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Evaluated Microscopic Neutron Cross Sections and 26 Group Constants for Cd

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Evaluated microscopic neutron cross sections and 26 group constants for Cd*

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*Work performed within the association in the field of fast reactors between the European Atomic Energy Community and Gesellschaft für Kernforschung mbH., Karlsruhe.

Abstract

This report briefly documents microscopic cross section data for Cd in the energy range 0.001 eV to 15 MeV recently incorporated in the Karlsruhe KEDAK file. The fast neutron cross sections were almost exclusively taken over from an evaluation by Drake from GGA with slight changes only in KeV capture cross sections. In the thermal and resolved resonance energy ranges the neutron cross sections were recalculated from resonance parameters reevaluated with due account of more recent experimental information. The evaluated microscopic cross sections and resonance parameters have been transferred to and are available from the ENEA/CCDN. From the microscopic cross sections (unshielded) group cross sections in the 26 ABN group structure were calculated using both the neutron spectrum of a fast Na cooled prototype reactor and the neutron spectrum of the ABN group cross section set as weighting spectra.

Zusammenfassung

Dieser Bericht stellt eine kurze Dokumentation dar für Wirkungsquerschnittsdaten für Cd im Energiebereich 0.001 eV - 15 MeV, die vor kurzem auf das Karlsruher Kerndatenband KEDAK aufgenommen wurden. Die schnellen Neutronenwirkungsquerschnitte wurden nahezu ausnahmslos von einer Auswertung von Drake (GGA) übernommen mit kleinen Änderungen nur in den keV Einfangquerschnitten. Für thermische Energien und im Gebiet aufgelöster Resonanzen wurden die Resonanzwirkungsquerschnitte neu berechnet. Hierzu wurden neu ausgewertete Resonanzparameter mit Berücksichtigung neuerer experimenteller Informationen verwandt. Die ausgewerteten mikroskopischen Wirkungsquerschnitte und Resonanzparameter wurden an das ENEA/CCDN weitergeleitet und sind von dort erhältlich. Von den mikroskopischen Wirkungsquerschnitten wurden (unabgeschirmte) Gruppenquerschnitte in 26 ABN-Gruppenstruktur berechnet. Hierbei wurden als Wichtungsspektren das Neutronenspektrum eines schnellen Na-gekühlten Prototypreaktors und das Neutronenspektrum des ABN-Gruppenquerschnittssatzes verwandt.

Contents

1. Introduction

This report briefly documents microscopic cross section data for Cd in the energy range 0.001 eV to 15 MeV recently incorporated in the Karlsruhe KEDAK file of evaluated data. The bulk of the fast neutron cross section data above 1 keV has been taken over almost without any change from a recent evaluation by Drake [1]. In the range of resolved resonances below 1 keV more recent resonance parameter information has been considered and incorporated into new sets of resonance parameters for all stable Cd isotopes. Also new cross sections in the thermal and resonance energy ranges have been calculated from these resonance parameters. The evaluated microscopic cross sections and resonance parameters have been transferred to and are available from the ENEA/CCDN.

The microscopic cross sections stored on the KEDAK file were then used to generate (unshielded) group cross sections in the 26 group structure introduced by Abagjan et al. [2] for two different weighting spectra, i.e. the weighting spectrum calculated for the core of a 300 MWe Na cooled fast prototype reactor (Na P-1 spectrum [3]) and the weighting spectrum as used by Abagjan et al. [2].

2. Neutron nuclear data for thermal and resonance energies (0.001 eV $\leq$ E $\leq$ 1.13 keV)

The most recent and first more comprehensive work on resonances of individual Cd isotopes is due to Adamchuk et al. [4]. These authors performed total and radiative capture cross section and self-indication measurements up to 1.5 keV neutron energy and analysed these in terms of resonance energies and neutron widths up to neutron energies (E_{max}) as specified in the table below.

Isotope	E_{max} (eV)
Cd 110	89.6
Cd 111	625.0
Cd 112	1125
Cd 113	858
Cd 114	1107
Cd 116	29.3

In addition for the odd isotopes Cd 111 and Cd 113 quite a number of resonance capture widths and spin values were determined. For most of the resonances the Γ_n and Γ_γ values as obtained by Adamchuk et al. represent the only available information. For the remaining resonances the existing experimental knowledge before Adamchuk's publication is compiled in [5].

The presently recommended resonance parameters are given in table.1. This list comprises only the isotopes Cd 110, 111, 112, 113, 114 and 116; no resonance parameters have so far been measured for the, however, least abundant isotopes Cd 106 (1.215%, [11] and Cd 108 (0.875%, [11]). Where recommended values of resonance energies and neutron widths are given in [5], the average was taken between [5] and Adamchuk, for resonance energies the arithmetic average, for neutron widths the average weighted with the inverse square of the assigned errors. The capture widths are mostly taken from Adamchuk. Average capture widths were determined as arithmetic average of the available experimental data (Cd 111, 113, [4]) or were taken over from references [1] and [5] (Cd 110, 112); they were used for those resonances for which no capture width is known. For Cd 114 and Cd 116 $\overline{\Gamma}_\gamma$ was set equal to $\overline{\Gamma}_\gamma$ of Cd 112. All resonances are assumed to be s-wave. This gives unequivocal J values (1/2) for the resonances of the even isotopes. For the odd isotopes Cd 111 and Cd 113 (I=1/2) in the cases where no resonance spin value had been determined we assumed with Adamchuk a total spin value of 1/2 in order to convert $\overline{2g}\,\Gamma_n$ values to Γ_n. The values of E_{max} given in the table above represent the highest resonance energies for which a full set of resonance parameters is given.

Total, elastic scattering and capture resonance cross sections were calculated from the above resonance parameters for each isotope as a sum of one-level Breit-Wigner terms (many-channel, multi-level random sign approximation as outlined in [6]), however, without the (negligibly small) resonance-resonance interference terms. The potential scattering cross section of Cd was calculated as average weighted with the inverse square of the assigned errors of the rather divergent available experimental information tabulated below. As no isotopic information exists, σ_{pot} was taken the same for all isotopes.

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Reference	Method	σ_{pot} (b)
Hibdon et al. [7]	transmission measuremant	5.42 ± 0.25
Arnold, Nereson [8]	coherent scattering length measurement	7.65 ± 0.78
Brockhouse, Stewart [9]	coherent scattering length measurement	4.83 ± 0.45
Seth et al. [10]	transmission measurement	5.56 ± 0.47

The result is

$$\sigma_{pot} = 5.47 \pm 0.19 \text{ (b)}$$

from which a "best" value for the nuclear radius

$$R = \sqrt{\frac{\sigma_{pot}}{4\pi}} = 6.6 \pm 0.1 \text{ (f)}$$

follows.

The isotopic resonance cross sections were multiplied by the natural isotopic abundances and summed up to give the resonance cross sections of natural Cd. The calculations were extended up to 1130 eV, slightly above the highest resonances at 1125 eV in Cd 112 and at 1107 eV in Cd 114. For the other isotopes the highest known resonances are at lower energies. At those energies, for which no resonances are known for an isotope, a statistical theory estimate including only s-waves was made using the well known formulae (see e.g. [6])

$$\langle \sigma_\gamma \rangle = 2\pi^2 \lambda\!\!\!^{-2} \cdot \sum_J \frac{g_J}{\bar{D}_J} \left\langle \frac{\Gamma_n \Gamma_\gamma}{\Gamma} \right\rangle_J$$

$$\langle \sigma_n \rangle = \sigma_{pot} + 2\pi^2 \lambda\!\!\!^{-2} \sum_J \frac{g_J}{\bar{D}_J} \left\langle \frac{\Gamma_n^2}{\Gamma} \right\rangle_J = \sigma_{pot} + \langle \sigma_n^{res} \rangle$$

$$\langle \sigma_T \rangle = \langle \sigma_\gamma \rangle + \langle \sigma_n \rangle$$

and added to the cross sections of the other isotopes after multiplication with the respective natural isotopic abundance. The energy ranges in which such estimates had to be made and the statistical resonance parameters used for each isotope are given in the table below. Cd 106 and Cd 108 were weglected.

Isotopes	Natural isotopic abundance [11]	So (10^{-4})	$\overline{\Gamma}_\gamma$(meV)	$\overline{D}_{obs}$ (eV)	ΔE(eV)
Cd 110	12.39	0.45	130	282	380-1130
Cd 111	12.75	0.46	119	29.9	630-1130
Cd 112	24.07	0.35	115	176	-
Cd 113	12.26	0.50	113	40.9	860-1130
Cd 114	28.86	0.91	115	175	-
Cd 116	7.58	0.91	115	175	35-1130

For Cd 111, 112, 113 and 114 the s-wave strength function S_o was taken from Adamchuk, for Cd 110 it was taken from [1], for Cd 116, for which only one resonance is known, it was arbitrarily set equal to that of Cd 114. The average observed level distances $\overline{D}_{obs}$ were calculated from the resonance positions appearing in table 1 for all isotopes except Cd 116 for which it was arbitrarily set equal to that of Cd 114. The results of these statistical cross section calculations are plotted in figure 1.

In the thermal energy range, as is well known, the behaviour particularly of the capture cross section, is dominated by the 0.178 eV resonance in Cd 113. Coincidentally the weighted average of the experimental 2200 m/sec capture cross section values given in [5] (2511.5 b) came out almost exactly equal to the value calculated from the resonance parameters of table 1 (2511.9 b). We therefore decided to calculate the cross sections throughout the thermal energy range down to 0.001 eV from the parameters of the positive energy resonances in table 1. It was also not considered nesessary and no attempt was made to include possible contributions of "negative" energy resonances.

We would like to emphasize the purely coincidental character of the agreement in σ_γ (2200 m/sec) mentioned above. This comes about mainly by the value of Meadows and Whalen [12] obtained by the pulsed neutron decay technique and by the particularly small error assigned by these authors to their result which gives it a particularly large weight in the averaging. Other authors using the same technique obtained a lower value and assigned a larger error to their measurement (2445$\pm$ 30 b) [13].

Also three independent measurements by Sokolowski et al. [14], Kay and Harris [13] and Jowitt et al. [15] using three different techniques (total cross section with correction for scattering [14], pulsed neutron decay technique [13], pile oscillator [15]) yielded almost exactly the same, but lower values compared to Meadows and Whalen (2445 ± 25 (b) [14], 2445 ± 30 (b) [13], 2444 ± 30 (b) [15]). There is a still lower pile oscillator value available from Sokolowski et al. [14]. All these arguments taken together favour a lower 2200 m/sec value than that adopted here, and the unweighted arithmetic average of 2450 ± 30 (b) recommended in [5] which is about 60 b or 2.5% lower than our value might be more realistic. In a more thorough reevaluation of the Cd cross sections than the present one these facts together with more recent measurements of the thermal capture cross section of Cd should be taken into account.

The resonance cross sections have been calculated as dense in energy as to allow linear interpolation between values at adjacent energies. Because of the very large number of energies covered only a rather small sample of the total amount of resonance cross section values for the energy range 0.001 eV to 20.0 eV is reproduced in this report in table 2. The meaning of the symbols in this table is as outlined in the introduction to reference [16]. The total set of data may be obtained from the ENEA/CCDN.

3. Neutron nuclear data for fast neutron energies (1.13 keV $< E \leq$ 15 MeV)

In the fast neutron energy region the cross sections so far have been taken over almost without change from the evaluation of Drake [1], since most of the data seem still to be valid. For the explanation of the evaluation procedures and documentation of the evaluated data the reader is referred to the mentioned report [1].

A few slight changes need extra mentioning. The first concerns σ_γ. Since the deadline of Drake's work new σ_γ measurements have been performed by Kompe [17] in the energy range 11.9 keV to 158 keV, using the Karlsruhe Van de Graaff accelerator and a large liquid scintillator. These data originally were normalised to the σ_γ (Au) curve recommended by Pönitz

[25] which was obtained by renormalising experimental data in the energy range 1 keV - 1 MeV published by other authors to a "best" value of σ_γ (Au) at 30 keV. Later on Kompe et al. [18] renormalized their σ_γ (Cd) data to the "grey" neutron detector σ_γ (Au) measurements of Pönitz et al. [26] in the energy range 25 to 500 keV which are normalised to a redetermined "best" value of σ_γ (Au) at 30 keV. We used these latter data of Kompe for σ_γ (Cd) [18].

Above 30 keV they are in exellent agreement with the earlier measurements of Gibbons et al. [19] , but are slightly lower than these between 20 and 30 keV, and on the average about 15% lower between 10 and 20 keV. This can be seen from figure 2 in which the available σ_γ measurements on Cd in the keV range of neutron energies are plotted. Above 10 keV Drake's recommended σ_γ values correspond to an average curve through the data of Gibbons et al. [19]. We followed Drake's recommendations below 7 and above 30 keV and chose several % lower values between 7 and 30 keV as an average between Gibbons and Kompe. For σ_T kept constant these changes in σ_γ compared to Drake entail slight changes in σ_n and σ_{tr}.

