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MCNP™ ENDF/B-VI Validation: Infinite Media Comparisons of ENDF/B-VI and ENDF/B-V

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MCNP™ ENDF/B-VI Validation: Infinite Media Comparisons of ENDF/B-VI and ENDF/B-V

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ERRATA

LA--12887: MCNP™ ENDF/B-VI Validation
Infinite Media Comparisons of ENDF/B-VI and ENDF/B-V

and

LA--12891: ENDF/B-VI Data for MCNP

{ CORRECTIONS ARE INDICATED BY A *}

Table 1. The MCNP ENDF60 Library

Material	ZAID	Filename	Evaluation	Release	Type	Photon
^{1}H	1001.60c	h1001	LANL	6.1[a]	New[b]	Yes[c]
^{2}H	1002.60c	d1002	LANL, AWRE	-	New	-
^{3}H	1003.60c	t1003	LANL	-	-	No
^{3}He	2003.60c	he2003	LANL	6.1	New	No
^{4}He	2004.60c	he2004	LANL	-	-	No
^{6}Li	3006.60c	li3006	LANL	6.1	New	-
^{7}Li	3007.60c	li3007	LANL	-	New	-
^{9}Be	4009.60c	be4009	LLNL	-	New	-
^{10}B	5010.60c	b5010	LANL	6.1	New	-
^{11}B	5011.60c	b5011	LANL	-	New	-
C	6000.60c	c6000	ORNL	6.1	New	-
^{14}N	7014.60c	n7014	LANL	LANL	New	-
^{15}N	7015.60c	n7015	LANL	-	New	-
^{16}O	8016.60c	o8016	LANL	-	New	-
^{17}O	8017.60c	o8017	BNL	-	-	No
^{19}F	9019.60c	f9019	ORNL	-	New	-
^{23}Na	11023.60c	na11023	ORNL	6.1	-	-
Mg	12000.60c	mg12000	ORNL	-	-	-
^{27}Al	13027.60c	al13027	LANL	-	-	-
Si	14000.60c	si14000	ORNL	-	-	-
^{31}P	15031.60c	p15031	LLNL	-	-	-
S	16000.60c	s16000	BNL	-	-	-
^{32}S	16032.60c	s16032	LLNL	-	-	-
Cl	17000.60c	cl17000	GGA	-	-	-
K	19000.60c	k19000	GGA	-	-	-
Ca	20000.60c	ca20000	ORNL	-	New*	-
^{45}Sc	21045.60c	sc21045	BNL	6.2	New*	-
Ti	22000.60c	ti22000	BRC, ANL	-	-	-
V	23000.60c	v23000	ANL, LLNL, +	-	New	-
^{50}Cr	24050.60c	cr24050	ORNL	6.1	New	-

[a] All releases are release 6.0 of ENDF/B-VI unless otherwise noted. LANL indicates modifications were performed.
[b] All types are translations from ENDF/B-V Release 0, unless otherwise noted.
[c] All nuclides have photon production, unless otherwise noted.

Table 1 (cont.) The MCNP ENDF60 Library

Material	ZAID	Filename	Evaluation	Release	Type	Photon
^{52}Cr	24052.60c	cr24052	ORNL	6.1	New	-
^{53}Cr	24053.60c	cr24053	ORNL	6.1	New	-
^{54}Cr	24054.60c	cr24054	ORNL	6.1	New	-
^{55}Mn	25055.60c	mn25055	ORNL	-	New	-
^{54}Fe	26054.60c	fe26054	ORNL	6.1	New	-
^{56}Fe	26056.60c	fe26056	ORNL	6.1	New	-
^{57}Fe	26057.60c	fe26057	ORNL	6.1	New	-
^{58}Fe	26058.60c	fe26058	ORNL	6.1	New	-
^{59}Co	27059.60c	co27059	ANL	6.2	New	-
^{58}Ni	28058.60c	ni28058	ORNL	6.1	New	-
^{60}Ni	28060.60c	ni28060	ORNL	6.1	New	-
^{61}Ni	28061.60c	ni28061	ORNL	6.1	New	-
^{62}Ni	28062.60c	ni28062	ORNL	6.1	New	-
^{64}Ni	28064.60c	ni28062	ORNL	6.1	New	-
^{63}Cu	29063.60c	cu29063	ORNL	6.2	New	-
^{65}Cu	29065.60c	cu29065	ORNL	6.2	New	-
Ga	31000.60c	ga31000	LLNL, LANL	-	-	-
^{89}Y	39089.60c	y39089	ANL, LLNL	-	New*	-
Zr	40000.60c	zr40000	SAI, BNL	6.1	-	No
^{93}Nb	41093.60c	nb41093	ANL, LLNL	6.1	New	-
Mo	42000.60c	mo42000	LLNL, HEDL	-	-	-
^{99}Tc	43099.60c	tc43099	HEDL, BAW	-	-	No
^{107}Ag	47107.60c	ag47107	BNL, HEDL	-	New*	No
^{109}Ag	47109.60c	ag47109	BNL, HEDL	-	New*	No
In	49000.60c	in49000	ANL	-	New	-
^{127}I	53127.60c	i53127	HEDL, RCN	LANL	New*	-
^{129}I	53129.60c	i53129	HEDL, RCN	-	-	No
^{133}Cs	55133.60c	cs55133	HEDL, BNL, +	-	-	No
^{134}Cs	55134.60c	cs55134	ORNL, HEDL	-	New	No
^{135}Cs	55135.60c	cs55135	HEDL	-	-	No
^{136}Cs	55136.60c	cs55136	HEDL	-	-	No
^{137}Cs	55137.60c	cs55137	HEDL	-	-	No

[a] All releases are release 6.0 of ENDF/B-VI unless otherwise noted. LANL indicates modifications were performed.

[b] All types are translations from ENDF/B-V Release 0, unless otherwise noted.

[c] All nuclides have photon production, unless otherwise noted.

Table 1 (cont.) The MCNP ENDF60 Library

Material	ZAID	Filename	Evaluation	Release	Type	Photon
^{138}Ba	56138.60c	ba56138	ORNL, HEDL	-	-	-
^{151}Eu	63151.60c	eu63151	LANL	-	New	-
^{153}Eu	63153.60c	eu63153	LANL	-	New	-
^{152}Gd	64152.60c	gd64152	BNL	-	-	No
^{154}Gd	64154.60c	gd64154	BNL	-	-	No
^{155}Gd	64155.60c	gd64155	BNL	-	-	No
^{156}Gd	64156.60c	gd64156	BNL	-	-	No
^{157}Gd	64157.60c	gd64157	BNL	-	-	No
^{158}Gd	64158.60c	gd64158	BNL	-	-	No
^{160}Gd	64160.60c	gd64160	BNL	-	-	No
^{165}Ho	67165.60c	ho67165	LANL	-	New	-
Hf	72000.60c	hf72000	SAI	-	-	No
^{181}Ta	73181.60c	ta73181	LLNL	-	-	-
^{182}Ta	73182.60c	ta73182	AI	-	-	No
^{182}W	74182.60c	w74182	LANL, ANL, +	-	New*	-
^{183}W	74183.60c	w74183	LANL, ANL, +	-	New*	-
^{184}W	74184.60c	w74184	LANL, ANL, +	-	New*	-
^{186}W	74186.60c	w74186	LANL, ANL, +	-	New*	-
^{185}Re	75185.60c	re75185	ORNL, LANL	-	New	No
^{187}Re	75187.60c	re75187	ORNL, LANL	-	New	No
^{197}Au	79197.60c	au79197	LANL	6.1	New	-
^{206}Pb	82206.60c	pb82206	ORNL	-	New	-
^{207}Pb	82207.60c	pb82207	ORNL	6.1	New	-
^{208}Pb	82208.60c	pb82208	ORNL	-	New	-
^{209}Bi	83209.60c	bi83209	ANL	-	New	-
^{230}Th	90230.60c	th90230	HEDL	-	-	No
^{232}Th	90232.60c	th90232	BNL, ANL, +	-	-	-
^{231}Pa	91231.60c	pa91231	HEDL	-	-	No
^{232}U	92232.60c	u92232	HEDL	-	-	No
^{233}U	92233.60c	u92233	LANL, ORNL	-	-	-
^{234}U	92234.60c	u92234	BNL, GGA	-	-	No

[a] All releases are release 6.0 of ENDF/B-VI unless otherwise noted. LANL indicates modifications were performed.

[b] All types are translations from ENDF/B-V Release 0, unless otherwise noted.

[c] All nuclides have photon production, unless otherwise noted.

Table 1 (cont.) The MCNP ENDF60 Library

Material	ZAID	Filename	Evaluation	Release	Type	Photon
^{235}U	92235.60c	u92235	ORNL, LANL	6.2*	New	-
^{236}U	92236.60c	u92236	HEDL	-	New	No
^{238}U	92238.60c	u92238	ORNL, LANL, +	6.2	New	-
^{237}Np	93237.60c	np93237	LANL	6.1	New	-
^{238}Np[d]	93238.60c	np93238	SRL	6.2*	New	No
^{239}Np	93239.60c	np93239	ORNL	-	New	No
^{236}Pu	94236.60c	pu94236	HEDL, SRL	-	-*	No
^{237}Pu	94237.60c	pu94237	HEDL	-	-*	No
^{238}Pu	94238.60c	pu94238	HEDL, AI, +	-	-	No
^{239}Pu	94239.60c	pu94239	LANL	6.2	New	-
^{240}Pu	94240.60c	pu94240	ORNL	6.2*	New	-
^{241}Pu	94241.60c	pu94241	ORNL	6.1	New	-
^{242}Pu	94242.60c	pu94242	HEDL, SRL, +	-	-	-
^{243}Pu	94243.60c	pu94243	BNL, SRL, +	6.2*	-	-
^{244}Pu	94244.60c	pu94244	HEDL, SRL	-	-	No
^{241}Am	95241.60c	am95241	CNDC	LANL	New	-
^{242}Am[d]	95242.60c	am95242	SRL	6.1	-	No
^{243}Am	95243.60c	am95243	ORNL, HEDL, +	-	New	-
^{241}Cm	96241.60c	cm96241	HEDL	-	-	No
^{242}Cm	96242.60c	cm96242	HEDL, SRL, +	-	-	-
^{243}Cm	96243.60c	cm96243	HEDL, SRL, +	-	-	-
^{244}Cm	96244.60c	cm96244	HEDL, SRL, +	-	-	-
^{245}Cm	96245.60c	cm96245	SRL, LLNL	6.2	-	-
^{246}Cm	96246.60c	cm96246	BNL, SRL, +	6.2	-	-
^{247}Cm	96247.60c	cm96247	BNL, SRL, +	6.2	-	-
^{248}Cm	96248.60c	cm96248	HEDL, SRL, +	-	-	-
^{249}Bk	97249.60c	bk97249	CNDC	-	New	No
^{249}Cf	98249.60c	cf98249	CNDC	LANL	New	No
^{250}Cf	98250.60c	cf98250	BNL, SRL, +	6.2	-	-
^{251}Cf	98251.60c	cf98251	BNL, SRL, +	6.2	-	-
^{252}Cf	98252.60c	cf98252	BNL, SRL, +	6.2*	-	-

[a] All releases are release 6.0 of ENDF/B-VI unless otherwise noted. LANL indicates modifications were performed.

[b] All types are translations from ENDF/B-V Release 0, unless otherwise noted.

[c] All nuclides have photon production, unless otherwise noted.

[d] These data files are not recommended for use due to the evaluations being incomplete, and are currently being removed from distribution. Additionally, 95242.60c represents the ground state of ^{242}Am, <u>not</u> the metastable state.

MCNP™ ENDF/B-VI VALIDATION: INFINITE MEDIA COMPARISONS OF ENDF/B-VI AND ENDF/B-V

by

John D. Court, John S. Hendricks, and Stephanie C. Frankle

ABSTRACT

Infinite media calculations have been performed to validate the new MCNP ENDF/B-VI Library, ENDF60. All 124 nuclides have neutron flux and heating tallies compared against ENDF/B-V, as well as the MCNP Recommended Data Sets when these were not ENDF/B-V. For nuclides with photon production, photon flux and heating tallies have also been compared. All significant differences between the new ENDF60 results and those obtained with other data sets are discussed. This report provides a method for data comparison so that a better decision can be made as to the best data set to be used for a particular problem.

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I. INTRODUCTION

Although ENDF/B-VI has been available for approximately four years,[1] with Release 2 issued in June of 1993, the ability to utilize this data set is only now available for MCNP. The new ENDF/B-VI evaluations could not be utilized to their full extent until the release of MCNP4A in October 1993, which included new sampling schemes for the new ENDF/B-VI representations of angular scattering.[2] The ENDF/B-VI library for MCNP has been released as the ENDF60 library[3,4] and is identified by the .60c designation.

The ENDF60 data library was processed from the ENDF/B-VI evaluations using the NJOY code[5] by the Nuclear Theory and Applications Group (T-2) at Los Alamos National Laboratory (LANL). Approximately 52% of the data are translations from ENDF/B-V to ENDF/B-VI, which should be only slightly different due to modifications in the NJOY code. The remaining 48% are new evaluations which have sometimes changed significantly.

In order to release the ENDF60 library in a timely fashion, the testing and validation phase was radically changed from that used in the past. The average size of each nuclide file in the ENDF60 library is 1.5 Mbytes with the largest being 8.1 Mbytes. Due to the enormous size of the individual data files for each nuclide, the former manual checking methods used in validating the MCNP ENDF/B-V libraries were not possible. Therefore, a new set of quality assurance tests was established for NJOY by T-2. In addition to these tests, the Radiation Transport Group (X-6) subjected the data to a number of customized checks and experimental benchmark comparisons. The customized checks included a detailed photon production assessment,[6] the infinite medium comparisons described in this report, and experimental benchmarks including criticality,[4] iron benchmarks,[7] and Livermore Pulsed Spheres.[8]

We report here a series of infinite media calculations that were undertaken for each nuclide in the ENDF60 library. Each nuclide was compared to the corresponding ENDF/B-V nuclide and/or the MCNP Recommended Data Set, and the differences were fully explored.

II. THE ENDF60 LIBRARY

The organizational structure of the ENDF60 data library has been modified from that of previous libraries. The library now consists of an individual data file for each nuclide. Table I provides a synopsis of the ENDF60 data library including the ZAID, corresponding file name, where the ENDF/B-VI evaluation was performed, the evaluation's revision number, and the availability of photon production. The type of evaluation, whether new or translated, is also indicated.

Of the 124 nuclides in the ENDF60 library, 31 have not been generally available to MCNP users until now. These previously unavailable data are listed in Table II. Four of these are new evaluations which were unavailable until ENDF/B-VI. Ten newly available nuclides are translations of ENDF/B-V data that have not been available previously in the MCNP data libraries. These 14 nuclides are listed in Table II under "No Previous Evaluation" as authorized versions have never been available for use with MCNP. Seventeen more nuclides are now available for which there were no previous MCNP Recommended Evaluations and were generally not distributed. These nuclides are listed under "No Previous MCNP Recommended Evaluations" and include 4 new ENDF/B-VI evaluations and 13 translations from

ENDF/B-V. The previous evaluations for these nuclides were mostly from obsolete sources and were only available locally at LANL and to some X–6 customers.

III. INFINITE MEDIA PROBLEM SETUP

The infinite media calculations consisted of a 20-MeV neutron source in a psuedo-infinite media (a sphere of 100 meter radius) of the nuclide. For light materials, this was sufficient to downscatter throughout the entire energy range. As materials got heavier, the source was modified so that for the heaviest elements, the source spanned the entire energy range so as to sample collisions over the entire energy range. The neutron flux and heating were then tallied along with the induced photon flux and heating, and coplots were made against the ENDF/B-V and/or the MCNP Recommended Library. Each coplot is presented here so that the user can determine the best data set to be used for a particular problem.

IV. RESULTS

Figures 1 through 364 contain the plots for the 124 evaluations contained in ENDF60. For each nuclide there are plots for the neutron flux and the neutron heating. The units for the flux tallies are $1/cm^2$, and the units for the heating tallies are MeV/gm. If the nuclide has photon production, then the photon flux and photon heating are also plotted.

In the figures, the ENDF60 library is referenced by "ENDF/B-6." The MCNP Recommended Library is referenced as "T–2" if it is an evaluation by the LANL Nuclear Theory and Applications Group (T–2) and "ENDF/B-5" if it is an ENDF/B-V based data set. There are some instances where an evaluation was available, but was not contained in the MCNP Recommended Library. In these instances, ENDF/B-VI was coplotted against the best available evaluation. Some of these evaluations are from the Lawrence Livermore National Laboratory Evaluated Nuclear Data Library (ENDL). These are labeled as "ENDL-85" or "ENDL-90" depending upon which version was used.

In several cases, the neutron heating tallies are greater at lower energies. The larger ENDF/B-VI heating at lower energies results from the improved NJOY ability to include nucleus recoil effects and is evident in many nuclides. A number of examples are listed in Table III.

Two of these translated evaluations, Cl and K, show significant changes in neutron heating due to the improvements in NJOY and are illustrated in Figs. 86 and 90, respectively.

Several evaluations now include photon production which caused a large decrease in the neutron heating tallies. When no photon production is available, all energy is deposited as neutron heating. Nuclides where the neutron heating is lower because photon production has been added are ^{11}B, ^{45}Sc, ^{89}Y, ^{197}Au, and ^{237}Np, Figs. 32, 98, 138, 236, and 274, respectively. Photon production was also added to ^{233}U (Fig. 258), but the neutron heating decrease is small because photon heating is very small compared to the fission heating. There are other evaluations (such as ENDL-85) which include photon production where ENDF/B-VI does not. For these, the ENDF60 neutron heating tallies are greater as shown in Fig. 350 for ^{249}Bk.

TABLE I. **The MCNP ENDF60 Library.**

Material	ZAID	Filename	Evaluation	Revision	Type	Photon
^{1}H	1001.60c	h1001	LANL	[a]6.1	[b]New	[c]Yes
^{2}H	1002.60c	d1002	LANL, AWRE	-	New	-
^{3}H	1003.60c	t1003	LANL	-	-	No
^{3}He	2003.60c	he2003	LANL	6.1	New	No
^{4}He	2004.60c	he2004	LANL	-	-	No
^{6}Li	3006.60c	li3006	LANL	6.1	New	-
^{7}Li	3007.60c	li3007	LANL	-	New	-
^{9}Be	4009.60c	be4009	LLNL	-	New	-
^{10}B	5010.60c	b5010	LANL	6.1	New	-
^{11}B	5011.60c	b5011	LANL	-	New	-
C	6000.60c	c6000	ORNL	6.1	New	-
^{14}N	7014.60c	n7014	LANL	LANL	New	-
^{15}N	7015.60c	n7015	LANL	-	New	-
^{16}O	8016.60c	o8016	LANL	-	New	-
^{17}O	8017.60c	o8017	BNL	-	-	No
^{19}F	9019.60c	f9019	ORNL	-	New	-
^{23}Na	11023.60c	na11023	ORNL	6.1	-	-
Mg	12000.60c	mg12000	ORNL	-	-	-
^{27}Al	13027.60c	al13027	LANL	-	-	-
Si	14000.60c	si14000	ORNL	-	-	-
^{31}P	15031.60c	p15031	LLNL	-	-	-
S	16000.60c	s16000	BNL	-	-	-
^{32}S	16032.60c	s16032	LLNL	-	-	-
Cl	17000.60c	cl17000	GGA	-	-	-
K	19000.60c	k19000	GGA	-	-	-
Ca	20000.60c	ca20000	ORNL	-	-	-
^{45}Sc	21045.60c	sc21045	BNL	6.2	-	-
Ti	22000.60c	ti22000	BRC, ANL	-	-	-
V	23000.60c	v23000	ANL, LLNL, +	-	New	-
^{50}Cr	24050.60c	cr24050	ORNL	6.1	New	-

[a]All revisions are revision 6.0 of ENDF/B-VI unless otherwise noted. LANL indicates modifications were performed.
[b]All types are translations from ENDF/B-V, unless otherwise noted.
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TABLE I (cont.) **The MCNP ENDF60 Library.**

Material	ZAID	Filename	Evaluation	Revision	Type	Photon
^{52}Cr	24052.60c	cr24052	ORNL	6.1	New	-
^{53}Cr	24053.60c	cr24053	ORNL	6.1	New	-
^{54}Cr	24054.60c	cr24054	ORNL	6.1	New	-
^{55}Mn	25055.60c	mn25055	ORNL	-	New	-
^{54}Fe	26054.60c	fe26054	ORNL	6.1	New	-
^{56}Fe	26056.60c	fe26056	ORNL	6.1	New	-
^{57}Fe	26057.60c	fe26057	ORNL	6.1	New	-
^{58}Fe	26058.60c	fe26058	ORNL	6.1	New	-
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^{58}Ni	28058.60c	ni28058	ORNL	6.1	New	-
^{60}Ni	28060.60c	ni28060	ORNL	6.1	New	-
^{61}Ni	28061.60c	ni28061	ORNL	6.1	New	-
^{62}Ni	28062.60c	ni28062	ORNL	6.1	New	-
^{64}Ni	28064.60c	ni28062	ORNL	6.1	New	-
^{63}Cu	29063.60c	cu29063	ORNL	6.2	New	-
^{65}Cu	29065.60c	cu29065	ORNL	6.2	New	-
Ga	31000.60c	ga31000	LLNL, LANL	-	-	-
^{89}Y	39089.60c	y39089	ANL, LLNL	-	-	-
Zr	40000.60c	zr40000	SAI, BNL	6.1	-	No
^{93}Nb	41093.60c	nb41093	ANL, LLNL	6.1	New	-
Mo	42000.60c	mo42000	LLNL, HEDL	-	-	-
^{99}Tc	43099.60c	tc43099	HEDL, BAW	-	-	No
^{107}Ag	47107.60c	ag47107	BNL, HEDL	-	-	No
^{109}Ag	47109.60c	ag47109	BNL, HEDL	-	-	No
In	49000.60c	in49000	ANL	-	New	-
^{127}I	53127.60c	i53127	HEDL, RCN	LANL	-	-
^{129}I	53129.60c	i53129	HEDL, RCN	-	-	No
^{133}Cs	55133.60c	cs55133	HEDL, BNL, +	-	-	No
^{134}Cs	55134.60c	cs55134	ORNL, HEDL	-	New	No
^{135}Cs	55135.60c	cs55135	HEDL	-	-	No
^{136}Cs	55136.60c	cs55136	HEDL	-	-	No
^{137}Cs	55137.60c	cs55137	HEDL	-	-	No

All revisions are revision 6.0 of ENDF/B-VI unless otherwise noted. LANL indicates modifications were performed.
All types are translations from ENDF/B-V, unless otherwise noted.
All nuclides have photon production, unless otherwise noted.

TABLE I (cont.) **The MCNP ENDF60 Library.**

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^{138}Ba	56138.60c	ba56138	ORNL, HEDL	-	-	-
^{151}Eu	63151.60c	eu63151	LANL	-	New	-
^{153}Eu	63153.60c	eu63153	LANL	-	New	-
^{152}Gd	64152.60c	gd64152	BNL	-	-	No
^{154}Gd	64154.60c	gd64154	BNL	-	-	No
^{155}Gd	64155.60c	gd64155	BNL	-	-	No
^{156}Gd	64156.60c	gd64156	BNL	-	-	No
^{157}Gd	64157.60c	gd64157	BNL	-	-	No
^{158}Gd	64158.60c	gd64158	BNL	-	-	No
^{160}Gd	64160.60c	gd64160	BNL	-	-	No
^{165}Ho	67165.60c	ho67165	LANL	-	New	-
Hf	72000.60c	hf72000	SAI	-	-	No
^{181}Ta	73181.60c	ta73181	LLNL	-	-	-
^{182}Ta	73182.60c	ta73182	AI	-	-	No
^{182}W	74182.60c	w74182	LANL, ANL, +	-	-	-
^{183}W	74183.60c	w74183	LANL, ANL, +	-	-	-
^{184}W	74184.60c	w74184	LANL, ANL, +	-	-	-
^{186}W	74186.60c	w74186	LANL, ANL, +	-	-	-
^{185}Re	75185.60c	re75185	ORNL, LANL	-	New	No
^{187}Re	75187.60c	re75187	ORNL, LANL	-	New	No
^{197}Au	79197.60c	au79197	LANL	6.1	New	-
^{206}Pb	82206.60c	pb82206	ORNL	-	New	-
^{207}Pb	82207.60c	pb82207	ORNL	6.1	New	-
^{208}Pb	82208.60c	pb82208	ORNL	-	New	-
^{209}Bi	83209.60c	bi83209	ANL	-	New	-
^{230}Th	90230.60c	th90230	HEDL	-	-	No
^{232}Th	90232.60c	th90232	BNL, ANL, +	-	-	-
^{231}Pa	91231.60c	pa91231	HEDL	-	-	No
^{232}U	92232.60c	u92232	HEDL	-	-	No
^{233}U	92233.60c	u92233	LANL, ORNL	-	-	-
^{234}U	92234.60c	u92234	BNL, GGA	-	-	No

All revisions are revision 6.0 of ENDF/B-VI unless otherwise noted. LANL indicates modifications were performed.
All types are translations from ENDF/B-V, unless otherwise noted.
All nuclides have photon production, unless otherwise noted.

TABLE I (cont.) **The MCNP ENDF60 Library.**

Material	ZAID	Filename	Evaluation	Revision	Type	Photon
^{235}U	92235.60c	u92235	ORNL, LANL	LANL	New	-
^{236}U	92236.60c	u92236	HEDL	-	New	No
^{238}U	92238.60c	u92238	ORNL, LANL, +	6.2	New	-
^{237}Np	93237.60c	np93237	LANL	6.1	New	-
^{238}Np	93238.60c	np93238	SRL	LANL	New	No
^{239}Np	93239.60c	np93239	ORNL	-	New	No
^{236}Pu	94236.60c	pu94236	HEDL, SRL	-	New	No
^{237}Pu	94237.60c	pu94237	HEDL	-	New	No
^{238}Pu	94238.60c	pu94238	HEDL, AI, +	-	-	No
^{239}Pu	94239.60c	pu94239	LANL	6.2	New	-
^{240}Pu	94240.60c	pu94240	ORNL	LANL	New	-
^{241}Pu	94241.60c	pu94241	ORNL	6.1	New	-
^{242}Pu	94242.60c	pu94242	HEDL, SRL, +	-	-	-
^{243}Pu	94243.60c	pu94243	BNL, SRL, +	LANL	-	-
^{244}Pu	94244.60c	pu94244	HEDL, SRL	-	-	No
^{241}Am	95241.60c	am95241	CNDC	LANL	New	-
^{242}Am	95242.60c	am95242	SRL	6.1	-	No
^{243}Am	95243.60c	am95243	ORNL, HEDL, +	-	New	-
^{241}Cm	96241.60c	cm96241	HEDL	-	-	No
^{242}Cm	96242.60c	cm96242	HEDL, SRL, +	-	-	-
^{243}Cm	96243.60c	cm96243	HEDL, SRL, +	-	-	-
^{244}Cm	96244.60c	cm96244	HEDL, SRL, +	-	-	-
^{245}Cm	96245.60c	cm96245	SRL, LLNL	6.2	-	-
^{246}Cm	96246.60c	cm96246	BNL, SRL, +	6.2	-	-
^{247}Cm	96247.60c	cm96247	BNL, SRL, +	6.2	-	-
^{248}Cm	96248.60c	cm96248	HEDL, SRL, +	-	-	-
^{249}Bk	97249.60c	bk97249	CNDC	-	New	No
^{249}Cf	98249.60c	cf98249	CNDC	LANL	New	No
^{250}Cf	98250.60c	cf98250	BNL, SRL, +	6.2	-	-
^{251}Cf	98251.60c	cf98251	BNL, SRL, +	6.2	-	-
^{252}Cf	98252.60c	cf98252	BNL, SRL, +	LANL	-	-

All revisions are revision 6.0 of ENDF/B-VI unless otherwise noted. LANL indicates modifications were performed.
All types are translations from ENDF/B-V, unless otherwise noted.
All nuclides have photon production, unless otherwise noted.

TABLE II. **New ENDF/B-VI Evaluations.**

No Previous Evaluation		No Previous MCNP Rec. Eval.	
New	Translation	New	Translation
In	^{17}O	^{238}Np	^{45}Sc
^{134}Cs	S	^{237}Pu	^{99}Tc
^{239}Np	^{129}I	^{249}Bk	^{127}I
^{236}Pu	^{136}Cs	^{249}Cf	^{135}Cs
	^{137}Cs		^{231}Pa
	^{182}Ta		^{243}Pu
	^{230}Th		^{243}Cm
	^{232}U		^{246}Cm
	^{244}Pu		^{247}Cm
	^{241}Cm		^{248}Cm
			^{250}Cf
			^{251}Cf
			^{252}Cf

TABLE III. **Some examples of evaluations that showed higher neutron heating at lower energies from the improvement in the treatment of nucleus recoil effects in NJOY.**

New Evaluations	Translations	
^{1}H	^{23}Na	Zr
^{7}Li	Mg	^{183}W
^{16}O	^{27}Al	^{184}W
C	Si	^{186}W
^{59}Co	^{31}P	^{238}Pu
Ni	Ti	^{231}Pa
^{243}Am		

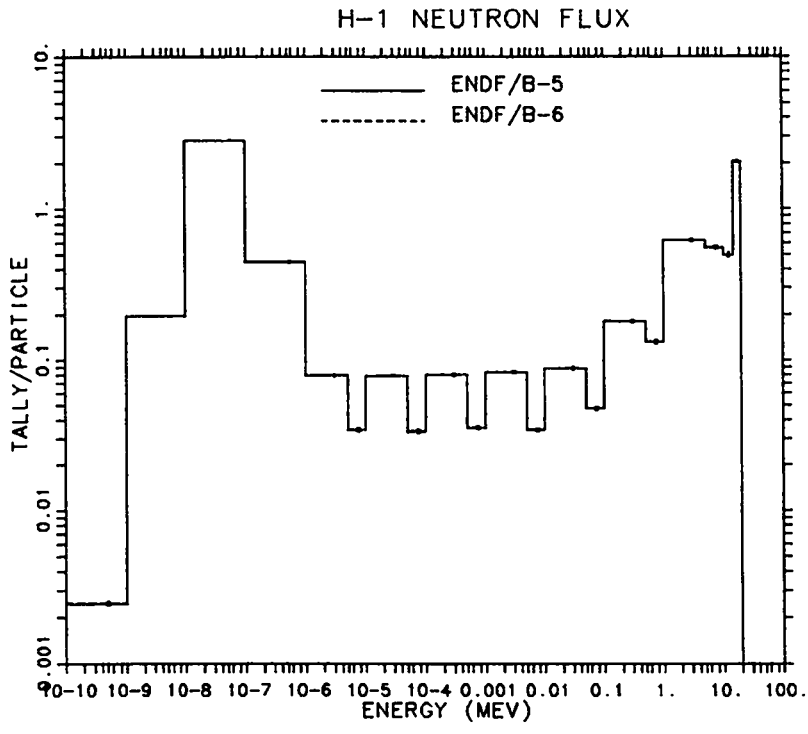

Fig. 1. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{1}H sphere.

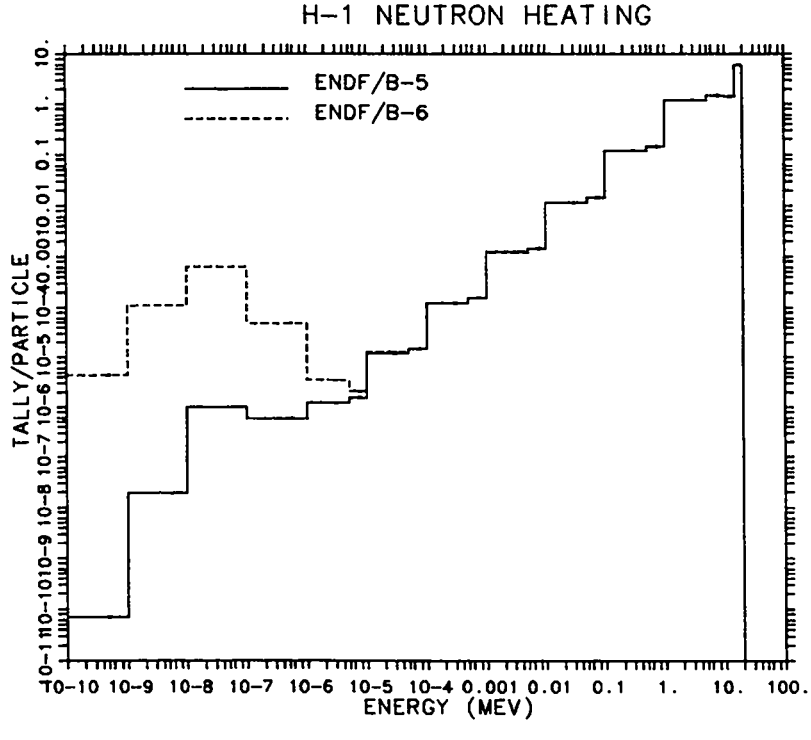

Fig. 2. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{1}H sphere.

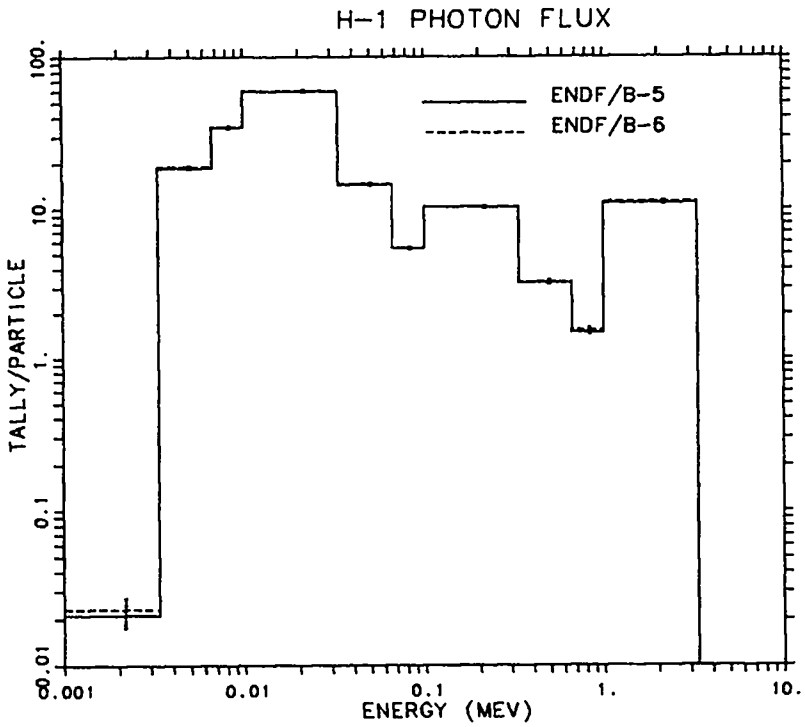

Fig. 3. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{1}H sphere.

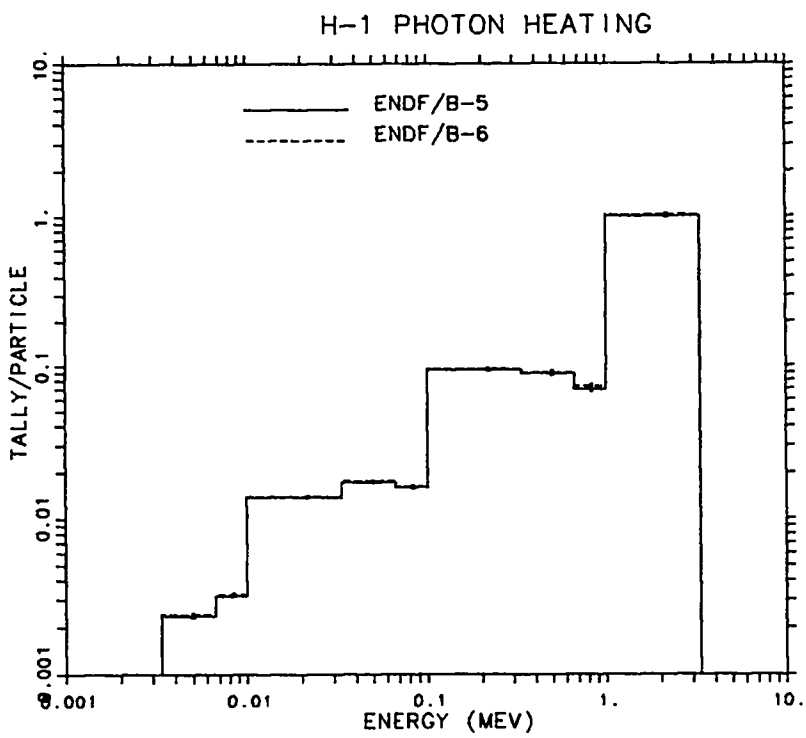

Fig. 4. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{1}H sphere.

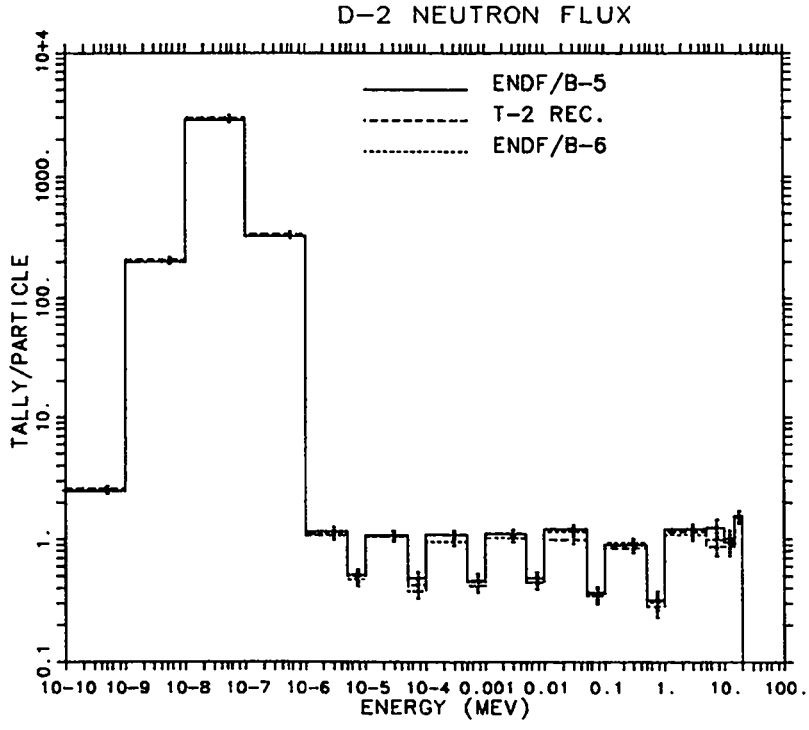

Fig. 5. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{2}H sphere.

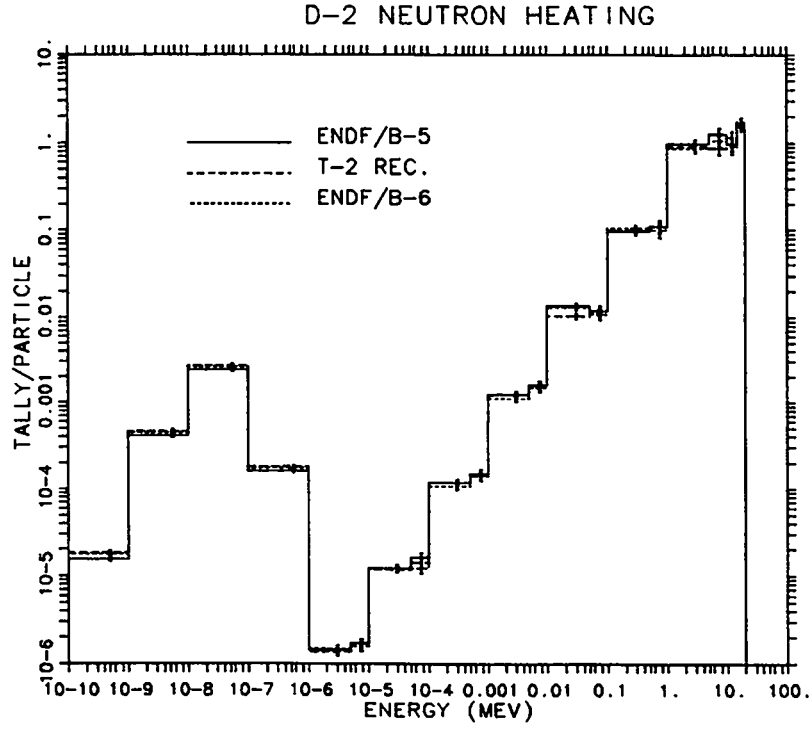

Fig. 6. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{2}H sphere.

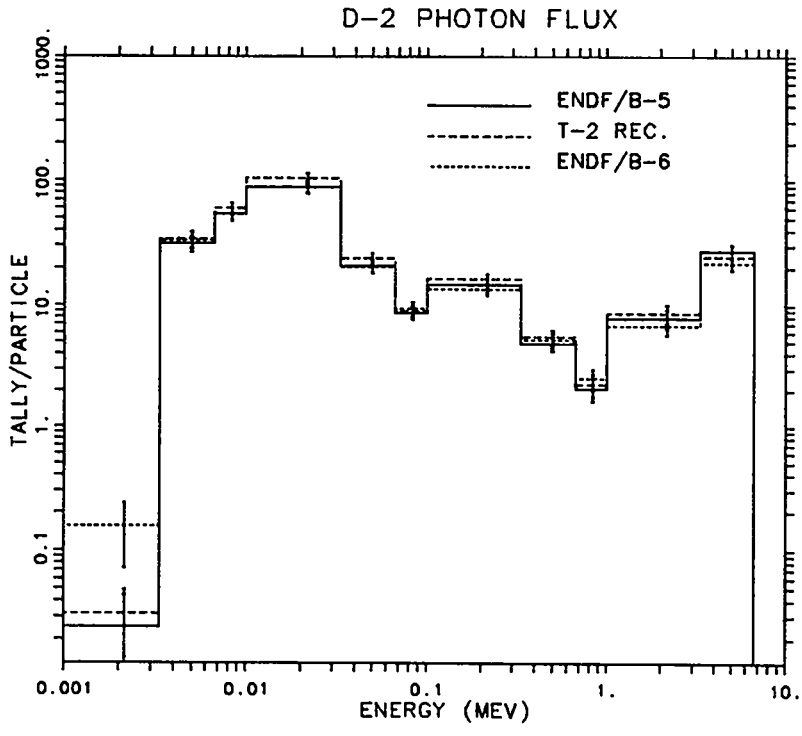

Fig. 7. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon flux for the ^{2}H sphere.

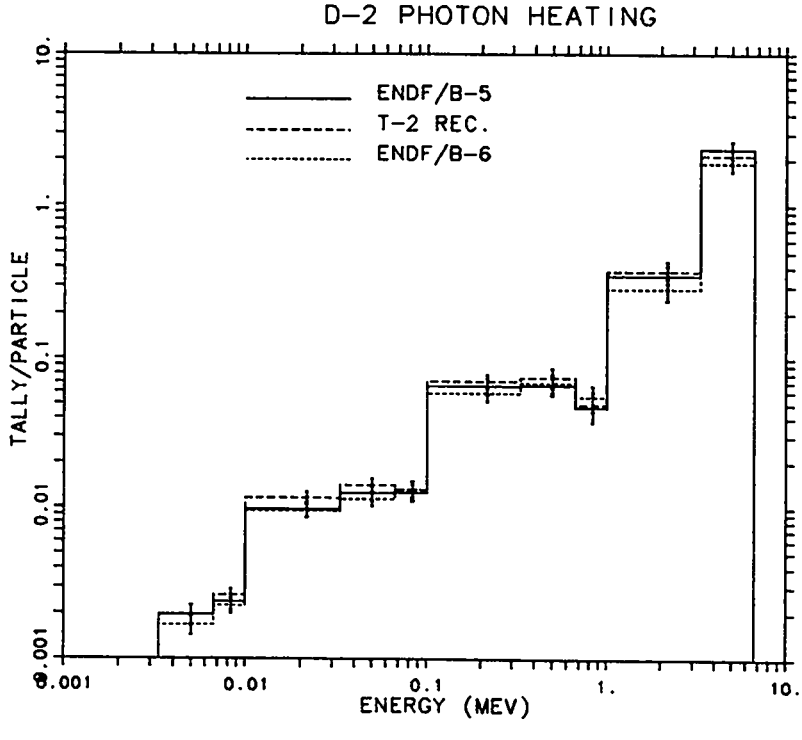

Fig. 8. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon heating for the ^{2}H sphere.

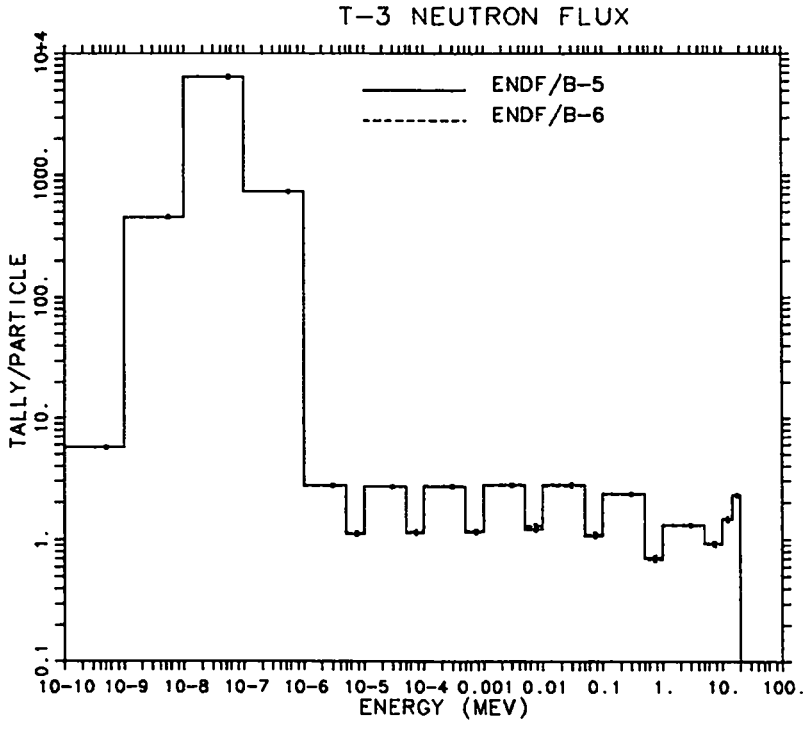

Fig. 9. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{3}H sphere.

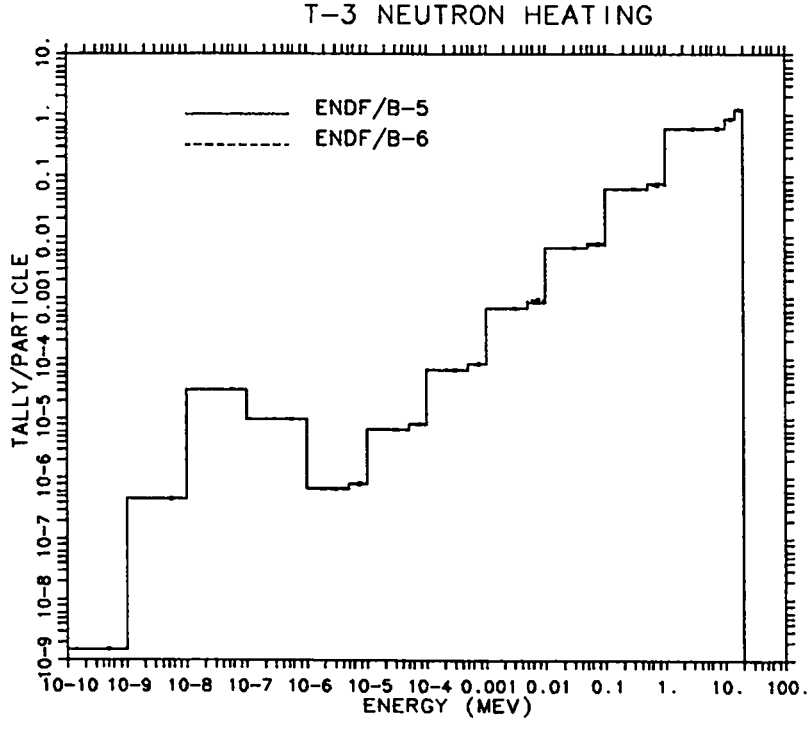

Fig. 10. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{3}H sphere.

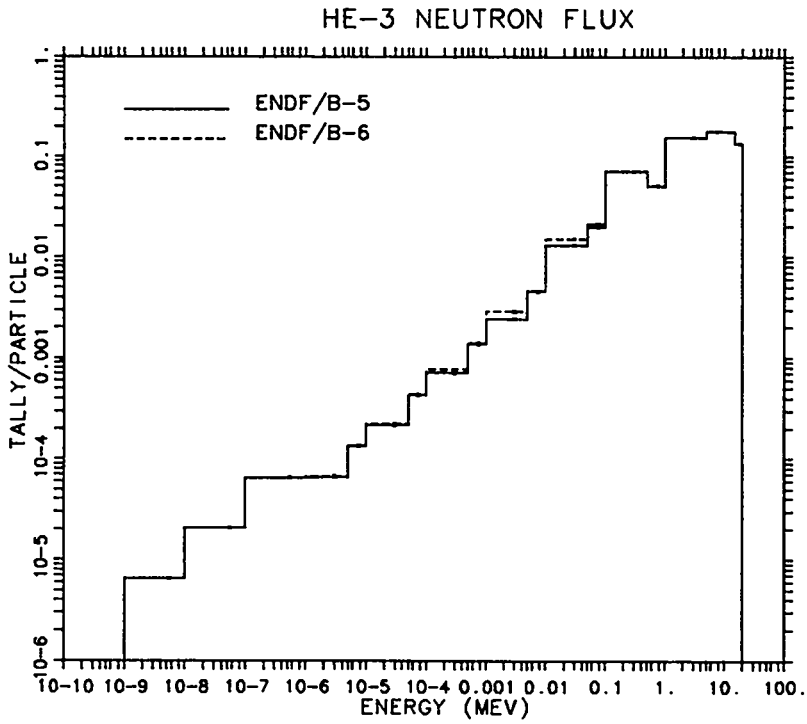

Fig. 11. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{3}He sphere.

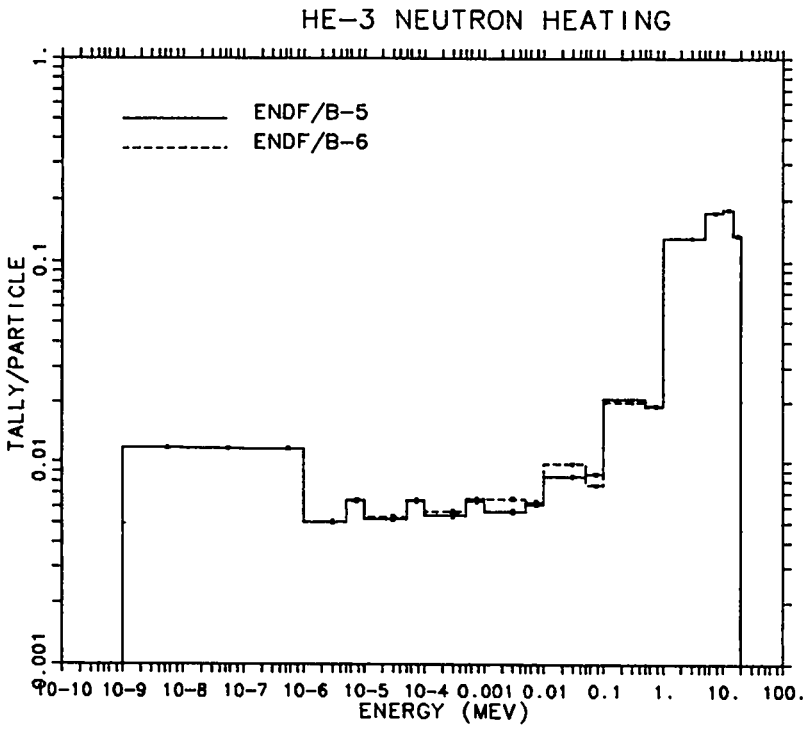

Fig. 12. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{3}He sphere.

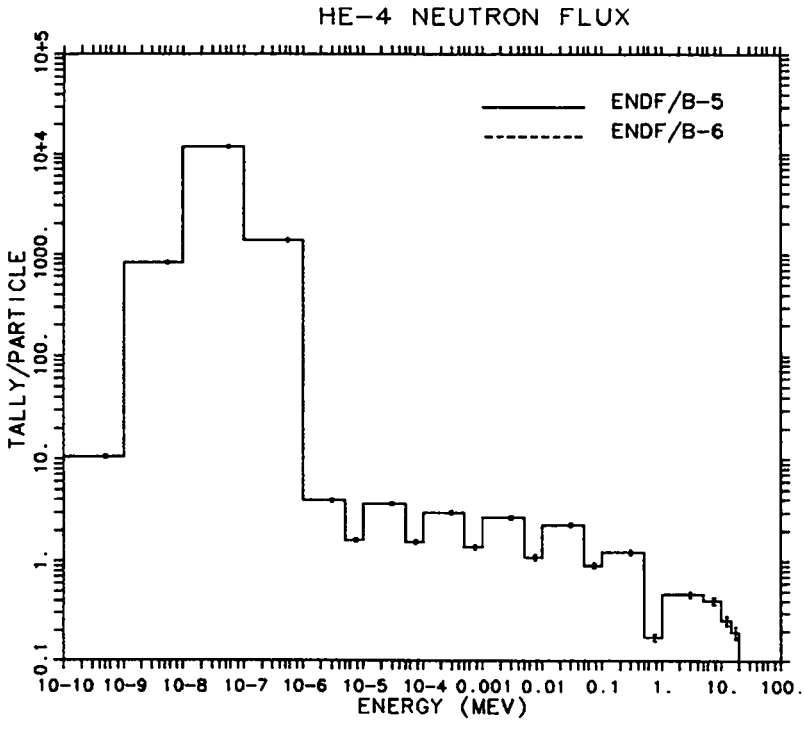

Fig. 13. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{4}He sphere.

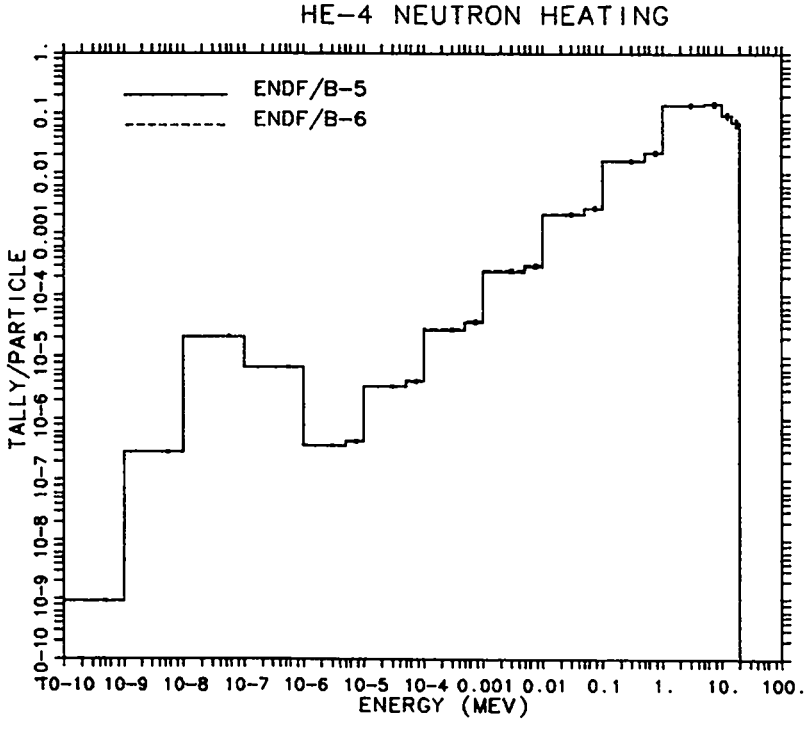

Fig. 14. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{4}He sphere.

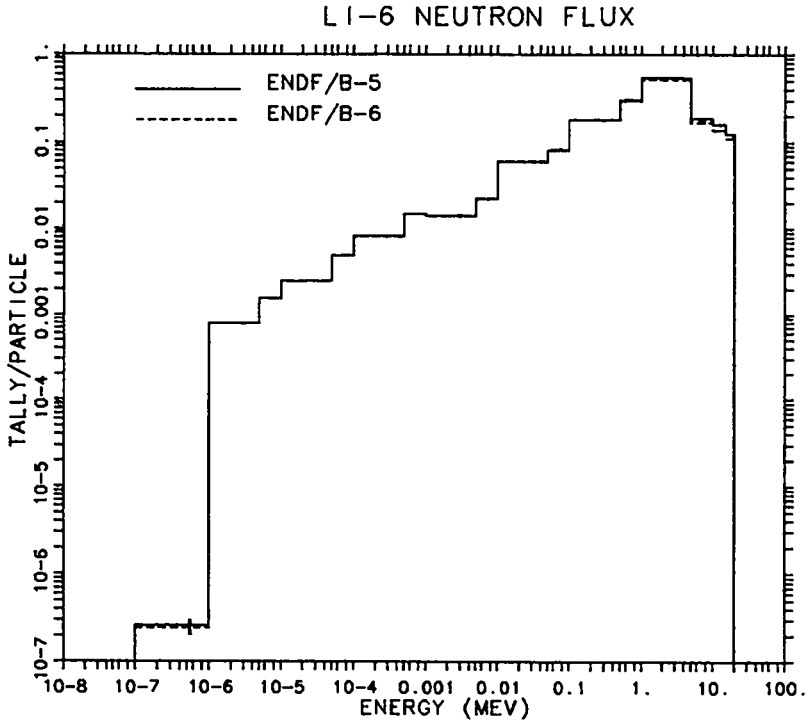

Fig. 15. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{6}Li sphere.

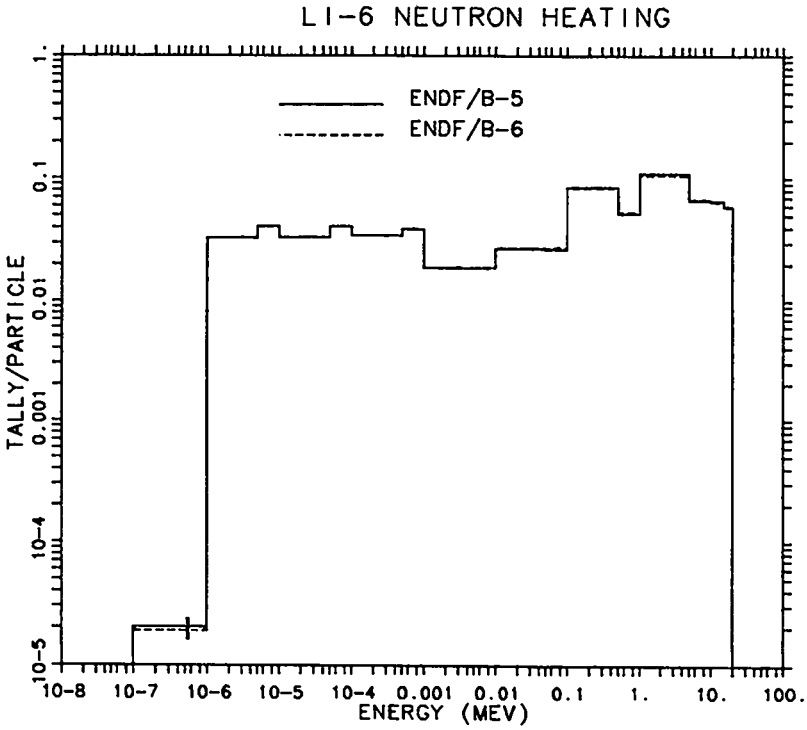

Fig. 16. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{6}Li sphere.

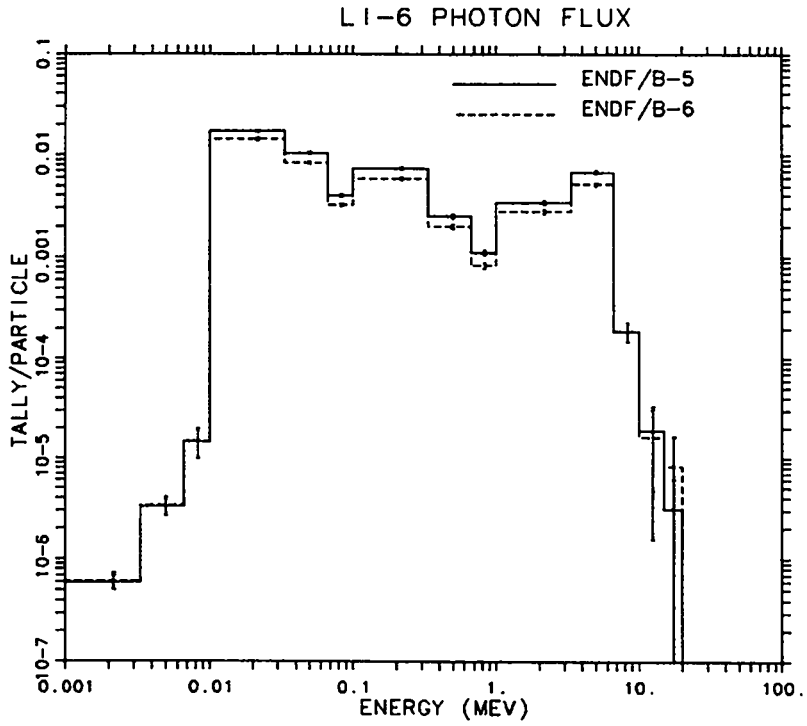

Fig. 17. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{6}Li sphere.

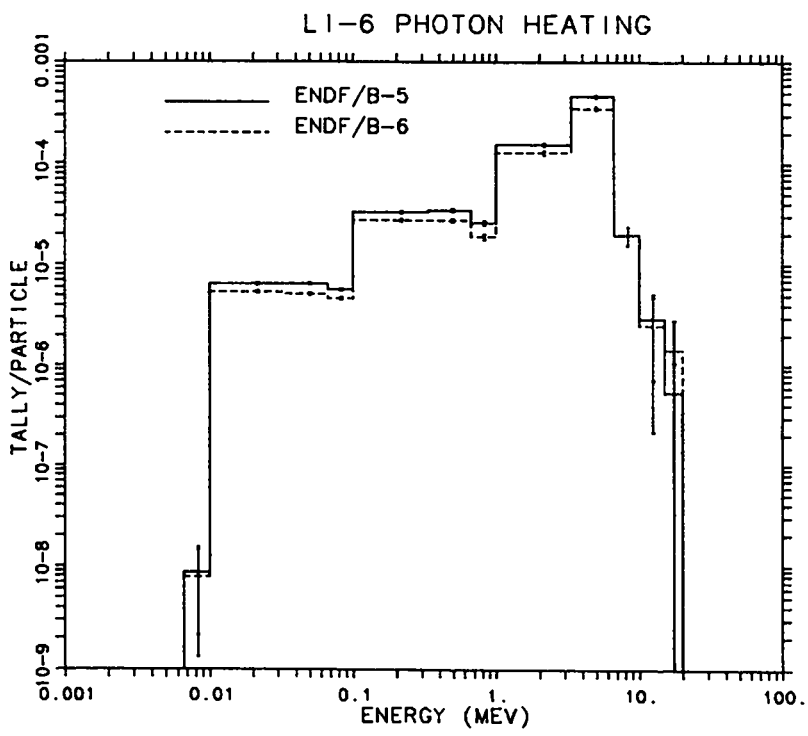

Fig. 18. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{6}Li sphere.

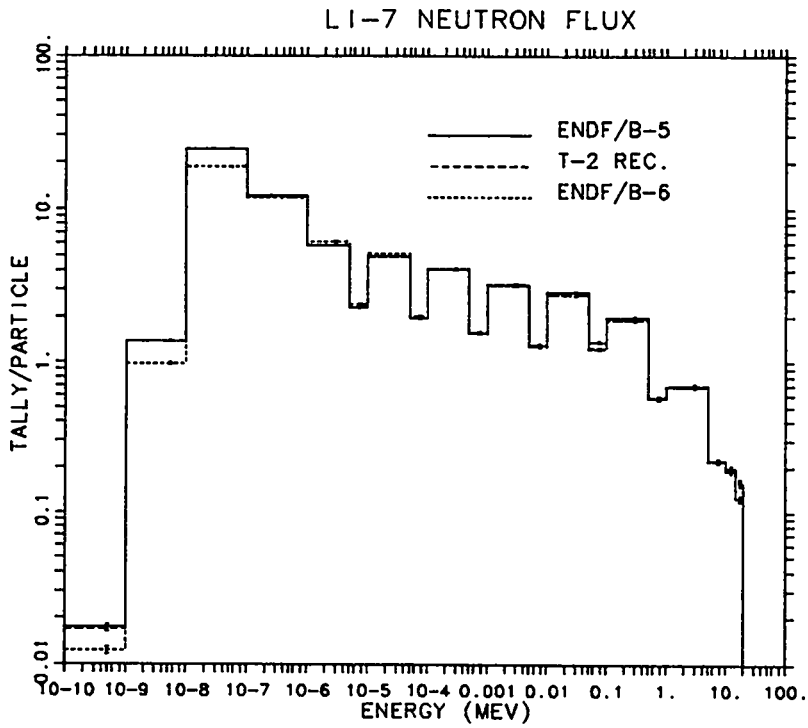

Fig. 19. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{7}Li sphere.

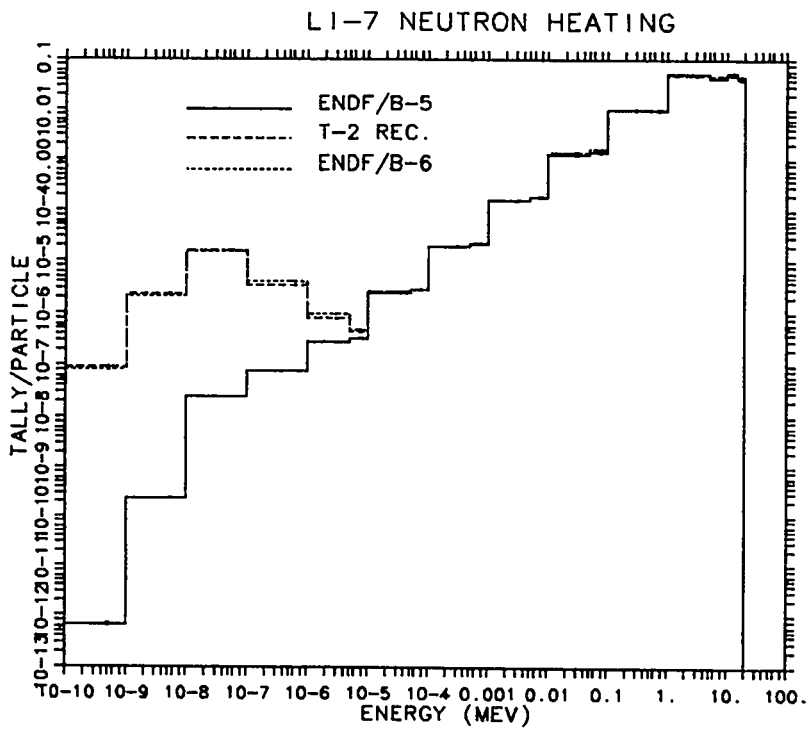

Fig. 20. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{7}Li sphere.

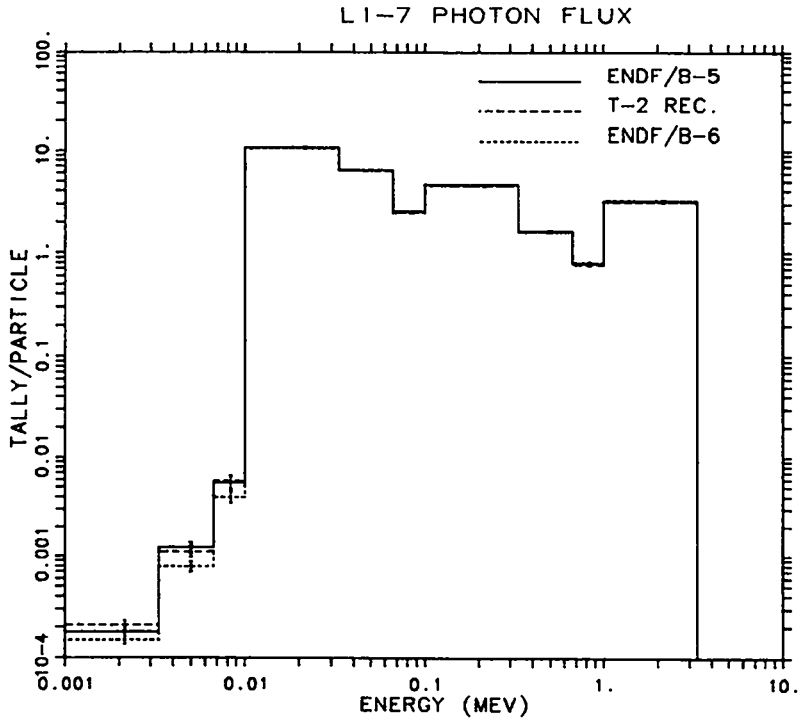

Fig. 21. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon flux for the ^{7}Li sphere.

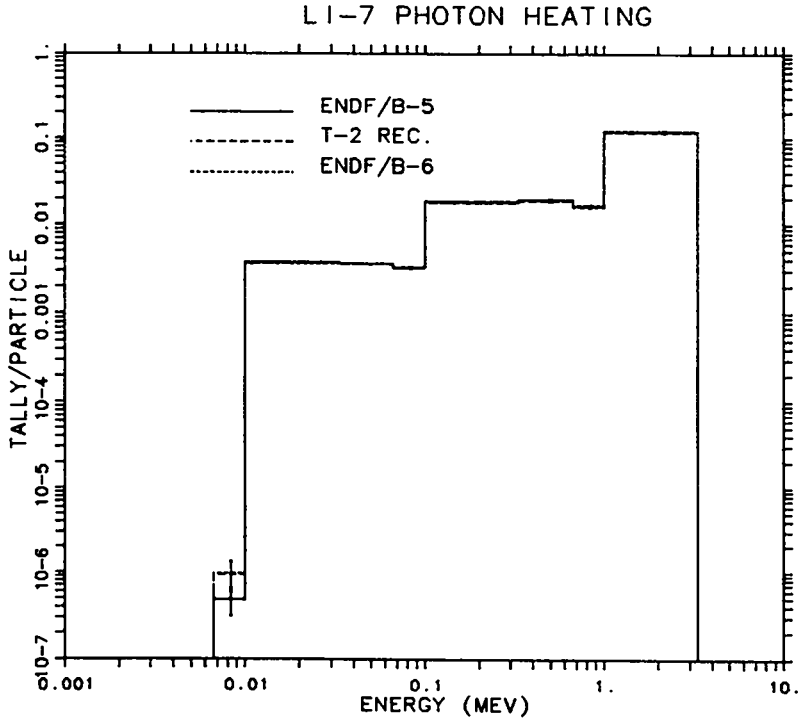

Fig. 22. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon heating for the ^{7}Li sphere.

