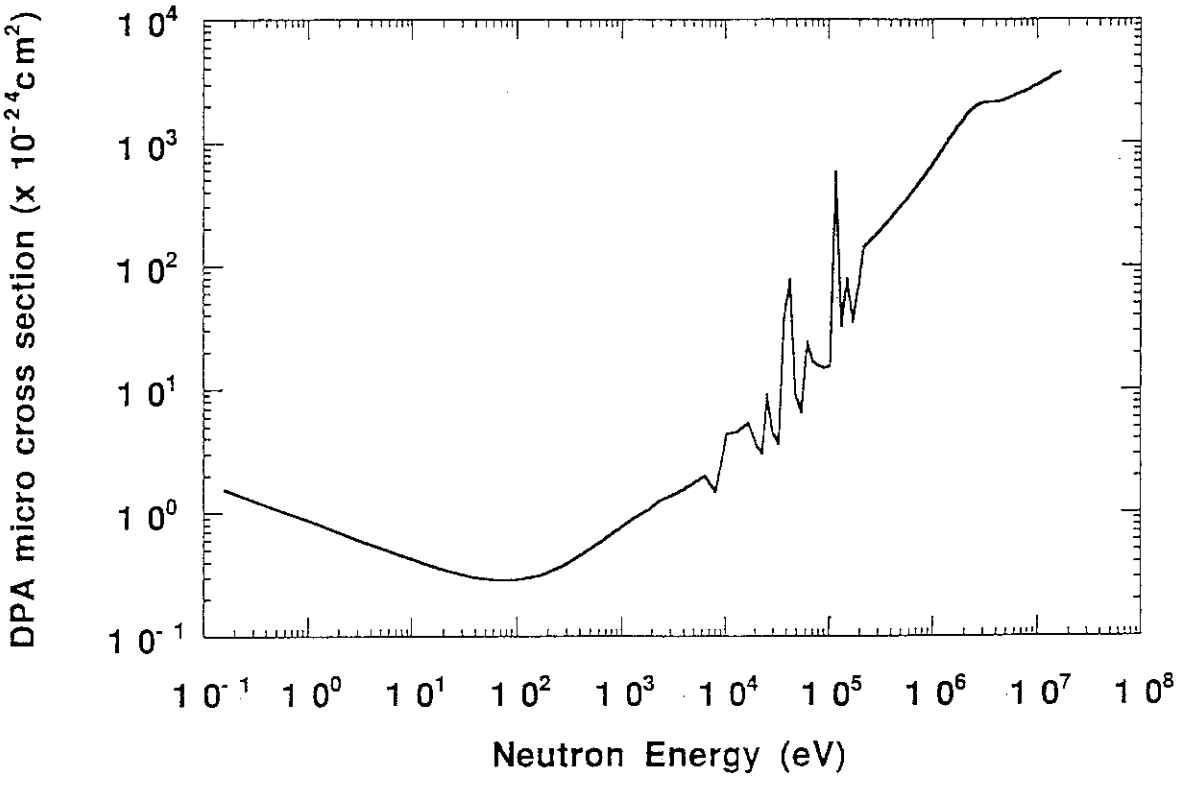

Fig. 3.60 K DPA cross section (FUSION-J3)

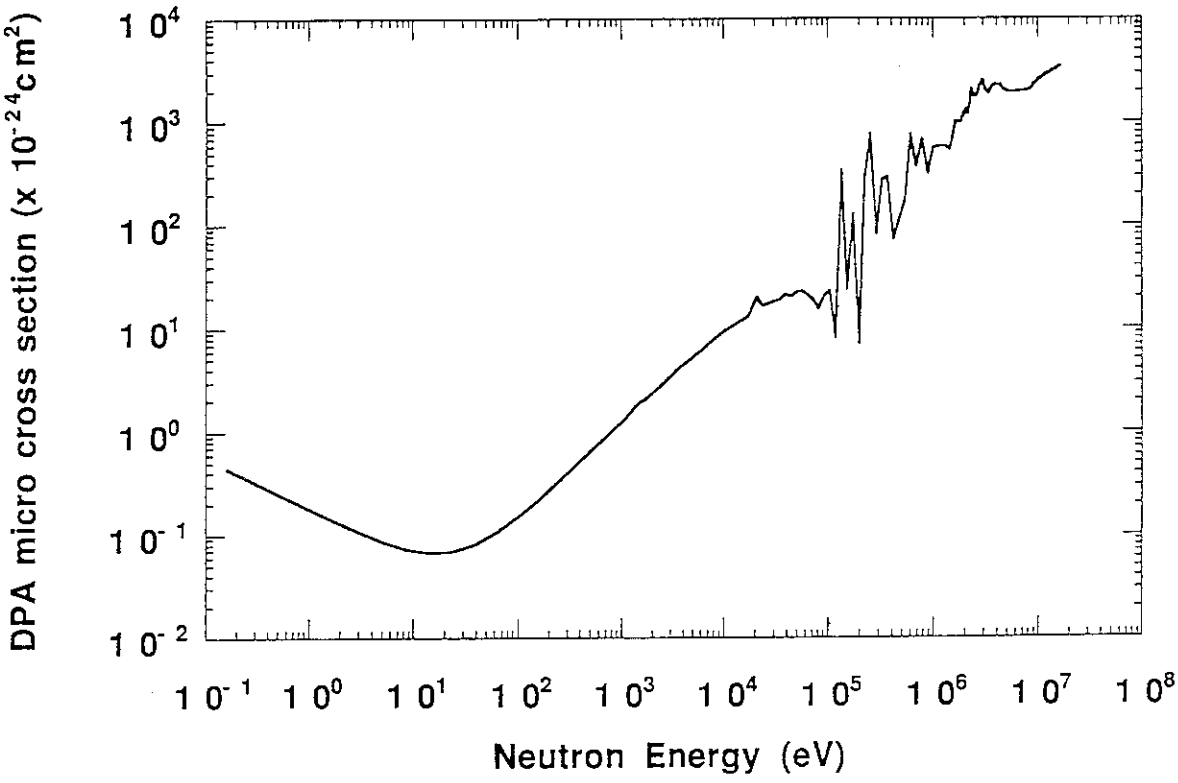

Fig. 3.61 Ca DPA cross section (FUSION-J3)

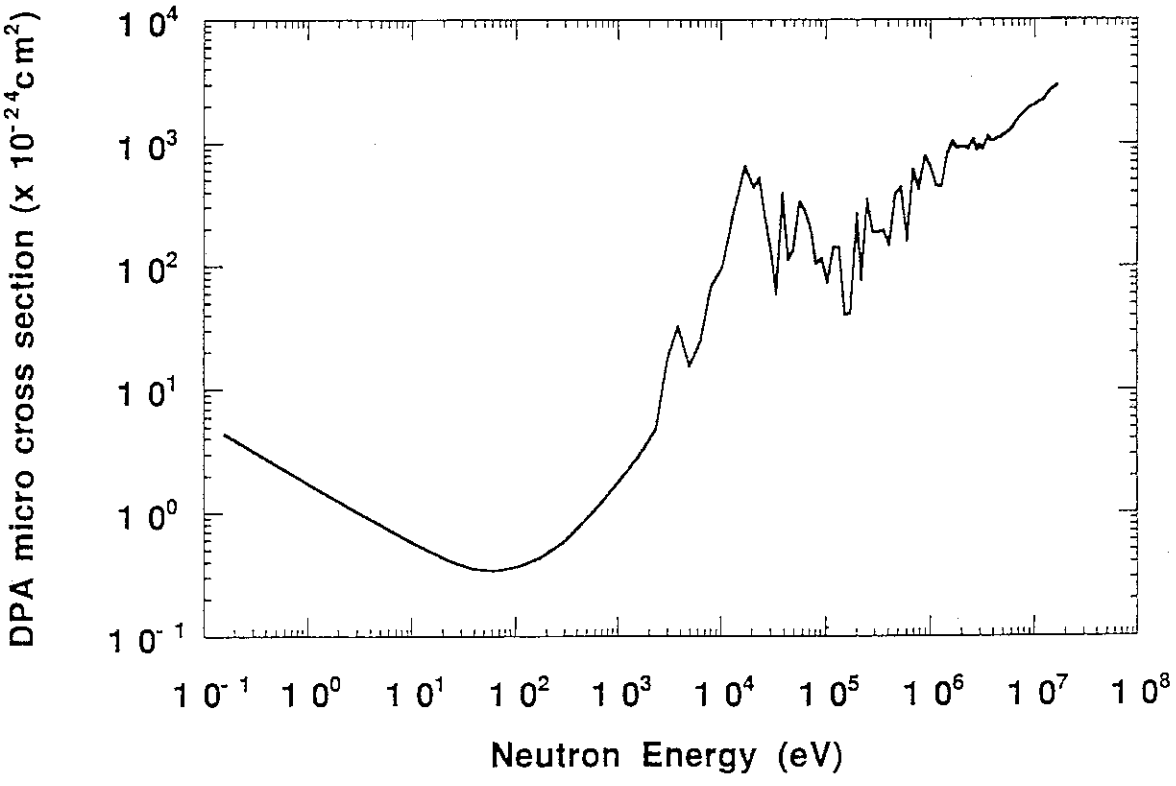

Fig. 3.62 Ti DPA cross section (FUSION-J3)