Secondly Drake [1] evaluated Legendre expansion coefficients for elastic scattering f_1^C in the center - of - mass system. We need only the first Legendre expansion coefficient in the laboratory system $f_1^L = \overline{\cos\theta_L} = \overline{\mu}_L$. This was obtained from Drake's f_1^C according to the formula [27]

$$\overline{\mu}_L = \frac{2}{3A} + \left(1 - \frac{3}{5A^2}\right) f_1^C + \left(\frac{4}{7A^3} - \frac{2}{3A}\right) f_2^C + \dots$$

$$\cong f_1^C + 0.007742\left(1 - f_2^C\right)$$

$$\text{for } A\,(\text{Cd}) = 112.41 \gg 1$$

For isotropic scattering in the center - of - mass system below 100 keV

$$f_l^C = 0 \quad \text{for } l \geq 1 \quad \text{and} \quad \overline{\mu}_L = 0.007742$$

Table 2 contains all fast energy cross section data except inelastic excitation cross sections; these are reproduced in table 3.

4. 26 group cross sections

From the microscopic cross sections as discussed in sections 2 and 3 unshielded group cross sections were generated using the 26 energy groups structure introduced by Abagjan et al. [2]. As weighting spectra the neutron energy spectrum calculated for the core of a 300 MWe Na cooled fast prototype reactor (Na P-1 spectrum [3]) and the neutron energy spectrum as used by Abagjan et al. [2] (fission spectrum in the ABN groups 1-3, 1/E-spectrum in the ABN-groups 4 - 25) were applied. The results for the NaP-1 spectrum are given in tables 4 (cross sections) and 5 (inelastic scattering matrix), for the ABN spectrum in tables 6 (cross sections) and 7 (inelastic scattering matrix). The meanings of the group cross section symbols used in these tables are

$\sigma_a = \sigma_\gamma + \sigma_p + \sigma_\alpha$ = absorption cross section

σ_n = elastic scattering cross section

σ'_n = inelastic scattering cross section

$\bar{\mu}_L = \overline{\cos \theta_L}$

$\sigma_{er} = \sigma_n^{ii+1}$ = elastic removal cross section
= cross section for elastic scattering from group i in the next lower group i + 1

σ_{tr} = transport cross section

$\sigma_{n'}^{ii+k}$ = cross section for inelastic scattering from group i into group i + k

The cross sections in the 26 th group are in both group sets identical and are the cross section values at o.0253 eV.

For the calculation of σ_{er} the improved treatment (compared to that proposed by Yiftah et al. [28]) given by Huschke [3] was used. We shall not reproduce the formulae here, but refer for convenience only to the formulae numbers in Huschke's report. Thus formula 3.14 was used for energies above 100 keV (groups 1-8) together with the formulae 3.9 and 3.13, for energies below 100 keV (groups 9-25) together

with the formulae 3.27 and 3.28.

For the generation of the inelastic scattering matrices in the groups 5-7 the excitation cross sections of individual levels as given in table 3 were used, in the groups 1-4 an evaporation model for the inelastic scattering energy spectra [29] with nuclear temperatures as recommended by Swarczbaum et al. [30] was used.

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Table 1

Recommended parameters of resolved resonances for stable Cd isotopes

Isotope	E_r(eV)	Γ_n(meV)	Γ_γ(meV)	l	J
Cd 110	89.6 [4,5]	116,7 [4,5]	130.0 [1,5]	0	0.5
I=0	372.0 [4]	991.0 [1]	130.0 [1,5]	0	0.5
Cd 111	27.7 [5]	7.7 [4,5]	119.0 [4]	0	1.0
I=1/2	69.5 [4]	0.136 [4]	119.0 [4]	0	0.5
	86.3 [4,5]	5.2 [4,5]	119.0 [4]	0	0.5
	99.6 [4,5]	13.3 [4,5]	72.0 [4]	0	1.0
	103.2 [4]	1.44 [4]	119.0 [4]	0	0.5
	115.0 [4]	0.66 [4]	119.0 [4]	0	0.5
	138.3 [4,5]	13.0 [4,5]	119.0 [4]	0	1.0
	164.3 [4,5]	44.8 [4,5]	104.0 [4]	0	1.0
	225.4 [4,5]	50.0 [4]	119.0 [4]	0	0.5
	233.7 [4,5]	230.0 [4,5]	160.0 [4]	0	0.0
	275.8 [4]	34.0 [4]	119.0 [4]	0	0.5
	314.0 [4]	5.4 [4]	119.0 [4]	0	0.5
	332.2 [4]	12.0 [4]	119.0 [4]	0	0.5
	356.5 [4]	49.0 [4]	93.0 [4]	0	1.0
	389.5 [4]	124.0 [4]	90.0 [4]	0	0.0
	439.0 [4]	24.0 [4]	119.0 [4]	0	0.5
	480.0 [4]	14.0 [4]	119.0 [4]	0	0.5
	541.0 [4]	126.0 [4]	119.0 [4]	0	0.5
	578.0 [4]	296.0 [4]	150.0 [4]	0	0.0
	606.0 [4]	90.0 [4]	119.0 [4]	0	0 5
	625.0 [4]	104.0 [4]	119.0 [4]	0	0.5
Cd 112	66.7 [4,5]	9.6 [4,5]	90.0 [5]	0	0.5
I = 0	83 3 [4]	0.76 [4]	115.0 [1]	0	0.5
	226.7 [4,5]	26.3 [4,5]	115.0 [1]	0	0.5
	444.3 [4]	60.0 [4]	115.0 [1]	0	0.5
	743.0 [4]	180.0 [4]	115.0 [1]	0	0.5
	935.0 [4]	220.0 [4]	115.0 [1]	0	0.5
	1125.0 [4]	600.0 [4]	115.0 [1]	0	0.5

Isotope	E_r(eV)	Γ_n(meV)	Γ_γ(meV)	l	J
Cd 113	0.178 [4,5]	0.65 [4,5]	113.0 [4,5]	0	1.0
I = 1/2	18.4 [4,5]	0.19 [4,5]	113.0 [4]	0	1.0
	56.3 [4]	0.106 [4]	113.0 [4]	0	0.5
	63.9 [4.5]	3.8 [4,5]	110.0 [4]	0	1.0
	84.9 [4,5]	27.0 [4,5]	121.0 [4]	0	1.0
	108.5 [4,5]	15.0 [4,5]	128.0 [4]	0	1.0
	143.9 [4,5]	6.6 [4,5]	113.0 [4]	0	0.5
	159.0 [4,5]	18.0 [4,5]	113.0 [4]	0	0.5
	193.3 [4,5]	224.0 [4,5]	112.0 [4]	0	0.0
	215.7 [4,5]	24.0 [4,5]	114.0 [4]	0	1.0
	261.5 [4]	45.0 [4]	106.0 [4]	0	1.0
	270.0 [4]	64.0 [4]	124.0 [4]	0	0.0
	292.2 [4]	11.4 [4]	113.0 [4]	0	0.5
	415.8 [4]	140.0 [4]	116.0 [4]	0	1.0
	433.8 [4]	36.0 [4]	110.0 [4]	0	1.0
	503.0 [4]	80.0 [4]	95.0 [4]	0	1.0
	527.0 [4]	44.0 [4]	100.0 [4]	0	1.0
	552.0 [4]	137.0 [4]	110.0 [4]	0	1.0
	625.0 [4]	80.0 [4]	113.0 [4]	0	0.5
	675.0 [4]	190.0 [4]	113.0 [4]	0	0.5
	724.0 [4]	53.0 [4]	113.0 [4]	0	1.0
	858.0 [4]	660.0 [4]	113.0 [4]	0	1.0
Cd 114	58.7 [1]	0.077 [1]	115.0	0	0.5
I = 0	120.1 [4,5]	57.0 [4,5]			
	226.0 [4]	1.8 [4]			
	394.1 [4]	760.0 [4]			
	673.0 [4]	220.0 [4]			
	756.0 [4]	140.0 [4]			
	1107.0 [4]	1500.0 [4]	115.0	0	0.5
Cd 116	29.3 [4]	0.042 [4]	115.0	0	0.5
I = 0					

Table 2

MATERIAL CD

Evaluated microscopic cross sections for Cd

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
1.0000E-3	23.0259	9712.44100	6.83980	9712.38800	9705.60100	0.0	0.0	0.0	9705.60100
2.0000E-3	22.3327	6940.58700	6.87024	6940.53400	6933.71700	0.0	0.0	0.0	6933.71700
3.0000E-3	21.9272	5726.95000	6.90122	5726.89700	5720.04900	0.0	0.0	0.0	5720.04900
4.0000E-3	21.6396	5012.23600	6.93277	5012.18200	5005.30300	0.0	0.0	0.0	5005.30300
5.0000E-3	21.4164	4530.69100	6.96488	4530.63700	4523.72600	0.0	0.0	0.0	4523.72600
6.0000E-3	21.2341	4179.99100	6.99758	4179.93700	4172.99400	0.0	0.0	0.0	4172.99400
7.0000E-3	21.0799	3911.28100	7.03088	3911.22700	3904.25100	0.0	0.0	0.0	3904.25100
8.0000E-3	20.9464	3697.91500	7.06478	3697.86000	3690.85000	0.0	0.0	0.0	3690.85000
9.0000E-3	20.8286	3523.97100	7.09931	3523.91600	3516.87200	0.0	0.0	0.0	3516.87200
10.0000E-3	20.7233	3379.27700	7.13447	3379.22100	3372.14200	0.0	0.0	0.0	3372.14200
15.0000E-3	20.3178	2913.57400	7.32029	2913.51800	2906.25400	0.0	0.0	0.0	2906.25400
20.0000E-3	20.0301	2667.68800	7.52423	2667.63000	2660.16400	0.0	0.0	0.0	2660.16400
25.3000E-3	19.7950	2519.64300	7.76256	2519.58300	2511.88100	0.0	0.0	0.0	2511.88100
30.0000E-3	19.6247	2444.44100	7.99525	2444.37900	2436.44600	0.0	0.0	0.0	2436.44600
40.0000E-3	19.3370	2389.51700	8.56833	2389.45100	2380.94900	0.0	0.0	0.0	2380.94900
50.0000E-3	19.1138	2427.66400	9.27057	2427.59200	2418.39400	0.0	0.0	0.0	2418.39400
60.0000E-3	18.9315	2534.41900	10.13751	2534.34000	2524.28100	0.0	0.0	0.0	2524.28100
65.0000E-3	18.8515	2610.98500	10.64681	2610.90300	2600.33800	0.0	0.0	0.0	2600.33800
70.0000E-3	18.7774	2702.87300	11.21583	2702.78600	2691.65800	0.0	0.0	0.0	2691.65800
75.0000E-3	18.7084	2810.48500	11.85273	2810.39300	2798.63300	0.0	0.0	0.0	2798.63300

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
1.0000E-3	23.0259	0.0	0.0	9705.60100	0.00774	0.0	0.0	0.0	0.0
2.0000E-3	22.3327	0.0	0.0	6933.71700	0.00774	0.0	0.0	0.0	0.0
3.0000E-3	21.9272	0.0	0.0	5720.04900	0.00774	0.0	0.0	0.0	0.0
4.0000E-3	21.6396	0.0	0.0	5005.30300	0.00774	0.0	0.0	0.0	0.0
5.0000E-3	21.4164	0.0	0.0	4523.72600	0.00774	0.0	0.0	0.0	0.0
6.0000E-3	21.2341	0.0	0.0	4172.99400	0.00774	0.0	0.0	0.0	0.0
7.0000E-3	21.0799	0.0	0.0	3904.25100	0.00774	0.0	0.0	0.0	0.0
8.0000E-3	20.9464	0.0	0.0	3690.85000	0.00774	0.0	0.0	0.0	0.0
9.0000E-3	20.8286	0.0	0.0	3516.87200	0.00774	0.0	0.0	0.0	0.0
10.0000E-3	20.7233	0.0	0.0	3372.14200	0.00774	0.0	0.0	0.0	0.0
15.0000E-3	20.3178	0.0	0.0	2906.25400	0.00774	0.0	0.0	0.0	0.0
20.0000E-3	20.0301	0.0	0.0	2660.16400	0.00774	0.0	0.0	0.0	0.0
25.3000E-3	19.7950	0.0	0.0	2511.88100	0.00774	0.0	0.0	0.0	0.0
30.0000E-3	19.6247	0.0	0.0	2436.44600	0.00774	0.0	0.0	0.0	0.0
40.0000E-3	19.3370	0.0	0.0	2380.94900	0.00774	0.0	0.0	0.0	0.0
50.0000E-3	19.1138	0.0	0.0	2418.39400	0.00774	0.0	0.0	0.0	0.0
60.0000E-3	18.9315	0.0	0.0	2524.28100	0.00774	0.0	0.0	0.0	0.0
65.0000E-3	18.8515	0.0	0.0	2600.33800	0.00774	0.0	0.0	0.0	0.0
70.0000E-3	18.7774	0.0	0.0	2691.65800	0.00774	0.0	0.0	0.0	0.0
75.0000E-3	18.7084	0.0	0.0	2798.63300	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
80.0000E-3	18.6438	2934.53500	12.56679	2934.43800	2921.96800	0.0	0.0	0.0	2921.96800
85.0000E-3	18.5832	3076.00000	13.36859	3075.89700	3062.63200	0.0	0.0	0.0	3062.63200
90.0000E-3	18.5260	3236.07900	14.27007	3235.96900	3221.80900	0.0	0.0	0.0	3221.80900
95.0000E-3	18.4720	3416.14600	15.28462	3416.02700	3400.86100	0.0	0.0	0.0	3400.86100
100.0000E-3	18.4207	3617.68800	16.42704	3617.56100	3601.26100	0.0	0.0	0.0	3601.26100
110.0000E-3	18.3254	4091.18400	19.16058	4091.03500	4072.02300	0.0	0.0	0.0	4072.02300
120.0000E-3	18.2384	4666.32900	22.60499	4666.15400	4643.72400	0.0	0.0	0.0	4643.72400
130.0000E-3	18.1583	5343.12700	26.87238	5342.91900	5316.25500	0.0	0.0	0.0	5316.25500
140.0000E-3	18.0842	6097.61100	31.97489	6097.36300	6065.63600	0.0	0.0	0.0	6065.63600
150.0000E-3	18.0152	6861.38000	37.68650	6861.08800	6823.69400	0.0	0.0	0.0	6823.69400
160.0000E-3	17.9507	7505.76500	43.38217	7505.42900	7462.38300	0.0	0.0	0.0	7462.38300
165.0000E-3	17.9199	7729.54400	45.90749	7729.18800	7683.63600	0.0	0.0	0.0	7683.63600
170.0000E-3	17.8901	7859.17700	48.01743	7858.80600	7811.16000	0.0	0.0	0.0	7811.16000
172.0000E-3	17.8784	7880.92100	48.71313	7880.54400	7832.20800	0.0	0.0	0.0	7832.20800
174.0000E-3	17.8668	7884.37000	49.31238	7883.98800	7835.05800	0.0	0.0	0.0	7835.05800
176.0000E-3	17.8554	7869.13700	49.80895	7868.75100	7819.32800	0.0	0.0	0.0	7819.32800
178.0000E-3	17.8441	7835.10500	50.19801	7834.71600	7784.90700	0.0	0.0	0.0	7784.90700
180.0000E-3	17.8329	7782.43500	50.47625	7782.04400	7731.95900	0.0	0.0	0.0	7731.95900
182.0000E-3	17.8218	7711.56600	50.64205	7711.17300	7660.92400	0.0	0.0	0.0	7660.92400
184.0000E-3	17.8109	7623.20000	50.69541	7622.80700	7572.50400	0.0	0.0	0.0	7572.50400