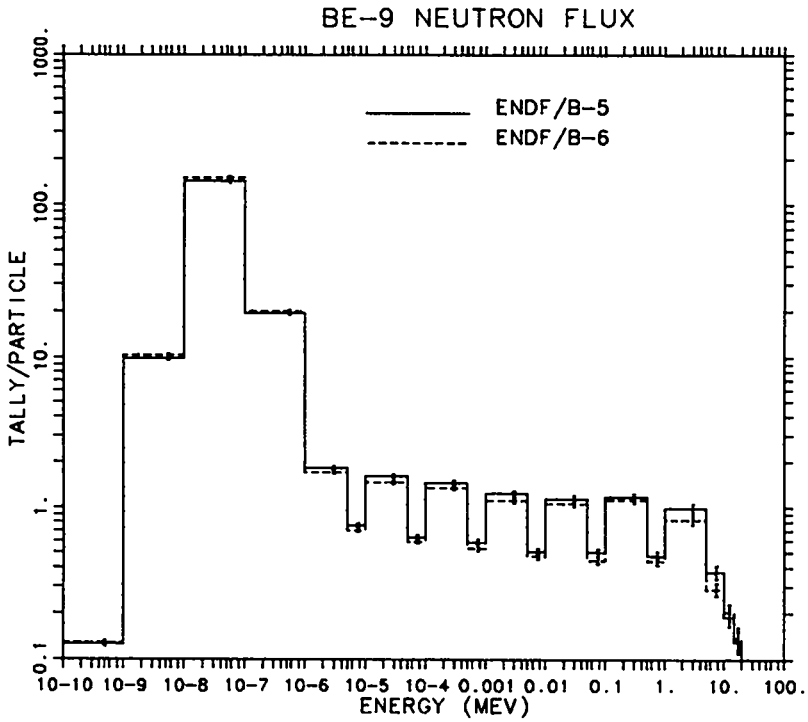

Fig. 23. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{9}Be sphere.

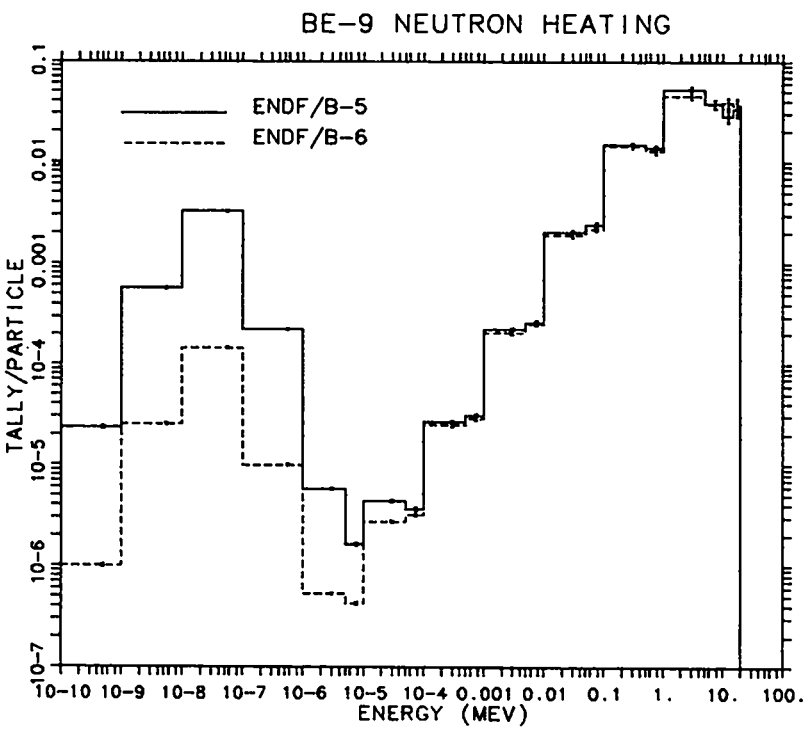

Fig. 24. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{9}Be sphere.

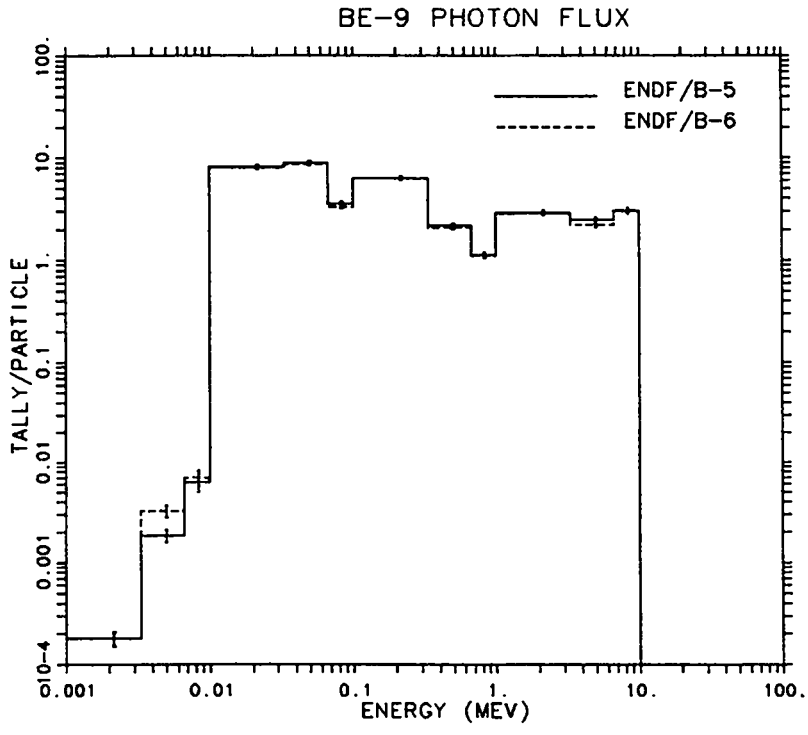

Fig. 25. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{9}Be sphere.

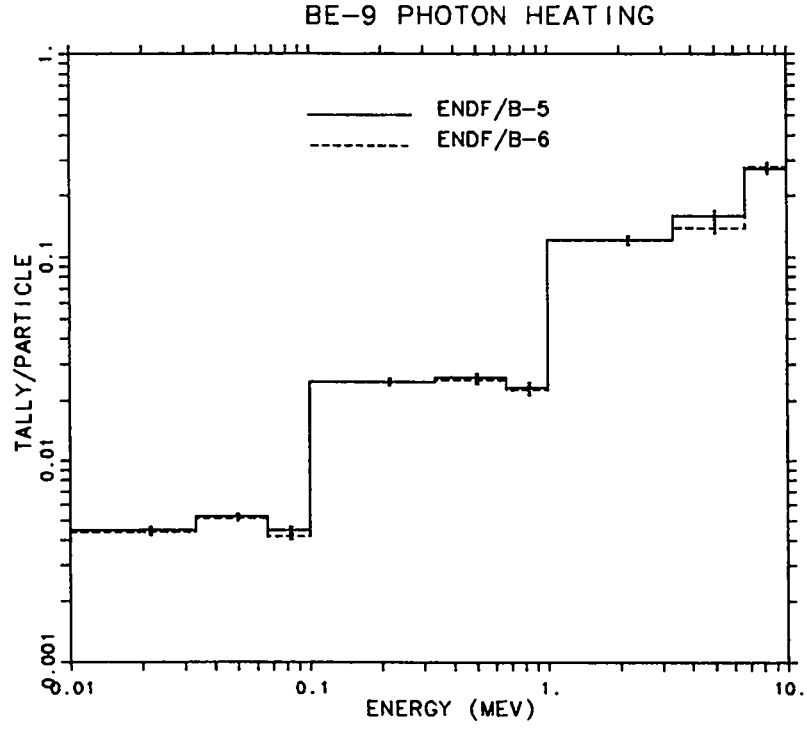

Fig. 26. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{9}Be sphere.

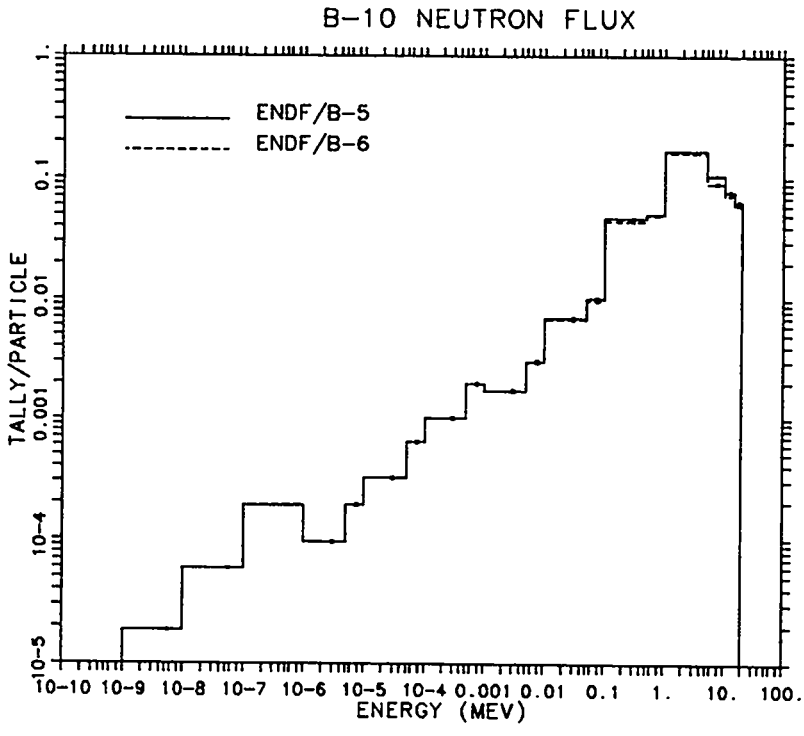

Fig. 27. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{10}B sphere.

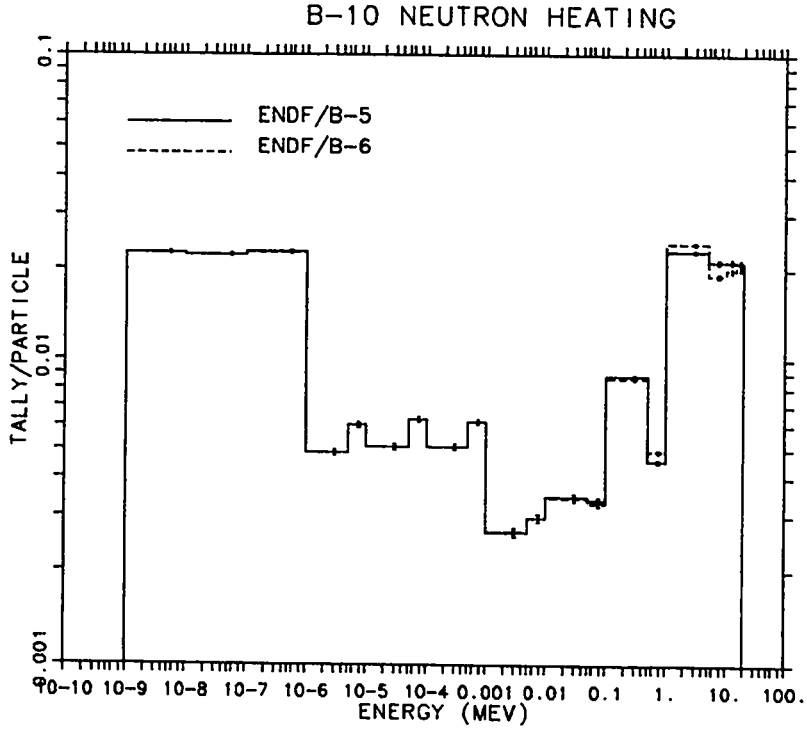

Fig. 28. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{10}B sphere.

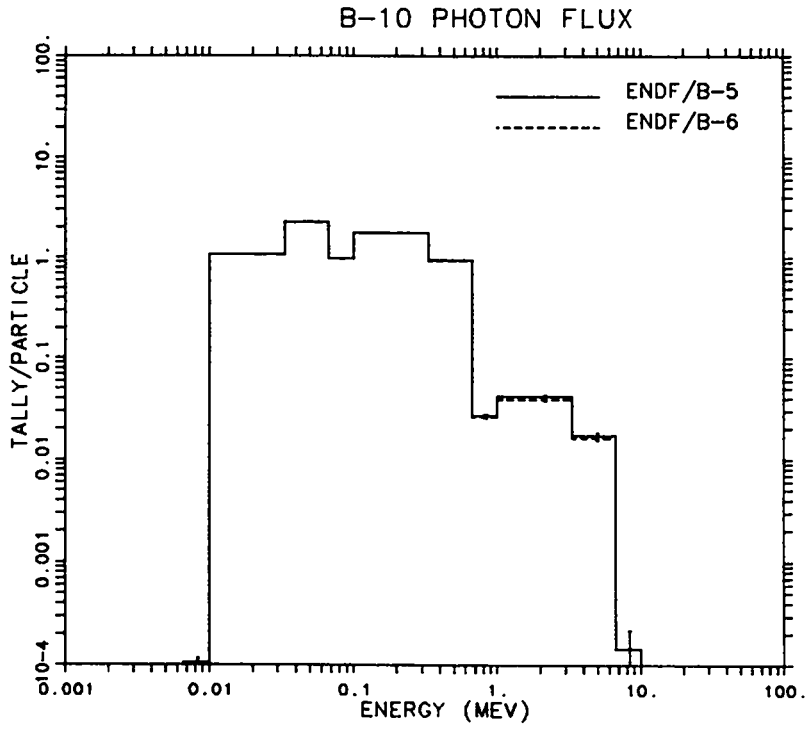

Fig. 29. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{10}B sphere.

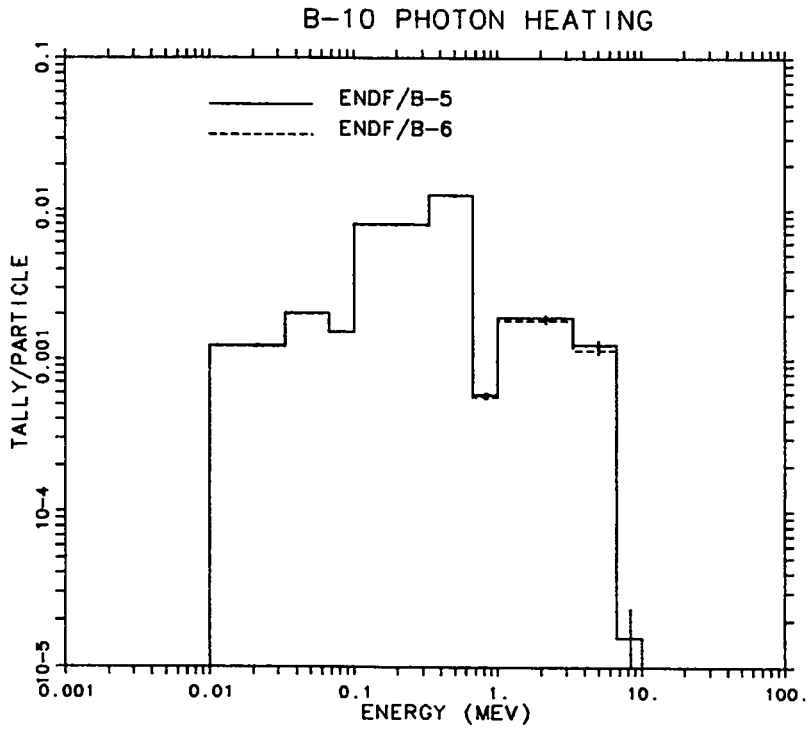

Fig. 30. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{10}B sphere.

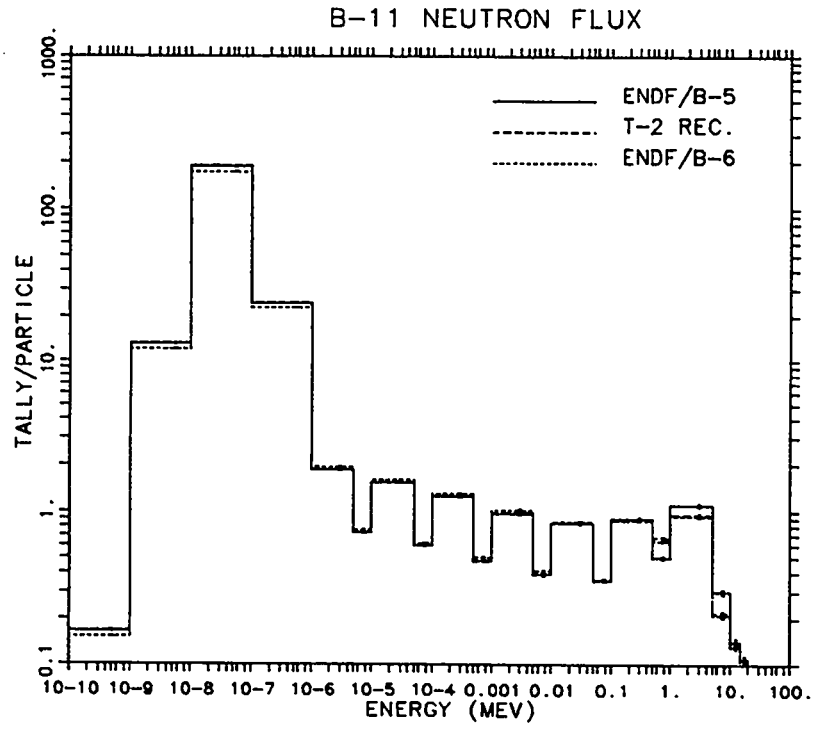

Fig. 31. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{11}B sphere.

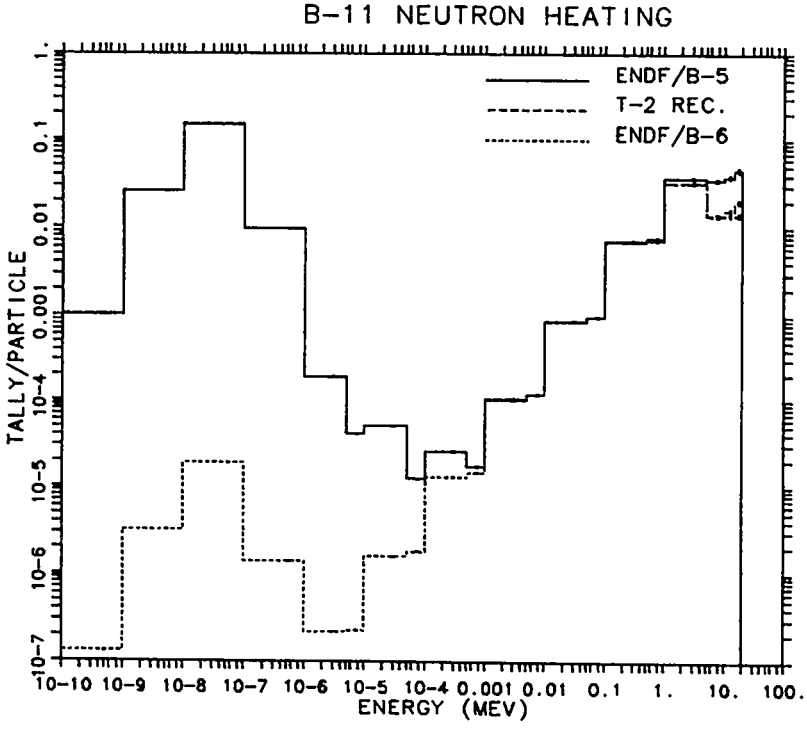

Fig. 32. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{11}B sphere.

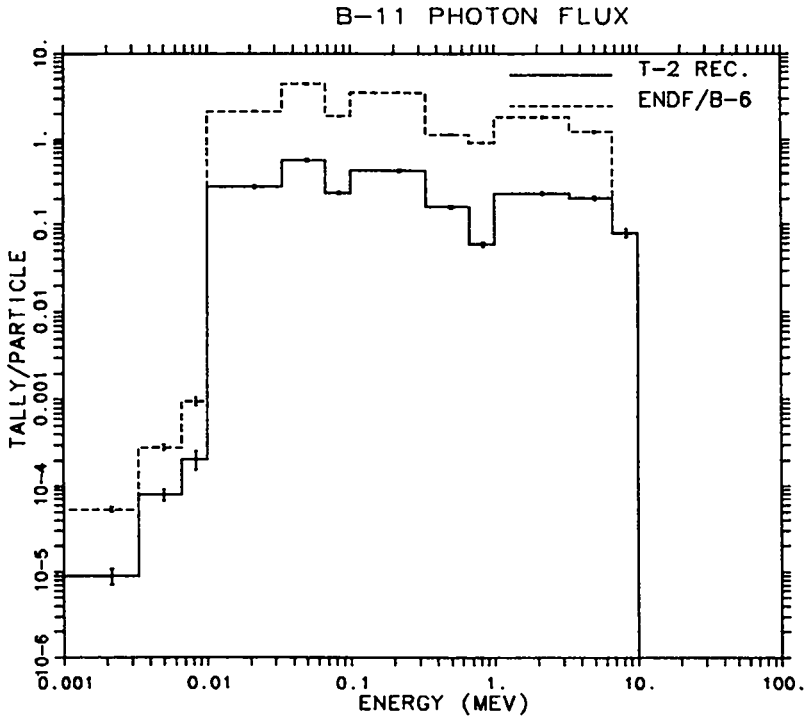

Fig. 33. Plot of MCNP Recommended and ENDF/B-VI calculated photon flux for the ^{11}B sphere.

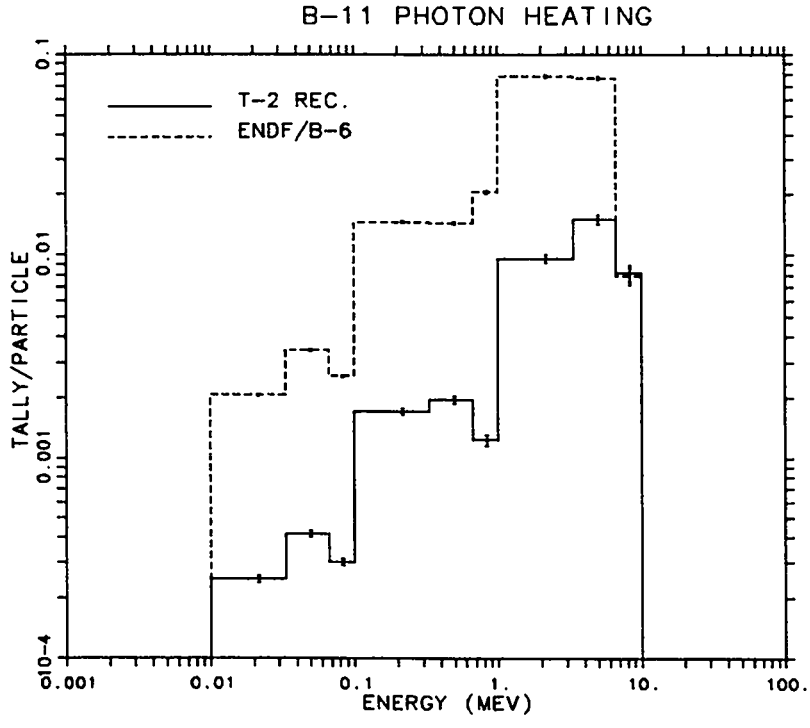

Fig. 34. Plot of MCNP Recommended and ENDF/B-VI calculated photon heating for the ^{11}B sphere.

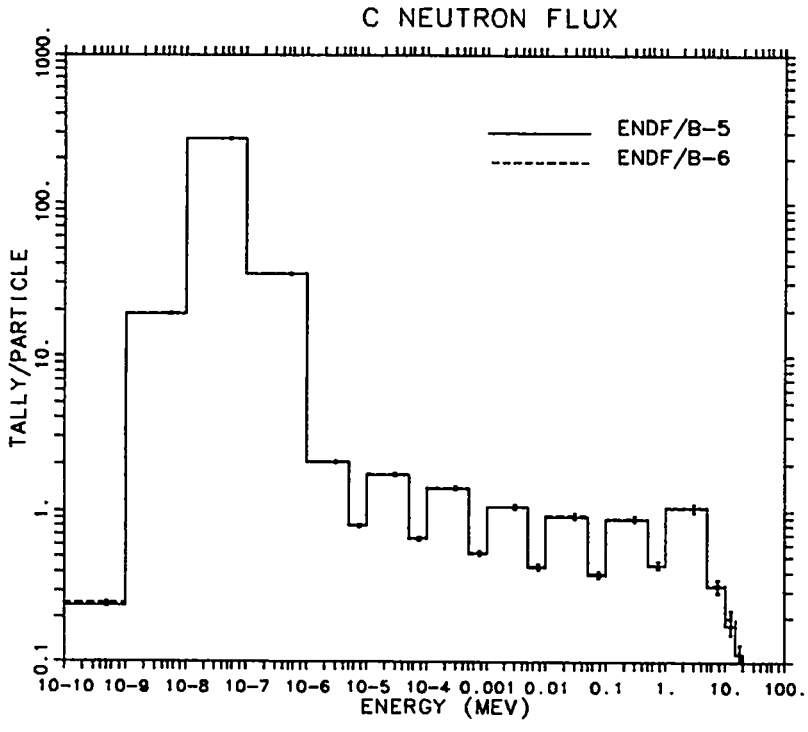

Fig. 35. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius carbon sphere.

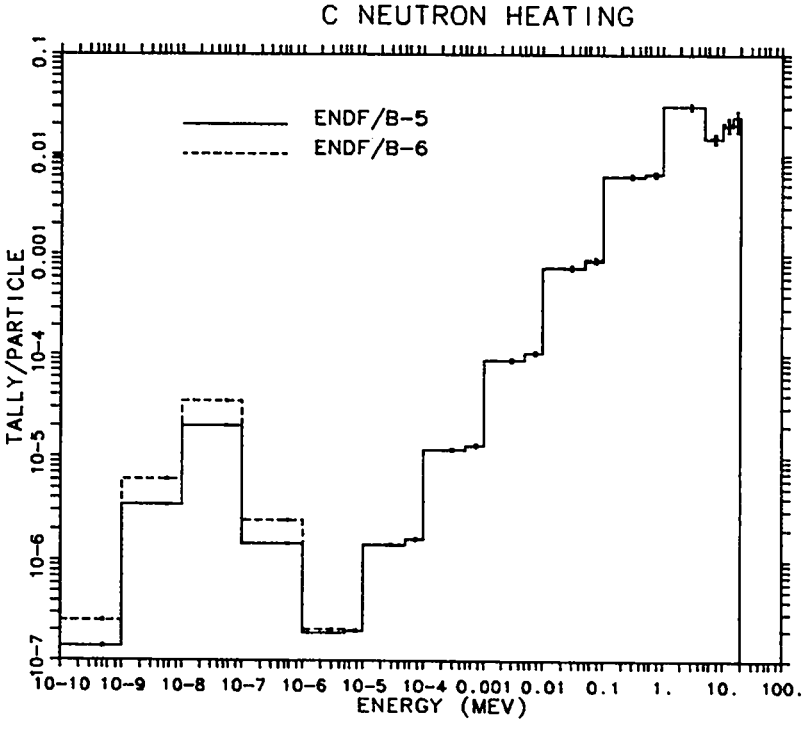

Fig. 36. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the carbon sphere.

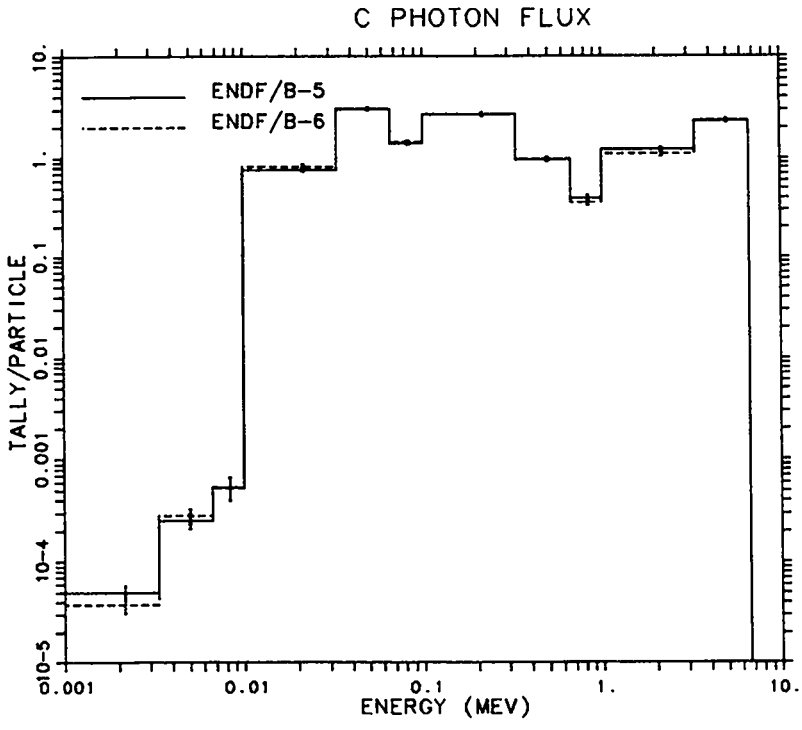

Fig. 37. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the carbon sphere.

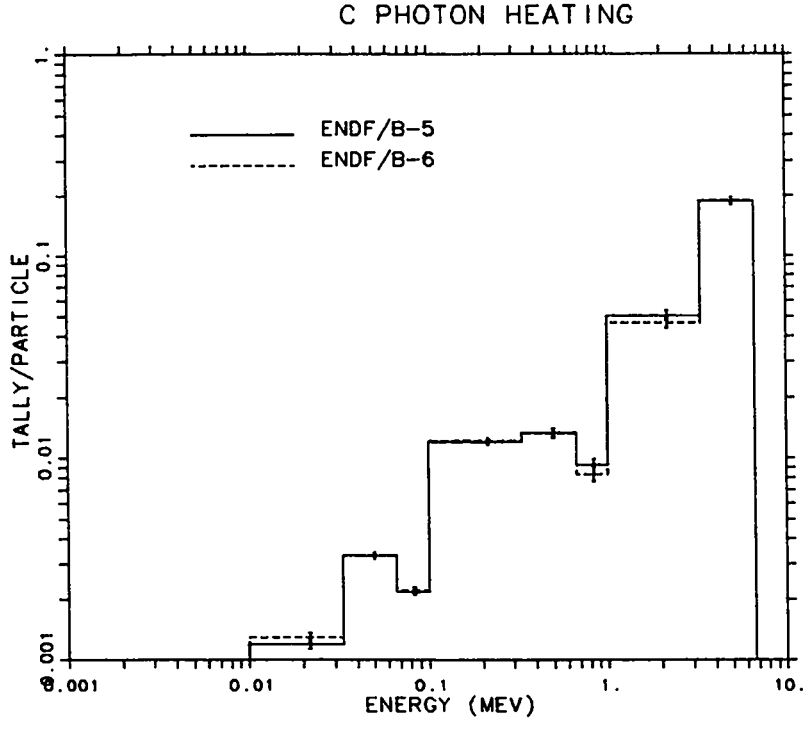

Fig. 38. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the carbon sphere.

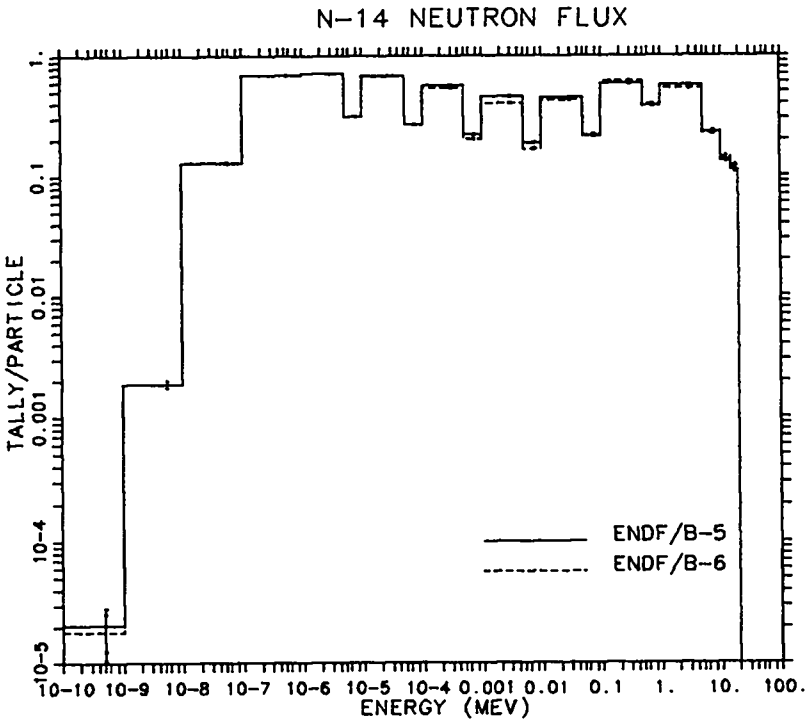

Fig. 39. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{14}N sphere.

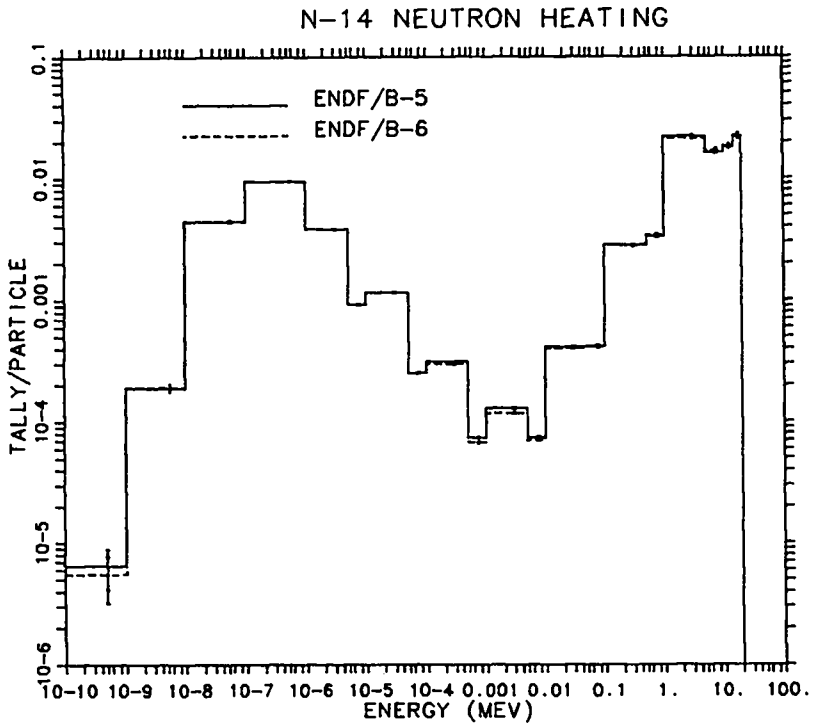

Fig. 40. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{14}N sphere.

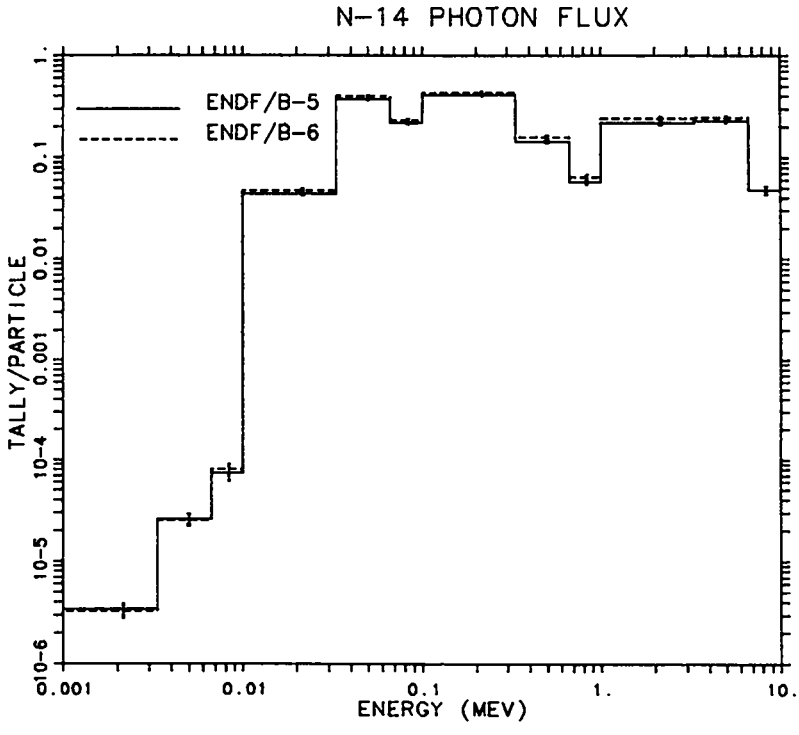

Fig. 41. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{14}N sphere.

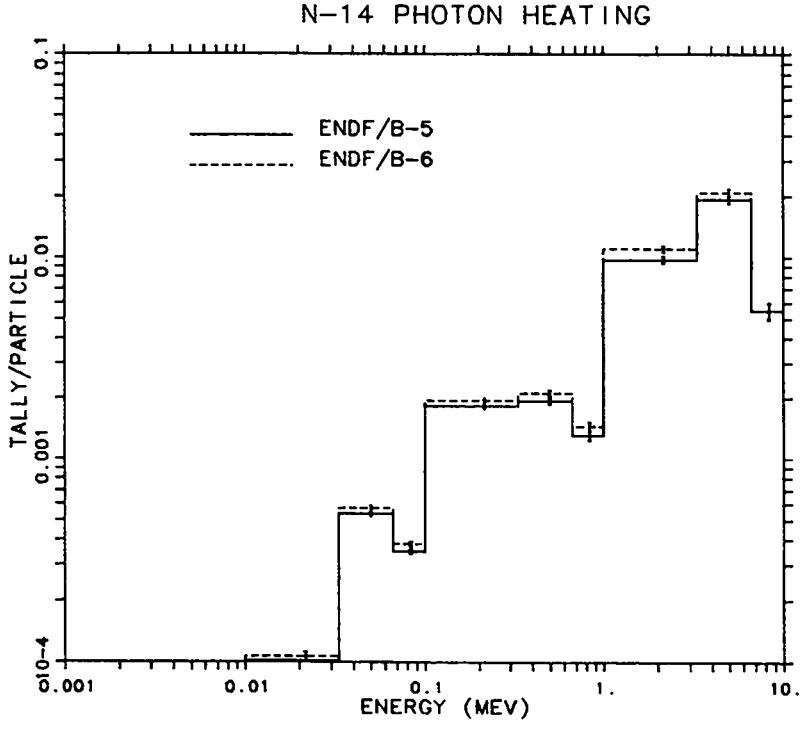

Fig. 42. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{14}N sphere.

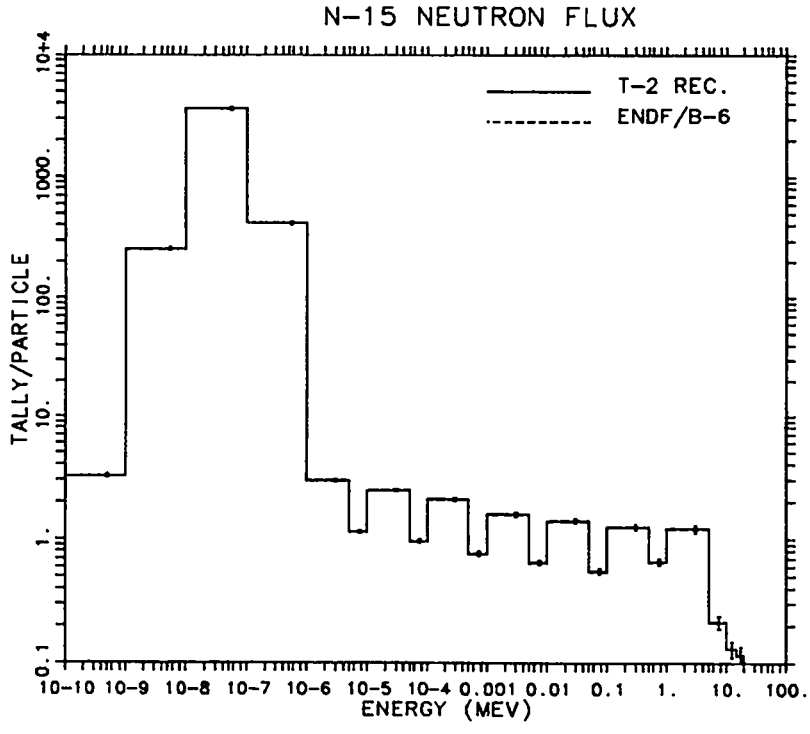

Fig. 43. Plot of MCNP Recommended and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{15}N sphere.

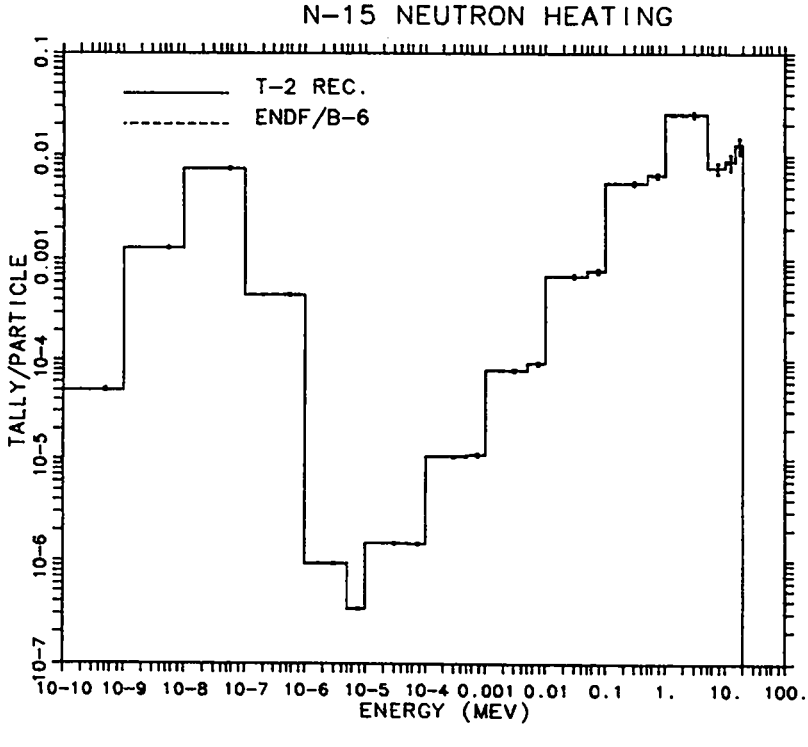

Fig. 44. Plot of MCNP Recommended and ENDF/B-VI calculated neutron heating for the ^{15}N sphere.

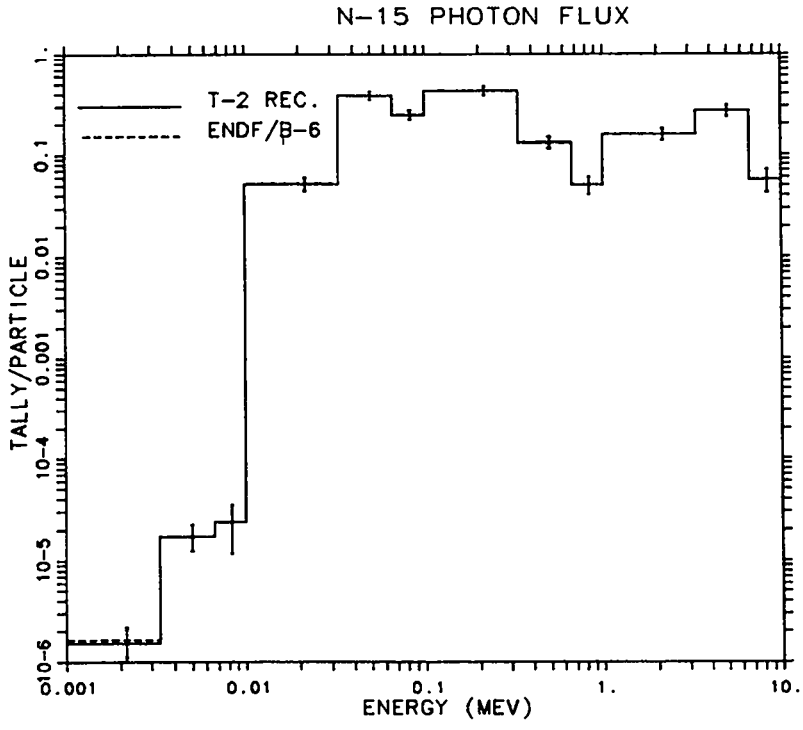

Fig. 45. Plot of MCNP Recommended and ENDF/B-VI calculated photon flux for the ^{15}N sphere.

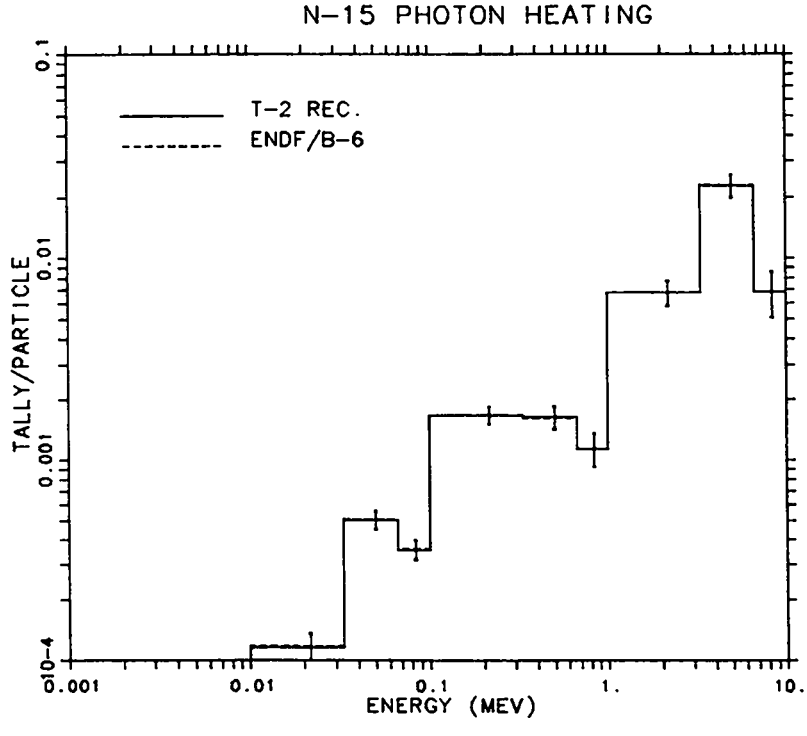

Fig. 46. Plot of MCNP Recommended and ENDF/B-VI calculated photon heating for the ^{15}N sphere.

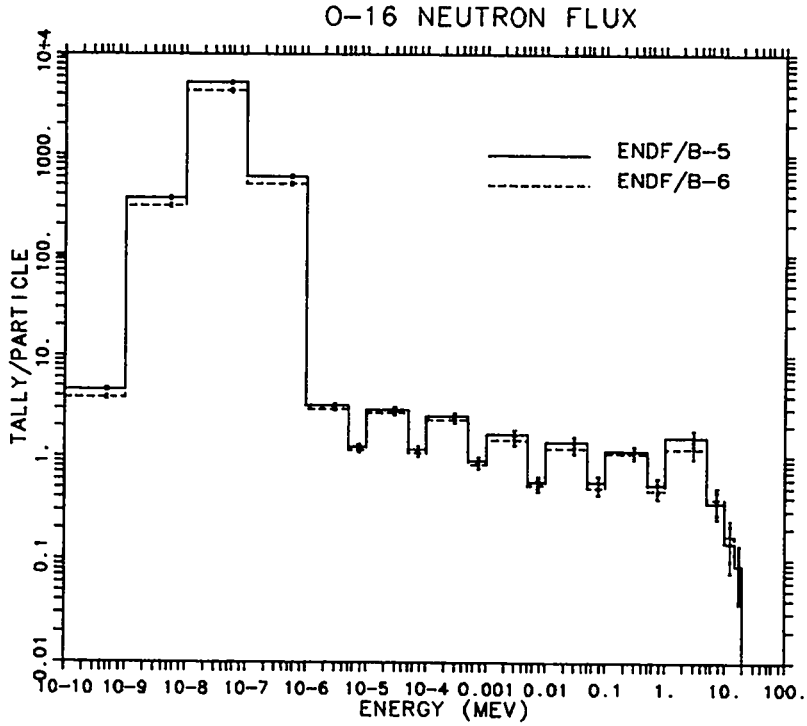

Fig. 47. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{16}O sphere.

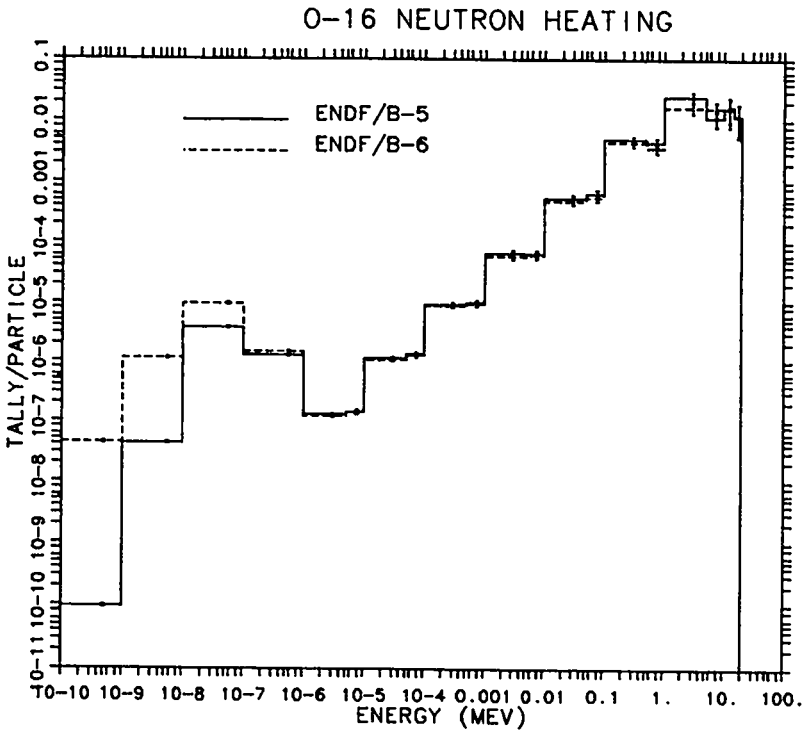

Fig. 48. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{16}O sphere.

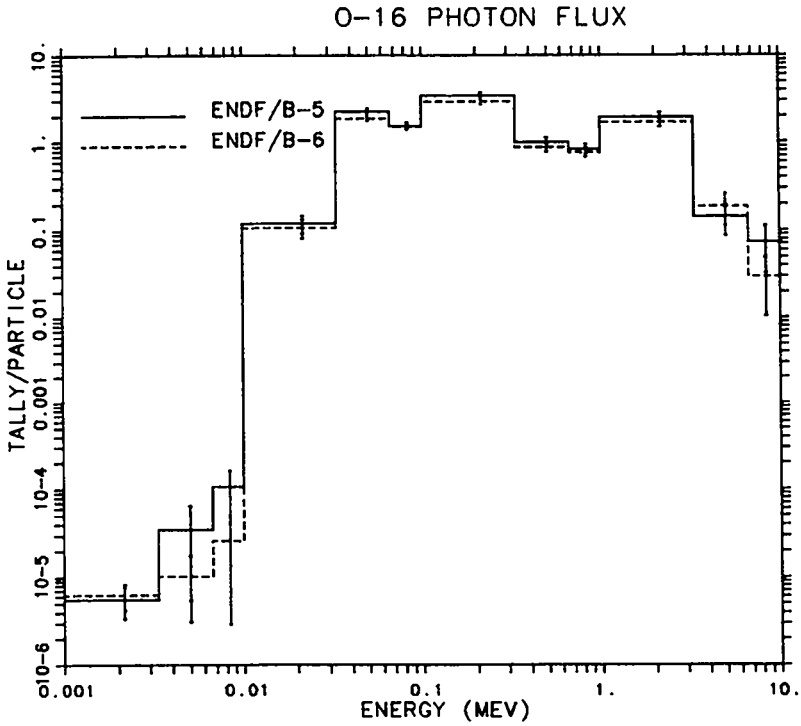

Fig. 49. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{16}O sphere.

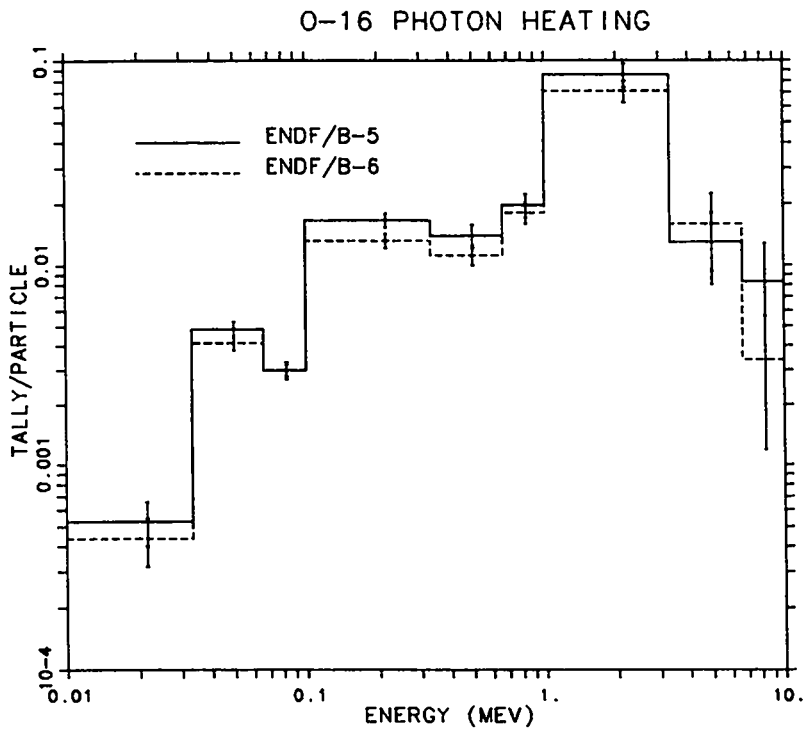

Fig. 50. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{16}O sphere.

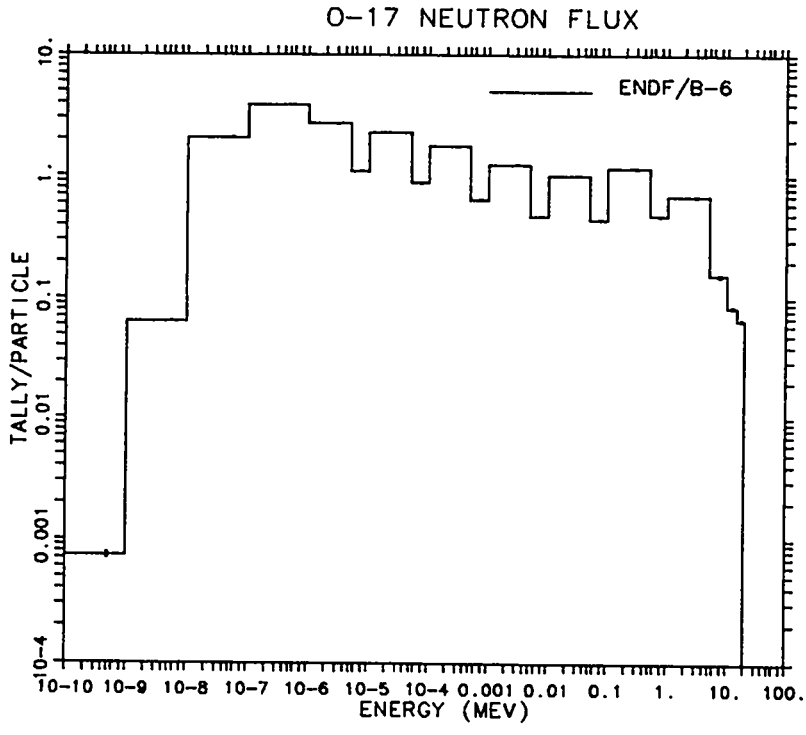

Fig. 51. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{17}O sphere.

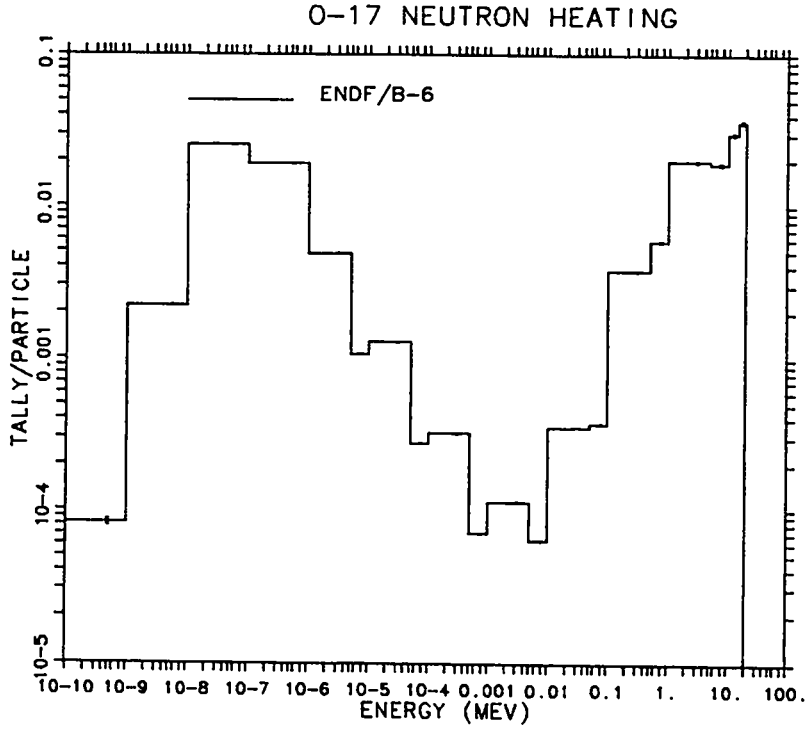

Fig. 52. Plot of ENDF/B-VI calculated neutron heating for the ^{17}O sphere.

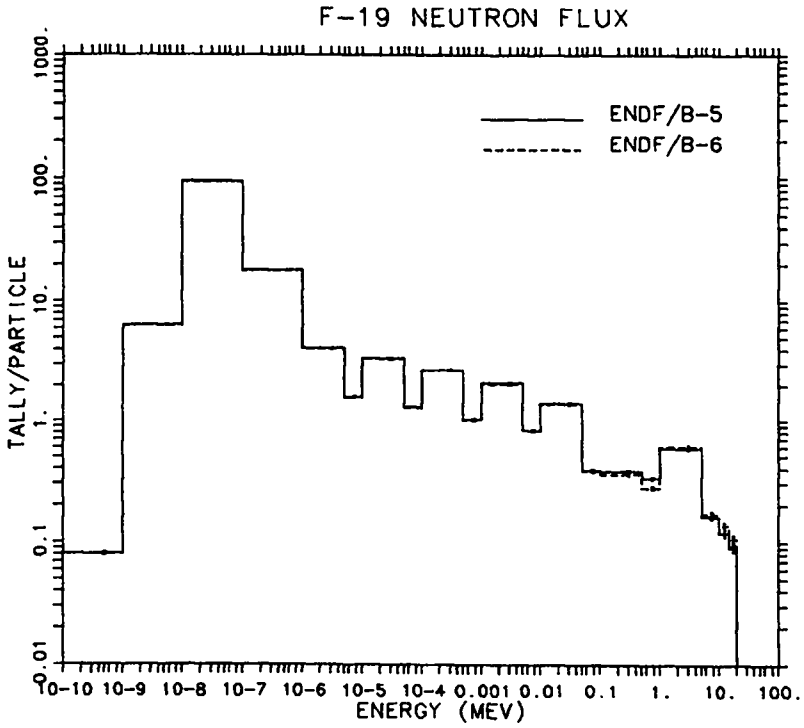

Fig. 53. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{19}F sphere.

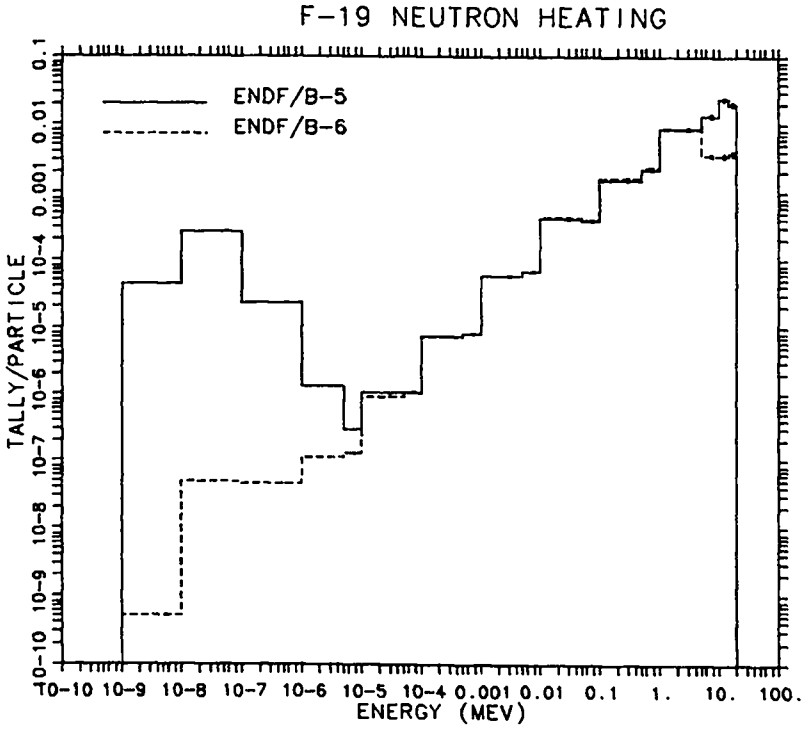

Fig. 54. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{19}F sphere.

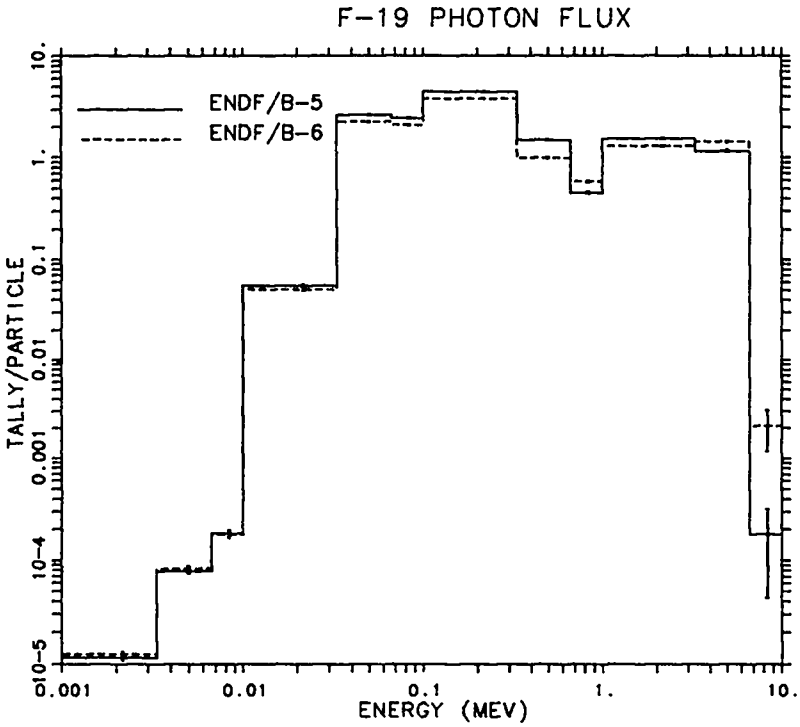

Fig. 55. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{19}F sphere.

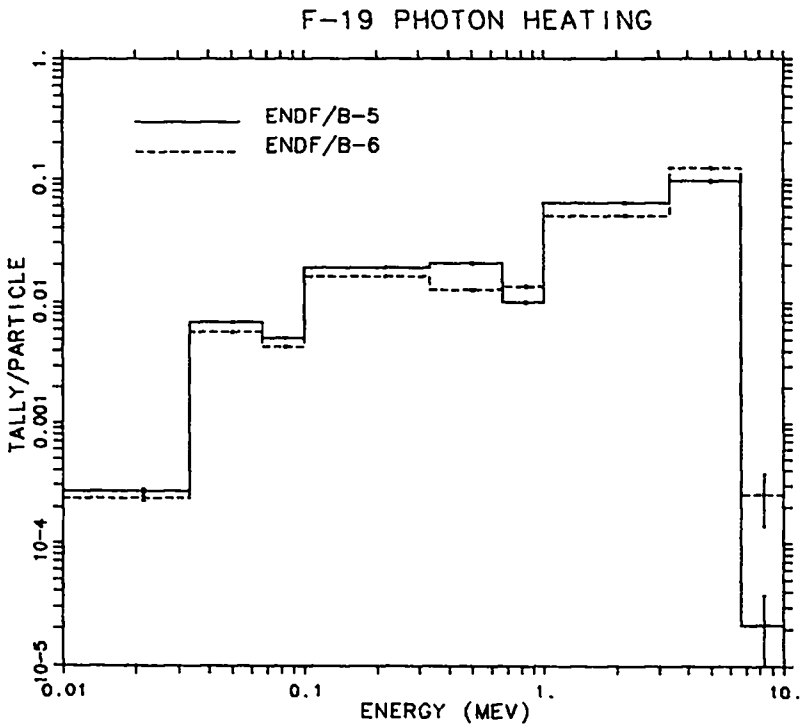

Fig. 56. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{19}F sphere.

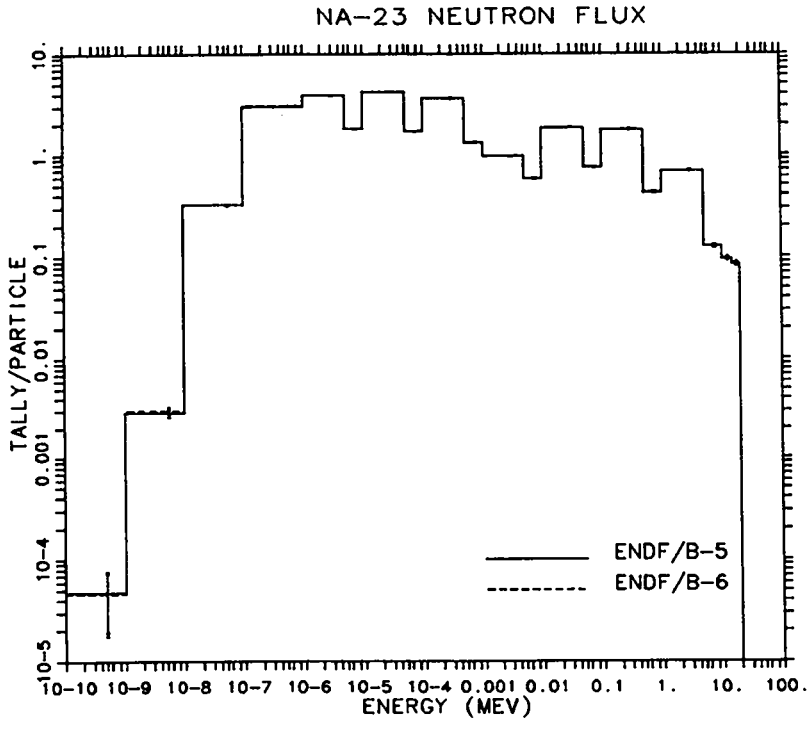

Fig. 57. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{23}Na sphere.

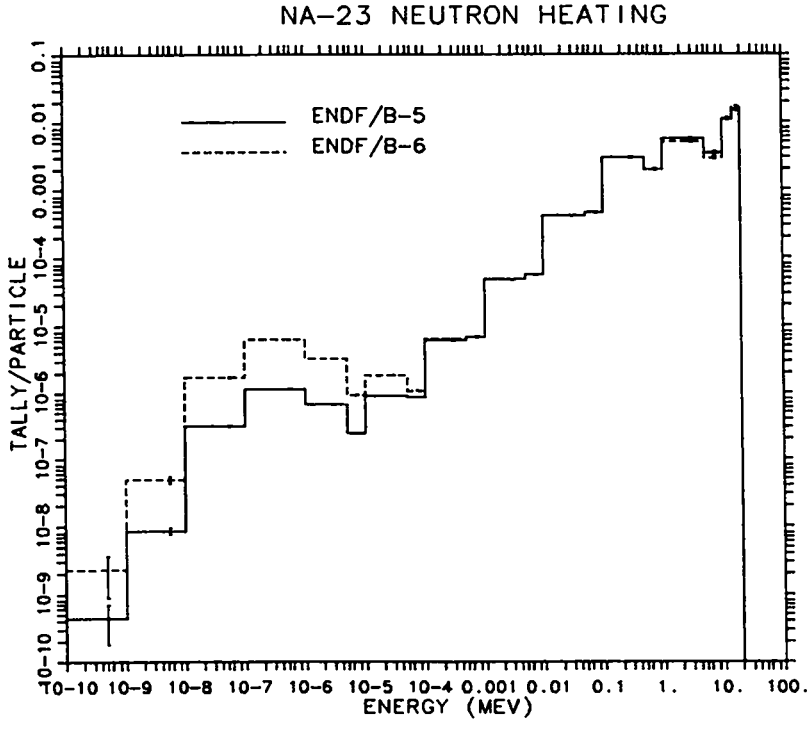

Fig. 58. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{23}Na sphere.