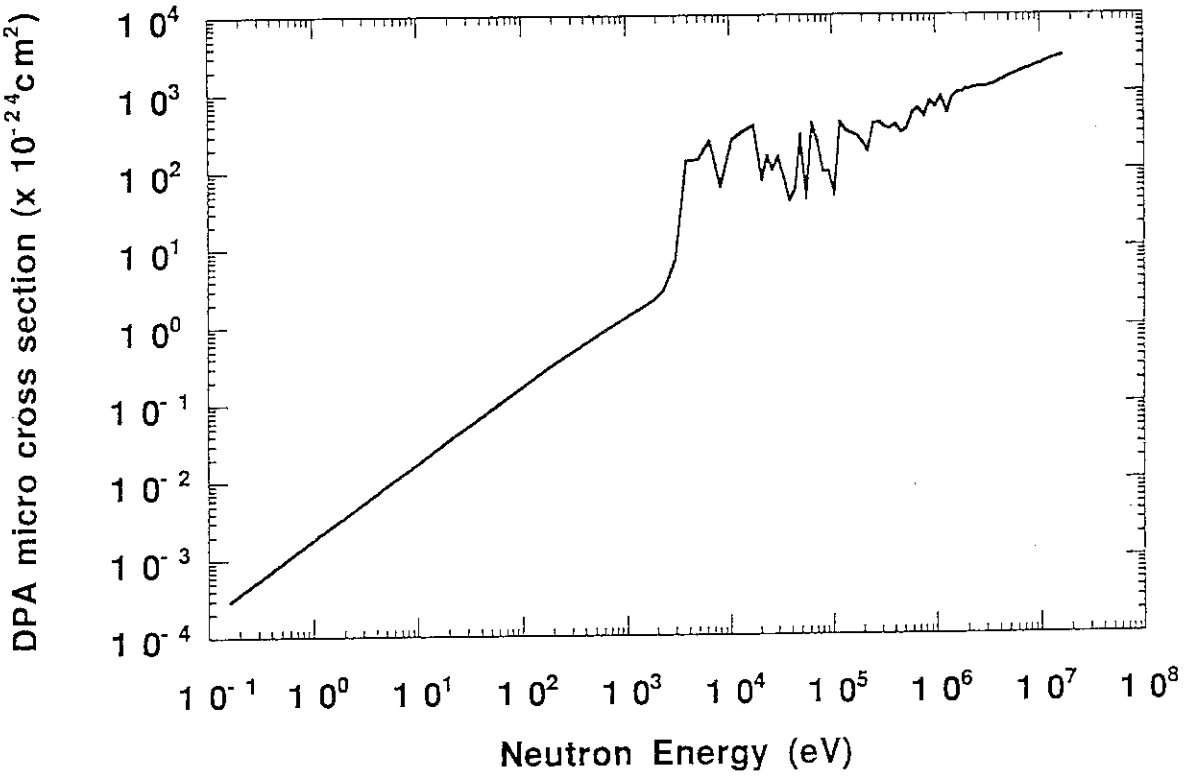

Fig. 3.63 V DPA cross section (FUSION-J3)

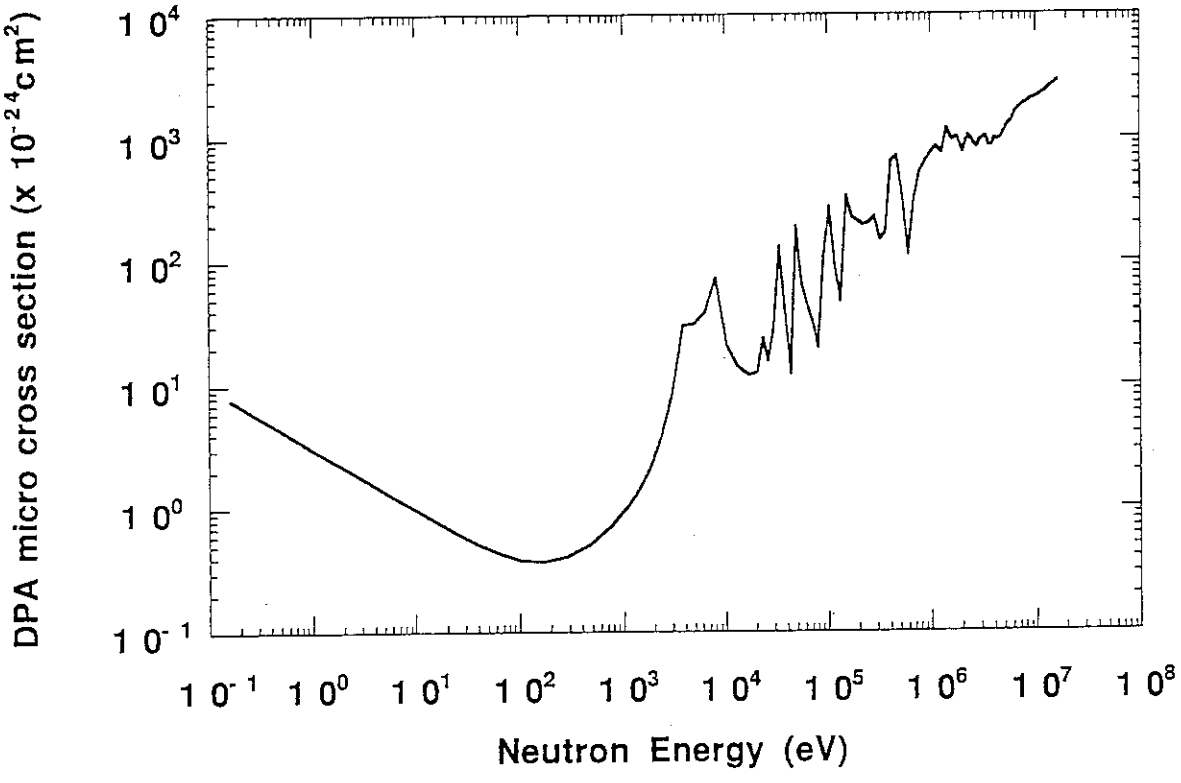

Fig. 3.64 Cr DPA cross section (FUSION-J3)

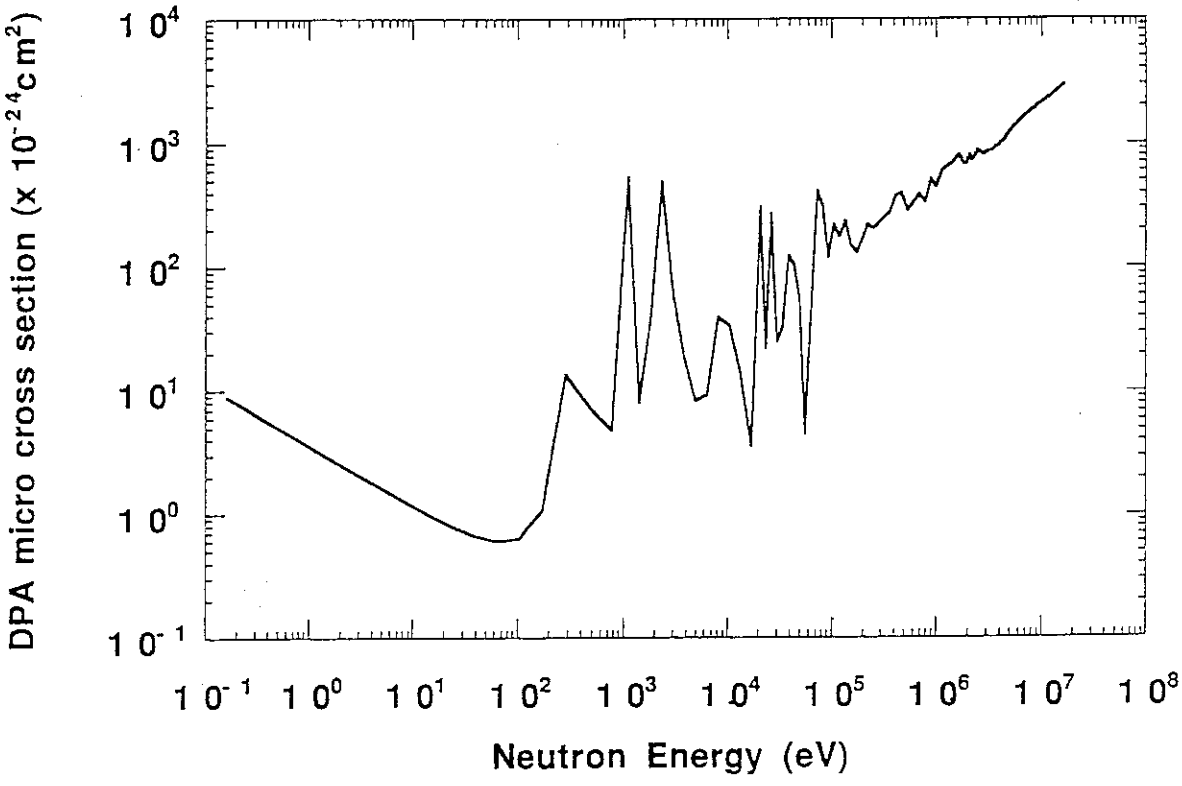

Fig. 3.65 Mn DPA cross section (FUSION-J3)

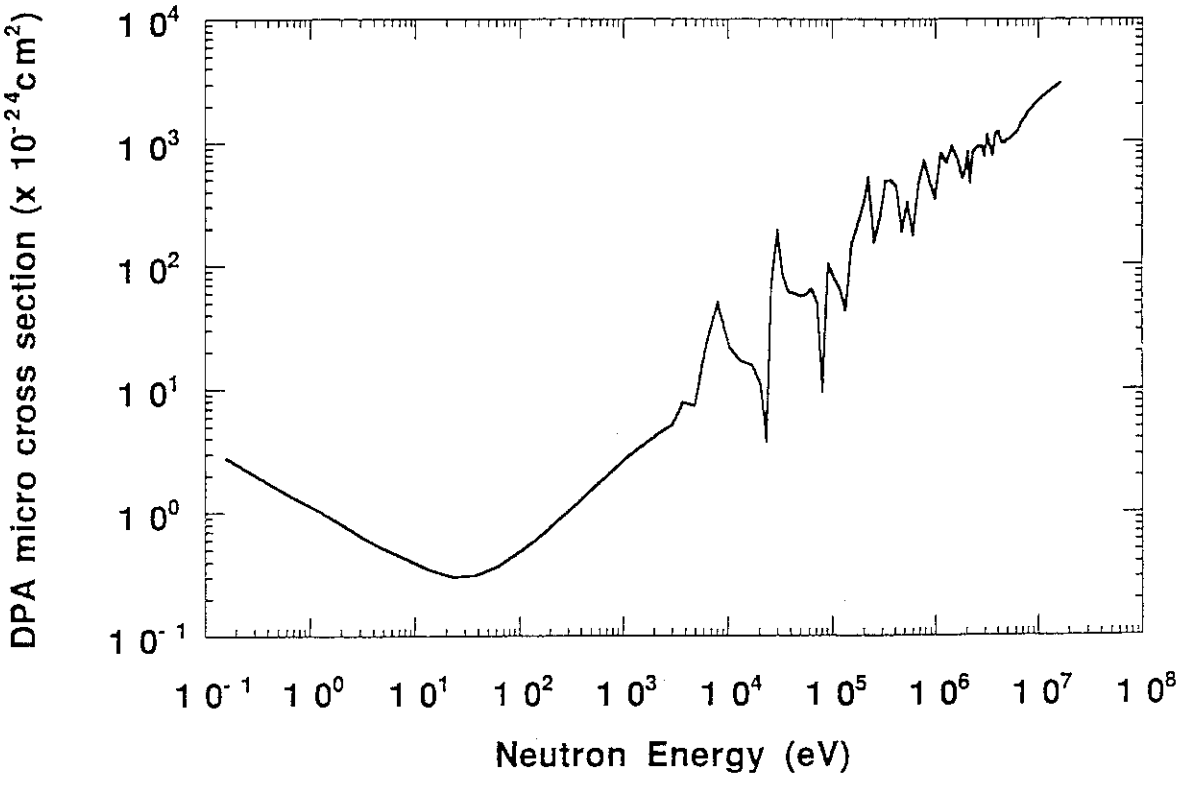

Fig. 3.66 Fe DPA cross section (FUSION-J3)