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
80.0000E-3	18.6438	0.0	0.0	2921.96800	0.00774	0.0	0.0	0.0	0.0
85.0000E-3	18.5832	0.0	0.0	3062.63200	0.00774	0.0	0.0	0.0	0.0
90.0000E-3	18.5260	0.0	0.0	3221.80900	0.00774	0.0	0.0	0.0	0.0
95.0000E-3	18.4720	0.0	0.0	3400.86100	0.00774	0.0	0.0	0.0	0.0
100.0000E-3	18.4207	0.0	0.0	3601.26100	0.00774	0.0	0.0	0.0	0.0
110.0000E-3	18.3254	0.0	0.0	4072.02300	0.00774	0.0	0.0	0.0	0.0
120.0000E-3	18.2384	0.0	0.0	4643.72400	0.00774	0.0	0.0	0.0	0.0
130.0000E-3	18.1583	0.0	0.0	5316.25500	0.00774	0.0	0.0	0.0	0.0
140.0000E-3	18.0842	0.0	0.0	6065.63600	0.00774	0.0	0.0	0.0	0.0
150.0000E-3	18.0152	0.0	0.0	6823.69400	0.00774	0.0	0.0	0.0	0.0
160.0000E-3	17.9507	0.0	0.0	7462.38300	0.00774	0.0	0.0	0.0	0.0
165.0000E-3	17.9199	0.0	0.0	7683.63600	0.00774	0.0	0.0	0.0	0.0
170.0000E-3	17.8901	0.0	0.0	7811.16000	0.00774	0.0	0.0	0.0	0.0
172.0000E-3	17.8784	0.0	0.0	7832.20800	0.00774	0.0	0.0	0.0	0.0
174.0000E-3	17.8668	0.0	0.0	7835.05800	0.00774	0.0	0.0	0.0	0.0
176.0000E-3	17.8554	0.0	0.0	7819.32800	0.00774	0.0	0.0	0.0	0.0
178.0000E-3	17.8441	0.0	0.0	7784.90700	0.00774	0.0	0.0	0.0	0.0
180.0000E-3	17.8329	0.0	0.0	7731.95900	0.00774	0.0	0.0	0.0	0.0
182.0000E-3	17.8218	0.0	0.0	7660.92400	0.00774	0.0	0.0	0.0	0.0
184.0000E-3	17.8109	0.0	0.0	7572.50400	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
186.0000E-3	17.8001	7518.28100	50.63800	7517.88900	7467.64300	0.0	0.0	0.0	7467.64300
188.0000E-3	17.7894	7397.96600	50.47303	7397.57500	7347.49300	0.0	0.0	0.0	7347.49300
190.0000E-3	17.7788	7263.58700	50.20511	7263.19800	7213.38200	0.0	0.0	0.0	7213.38200
195.0000E-3	17.7529	6875.96200	49.12573	6875.58100	6826.83600	0.0	0.0	0.0	6826.83600
200.0000E-3	17.7275	6434.50500	47.55662	6434.13600	6386.94800	0.0	0.0	0.0	6386.94800
210.0000E-3	17.6787	5485.11700	43.47456	5484.78100	5441.64300	0.0	0.0	0.0	5441.64300
220.0000E-3	17.6322	4567.51500	38.91457	4567.21400	4528.60100	0.0	0.0	0.0	4528.60100
230.0000E-3	17.5878	3761.87100	34.51662	3761.60400	3727.35400	0.0	0.0	0.0	3727.35400
240.0000E-3	17.5452	3091.36600	30.58918	3091.13000	3060.77700	0.0	0.0	0.0	3060.77700
250.0000E-3	17.5044	2548.50700	27.22108	2548.29700	2521.28600	0.0	0.0	0.0	2521.28600
260.0000E-3	17.4652	2114.18800	24.38944	2114.00000	2089.79900	0.0	0.0	0.0	2089.79900
270.0000E-3	17.4274	1767.60700	22.02761	1767.43600	1745.57900	0.0	0.0	0.0	1745.57900
280.0000E-3	17.3911	1490.26900	20.05963	1490.11400	1470.21000	0.0	0.0	0.0	1470.21000
290.0000E-3	17.3560	1267.06000	18.41505	1266.91700	1248.64500	0.0	0.0	0.0	1248.64500
300.0000E-3	17.3221	1086.09800	17.03371	1085.96600	1069.06400	0.0	0.0	0.0	1069.06400
310.0000E-3	17.2893	938.21200	15.86627	938.08900	922.34500	0.0	0.0	0.0	922.34500
320.0000E-3	17.2575	816.36500	14.87300	816.25000	801.49200	0.0	0.0	0.0	801.49200
330.0000E-3	17.2268	715.16400	14.02216	715.05600	701.14200	0.0	0.0	0.0	701.14200
340.0000E-3	17.1969	630.45600	13.28845	630.35300	617.16700	0.0	0.0	0.0	617.16700
350.0000E-3	17.1679	559.02600	12.65166	558.92800	546.37400	0.0	0.0	0.0	546.37400

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
186.0000E-3	17.8001	0.0	0.0	7467.64300	0.00774	0.0	0.0	0.0	0.0
188.0000E-3	17.7894	0.0	0.0	7347.49300	0.00774	0.0	0.0	0.0	0.0
190.0000E-3	17.7788	0.0	0.0	7213.38200	0.00774	0.0	0.0	0.0	0.0
195.0000E-3	17.7529	0.0	0.0	6826.83600	0.00774	0.0	0.0	0.0	0.0
200.0000E-3	17.7275	0.0	0.0	6386.94800	0.00774	0.0	0.0	0.0	0.0
210.0000E-3	17.6787	0.0	0.0	5441.64300	0.00774	0.0	0.0	0.0	0.0
220.0000E-3	17.6322	0.0	0.0	4528.60100	0.00774	0.0	0.0	0.0	0.0
230.0000E-3	17.5878	0.0	0.0	3727.35400	0.00774	0.0	0.0	0.0	0.0
240.0000E-3	17.5452	0.0	0.0	3060.77700	0.00774	0.0	0.0	0.0	0.0
250.0000E-3	17.5044	0.0	0.0	2521.28600	0.00774	0.0	0.0	0.0	0.0
260.0000E-3	17.4652	0.0	0.0	2089.79900	0.00774	0.0	0.0	0.0	0.0
270.0000E-3	17.4274	0.0	0.0	1745.57900	0.00774	0.0	0.0	0.0	0.0
280.0000E-3	17.3911	0.0	0.0	1470.21000	0.00774	0.0	0.0	0.0	0.0
290.0000E-3	17.3560	0.0	0.0	1248.64500	0.00774	0.0	0.0	0.0	0.0
300.0000E-3	17.3221	0.0	0.0	1069.06400	0.00774	0.0	0.0	0.0	0.0
310.0000E-3	17.2893	0.0	0.0	922.34500	0.00774	0.0	0.0	0.0	0.0
320.0000E-3	17.2575	0.0	0.0	801.49200	0.00774	0.0	0.0	0.0	0.0
330.0000E-3	17.2268	0.0	0.0	701.14200	0.00774	0.0	0.0	0.0	0.0
340.0000E-3	17.1969	0.0	0.0	617.16700	0.00774	0.0	0.0	0.0	0.0
350.0000E-3	17.1679	0.0	0.0	546.37400	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
360.0000E-3	17.1397	498.37100	12.09559	498.27700	486.27500	0.0	0.0	0.0	486.27500
370.0000E-3	17.1123	446.52600	11.60717	446.43600	434.91800	0.0	0.0	0.0	434.91800
380.0000E-3	17.0857	401.93700	11.17582	401.85000	390.76100	0.0	0.0	0.0	390.76100
390.0000E-3	17.0597	363.36600	10.79291	363.28300	352.57300	0.0	0.0	0.0	352.57300
400.0000E-3	17.0344	329.82000	10.45137	329.73900	319.36900	0.0	0.0	0.0	319.36900
410.0000E-3	17.0097	300.49700	10.14533	300.41800	290.35100	0.0	0.0	0.0	290.35100
414.0000E-3	17.0000	289.79900	10.03174	289.72100	279.76700	0.0	0.0	0.0	279.76700
420.0000E-3	16.9856	274.74100	9.86995	274.66500	264.87100	0.0	0.0	0.0	264.87100
430.0000E-3	16.9621	252.01900	9.62117	251.94500	242.39800	0.0	0.0	0.0	242.39800
440.0000E-3	16.9391	231.88900	9.39559	231.81600	222.49300	0.0	0.0	0.0	222.49300
450.0000E-3	16.9166	213.98400	9.19031	213.91300	204.79400	0.0	0.0	0.0	204.79400
460.0000E-3	16.8946	198.00100	9.00291	197.93100	188.99800	0.0	0.0	0.0	188.99800
470.0000E-3	16.8731	183.68200	8.83128	183.61400	174.85100	0.0	0.0	0.0	174.85100
475.0000E-3	16.8625	177.07800	8.75082	177.01000	168.32700	0.0	0.0	0.0	168.32700
480.0000E-3	16.8521	170.81200	8.67366	170.74500	162.13900	0.0	0.0	0.0	162.13900
490.0000E-3	16.8314	159.20900	8.52849	159.14300	150.68100	0.0	0.0	0.0	150.68100
500.0000E-3	16.8112	148.71700	8.39444	148.65200	140.32300	0.0	0.0	0.0	140.32300
532.0000E-3	16.7492	121.17800	8.02770	121.11500	113.15000	0.0	0.0	0.0	113.15000
550.0000E-3	16.7159	108.87200	7.85537	108.81100	101.01700	0.0	0.0	0.0	101.01700
575.0000E-3	16.6715	94.63882	7.64777	94.57961	86.99105	0.0	0.0	0.0	86.99105