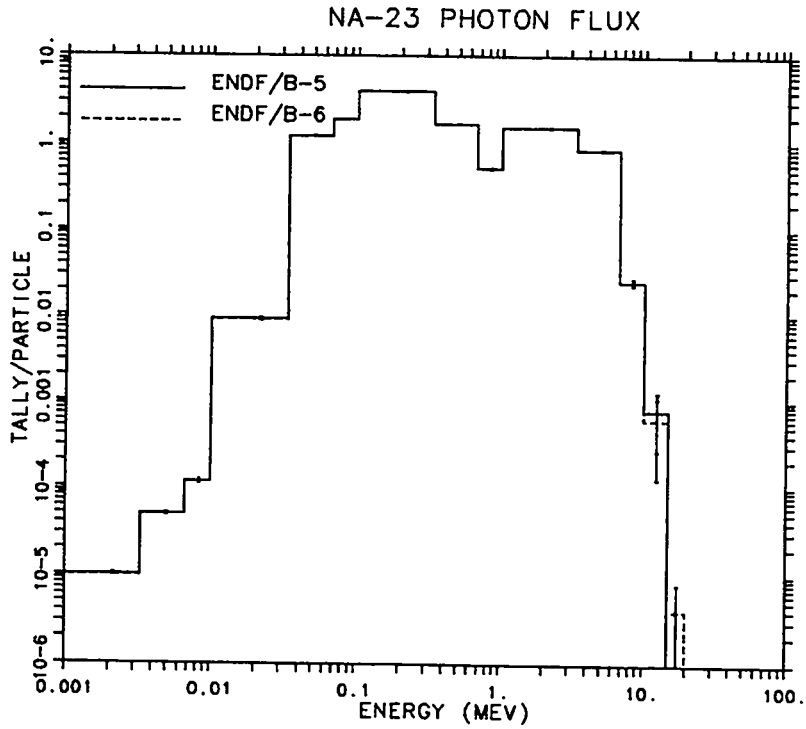

Fig. 59. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{23}Na sphere.

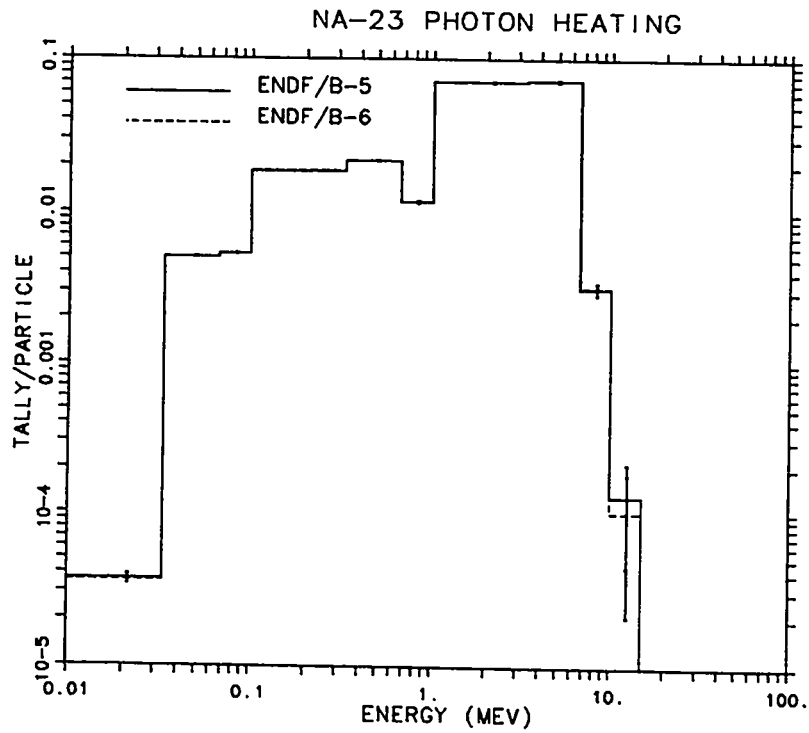

Fig. 60. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{23}Na sphere.

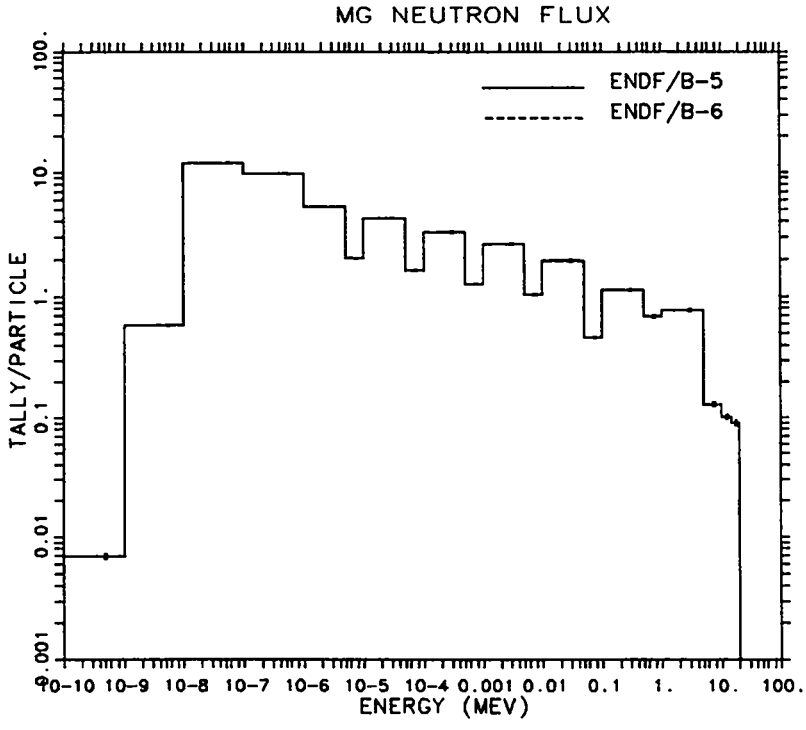

Fig. 61. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius magnesium sphere.

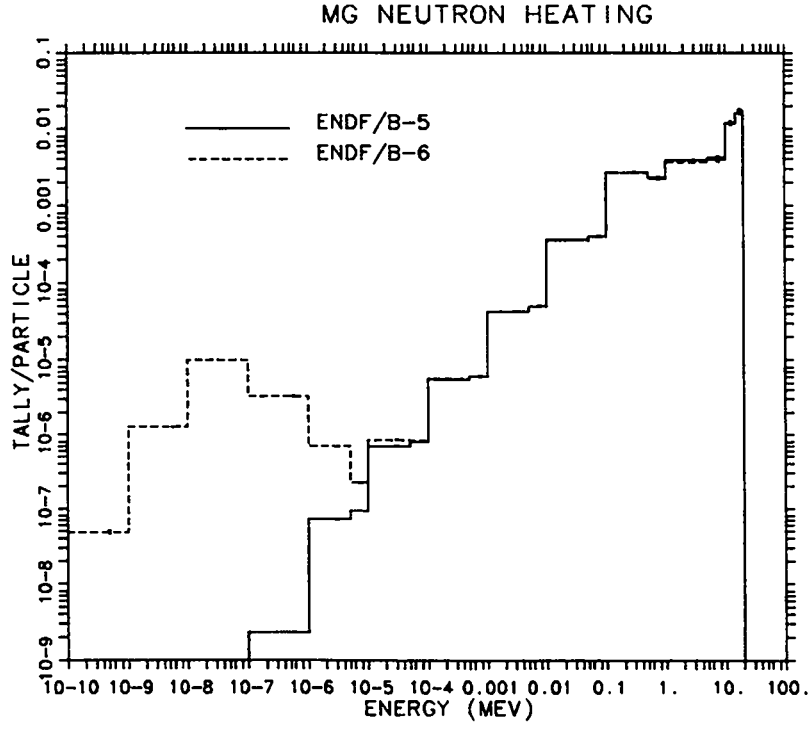

Fig. 62. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the magnesium sphere.

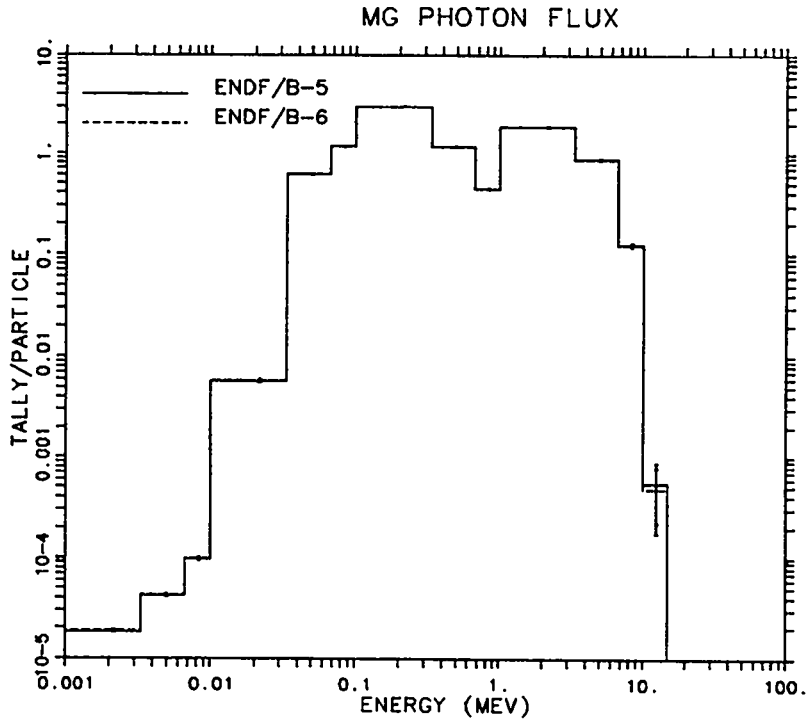

Fig. 63. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the magnesium sphere.

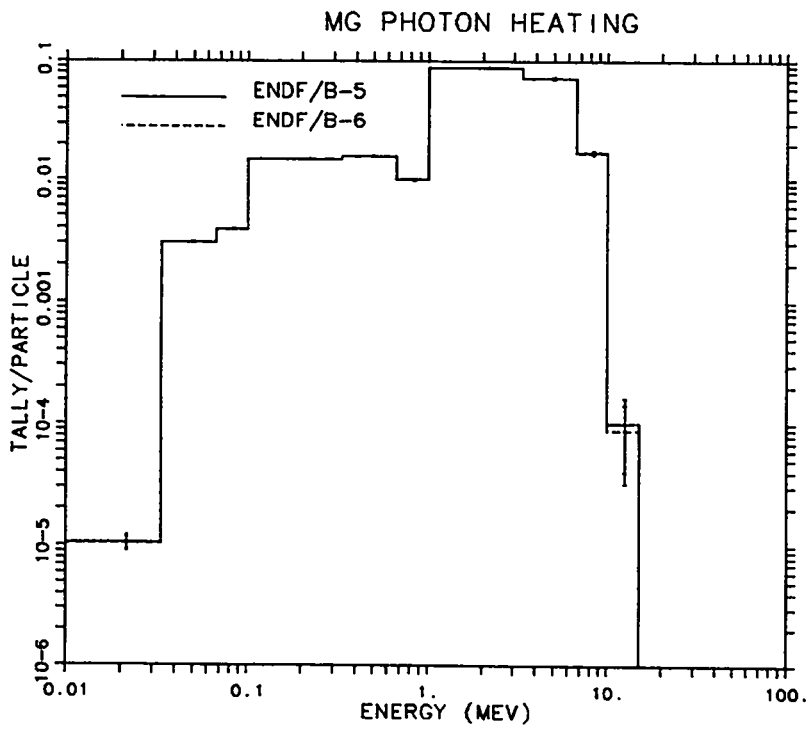

Fig. 64. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the magnesium sphere.

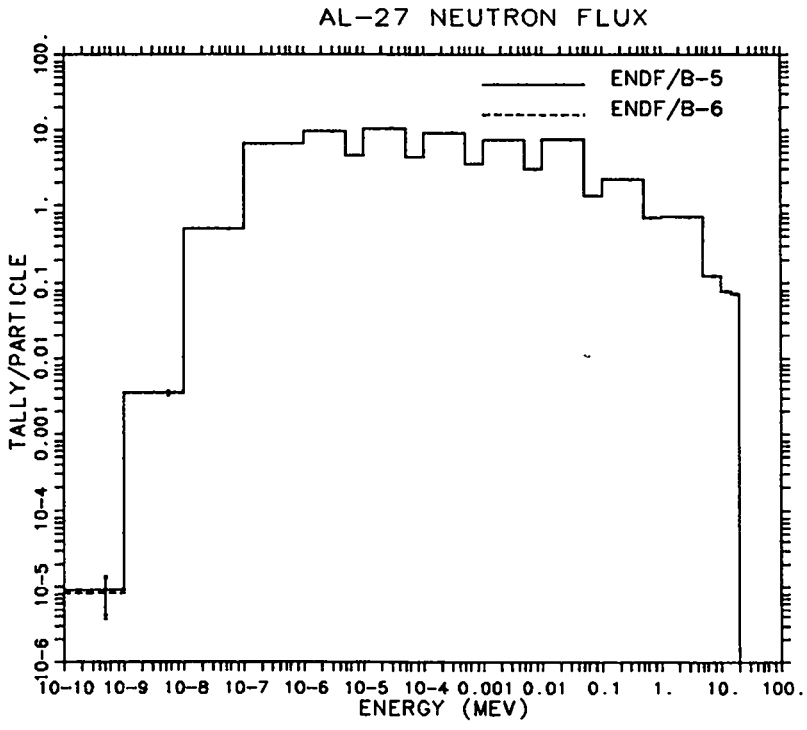

Fig. 65. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{27}Al sphere.

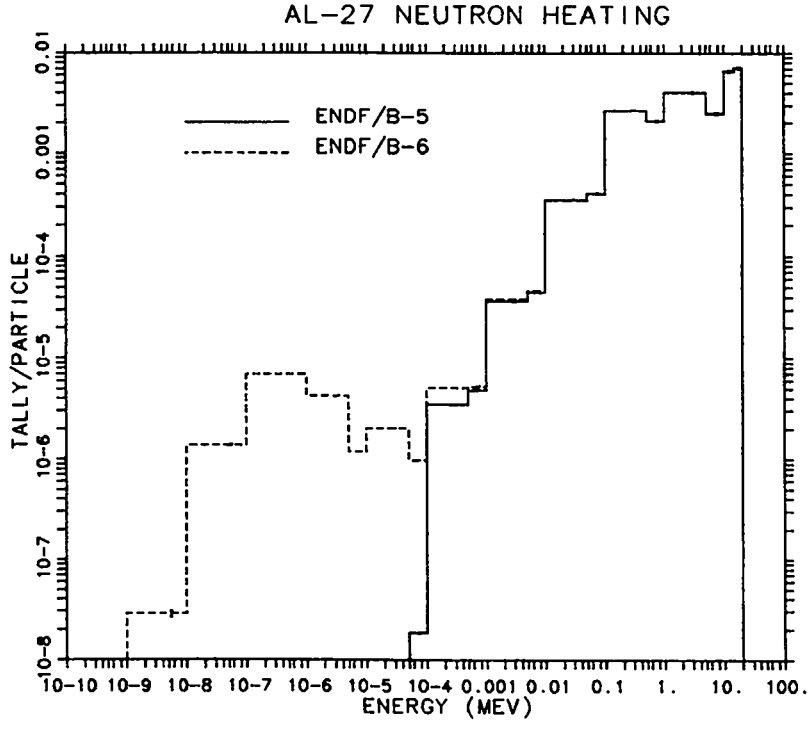

Fig. 66. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{27}Al sphere.

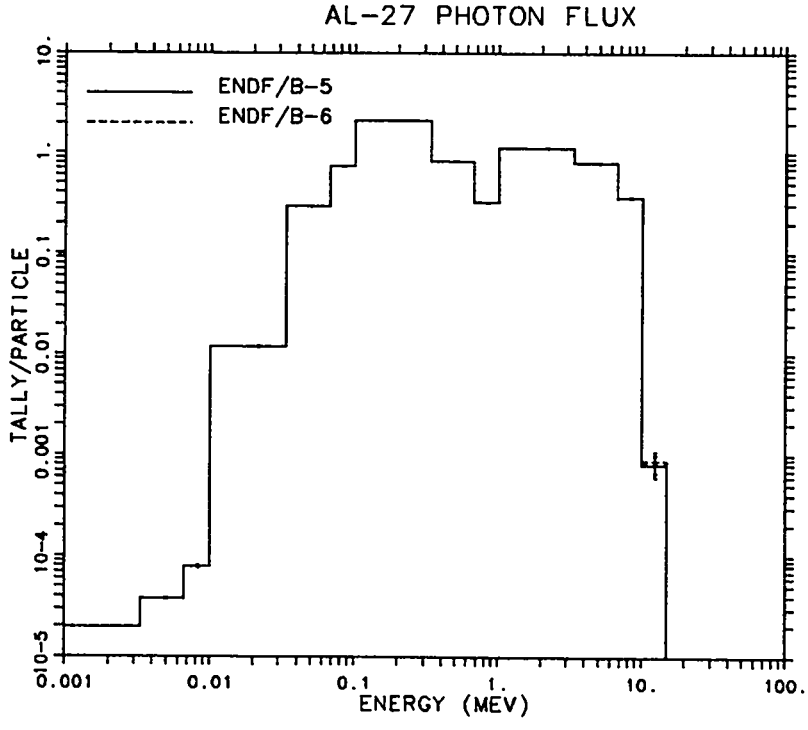

Fig. 67. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{27}Al sphere.

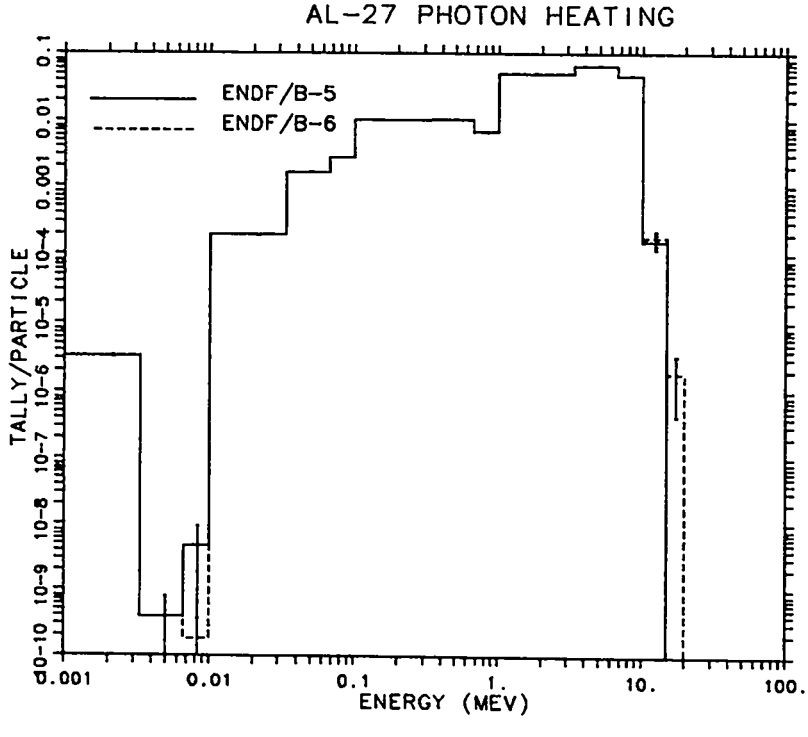

Fig. 68. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{27}Al sphere.

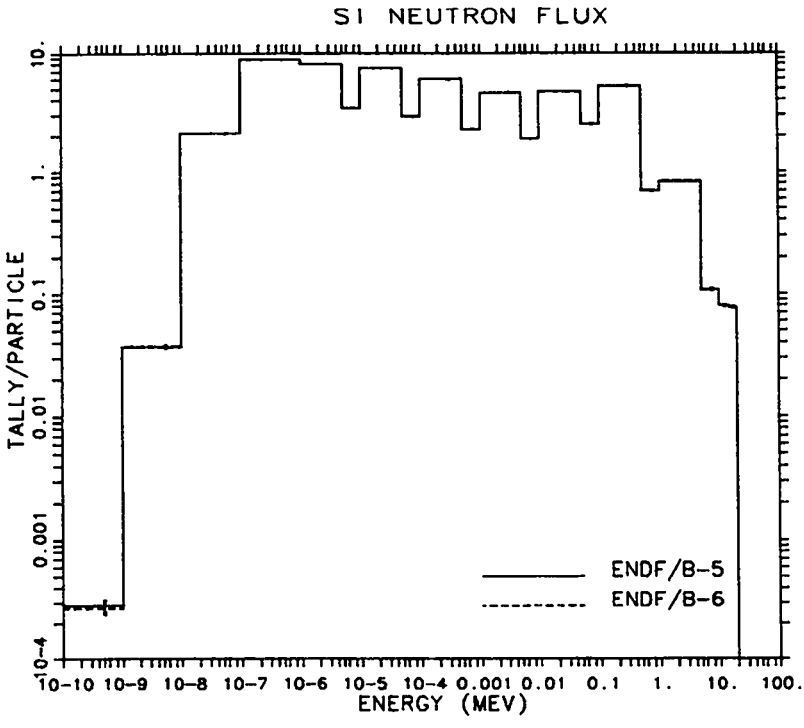

Fig. 69. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius silicon sphere.

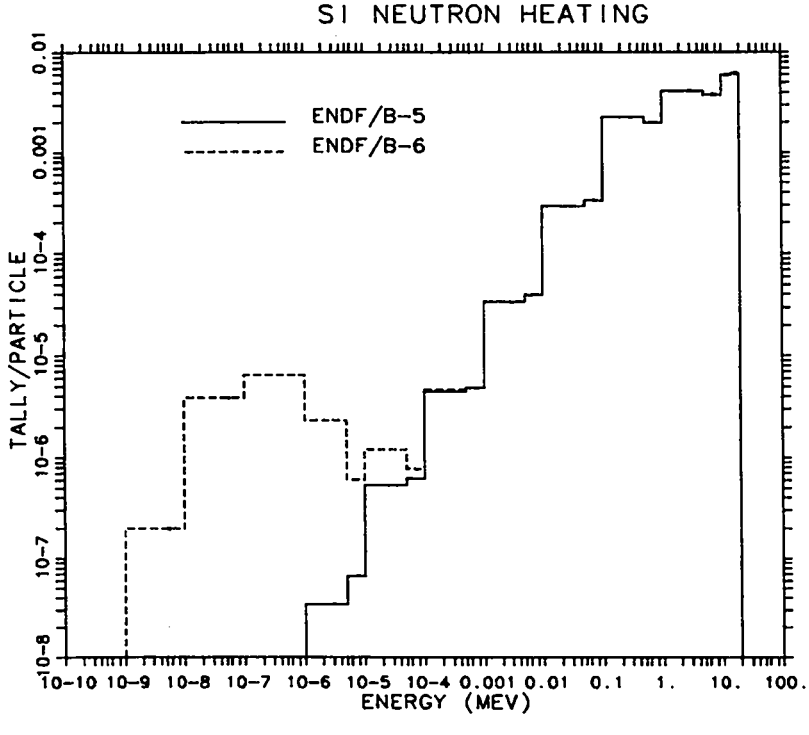

Fig. 70. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the silicon sphere.

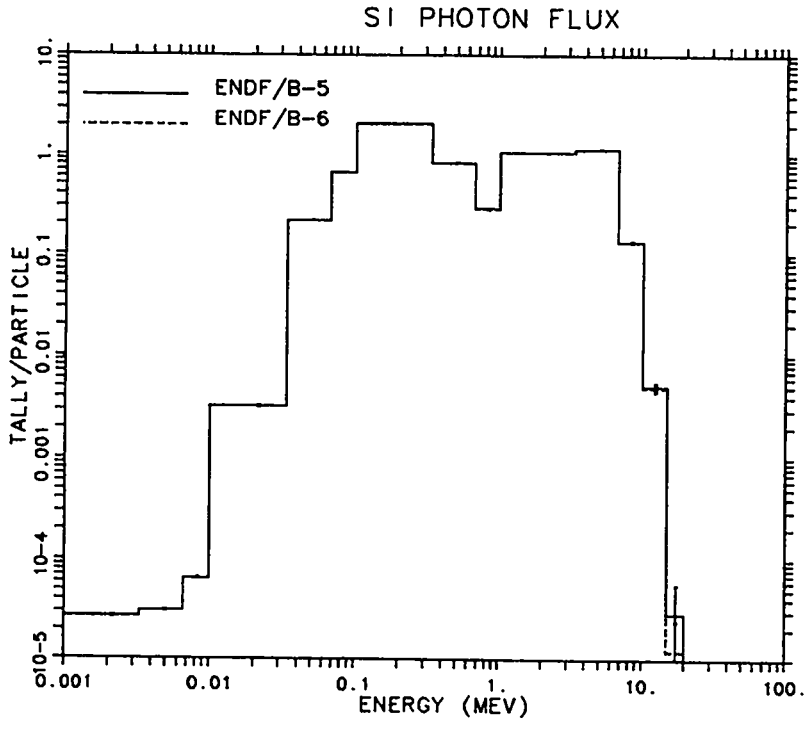

Fig. 71. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the silicon sphere.

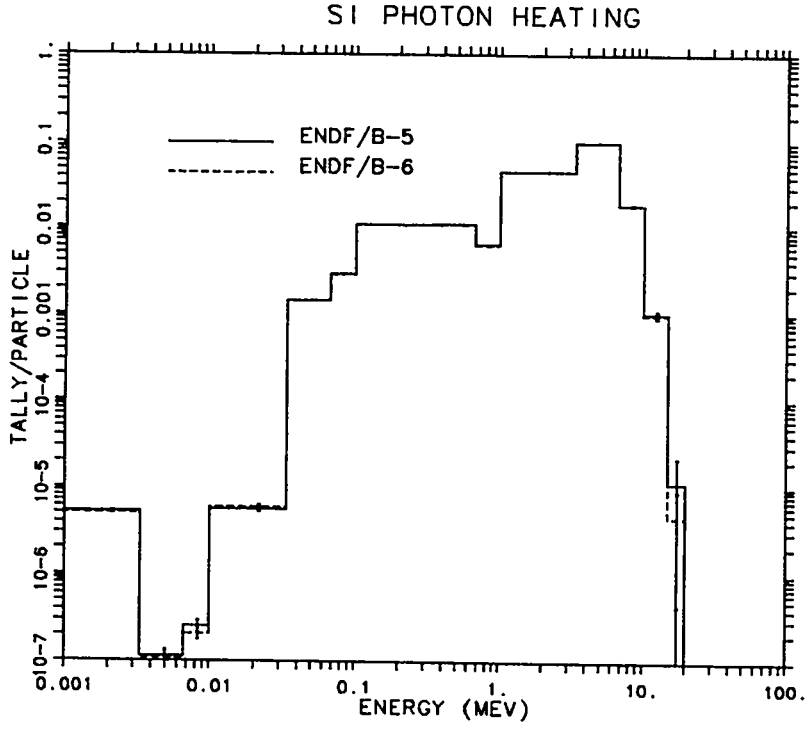

Fig. 72. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the silicon sphere.

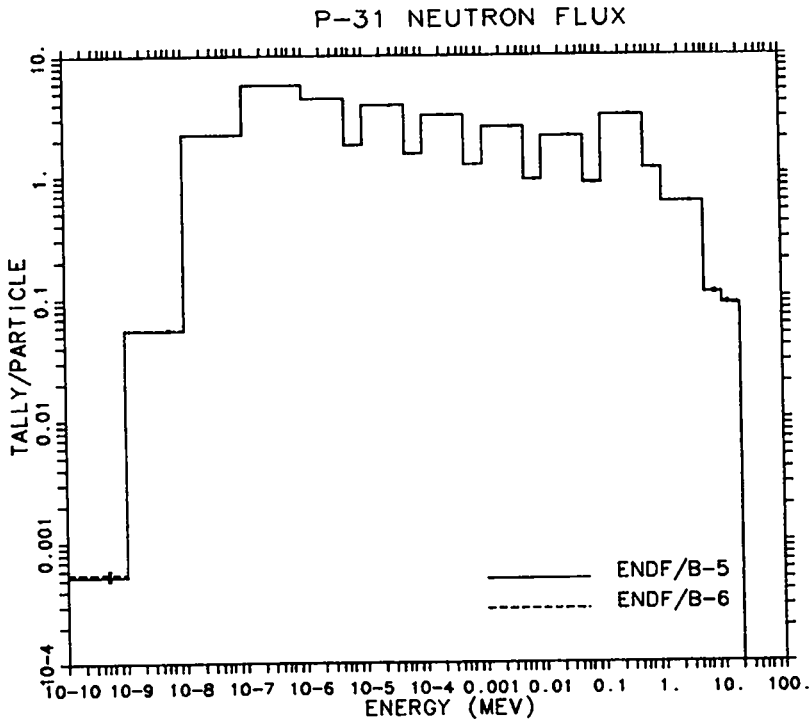

Fig. 73. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{31}P sphere.

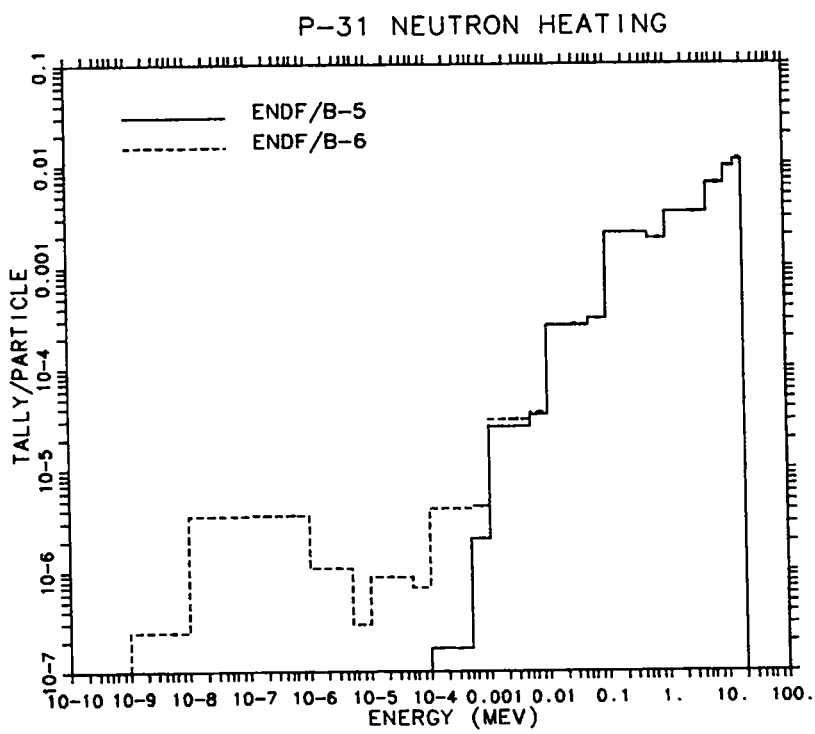

Fig. 74. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{31}P sphere.

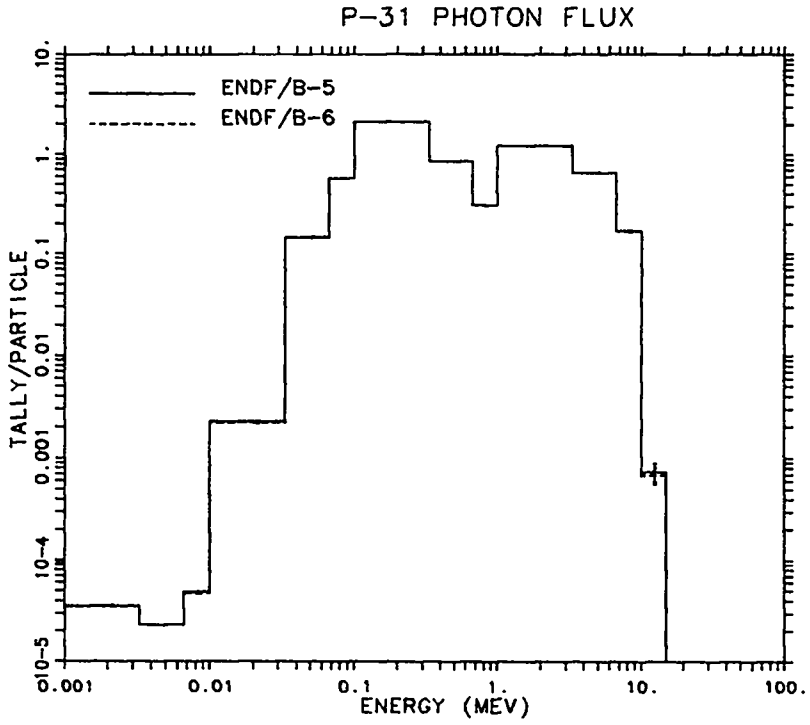

Fig. 75. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{31}P sphere.

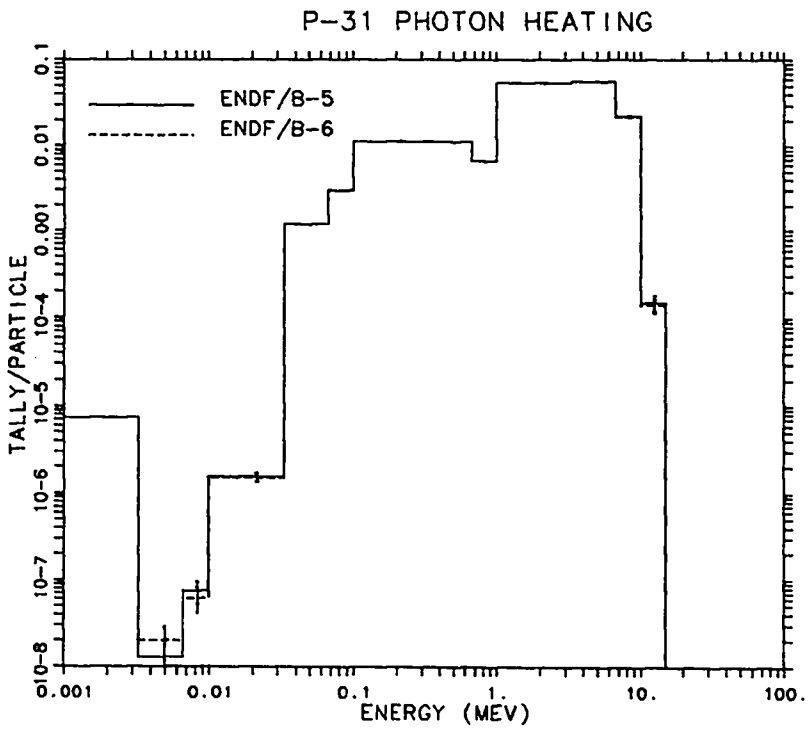

Fig. 76. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{31}P sphere.

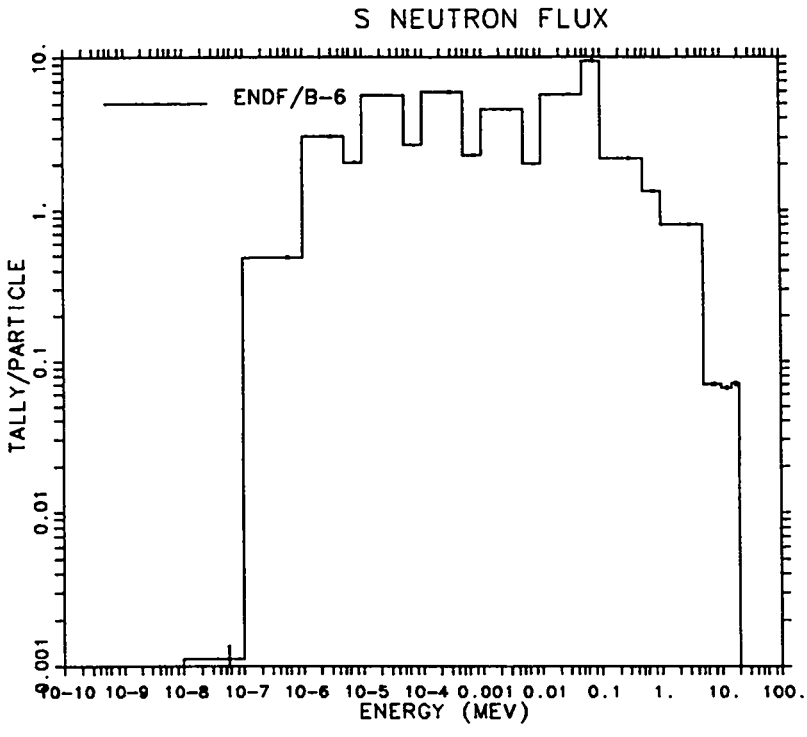

Fig. 77. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius sulfur sphere.

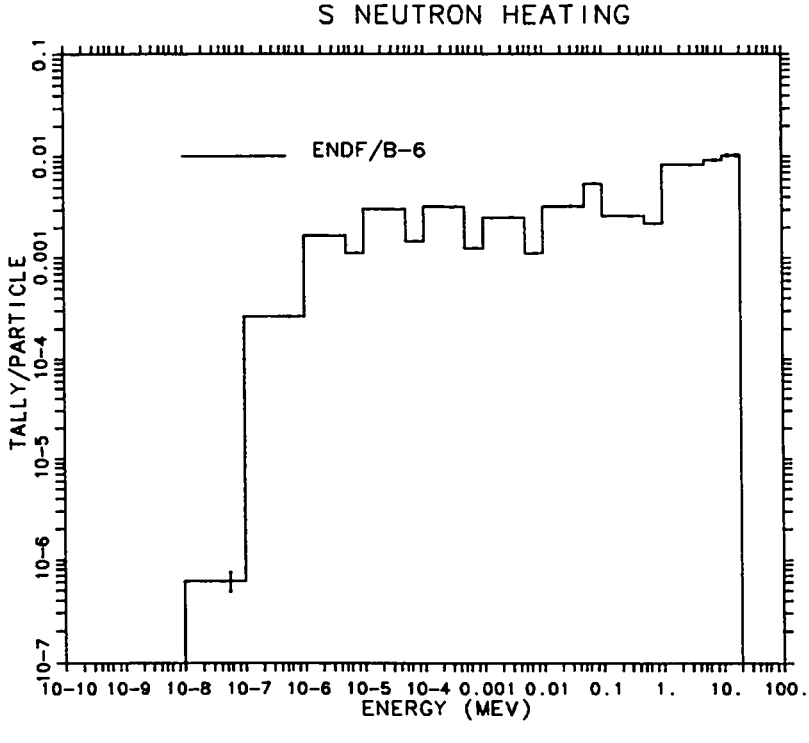

Fig. 78. Plot of ENDF/B-VI calculated neutron heating for the sulfur sphere.

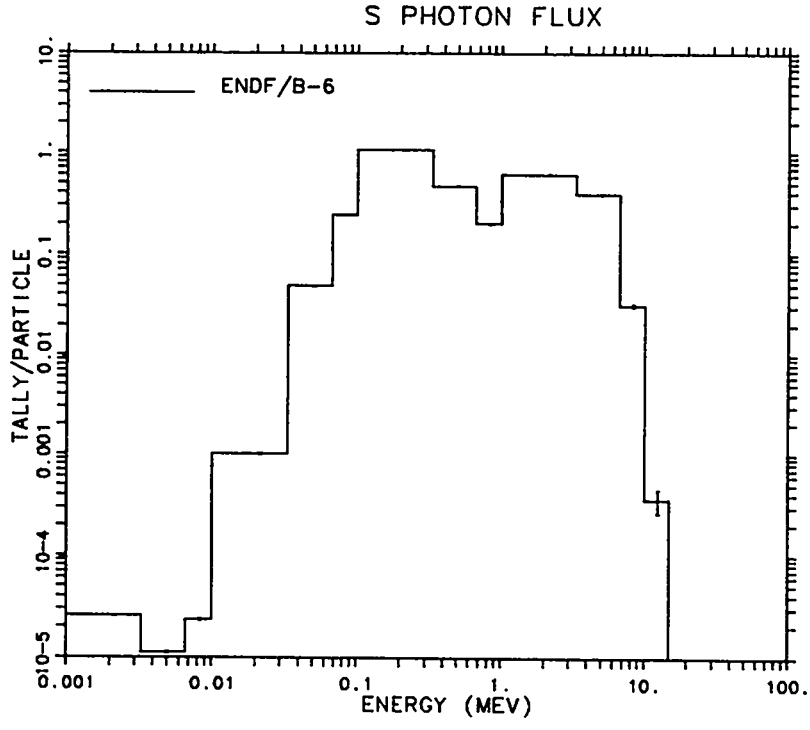

Fig. 79. Plot of ENDF/B-VI calculated photon flux for the sulfur sphere.

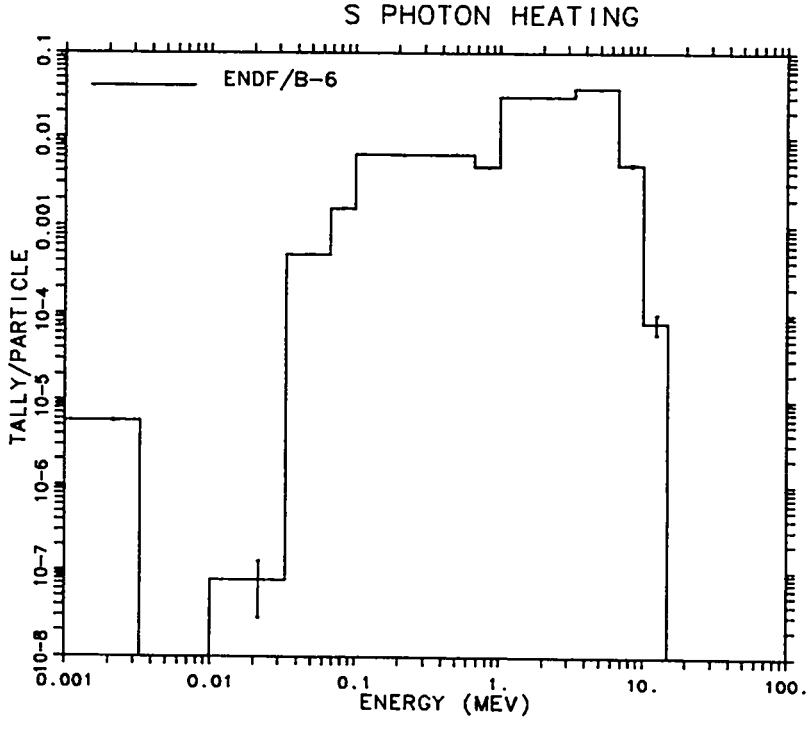

Fig. 80. Plot of ENDF/B-VI calculated photon heating for the sulfur sphere.

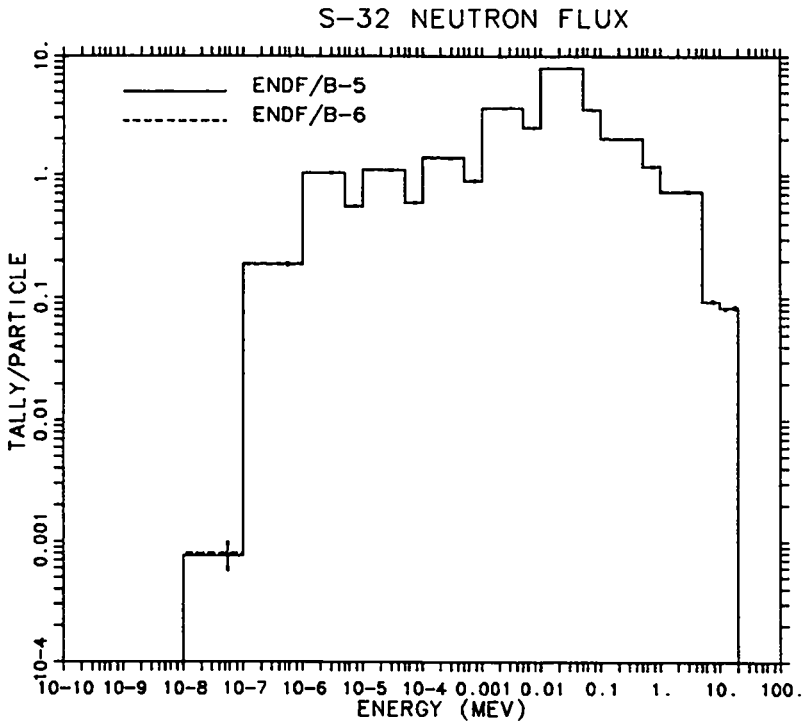

Fig. 81. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{32}S sphere.

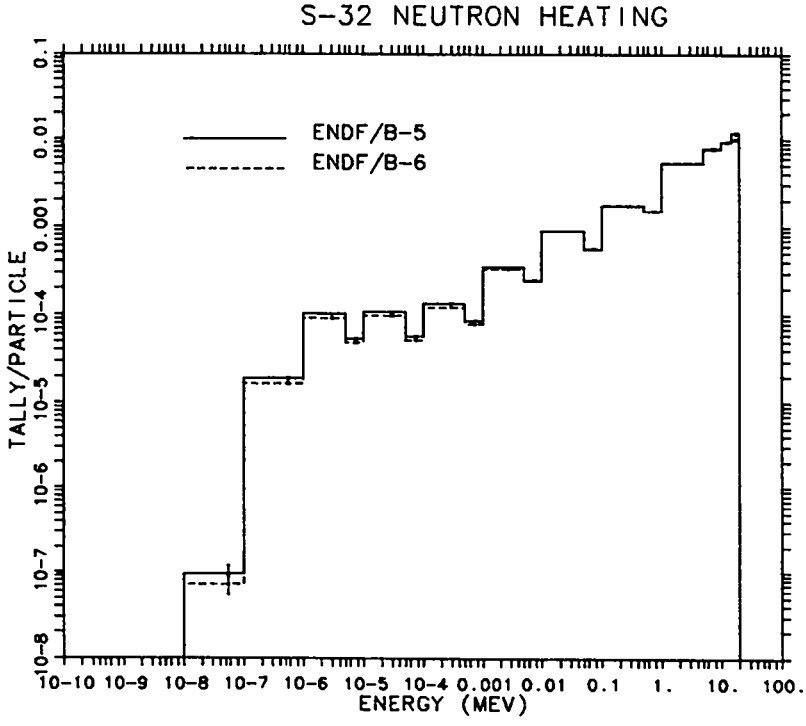

Fig. 82. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{32}S sphere.

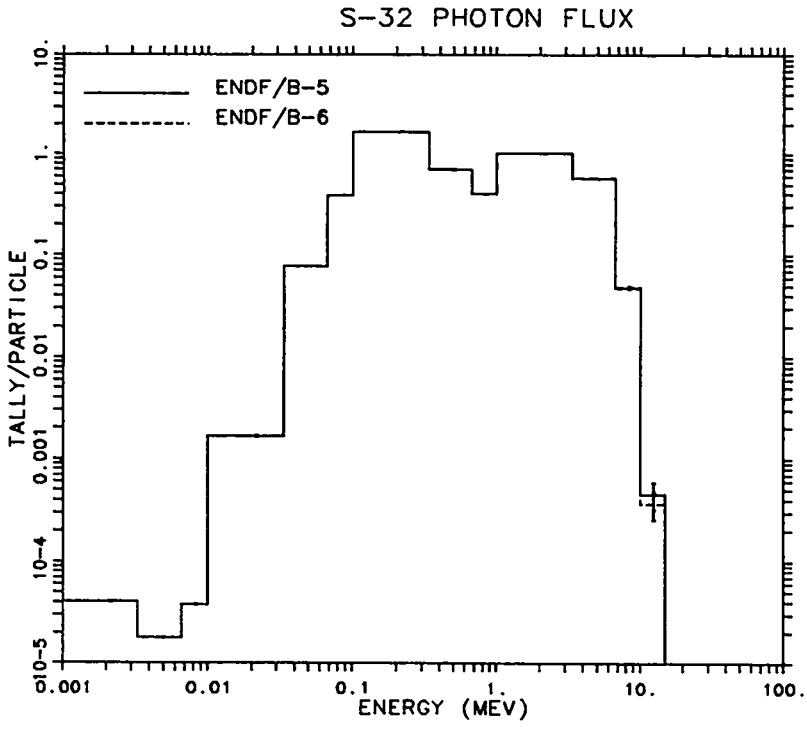

Fig. 83. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{32}S sphere.

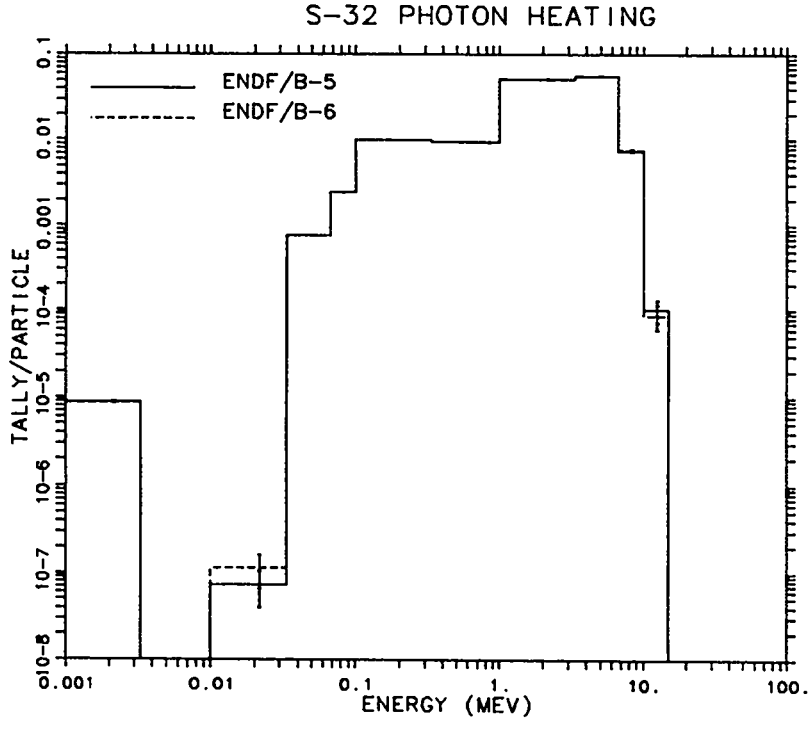

Fig. 84. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{32}S sphere.

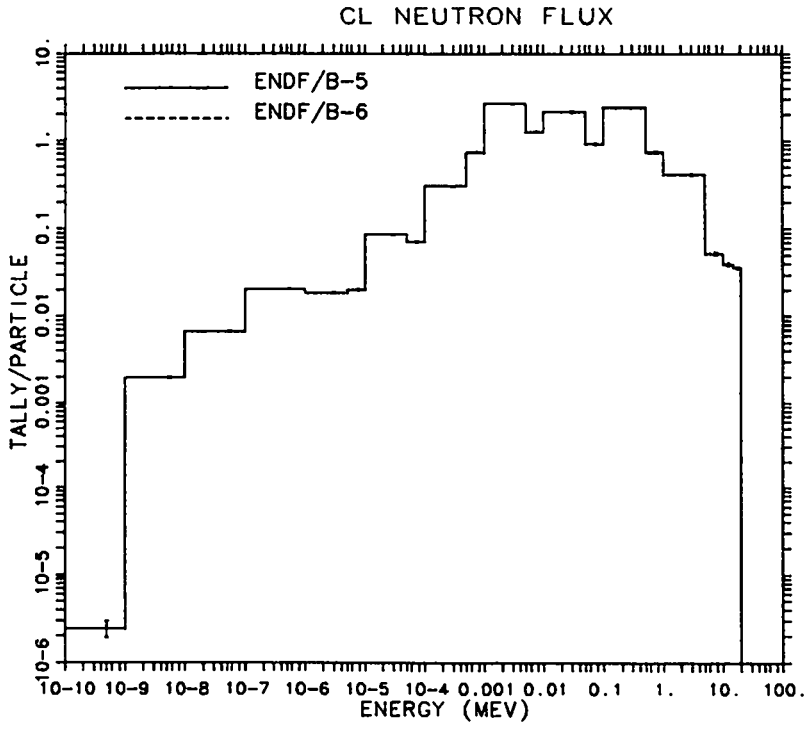

Fig. 85. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius chlorine sphere.

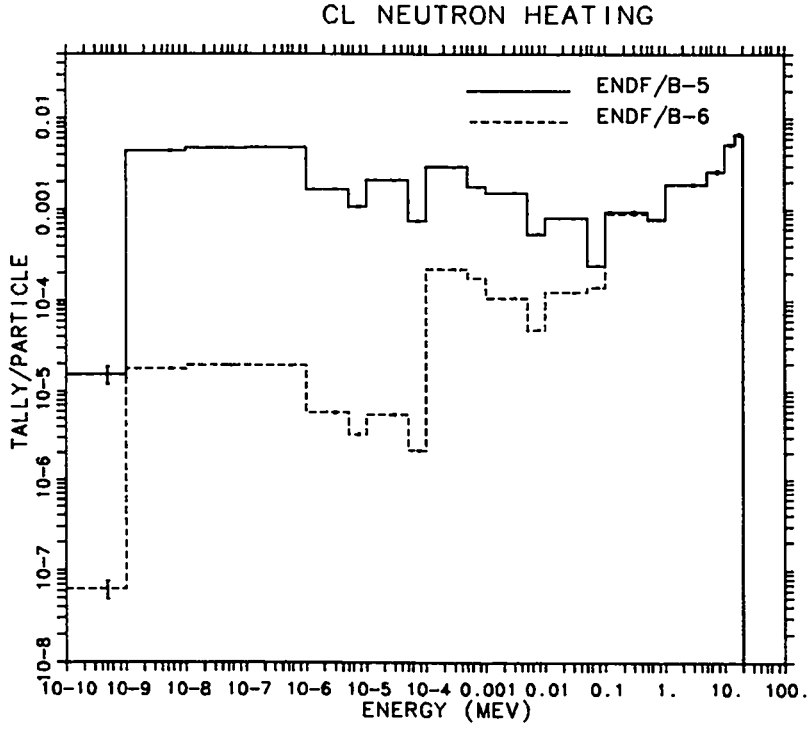

Fig. 86. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the chlorine sphere.

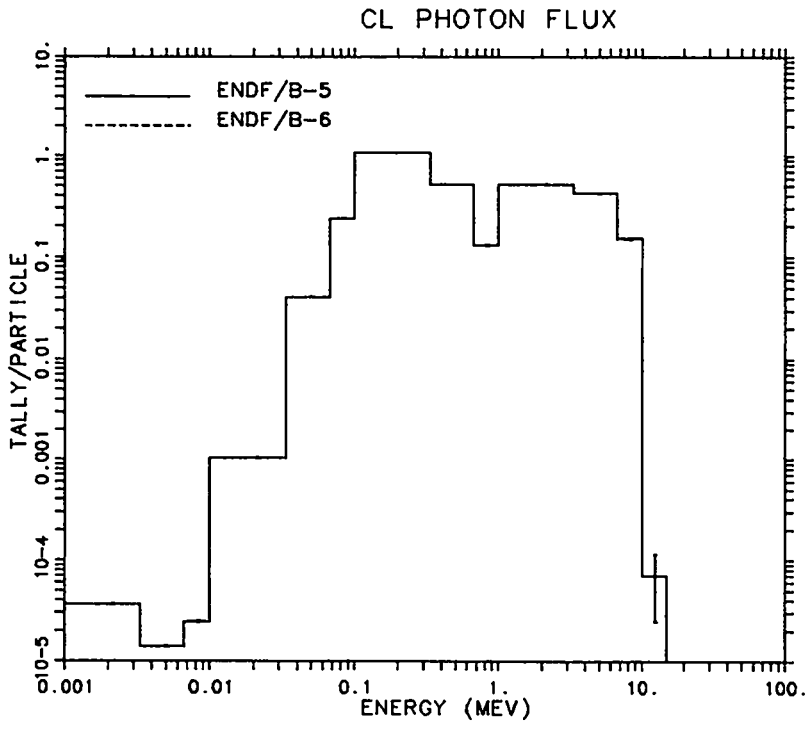

Fig. 87. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the chlorine sphere.

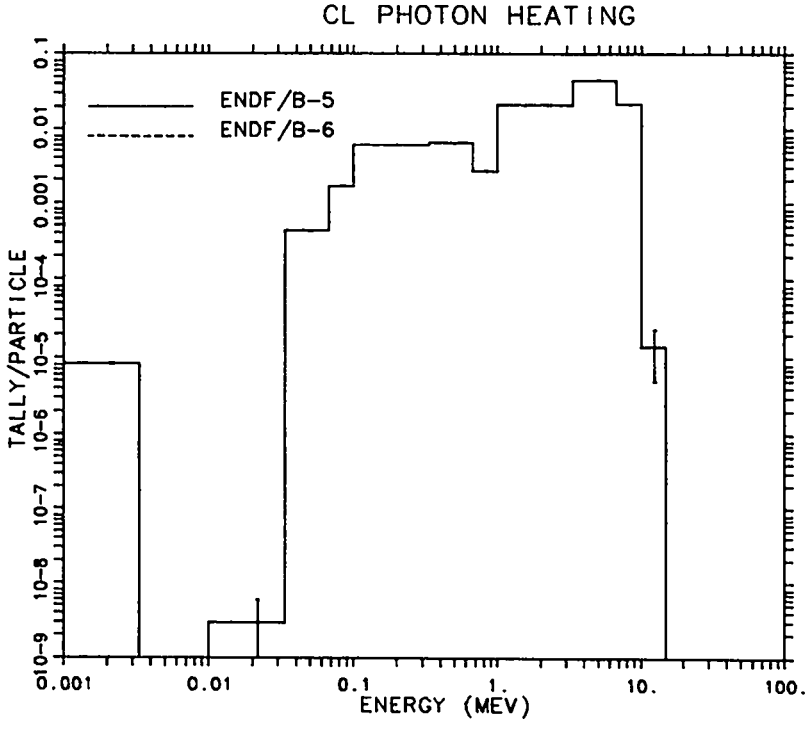

Fig. 88. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the chlorine sphere.

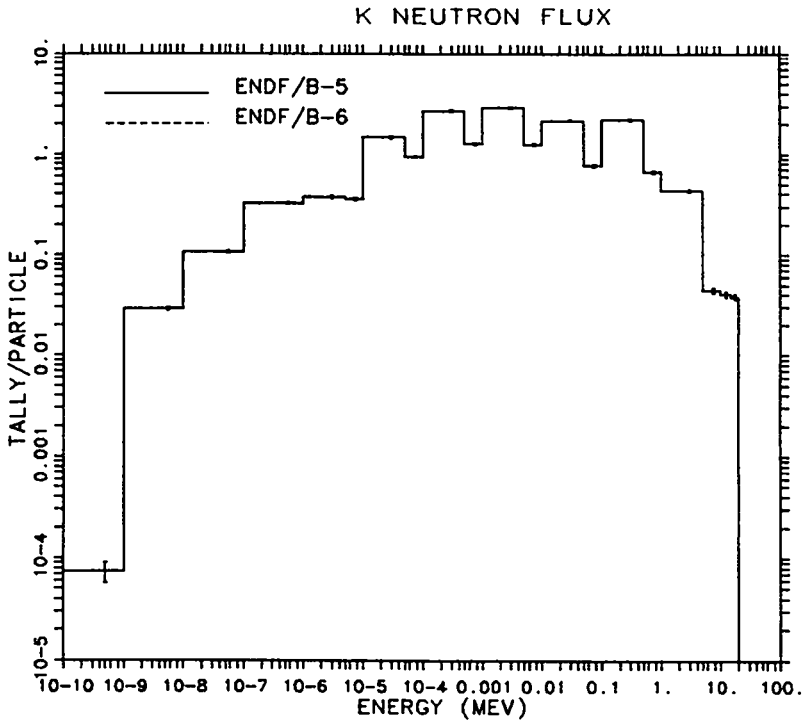

Fig. 89. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius potassium sphere.

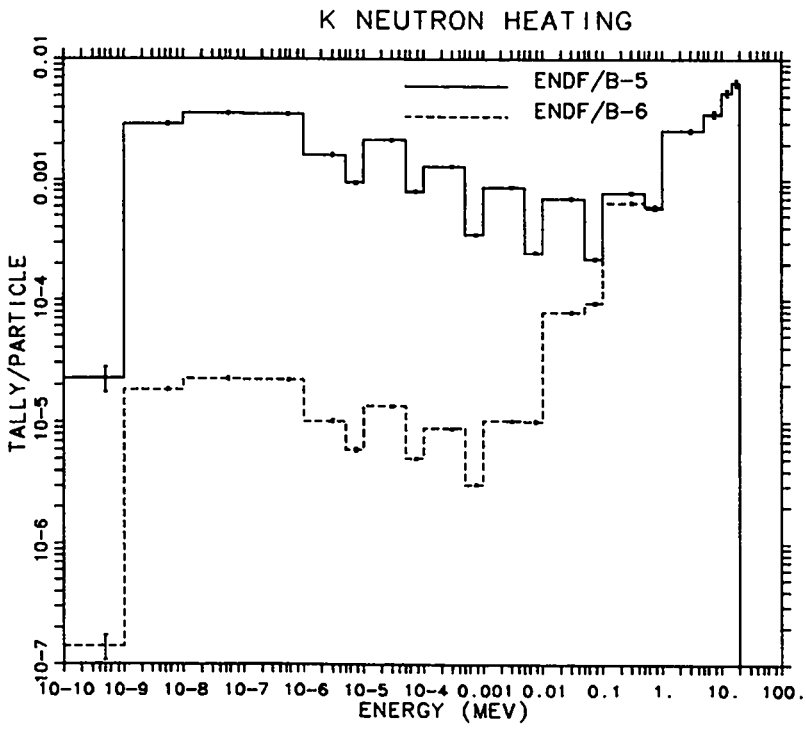

Fig. 90. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the potassium sphere.

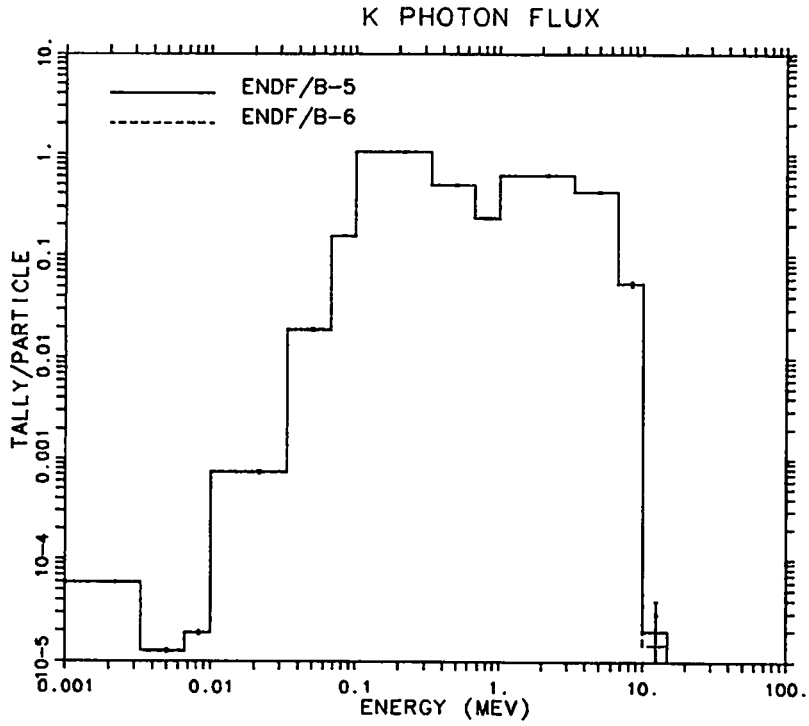

Fig. 91. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the potassium sphere.

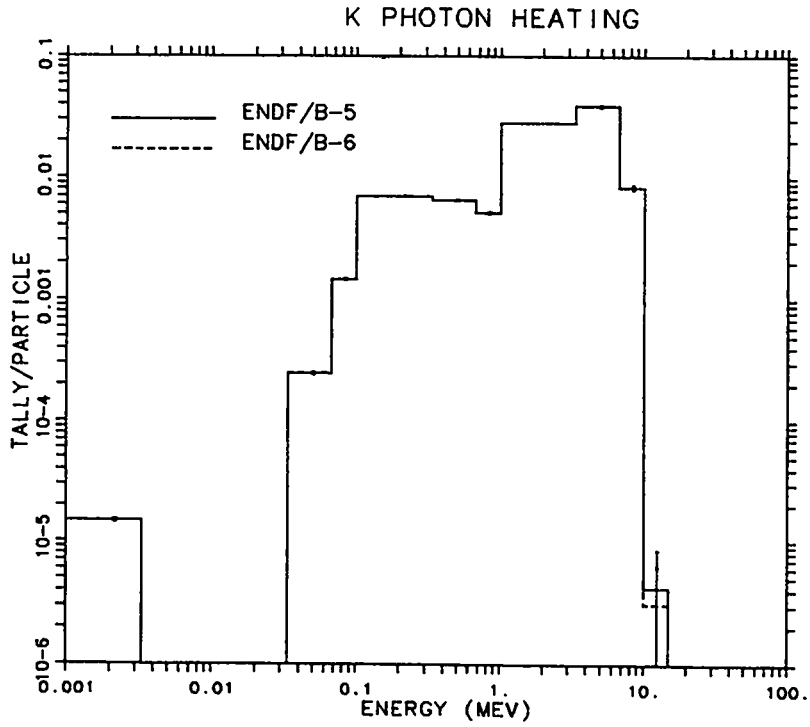

Fig. 92. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the potassium sphere.

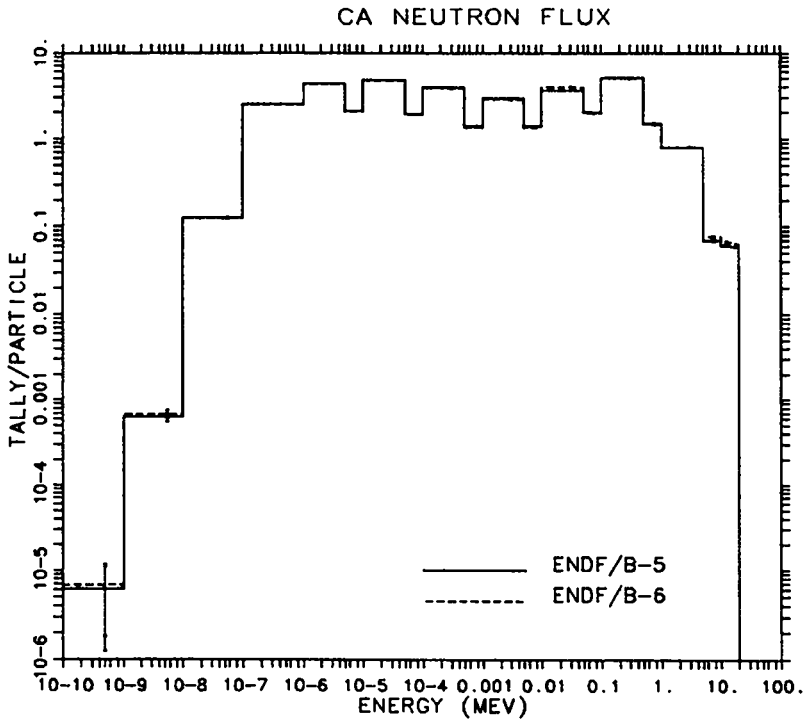

Fig. 93. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius calcium sphere.

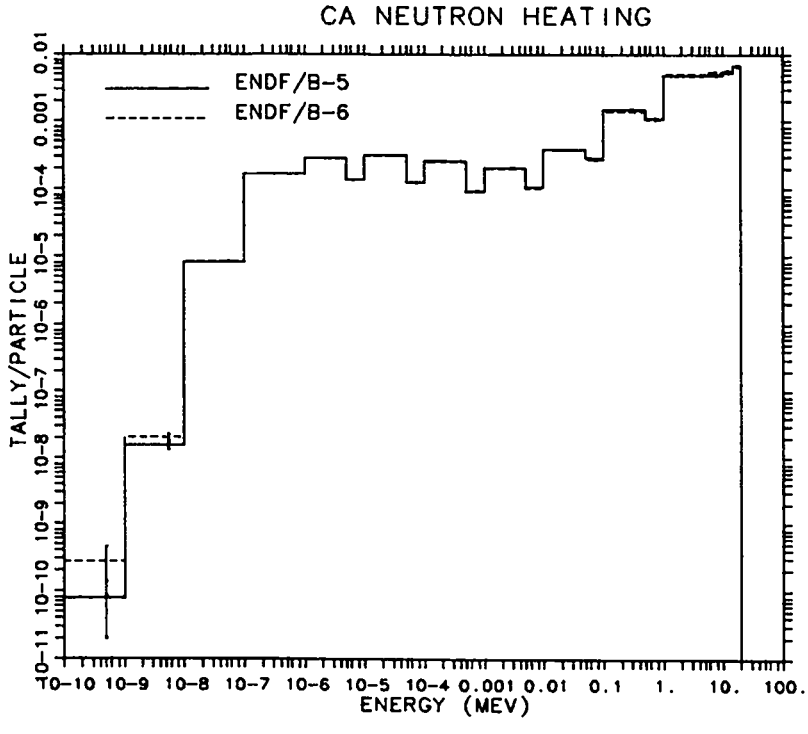

Fig. 94. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the calcium sphere.

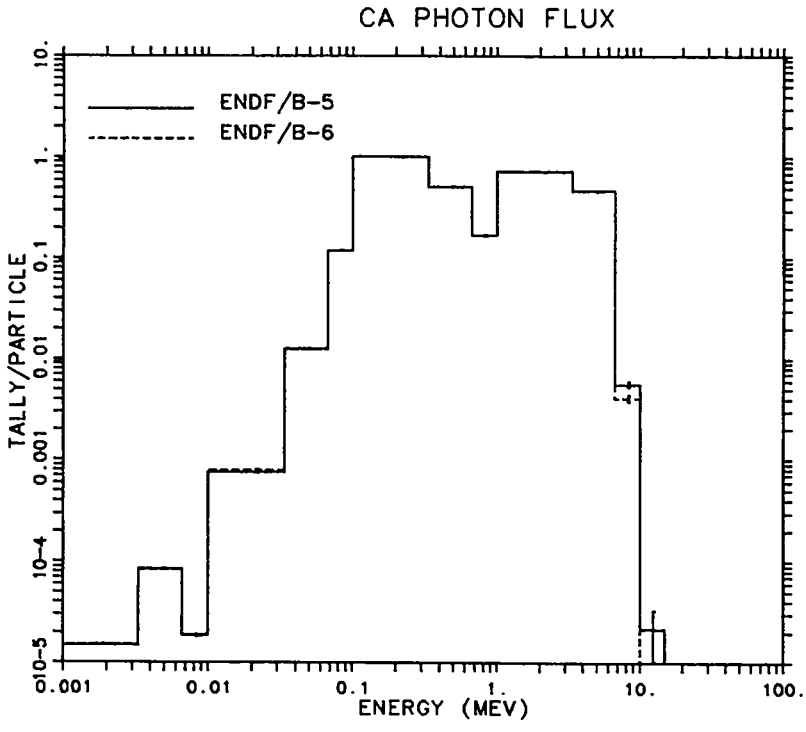

Fig. 95. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the calcium sphere.