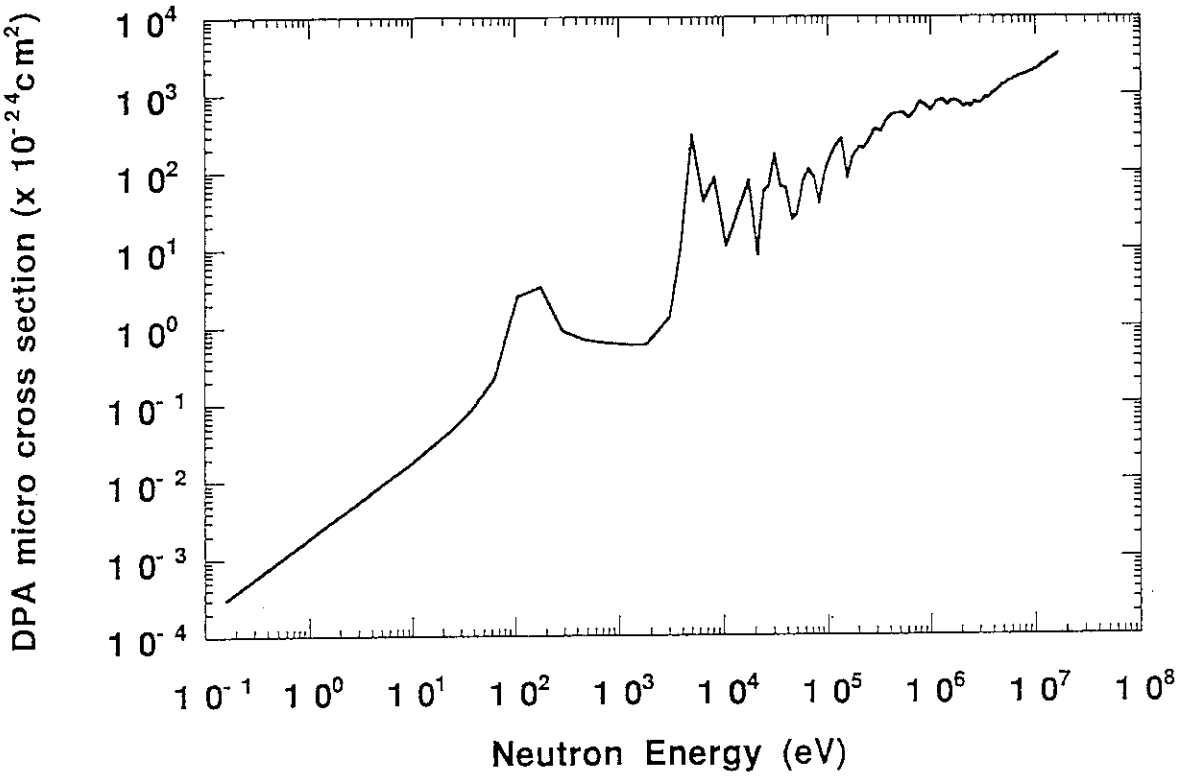

Fig. 3.67 Co DPA cross section (FUSION-J3)

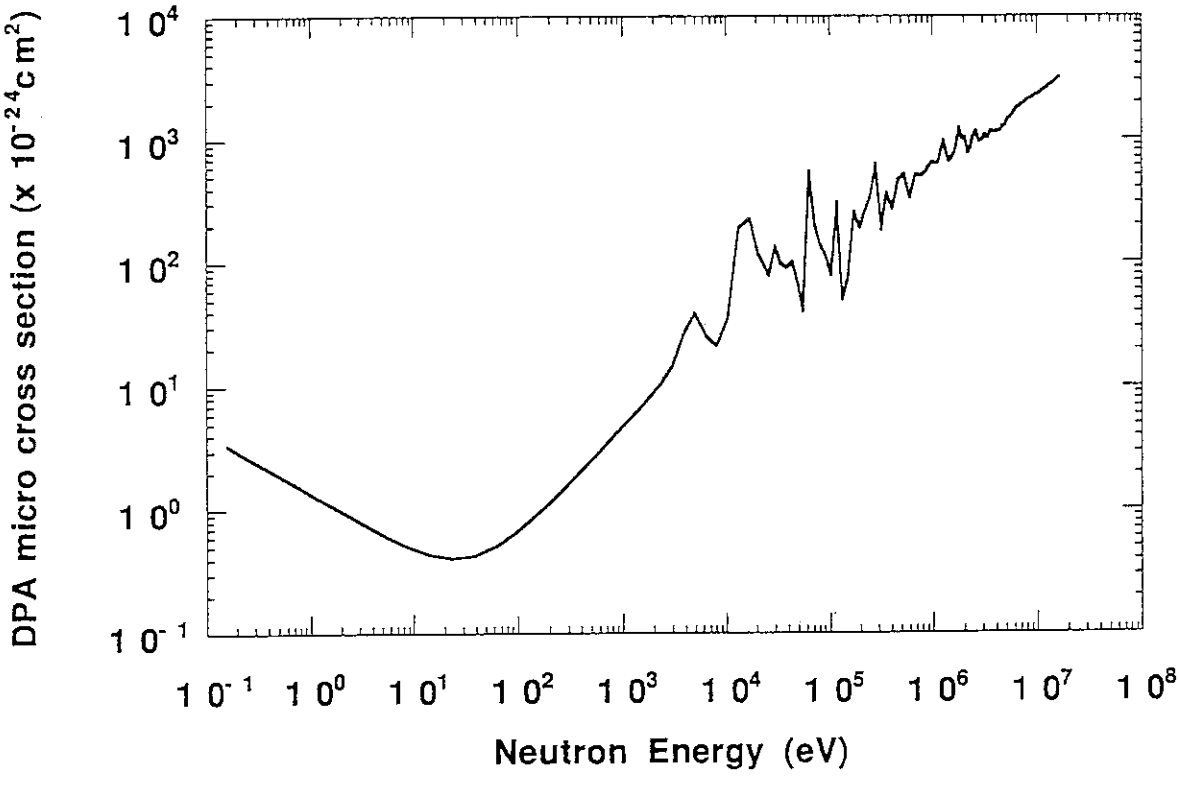

Fig. 3.68 Ni DPA cross section (FUSION-J3)

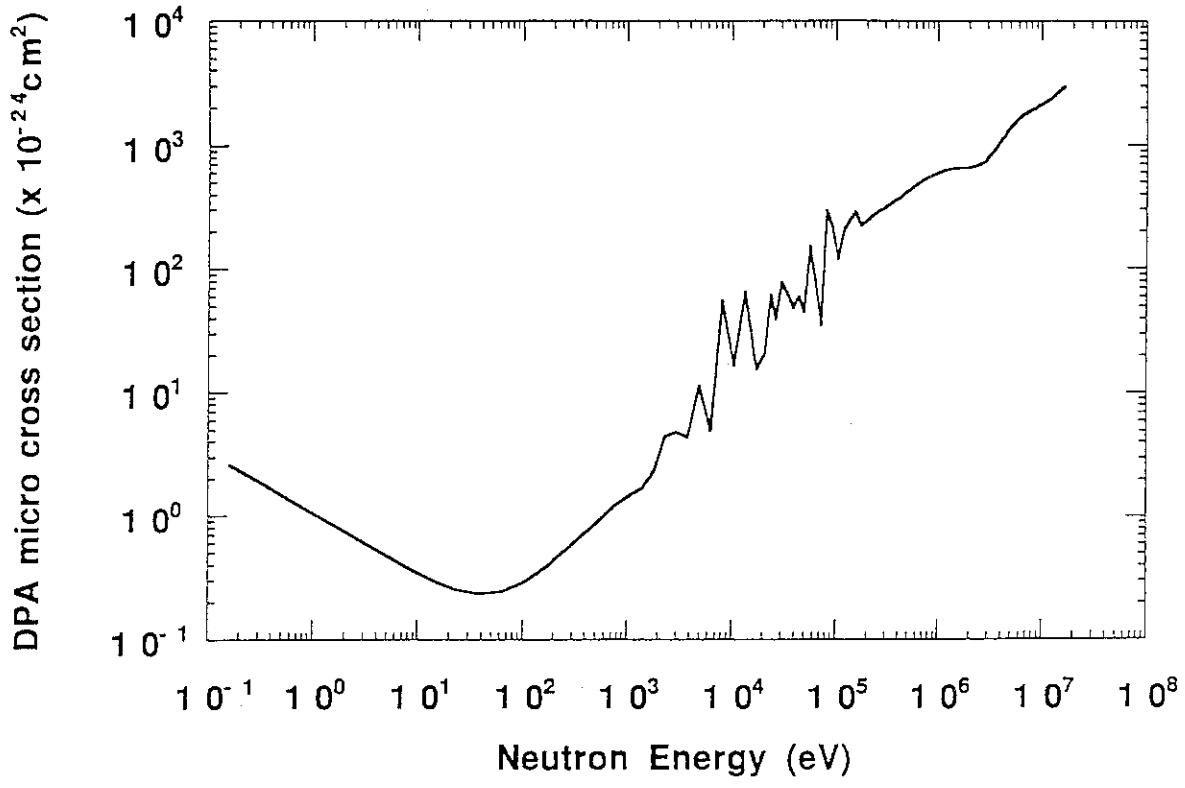

Fig. 3.69 Cu DPA cross section (FUSION-J3)