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
360.0000E-3	17.1397	0.0	0.0	486.27500	0.00774	0.0	0.0	0.0	0.0
370.0000E-3	17.1123	0.0	0.0	434.91800	0.00774	0.0	0.0	0.0	0.0
380.0000E-3	17.0857	0.0	0.0	390.76100	0.00774	0.0	0.0	0.0	0.0
390.0000E-3	17.0597	0.0	0.0	352.57300	0.00774	0.0	0.0	0.0	0.0
400.0000E-3	17.0344	0.0	0.0	319.36900	0.00774	0.0	0.0	0.0	0.0
410.0000E-3	17.0097	0.0	0.0	290.35100	0.00774	0.0	0.0	0.0	0.0
414.0000E-3	17.0000	0.0	0.0	279.76700	0.00774	0.0	0.0	0.0	0.0
420.0000E-3	16.9856	0.0	0.0	264.87100	0.00774	0.0	0.0	0.0	0.0
430.0000E-3	16.9621	0.0	0.0	242.39800	0.00774	0.0	0.0	0.0	0.0
440.0000E-3	16.9391	0.0	0.0	222.49300	0.00774	0.0	0.0	0.0	0.0
450.0000E-3	16.9166	0.0	0.0	204.79400	0.00774	0.0	0.0	0.0	0.0
460.0000E-3	16.8946	0.0	0.0	188.99800	0.00774	0.0	0.0	0.0	0.0
470.0000E-3	16.8731	0.0	0.0	174.85100	0.00774	0.0	0.0	0.0	0.0
475.0000E-3	16.8625	0.0	0.0	168.32700	0.00774	0.0	0.0	0.0	0.0
480.0000E-3	16.8521	0.0	0.0	162.13900	0.00774	0.0	0.0	0.0	0.0
490.0000E-3	16.8314	0.0	0.0	150.68100	0.00774	0.0	0.0	0.0	0.0
500.0000E-3	16.8112	0.0	0.0	140.32300	0.00774	0.0	0.0	0.0	0.0
532.0000E-3	16.7492	0.0	0.0	113.15000	0.00774	0.0	0.0	0.0	0.0
550.0000E-3	16.7159	0.0	0.0	101.01700	0.00774	0.0	0.0	0.0	0.0
575.0000E-3	16.6715	0.0	0.0	86.99105	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
590.0000E-3	16.6457	87.39357	7.53805	87.33521	79.85552	0.0	0.0	0.0	79.85552
600.0000E-3	16.6289	83.01651	7.47024	82.95867	75.54627	0.0	0.0	0.0	75.54627
625.0000E-3	16.5881	73.42008	7.31697	73.36344	66.10312	0.0	0.0	0.0	66.10312
650.0000E-3	16.5489	65.41690	7.18350	65.36129	58.23341	0.0	0.0	0.0	58.23341
683.0000E-3	16.4994	56.75258	7.03188	56.69814	49.72070	0.0	0.0	0.0	49.72070
700.0000E-3	16.4748	52.96798	6.96288	52.91407	46.00510	0.0	0.0	0.0	46.00510
750.0000E-3	16.4058	43.88050	6.78856	43.82795	37.09195	0.0	0.0	0.0	37.09195
800.0000E-3	16.3412	37.07009	6.64776	37.01863	30.42233	0.0	0.0	0.0	30.42233
850.0000E-3	16.2806	31.85121	6.53193	31.80064	25.31928	0.0	0.0	0.0	25.31928
876.0000E-3	16.2505	29.61073	6.47953	29.56057	23.13121	0.0	0.0	0.0	23.13121
890.0000E-3	16.2346	28.51484	6.45320	28.46488	22.06164	0.0	0.0	0.0	22.06164
910.0000E-3	16.2124	27.06803	6.41767	27.01834	20.65036	0.0	0.0	0.0	20.65036
930.0000E-3	16.1907	25.74684	6.38439	25.69742	19.36245	0.0	0.0	0.0	19.36245
950.0000E-3	16.1694	24.53754	6.35316	24.48835	18.18438	0.0	0.0	0.0	18.18438
970.0000E-3	16.1486	23.42819	6.32380	23.37923	17.10439	0.0	0.0	0.0	17.10439
980.0000E-3	16.1383	22.90769	6.30977	22.85884	16.59792	0.0	0.0	0.0	16.59792
990.0000E-3	16.1281	22.40837	6.29615	22.35963	16.11222	0.0	0.0	0.0	16.11222
1.0250E00	16.0934	20.81234	6.25146	20.76394	14.56088	0.0	0.0	0.0	14.56088
1.0500E00	16.0693	19.80035	6.22211	19.75218	13.57824	0.0	0.0	0.0	13.57824
1.0600E00	16.0598	19.42207	6.21092	19.37399	13.21115	0.0	0.0	0.0	13.21115

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
590.0000E-3	16.6457	0.0	0.0	79.85552	0.00774	0.0	0.0	0.0	0.0
600.0000E-3	16.6289	0.0	0.0	75.54627	0.00774	0.0	0.0	0.0	0.0
625.0000E-3	16.5881	0.0	0.0	66.10312	0.00774	0.0	0.0	0.0	0.0
650.0000E-3	16.5489	0.0	0.0	58.23341	0.00774	0.0	0.0	0.0	0.0
683.0000E-3	16.4994	0.0	0.0	49.72070	0.00774	0.0	0.0	0.0	0.0
700.0000E-3	16.4748	0.0	0.0	46.00510	0.00774	0.0	0.0	0.0	0.0
750.0000E-3	16.4058	0.0	0.0	37.09195	0.00774	0.0	0.0	0.0	0.0
800.0000E-3	16.3412	0.0	0.0	30.42233	0.00774	0.0	0.0	0.0	0.0
850.0000E-3	16.2806	0.0	0.0	25.31928	0.00774	0.0	0.0	0.0	0.0
876.0000E-3	16.2505	0.0	0.0	23.13121	0.00774	0.0	0.0	0.0	0.0
890.0000E-3	16.2346	0.0	0.0	22.06164	0.00774	0.0	0.0	0.0	0.0
910.0000E-3	16.2124	0.0	0.0	20.65036	0.00774	0.0	0.0	0.0	0.0
930.0000E-3	16.1907	0.0	0.0	19.36245	0.00774	0.0	0.0	0.0	0.0
950.0000E-3	16.1694	0.0	0.0	18.18438	0.00774	0.0	0.0	0.0	0.0
970.0000E-3	16.1486	0.0	0.0	17.10439	0.00774	0.0	0.0	0.0	0.0
980.0000E-3	16.1383	0.0	0.0	16.59792	0.00774	0.0	0.0	0.0	0.0
990.0000E-3	16.1281	0.0	0.0	16.11222	0.00774	0.0	0.0	0.0	0.0
1.0250E00	16.0934	0.0	0.0	14.56088	0.00774	0.0	0.0	0.0	0.0
1.0500E00	16.0693	0.0	0.0	13.57824	0.00774	0.0	0.0	0.0	0.0
1.0600E00	16.0598	0.0	0.0	13.21115	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
1.0700E00	16.0504	19.05786	6.20003	19.00985	12.85783	0.0	0.0	0.0	12.85783
1.0800E00	16.0411	18.70703	6.18942	18.65911	12.51761	0.0	0.0	0.0	12.51761
1.0900E00	16.0319	18.36897	6.17908	18.32113	12.18989	0.0	0.0	0.0	12.18989
1.1100E00	16.0137	17.72881	6.15918	17.68112	11.56962	0.0	0.0	0.0	11.56962
1.1250E00	16.0003	17.27801	6.14490	17.23043	11.13311	0.0	0.0	0.0	11.13311
1.1300E00	15.9959	17.13299	6.14026	17.08545	10.99273	0.0	0.0	0.0	10.99273
1.1500E00	15.9783	16.57764	6.12225	16.53024	10.45539	0.0	0.0	0.0	10.45539
1.2000E00	15.9358	15.34429	6.08079	15.29721	9.26351	0.0	0.0	0.0	9.26351
1.2500E00	15.8950	14.29762	6.04379	14.25083	8.25383	0.0	0.0	0.0	8.25383
1.3000E00	15.8557	13.40263	6.01057	13.35609	7.39205	0.0	0.0	0.0	7.39205
1.3500E00	15.8180	12.63204	5.98061	12.58574	6.65143	0.0	0.0	0.0	6.65143
1.4400E00	15.7535	11.49266	5.93347	11.44673	5.55919	0.0	0.0	0.0	5.55919
1.5000E00	15.7126	10.87256	5.90609	10.82683	4.96647	0.0	0.0	0.0	4.96647
1.6000E00	15.6481	10.02633	5.86623	9.98091	4.16010	0.0	0.0	0.0	4.16010
1.7000E00	15.5875	9.35853	5.83223	9.31337	3.52630	0.0	0.0	0.0	3.52630
1.7800E00	15.5415	8.92139	5.80844	8.87642	3.11295	0.0	0.0	0.0	3.11295
1.8600E00	15.4975	8.55181	5.78716	8.50701	2.76465	0.0	0.0	0.0	2.76465
1.9000E00	15.4762	8.38818	5.77734	8.34346	2.61084	0.0	0.0	0.0	2.61084
2.0000E00	15.4249	8.03029	5.75488	7.98574	2.27542	0.0	0.0	0.0	2.27542
2.1000E00	15.3762	7.73264	5.73498	7.68824	1.99767	0.0	0.0	0.0	1.99767

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
1.0700E00	16.0504	0.0	0.0	12.85783	0.00774	0.0	0.0	0.0	0.0
1.0800E00	16.0411	0.0	0.0	12.51761	0.00774	0.0	0.0	0.0	0.0
1.0900E00	16.0319	0.0	0.0	12.18989	0.00774	0.0	0.0	0.0	0.0
1.1100E00	16.0137	0.0	0.0	11.56962	0.00774	0.0	0.0	0.0	0.0
1.1250E00	16.0003	0.0	0.0	11.13311	0.00774	0.0	0.0	0.0	0.0
1.1300E00	15.9959	0.0	0.0	10.99273	0.00774	0.0	0.0	0.0	0.0
1.1500E00	15.9783	0.0	0.0	10.45539	0.00774	0.0	0.0	0.0	0.0
1.2000E00	15.9358	0.0	0.0	9.26351	0.00774	0.0	0.0	0.0	0.0
1.2500E00	15.8950	0.0	0.0	8.25383	0.00774	0.0	0.0	0.0	0.0
1.3000E00	15.8557	0.0	0.0	7.39205	0.00774	0.0	0.0	0.0	0.0
1.3500E00	15.8180	0.0	0.0	6.65143	0.00774	0.0	0.0	0.0	0.0
1.4400E00	15.7535	0.0	0.0	5.55919	0.00774	0.0	0.0	0.0	0.0
1.5000E00	15.7126	0.0	0.0	4.96647	0.00774	0.0	0.0	0.0	0.0
1.6000E00	15.6481	0.0	0.0	4.16010	0.00774	0.0	0.0	0.0	0.0
1.7000E00	15.5875	0.0	0.0	3.52630	0.00774	0.0	0.0	0.0	0.0
1.7800E00	15.5415	0.0	0.0	3.11295	0.00774	0.0	0.0	0.0	0.0
1.8600E00	15.4975	0.0	0.0	2.76465	0.00774	0.0	0.0	0.0	0.0
1.9000E00	15.4762	0.0	0.0	2.61084	0.00774	0.0	0.0	0.0	0.0
2.0000E00	15.4249	0.0	0.0	2.27542	0.00774	0.0	0.0	0.0	0.0
2.1000E00	15.3762	0.0	0.0	1.99767	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
2.2000E00	15.3296	7.48267	5.71723	7.43841	1.76544	0.0	0.0	0.0	1.76544
2.2900E00	15.2895	7.29056	5.70282	7.24641	1.58774	0.0	0.0	0.0	1.58774
2.3300E00	15.2722	7.21365	5.69684	7.16954	1.51681	0.0	0.0	0.0	1.51681
2.3800E00	15.2510	7.12398	5.68969	7.07993	1.43429	0.0	0.0	0.0	1.43429
2.4000E00	15.2426	7.08999	5.68693	7.04596	1.40305	0.0	0.0	0.0	1.40305
2.5000E00	15.2018	6.93436	5.67390	6.89044	1.26047	0.0	0.0	0.0	1.26047
2.6000E00	15.1626	6.79958	5.66202	6.75574	1.13756	0.0	0.0	0.0	1.13756
2.7000E00	15.1248	6.68212	5.65116	6.63837	1.03097	0.0	0.0	0.0	1.03097
2.8000E00	15.0885	6.57918	5.64117	6.53551	0.93801	0.0	0.0	0.0	0.93801
2.9000E00	15.0534	6.48850	5.63197	6.44490	0.85653	0.0	0.0	0.0	0.85653
3.0000E00	15.0195	6.40822	5.62346	6.36468	0.78475	0.0	0.0	0.0	0.78475
3.2000E00	14.9549	6.27306	5.60822	6.22965	0.66484	0.0	0.0	0.0	0.66484
3.4000E00	14.8943	6.16446	5.59497	6.12114	0.56949	0.0	0.0	0.0	0.56949
3.6000E00	14.8372	6.07591	5.58332	6.03269	0.49259	0.0	0.0	0.0	0.49259
3.8000E00	14.7831	6.00280	5.57301	5.95966	0.42980	0.0	0.0	0.0	0.42980
4.0000E00	14.7318	5.94175	5.56380	5.89867	0.37795	0.0	0.0	0.0	0.37795
4.2000E00	14.6830	5.89023	5.55553	5.84722	0.33470	0.0	0.0	0.0	0.33470
4.4000E00	14.6365	5.84636	5.54805	5.80341	0.29832	0.0	0.0	0.0	0.29832
4.6000E00	14.5920	5.80870	5.54124	5.76580	0.26746	0.0	0.0	0.0	0.26746
4.8000E00	14.5495	5.77611	5.53503	5.73326	0.24108	0.0	0.0	0.0	0.24108