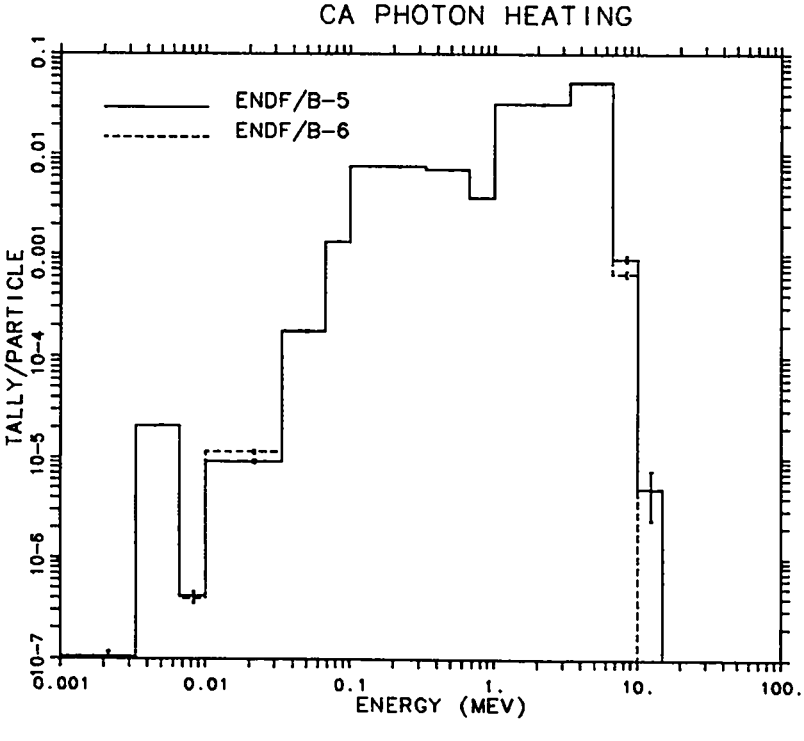

Fig. 96. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the calcium sphere.

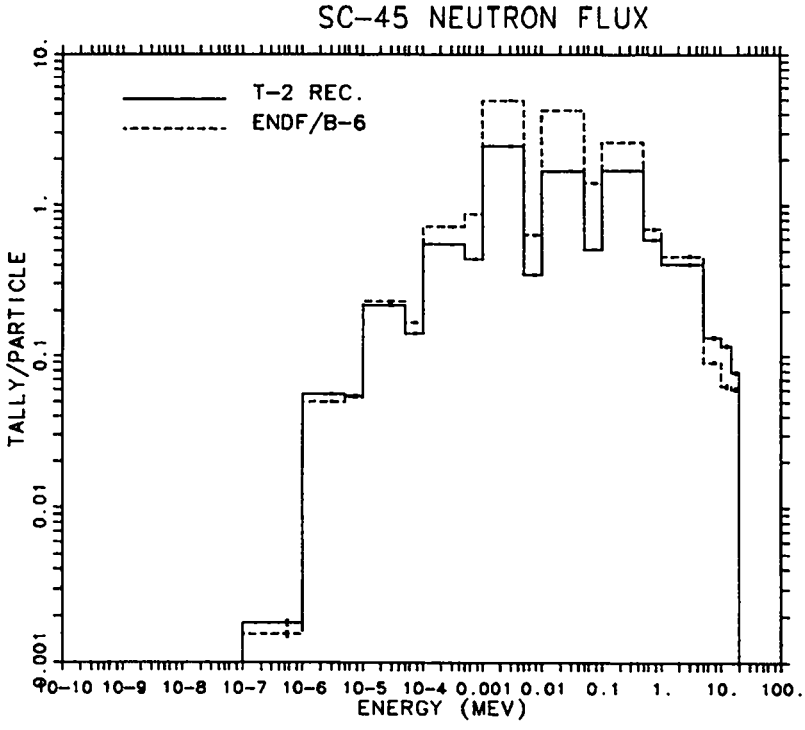

Fig. 97. Plot of a T-2 evaluation and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{45}Sc sphere. The T-2 evaluation is not the MCNP Recommended Evaluation for this isotope. MCNP does not have a recommended evaluation for this isotope.

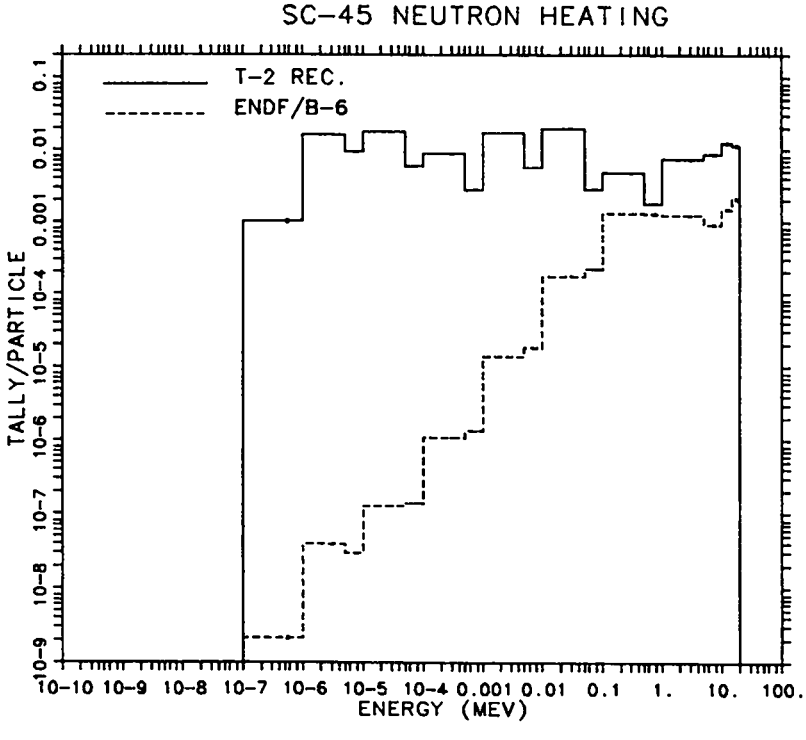

Fig. 98. Plot of a T-2 evaluation and ENDF/B-VI calculated neutron heating for the ^{45}Sc sphere. The T-2 evaluation is not the MCNP recommended Evaluation for this isotope. MCNP does not have a recommended evaluation for this isotope.

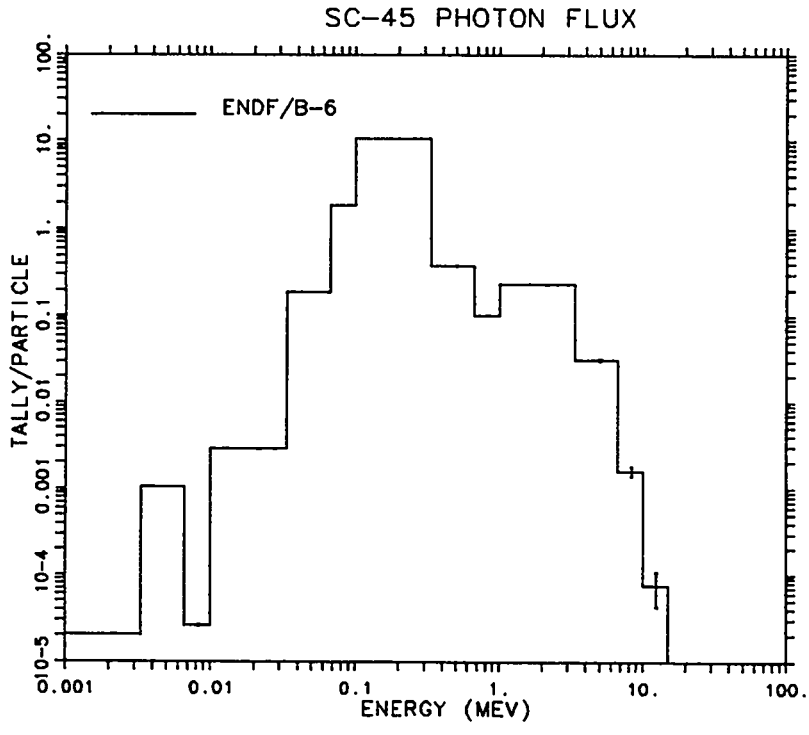

Fig. 99. Plot of ENDF/B-VI calculated photon flux for the ^{45}Sc sphere.

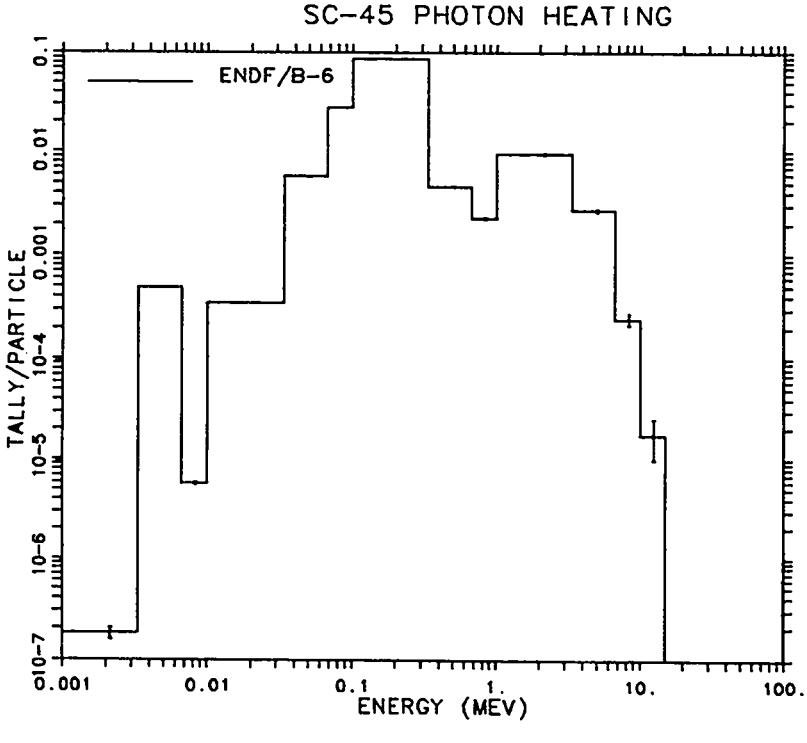

Fig. 100. Plot of ENDF/B-VI calculated photon heating for the ^{45}Sc sphere.

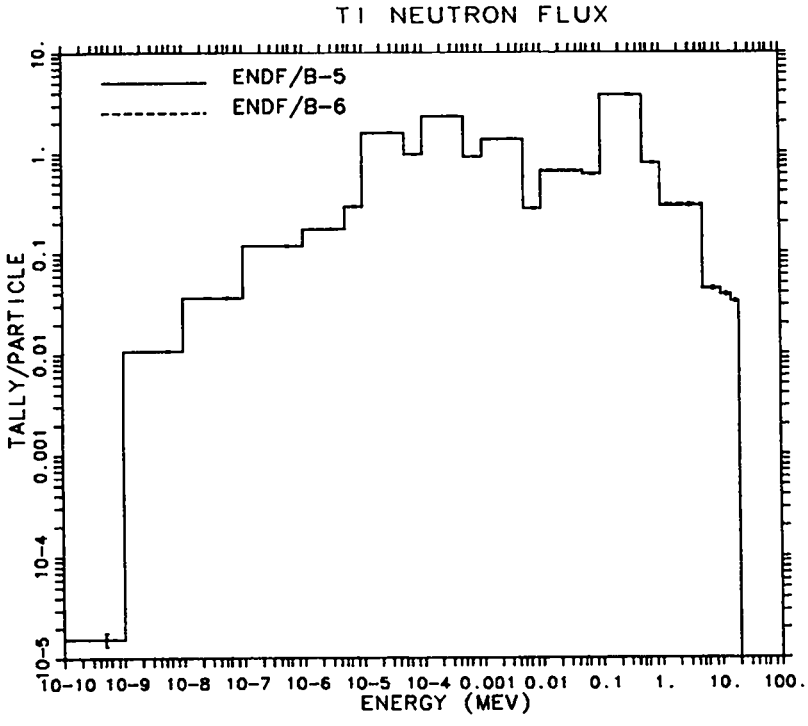

Fig. 101. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius titanium sphere.

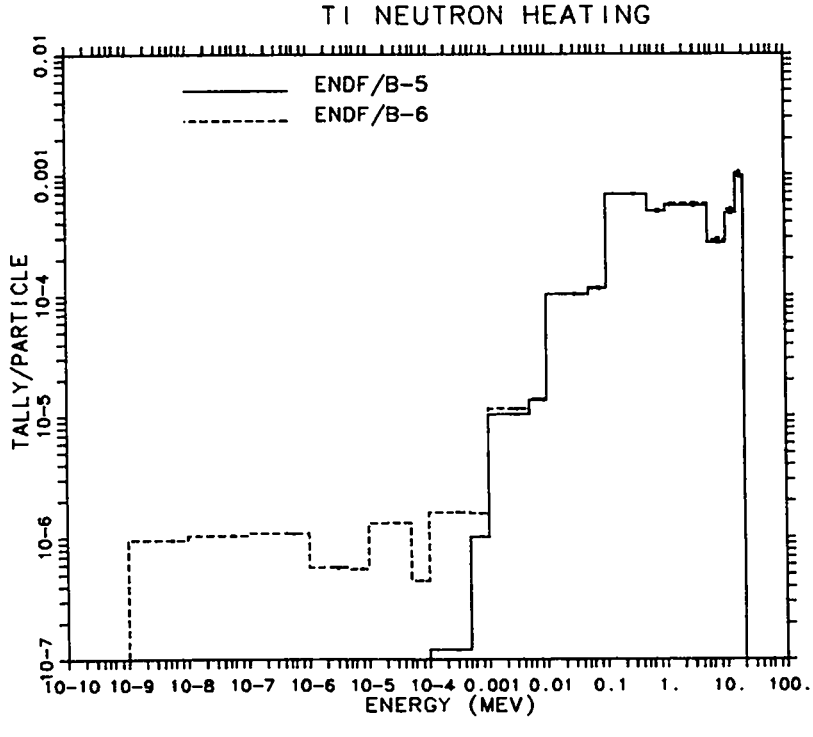

Fig. 102. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the titanium sphere.

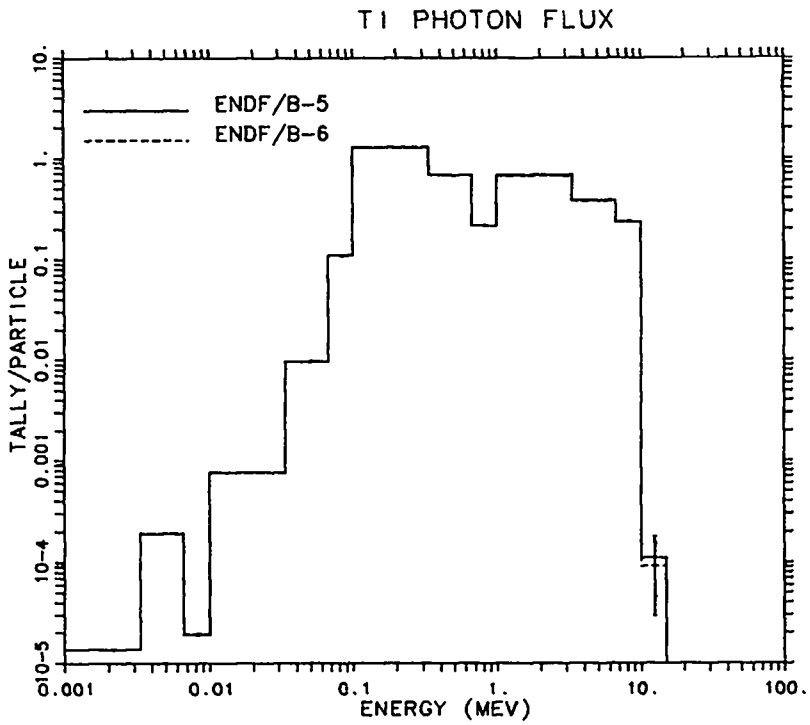

Fig. 103. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the titanium sphere.

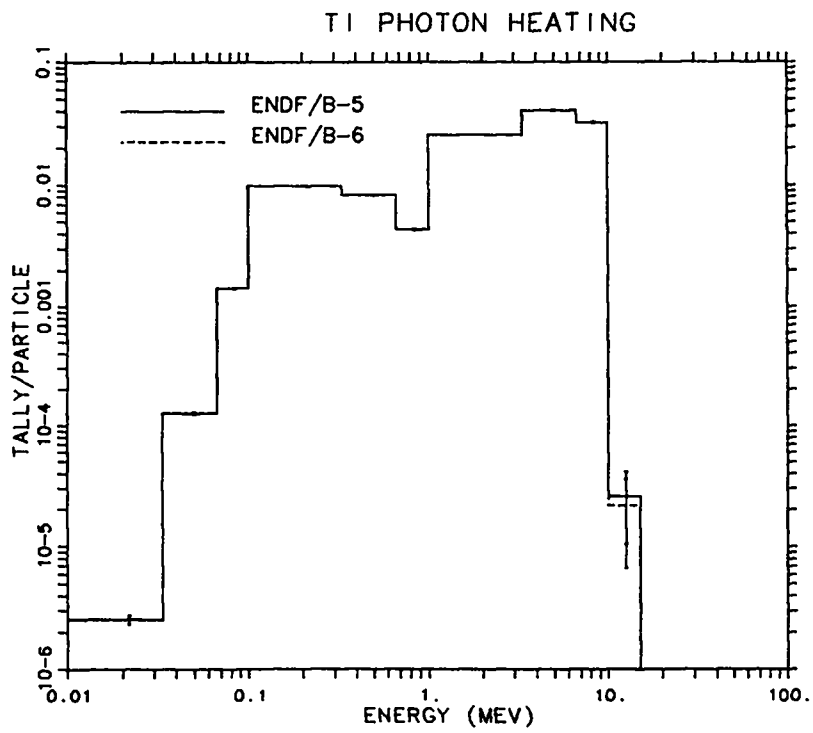

Fig. 104. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the titanium sphere.

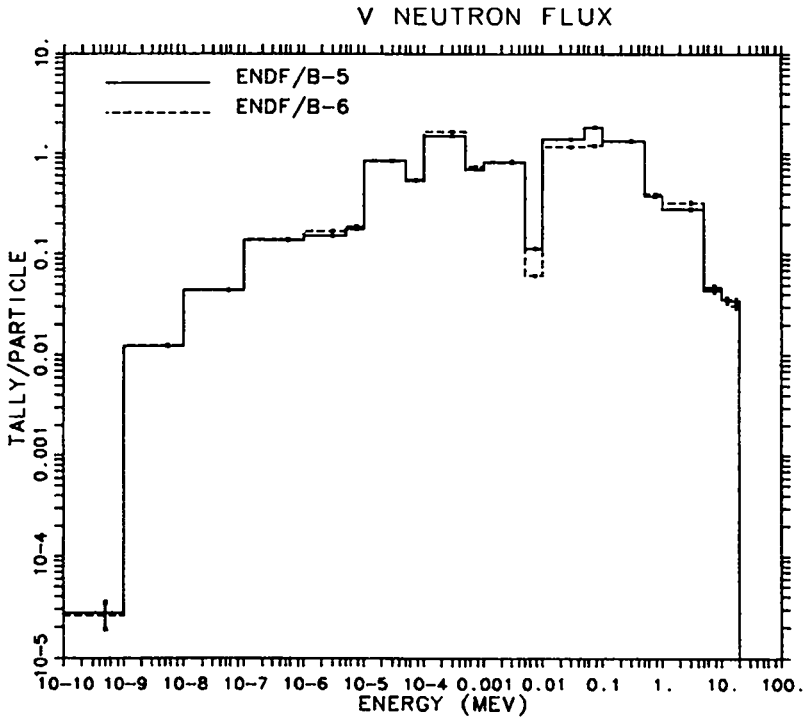

Fig. 105. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius vanadium sphere.

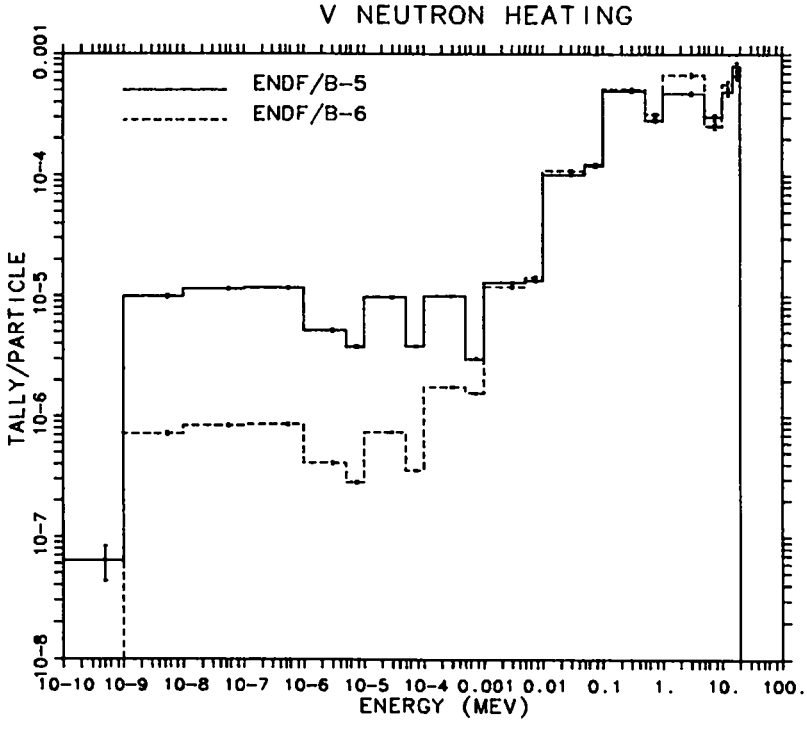

Fig. 106. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the vanadium sphere.

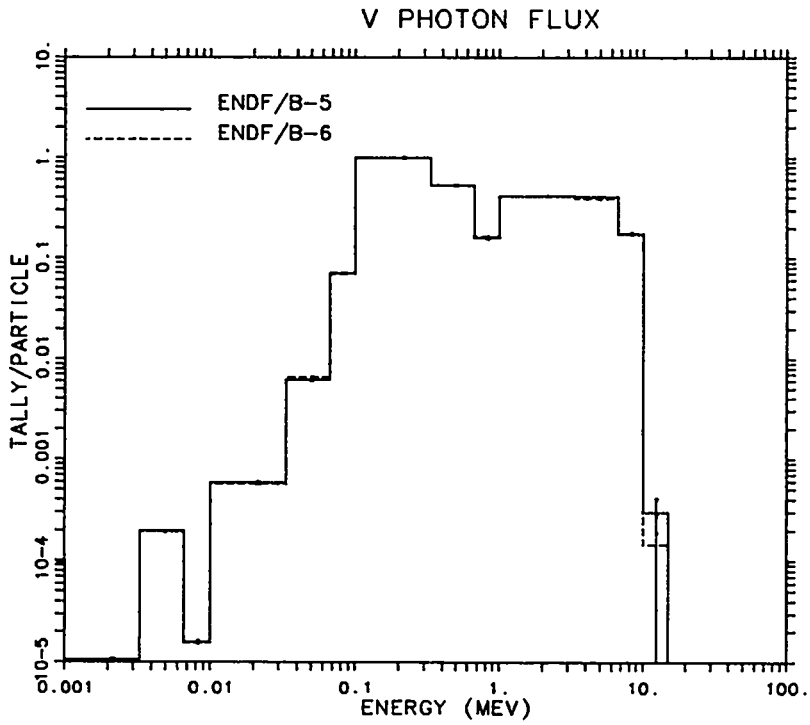

Fig. 107. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the vanadium sphere.

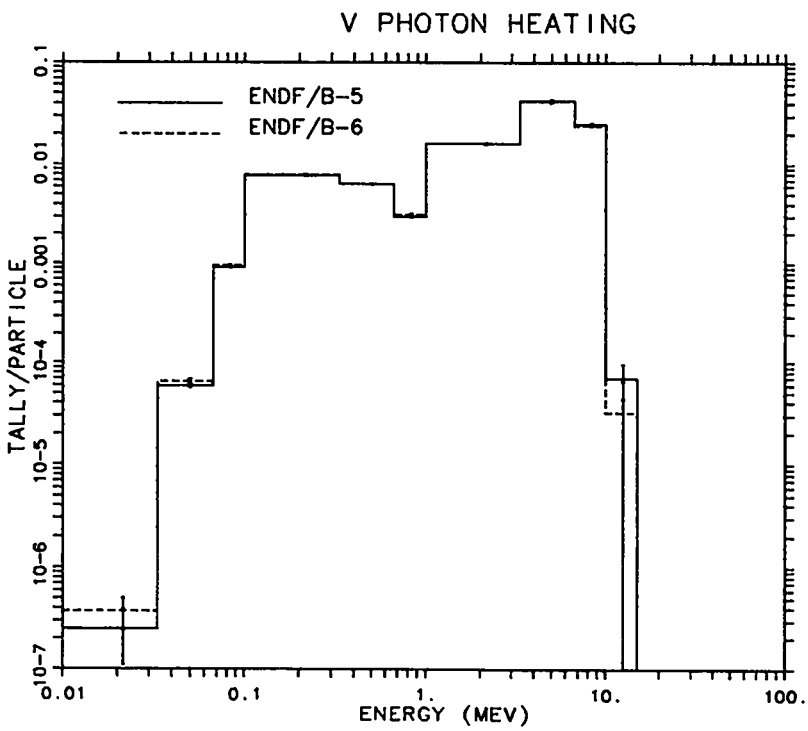

Fig. 108. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the vanadium sphere.

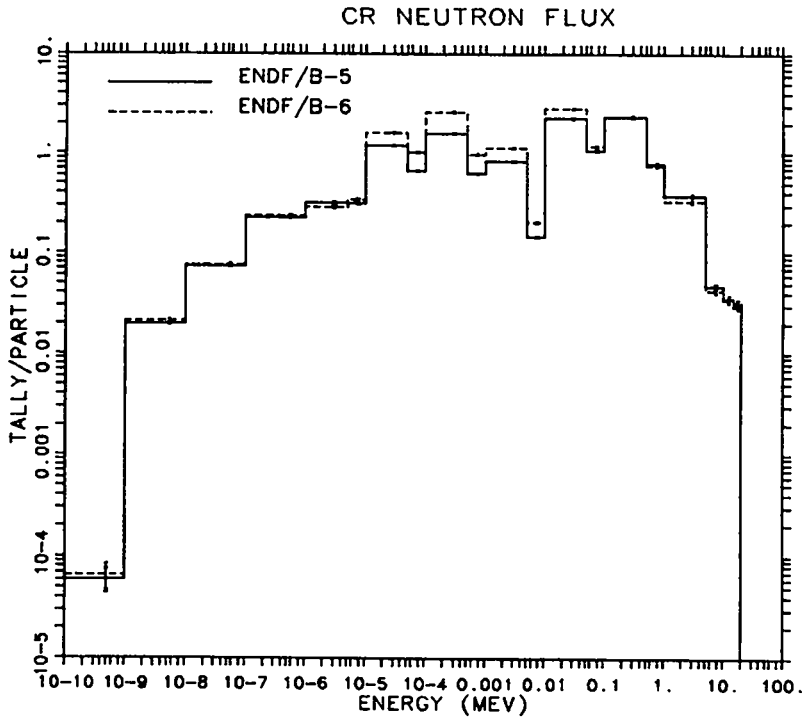

Fig. 109. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated neutron flux for a 10000 cm radius chromium sphere. The atom percent of isotopic ENDF/B-VI was: ^{50}Cr–4.345%, ^{52}Cr–83.79%, ^{53}Cr–9.5%, and ^{54}Cr–2.365%.

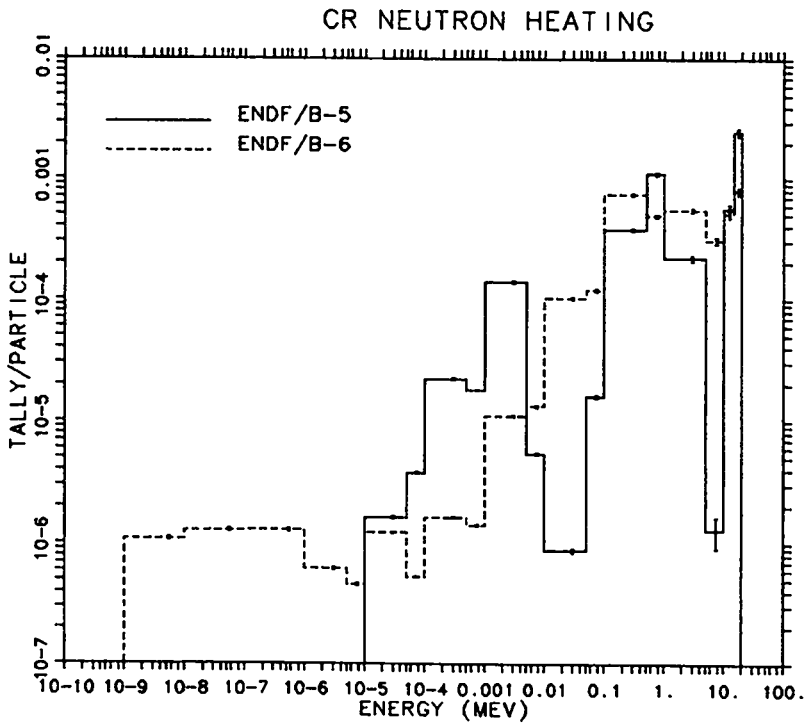

Fig. 110. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated neutron heating for the chromium sphere.

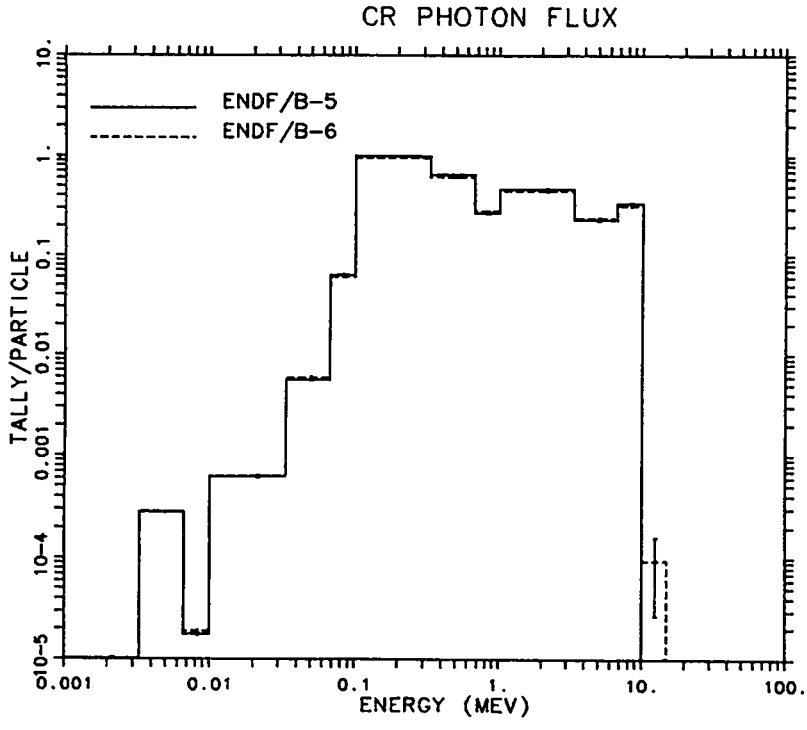

Fig. 111. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated photon flux for the chromium sphere.

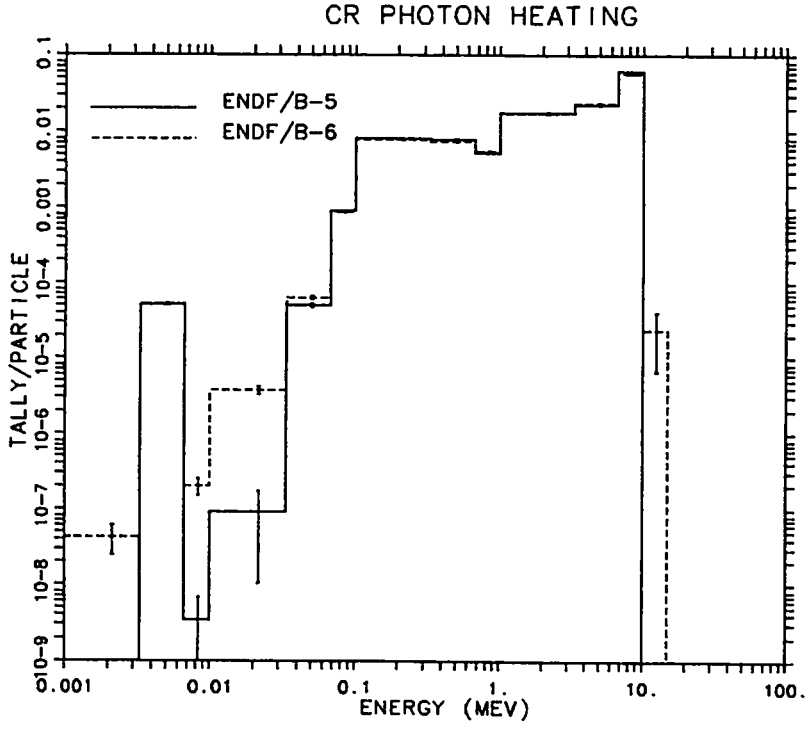

Fig. 112. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated photon heating for the chromium sphere.

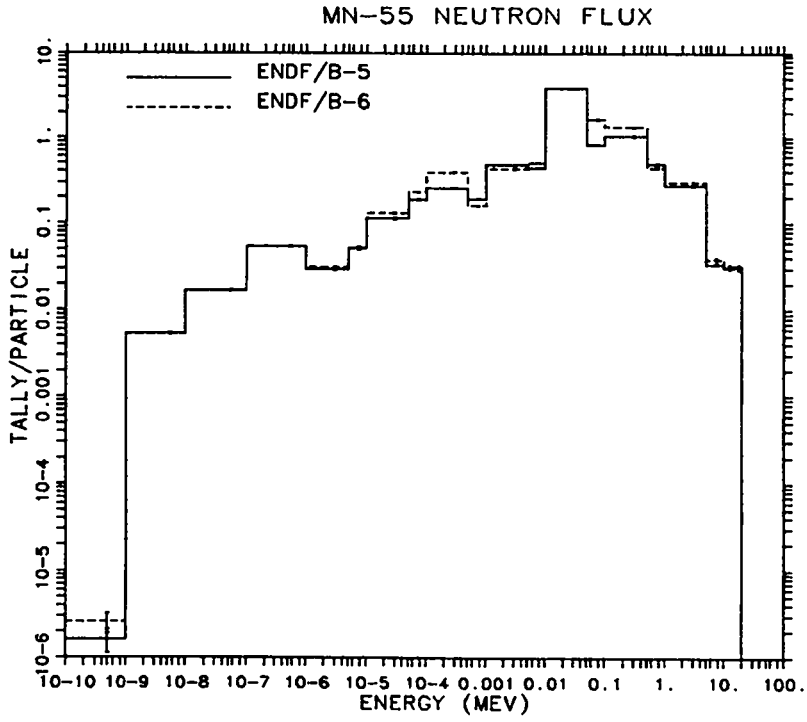

Fig. 113. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{55}Mn sphere.

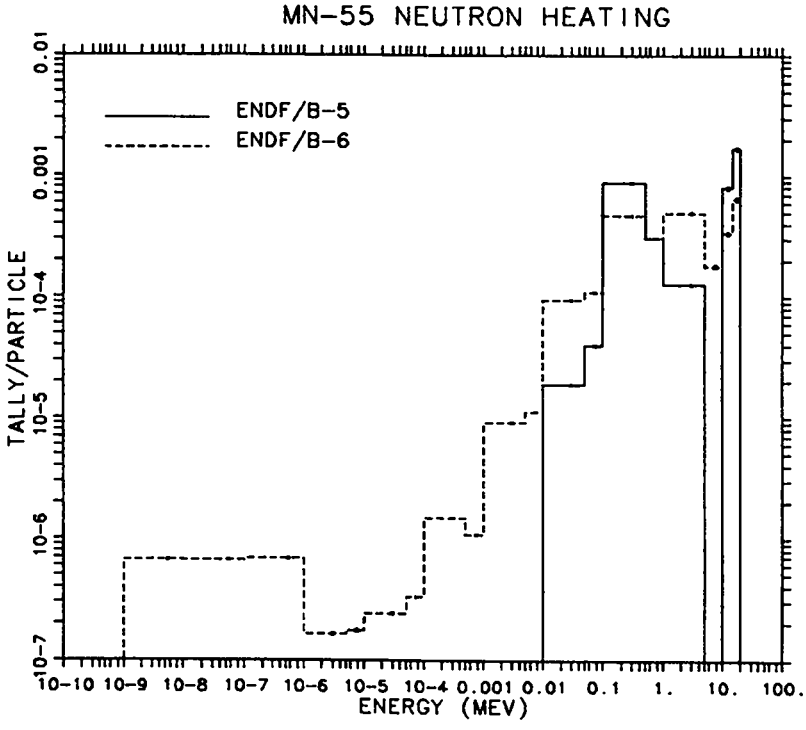

Fig. 114. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{55}Mn sphere.

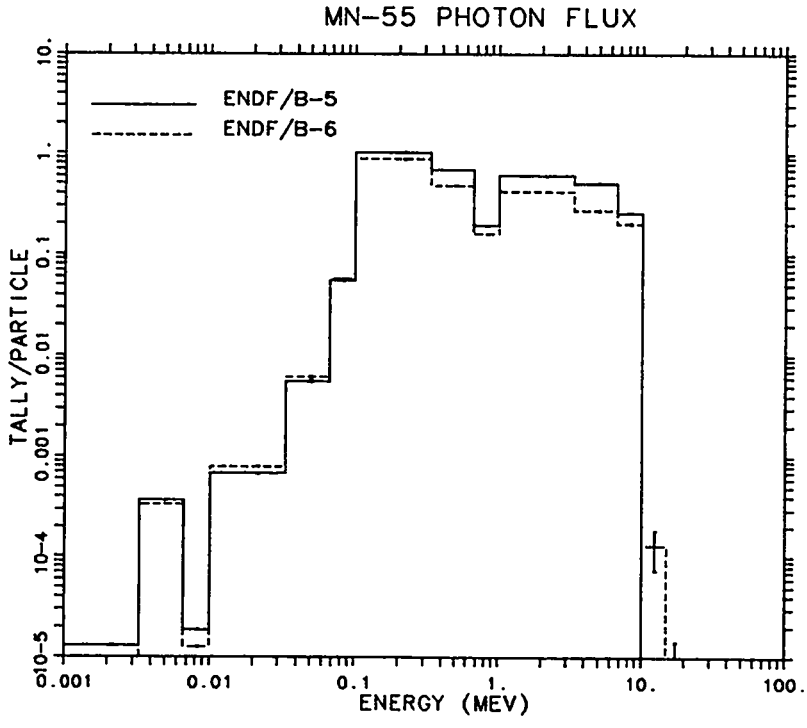

Fig. 115. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{55}Mn sphere.

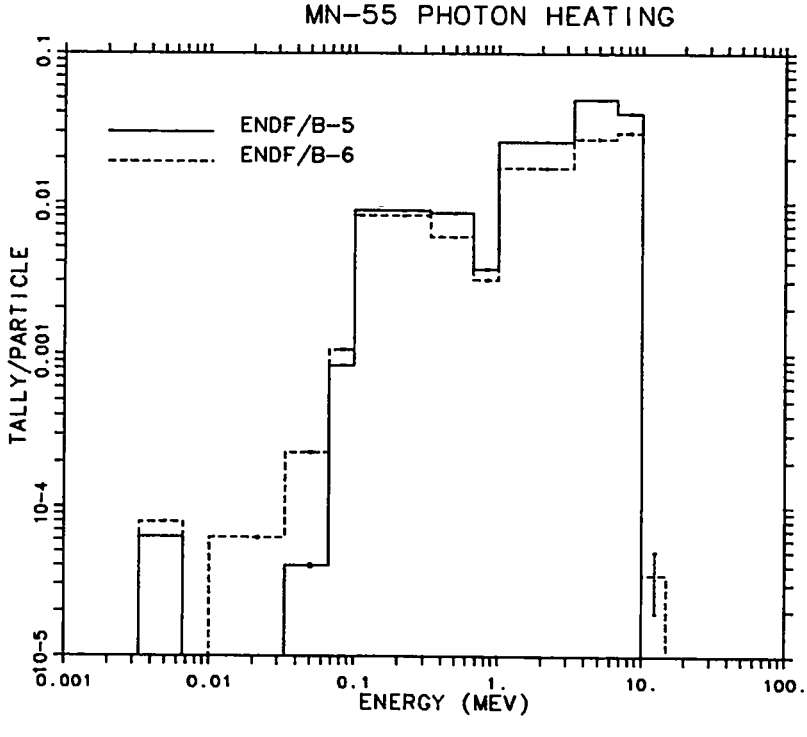

Fig. 116. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{55}Mn sphere.

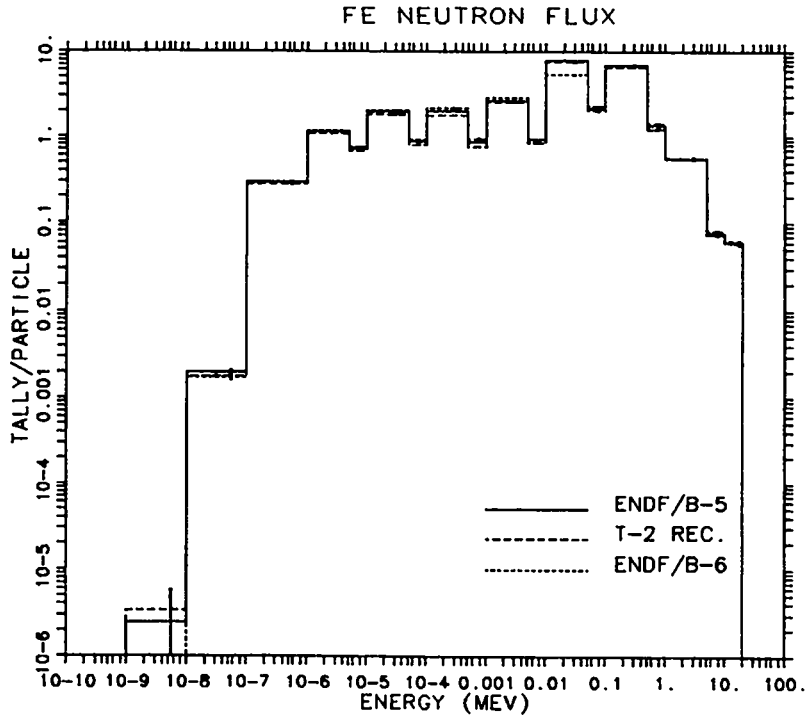

Fig. 117. Plot of elemental ENDF/B-V, elemental MCNP Recommended, and isotopic ENDF/B-VI calculated neutron flux for a 10000 cm radius iron sphere. The atom percent of isotopic ENDF/B-VI was: ^{54}Fe–5.9%, ^{56}Fe–91.72%, ^{57}Fe–2.1%, and ^{58}Fe–0.28%.

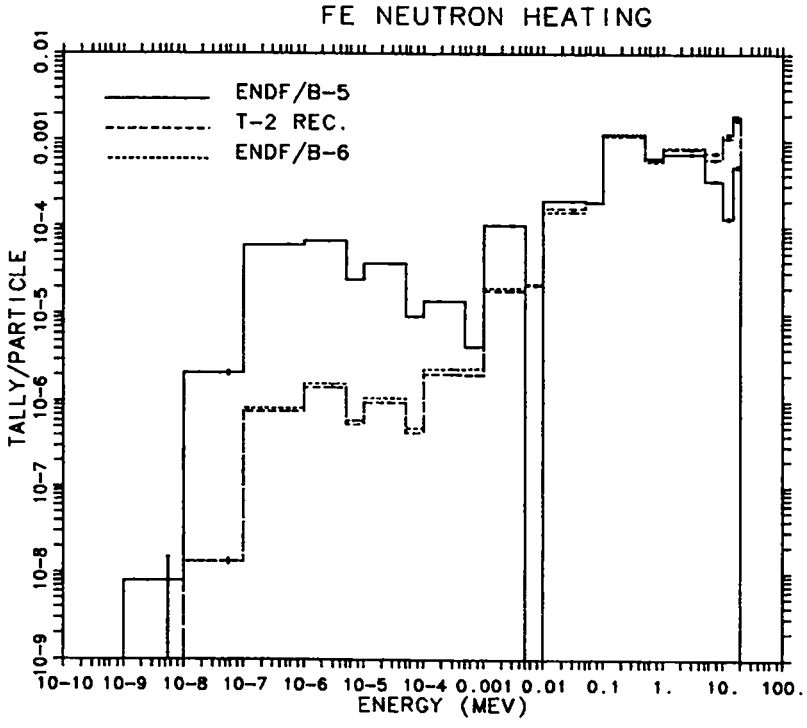

Fig. 118. Plot of elemental ENDF/B-V, elemental MCNP Recommended, and isotopic ENDF/B-VI calculated neutron heating for the iron sphere.

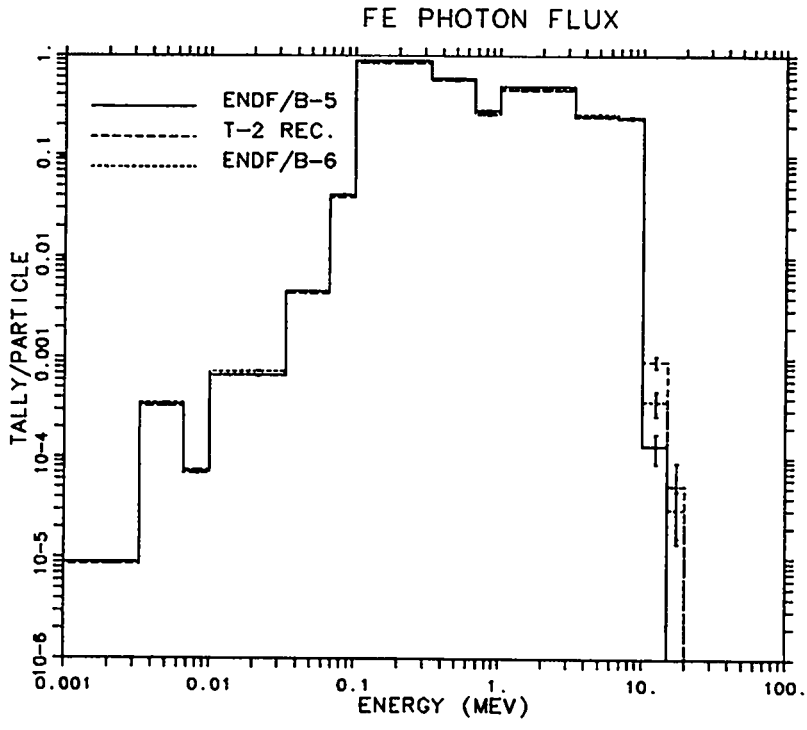

Fig. 119. Plot of elemental ENDF/B-V, elemental MCNP Recommended, and isotopic ENDF/B-VI calculated photon flux for the iron sphere.

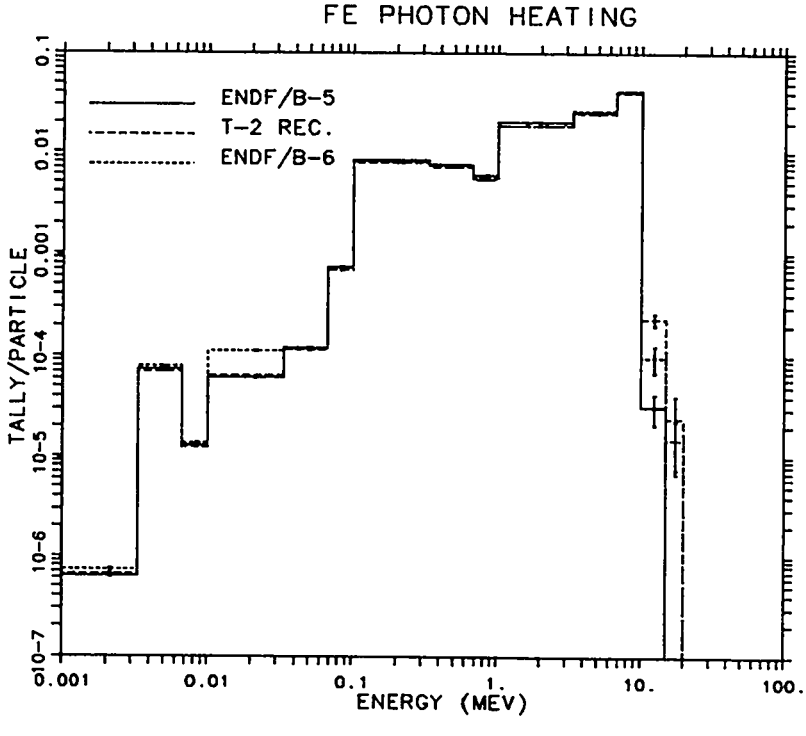

Fig. 120. Plot of elemental ENDF/B-V, elemental MCNP Recommended, and isotopic ENDF/B-VI calculated photon heating for the iron sphere.

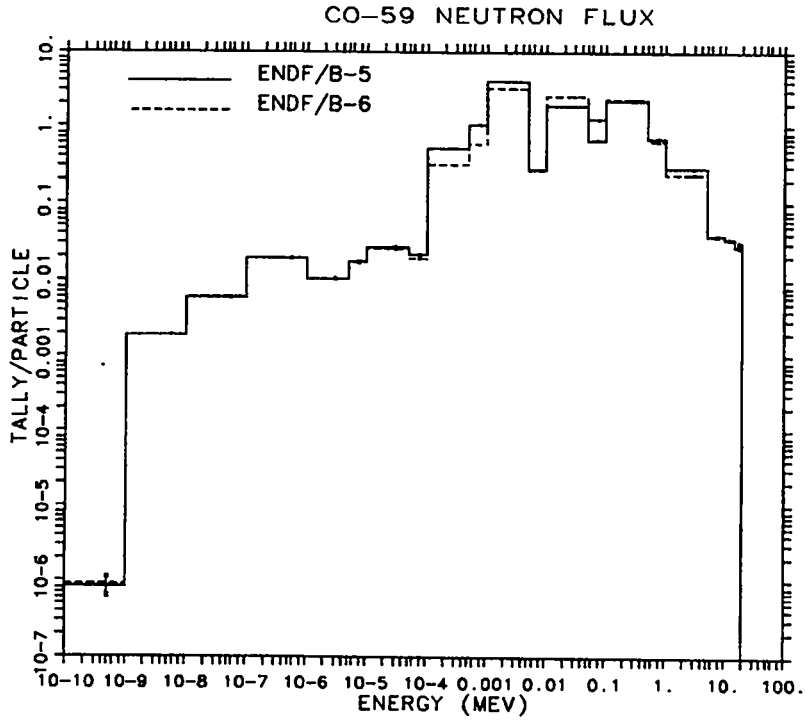

Fig. 121. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{59}Co sphere.

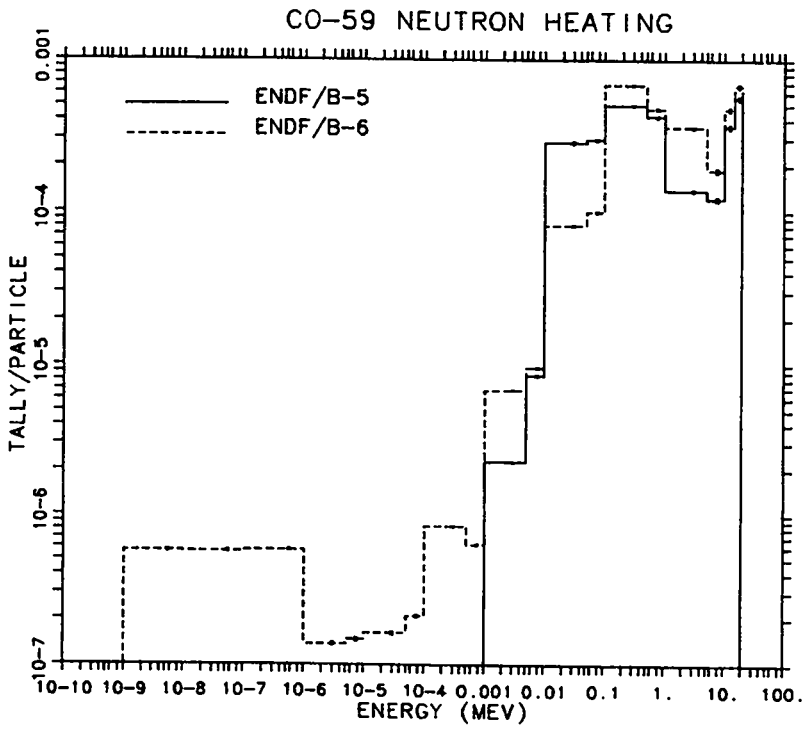

Fig. 122. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{59}Co sphere.

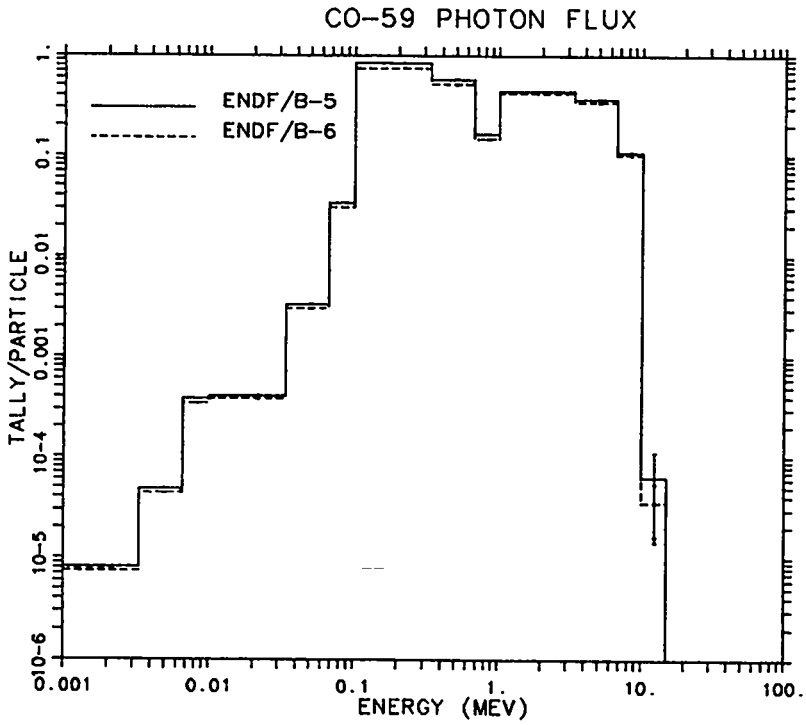

Fig. 123. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{59}Co sphere.

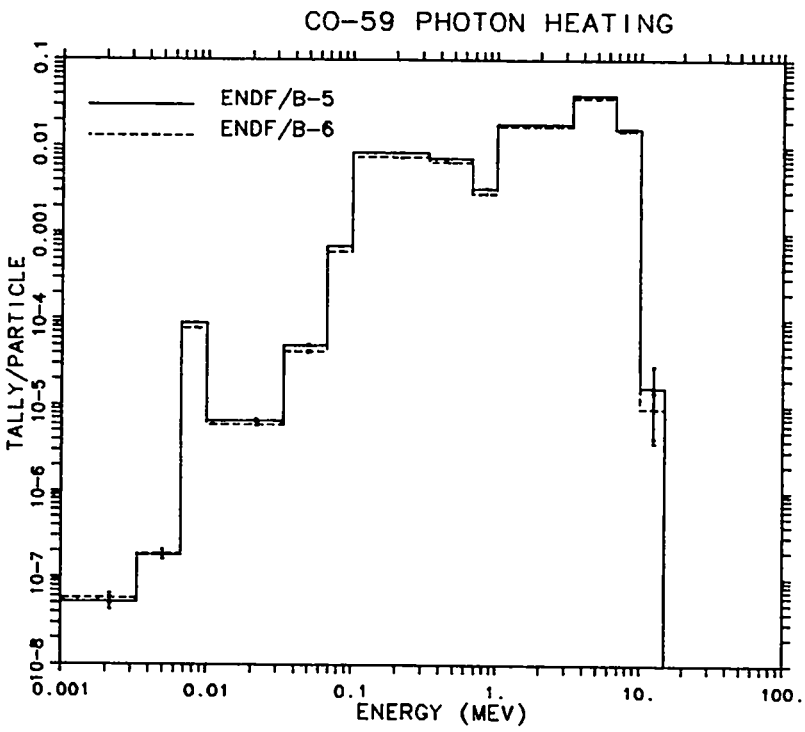

Fig. 124. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{59}Co sphere.

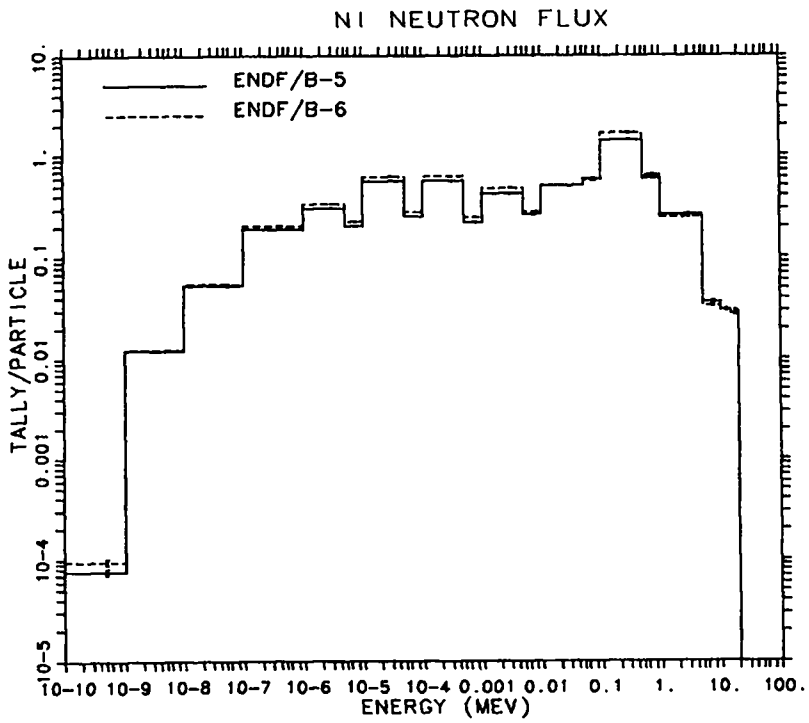

Fig. 125. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated neutron flux for a 10000 cm radius nickel sphere. The atom percent of isotopic ENDF/B-VI was: ^{58}Ni–68.27%, ^{60}Ni–26.1%, ^{61}Ni–1.13%, ^{62}Ni–3.59%, and ^{64}Ni–0.91%.

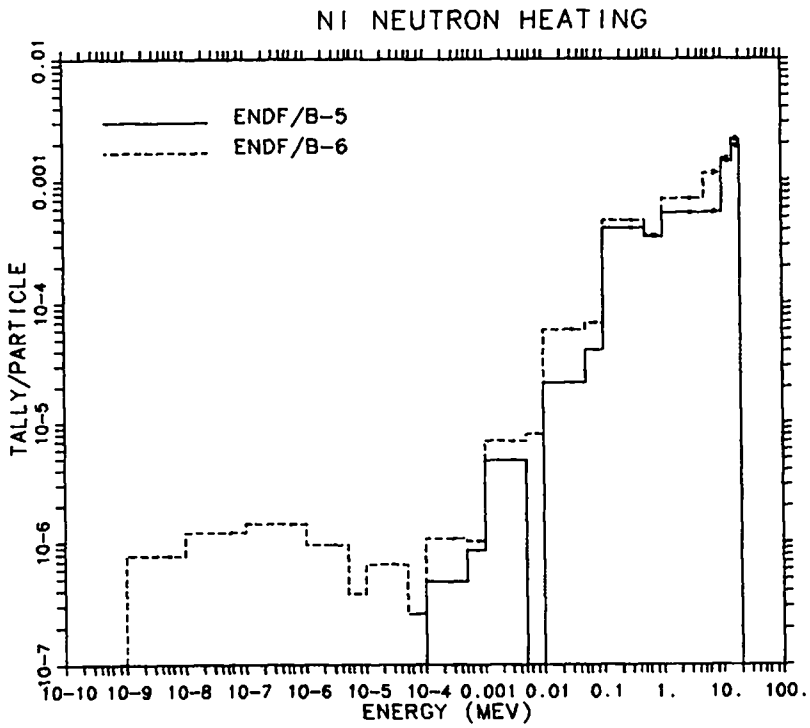

Fig. 126. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated neutron heating for the nickel sphere.

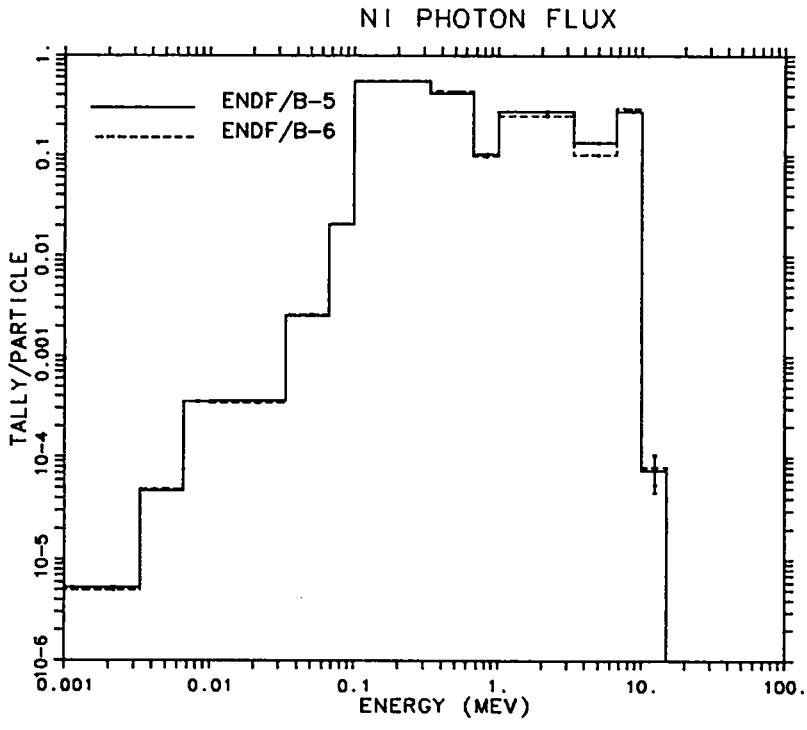

Fig. 127. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated photon flux for the nickel sphere.

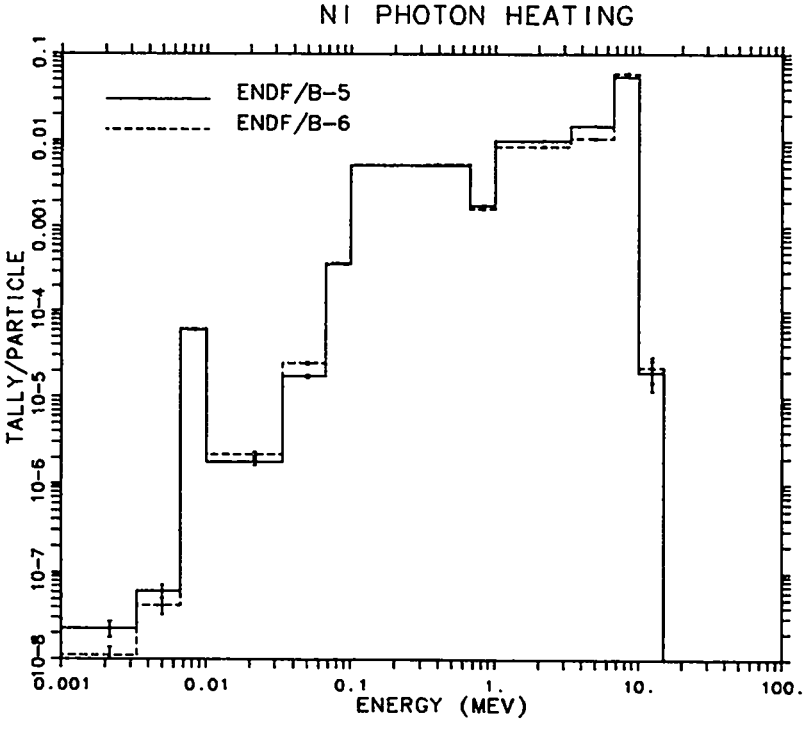

Fig. 128. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated photon heating for the nickel sphere.

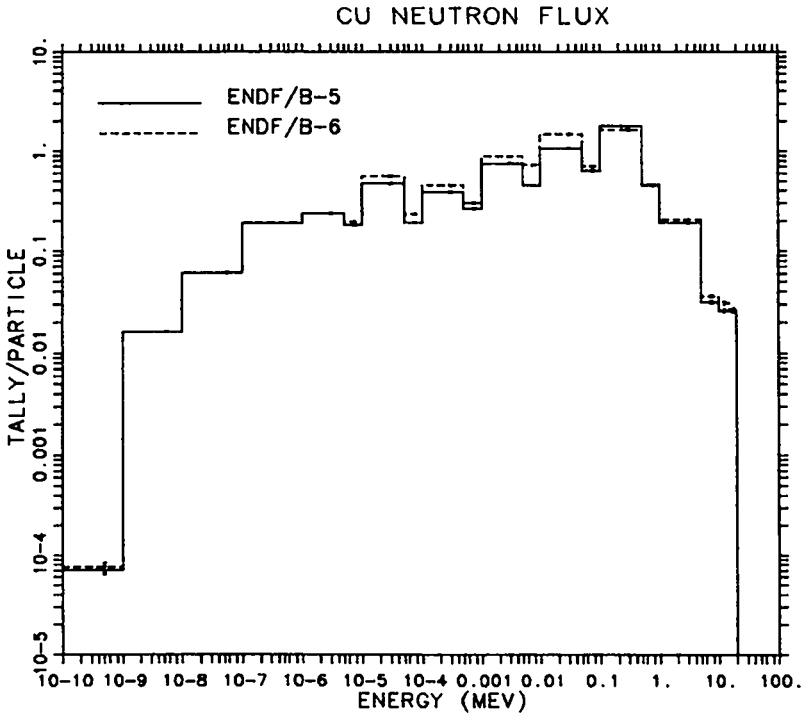

Fig. 129. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated neutron flux for a 10000 cm radius copper sphere. The atom percent of isotopic ENDF/B-VI was: ^{63}Cu–69.17% and ^{65}Cu–30.83%.

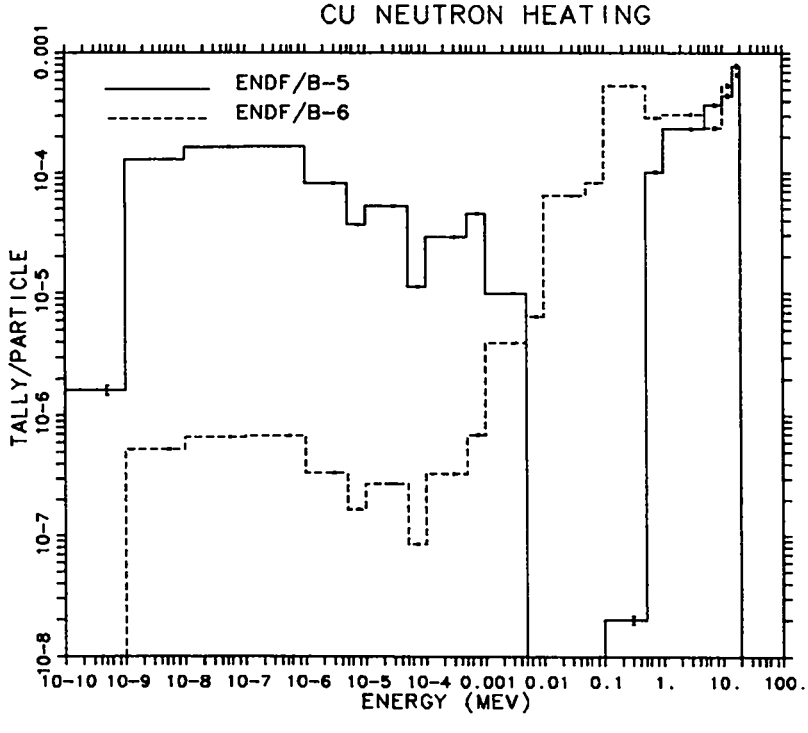

Fig. 130. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated neutron heating for the copper sphere.

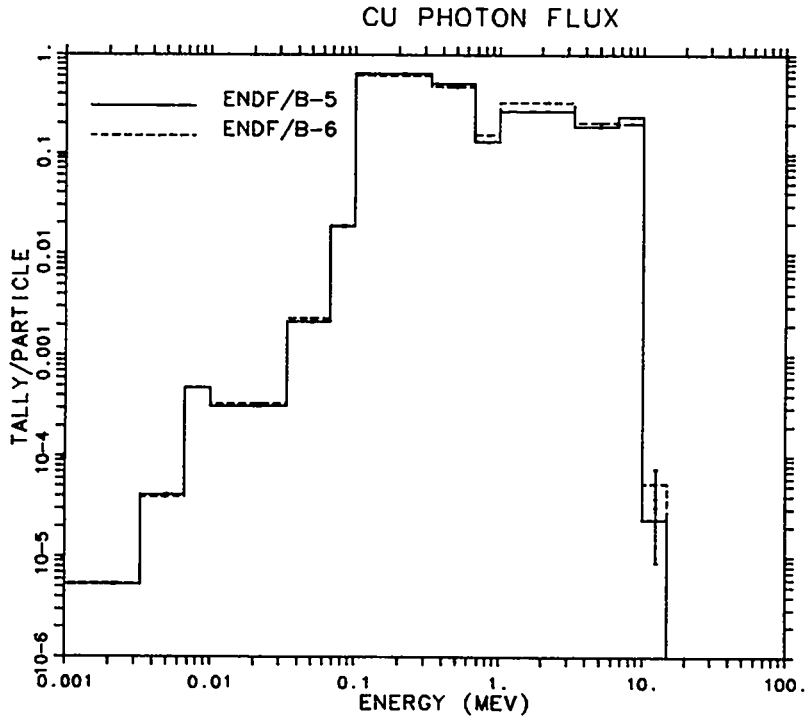

Fig. 131. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated photon flux for the copper sphere.