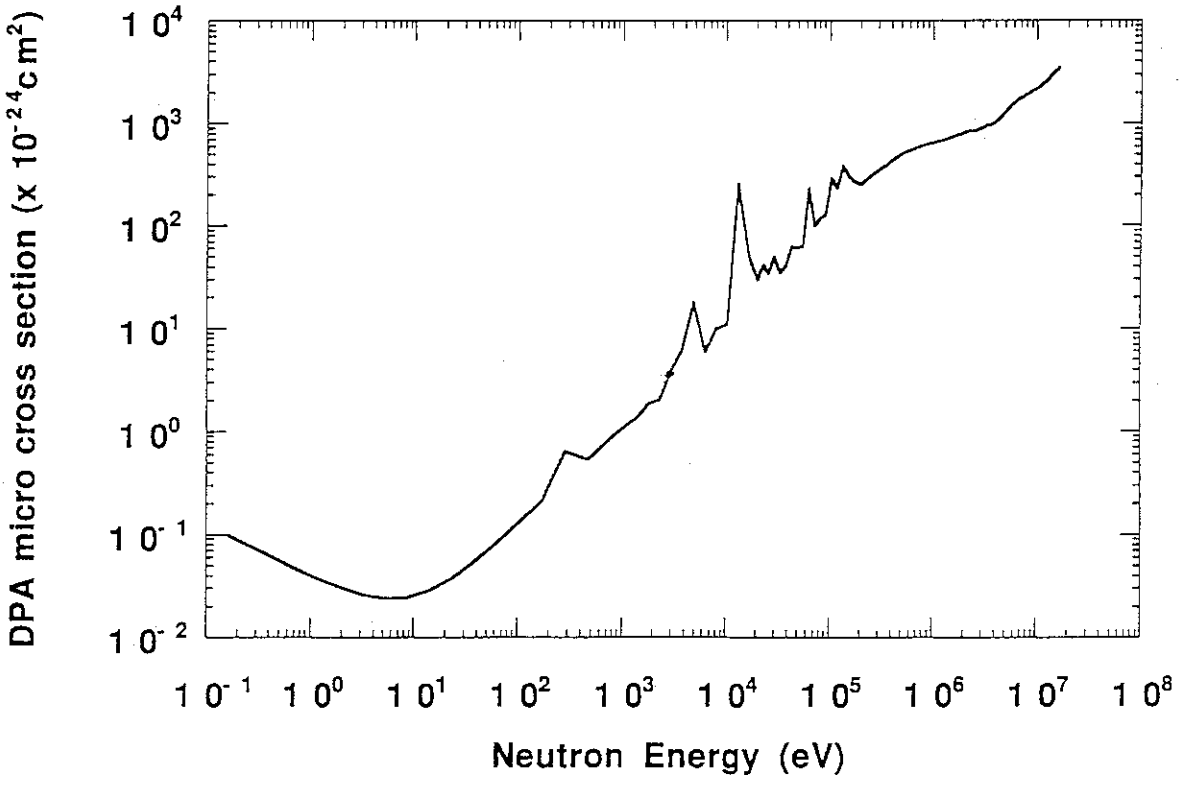

Fig. 3.70 Zr DPA cross section (FUSION-J3)

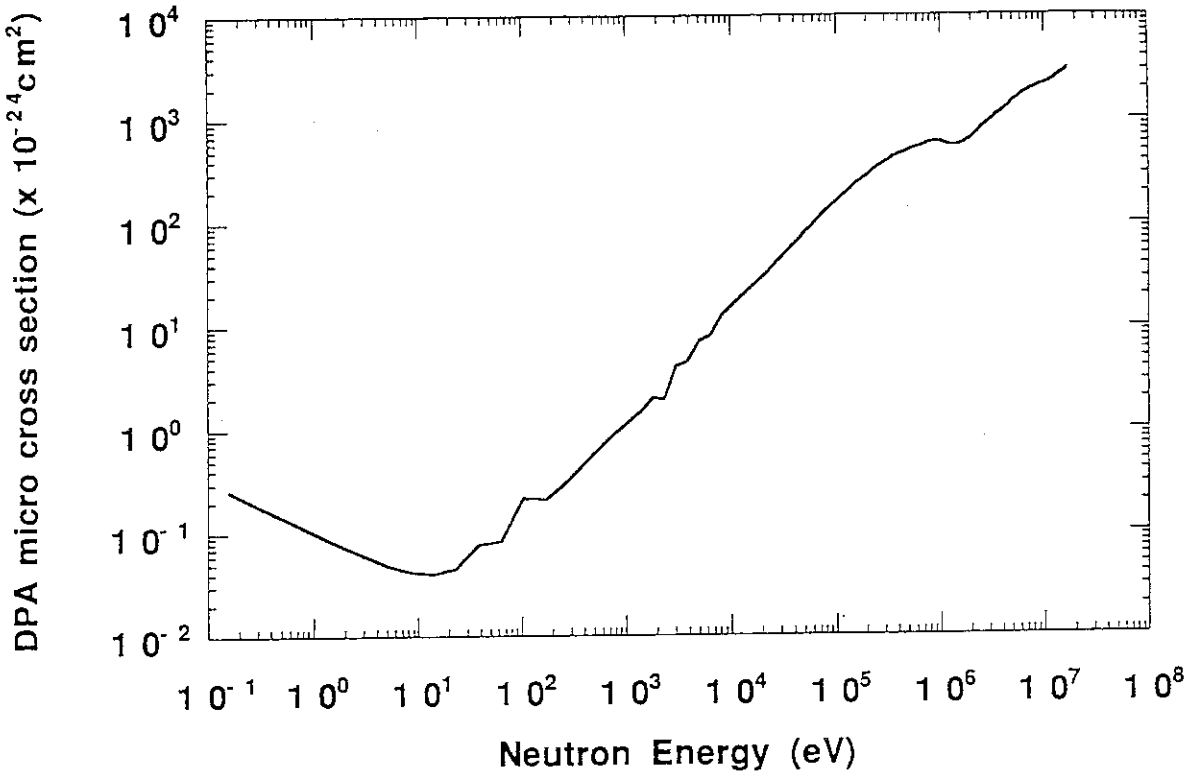

Fig. 3.71 Nb DPA cross section (FUSION-J3)

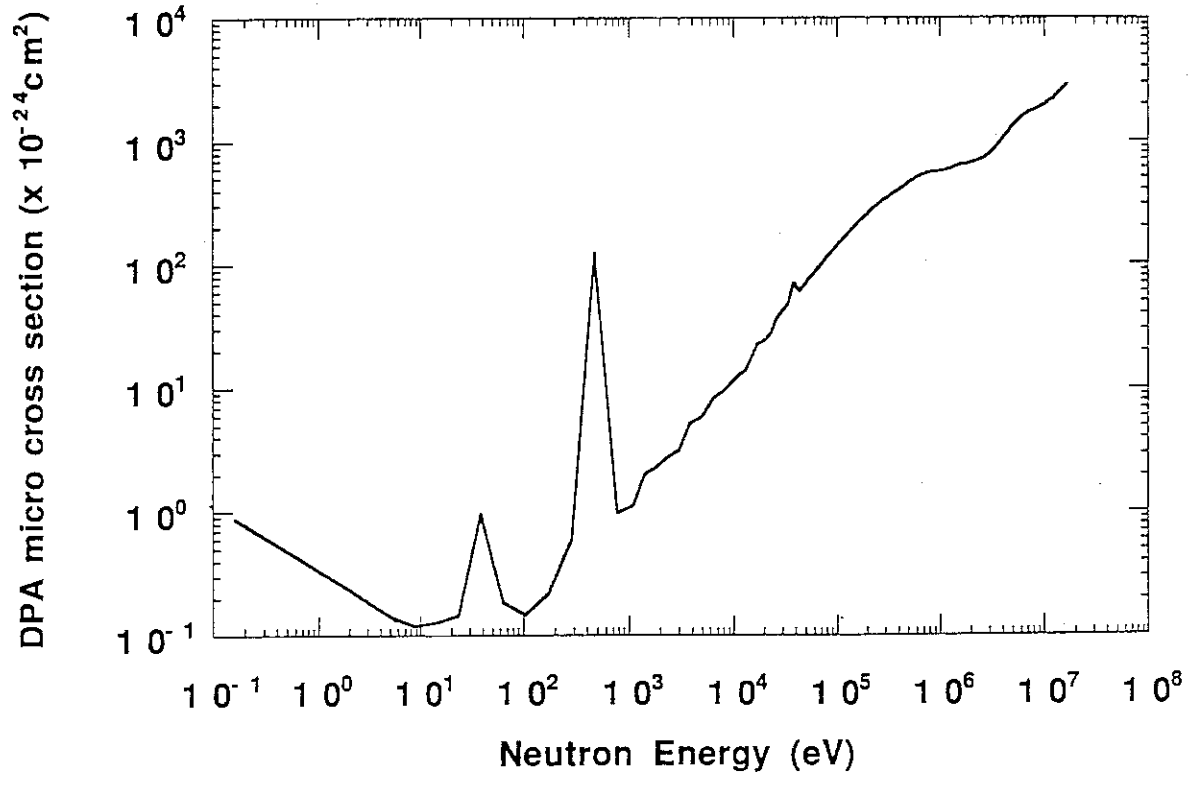

Fig. 3.72 Mo DPA cross section (FUSION-J3)

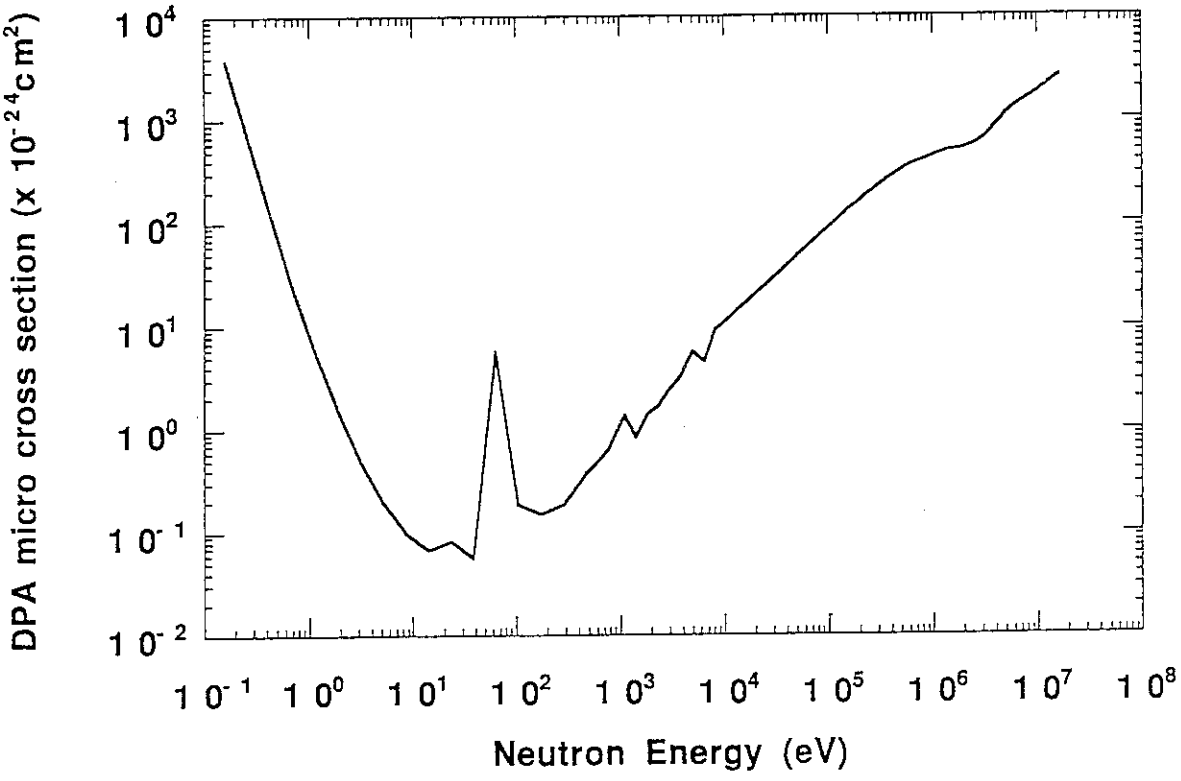

Fig. 3.73 Cd DPA cross section (FUSION-J3)