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
2.2000E00	15.3296	0.0	0.0	1.76544	0.00774	0.0	0.0	0.0	0.0
2.2900E00	15.2895	0.0	0.0	1.58774	0.00774	0.0	0.0	0.0	0.0
2.3300E00	15.2722	0.0	0.0	1.51681	0.00774	0.0	0.0	0.0	0.0
2.3800E00	15.2510	0.0	0.0	1.43429	0.00774	0.0	0.0	0.0	0.0
2.4000E00	15.2426	0.0	0.0	1.40305	0.00774	0.0	0.0	0.0	0.0
2.5000E00	15.2018	0.0	0.0	1.26047	0.00774	0.0	0.0	0.0	0.0
2.6000E00	15.1626	0.0	0.0	1.13756	0.00774	0.0	0.0	0.0	0.0
2.7000E00	15.1248	0.0	0.0	1.03097	0.00774	0.0	0.0	0.0	0.0
2.8000E00	15.0885	0.0	0.0	0.93801	0.00774	0.0	0.0	0.0	0.0
2.9000E00	15.0534	0.0	0.0	0.85653	0.00774	0.0	0.0	0.0	0.0
3.0000E00	15.0195	0.0	0.0	0.78475	0.00774	0.0	0.0	0.0	0.0
3.2000E00	14.9549	0.0	0.0	0.66484	0.00774	0.0	0.0	0.0	0.0
3.4000E00	14.8943	0.0	0.0	0.56949	0.00774	0.0	0.0	0.0	0.0
3.6000E00	14.8372	0.0	0.0	0.49259	0.00774	0.0	0.0	0.0	0.0
3.8000E00	14.7831	0.0	0.0	0.42980	0.00774	0.0	0.0	0.0	0.0
4.0000E00	14.7318	0.0	0.0	0.37795	0.00774	0.0	0.0	0.0	0.0
4.2000E00	14.6830	0.0	0.0	0.33470	0.00774	0.0	0.0	0.0	0.0
4.4000E00	14.6365	0.0	0.0	0.29832	0.00774	0.0	0.0	0.0	0.0
4.6000E00	14.5920	0.0	0.0	0.26746	0.00774	0.0	0.0	0.0	0.0
4.8000E00	14.5495	0.0	0.0	0.24108	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
5.0000E00	14.5087	5.74772	5.52932	5.70491	0.21839	0.0	0.0	0.0	0.21839
5.2000E00	14.4694	5.72282	5.52406	5.68005	0.19876	0.0	0.0	0.0	0.19876
5.4000E00	14.4317	5.70085	5.51919	5.65812	0.18167	0.0	0.0	0.0	0.18167
5.6000E00	14.3953	5.68137	5.51466	5.63868	0.16671	0.0	0.0	0.0	0.16671
5.8000E00	14.3602	5.66401	5.51044	5.62135	0.15357	0.0	0.0	0.0	0.15357
6.0000E00	14.3263	5.64846	5.50650	5.60582	0.14196	0.0	0.0	0.0	0.14196
6.2000E00	14.2935	5.63446	5.50279	5.59186	0.13167	0.0	0.0	0.0	0.13167
6.4000E00	14.2618	5.62182	5.49931	5.57925	0.12251	0.0	0.0	0.0	0.12251
7.0000E00	14.1722	5.59039	5.48996	5.54789	0.10043	0.0	0.0	0.0	0.10043
7.5000E00	14.1032	5.56985	5.48319	5.52740	0.08666	0.0	0.0	0.0	0.08666
8.0000E00	14.0387	5.55304	5.47715	5.51064	0.07589	0.0	0.0	0.0	0.07589
8.4000E00	13.9899	5.54166	5.47275	5.49929	0.06892	0.0	0.0	0.0	0.06892
9.0000E00	13.9209	5.52725	5.46670	5.48493	0.06055	0.0	0.0	0.0	0.06055
10.0000E00	13.8155	5.50680	5.45599	5.46456	0.05081	0.0	0.0	0.0	0.05081
10.4000E00	13.7763	5.50061	5.45271	5.45840	0.04791	0.0	0.0	0.0	0.04791
11.4000E00	13.6845	5.48759	5.44502	5.44543	0.04256	0.0	0.0	0.0	0.04256
12.4000E00	13.6004	5.47722	5.43781	5.43512	0.03940	0.0	0.0	0.0	0.03940
13.4000E00	13.5228	5.46887	5.43078	5.42682	0.03808	0.0	0.0	0.0	0.03808
13.9000E00	13.4862	5.46536	5.42724	5.42335	0.03812	0.0	0.0	0.0	0.03812
14.4000E00	13.4509	5.46234	5.42362	5.42035	0.03871	0.0	0.0	0.0	0.03871

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
5.0000E00	14.5087	0.0	0.0	0.21839	0.00774	0.0	0.0	0.0	0.0
5.2000E00	14.4694	0.0	0.0	0.19876	0.00774	0.0	0.0	0.0	0.0
5.4000E00	14.4317	0.0	0.0	0.18167	0.00774	0.0	0.0	0.0	0.0
5.6000E00	14.3953	0.0	0.0	0.16671	0.00774	0.0	0.0	0.0	0.0
5.8000E00	14.3602	0.0	0.0	0.15357	0.00774	0.0	0.0	0.0	0.0
6.0000E00	14.3263	0.0	0.0	0.14196	0.00774	0.0	0.0	0.0	0.0
6.2000E00	14.2935	0.0	0.0	0.13167	0.00774	0.0	0.0	0.0	0.0
6.4000E00	14.2618	0.0	0.0	0.12251	0.00774	0.0	0.0	0.0	0.0
7.0000E00	14.1722	0.0	0.0	0.10043	0.00774	0.0	0.0	0.0	0.0
7.5000E00	14.1032	0.0	0.0	0.08666	0.00774	0.0	0.0	0.0	0.0
8.0000E00	14.0387	0.0	0.0	0.07589	0.00774	0.0	0.0	0.0	0.0
8.4000E00	13.9899	0.0	0.0	0.06892	0.00774	0.0	0.0	0.0	0.0
9.0000E00	13.9209	0.0	0.0	0.06055	0.00774	0.0	0.0	0.0	0.0
10.0000E00	13.8155	0.0	0.0	0.05081	0.00774	0.0	0.0	0.0	0.0
10.4000E00	13.7763	0.0	0.0	0.04791	0.00774	0.0	0.0	0.0	0.0
11.4000E00	13.6845	0.0	0.0	0.04256	0.00774	0.0	0.0	0.0	0.0
12.4000E00	13.6004	0.0	0.0	0.03940	0.00774	0.0	0.0	0.0	0.0
13.4000E00	13.5228	0.0	0.0	0.03808	0.00774	0.0	0.0	0.0	0.0
13.9000E00	13.4862	0.0	0.0	0.03812	0.00774	0.0	0.0	0.0	0.0
14.4000E00	13.4509	0.0	0.0	0.03871	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
14.9000E00	13.4167	5.45988	5.41987	5.41792	0.04001	0.0	0.0	0.0	0.04001
15.4000E00	13.3837	5.45822	5.41589	5.41629	0.04232	0.0	0.0	0.0	0.04232
15.6500E00	13.3676	5.45783	5.41379	5.41592	0.04404	0.0	0.0	0.0	0.04404
15.9000E00	13.3518	5.45788	5.41157	5.41598	0.04631	0.0	0.0	0.0	0.04631
16.1500E00	13.3362	5.45856	5.40920	5.41669	0.04936	0.0	0.0	0.0	0.04936
16.4000E00	13.3208	5.46020	5.40664	5.41835	0.05356	0.0	0.0	0.0	0.05356
16.6000E00	13.3087	5.46258	5.40440	5.42074	0.05818	0.0	0.0	0.0	0.05818
16.8000E00	13.2967	5.46646	5.40194	5.42463	0.06452	0.0	0.0	0.0	0.06452
17.0000E00	13.2849	5.47276	5.39914	5.43096	0.07361	0.0	0.0	0.0	0.07361
17.2000E00	13.2732	5.48327	5.39588	5.44149	0.08739	0.0	0.0	0.0	0.08739
17.4000E00	13.2616	5.50174	5.39187	5.46000	0.10986	0.0	0.0	0.0	0.10986
17.5000E00	13.2559	5.51638	5.38945	5.47465	0.12693	0.0	0.0	0.0	0.12693
17.6000E00	13.2502	5.53722	5.38661	5.49551	0.15061	0.0	0.0	0.0	0.15061
17.7000E00	13.2445	5.56807	5.38318	5.52639	0.18489	0.0	0.0	0.0	0.18489
17.8000E00	13.2389	5.61616	5.37888	5.57451	0.23727	0.0	0.0	0.0	0.23727
17.9000E00	13.2333	5.69652	5.37324	5.65492	0.32328	0.0	0.0	0.0	0.32328
17.9500E00	13.2305	5.75836	5.36965	5.71679	0.38871	0.0	0.0	0.0	0.38871
18.0000E00	13.2277	5.84472	5.36532	5.80318	0.47940	0.0	0.0	0.0	0.47940
18.0500E00	13.2249	5.97015	5.35997	5.92865	0.61017	0.0	0.0	0.0	0.61017
18.1000E00	13.2222	6.16157	5.35317	6.12012	0.80840	0.0	0.0	0.0	0.80840

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
14.9000E00	13.4167	0.0	0.0	0.04001	0.00774	0.0	0.0	0.0	0.0
15.4000E00	13.3837	0.0	0.0	0.04232	0.00774	0.0	0.0	0.0	0.0
15.6500E00	13.3676	0.0	0.0	0.04404	0.00774	0.0	0.0	0.0	0.0
15.9000E00	13.3518	0.0	0.0	0.04631	0.00774	0.0	0.0	0.0	0.0
16.1500E00	13.3362	0.0	0.0	0.04936	0.00774	0.0	0.0	0.0	0.0
16.4000E00	13.3208	0.0	0.0	0.05356	0.00774	0.0	0.0	0.0	0.0
16.6000E00	13.3087	0.0	0.0	0.05818	0.00774	0.0	0.0	0.0	0.0
16.8000E00	13.2967	0.0	0.0	0.06452	0.00774	0.0	0.0	0.0	0.0
17.0000E00	13.2849	0.0	0.0	0.07361	0.00774	0.0	0.0	0.0	0.0
17.2000E00	13.2732	0.0	0.0	0.08739	0.00774	0.0	0.0	0.0	0.0
17.4000E00	13.2616	0.0	0.0	0.10986	0.00774	0.0	0.0	0.0	0.0
17.5000E00	13.2559	0.0	0.0	0.12693	0.00774	0.0	0.0	0.0	0.0
17.6000E00	13.2502	0.0	0.0	0.15061	0.00774	0.0	0.0	0.0	0.0
17.7000E00	13.2445	0.0	0.0	0.18489	0.00774	0.0	0.0	0.0	0.0
17.8000E00	13.2389	0.0	0.0	0.23727	0.00774	0.0	0.0	0.0	0.0
17.9000E00	13.2333	0.0	0.0	0.32328	0.00774	0.0	0.0	0.0	0.0
17.9500E00	13.2305	0.0	0.0	0.38871	0.00774	0.0	0.0	0.0	0.0
18.0000E00	13.2277	0.0	0.0	0.47940	0.00774	0.0	0.0	0.0	0.0
18.0500E00	13.2249	0.0	0.0	0.61017	0.00774	0.0	0.0	0.0	0.0
18.1000E00	13.2222	0.0	0.0	0.80840	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
18.1500E00	13.2194	6.47317	5.34421	6.43179	1.12895	0.0	0.0	0.0	1.12895
18.2000E00	13.2167	7.02617	5.33197	6.98489	1.69420	0.0	0.0	0.0	1.69420
18.2300E00	13.2150	7.58687	5.32235	7.54566	2.26451	0.0	0.0	0.0	2.26451
18.2600E00	13.2134	8.47987	5.31054	8.43876	3.16933	0.0	0.0	0.0	3.16933
18.2800E00	13.2123	9.39301	5.30142	9.35196	4.09159	0.0	0.0	0.0	4.09159
18.3000E00	13.2112	10.73067	5.29178	10.68970	5.43889	0.0	0.0	0.0	5.43889
18.3200E00	13.2101	12.74205	5.28327	12.70114	7.45877	0.0	0.0	0.0	7.45877
18.3400E00	13.2090	15.78709	5.28065	15.74621	10.50645	0.0	0.0	0.0	10.50645
18.3500E00	13.2085	17.80655	5.28476	17.76563	12.52178	0.0	0.0	0.0	12.52178
18.3600E00	13.2079	20.15200	5.29542	20.11100	14.85658	0.0	0.0	0.0	14.85658
18.3700E00	13.2074	22.69497	5.31534	22.65381	17.37962	0.0	0.0	0.0	17.37962
18.3800E00	13.2068	25.12710	5.34661	25.08571	19.78050	0.0	0.0	0.0	19.78050
18.3900E00	13.2063	26.95626	5.38867	26.91454	21.56759	0.0	0.0	0.0	21.56759
18.4000E00	13.2057	27.67035	5.43666	27.62826	22.23369	0.0	0.0	0.0	22.23369
18.4100E00	13.2052	27.03839	5.48240	26.99594	21.55599	0.0	0.0	0.0	21.55599
18.4200E00	13.2047	25.27766	5.51843	25.23494	19.75924	0.0	0.0	0.0	19.75924
18.4300E00	13.2041	22.89326	5.54161	22.85035	17.35165	0.0	0.0	0.0	17.35165
18.4400E00	13.2036	20.37781	5.55304	20.33482	14.82477	0.0	0.0	0.0	14.82477
18.4500E00	13.2030	18.04421	5.55584	18.00120	12.48838	0.0	0.0	0.0	12.48838
18.4600E00	13.2025	16.02610	5.55318	15.98311	10.47293	0.0	0.0	0.0	10.47293