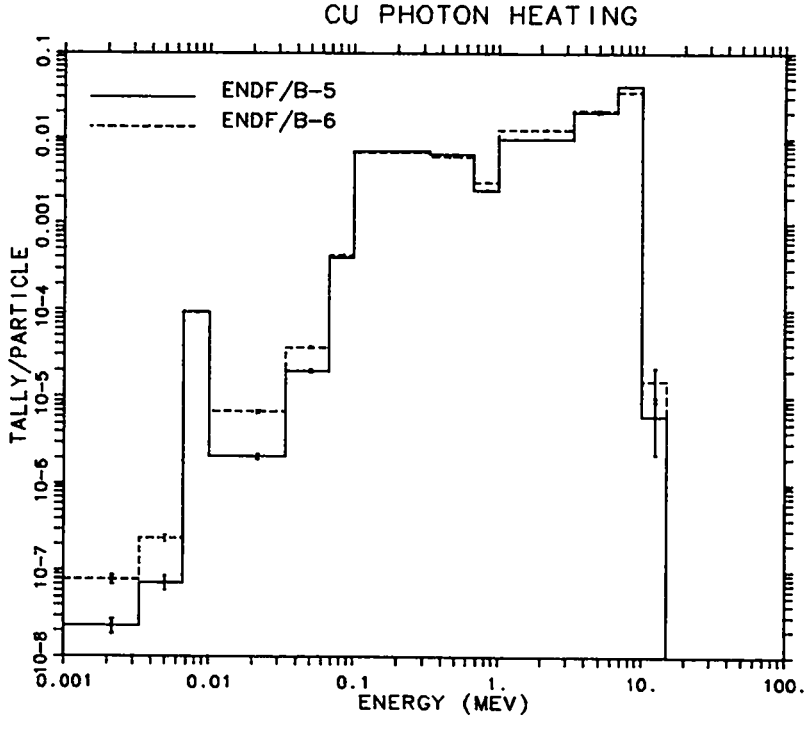

Fig. 132. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated photon heating for the copper sphere.

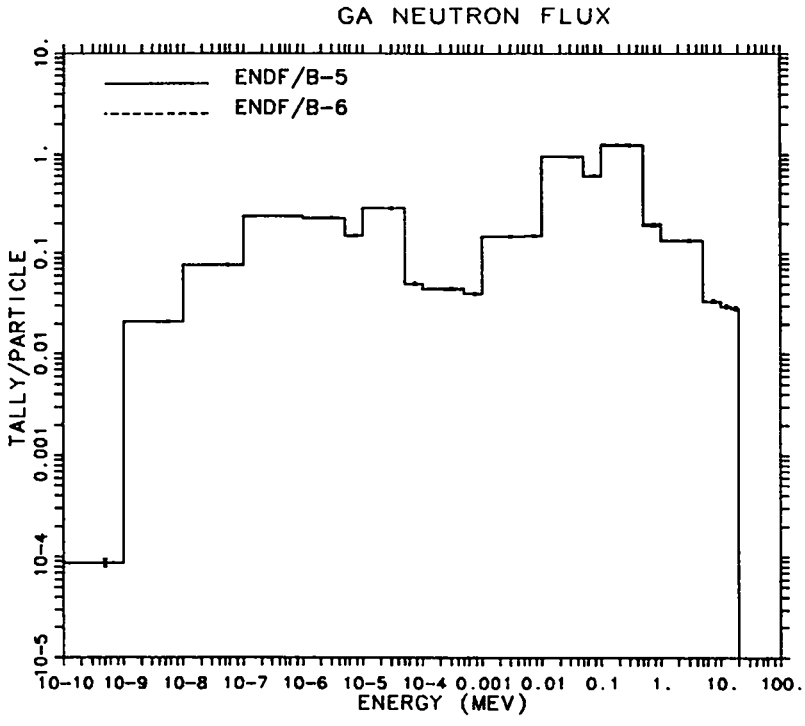

Fig. 133. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius gallium sphere.

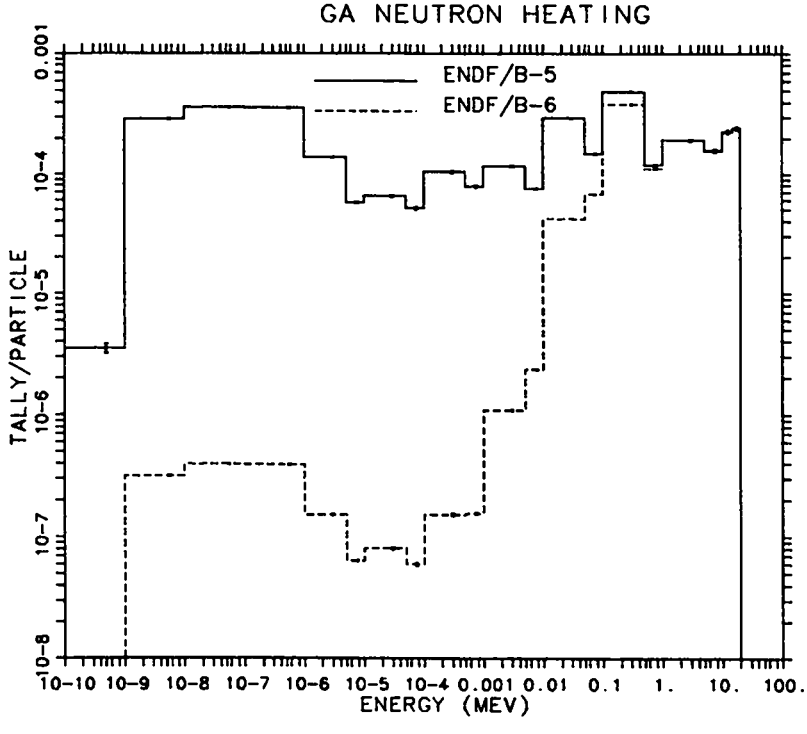

Fig. 134. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the gallium sphere.

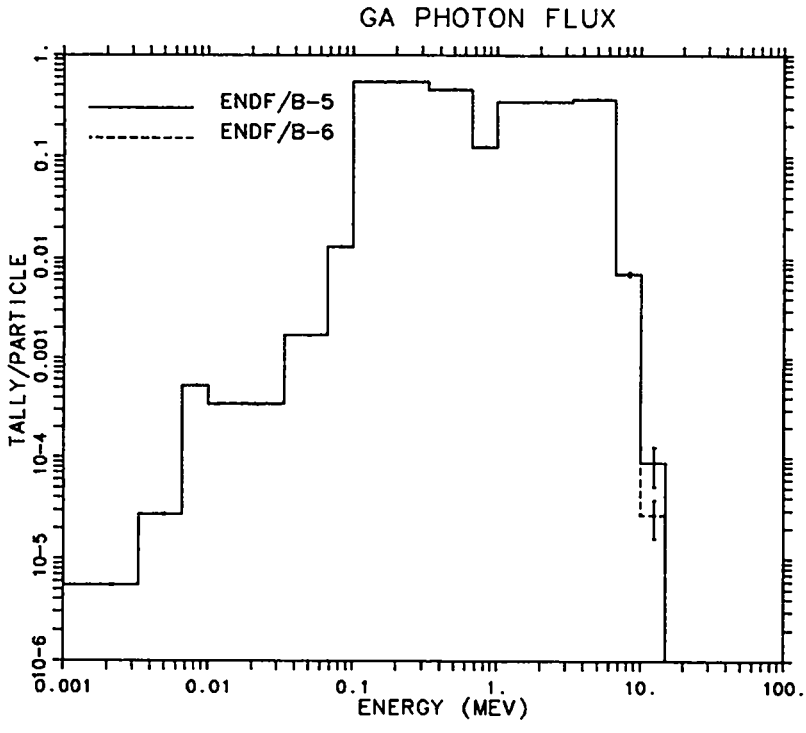

Fig. 135. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the gallium sphere.

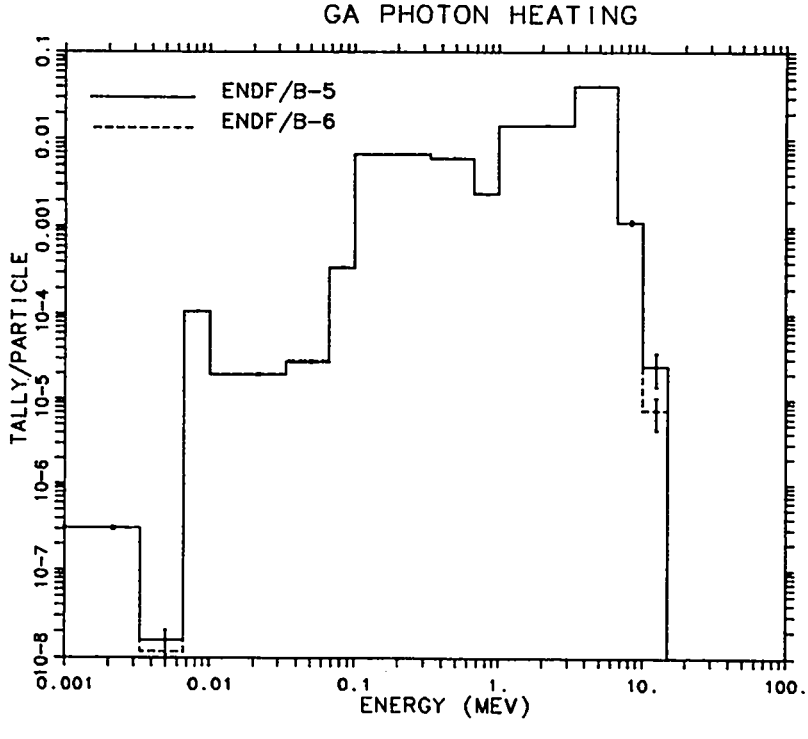

Fig. 136. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the gallium sphere.

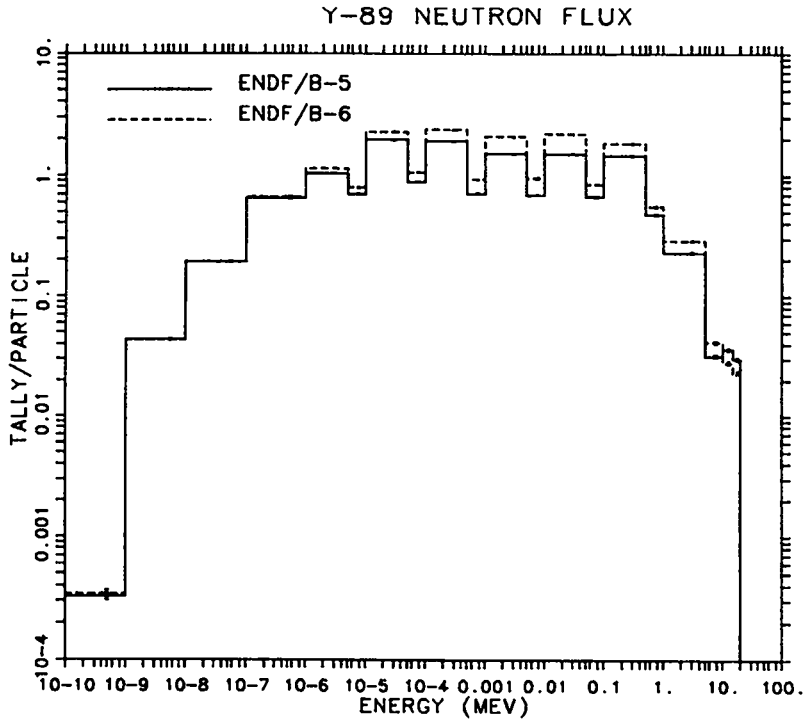

Fig. 137. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{89}Y sphere.

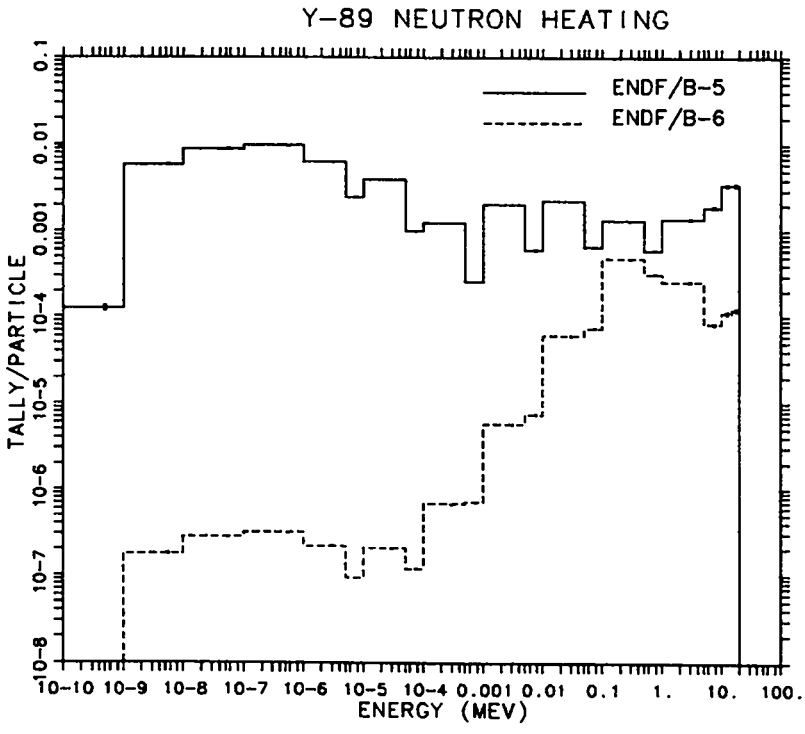

Fig. 138. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{89}Y sphere.

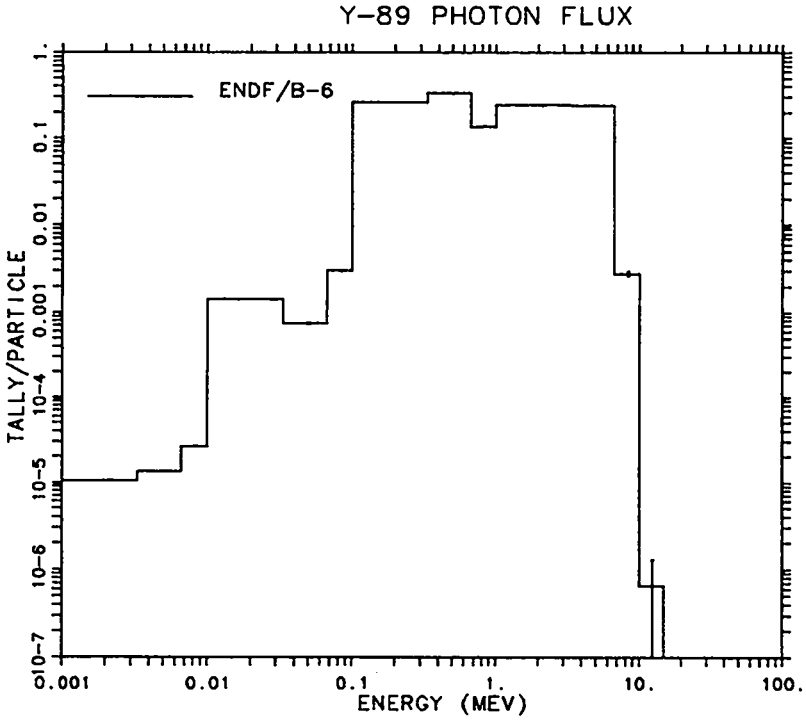

Fig. 139. Plot of ENDF/B-VI calculated photon flux for the ^{89}Y sphere.

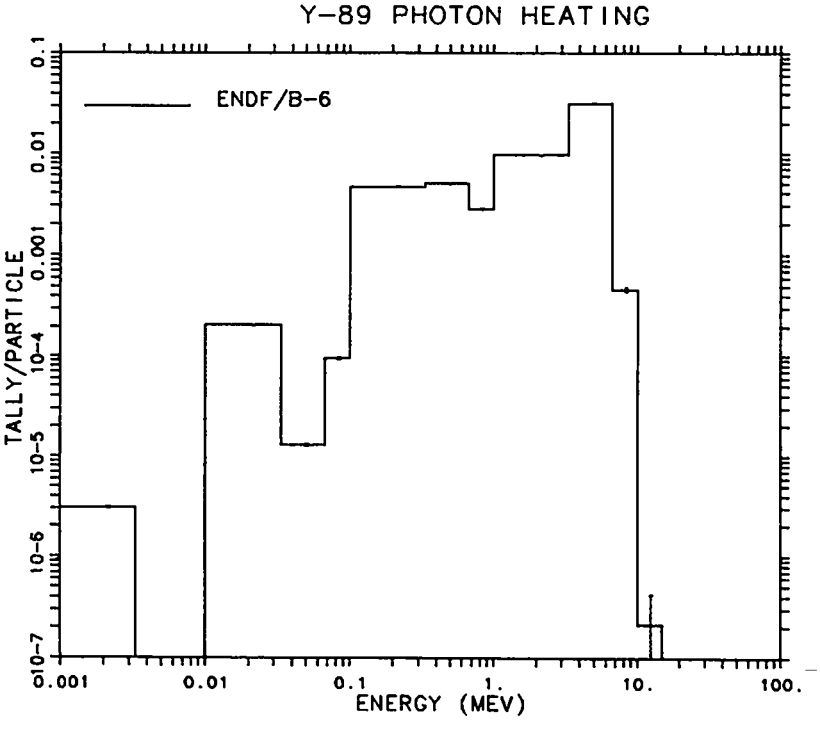

Fig. 140. Plot of ENDF/B-VI calculated photon heating for the ^{89}Y sphere.

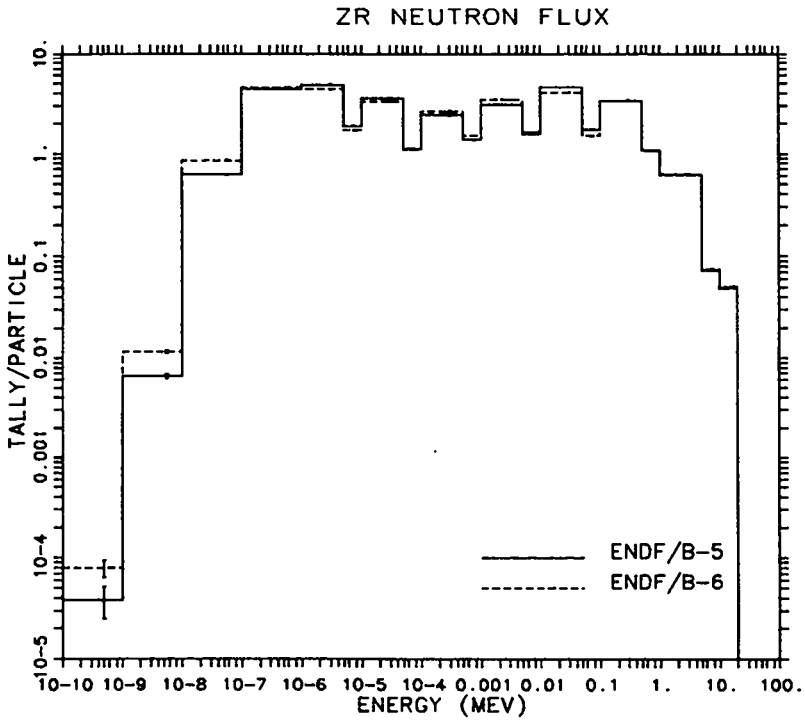

Fig. 141. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius zirconium sphere.

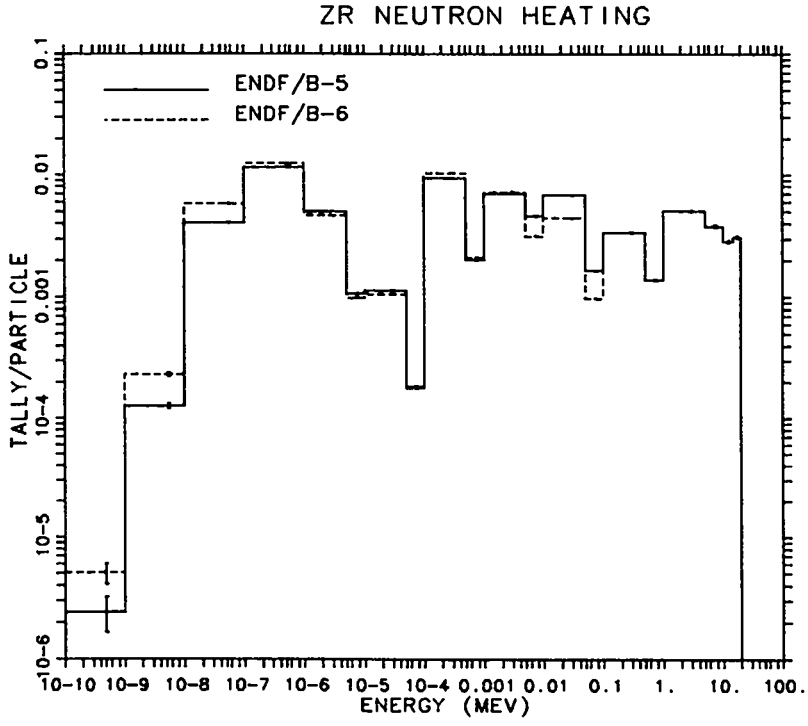

Fig. 142. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the zirconium sphere.

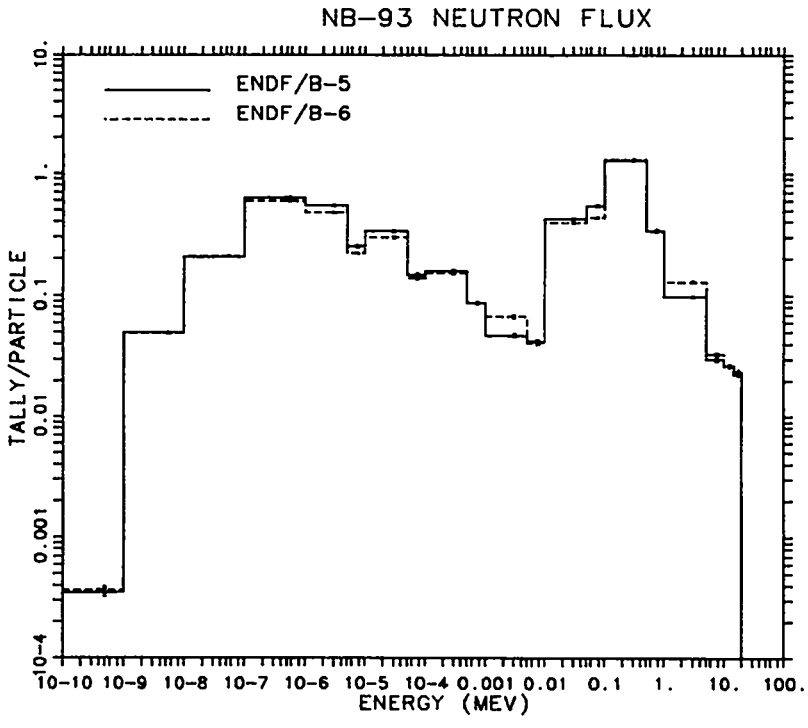

Fig. 143. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{93}Nb sphere.

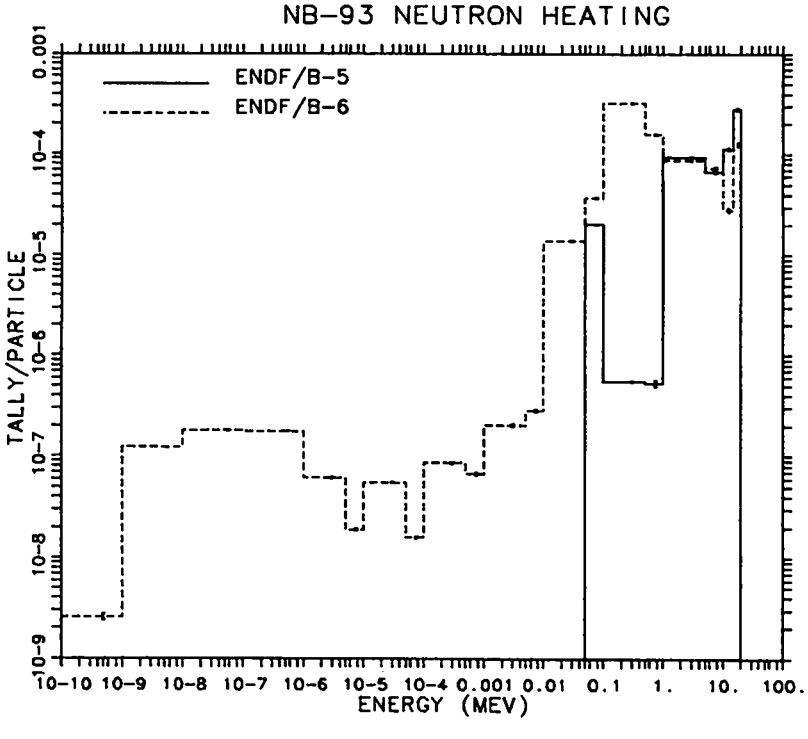

Fig. 144. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{93}Nb sphere.

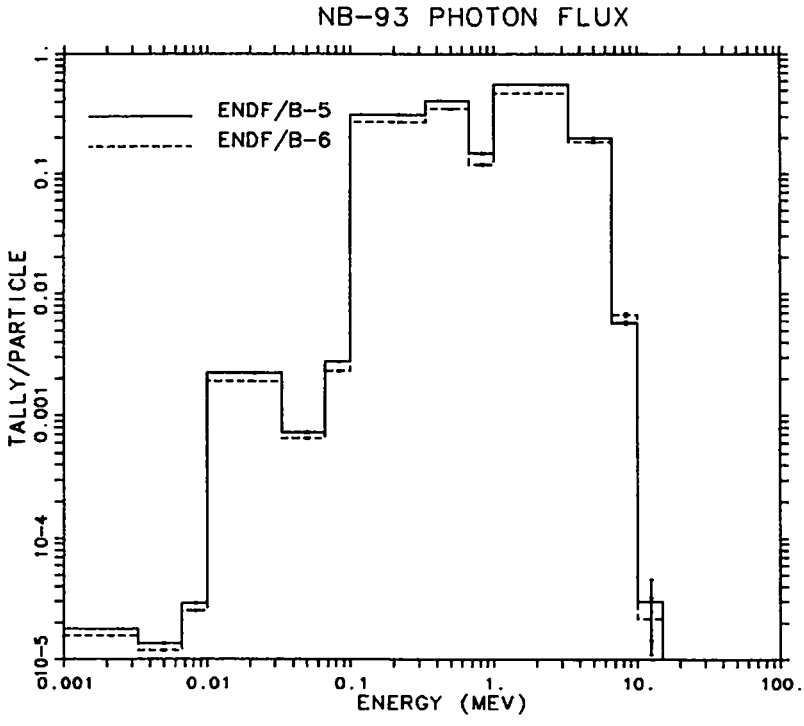

Fig. 145. Plot of ENDF/B-VI calculated photon flux for the ^{93}Nb sphere.

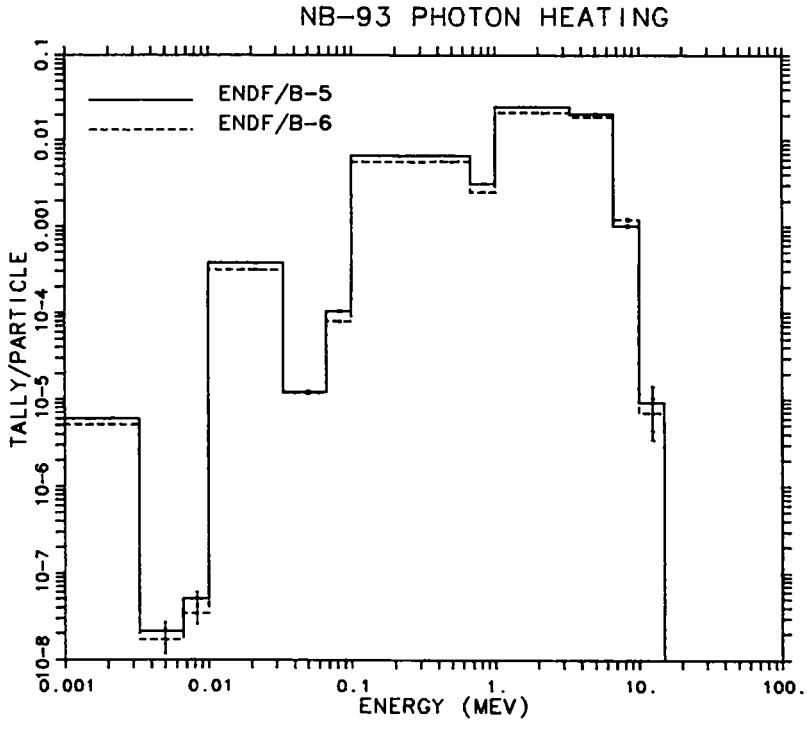

Fig. 146. Plot of ENDF/B-VI calculated photon heating for the ^{93}Nb sphere.

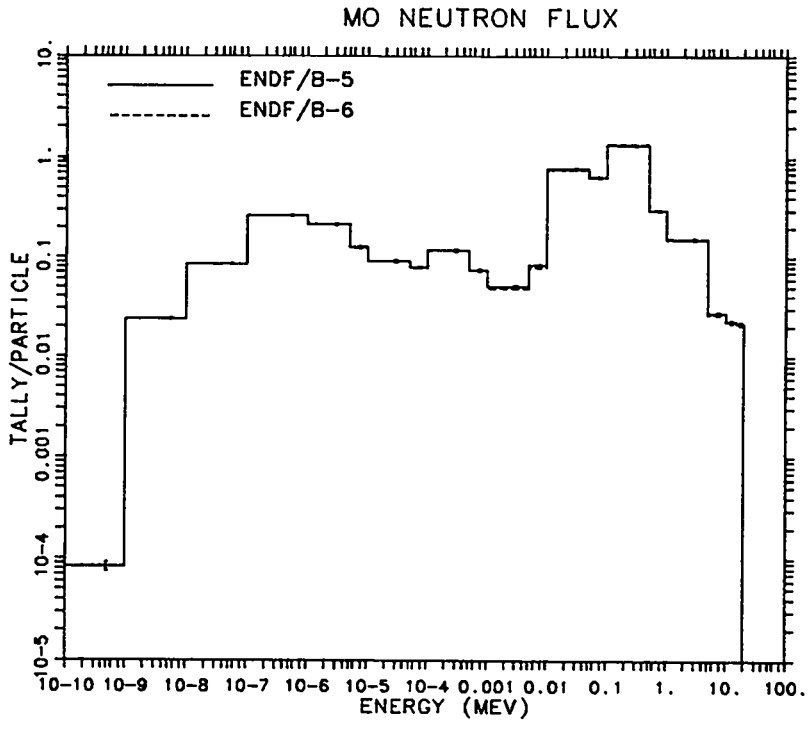

Fig. 147. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius molybdenum sphere.

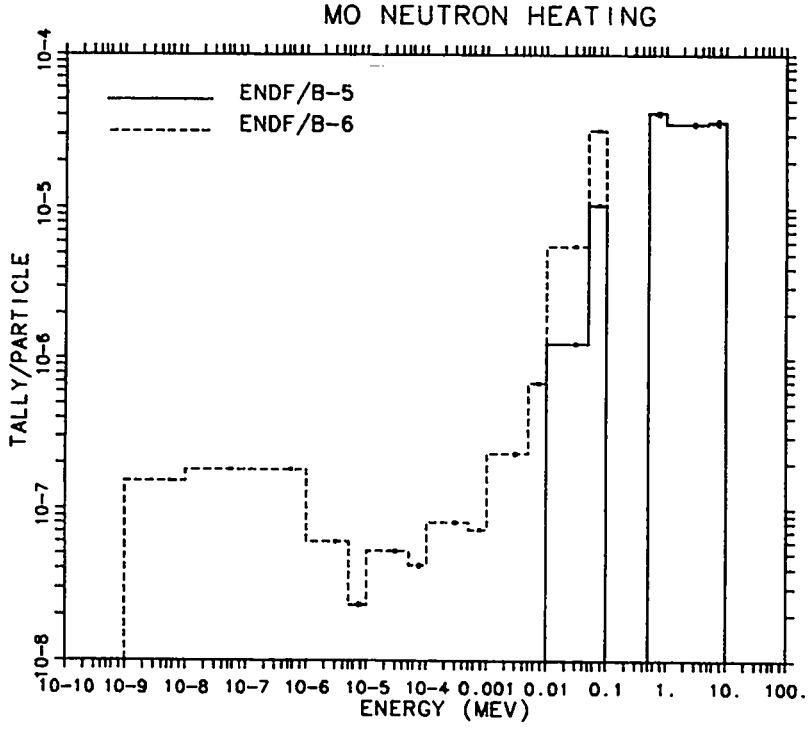

Fig. 148. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the molybdenum sphere.

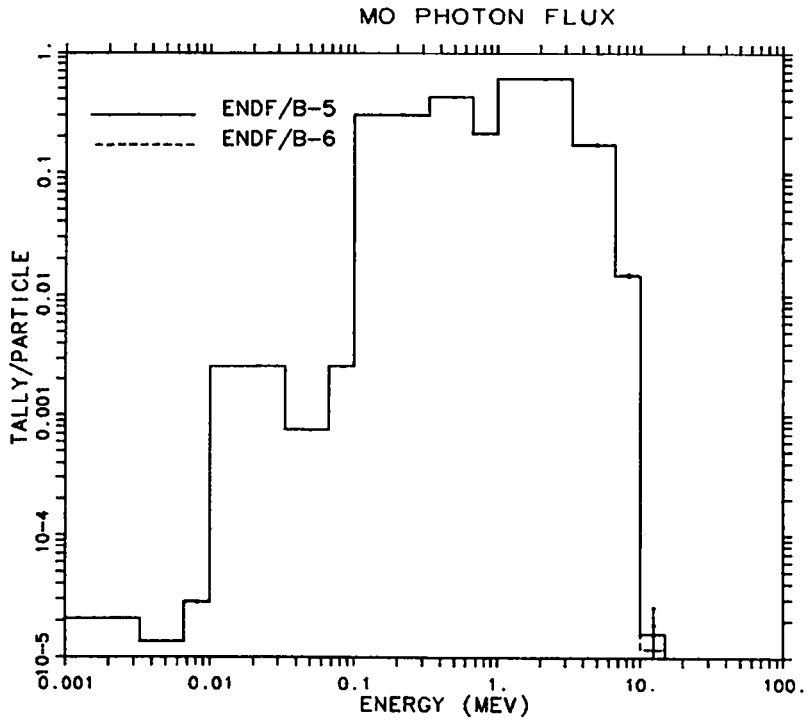

Fig. 149. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the molybdenum sphere.

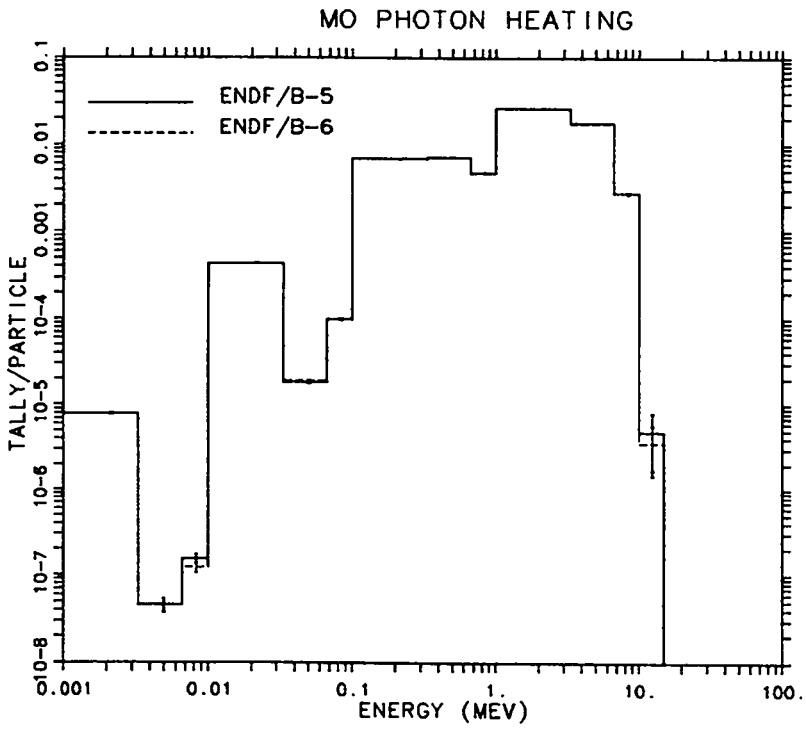

Fig. 150. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the molybdenum sphere.

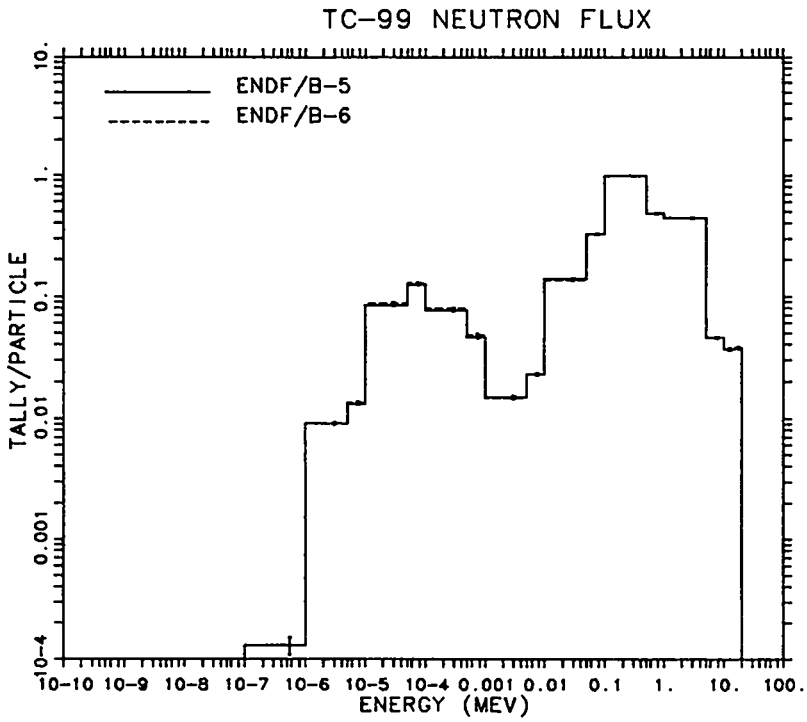

Fig. 151. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{99}Tc sphere. The ENDF/B-V evaluation is not the recommended evaluation for this isotope. The MCNP library does not contain a recommended evaluation for this isotope.

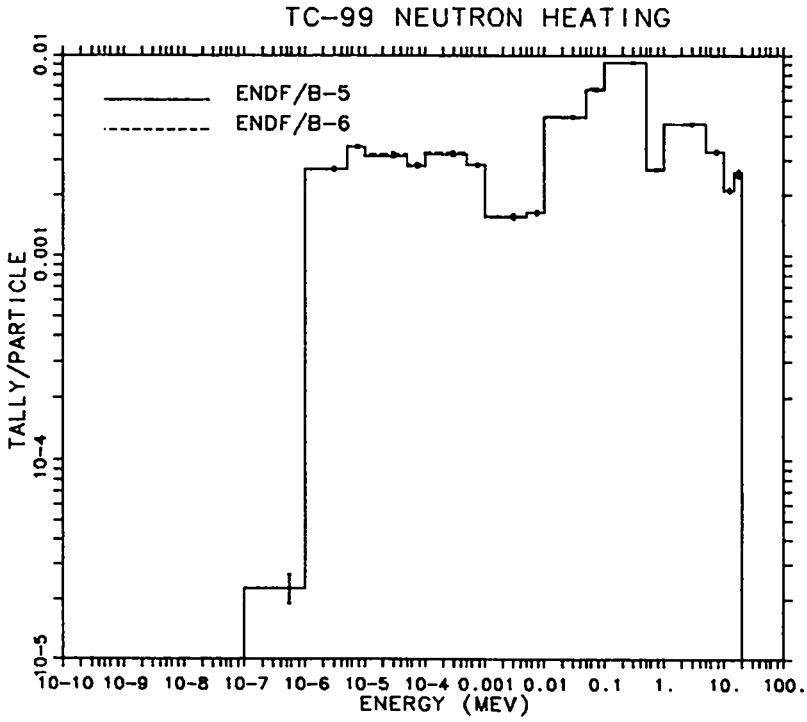

Fig. 152. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{99}Tc sphere. The ENDF/B-V evaluation is not the recommended evaluation for this isotope. The MCNP library does not contain a recommended evaluation for this isotope.

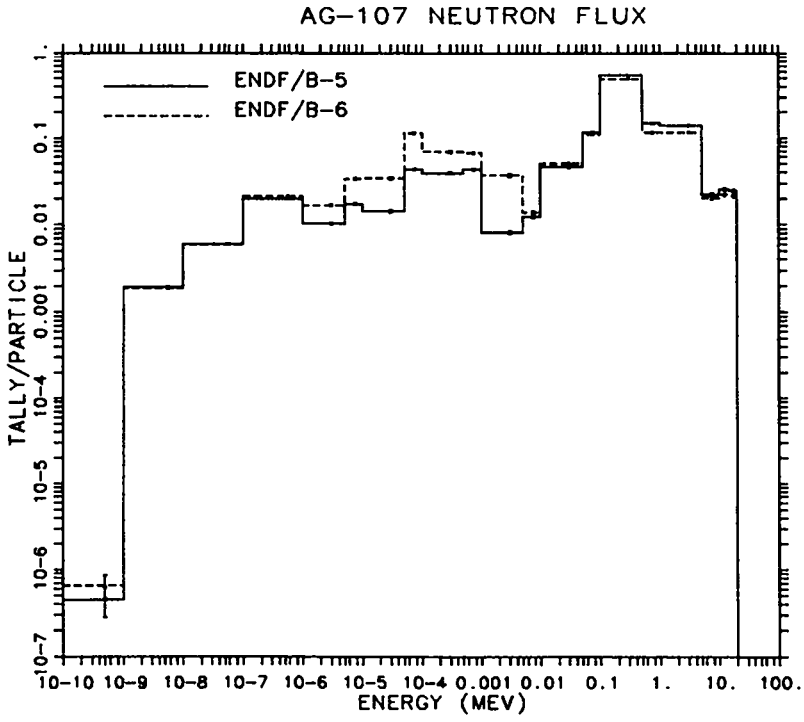

Fig. 153. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{107}Ag sphere.

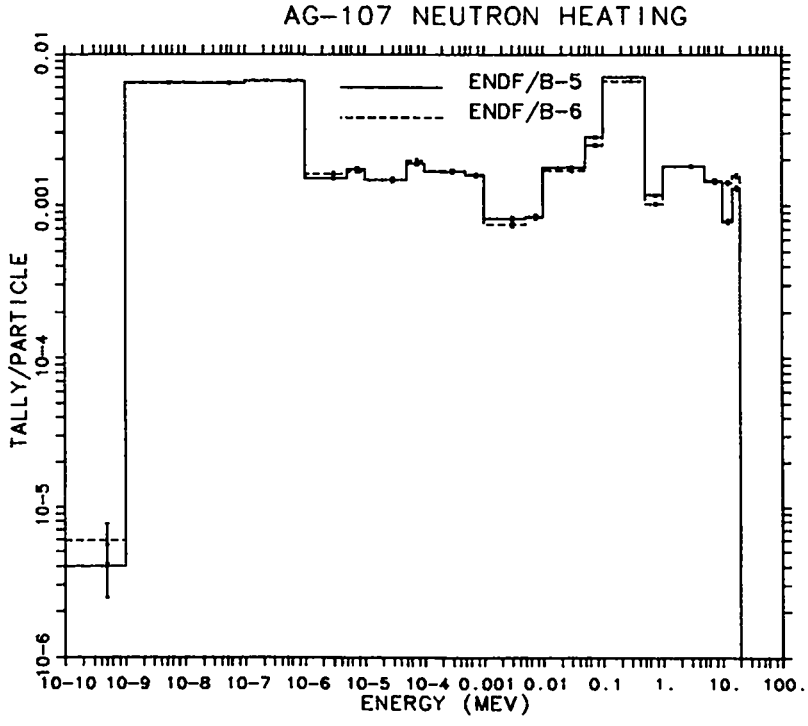

Fig. 154. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{107}Ag sphere.

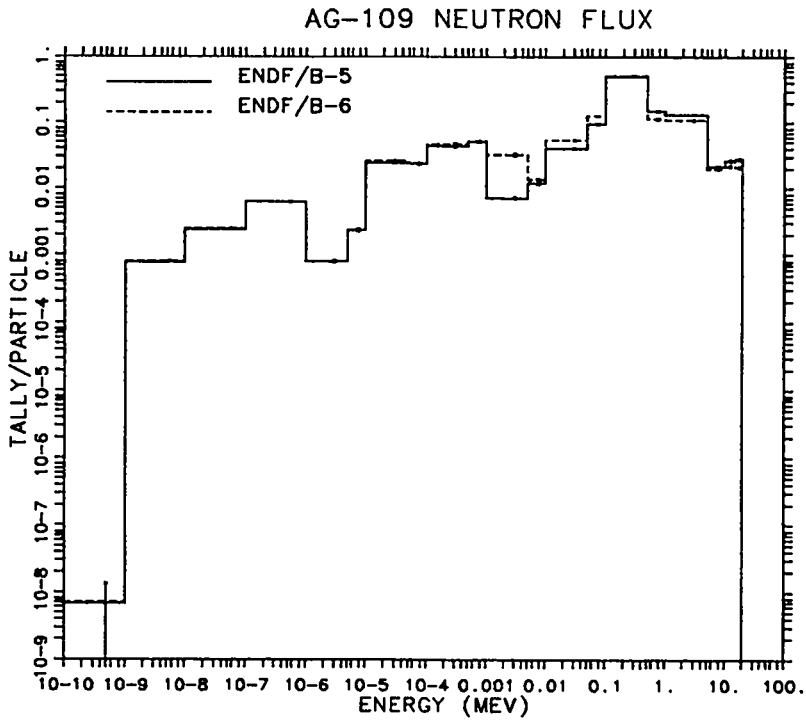

Fig. 155. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{109}Ag sphere.

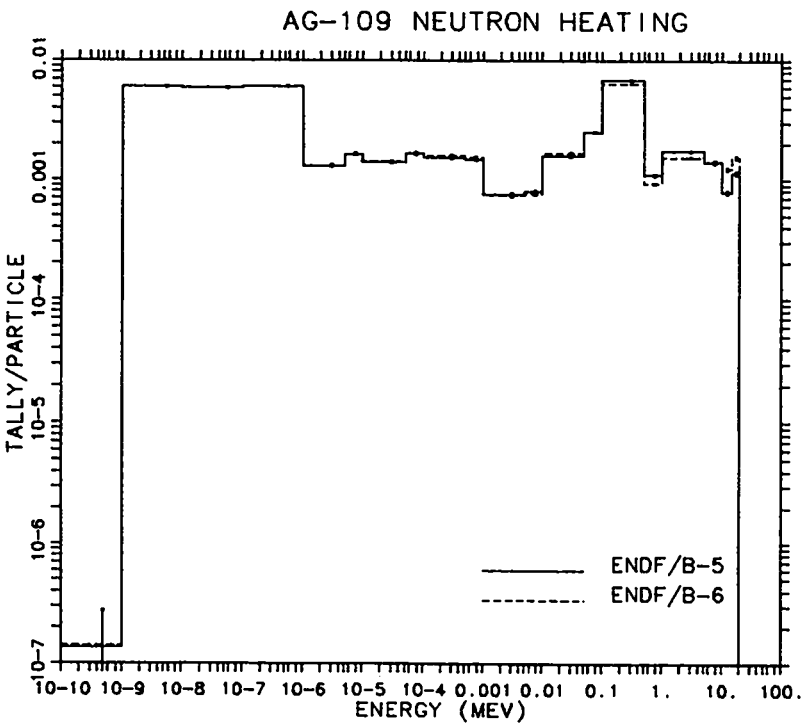

Fig. 156. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{109}Ag sphere.

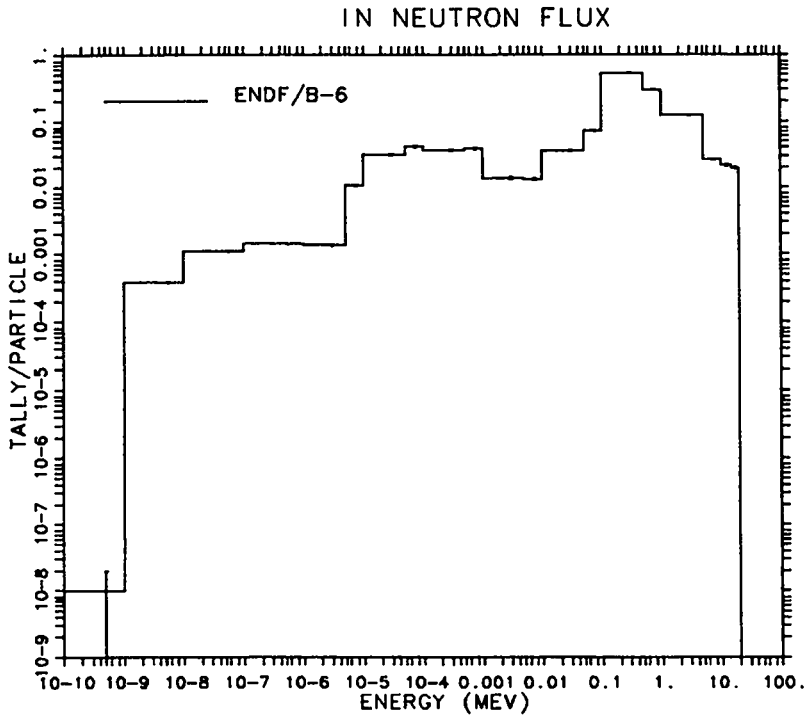

Fig. 157. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius indium sphere.

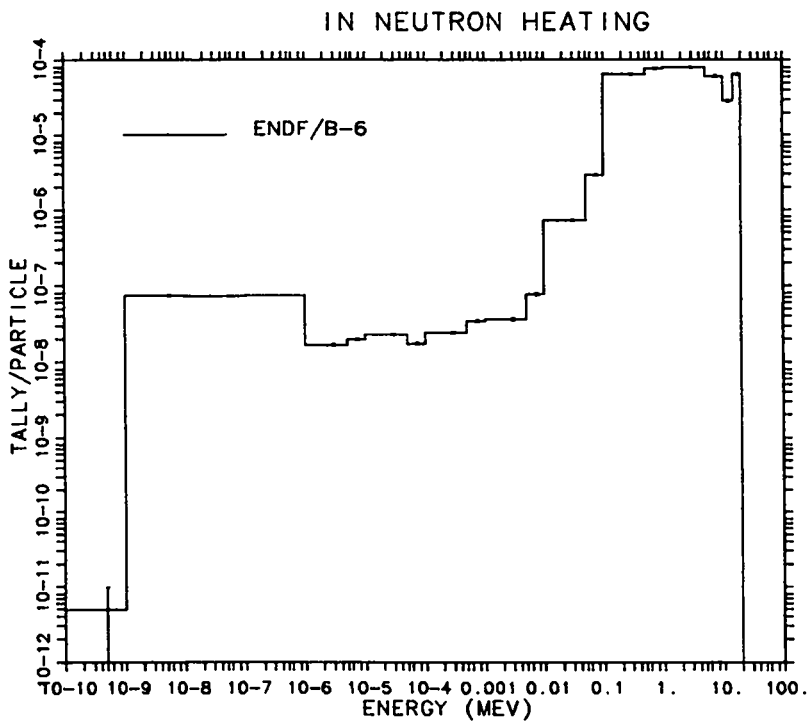

Fig. 158. Plot of ENDF/B-VI calculated neutron heating for the indium sphere.

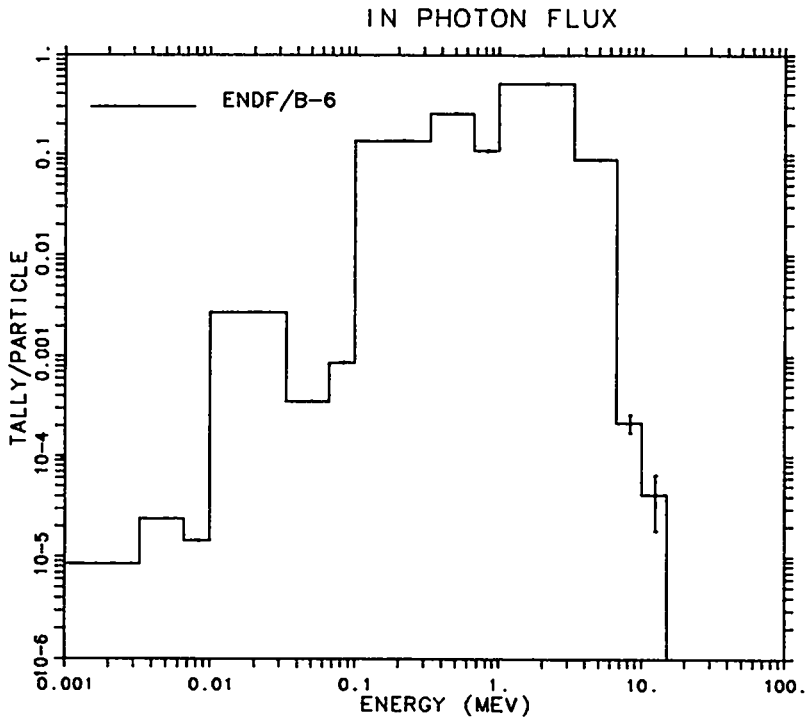

Fig. 159. Plot of ENDF/B-VI calculated photon flux for the indium sphere.

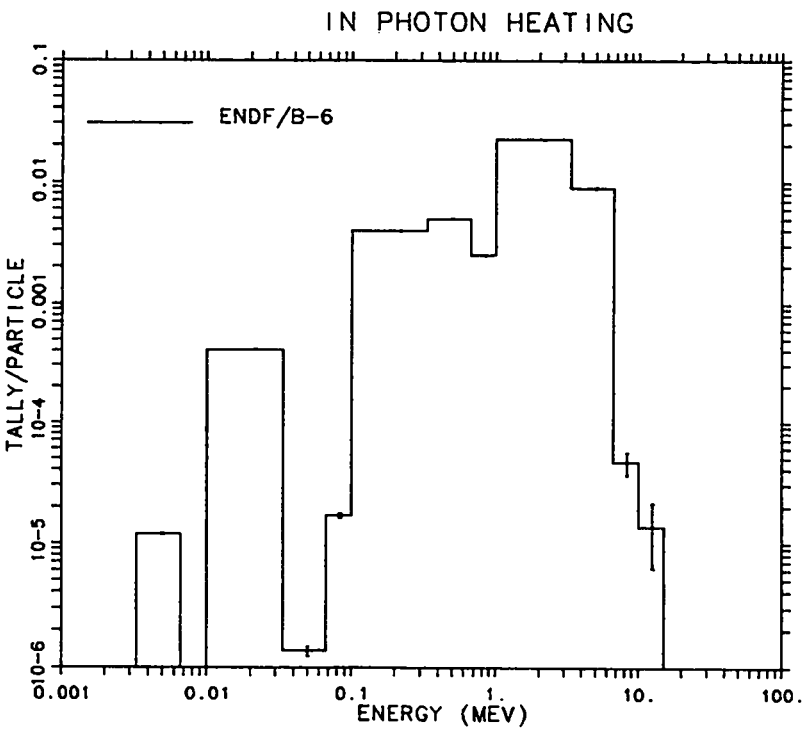

Fig. 160. Plot of ENDF/B-VI calculated photon heating for the indium sphere.

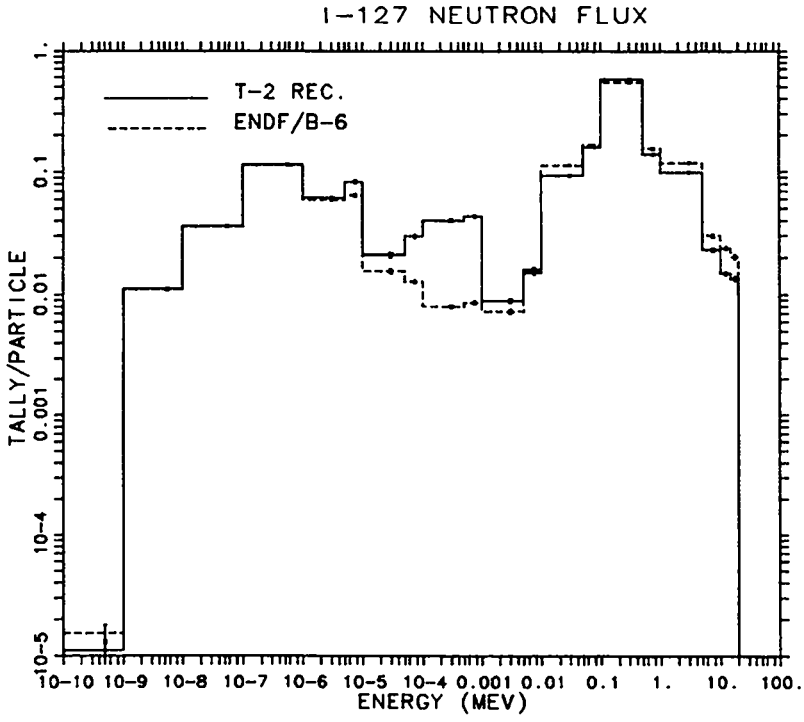

Fig. 161. Plot of a T-2 evaluation and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{127}I sphere. The T-2 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

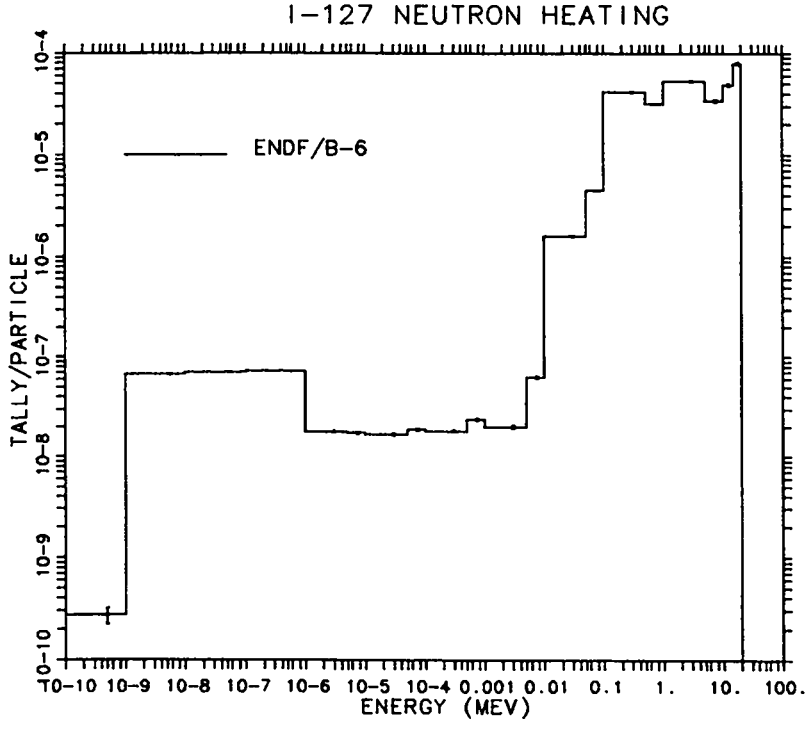

Fig. 162. Plot of ENDF/B-VI calculated neutron heating for the ^{127}I sphere.

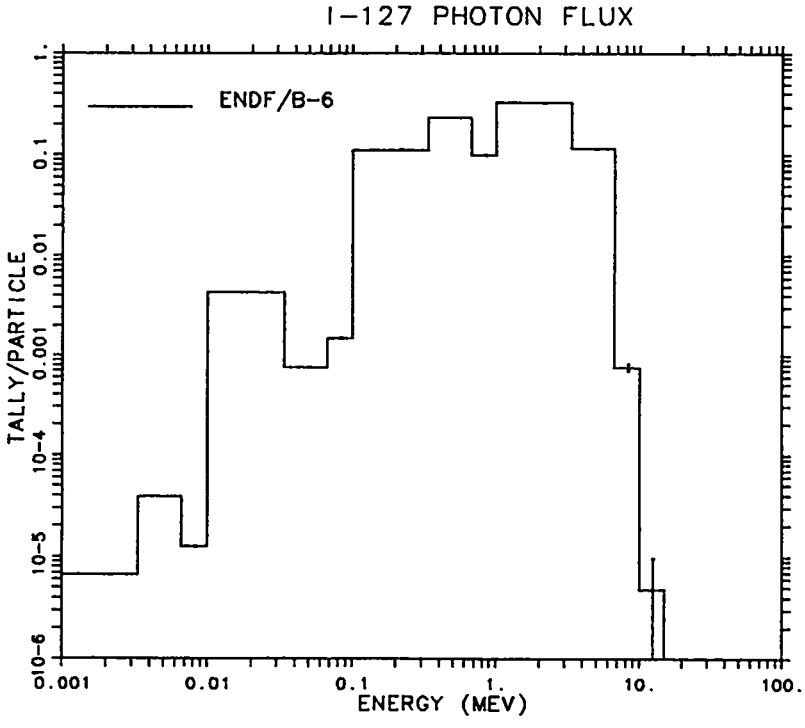

Fig. 163. Plot of ENDF/B-VI calculated photon flux for the ^{127}I sphere.

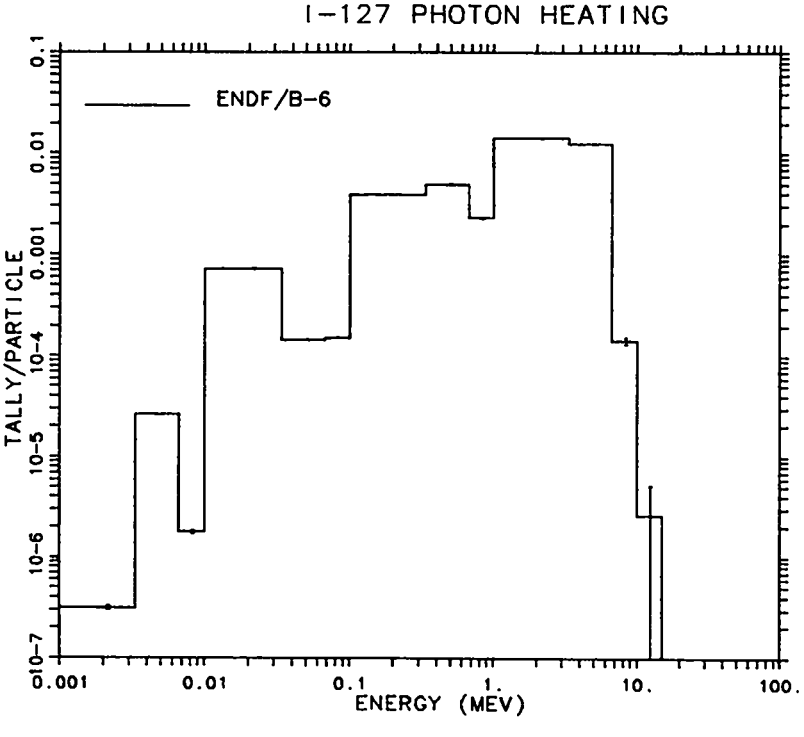

Fig. 164. Plot of ENDF/B-VI calculated photon heating for the ^{127}I sphere.

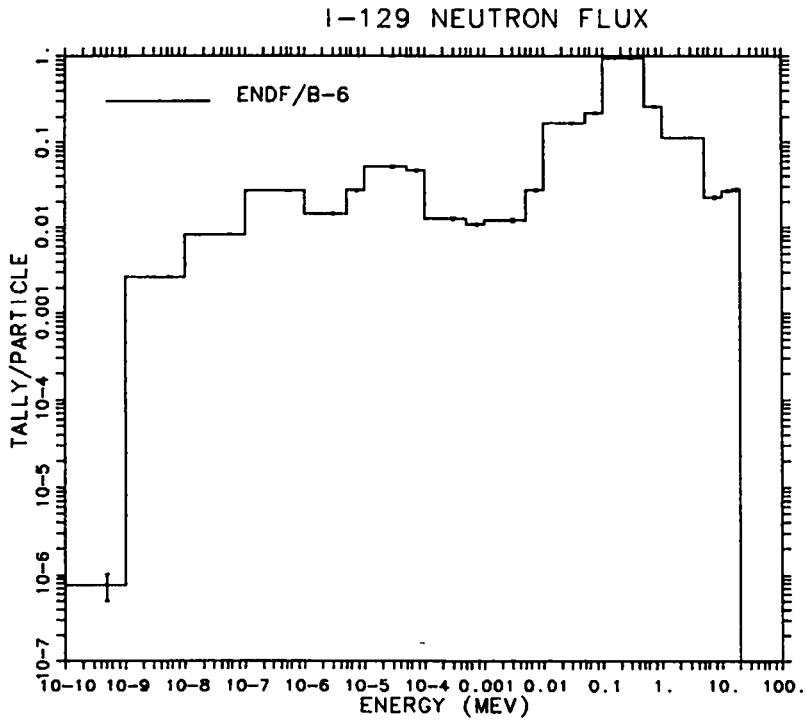

Fig. 165. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{129}I sphere.

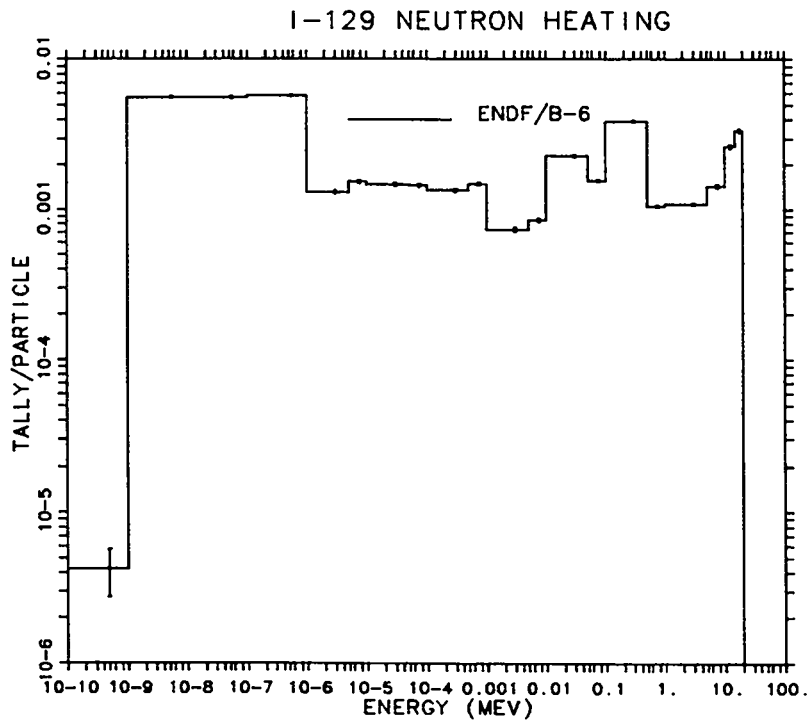

Fig. 166. Plot of ENDF/B-VI calculated neutron heating for the ^{129}I sphere.

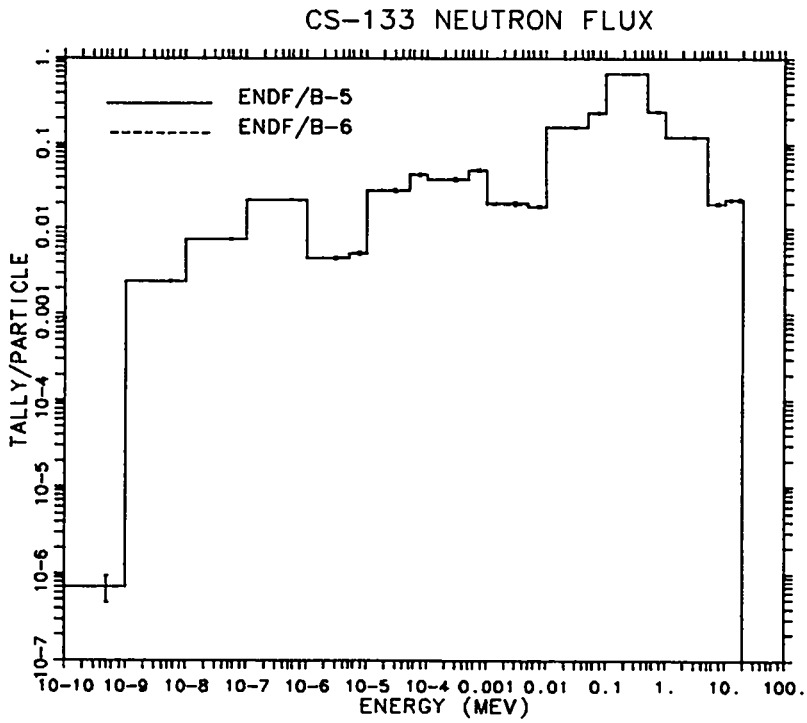

Fig. 167. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{133}Cs sphere.

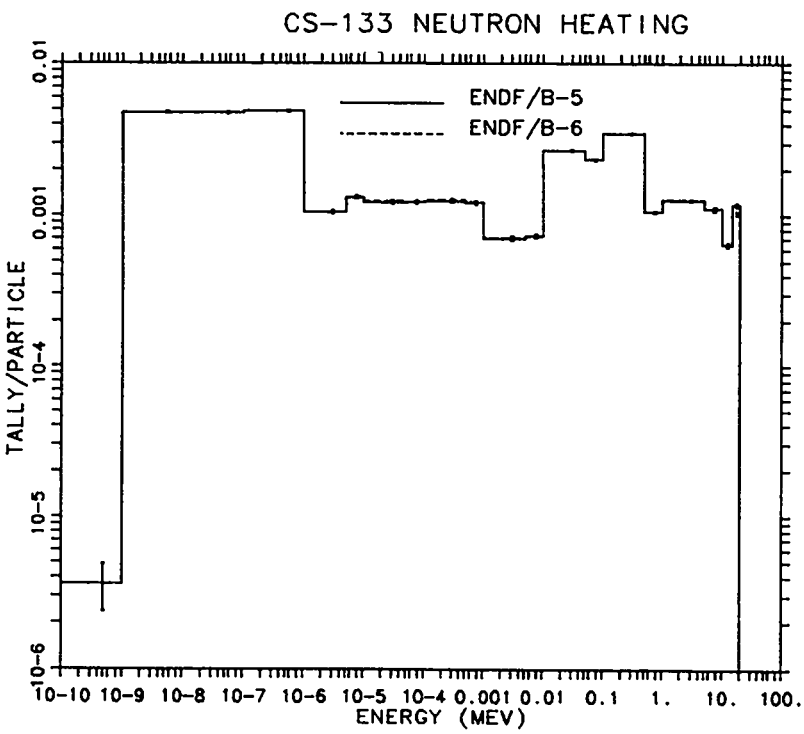

Fig. 168. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{133}Cs sphere.