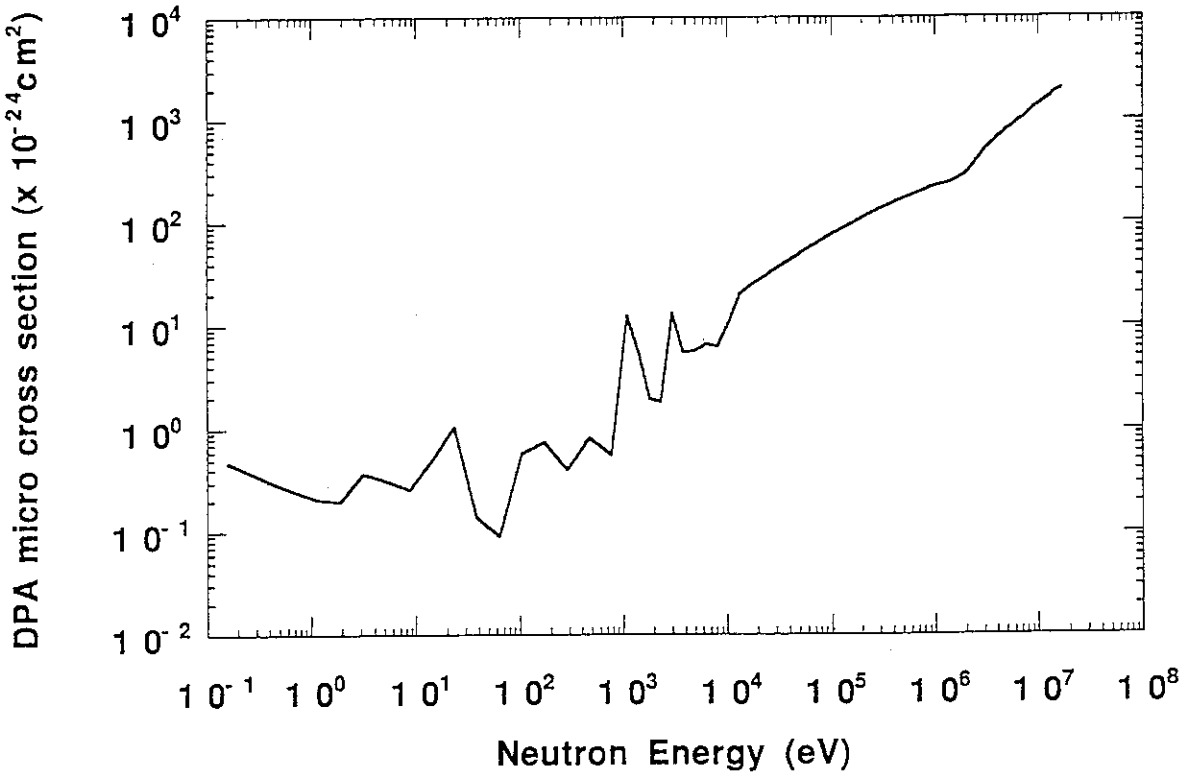

Fig. 3.74 W DPA cross section (FUSION-J3)

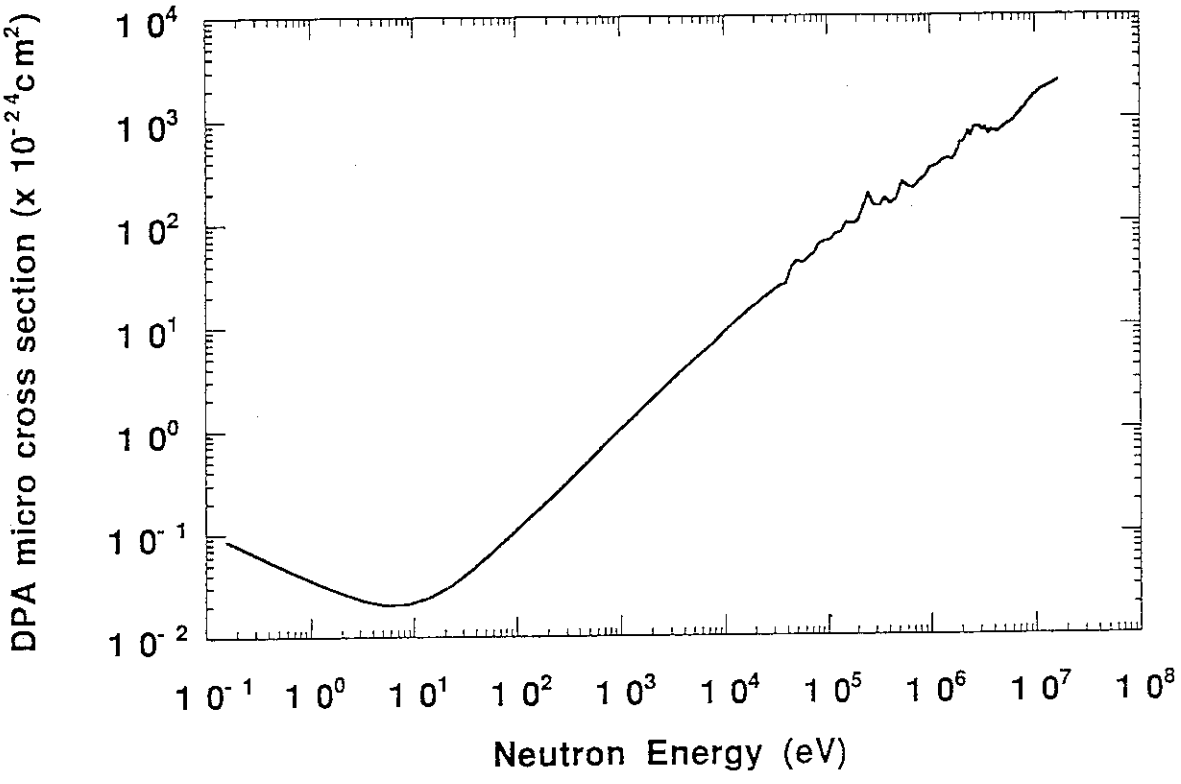

Fig. 3.75 Pb DPA cross section (FUSION-J3)

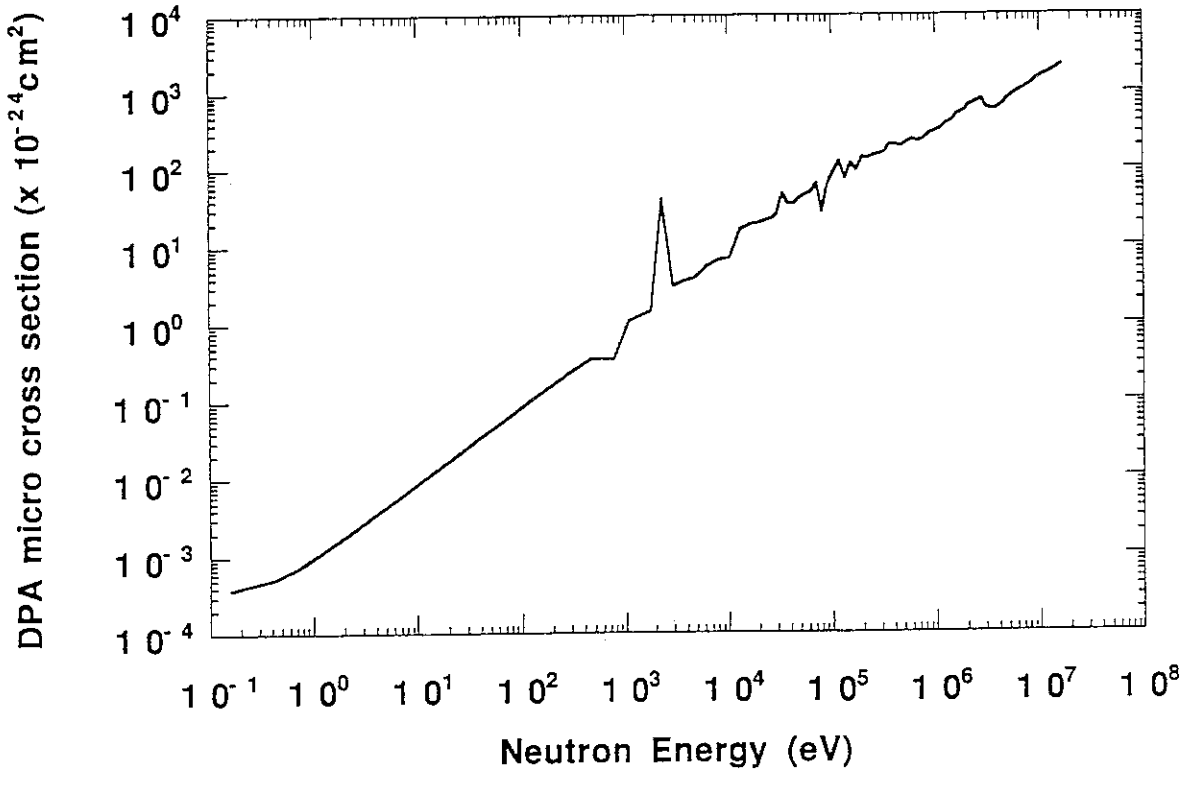

Fig. 3.76 Bi DPA cross section (FUSION-J3)