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
18.1500E00	13.2194	0.0	0.0	1.12895	0.00774	0.0	0.0	0.0	0.0
18.2000E00	13.2167	0.0	0.0	1.69420	0.00774	0.0	0.0	0.0	0.0
18.2300E00	13.2150	0.0	0.0	2.26451	0.00774	0.0	0.0	0.0	0.0
18.2600E00	13.2134	0.0	0.0	3.16933	0.00774	0.0	0.0	0.0	0.0
18.2800E00	13.2123	0.0	0.0	4.09159	0.00774	0.0	0.0	0.0	0.0
18.3000E00	13.2112	0.0	0.0	5.43889	0.00774	0.0	0.0	0.0	0.0
18.3200E00	13.2101	0.0	0.0	7.45877	0.00774	0.0	0.0	0.0	0.0
18.3400E00	13.2090	0.0	0.0	10.50645	0.00774	0.0	0.0	0.0	0.0
18.3500E00	13.2085	0.0	0.0	12.52178	0.00774	0.0	0.0	0.0	0.0
18.3600E00	13.2079	0.0	0.0	14.85658	0.00774	0.0	0.0	0.0	0.0
18.3700E00	13.2074	0.0	0.0	17.37962	0.00774	0.0	0.0	0.0	0.0
18.3800E00	13.2068	0.0	0.0	19.78050	0.00774	0.0	0.0	0.0	0.0
18.3900E00	13.2063	0.0	0.0	21.56759	0.00774	0.0	0.0	0.0	0.0
18.4000E00	13.2057	0.0	0.0	22.23369	0.00774	0.0	0.0	0.0	0.0
18.4100E00	13.2052	0.0	0.0	21.55599	0.00774	0.0	0.0	0.0	0.0
18.4200E00	13.2047	0.0	0.0	19.75924	0.00774	0.0	0.0	0.0	0.0
18.4300E00	13.2041	0.0	0.0	17.35165	0.00774	0.0	0.0	0.0	0.0
18.4400E00	13.2036	0.0	0.0	14.82477	0.00774	0.0	0.0	0.0	0.0
18.4500E00	13.2030	0.0	0.0	12.48838	0.00774	0.0	0.0	0.0	0.0
18.4600E00	13.2025	0.0	0.0	10.47293	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
18.4800E00	13.2014	12.96763	5.54030	12.92474	7.42733	0.0	0.0	0.0	7.42733
18.5000E00	13.2003	10.93556	5.52501	10.89278	5.41055	0.0	0.0	0.0	5.41055
18.5200E00	13.1992	9.57720	5.51084	9.53453	4.06636	0.0	0.0	0.0	4.06636
18.5400E00	13.1982	8.64552	5.49861	8.60295	3.14690	0.0	0.0	0.0	3.14690
18.5700E00	13.1965	7.72938	5.48375	7.68692	2.24562	0.0	0.0	0.0	2.24562
18.6000E00	13.1949	7.15037	5.47221	7.10801	1.67816	0.0	0.0	0.0	1.67816
18.6500E00	13.1922	6.57461	5.45805	6.53236	1.11656	0.0	0.0	0.0	1.11656
18.7000E00	13.1896	6.24673	5.44799	6.20455	0.79874	0.0	0.0	0.0	0.79874
18.7500E00	13.1869	6.04314	5.44049	6.00102	0.60265	0.0	0.0	0.0	0.60265
18.8000E00	13.1842	5.90829	5.43466	5.86622	0.47363	0.0	0.0	0.0	0.47363
18.8500E00	13.1816	5.81441	5.42998	5.77237	0.38443	0.0	0.0	0.0	0.38443
18.9000E00	13.1789	5.74642	5.42613	5.70441	0.32029	0.0	0.0	0.0	0.32029
19.0000E00	13.1737	5.65656	5.42008	5.61460	0.23648	0.0	0.0	0.0	0.23648
19.1000E00	13.1684	5.60142	5.41547	5.55949	0.18595	0.0	0.0	0.0	0.18595
19.2000E00	13.1632	5.56508	5.41177	5.52318	0.15331	0.0	0.0	0.0	0.15331
19.3000E00	13.1580	5.53979	5.40867	5.49792	0.13113	0.0	0.0	0.0	0.13113
19.4000E00	13.1528	5.52145	5.40598	5.47960	0.11547	0.0	0.0	0.0	0.11547
19.6000E00	13.1426	5.49708	5.40142	5.45526	0.09566	0.0	0.0	0.0	0.09566
19.8000E00	13.1324	5.48197	5.39753	5.44018	0.08444	0.0	0.0	0.0	0.08444
20.0000E00	13.1224	5.47191	5.39404	5.43015	0.07787	0.0	0.0	0.0	0.07787

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
18.4800E00	13.2014	0.0	0.0	7.42733	0.00774	0.0	0.0	0.0	0.0
18.5000E00	13.2003	0.0	0.0	5.41055	0.00774	0.0	0.0	0.0	0.0
18.5200E00	13.1992	0.0	0.0	4.06636	0.00774	0.0	0.0	0.0	0.0
18.5400E00	13.1982	0.0	0.0	3.14690	0.00774	0.0	0.0	0.0	0.0
18.5700E00	13.1965	0.0	0.0	2.24562	0.00774	0.0	0.0	0.0	0.0
18.6000E00	13.1949	0.0	0.0	1.67816	0.00774	0.0	0.0	0.0	0.0
18.6500E00	13.1922	0.0	0.0	1.11656	0.00774	0.0	0.0	0.0	0.0
18.7000E00	13.1896	0.0	0.0	0.79874	0.00774	0.0	0.0	0.0	0.0
18.7500E00	13.1869	0.0	0.0	0.60265	0.00774	0.0	0.0	0.0	0.0
18.8000E00	13.1842	0.0	0.0	0.47363	0.00774	0.0	0.0	0.0	0.0
18.8500E00	13.1816	0.0	0.0	0.38443	0.00774	0.0	0.0	0.0	0.0
18.9000E00	13.1789	0.0	0.0	0.32029	0.00774	0.0	0.0	0.0	0.0
19.0000E00	13.1737	0.0	0.0	0.23648	0.00774	0.0	0.0	0.0	0.0
19.1000E00	13.1684	0.0	0.0	0.18595	0.00774	0.0	0.0	0.0	0.0
19.2000E00	13.1632	0.0	0.0	0.15331	0.00774	0.0	0.0	0.0	0.0
19.3000E00	13.1580	0.0	0.0	0.13113	0.00774	0.0	0.0	0.0	0.0
19.4000E00	13.1528	0.0	0.0	0.11547	0.00774	0.0	0.0	0.0	0.0
19.6000E00	13.1426	0.0	0.0	0.09566	0.00774	0.0	0.0	0.0	0.0
19.8000E00	13.1324	0.0	0.0	0.08444	0.00774	0.0	0.0	0.0	0.0
20.0000E00	13.1224	0.0	0.0	0.07787	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
1.1300E 3	9.0881	17.31569	16.07137	17.19126	1.24431	0.0	0.0	0.0	1.24431
2.0000E 3	8.5172	6.35000	4.75000	6.31323	1.60000	0.0	0.0	0.0	1.60000
3.0000E 3	8.1117	6.40000	5.00000	6.36129	1.40000	0.0	0.0	0.0	1.40000
4.0000E 3	7.8240	6.45000	5.15000	6.41013	1.30000	0.0	0.0	0.0	1.30000
5.0000E 3	7.6009	6.50000	5.30000	6.45897	1.20000	0.0	0.0	0.0	1.20000
6.0000E 3	7.4186	6.55000	5.45000	6.50781	1.10000	0.0	0.0	0.0	1.10000
7.0000E 3	7.2644	6.60000	5.58000	6.55680	1.02000	0.0	0.0	0.0	1.02000
8.0000E 3	7.1309	6.65000	5.71000	6.60579	0.94000	0.0	0.0	0.0	0.94000
9.0000E 3	7.0131	6.70000	5.84000	6.65479	0.86000	0.0	0.0	0.0	0.86000
10.0000E 3	6.9078	6.70000	5.91000	6.65424	0.79000	0.0	0.0	0.0	0.79000
15.0000E 3	6.5023	6.75000	6.19000	6.70208	0.56000	0.0	0.0	0.0	0.56000
20.0000E 3	6.2146	6.75000	6.31000	6.70115	0.44000	0.0	0.0	0.0	0.44000
25.0000E 3	5.9915	6.80000	6.44000	6.75014	0.36000	0.0	0.0	0.0	0.36000
30.0000E 3	5.8091	6.85000	6.52000	6.79952	0.33000	0.0	0.0	0.0	0.33000
40.0000E 3	5.5215	6.90000	6.64000	6.84859	0.26000	0.0	0.0	0.0	0.26000
50.0000E 3	5.2983	6.95000	6.72500	6.89794	0.22500	0.0	0.0	0.0	0.22500
60.0000E 3	5.1160	7.00000	6.80000	6.94735	0.20000	0.0	0.0	0.0	0.20000
70.0000E 3	4.9618	7.05000	6.87000	6.99681	0.18000	0.0	0.0	0.0	0.18000
80.0000E 3	4.8283	7.10000	6.93000	7.04635	0.17000	0.0	0.0	0.0	0.17000
90.0000E 3	4.7105	7.15000	6.99000	7.09588	0.16000	0.0	0.0	0.0	0.16000

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
1.1300E 3	9.0881	0.0	0.0	1.24431	0.00774	0.0	0.0	0.0	0.0
2.0000E 3	8.5172	0.0	0.0	1.60000	0.00774	0.0	0.0	0.0	0.0
3.0000E 3	8.1117	0.0	0.0	1.40000	0.00774	0.0	0.0	0.0	0.0
4.0000E 3	7.8240	0.0	0.0	1.30000	0.00774	0.0	0.0	0.0	0.0
5.0000E 3	7.6009	0.0	0.0	1.20000	0.00774	0.0	0.0	0.0	0.0
6.0000E 3	7.4186	0.0	0.0	1.10000	0.00774	0.0	0.0	0.0	0.0
7.0000E 3	7.2644	0.0	0.0	1.02000	0.00774	0.0	0.0	0.0	0.0
8.0000E 3	7.1309	0.0	0.0	0.94000	0.00774	0.0	0.0	0.0	0.0
9.0000E 3	7.0131	0.0	0.0	0.86000	0.00774	0.0	0.0	0.0	0.0
10.0000E 3	6.9078	0.0	0.0	0.79000	0.00774	0.0	0.0	0.0	0.0
15.0000E 3	6.5023	0.0	0.0	0.56000	0.00774	0.0	0.0	0.0	0.0
20.0000E 3	6.2146	0.0	0.0	0.44000	0.00774	0.0	0.0	0.0	0.0
25.0000E 3	5.9915	0.0	0.0	0.36000	0.00774	0.0	0.0	0.0	0.0
30.0000E 3	5.8091	0.0	0.0	0.33000	0.00774	0.0	0.0	0.0	0.0
40.0000E 3	5.5215	0.0	0.0	0.26000	0.00774	0.0	0.0	0.0	0.0
50.0000E 3	5.2983	0.0	0.0	0.22500	0.00774	0.0	0.0	0.0	0.0
60.0000E 3	5.1160	0.0	0.0	0.20000	0.00774	0.0	0.0	0.0	0.0
70.0000E 3	4.9618	0.0	0.0	0.18000	0.00774	0.0	0.0	0.0	0.0
80.0000E 3	4.8283	0.0	0.0	0.17000	0.00774	0.0	0.0	0.0	0.0
90.0000E 3	4.7105	0.0	0.0	0.16000	0.00774	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
100.0000E 3	4.6052	7.20000	7.05000	7.10130	0.15000	0.0	0.0	0.0	0.15000
120.0000E 3	4.4228	7.22000	7.08200	6.68177	0.13800	0.0	0.0	0.0	0.13800
140.0000E 3	4.2687	7.23000	7.10000	6.38510	0.13000	0.0	0.0	0.0	0.13000
160.0000E 3	4.1352	7.24000	7.11600	6.15125	0.12400	0.0	0.0	0.0	0.12400
180.0000E 3	4.0174	7.25000	7.13200	5.93771	0.11800	0.0	0.0	0.0	0.11800
200.0000E 3	3.9120	7.26000	7.14500	5.75241	0.11500	0.0	0.0	0.0	0.11500
220.0000E 3	3.8167	7.27000	7.15800	5.58787	0.11200	0.0	0.0	0.0	0.11200
240.0000E 3	3.7297	7.28000	7.17200	5.44397	0.10800	0.0	0.0	0.0	0.10800
260.0000E 3	3.6497	7.27000	7.16300	5.30734	0.10700	0.0	0.0	0.0	0.10700
280.0000E 3	3.5756	7.26000	7.15400	5.18534	0.10600	0.0	0.0	0.0	0.10600
300.0000E 3	3.5066	7.25000	7.14500	5.07792	0.10500	0.0	0.0	0.0	0.10500
350.0000E 3	3.3524	7.25000	7.10100	4.91377	0.10200	0.0	0.0	0.0	0.10200
400.0000E 3	3.2189	7.25000	7.05100	4.79625	0.10000	0.0	0.0	0.0	0.10000
450.0000E 3	3.1011	7.25000	7.02000	4.69472	0.09800	0.0	0.0	0.0	0.09800
500.0000E 3	2.9957	7.20000	6.93000	4.58739	0.09500	0.0	0.0	0.0	0.09500
550.0000E 3	2.9004	7.05000	6.73900	4.42853	0.09100	0.0	0.0	0.0	0.09100
600.0000E 3	2.8134	6.95000	6.59800	4.31080	0.08800	0.0	0.0	0.0	0.08800
650.0000E 3	2.7334	6.85000	6.34100	4.26287	0.08400	0.0	0.0	0.0	0.08400
700.0000E 3	2.6593	6.80000	6.12000	4.24184	0.08000	0.0	0.0	0.0	0.08000
750.0000E 3	2.5903	6.75000	5.93400	4.22212	0.07600	0.0	0.0	0.0	0.07600