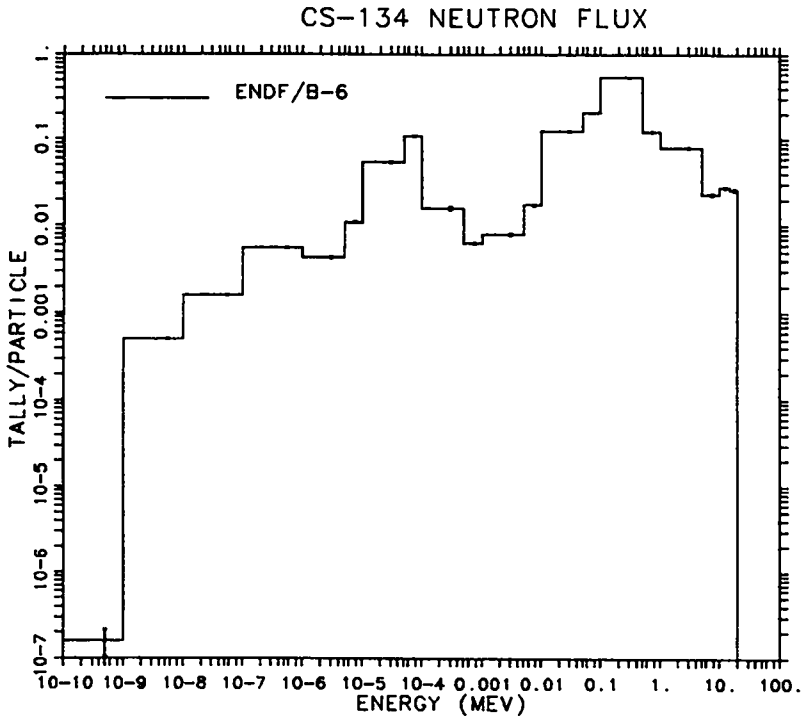

Fig. 169. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{134}Cs sphere.

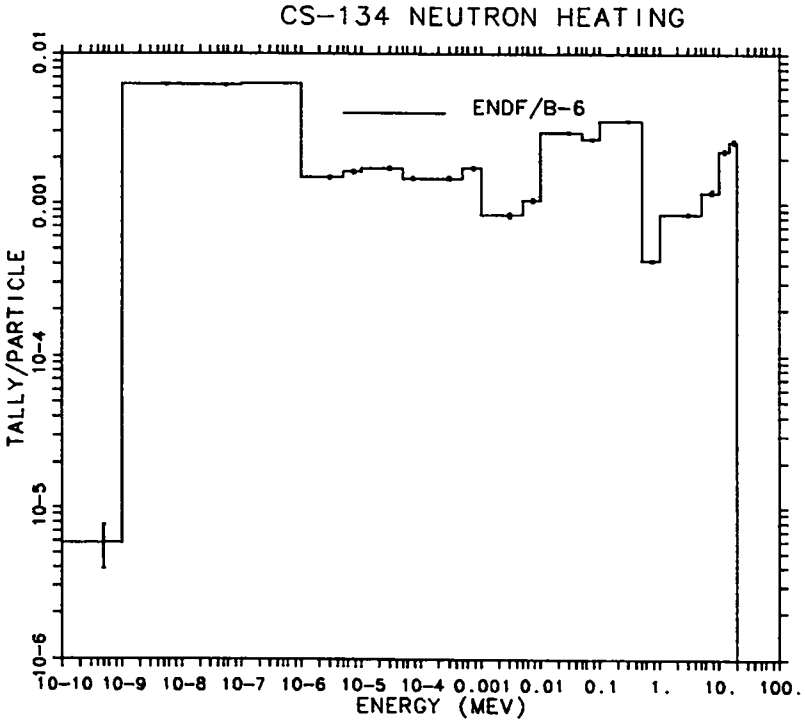

Fig. 170. Plot of ENDF/B-VI calculated neutron heating for the ^{134}Cs sphere.

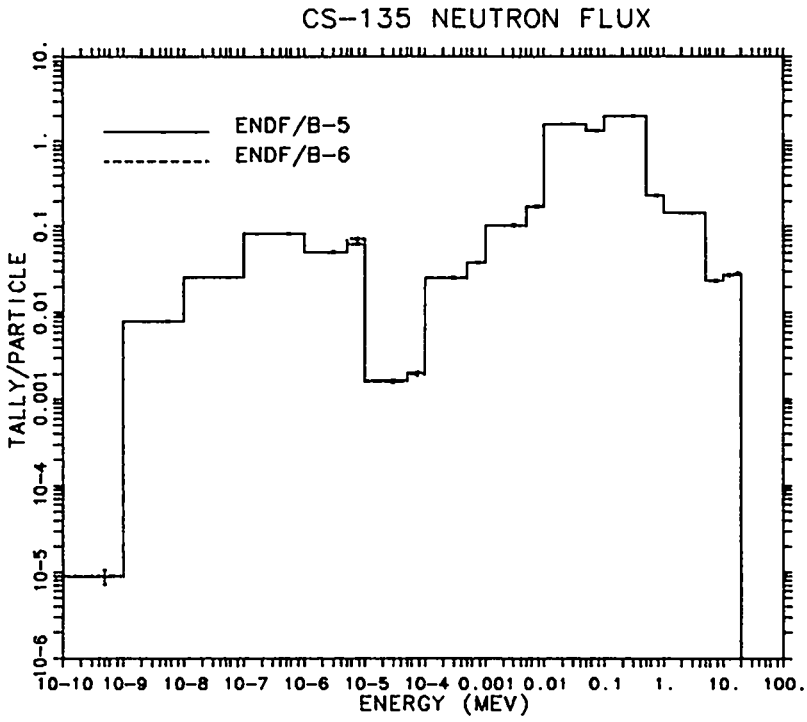

Fig. 171. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{135}Cs sphere. The ENDF/B-V evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

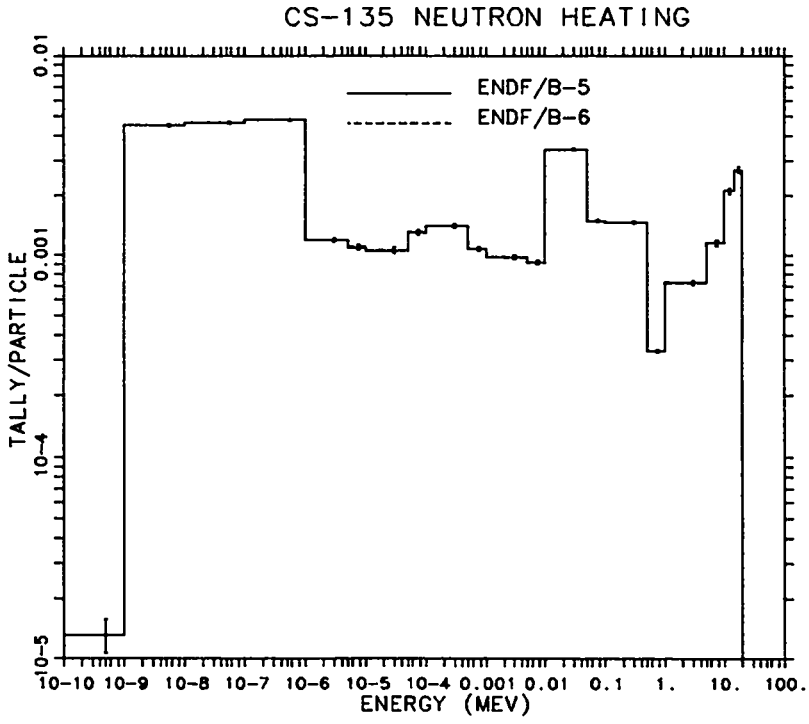

Fig. 172. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{135}Cs sphere. The ENDF/B-V evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

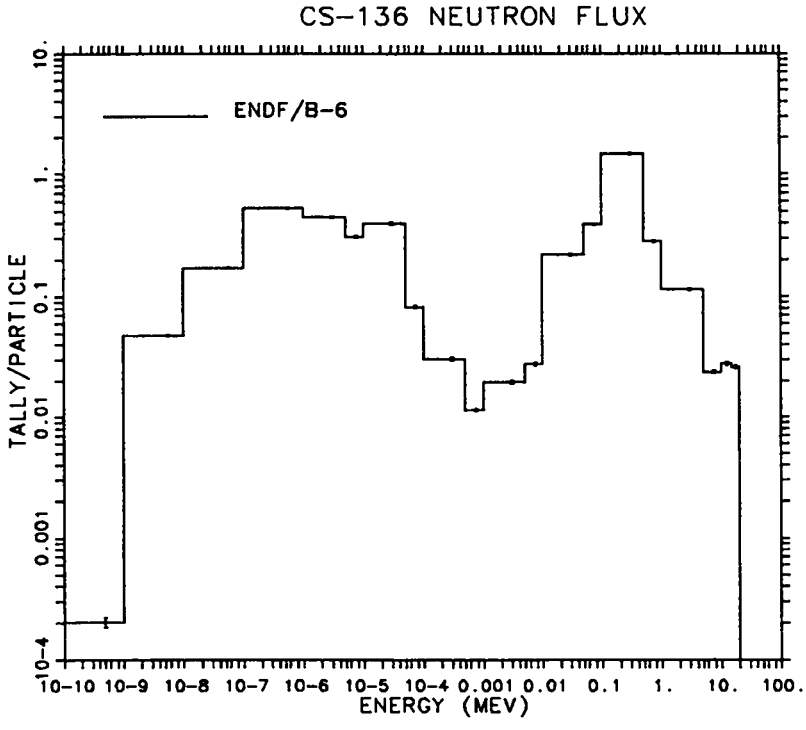

Fig. 173. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{136}Cs sphere.

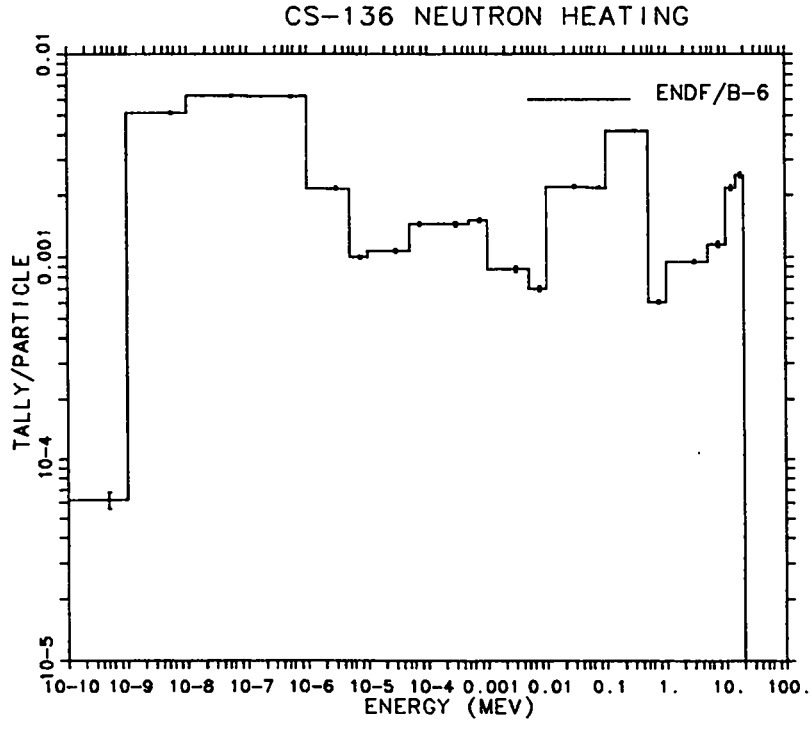

Fig. 174. Plot of ENDF/B-VI calculated neutron heating for the ^{136}Cs sphere.

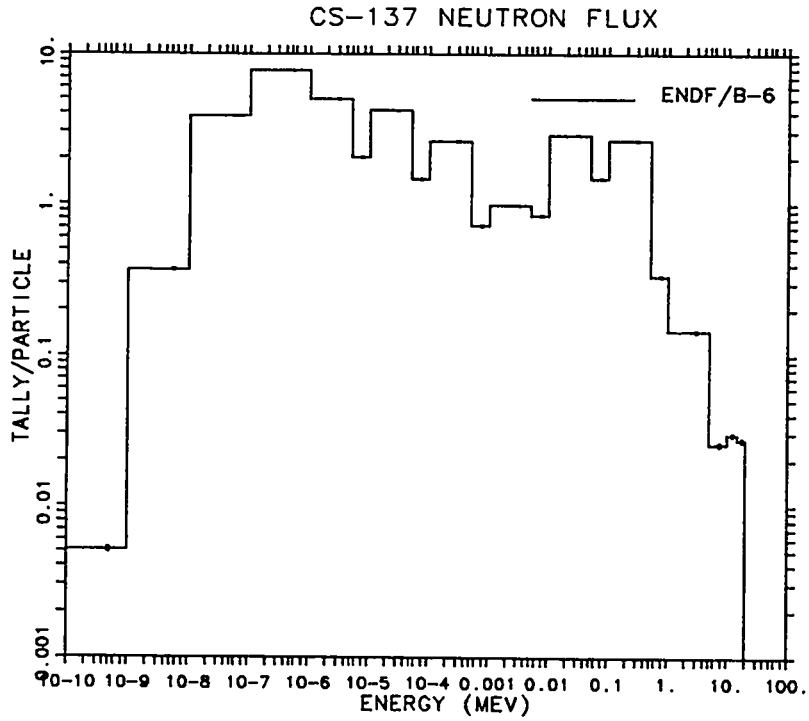

Fig. 175. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{137}Cs sphere.

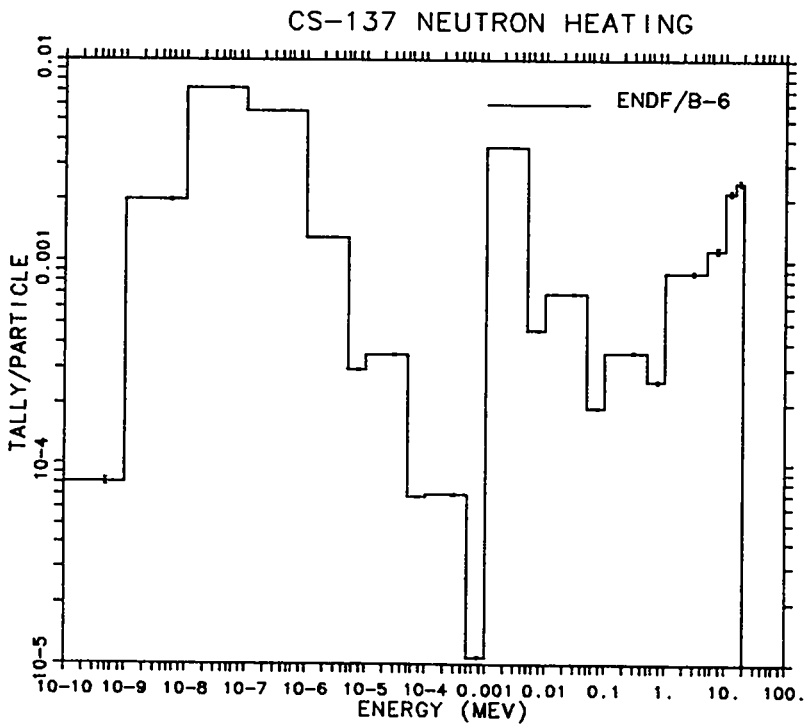

Fig. 176. Plot of ENDF/B-VI calculated neutron heating for the ^{137}Cs sphere.

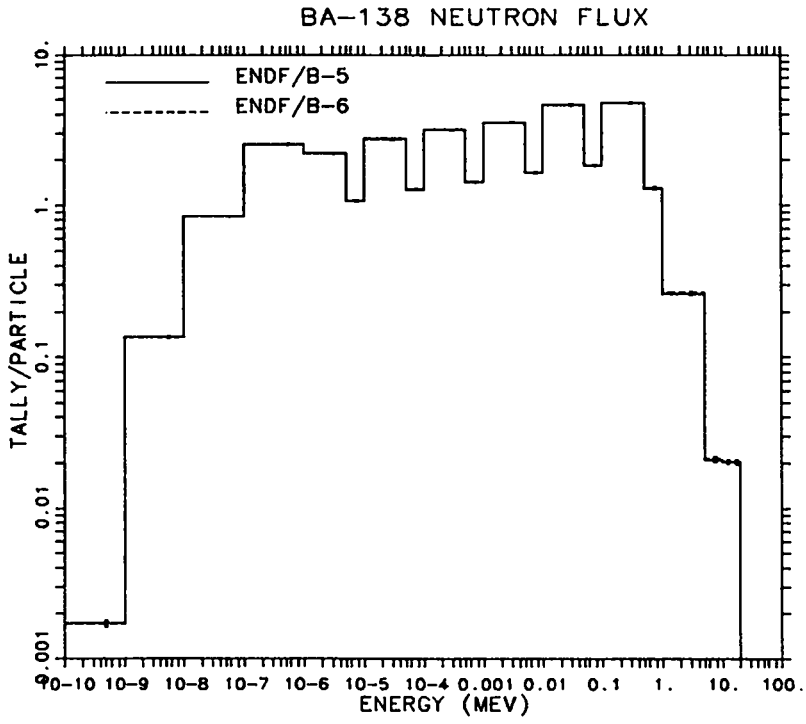

Fig. 177. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{138}Ba sphere.

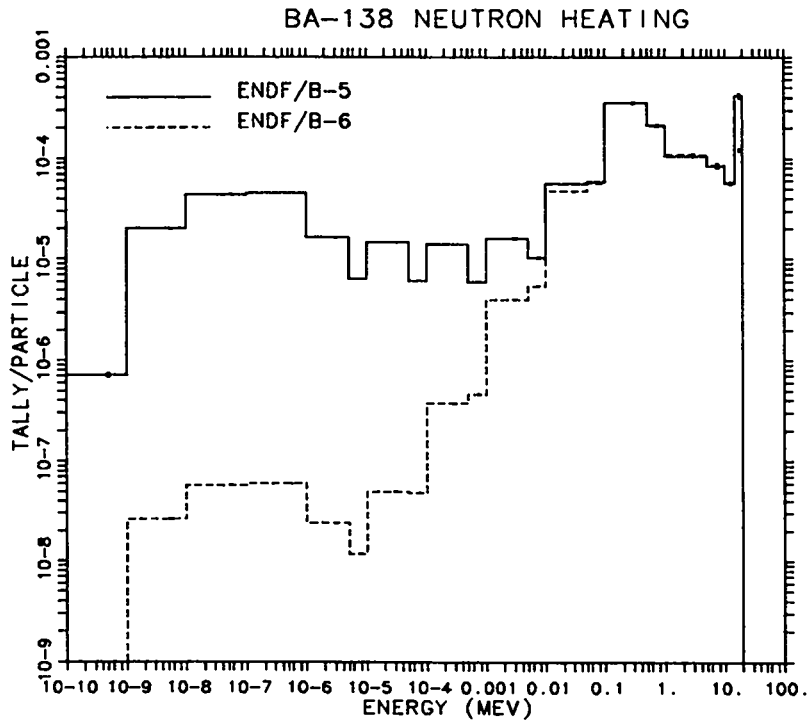

Fig. 178. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{138}Ba sphere.

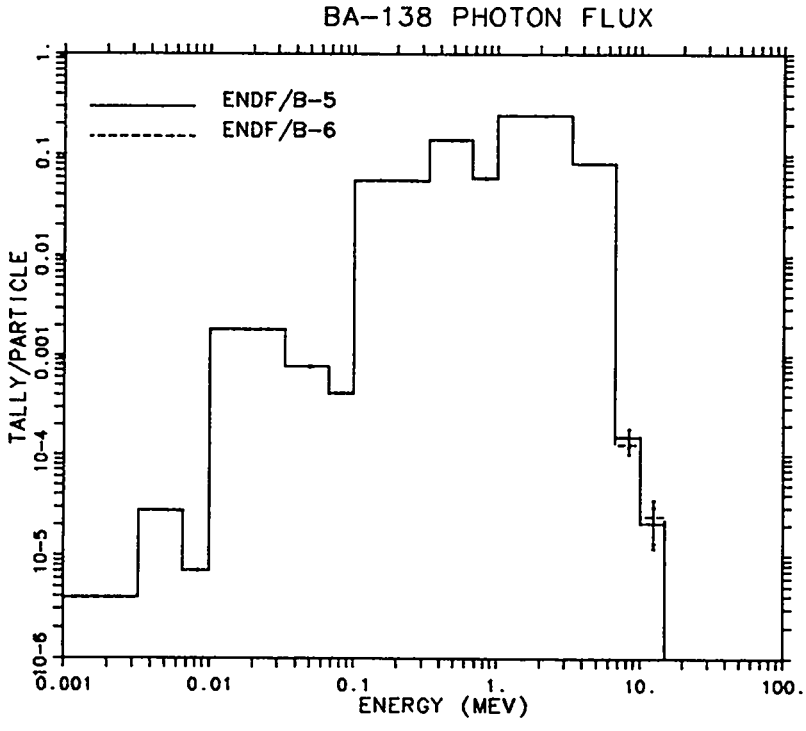

Fig. 179. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{138}Ba sphere.

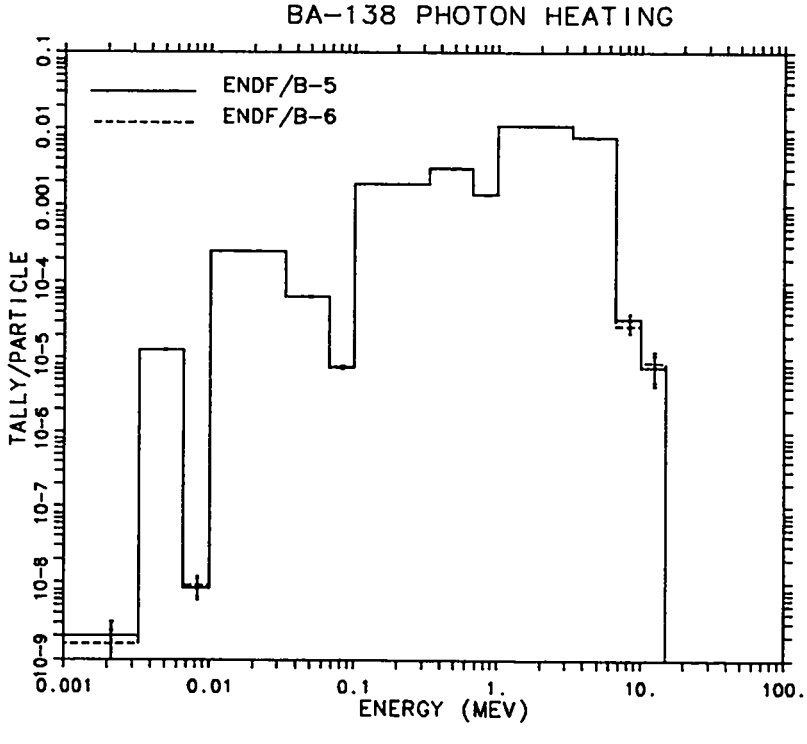

Fig. 180. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{138}Ba sphere.

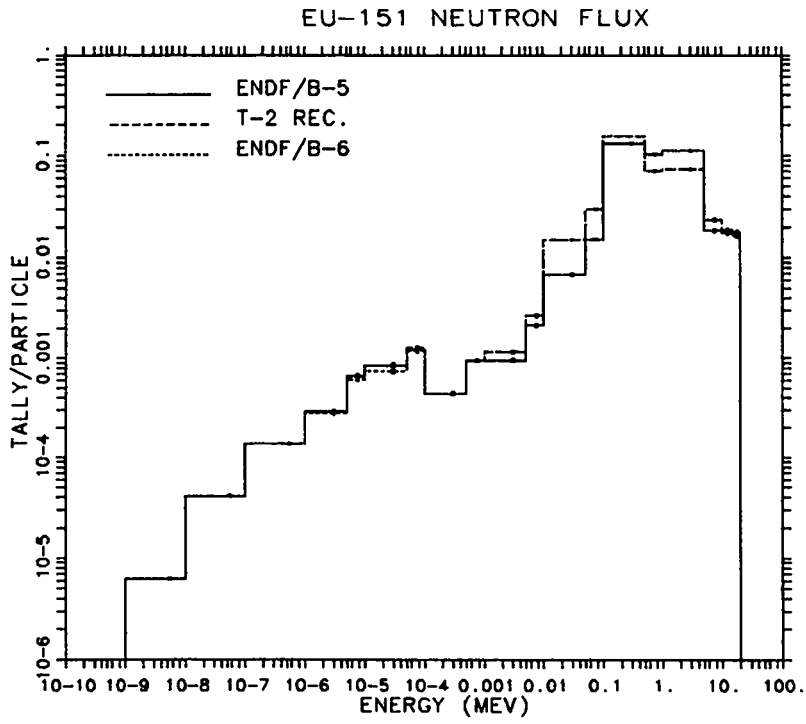

Fig. 181. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{151}Eu sphere.

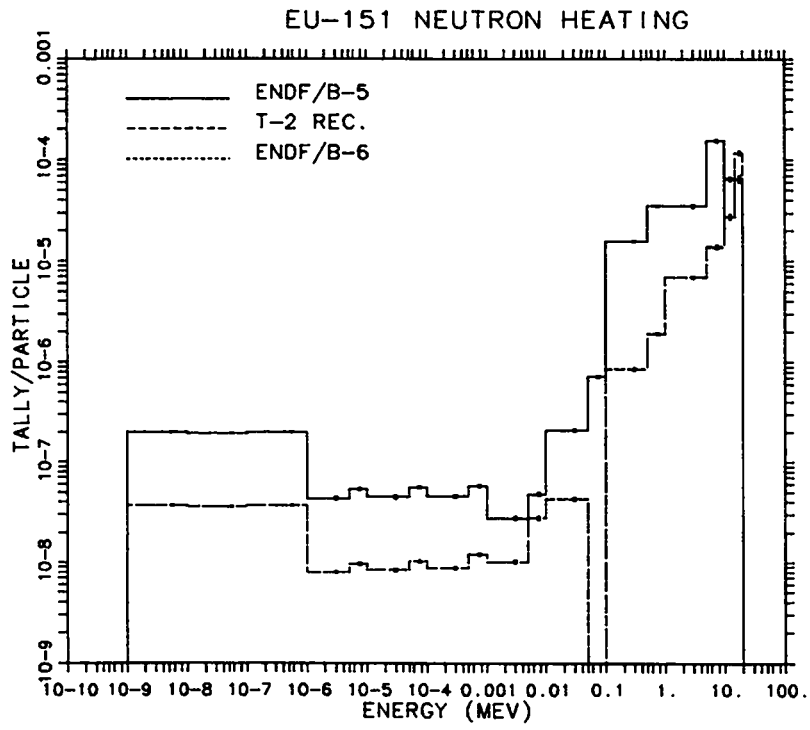

Fig. 182. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{151}Eu sphere.

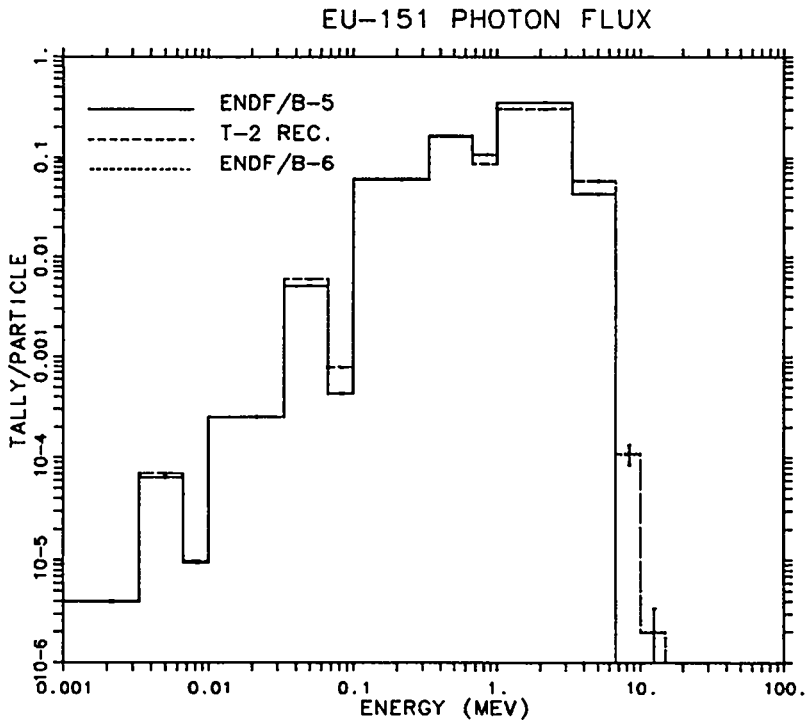

Fig. 183. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon flux for the ^{151}Eu sphere.

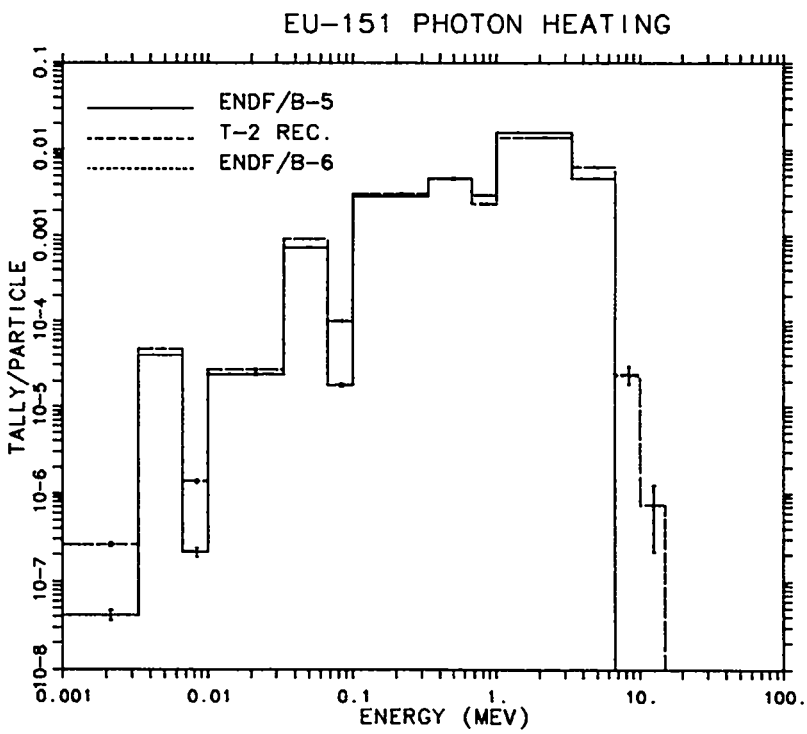

Fig. 184. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon heating for the ^{151}Eu sphere.

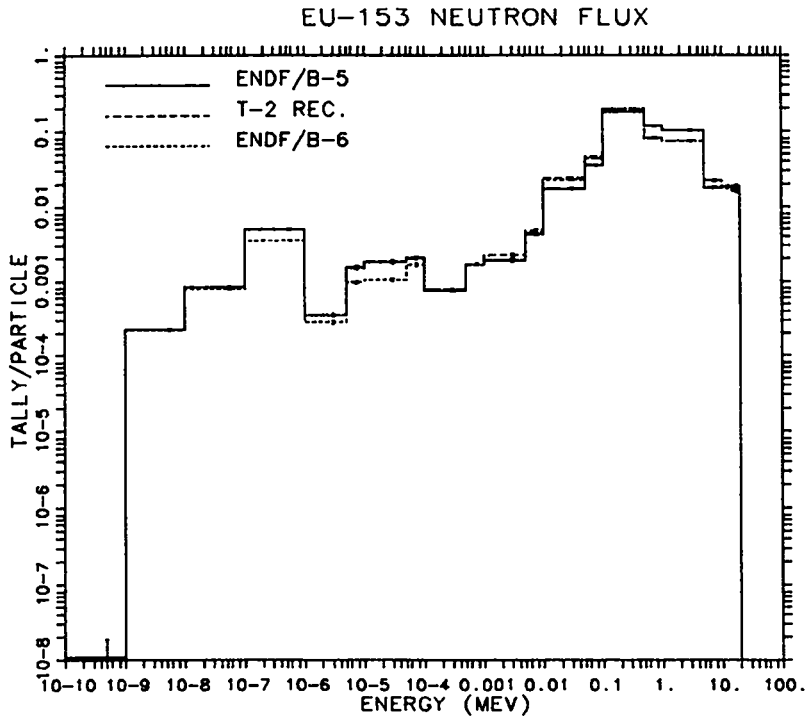

Fig. 185. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{153}Eu sphere.

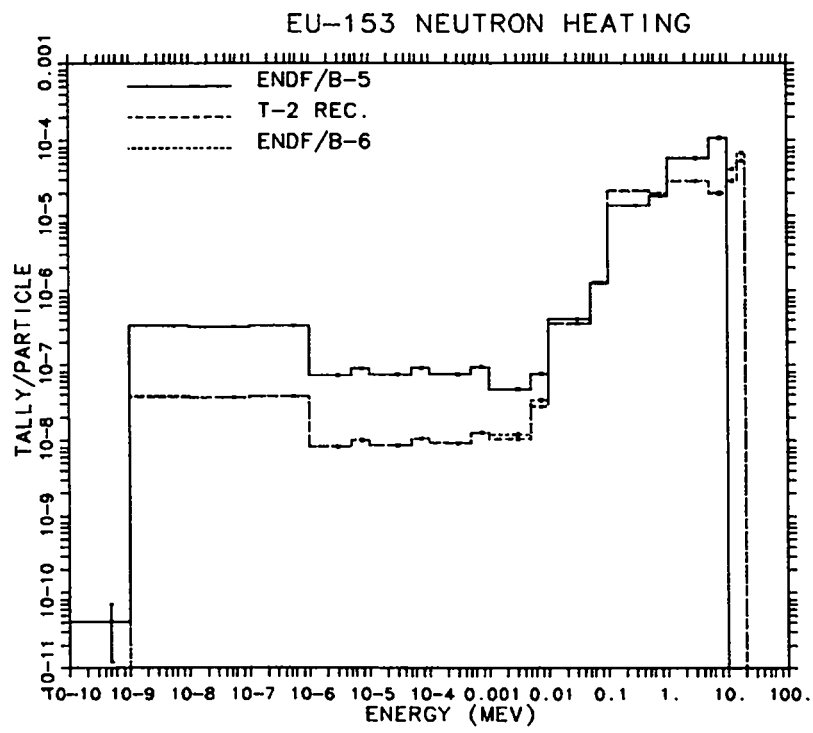

Fig. 186. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{153}Eu sphere.

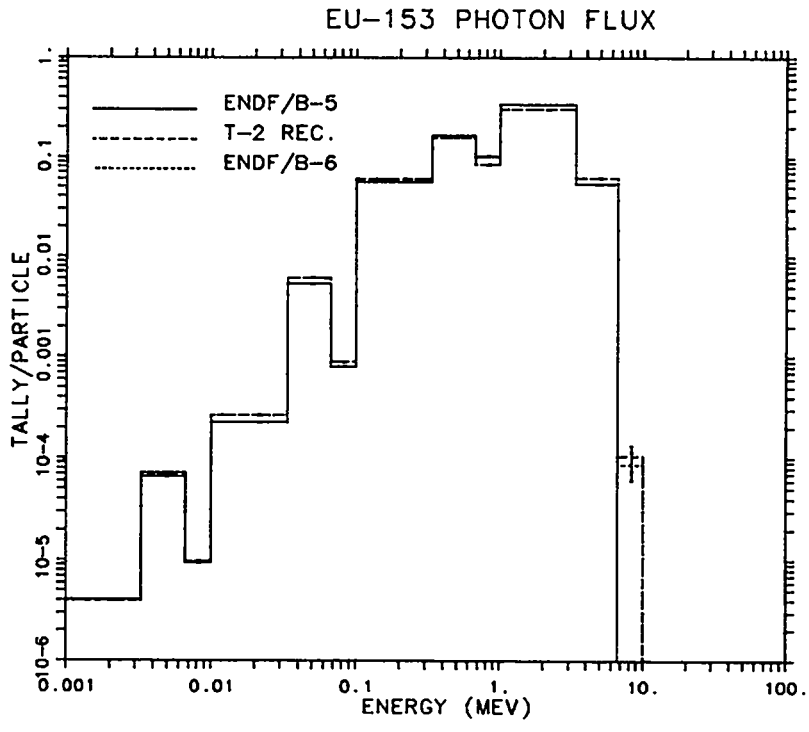

Fig. 187. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon flux for the ^{153}Eu sphere.

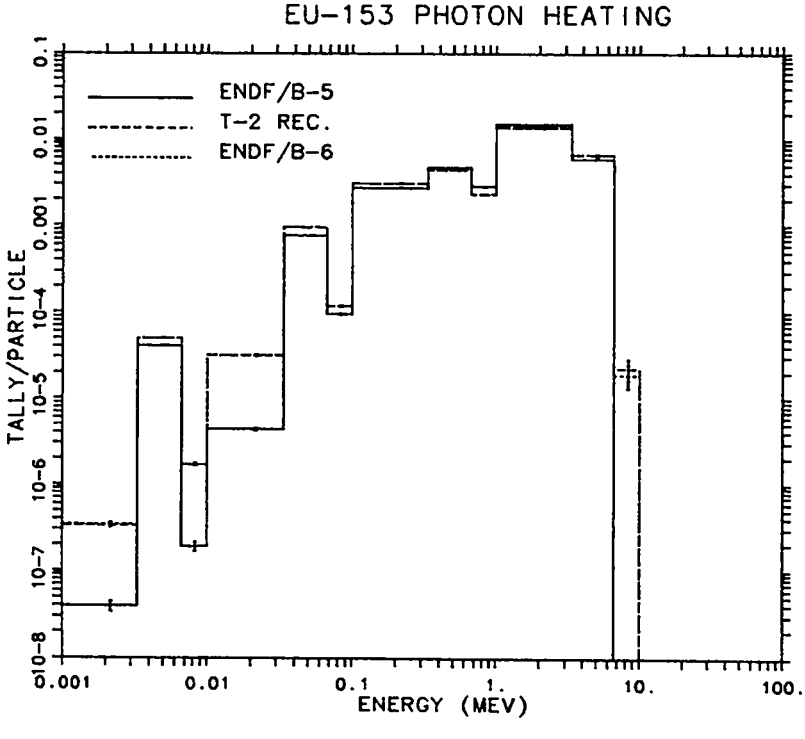

Fig. 188. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon heating for the ^{153}Eu sphere.

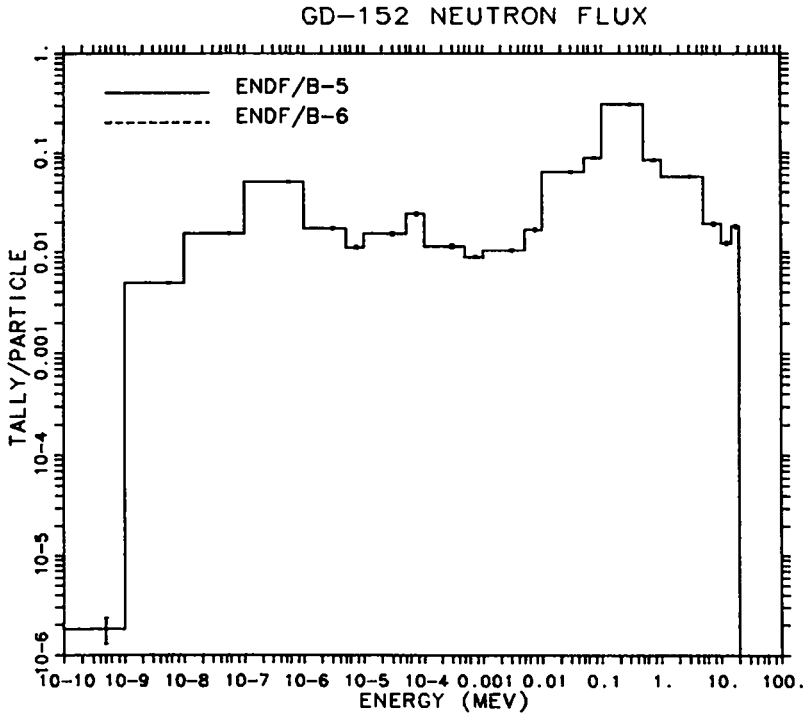

Fig. 189. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{152}Gd sphere.

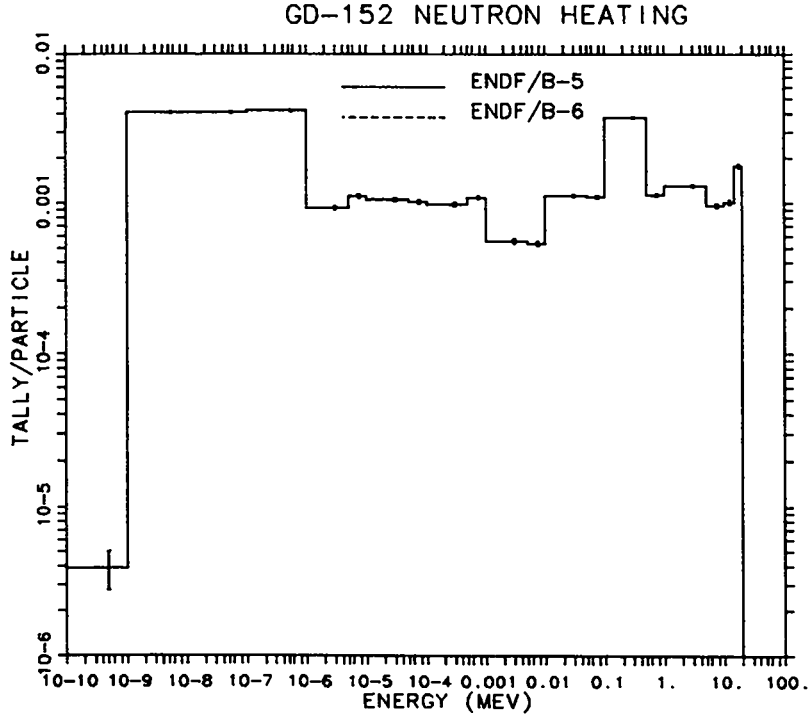

Fig. 190. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{152}Gd sphere.

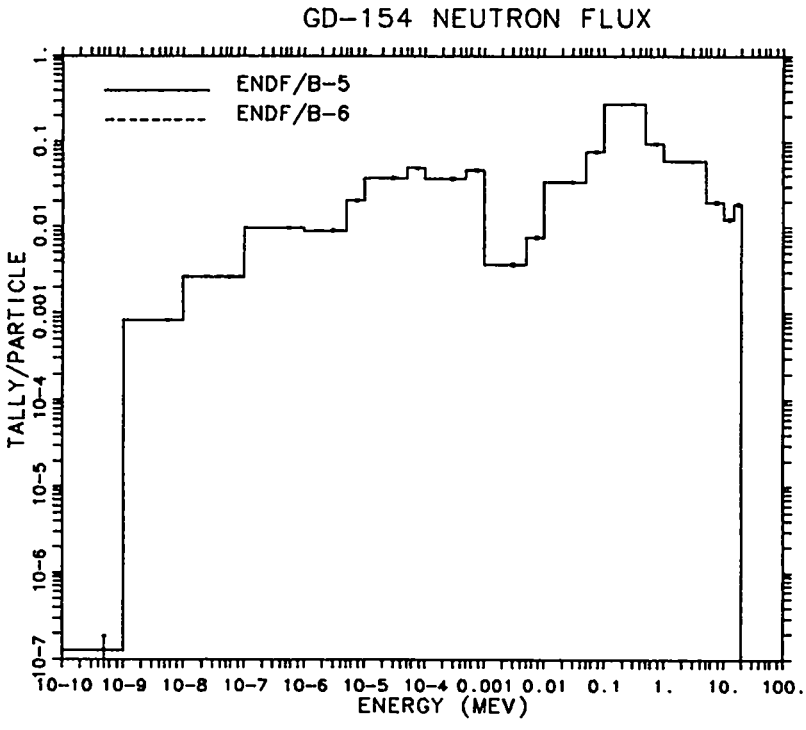

Fig. 191. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{154}Gd sphere.

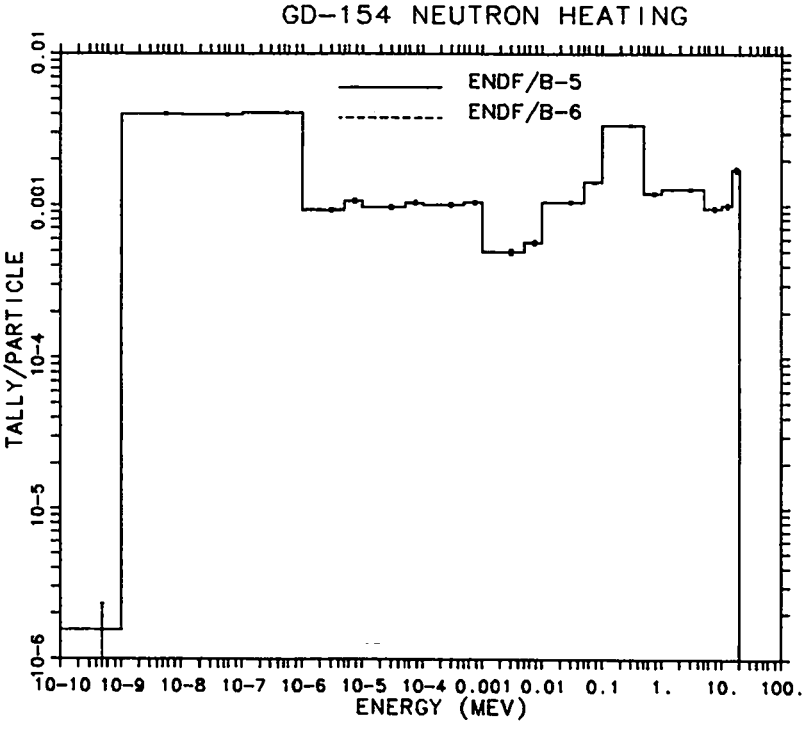

Fig. 192. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{154}Gd sphere.

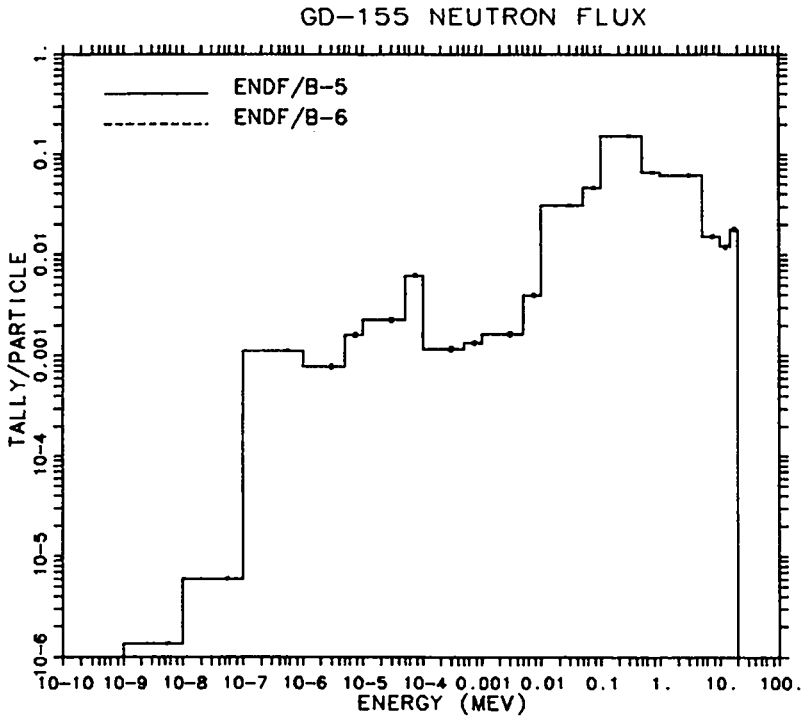

Fig. 193. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{155}Gd sphere.

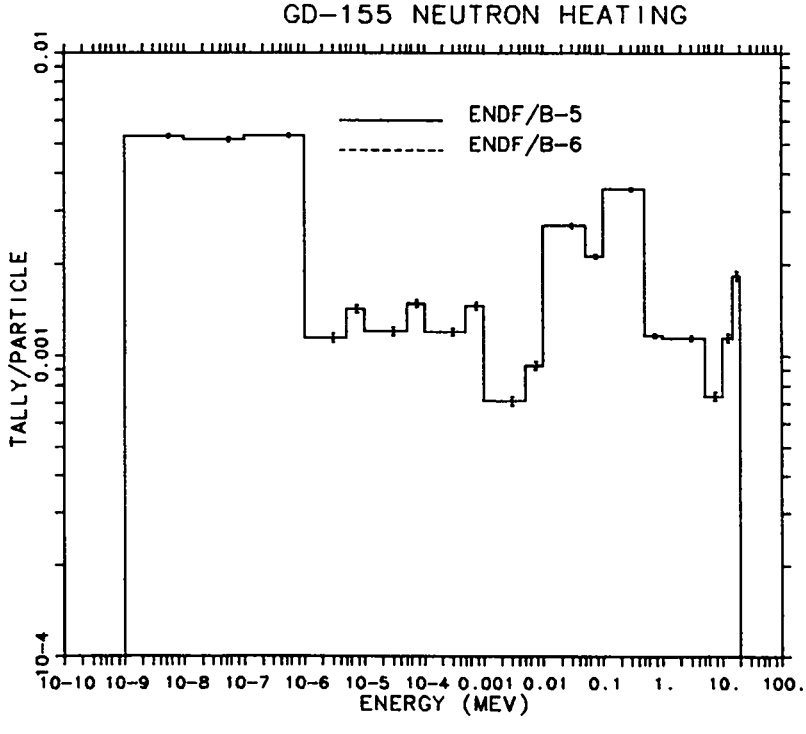

Fig. 194. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{155}Gd sphere.

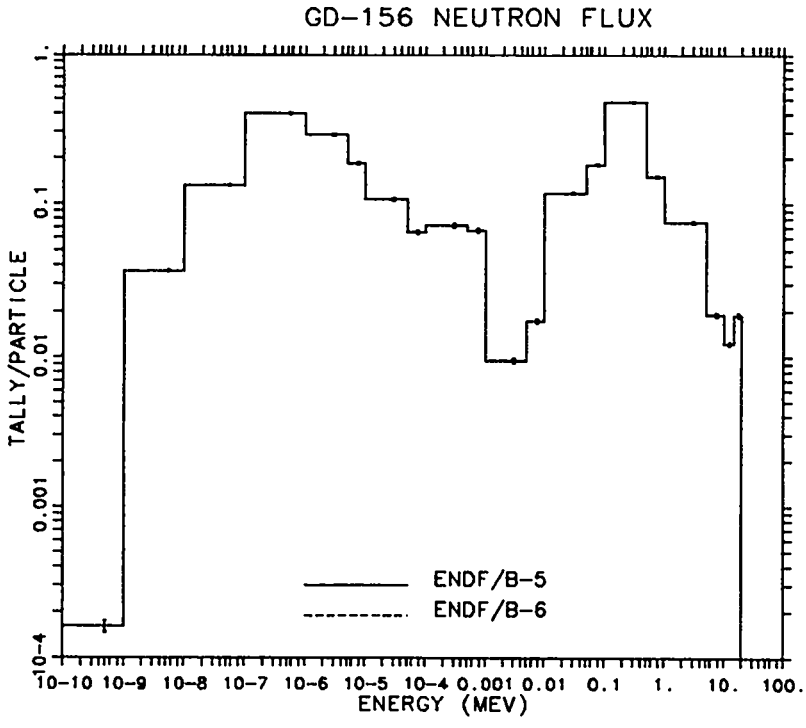

Fig. 195. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{156}Gd sphere.

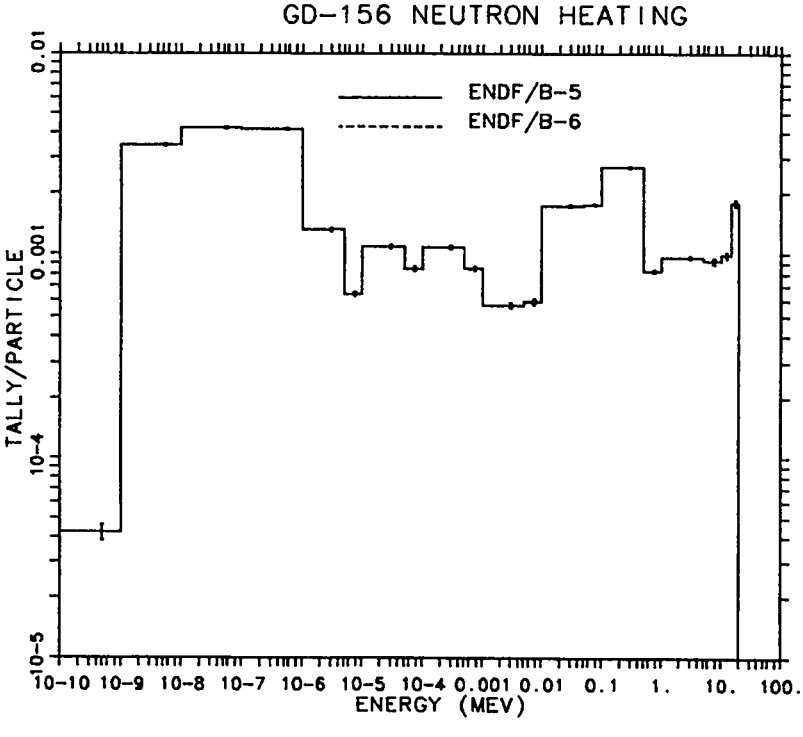

Fig. 196. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{156}Gd sphere.

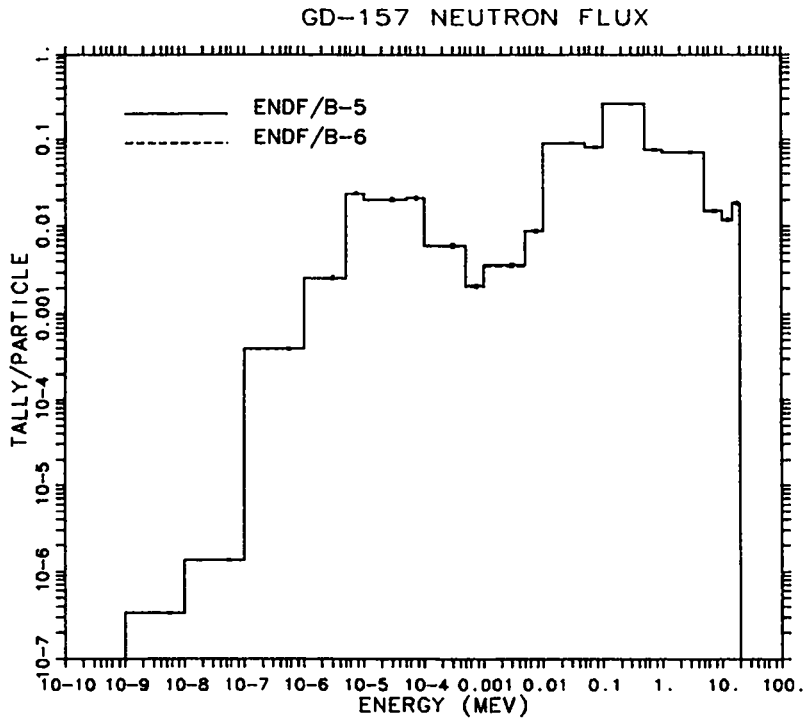

Fig. 197. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{157}Gd sphere.

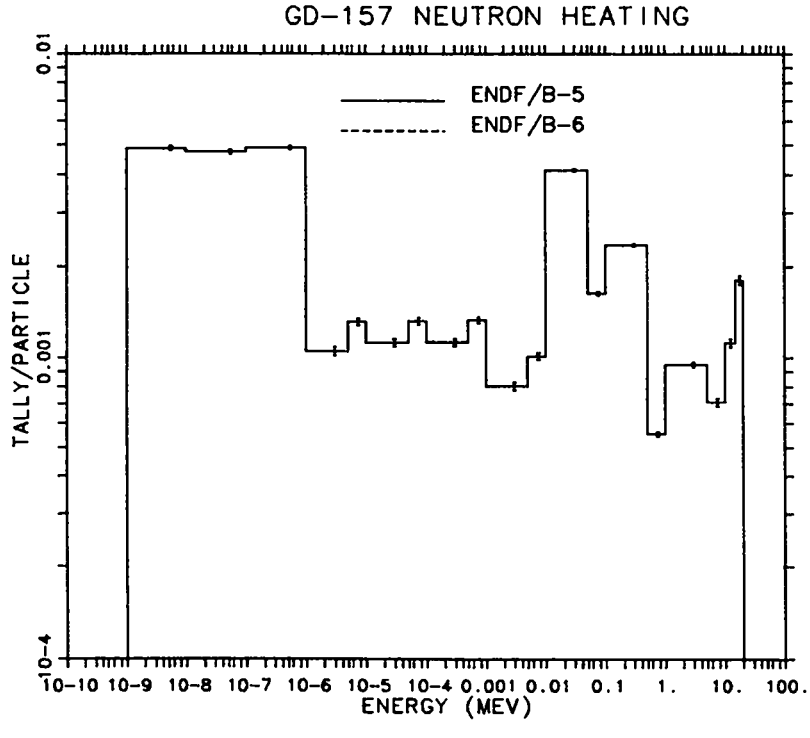

Fig. 198. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{157}Gd sphere.

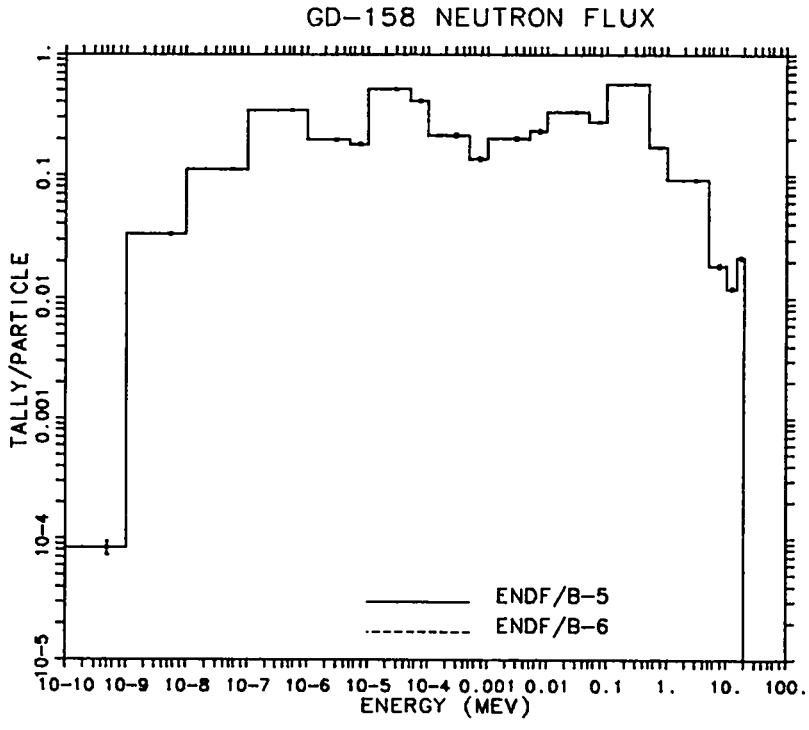

Fig. 199. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{158}Gd sphere.

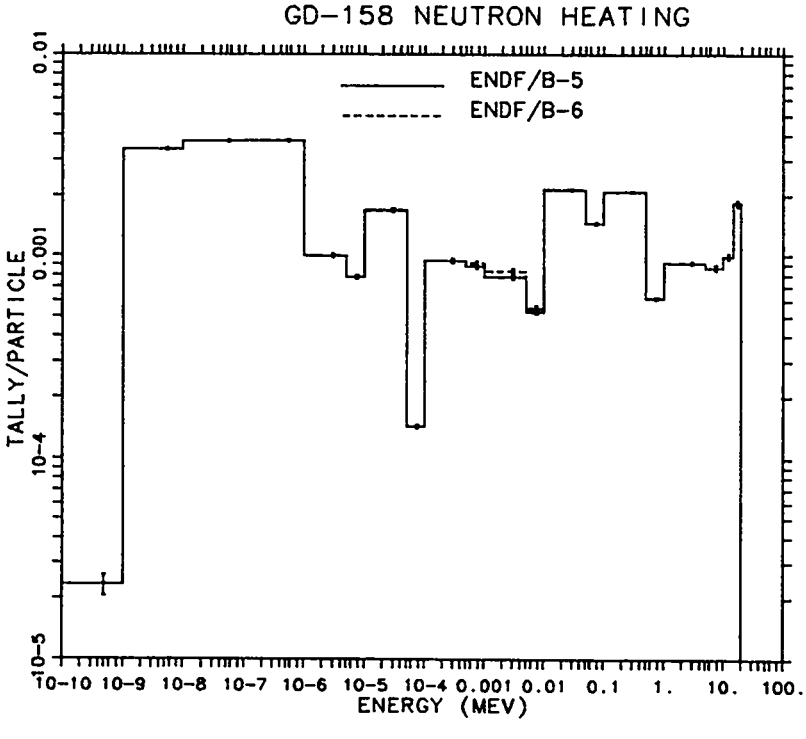

Fig. 200. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{158}Gd sphere.

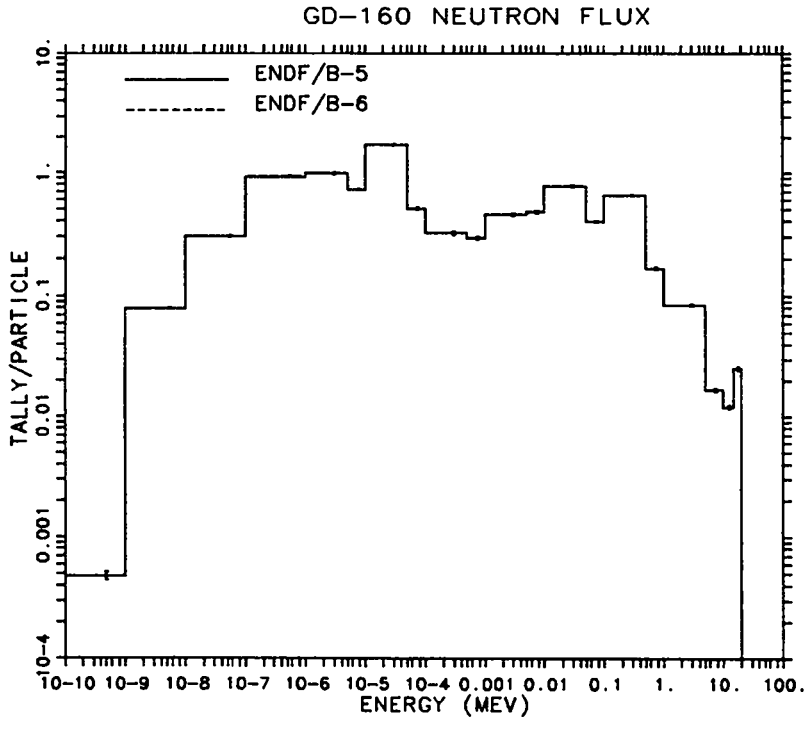

Fig. 201. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{160}Gd sphere.

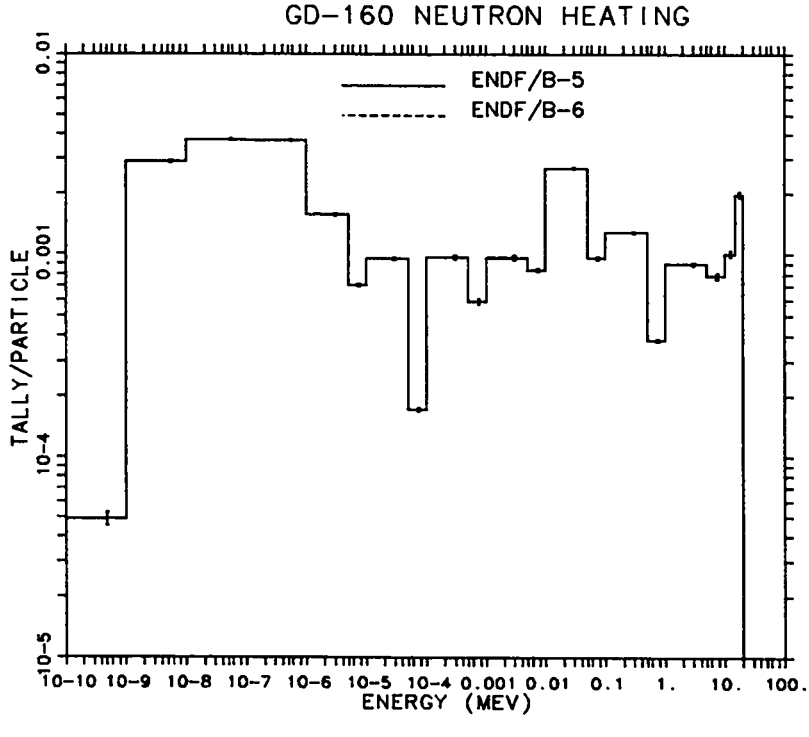

Fig. 202. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{160}Gd sphere.

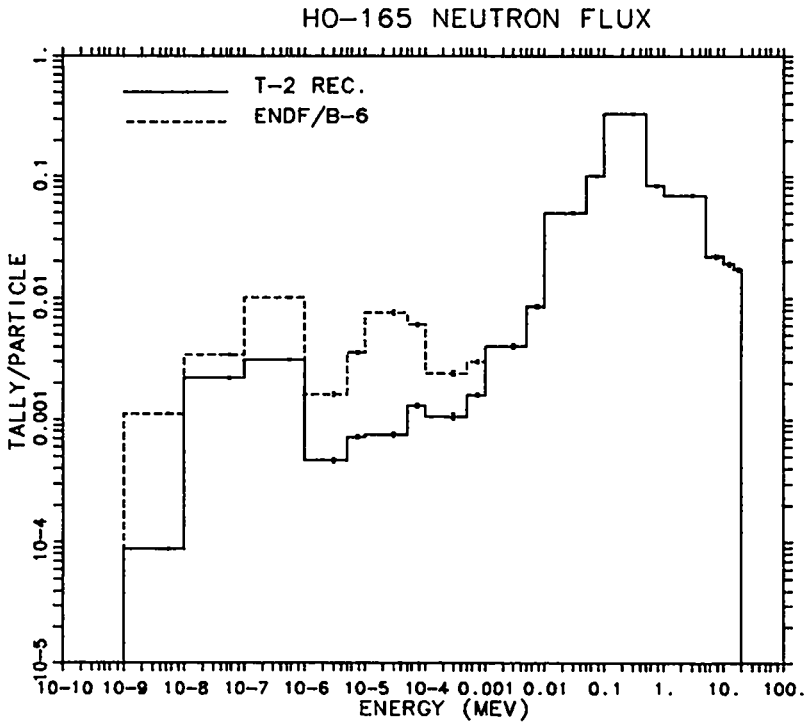

Fig. 203. Plot of MCNP Recommended and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{165}Ho sphere.

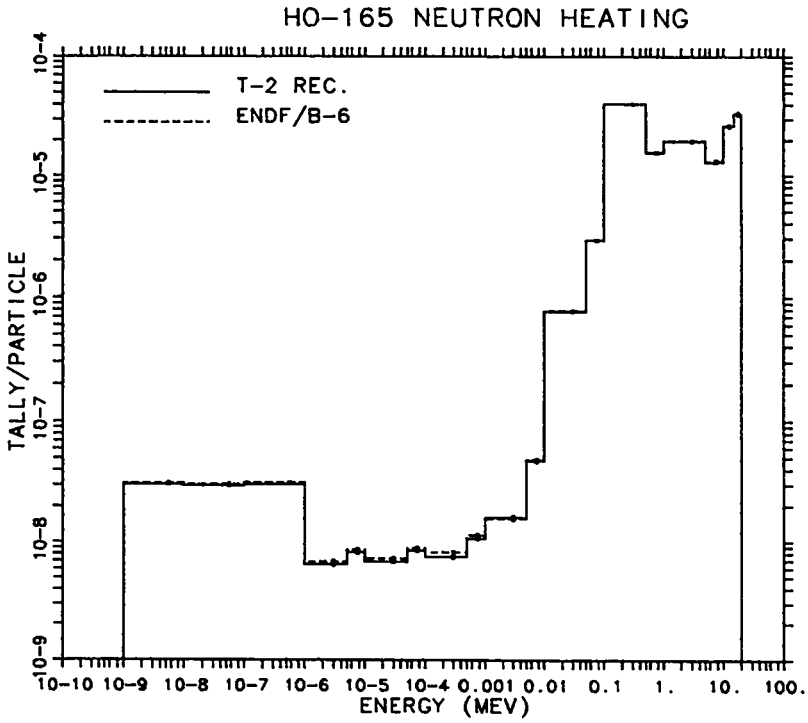

Fig. 204. Plot of MCNP Recommended and ENDF/B-VI calculated neutron heating for the ^{165}Ho sphere.

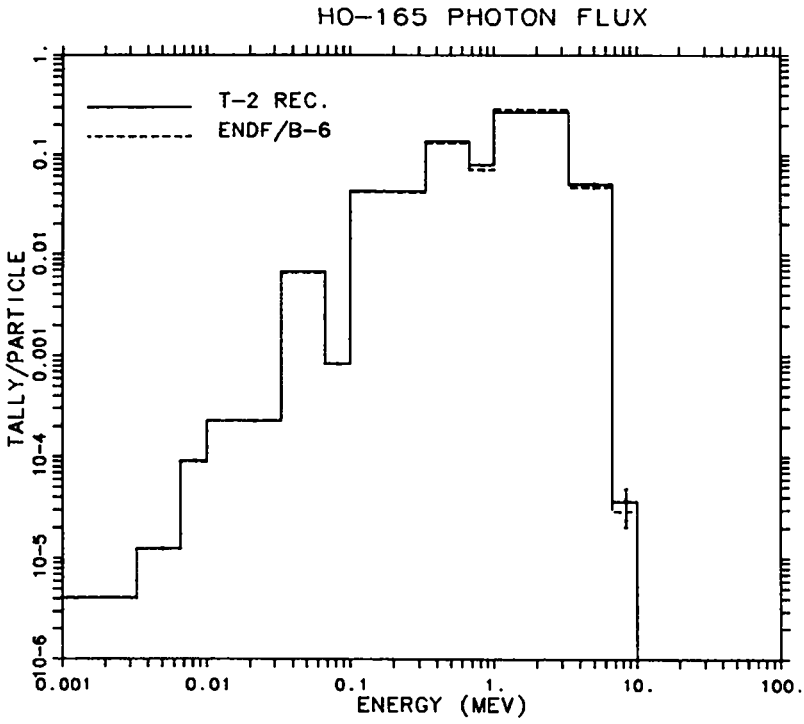

Fig. 205. Plot of MCNP Recommended and ENDF/B-VI calculated photon flux for the ^{165}Ho sphere.