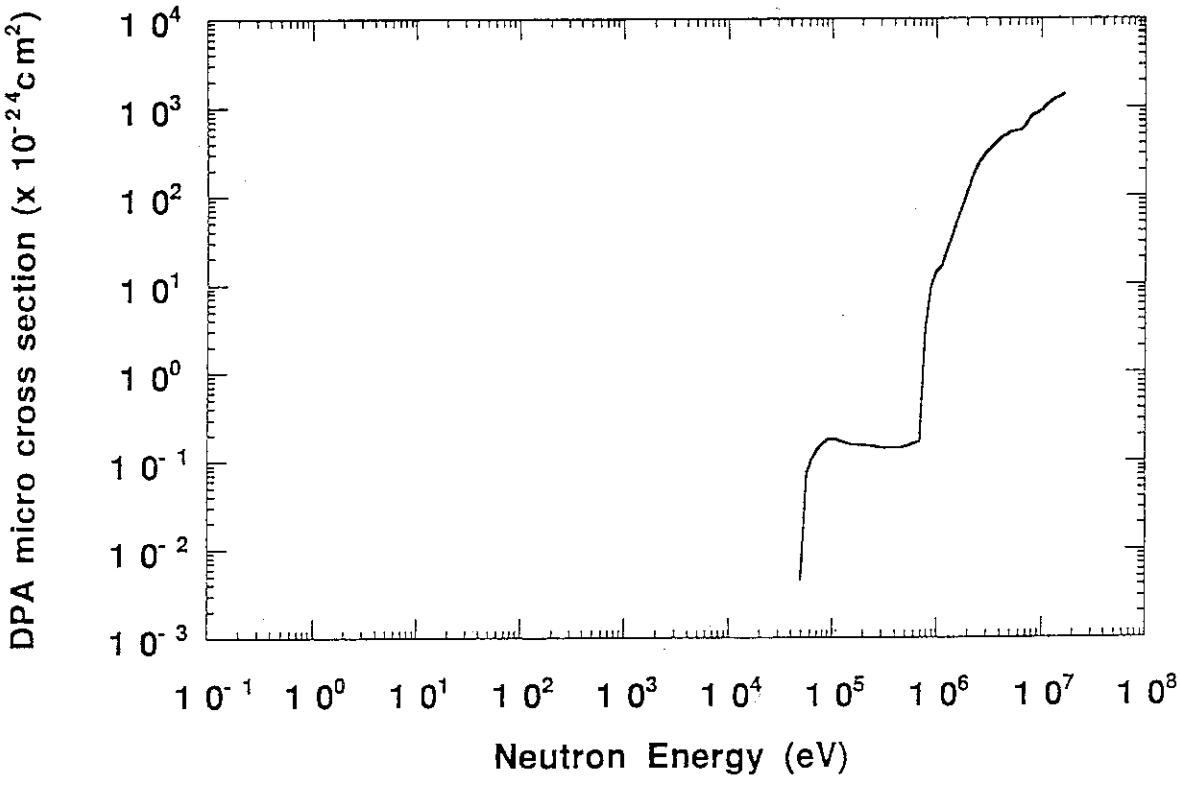

Fig. 3.77 Th DPA cross section (FUSION-J3)

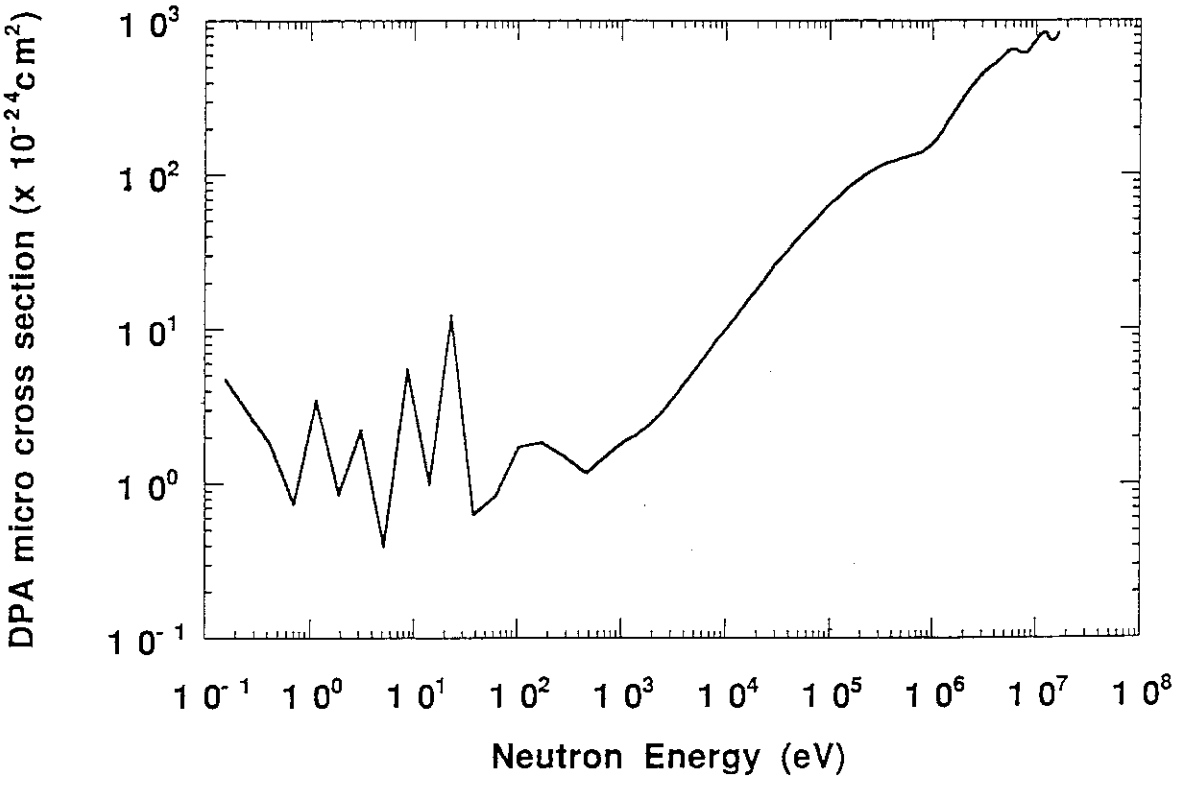

Fig. 3.78 U-235 DPA cross section (FUSION-J3)

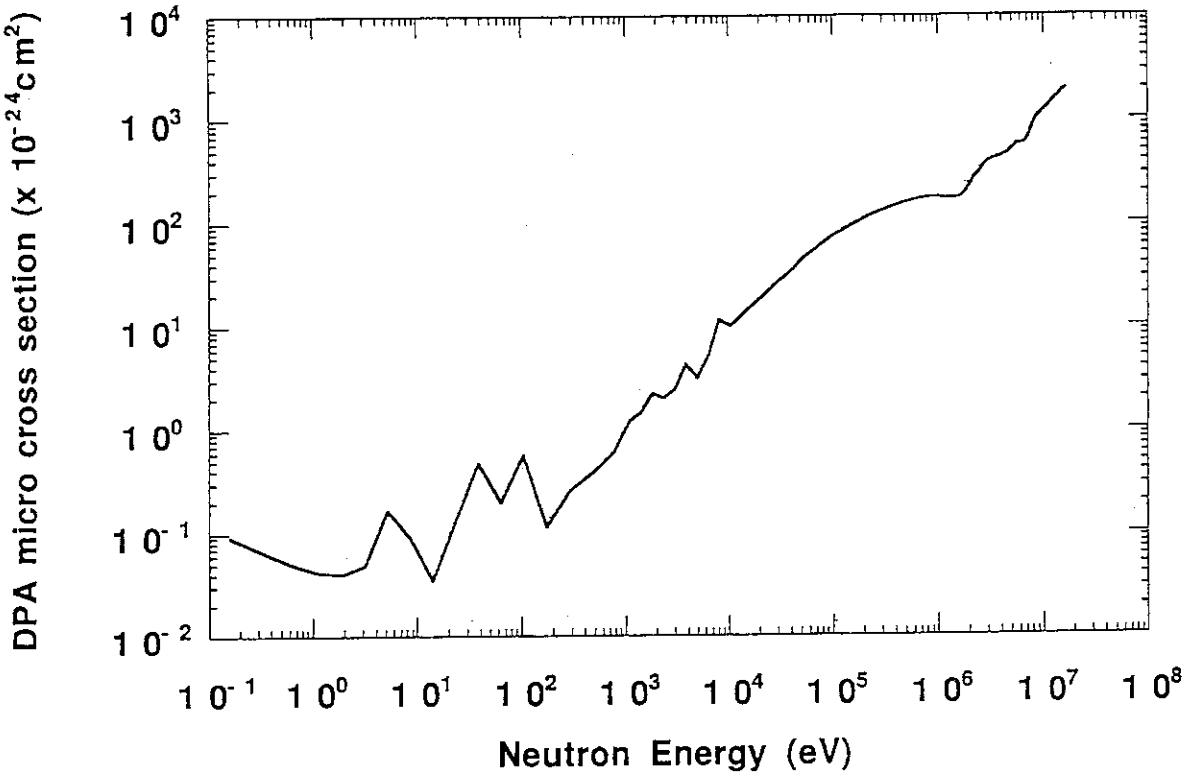

Fig. 3.79 U-238 DPA cross section (FUSION-J3)

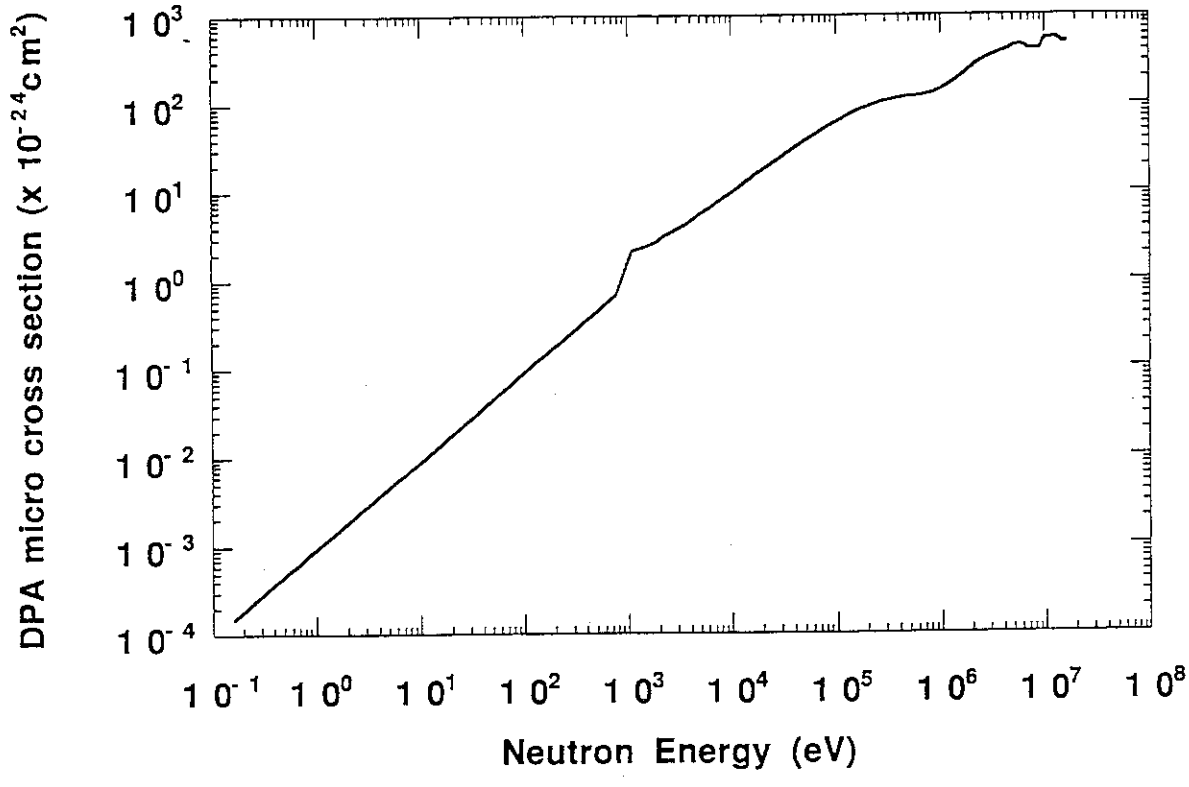

Fig. 3.80 Pu DPA cross section (FUSION-J3)