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
100.0000E 3	4.6052	0.0	0.0	0.15000	0.01400	0.0	0.0	0.0	0.0
120.0000E 3	4.4228	0.0	0.0	0.13800	0.07600	0.0	0.0	0.0	0.0
140.0000E 3	4.2687	0.0	0.0	0.13000	0.11900	0.0	0.0	0.0	0.0
160.0000E 3	4.1352	0.0	0.0	0.12400	0.15300	0.0	0.0	0.0	0.0
180.0000E 3	4.0174	0.0	0.0	0.11800	0.18400	0.0	0.0	0.0	0.0
200.0000E 3	3.9120	0.0	0.0	0.11500	0.21100	0.0	0.0	0.0	0.0
220.0000E 3	3.8167	0.0	0.0	0.11200	0.23500	0.0	0.0	0.0	0.0
240.0000E 3	3.7297	0.0	0.0	0.10800	0.25600	0.0	0.0	0.0	0.0
260.0000E 3	3.6497	0.0	0.0	0.10700	0.27400	0.0	0.0	0.0	0.0
280.0000E 3	3.5756	0.0	0.0	0.10600	0.29000	0.0	0.0	0.0	0.0
300.0000E 3	3.5066	0.0	0.0	0.10500	0.30400	0.0	0.0	0.0	0.0
350.0000E 3	3.3524	0.04700	0.0	0.14900	0.32900	0.0	0.0	0.0	0.0
400.0000E 3	3.2189	0.09900	0.0	0.19900	0.34800	0.0	0.0	0.0	0.0
450.0000E 3	3.1011	0.13200	0.0	0.23000	0.36400	0.0	0.0	0.0	0.0
500.0000E 3	2.9957	0.17500	0.0	0.27000	0.37700	0.0	0.0	0.0	0.0
550.0000E 3	2.9004	0.22000	0.0	0.31100	0.38900	0.0	0.0	0.0	0.0
600.0000E 3	2.8134	0.26400	0.0	0.35200	0.40000	0.0	0.0	0.0	0.0
650.0000E 3	2.7334	0.42500	0.0	0.50900	0.40800	0.0	0.0	0.0	0.0
700.0000E 3	2.6593	0.60000	0.0	0.68000	0.41800	0.0	0.0	0.0	0.0
750.0000E 3	2.5903	0.74000	0.0	0.81600	0.42600	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
800.0000E 3	2.5257	6.70000	5.79700	4.18990	0.07300	0.0	0.0	0.0	0.07300
850.0000E 3	2.4651	6.65000	5.68100	4.15036	0.06900	0.0	0.0	0.0	0.06900
900.0000E 3	2.4079	6.60000	5.57600	4.09638	0.06400	0.0	0.0	0.0	0.06400
950.0000E 3	2.3539	6.55000	5.46900	4.05614	0.06100	0.0	0.0	0.0	0.06100
1.0000E 6	2.3026	6.50000	5.37250	4.00716	0.05750	0.0	0.0	0.0	0.05750
1.2000E 6	2.1203	6.09000	4.94400	3.62789	0.04800	0.0	0.0	0.0	0.04800
1.3000E 6	2.0402	5.95000	4.80000	3.47320	0.04400	0.0	0.0	0.0	0.04400
1.4000E 6	1.9661	5.80000	4.56600	3.36176	0.04000	0.0	0.0	0.0	0.04000
1.6000E 6	1.8326	5.78000	4.21600	3.41061	0.03400	0.0	0.0	0.0	0.03400
1.8000E 6	1.7148	5.55000	3.89050	3.30907	0.02950	0.0	0.0	0.0	0.02950
2.0000E 6	1.6094	5.35000	3.60400	3.23806	0.02600	0.0	0.0	0.0	0.02600
2.2000E 6	1.5141	5.30000	3.49700	3.22978	0.02300	0.0	0.0	0.0	0.02300
2.4000E 6	1.4271	5.00000	3.13950	3.12886	0.02050	0.0	0.0	0.0	0.02050
2.6000E 6	1.3471	4.77000	2.86100	3.05912	0.01900	0.0	0.0	0.0	0.01900
2.8000E 6	1.2730	4.63000	2.67300	3.02353	0.01700	0.0	0.0	0.0	0.01700
3.0000E 6	1.2040	4.48000	2.50350	2.97039	0.01550	0.0	0.0	0.0	0.01550
3.5000E 6	1.0498	4.22000	2.17700	2.90292	0.01300	0.0	0.0	0.0	0.01300
4.0000E 6	0.9163	4.08000	1.99890	2.86667	0.01100	0.0	0.00010	0.0	0.01110
4.5000E 6	0.7985	4.02000	1.90040	2.86646	0.00950	0.0	0.00010	0.0	0.00960
5.0000E 6	0.6931	4.00000	1.87040	2.85906	0.00840	0.0	0.00020	0.0	0.00860

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
800.0000E 3	2.5257	0.83000	0.0	0.90300	0.43300	0.0	0.0	0.0	0.0
850.0000E 3	2.4651	0.90000	0.0	0.96900	0.44000	0.0	0.0	0.0	0.0
900.0000E 3	2.4079	0.96000	0.0	1.02400	0.44900	0.0	0.0	0.0	0.0
950.0000E 3	2.3539	1.02000	0.0	1.08100	0.45600	0.0	0.0	0.0	0.0
1.0000E 6	2.3026	1.07000	0.0	1.12750	0.46400	0.0	0.0	0.0	0.0
1.2000E 6	2.1203	1.09800	0.0	1.14600	0.49800	0.0	0.0	0.0	0.0
1.3000E 6	2.0402	1.10600	0.0	1.15000	0.51600	0.0	0.0	0.0	0.0
1.4000E 6	1.9661	1.19400	0.0	1.23400	0.53400	0.0	0.0	0.0	0.0
1.6000E 6	1.8326	1.53000	0.0	1.56400	0.56200	0.0	0.0	0.0	0.0
1.8000E 6	1.7148	1.63000	0.0	1.65950	0.57600	0.0	0.0	0.0	0.0
2.0000E 6	1.6094	1.72000	0.0	1.74600	0.58600	0.0	0.0	0.0	0.0
2.2000E 6	1.5141	1.78000	0.0	1.80300	0.59200	0.0	0.0	0.0	0.0
2.4000E 6	1.4271	1.84000	0.0	1.86050	0.59600	0.0	0.0	0.0	0.0
2.6000E 6	1.3471	1.89000	0.0	1.90900	0.59800	0.0	0.0	0.0	0.0
2.8000E 6	1.2730	1.94000	0.0	1.95700	0.60100	0.0	0.0	0.0	0.0
3.0000E 6	1.2040	1.96100	0.0	1.97650	0.60300	0.0	0.0	0.0	0.0
3.5000E 6	1.0498	2.03000	0.0	2.04300	0.60500	0.0	0.0	0.0	0.0
4.0000E 6	0.9163	2.07000	0.0	2.08110	0.60700	0.0	0.0	0.0	0.0
4.5000E 6	0.7985	2.11000	0.0	2.11960	0.60700	0.0	0.0	0.0	0.0
5.0000E 6	0.6931	2.12100	0.0	2.12960	0.61000	0.0	0.0	0.0	0.0

MATERIAL CD

E	U	SGT	SGN	SGTR	SGG	SGF	SGP	SGALP	SGA
5.5000E 6	0.5978	4.00000	1.87020	2.85170	0.00750	0.0	0.00030	0.0	0.00780
6.0000E 6	0.5108	4.01000	1.90070	2.82396	0.00680	0.0	0.00050	0.0	0.00730
6.5000E 6	0.4308	4.03000	1.94000	2.79422	0.00630	0.0	0.00070	0.0	0.00700
7.0000E 6	0.3567	4.08000	2.00020	2.77787	0.00570	0.0	0.00100	0.00010	0.00680
7.5000E 6	0.2877	4.11000	2.05030	2.74655	0.00530	0.0	0.00130	0.00010	0.00670
8.0000E 6	0.2231	4.18000	2.13030	2.72501	0.00490	0.0	0.00170	0.00010	0.00670
8.5000E 6	0.1625	4.22000	2.18020	2.68514	0.00450	0.0	0.00210	0.00020	0.00680
9.0000E 6	0.1054	4.27000	2.23980	2.65510	0.00420	0.0	0.00280	0.00020	0.00720
9.5000E 6	0.0513	4.32000	2.30030	2.62238	0.00390	0.0	0.00350	0.00030	0.00770
10.0000E 6	0.0000	4.36000	2.34960	2.57430	0.00360	0.0	0.00440	0.00040	0.00840
10.5000E 6	-0.0488	4.41000	2.40480	2.53426	0.00340	0.0	0.00530	0.00050	0.00920
11.0000E 6	-0.0953	4.47000	2.46960	2.50173	0.00320	0.0	0.00650	0.00070	0.01040
11.5000E 6	-0.1398	4.52000	2.52520	2.46701	0.00300	0.0	0.00790	0.00090	0.01180
12.0000E 6	-0.1823	4.54000	2.54950	2.42646	0.00280	0.0	0.00950	0.00120	0.01350
12.5000E 6	-0.2231	4.56000	2.57450	2.39742	0.00270	0.0	0.01130	0.00150	0.01550
13.0000E 6	-0.2624	4.58000	2.60020	2.36723	0.00250	0.0	0.01350	0.00180	0.01780
13.5000E 6	-0.3001	4.60000	2.62450	2.33768	0.00240	0.0	0.01590	0.00220	0.02050
14.0000E 6	-0.3365	4.62000	2.64950	2.32023	0.00230	0.0	0.01860	0.00260	0.02350
14.5000E 6	-0.3716	4.60000	2.63530	2.28884	0.00220	0.0	0.02140	0.00310	0.02670
15.0000E 6	-0.4055	4.55000	2.58950	2.25829	0.00210	0.0	0.02480	0.00360	0.03050

E	U	SGI	SG2N	SGX	MUEL	NUE	ALPHA	ETA	CHIF
5.5000E 6	0.5978	2.12200	0.0	2.12980	0.61400	0.0	0.0	0.0	0.0
6.0000E 6	0.5108	2.10200	0.0	2.10930	0.62400	0.0	0.0	0.0	0.0
6.5000E 6	0.4308	2.08300	0.0	2.09000	0.63700	0.0	0.0	0.0	0.0
7.0000E 6	0.3567	2.07300	0.0	2.07980	0.65100	0.0	0.0	0.0	0.0
7.5000E 6	0.2877	2.05300	0.0	2.05970	0.66500	0.0	0.0	0.0	0.0
8.0000E 6	0.2231	2.03400	0.00900	2.04970	0.68300	0.0	0.0	0.0	0.0
8.5000E 6	0.1625	1.99800	0.03500	2.03980	0.70400	0.0	0.0	0.0	0.0
9.0000E 6	0.1054	1.95300	0.07000	2.03020	0.72100	0.0	0.0	0.0	0.0
9.5000E 6	0.0513	1.87900	0.13300	2.01970	0.73800	0.0	0.0	0.0	0.0
10.0000E 6	0.0000	1.71700	0.28500	2.01040	0.76000	0.0	0.0	0.0	0.0
10.5000E 6	-0.0488	1.48400	0.51200	2.00520	0.78000	0.0	0.0	0.0	0.0
11.0000E 6	-0.0953	1.23900	0.75100	2.00040	0.79700	0.0	0.0	0.0	0.0
11.5000E 6	-0.1398	0.99600	0.98700	1.99480	0.81300	0.0	0.0	0.0	0.0
12.0000E 6	-0.1823	0.79500	1.18200	1.99050	0.82900	0.0	0.0	0.0	0.0
12.5000E 6	-0.2231	0.63400	1.33600	1.98550	0.84000	0.0	0.0	0.0	0.0
13.0000E 6	-0.2624	0.51500	1.44700	1.97980	0.85100	0.0	0.0	0.0	0.0
13.5000E 6	-0.3001	0.42300	1.53200	1.97550	0.86200	0.0	0.0	0.0	0.0
14.0000E 6	-0.3365	0.36600	1.58100	1.97050	0.86800	0.0	0.0	0.0	0.0
14.5000E 6	-0.3716	0.32500	1.61300	1.96470	0.87700	0.0	0.0	0.0	0.0
15.0000E 6	-0.4055	0.29700	1.63300	1.96050	0.88500	0.0	0.0	0.0	0.0

Table 3

Inelastic excitation cross sections for Cd

E (MeV)	$\sigma_{n'}^{0.3}$(b)	$\sigma_{n'}^{0.6}$(b)	$\sigma_{n'}^{1.2}$(b)	$\sigma_{n'}^{1.3}$(b)
0.30	0.0			
0.35	0.047			
0.40	0.099			
0.45	0.132			
0.50	0.175			
0.55	0.220			
0.60	0.264	0.0		
0.65	0.296	0.129		
0.70	0.310	0.290		
0.75	0.312	0.428		
0.80	0.297	0.533		
0.85	0.273	0.627		
0.90	0.246	0.714		
0.95	0.224	0.796		
1.00	0.200	0.870		
1.20	0.158	0.940	0.0	
1.30	0.146	0.868	0.092	0.0
1.40	0.135	0.760	0.173	0.126

Table 4

26 group cross sections for Cd (Na P1 - weighting spectrum)