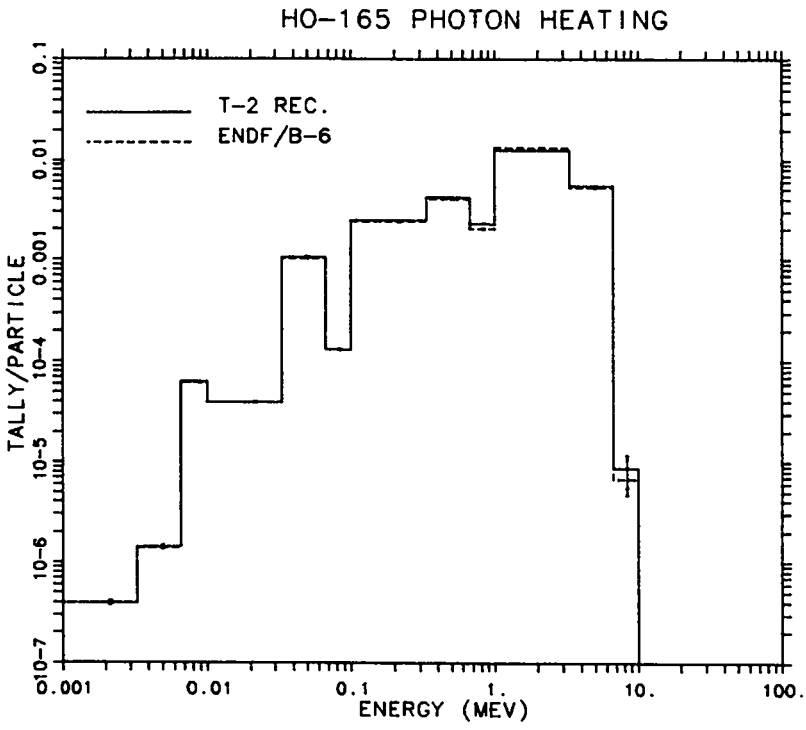

Fig. 206. Plot of MCNP Recommended and ENDF/B-VI calculated photon heating for the ^{165}Ho sphere.

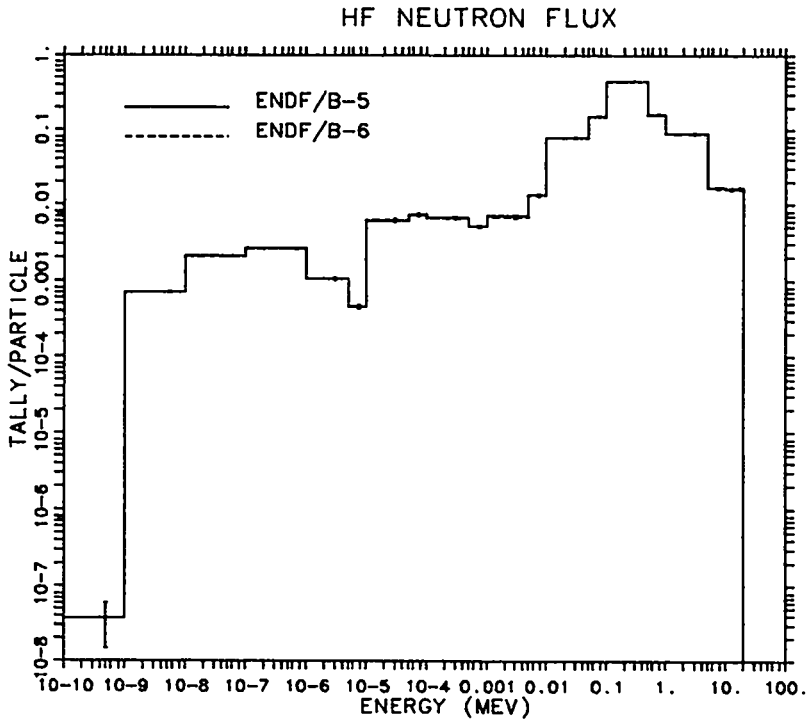

Fig. 207. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius hafnium sphere.

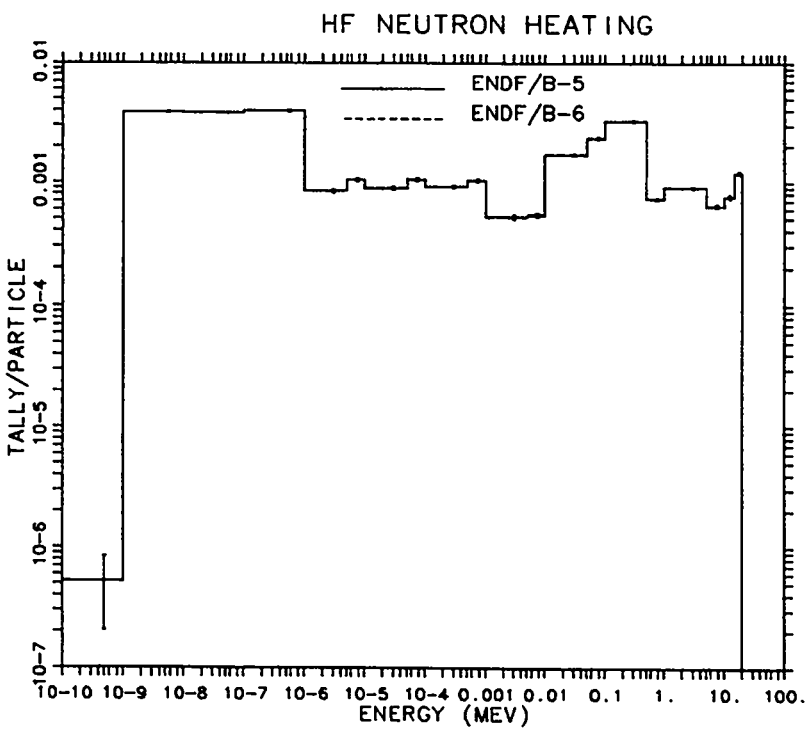

Fig. 208. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the hafnium sphere.

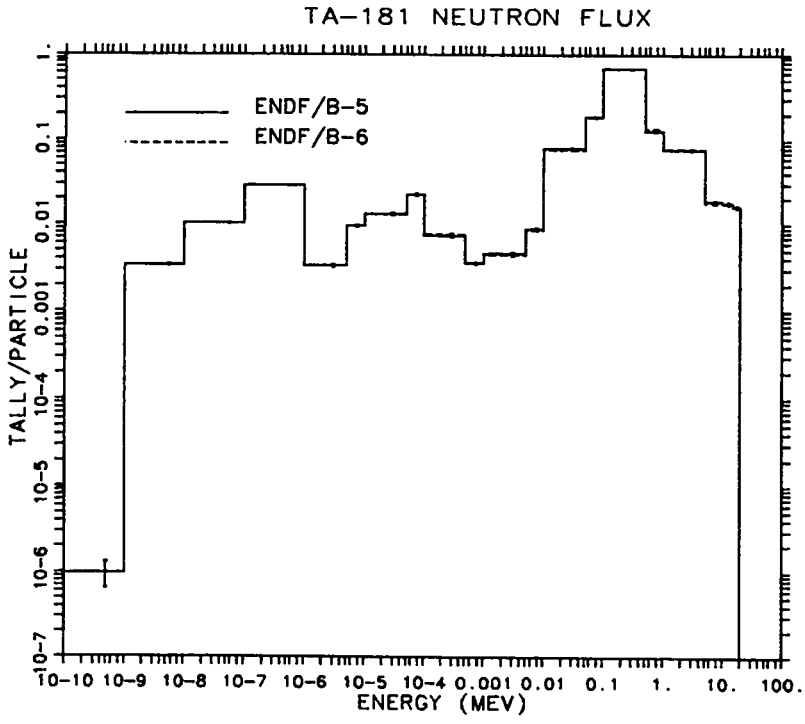

Fig. 209. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{181}Ta sphere.

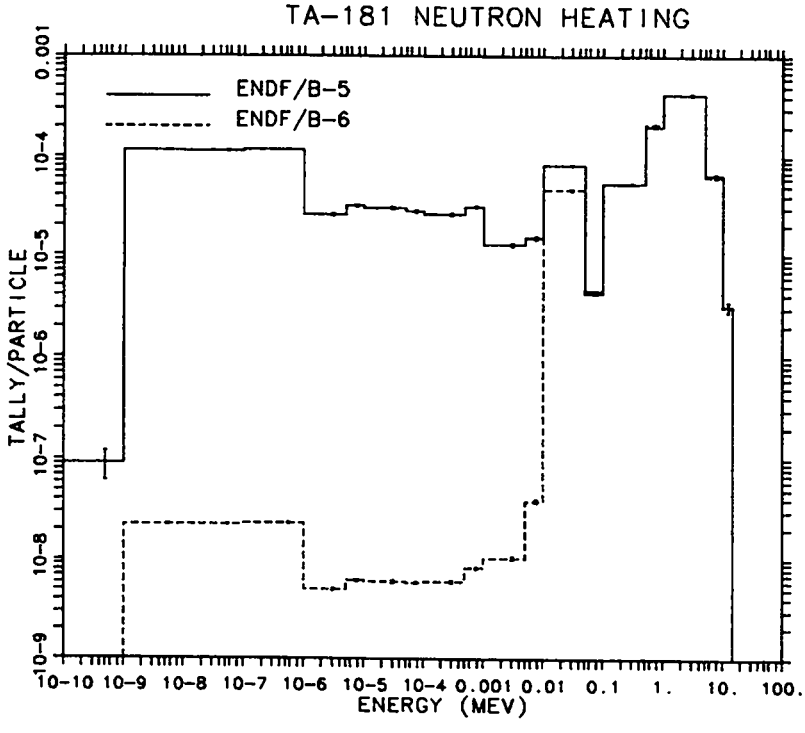

Fig. 210. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{181}Ta sphere.

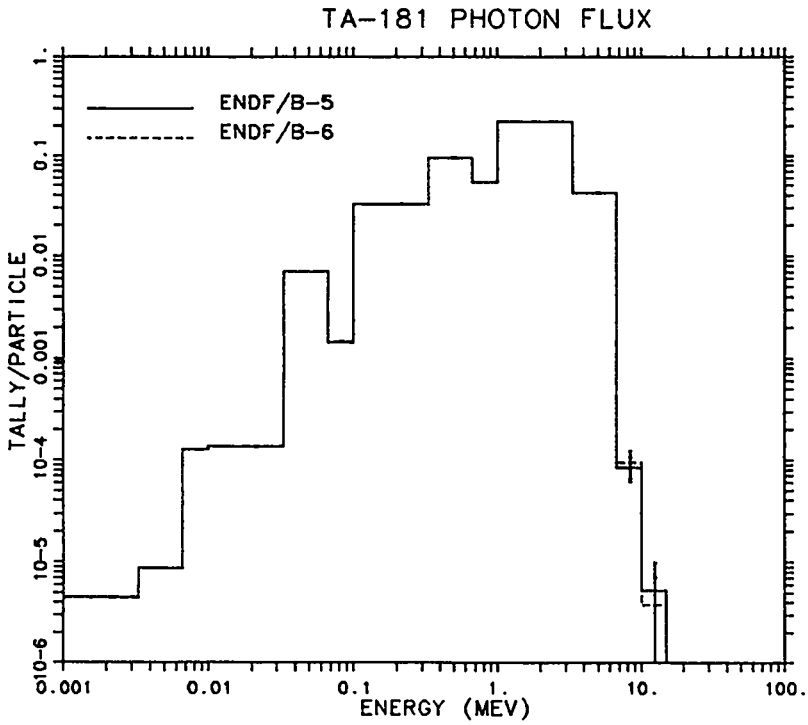

Fig. 211. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{181}Ta sphere.

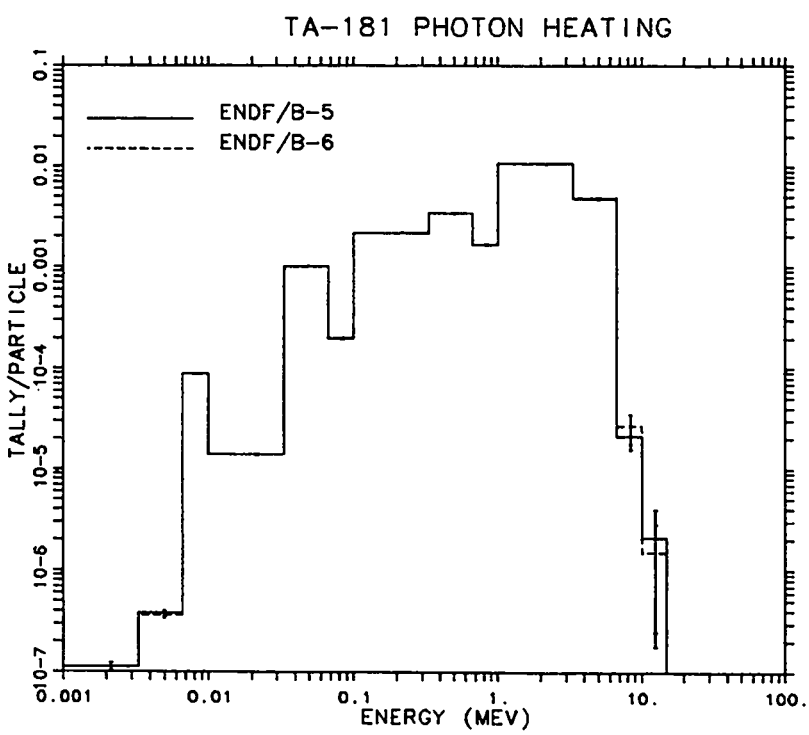

Fig. 212. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{181}Ta sphere.

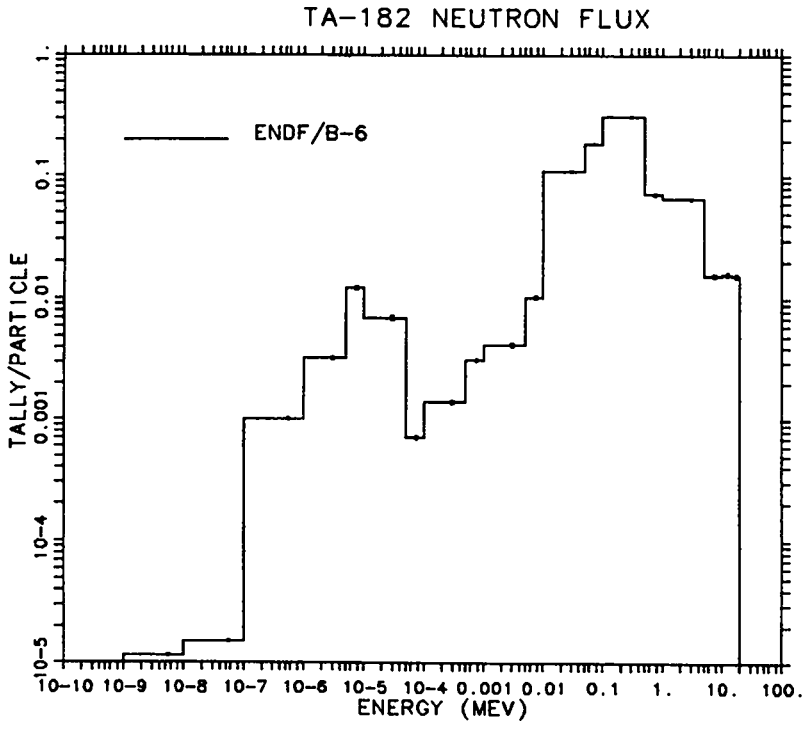

Fig. 213. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{182}Ta sphere.

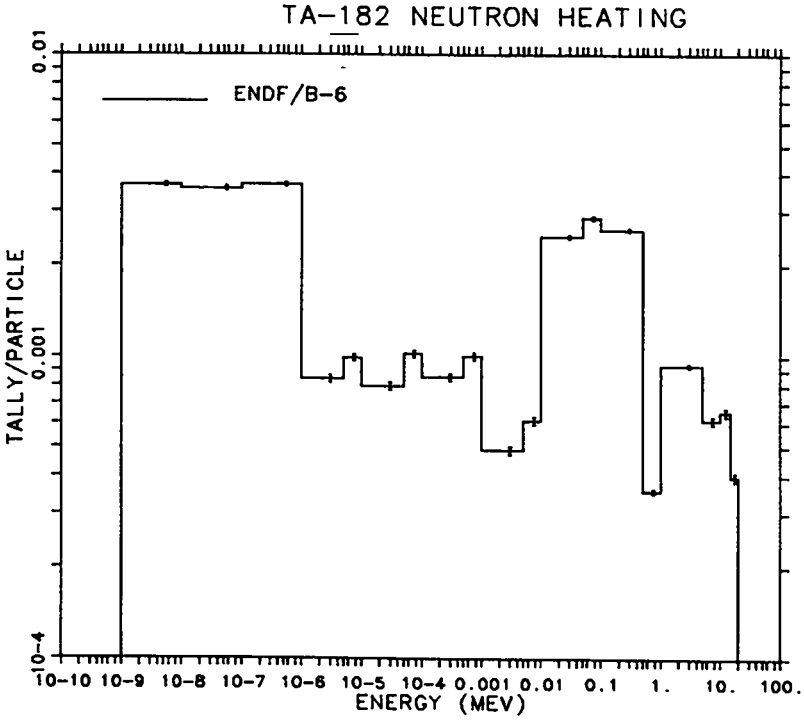

Fig. 214. Plot of ENDF/B-VI calculated neutron heating for the ^{182}Ta sphere.

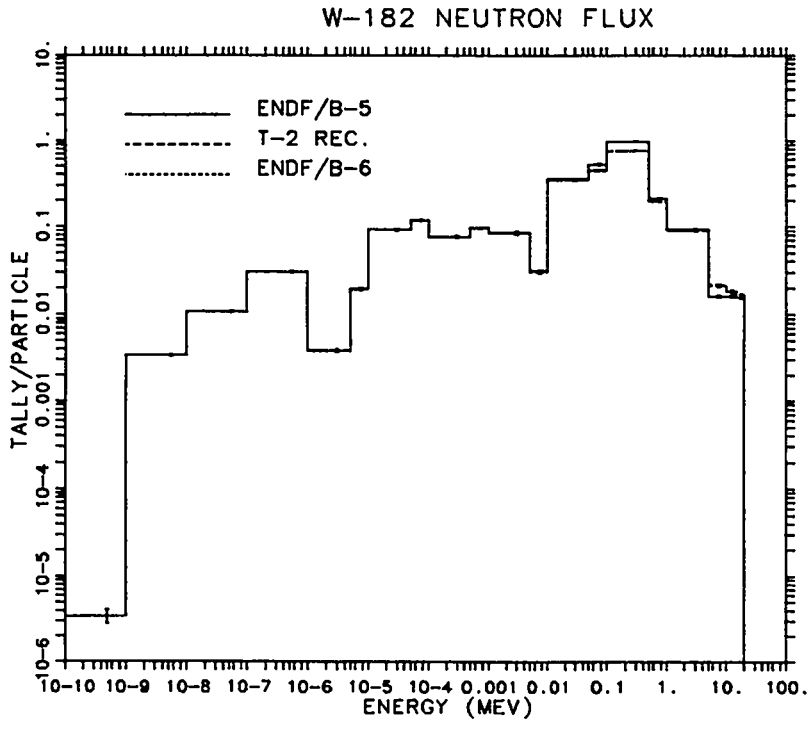

Fig. 215. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{182}W sphere.

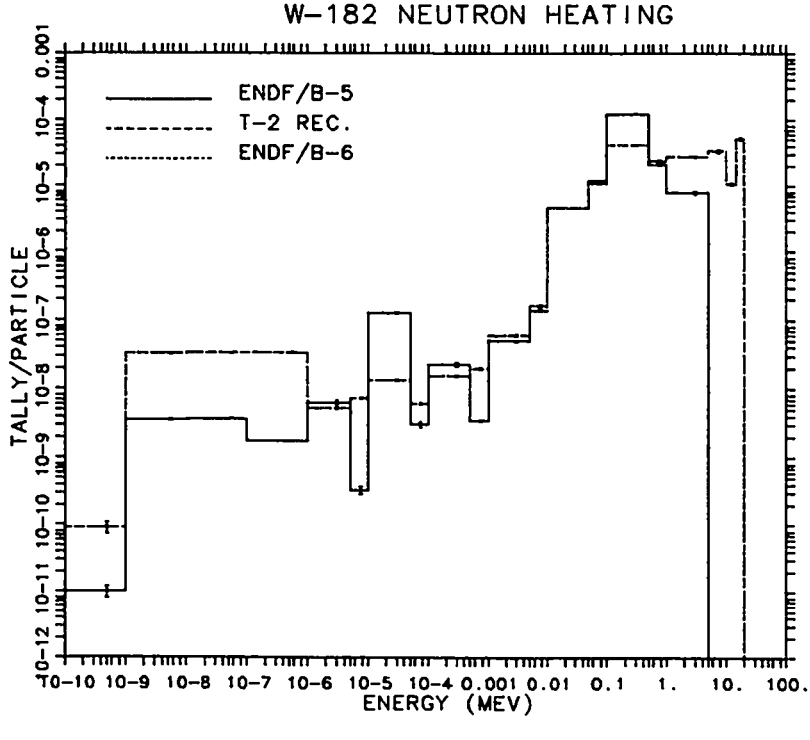

Fig. 216. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{182}W sphere.

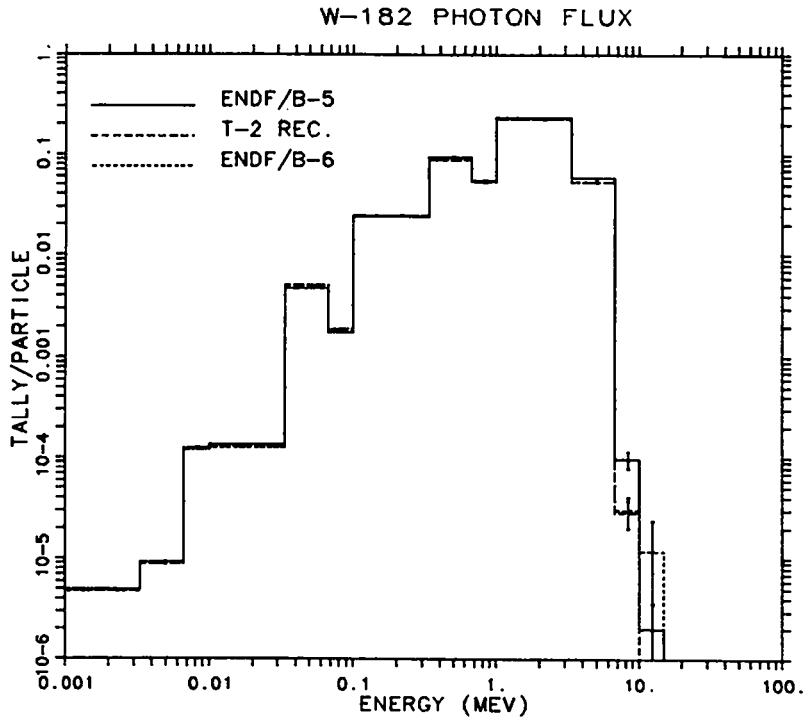

Fig. 217. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon flux for the ^{182}W sphere.

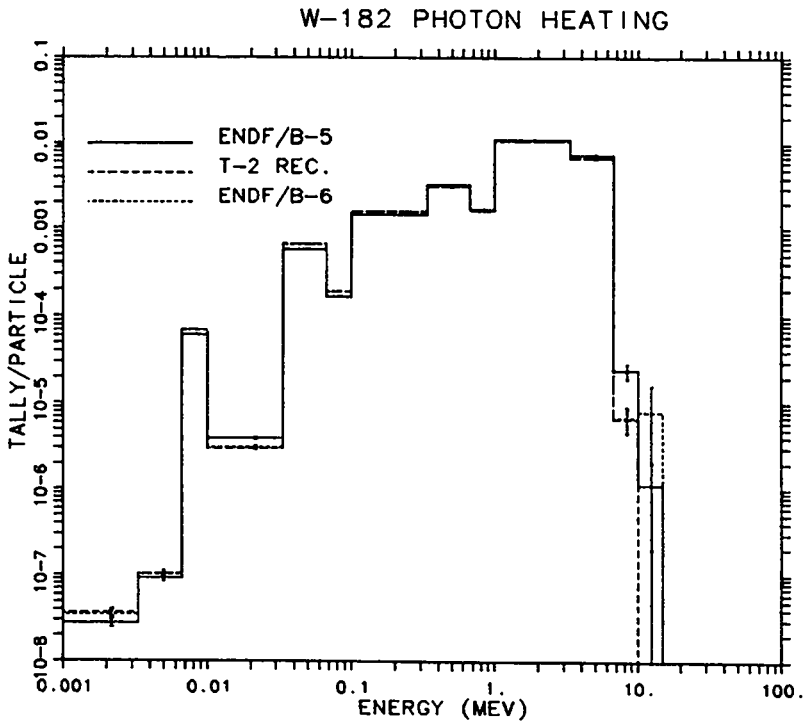

Fig. 218. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon heating for the ^{182}W sphere.

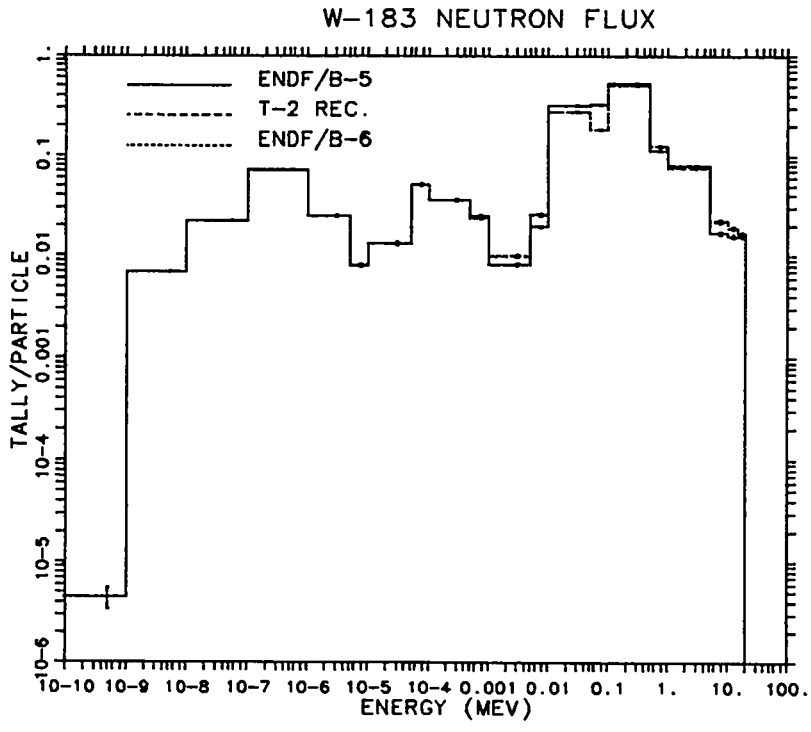

Fig. 219. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{183}W sphere.

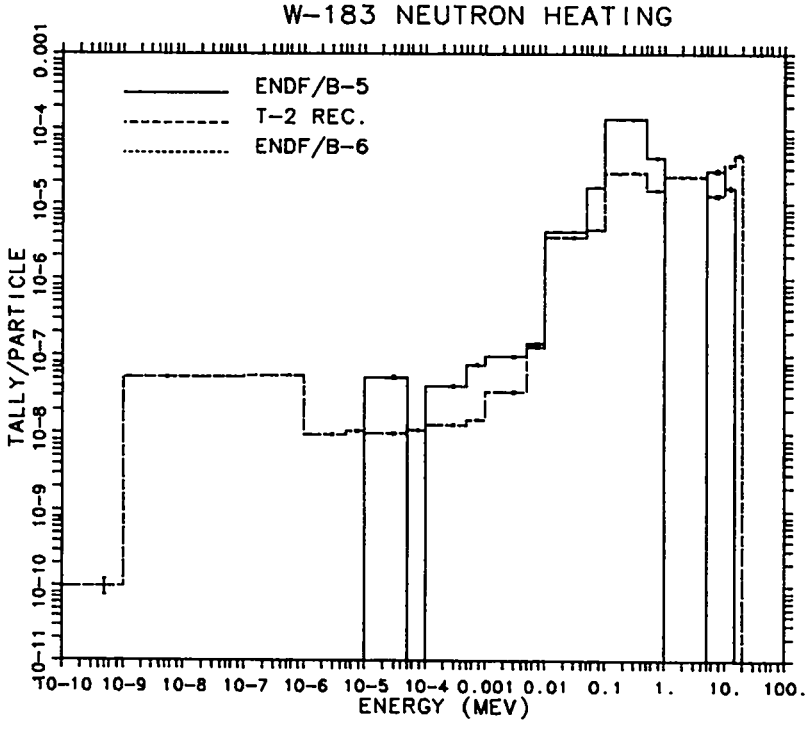

Fig. 220. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{183}W sphere.

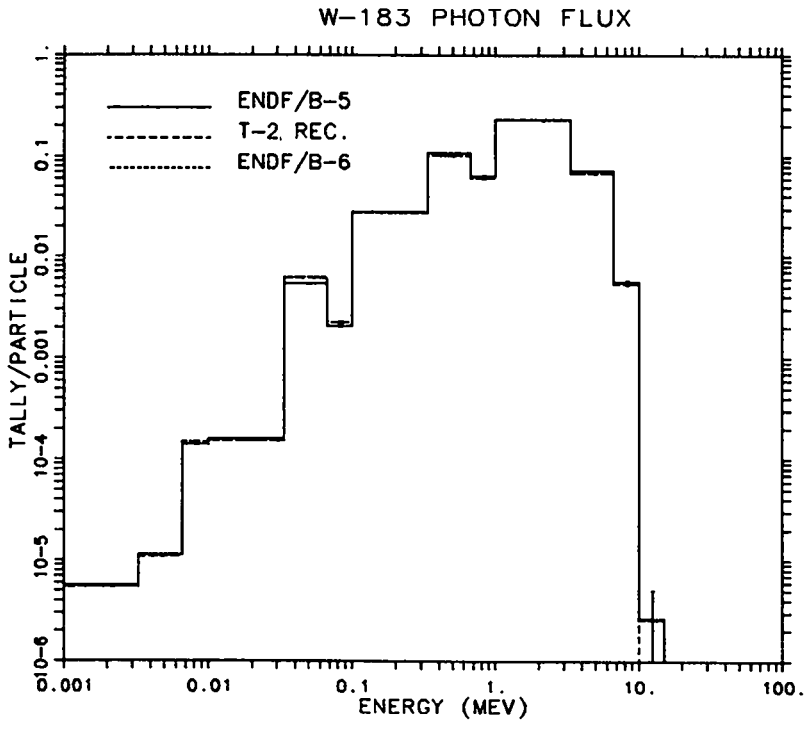

Fig. 221. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon flux for the ^{183}W sphere.

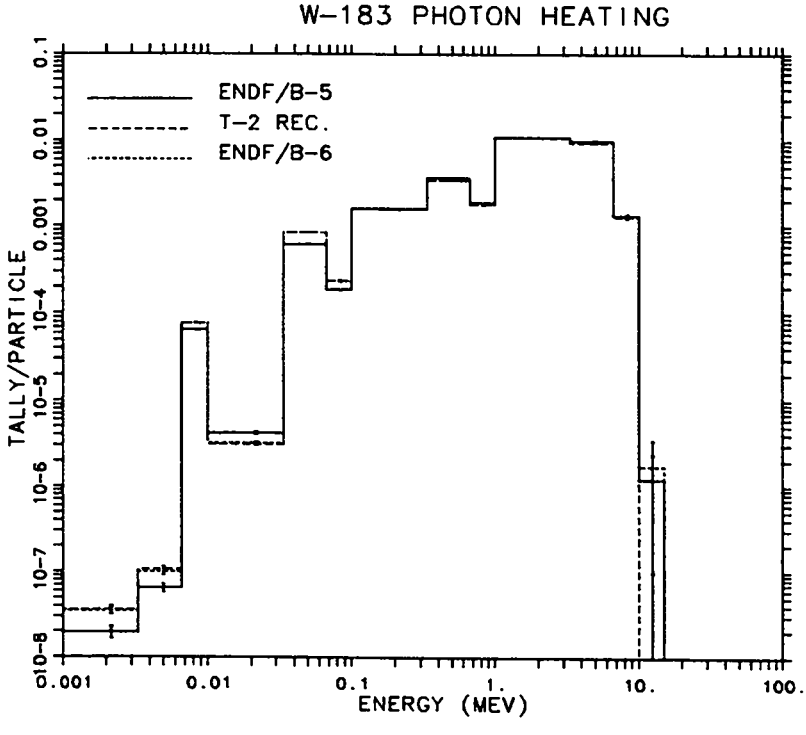

Fig. 222. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon heating for the ^{183}W sphere.

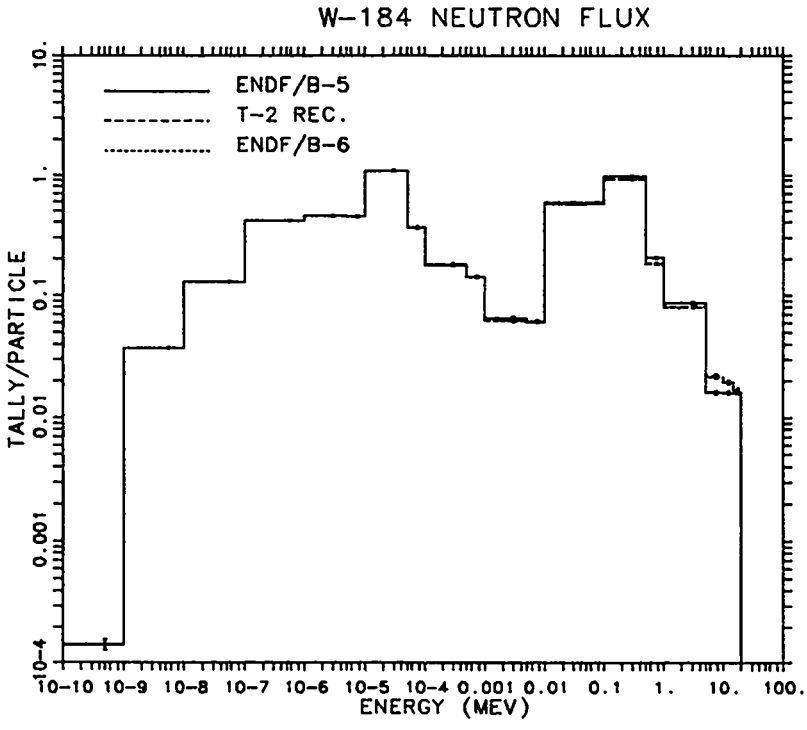

Fig. 223. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{184}W sphere.

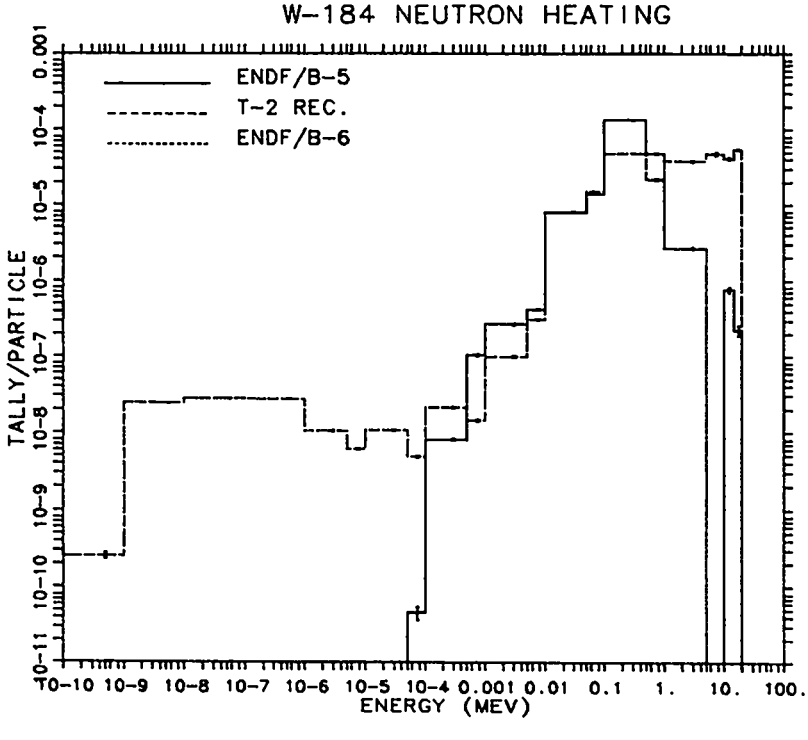

Fig. 224. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{184}W sphere.

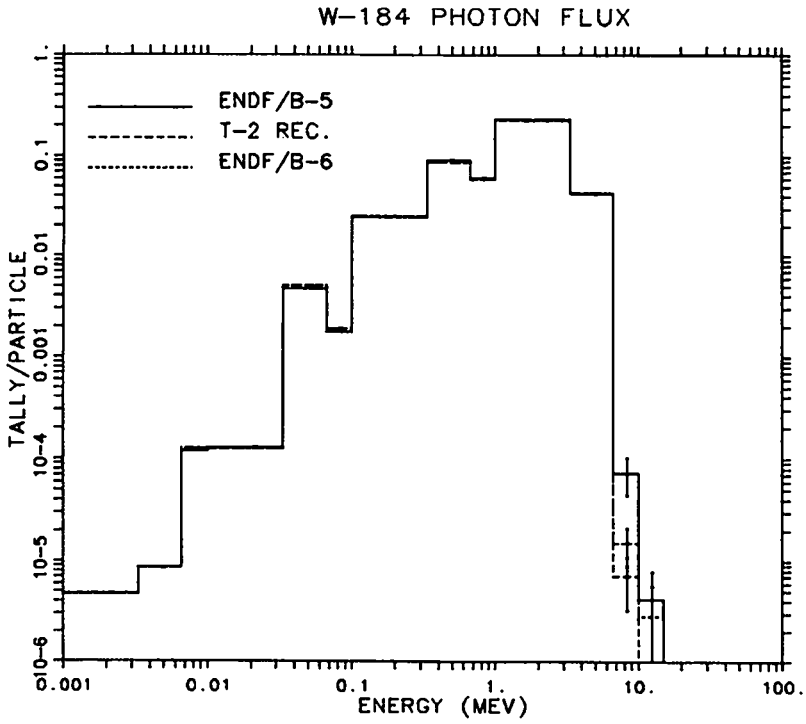

Fig. 225. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon flux for the ^{184}W sphere.

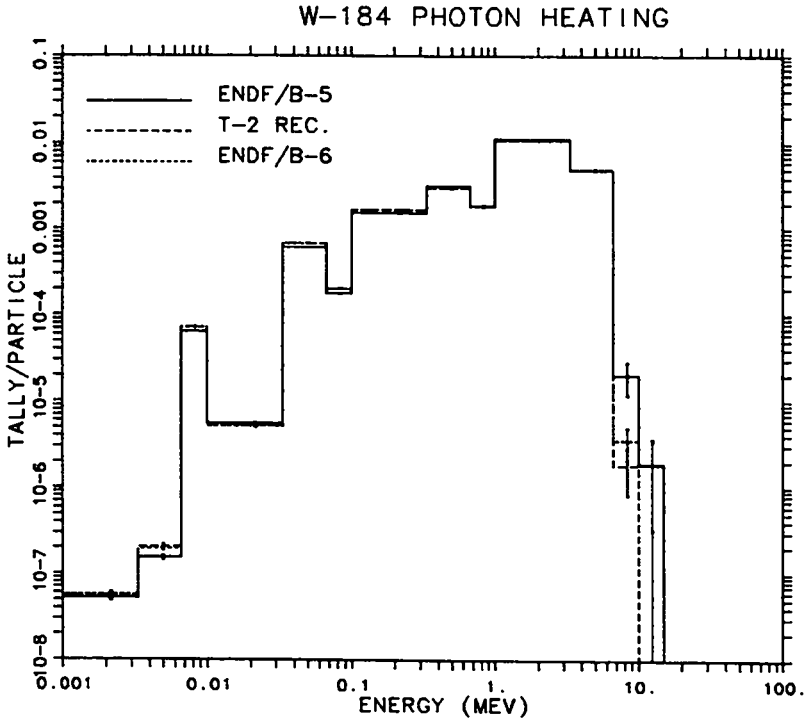

Fig. 226. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon heating for the ^{184}W sphere.

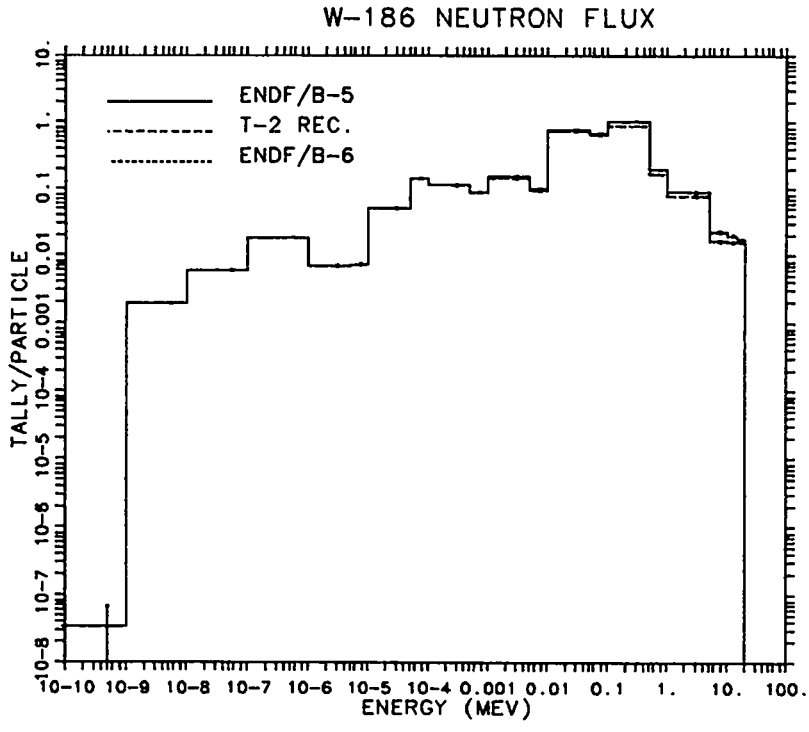

Fig. 227. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{186}W sphere.

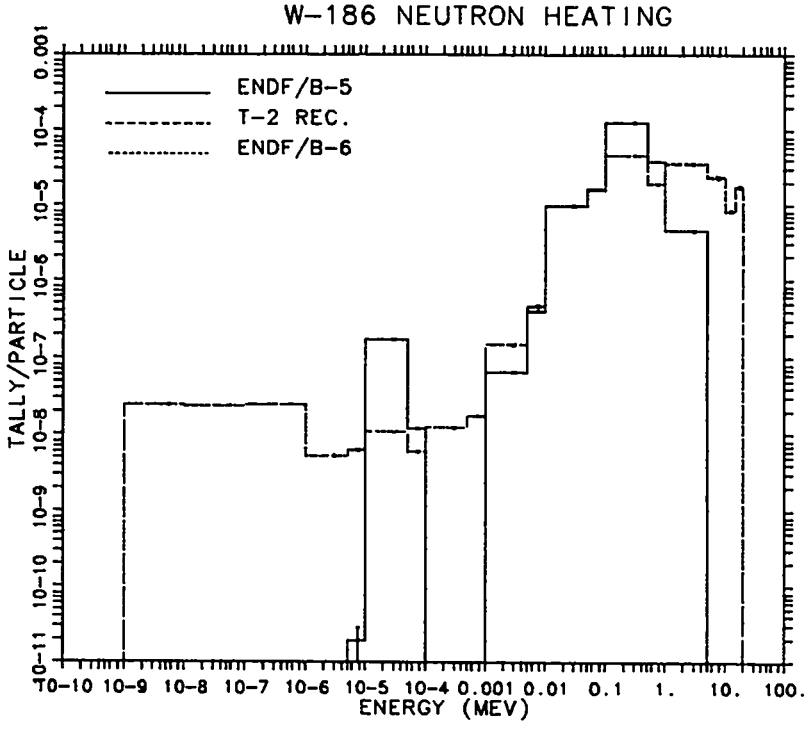

Fig. 228. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{186}W sphere.

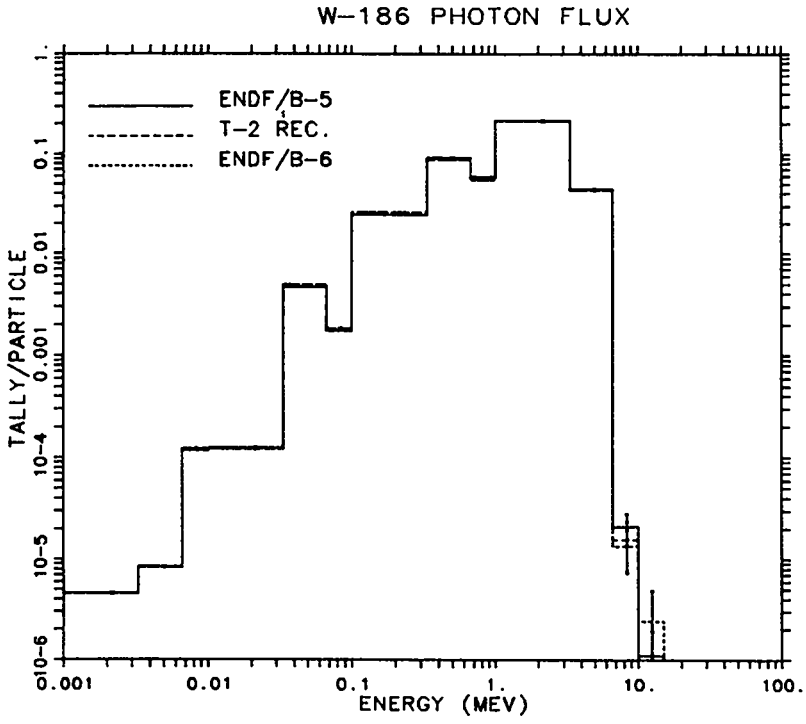

Fig. 229. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon flux for the ^{186}W sphere.

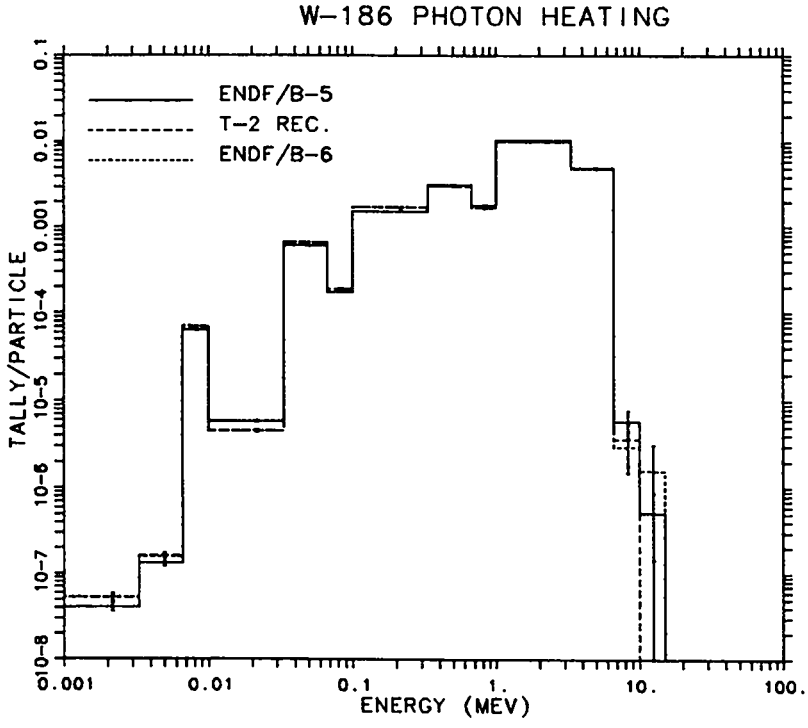

Fig. 230. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated photon heating for the ^{186}W sphere.

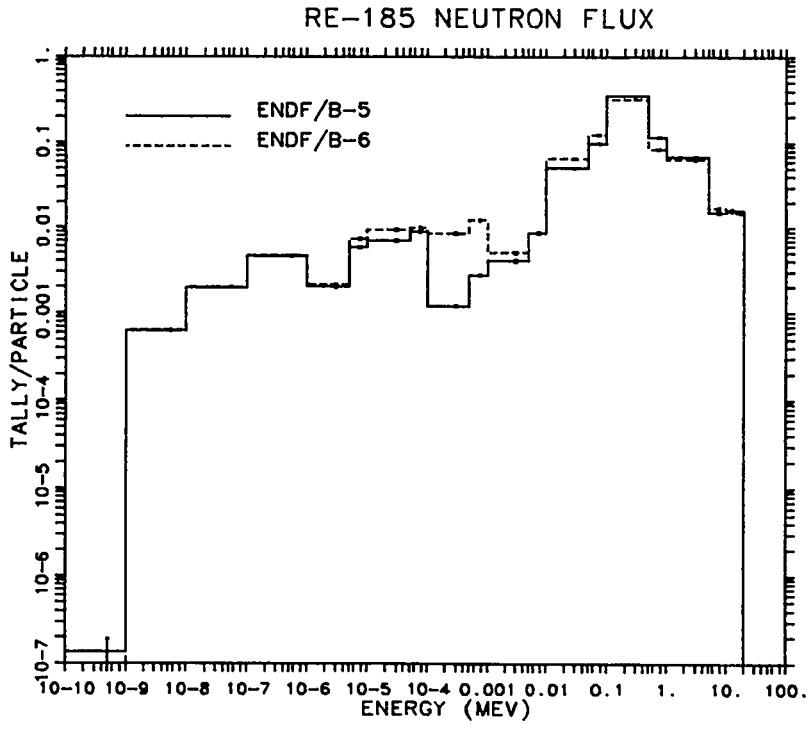

Fig. 231. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{185}Re sphere.

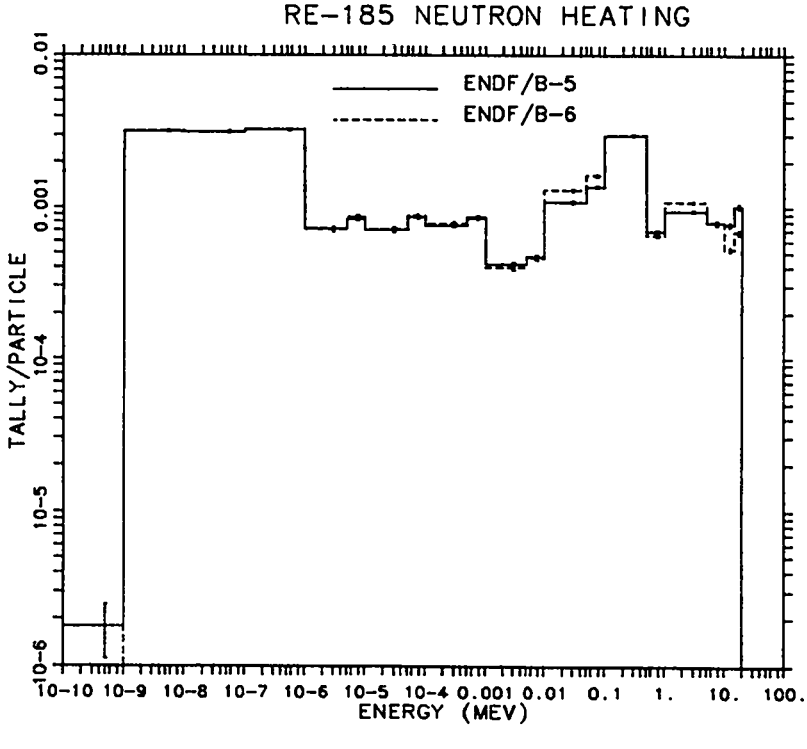

Fig. 232. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{185}Re sphere.

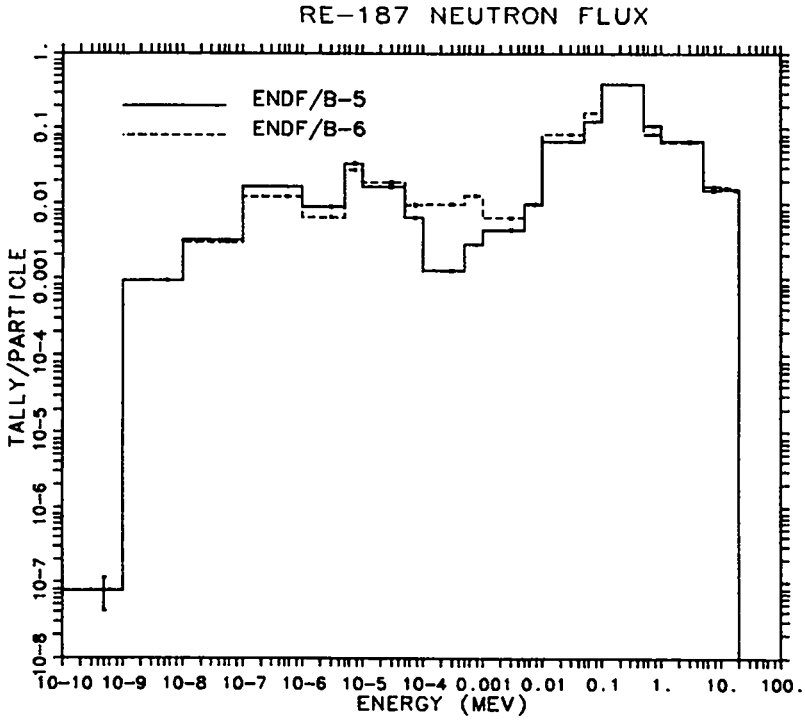

Fig. 233. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{187}Re sphere.

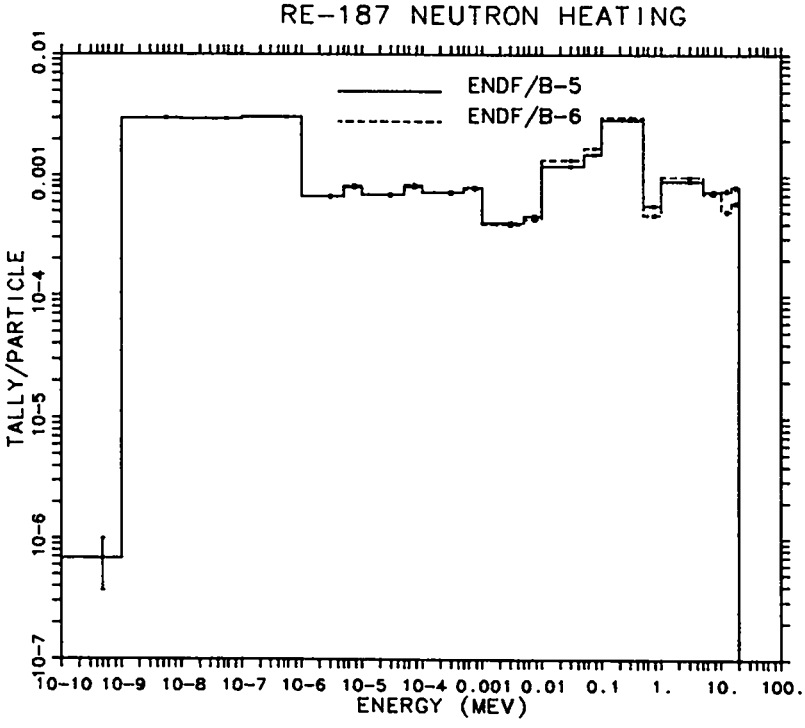

Fig. 234. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{187}Re sphere.

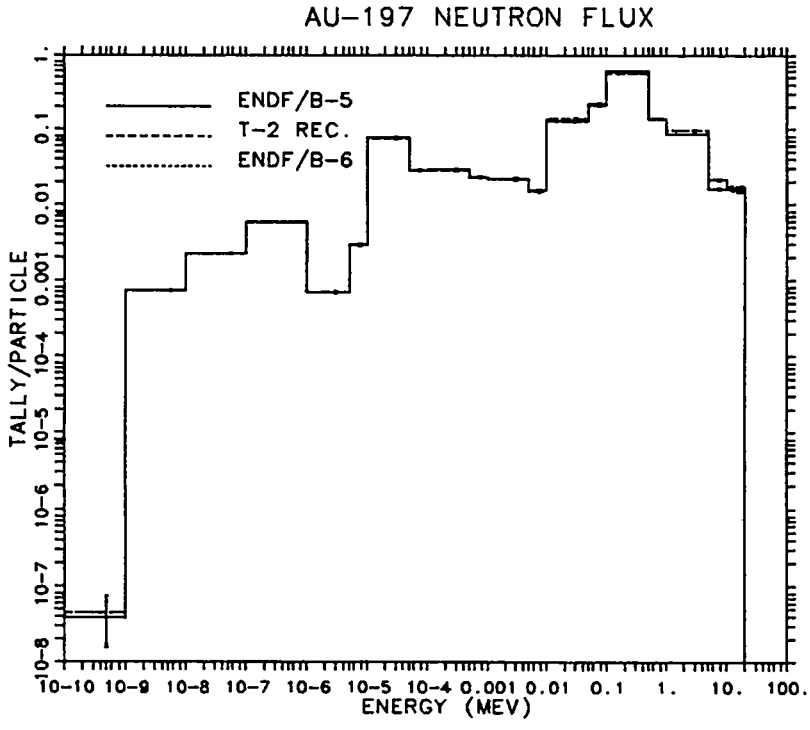

Fig. 235. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{197}Au sphere.

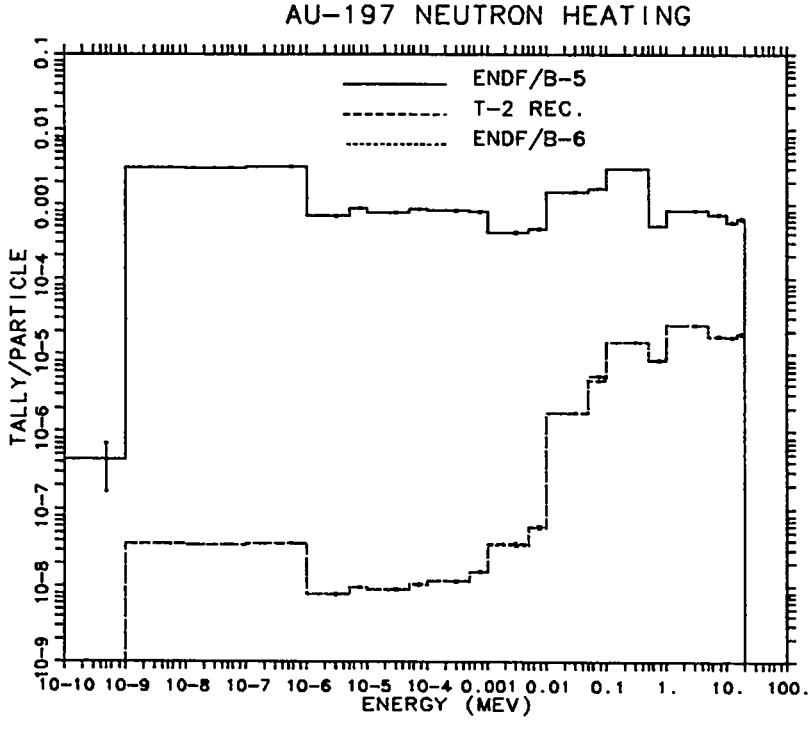

Fig. 236. Plot of ENDF/B-V, MCNP Recommended, and ENDF/B-VI calculated neutron heating for the ^{197}Au sphere.

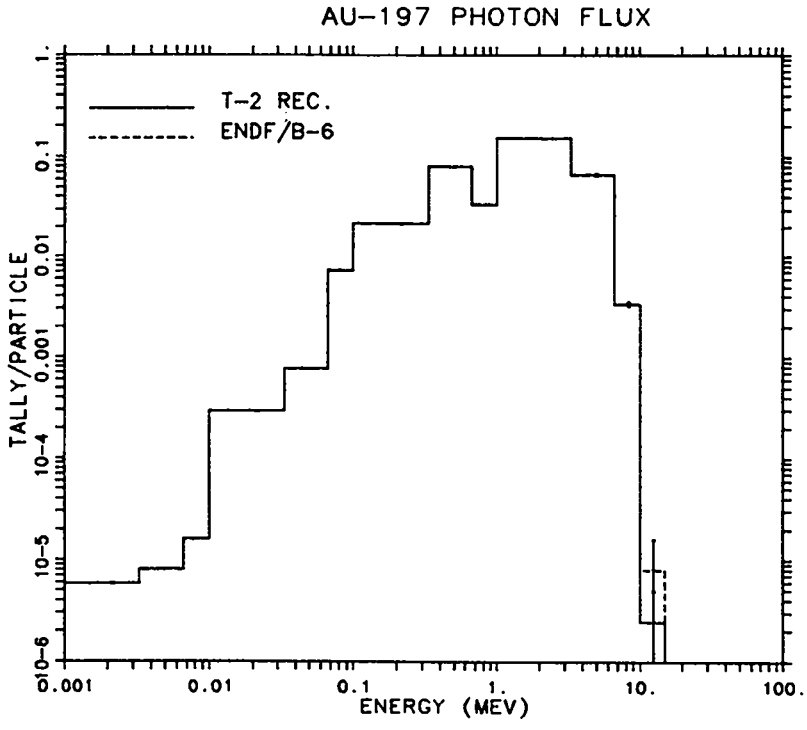

Fig. 237. Plot of MCNP Recommended and ENDF/B-VI calculated photon flux for the ^{197}Au sphere.

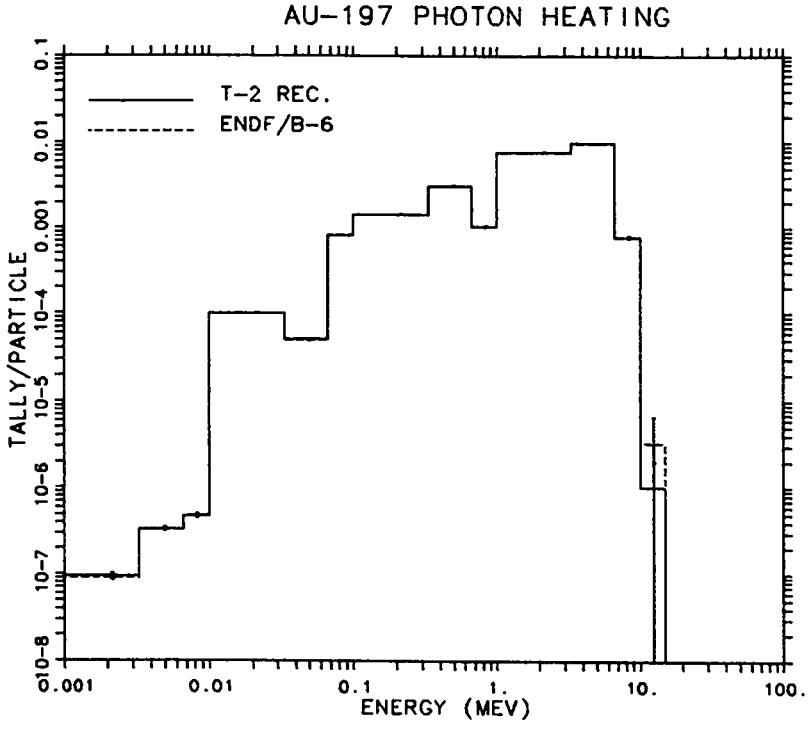

Fig. 238. Plot of MCNP Recommended and ENDF/B-VI calculated photon heating for the ^{197}Au sphere.

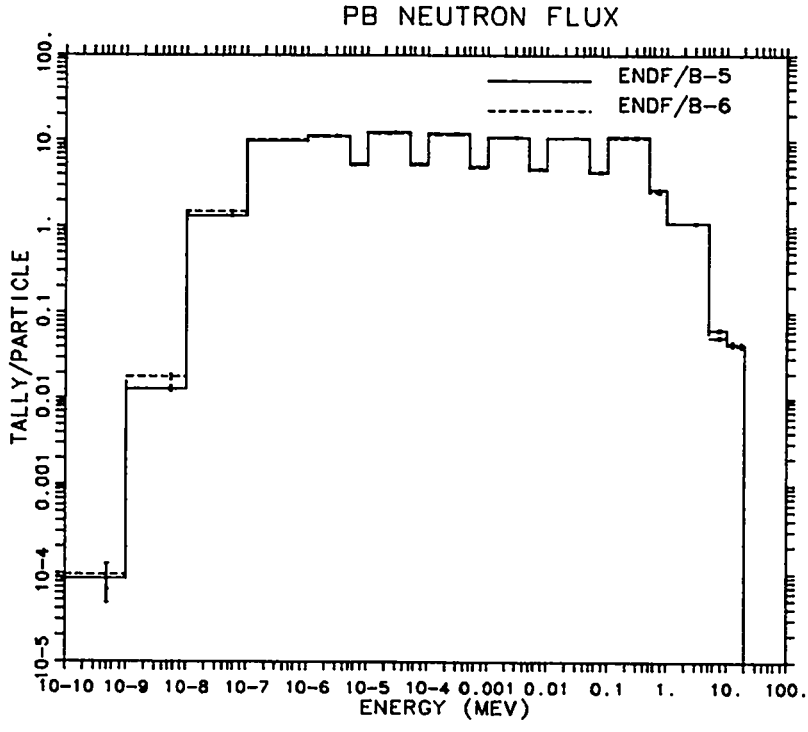

Fig. 239. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated neutron flux for a 10000 cm radius lead sphere. The atom percent of isotopic ENDF/B-VI was: ^{206}Pb-24.1%, ^{207}Pb-22.1%, and ^{208}Pb-52.4%.

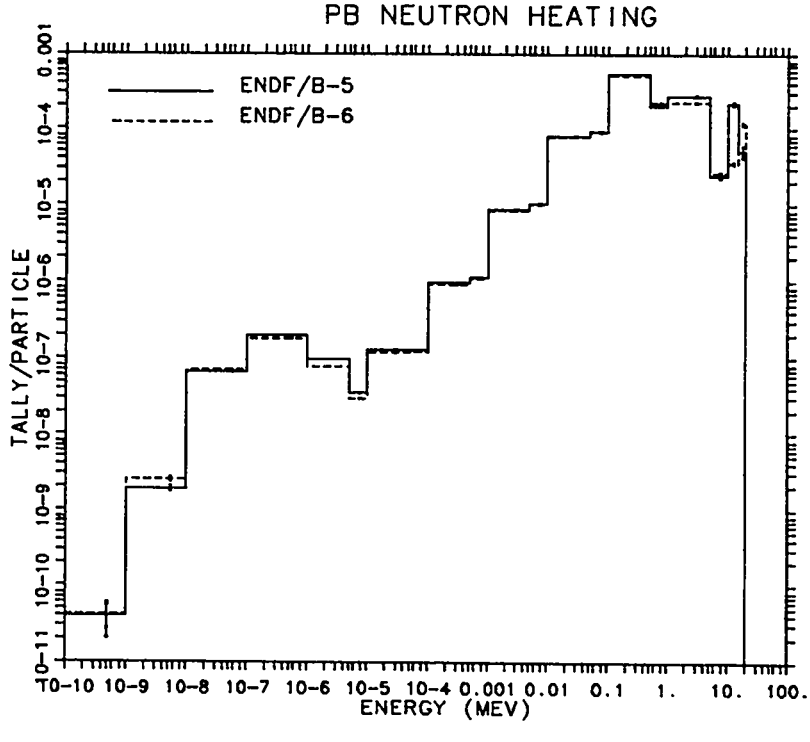

Fig. 240. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated neutron heating for the lead sphere.

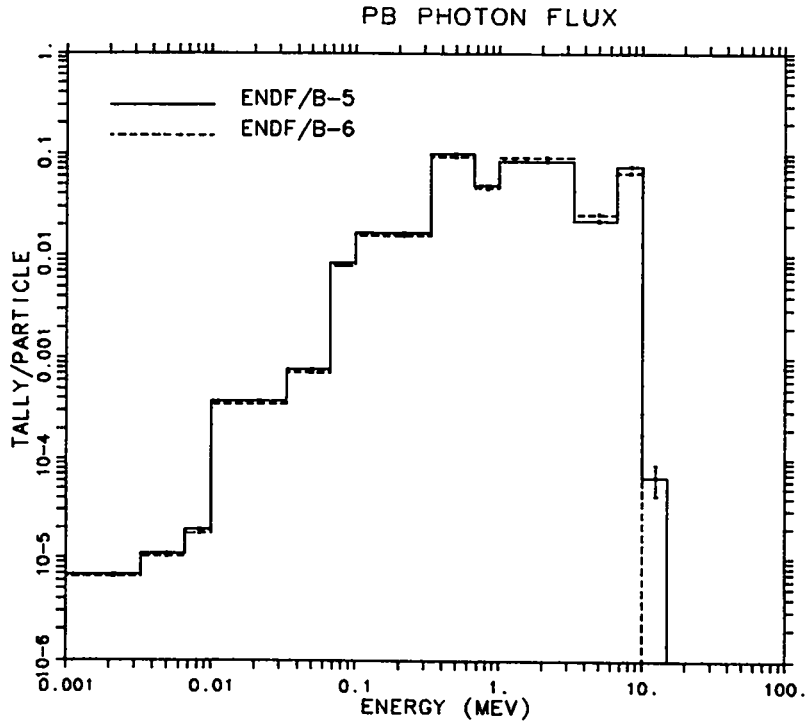

Fig. 241. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated photon flux for the lead sphere.