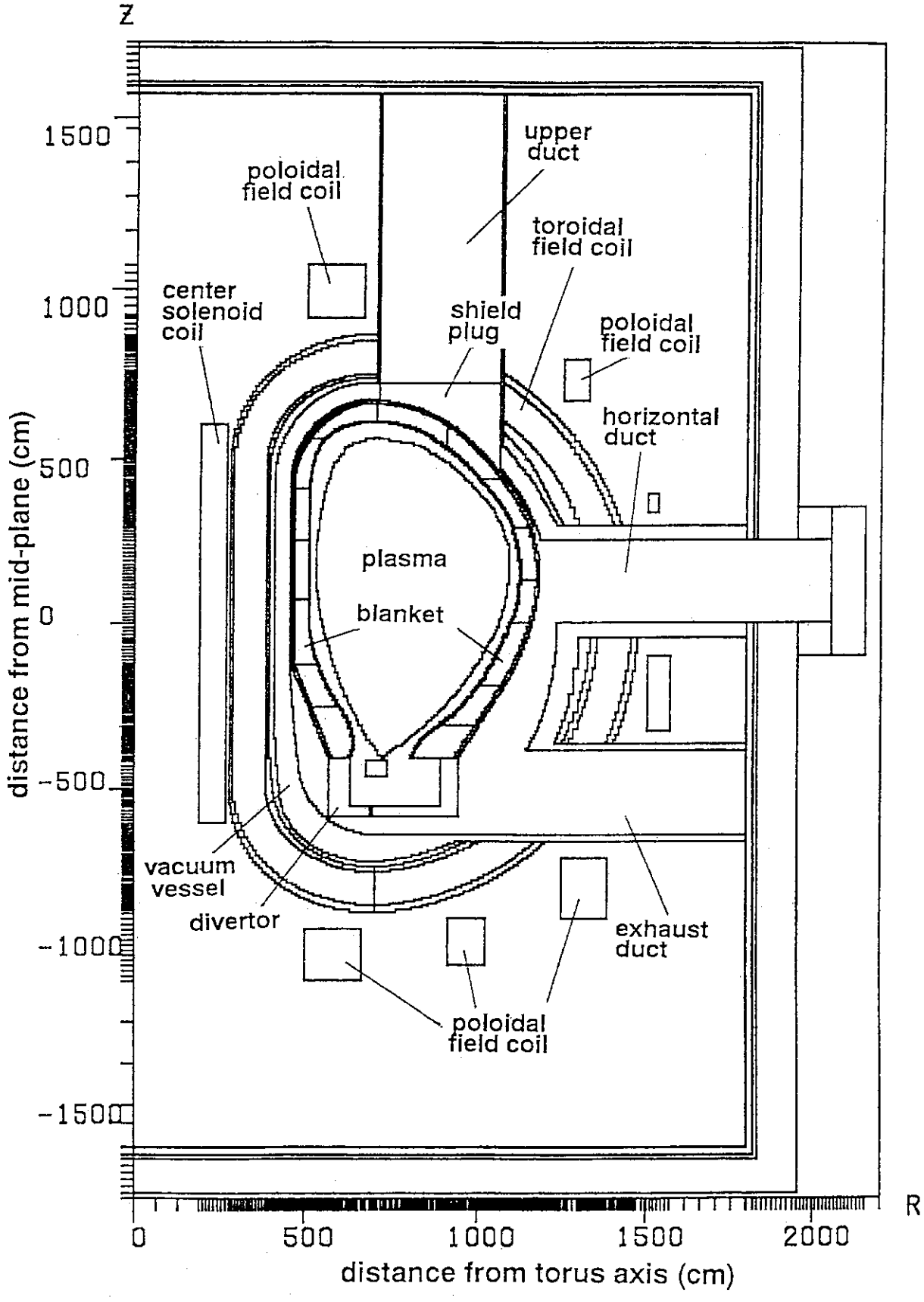

Fig.4.1 Two dimensional RZ torus model of ITER.

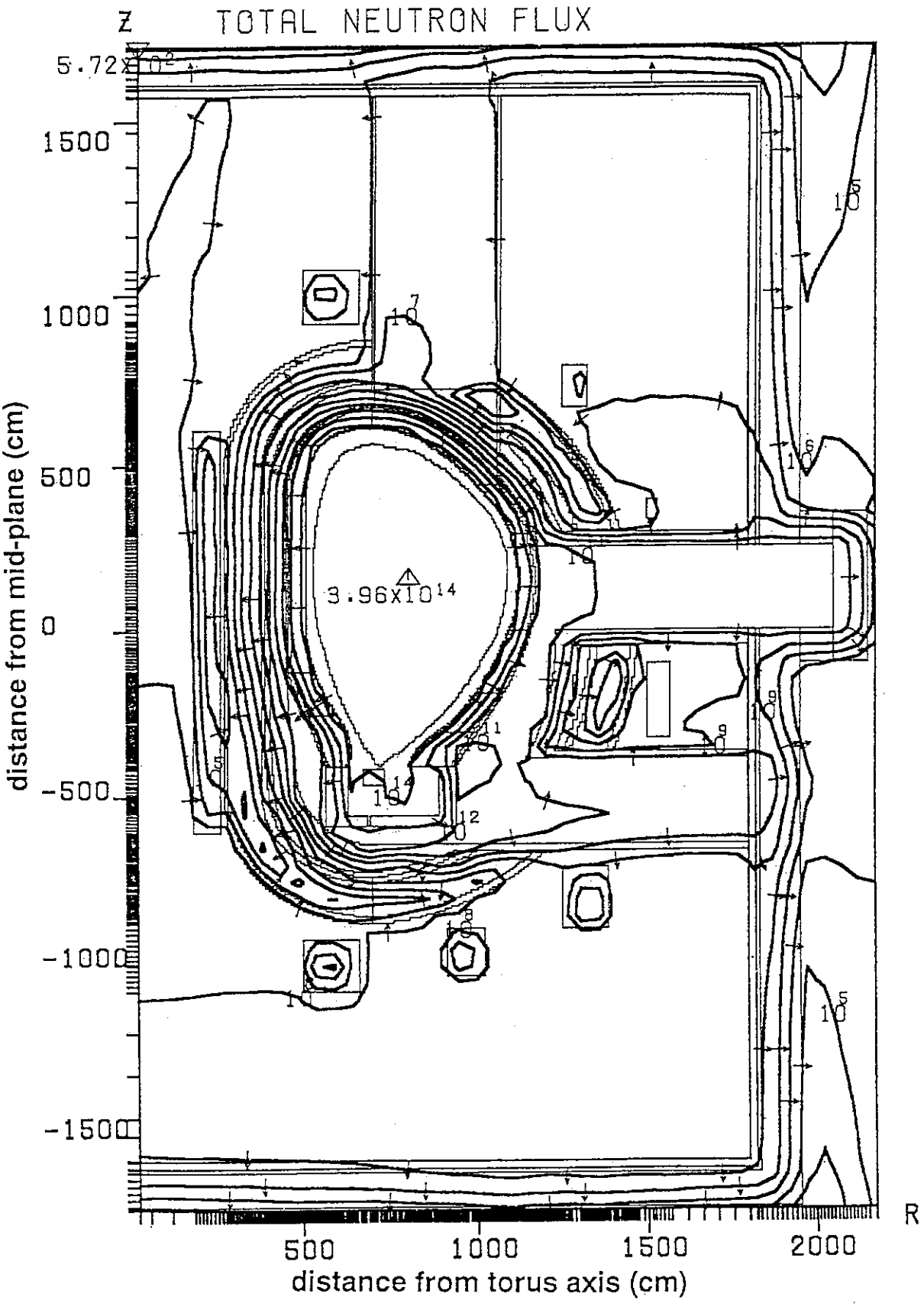

Fig.4.2 Total neutron flux contour in the poloidal cross section in ITER (unit:n/cm²s).