Energy group	ΔE	σ_a(b)	σ_n(b)	$\sigma_{n'}$(b)	$\bar{\mu}_L$	σ_{er}(b)	σ_{tr}(b)
1	6.5-10.5MeV	0.007	2.090	2.014	0.7038	0.052	2.729
2	4.0- 6.5	0.009	1.913	2.103	0.6154	0.049	2.856
3	2.5- 4.0	0.015	2.481	1.970	0.6034	0.058	2.972
4	1.4- 2.5	0.030	3.892	1.595	0.5780	0.082	3.300
5	0.8- 1.4	0.057	5.276	1.032	0.4818	0.125	3.880
6	0.4- 0.8	0.090	6.644	0.307	0.3966	0.142	4.470
7	0.2- 0.4	0.107	7.138	0.016	0.2950	0.162	5.239
8	0.1- 0.2MeV	0.131	7.100	0	0.1289	0.173	6.397
9	46.5-100 keV	0.187	6.865		0.00833	0.146	6.996
10	21.5-46.5	0.314	6.541		0.00774	0.122	6.805
11	10.0-21.5	0.590	6.147			0.123	6.689
12	4.65-10.0	0.999	5.612			0.073	6.568
13	2.15-4.65	1.376	5.044			0.080	6.381
14	1.0-2.15keV	1.542	11.714			0.129	13.165
15	465 -1000 eV	2.038	9.786			0.106	11.755
16	215 -465	4.638	22.410			0.070	26.884
17	100 -215	5.026	9.913			0.077	14.862
18	46.5-100	16.646	16.528			0.057	33.045
19	21.5-46.5	3.822	7.329			0.030	11.095
20	10.0-21.5	0.513	5.405			0.020	5.877
21	4.65-10.0	0.093	5.481			0.052	5.531
22	2.15-4.65	0.577	5.590			0.029	6.123
23	1.0-2.15	4.434	5.861			0.050	10.249
24	0.465- 1.0	39.699	6.784			0.034	46.431
25	0.215-0.465	509.856	11.957			0.205	521.720
26	0.025 eV	2511.881	7.763	0	0.00774	0	2519.583

Table 5

26 group inelastic scattering matrix for Cd, $\sigma_{n'}^{i,\,i+k}$ (Na P1 - weighting spectrum)

i \ k	0	1	2	3	4	5	6	7	8	9	10
1	0.001	0.029	0.177	0.527	0.575	0.447	0.179	0.057	0.017	0.004	0.001
2	0.008	0.089	0.422	0.621	0.581	0.260	0.088	0.027	0.006	0.001	
3	0.032	0.261	0.544	0.638	0.328	0.119	0.037	0.009	0.002		
4	0.101	0.349	0.572	0.362	0.146	0.049	0.012	0.003	0.001		
5	0.055	0.593	0.291	0.082	0.009	0.002					
6	0.046	0.110	0.106	0.040	0.004	0.001					
7	0.000	0.000	0.012	0.003	0.001						

Table 6

26 group cross sections for Cd (ABN weighting spectrum)

Energy group	ΔE	σ_a(b)	σ_n(b)	$\sigma_{n'}$(b)	$\bar{\mu}_L$	σ_{er}(b)	σ_{tr}(b)
1	6.5 - 10.5 MeV	0.007	2.068	2.031	0.7038	0.064	2.740
2	4.0 - 6.5	0.009	1.911	2.104	0.6154	0.046	2.856
3	2.5 - 4.0	0.015	2.467	1.973	0.6034	0.053	2.969
4	1.4 - 2.5	0.029	3.821	1.625	0.5780	0.064	3.286
5	0.8 - 1.4	0.055	5.232	1.042	0.4818	0.104	3.847
6	0.4 - 0.8	0.089	6.595	0.333	0.3966	0.118	4.445
7	0.2 - 0.4	0.106	7.135	0.018	0.2950	0.145	5.214
8	0.1 - 0.2 MeV	0.131	7.100	0	0.1289	0.179	6.400
9	46.5 -100 keV	0.189	6.860		0.00833	0.156	6.992
10	21.5 - 46.5	0.319	6.532		0.00774	0.147	6.800
11	10.0 - 21.5	0.602	6.132			0.138	6.687
12	4.65- 10.0	1.028	5.567			0.122	6.552
13	2.15- 4.65	1.402	5.008			0.111	6.371
14	1.0 - 2.15 keV	1.531	12.743			0.177	14.175
15	465 -100 eV	2.035	9.674			0.197	11.641
16	215 -465	4.562	18.978			0.145	23.401
17	100 --215	7.010	10.509			0.228	17.438
18	46.5 - 100	11.847	12.821			0.186	24.568
19	21.5 - 46.5	5.526	6.731			0.124	12.205
20	10.0 - 21.5	0.321	5.421			0.127	5.699
21	4.65- 10.0	0.123	5.495			0.129	5.575
22	2.15- 4.65	0.810	5.618			0.133	6.385
23	1.0 - 2.12	6.406	5.949			0.147	12.309
24	0.465- 1.0	65.206	7.217			0.208	72.368
25	0.215-0.465	1392.145	18.531			0.954	1410.532
26	0.025 eV	2511.881	7.763	0	0.00774	0	2519.583

Table 7

26 group inelastic scattering matrix for Cd, $\sigma_{n'}^{i,i+k}$ (ABN weighting spectrum)

i \ k	0	1	2	3	4	5	6	7	8	9	10
1	0.003	0.056	0.246	0.582	0.548	0.388	0.146	0.045	0.013	0.003	0.001
2	0.019	0.146	0.509	0.614	0.509	0.213	0.068	0.020	0.005	0.001	
3	0.056	0.337	0.573	0.591	0.280	0.097	0.030	0.007	0.002		
4	0.164	0.418	0.561	0.314	0.118	0.038	0.009	0.003			
5	0.063	0.626	0.264	0.075	0.011	0.002	0.001				
6	0.056	0.115	0.116	0.040	0.005	0.001					
7	0.000	0.000	0.014	0.003	0.001						

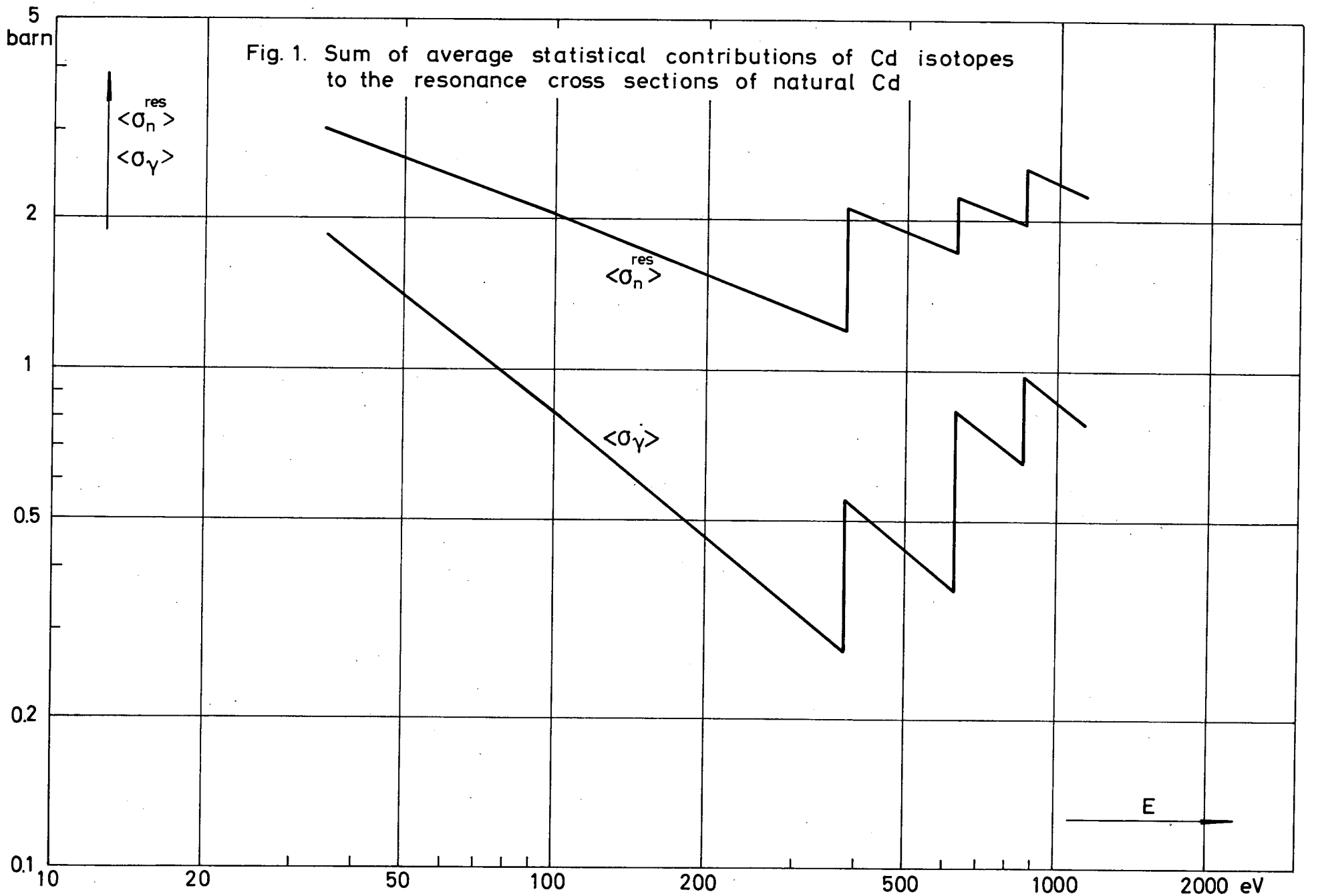

Fig. 1. Sum of average statistical contributions of Cd isotopes to the resonance cross sections of natural Cd

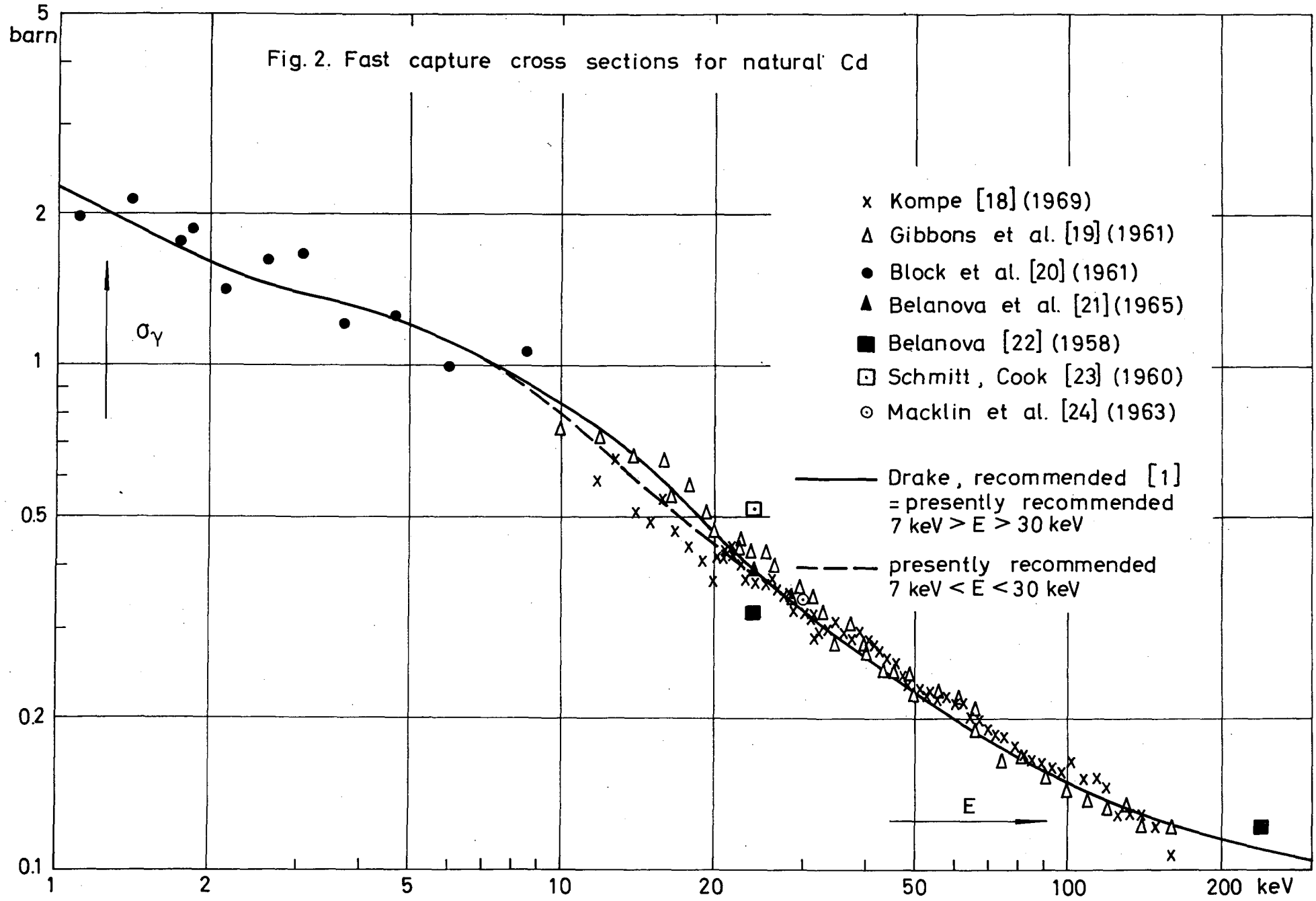

Fig. 2. Fast capture cross sections for natural Cd