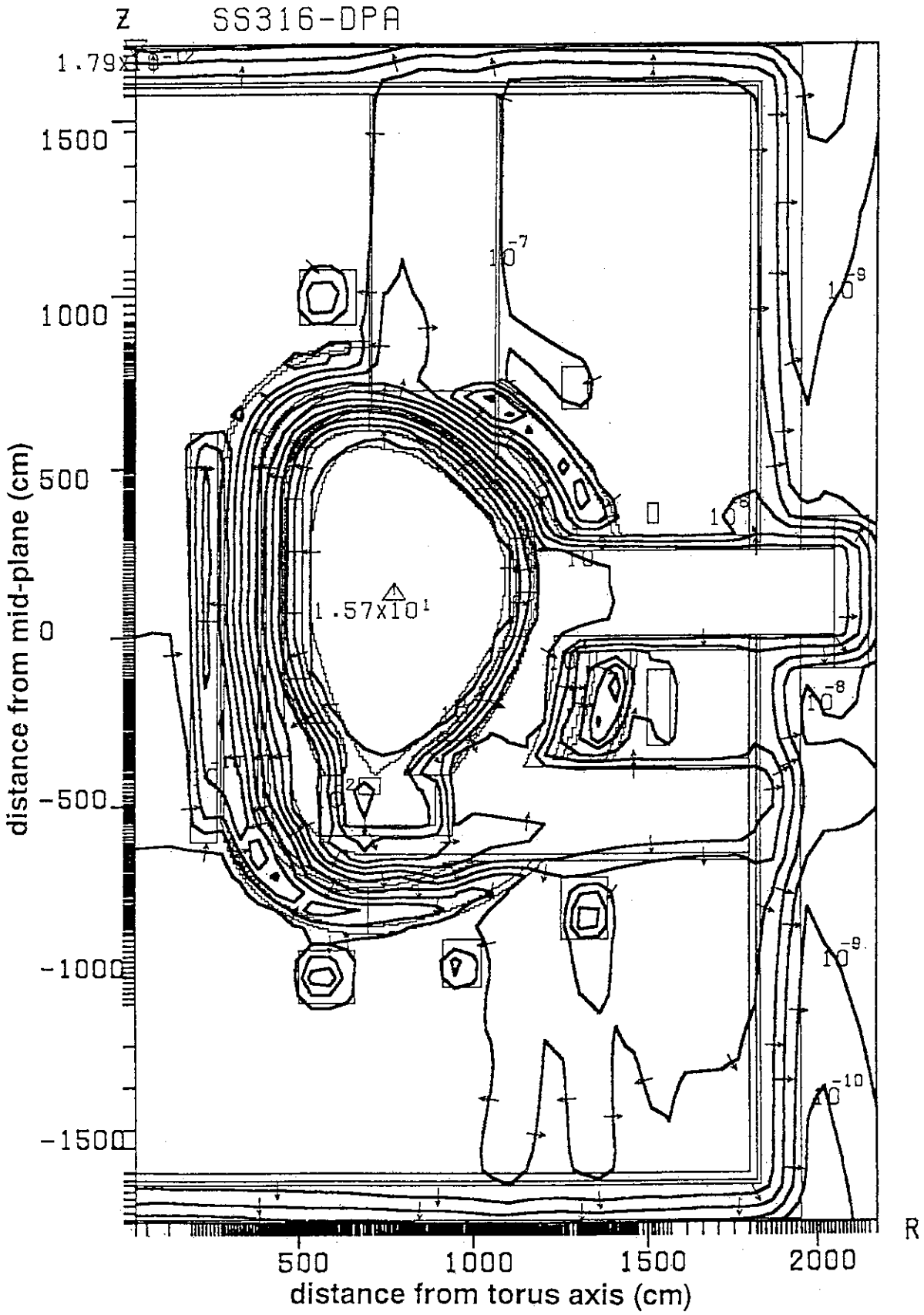

Fig.4.3 Displacement per atom contour of SS316 in the poloidal cross section in ITER (the first wall neutron fluence of 1MWa/m^{2}s, unit:dpa).

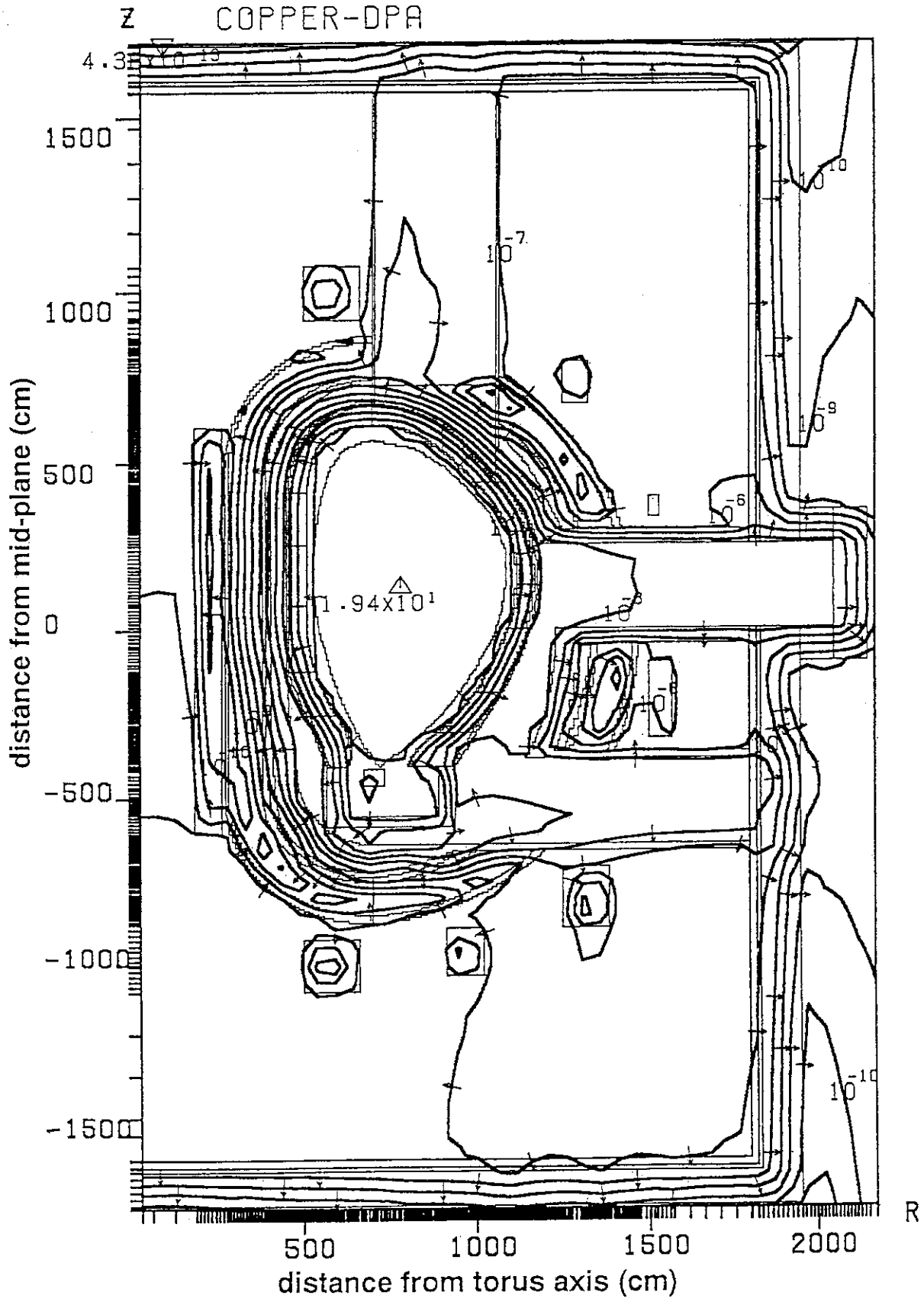

Fig.4.4 Displacement per atom contour of copper in the poloidal cross section in ITER (the first wall neutron fluence of 1MWa/m^{2}s, unit:dpa).

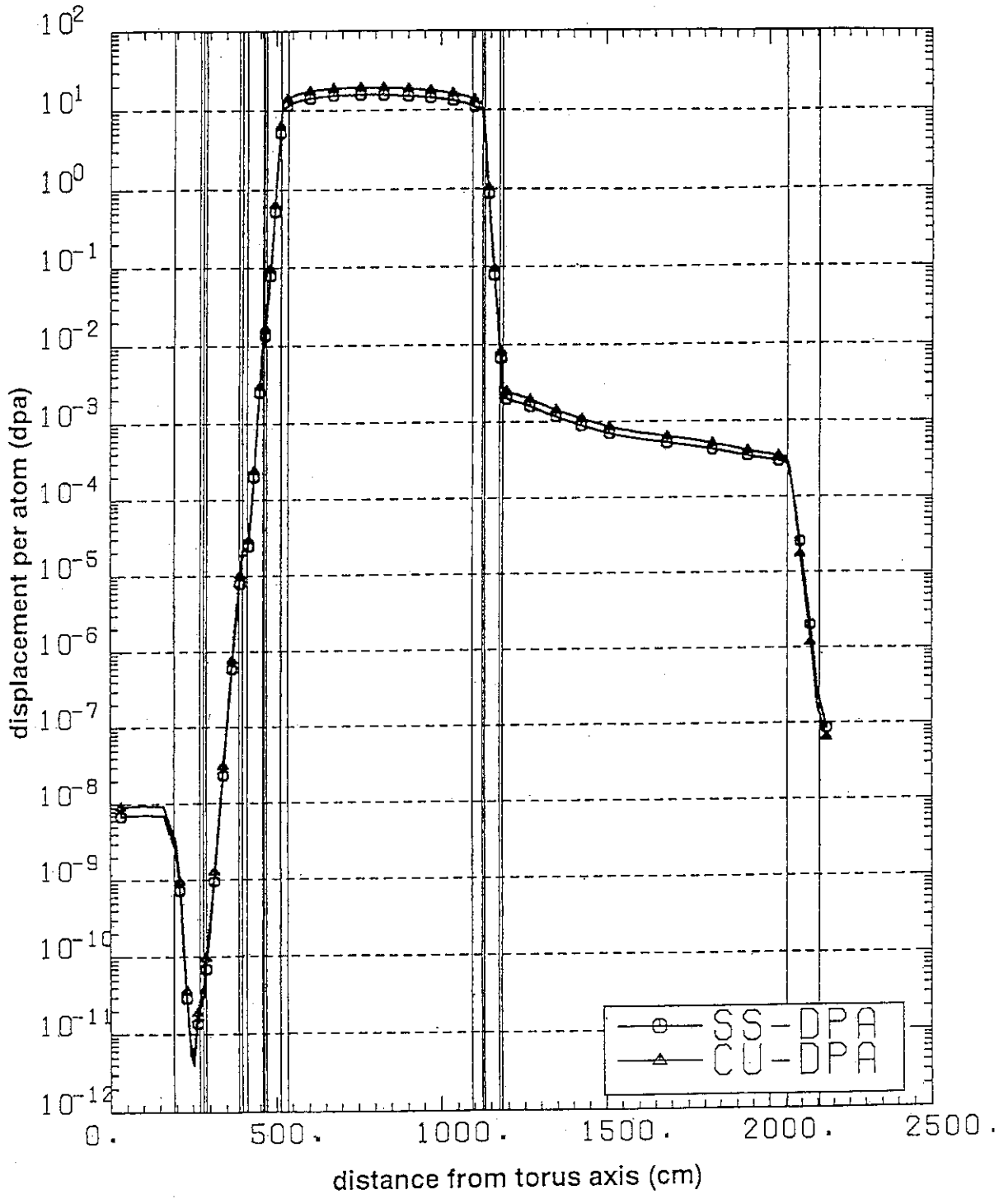

Fig.4.5 Displacement per atom distributions of SS316 and copper on the mid-plane of ITER (the first wall neutron fluence of 1MWa/m^{2}s).