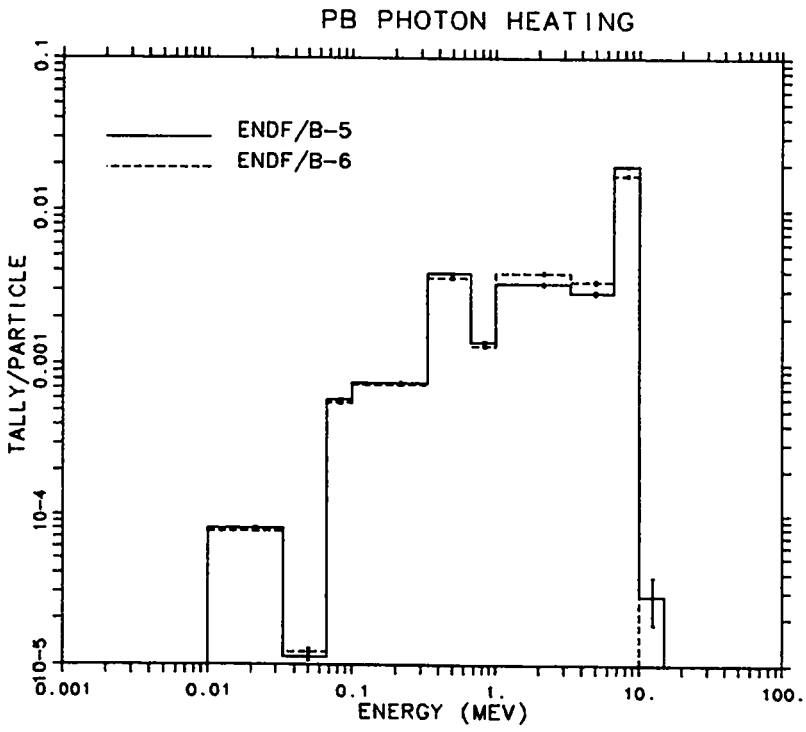

Fig. 242. Plot of elemental ENDF/B-V and isotopic ENDF/B-VI calculated photon heating for the lead sphere.

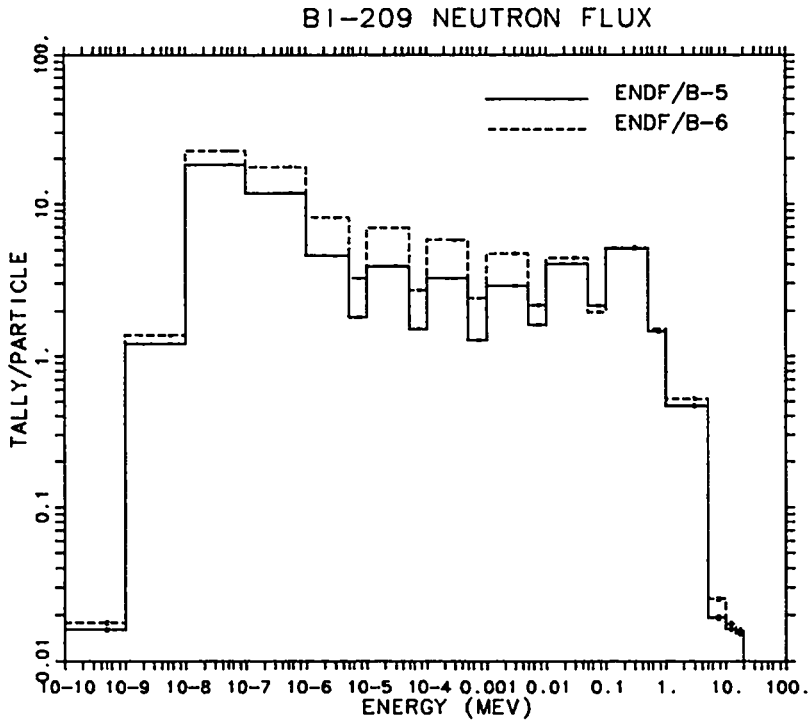

Fig. 243. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{209}Bi sphere.

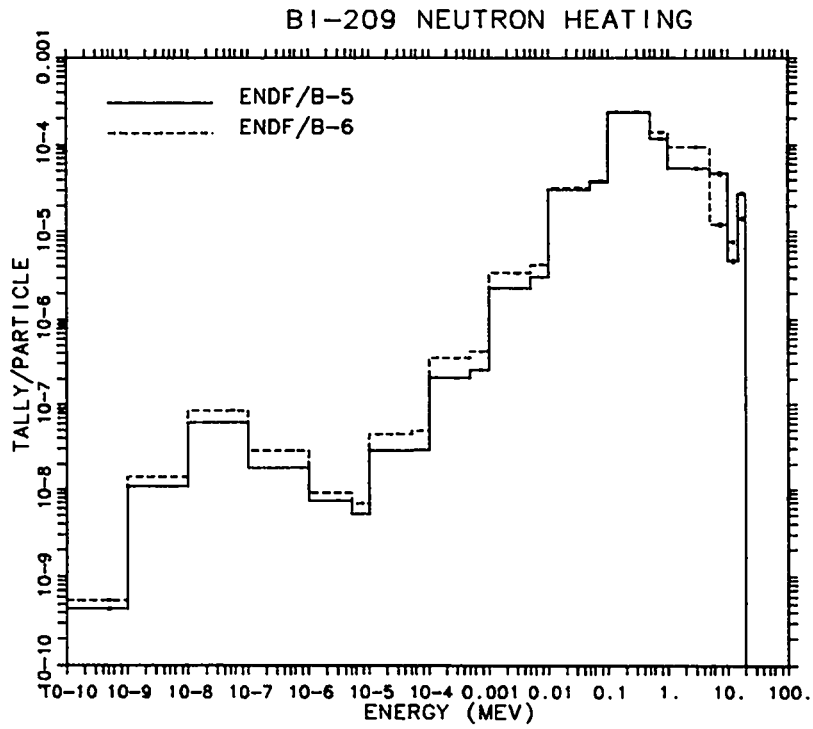

Fig. 244. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{209}Bi sphere.

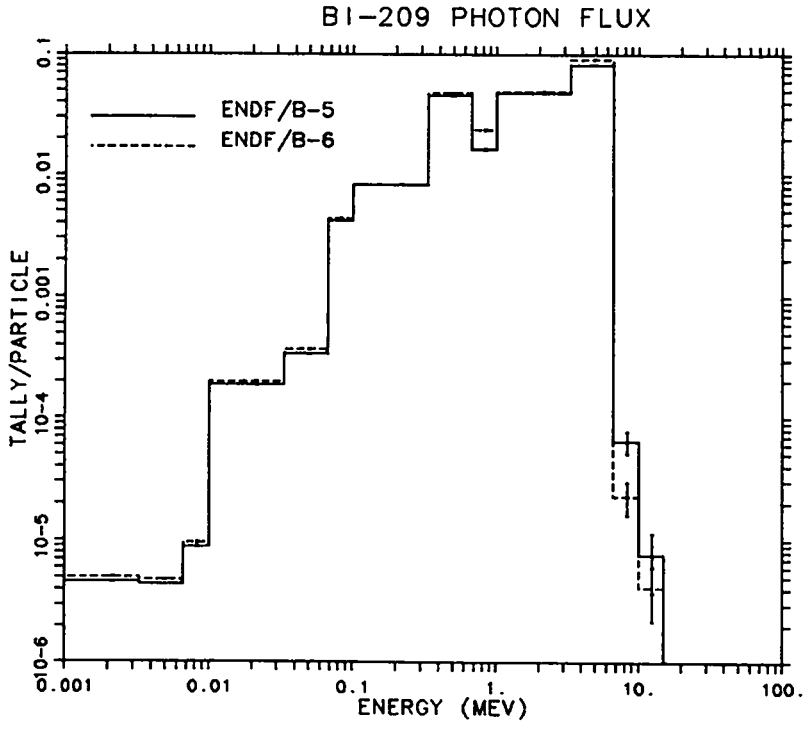

Fig. 245. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{209}Bi sphere.

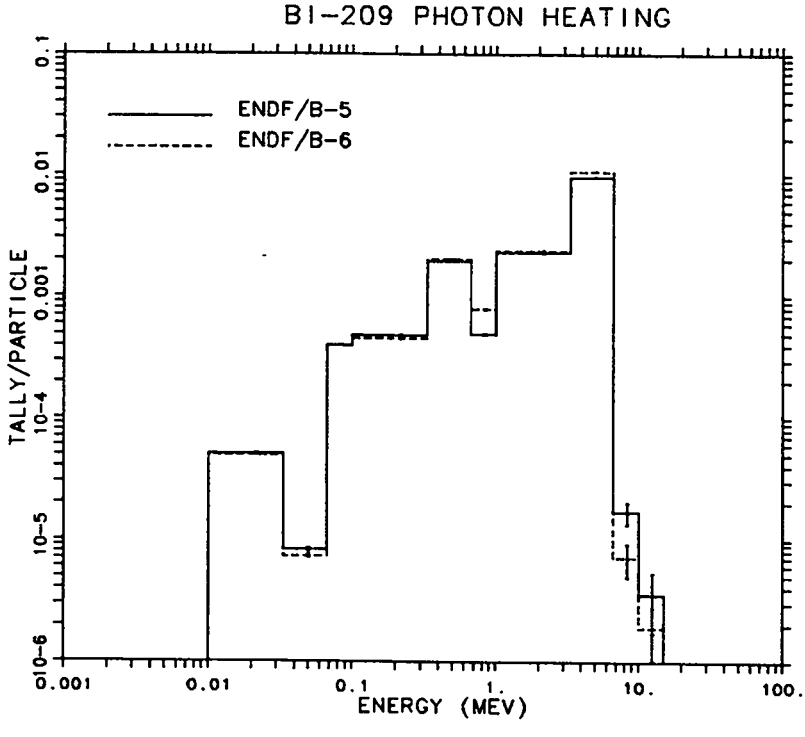

Fig. 246. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{209}Bi sphere.

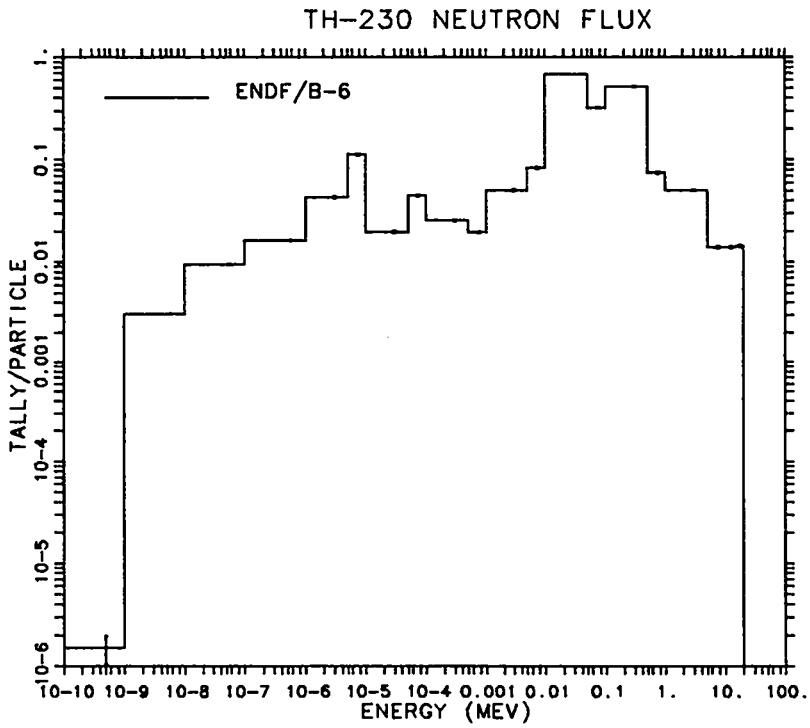

Fig. 247. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{230}Th sphere.

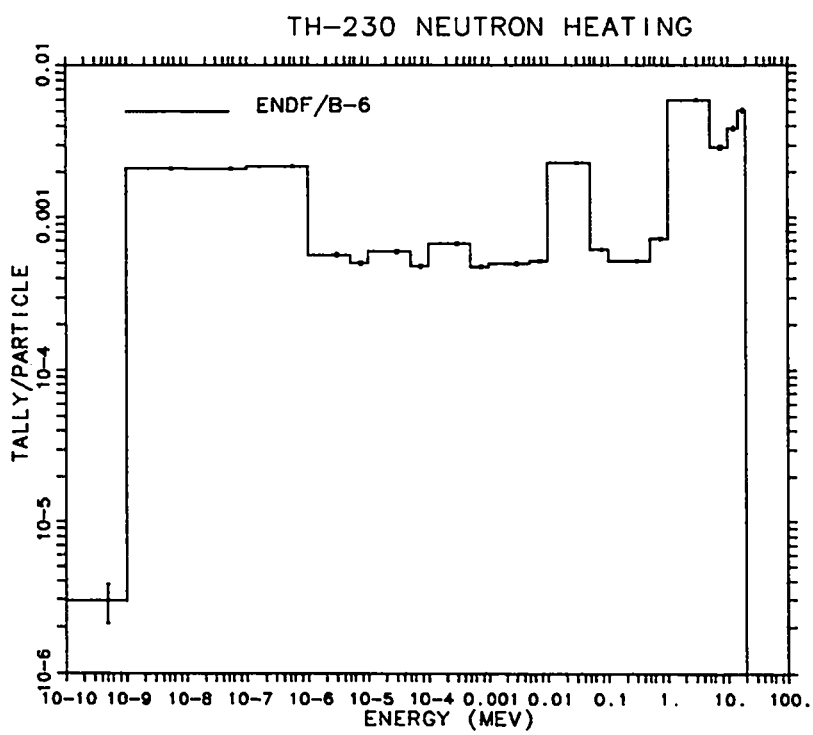

Fig. 248. Plot of ENDF/B-VI calculated neutron heating for the ^{230}Th sphere.

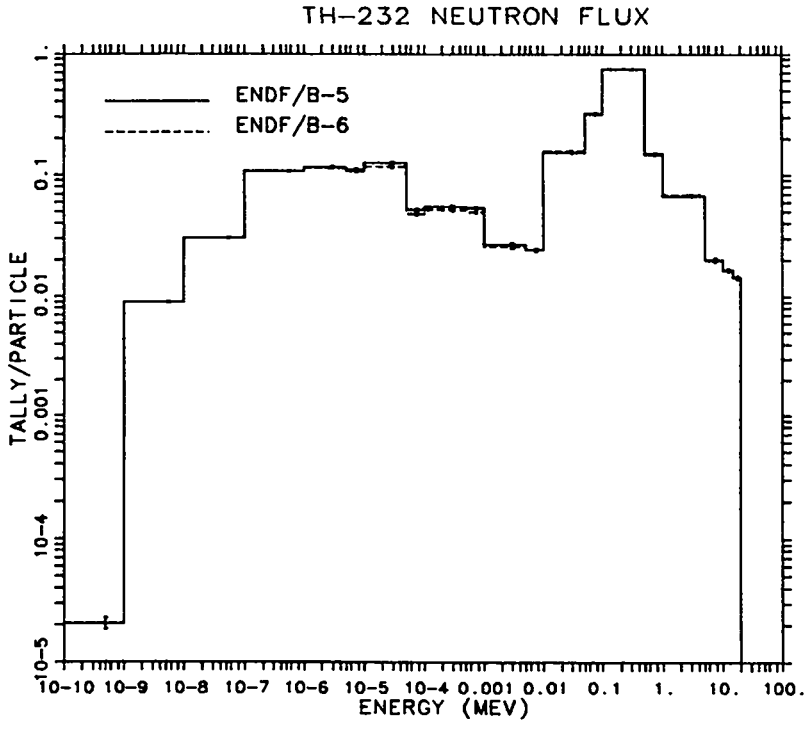

Fig. 249. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{232}Th sphere.

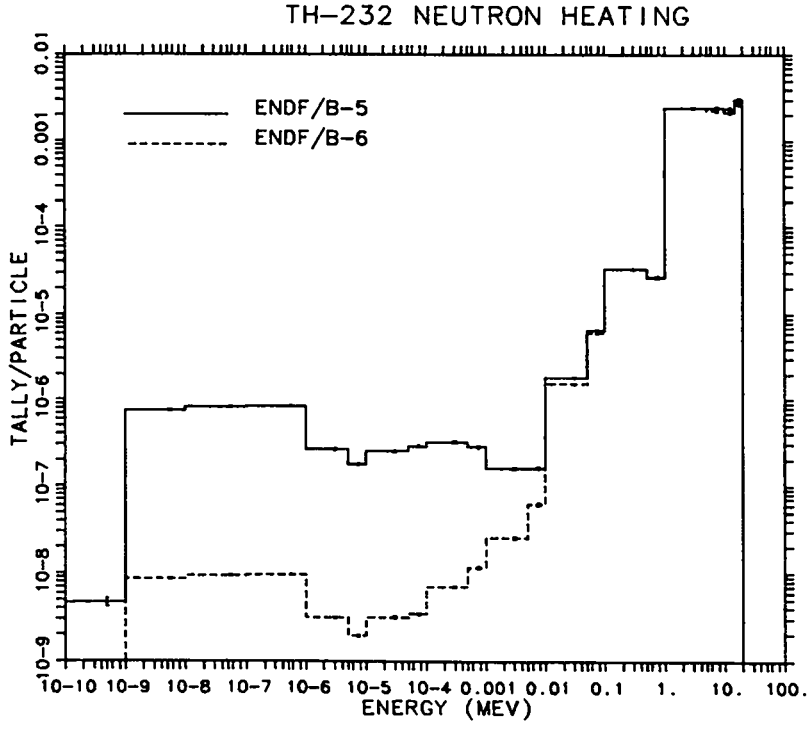

Fig. 250. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{232}Th sphere.

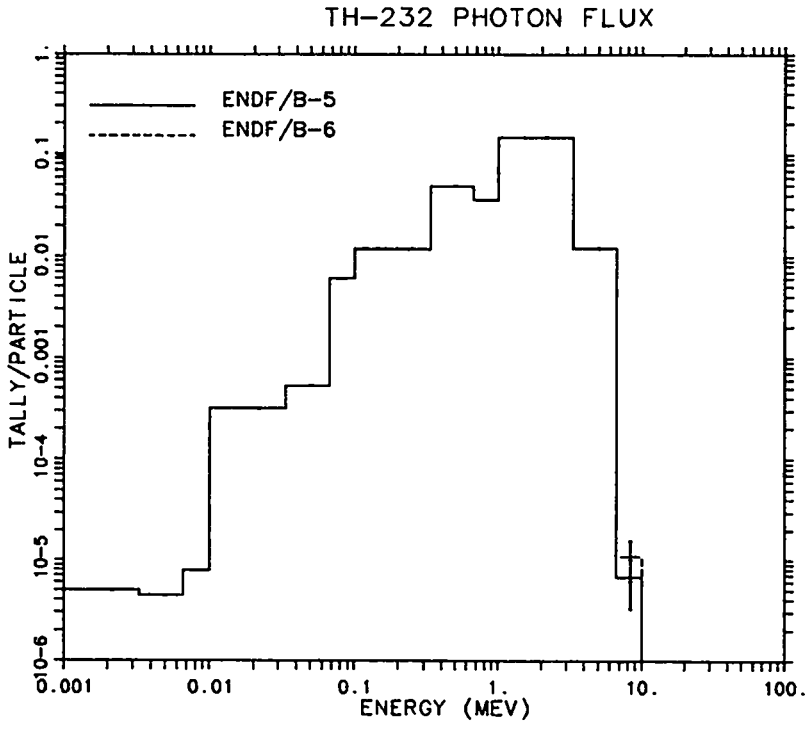

Fig. 251. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{232}Th sphere.

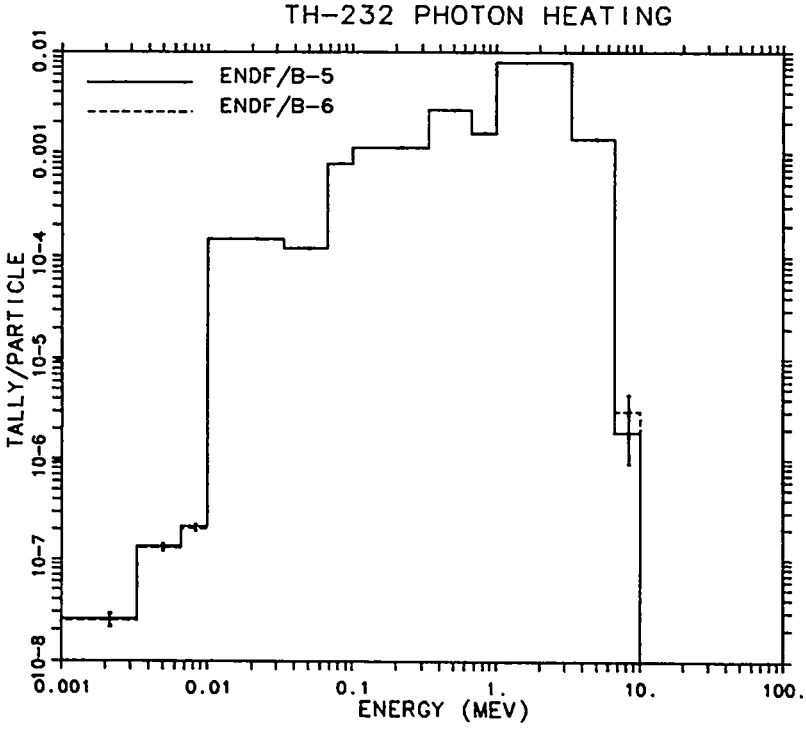

Fig. 252. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{232}Th sphere.

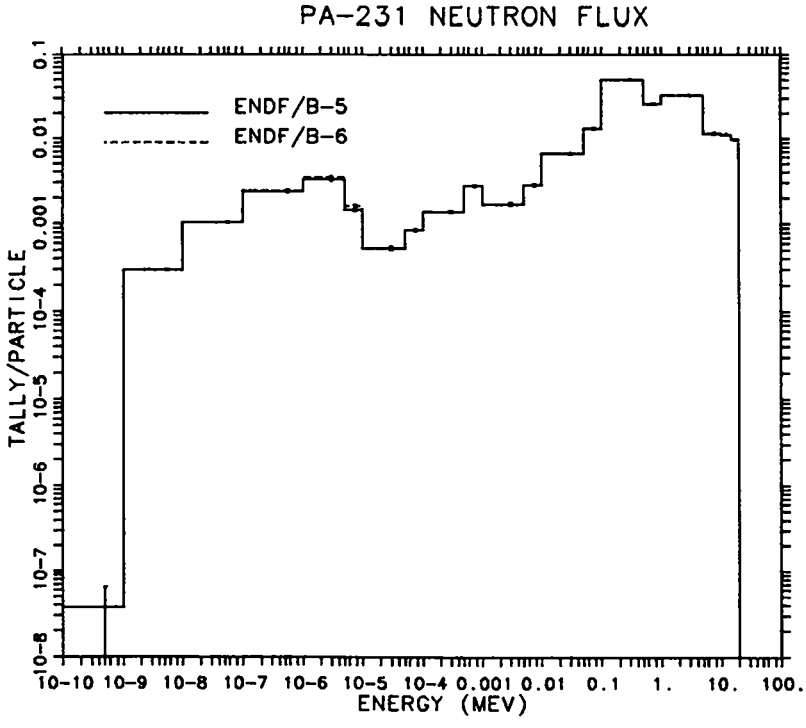

Fig. 253. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{231}Pa sphere. The ENDF/B-V evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

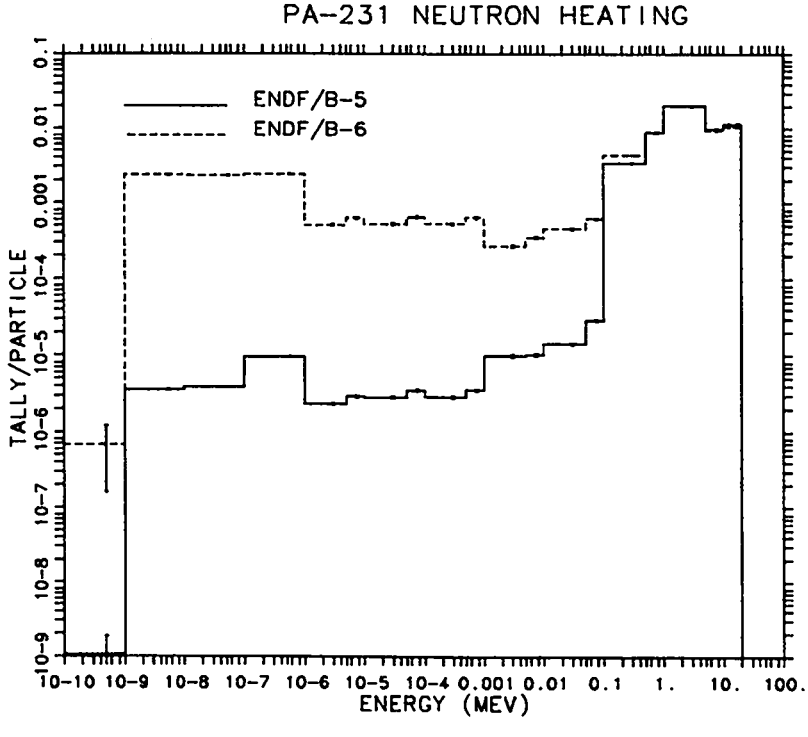

Fig. 254. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{231}Pa sphere. The ENDF/B-V evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

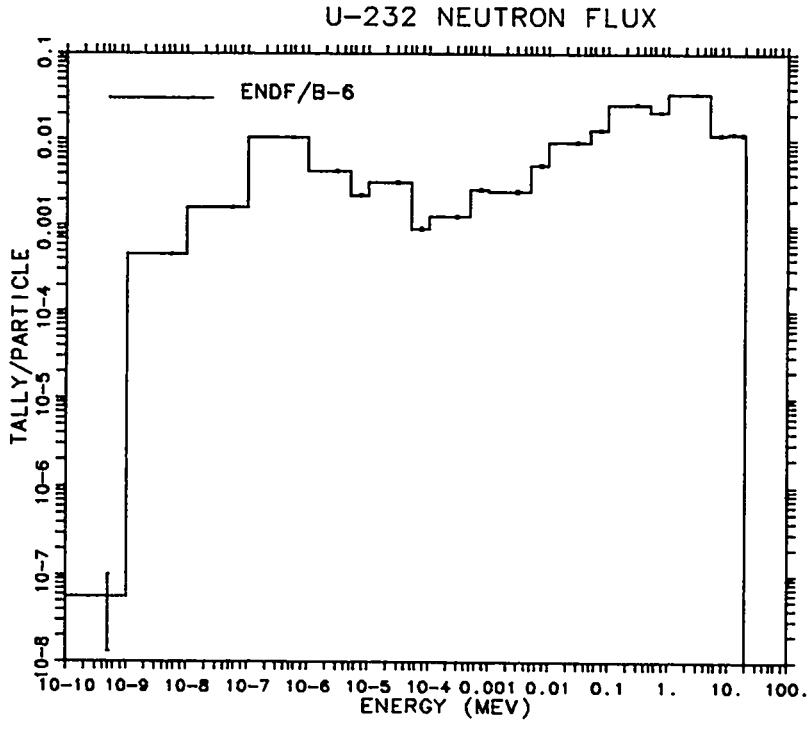

Fig. 255. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{232}U sphere.

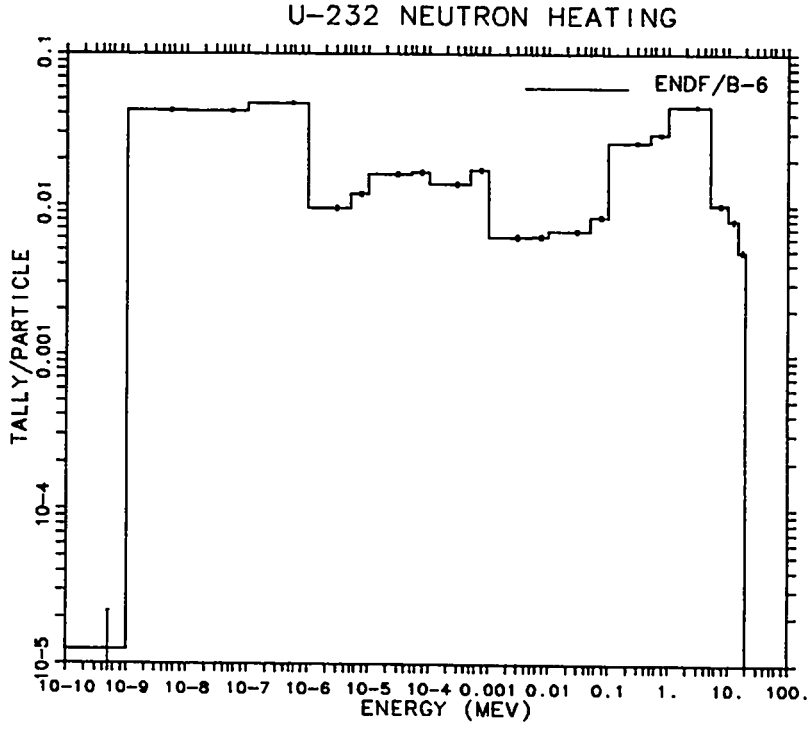

Fig. 256. Plot of ENDF/B-VI calculated neutron heating for the ^{232}U sphere.

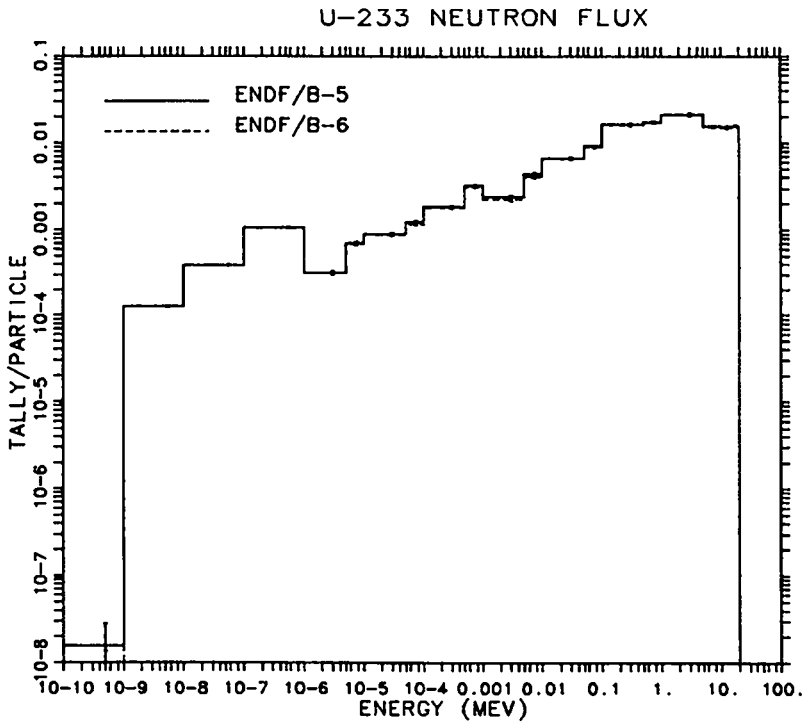

Fig. 257. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{233}U sphere.

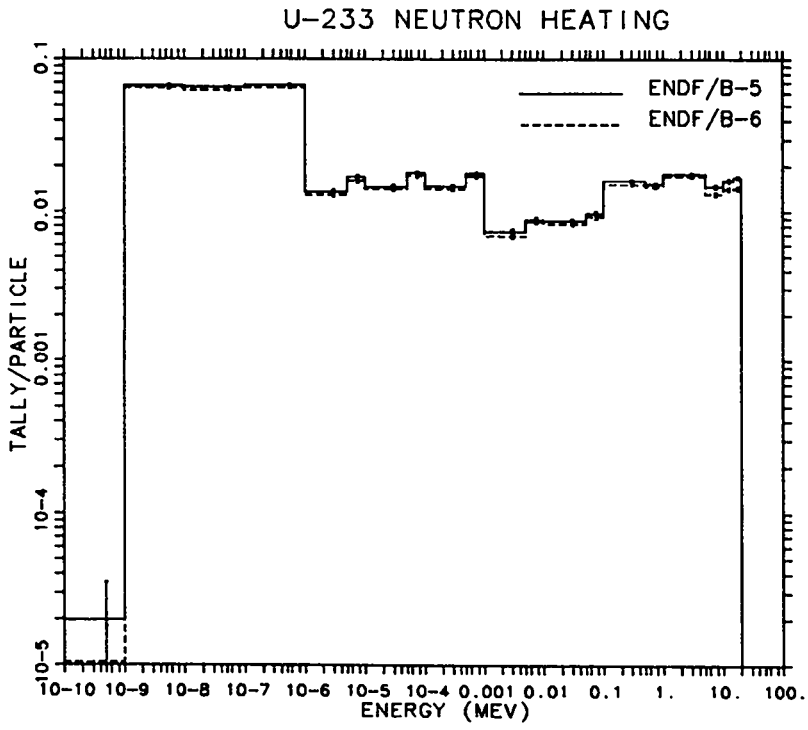

Fig. 258. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{233}U sphere.

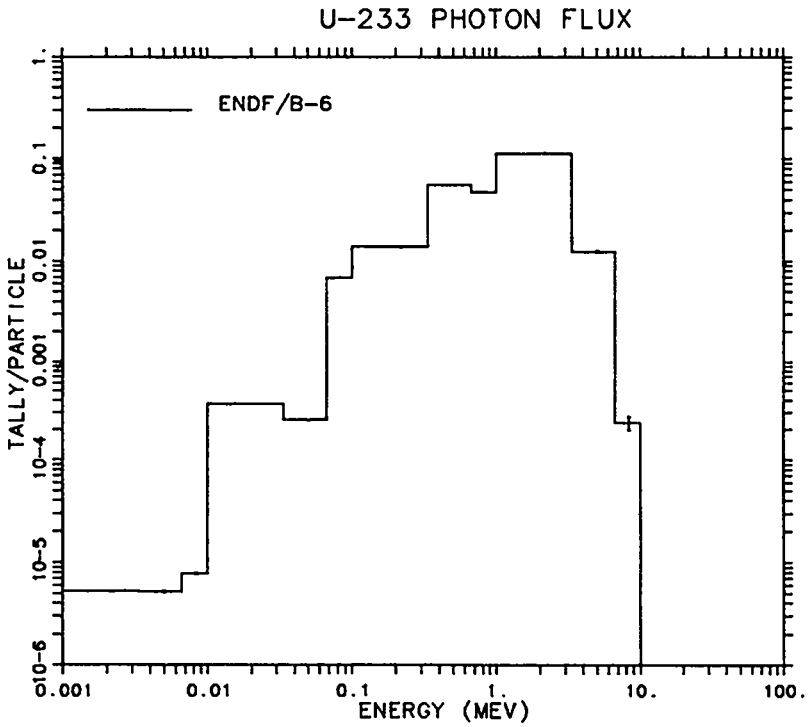

Fig. 259. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{233}U sphere.

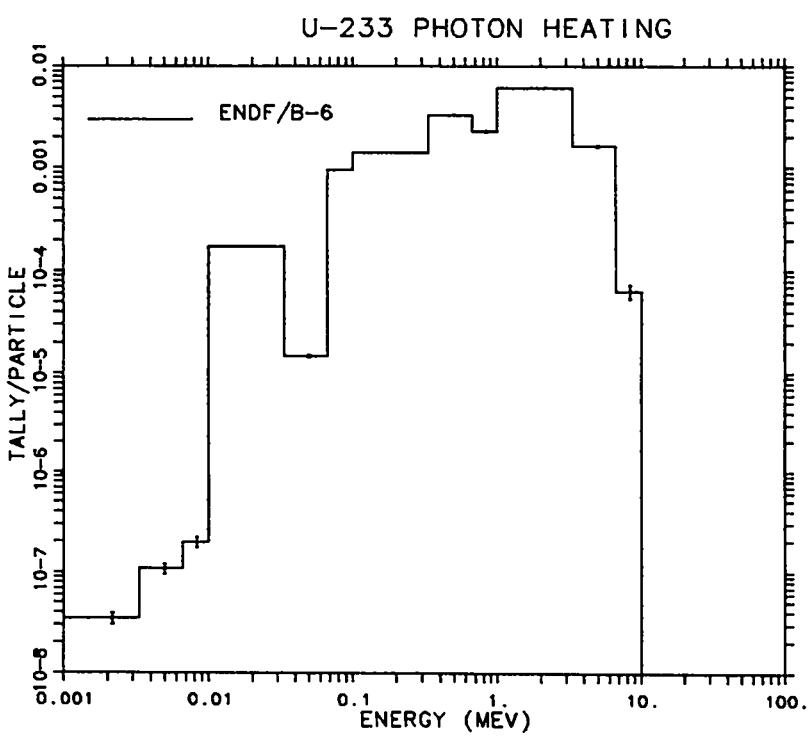

Fig. 260. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{233}U sphere.

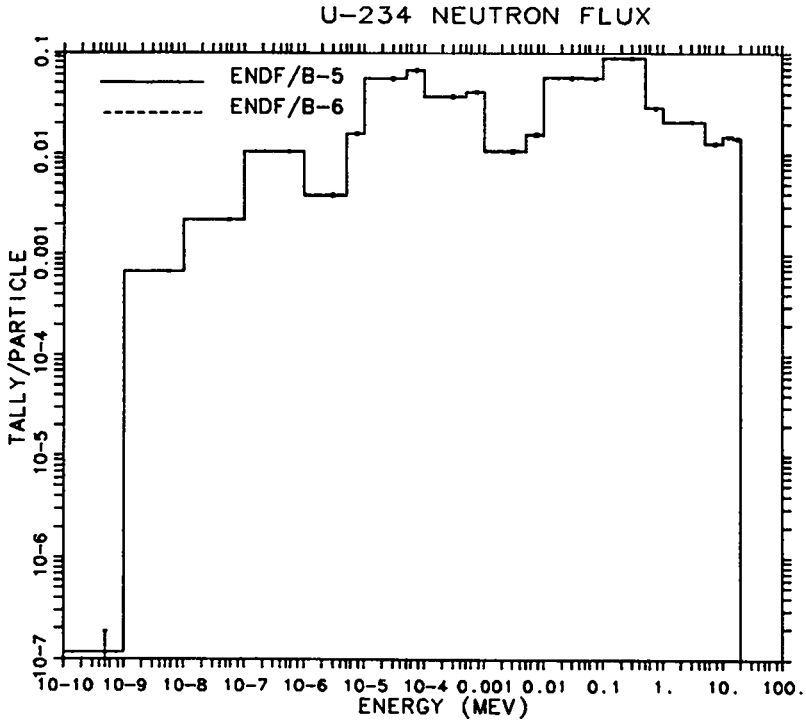

Fig. 261. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{234}U sphere.

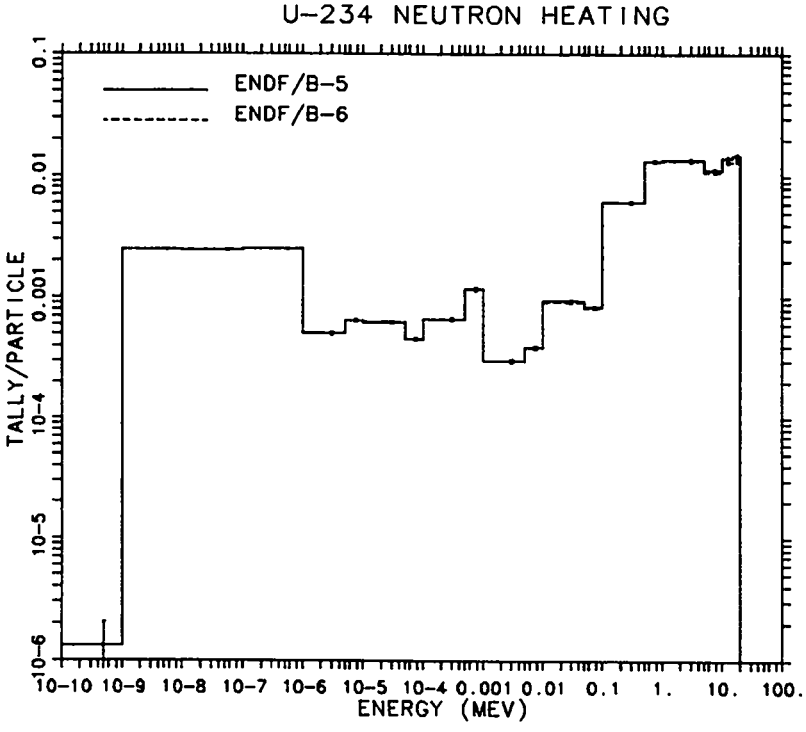

Fig. 262. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{234}U sphere.

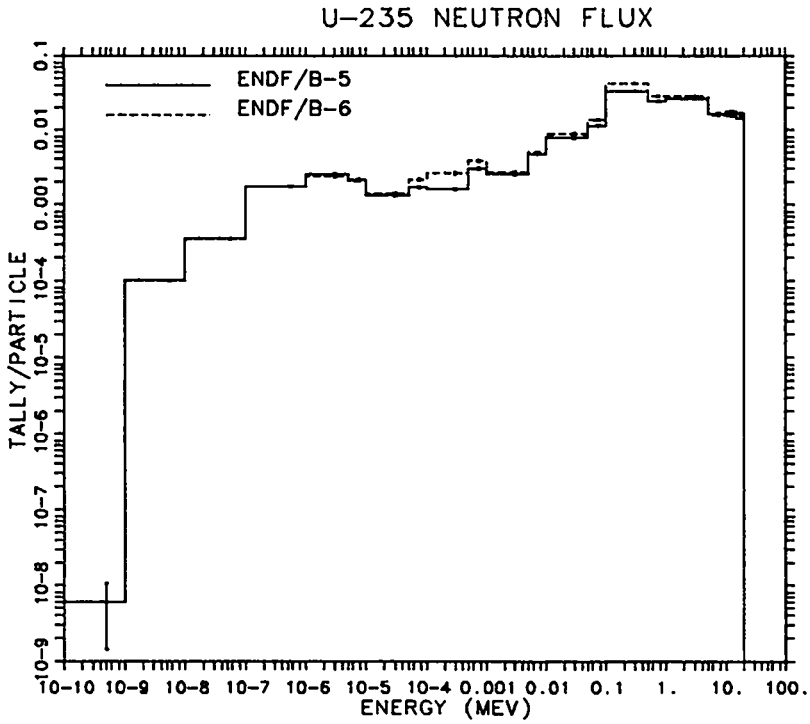

Fig. 263. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{235}U sphere.

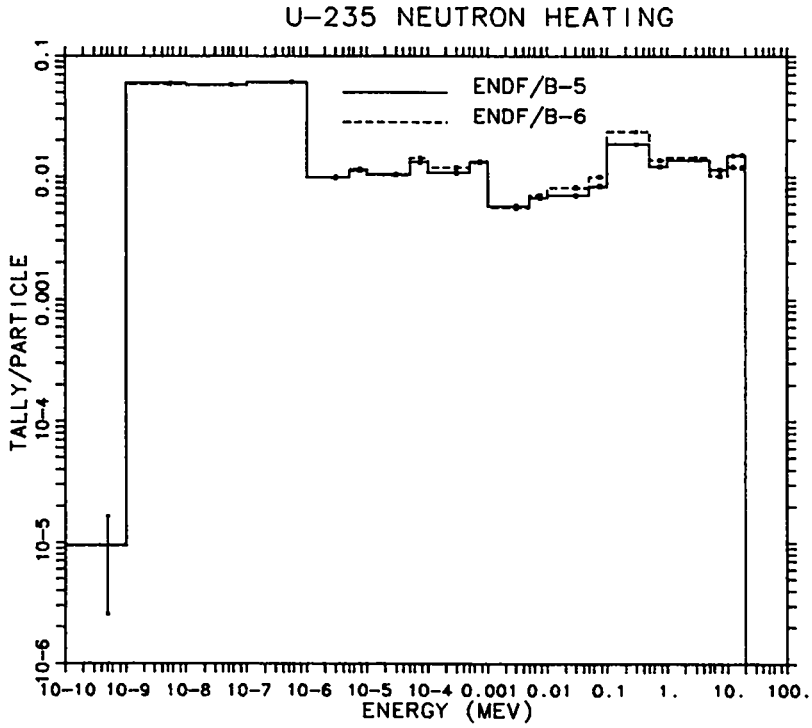

Fig. 264. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{235}U sphere.

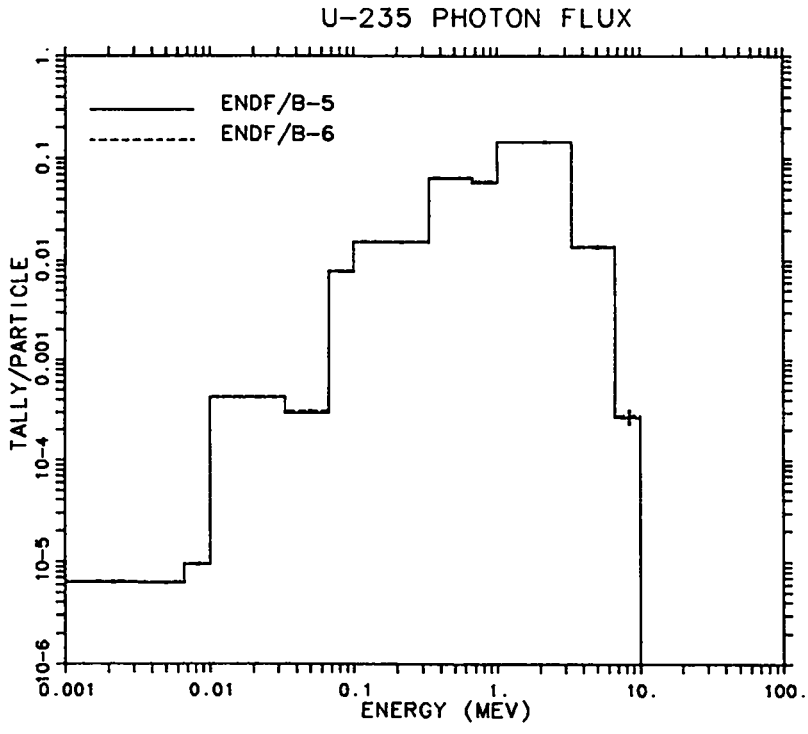

Fig. 265. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{235}U sphere.

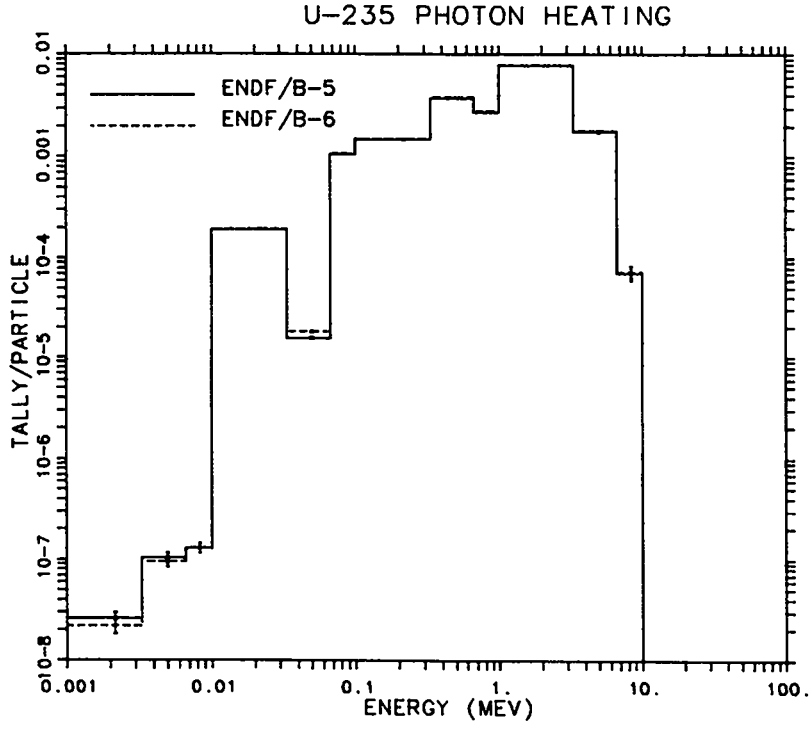

Fig. 266. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{235}U sphere.

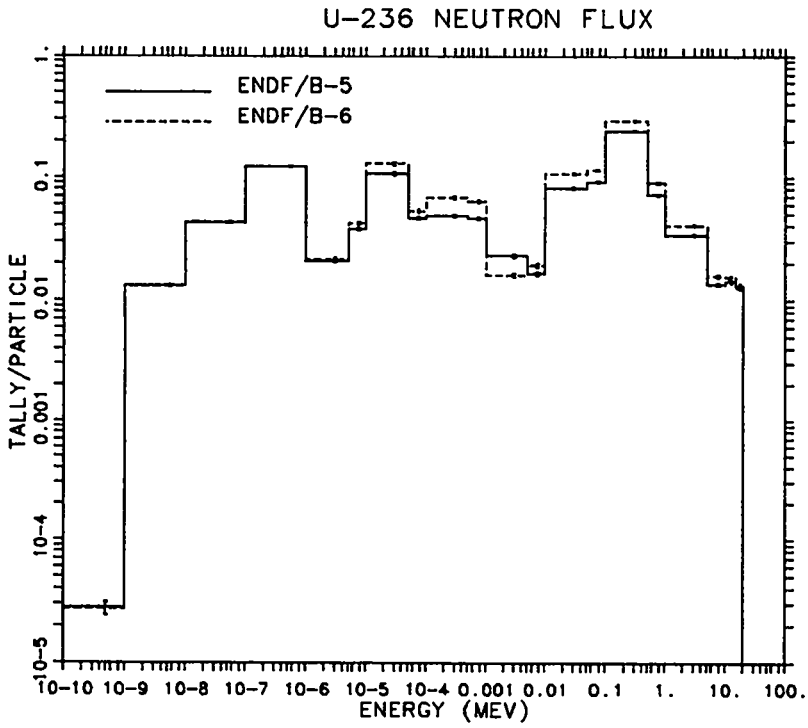

Fig. 267. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{236}U sphere.

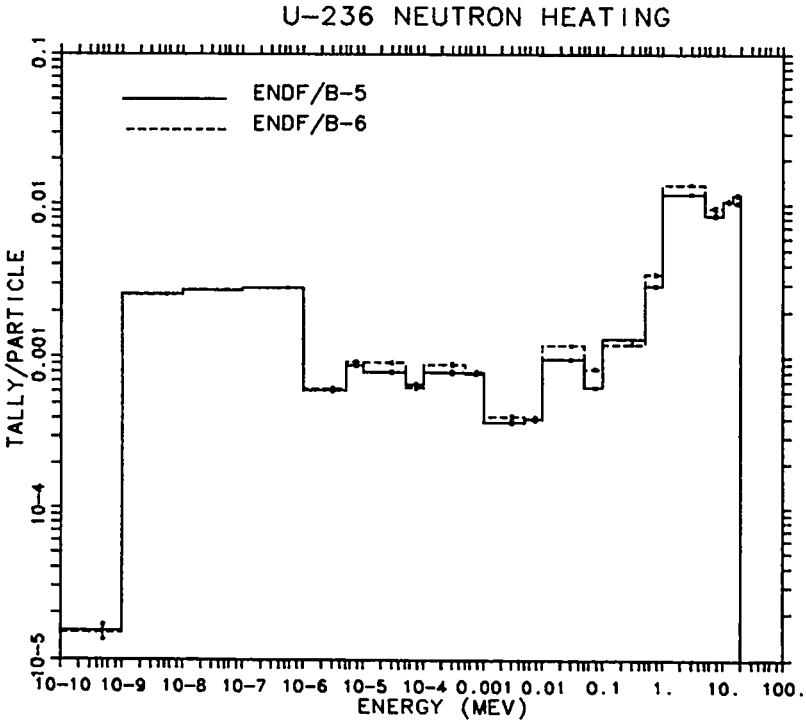

Fig. 268. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{236}U sphere.

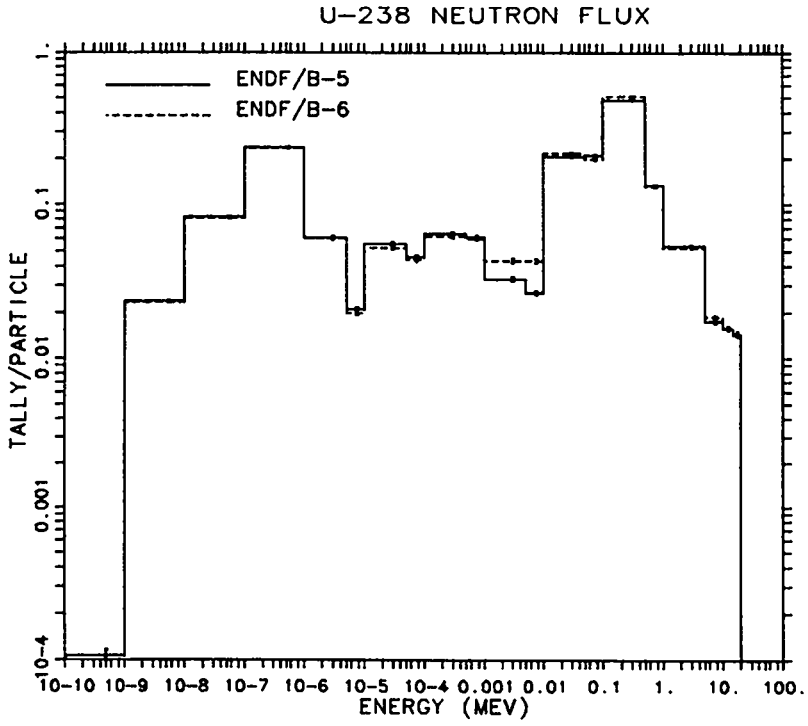

Fig. 269. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{238}U sphere.

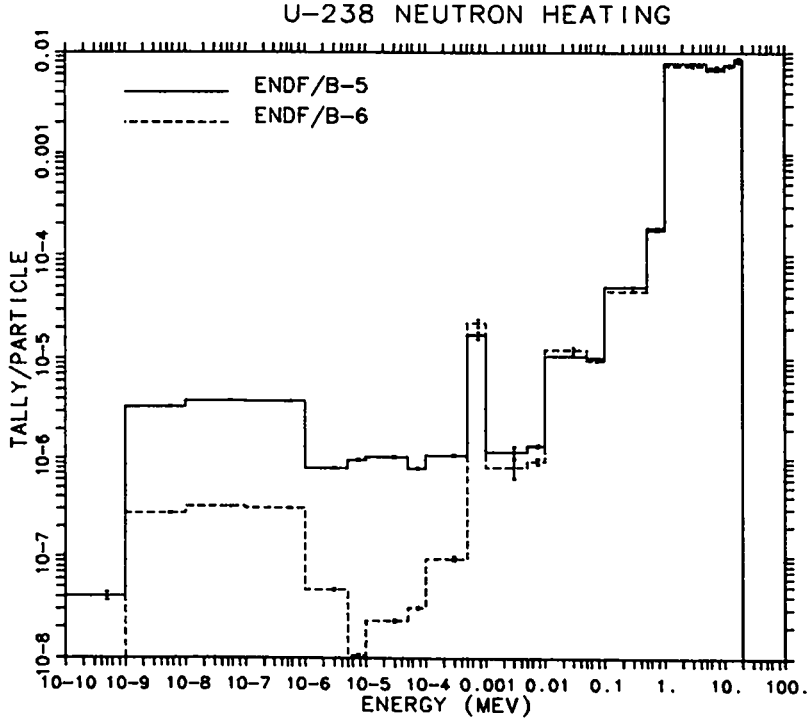

Fig. 270. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{238}U sphere.

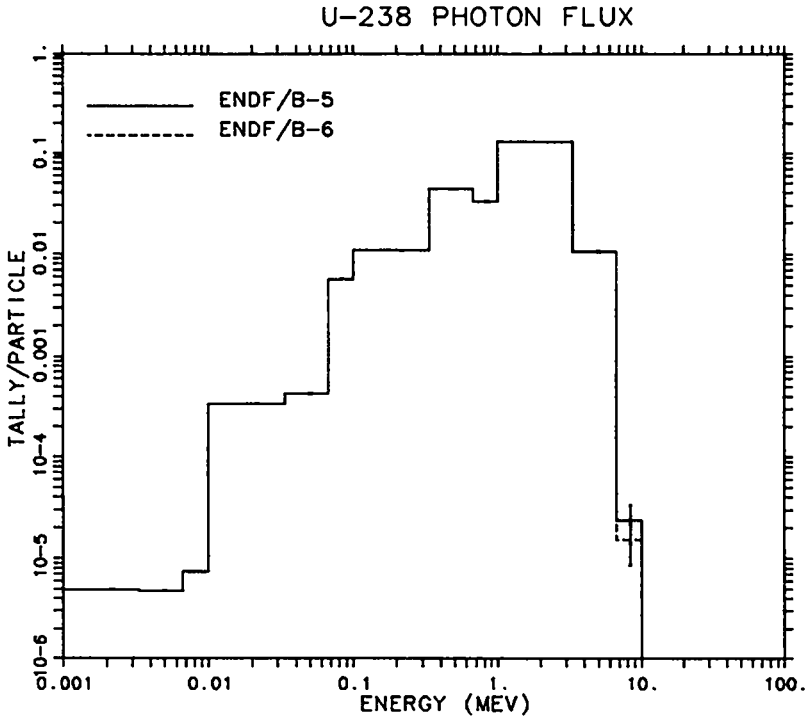

Fig. 271. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{238}U sphere.

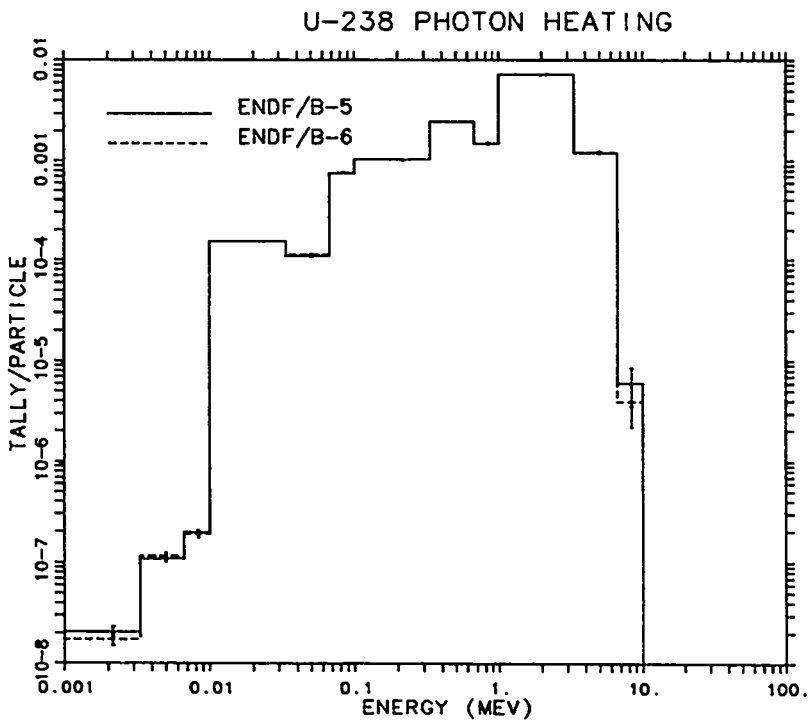

Fig. 272. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{238}U sphere.

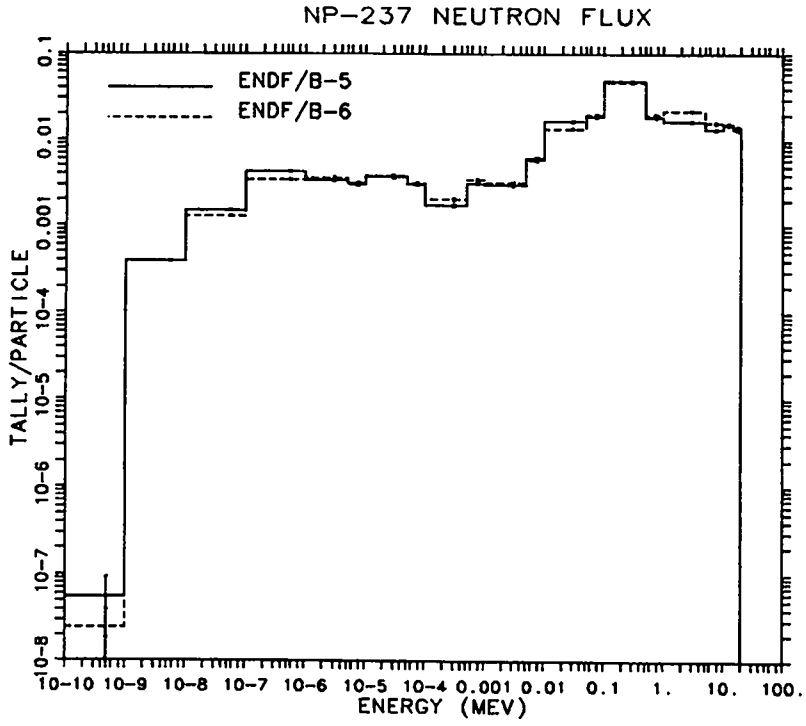

Fig. 273. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{237}Np sphere.

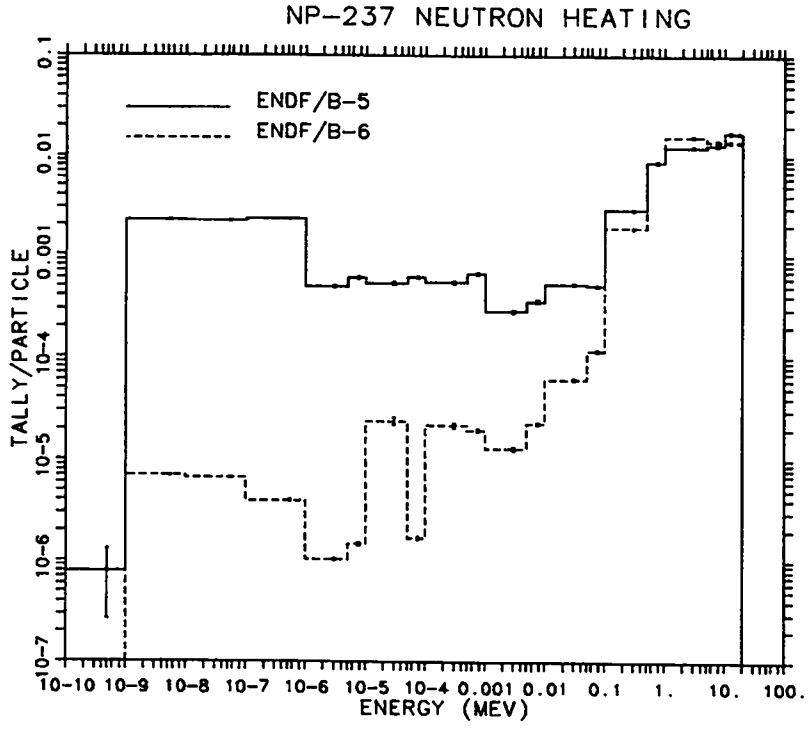

Fig. 274. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{237}Np sphere.

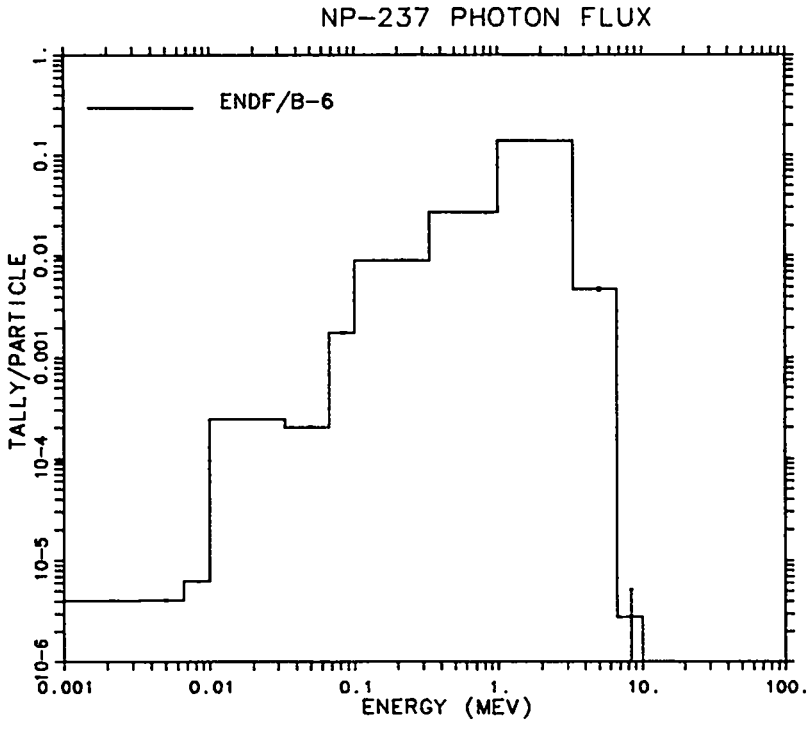

Fig. 275. Plot of ENDF/B-VI calculated photon flux for the ^{237}Np sphere.

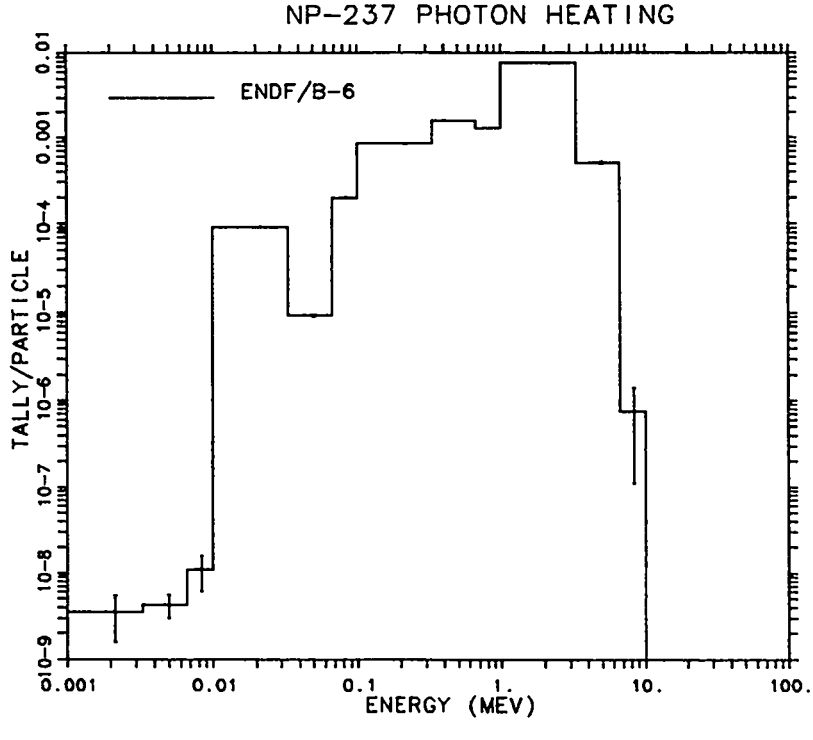

Fig. 276. Plot of ENDF/B-VI calculated photon heating for the ^{237}Np sphere.

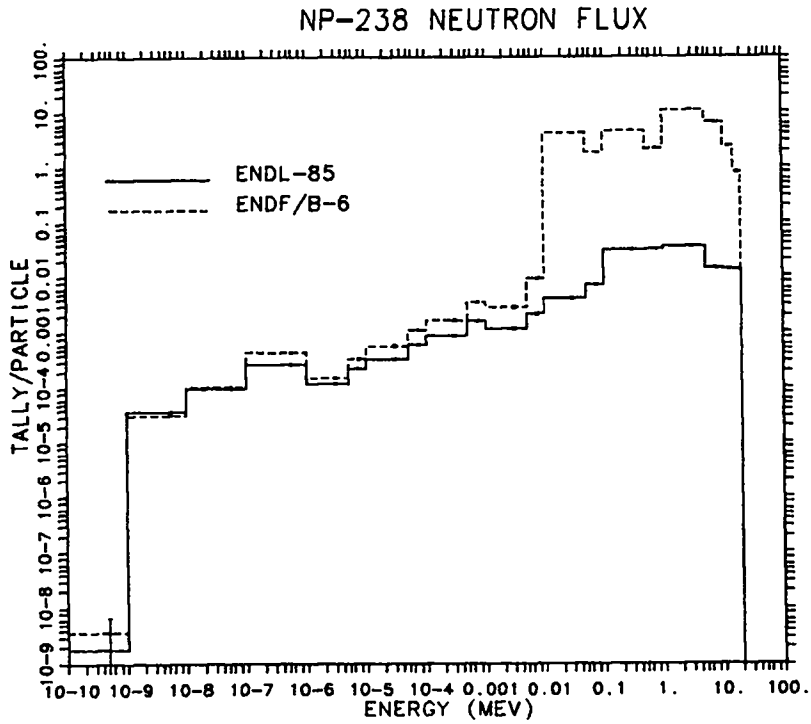

Fig. 277. Plot of ENDL-85 and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{238}Np sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

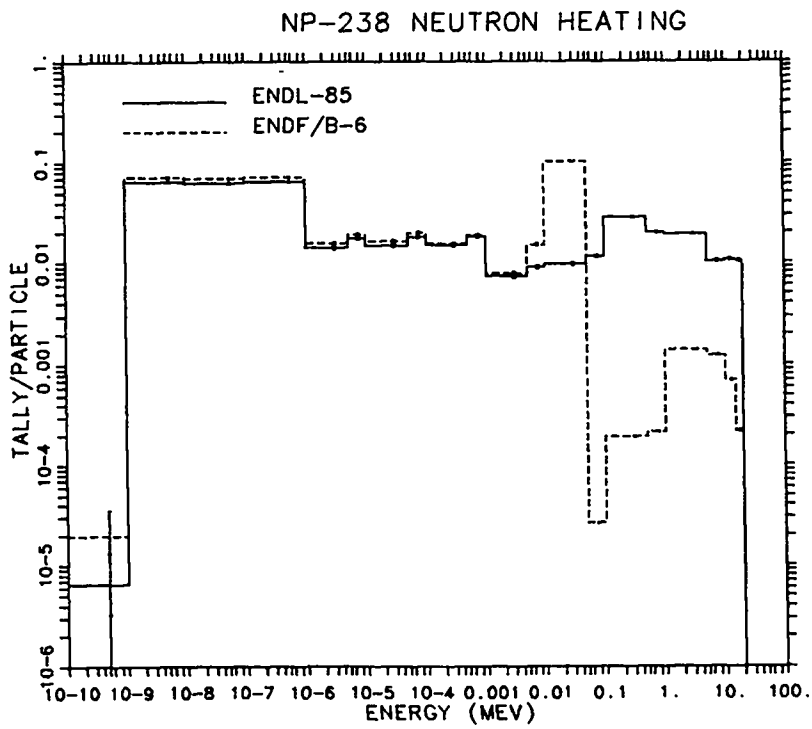

Fig. 278. Plot of ENDL-85 and ENDF/B-VI calculated neutron heating for the ^{238}Np sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

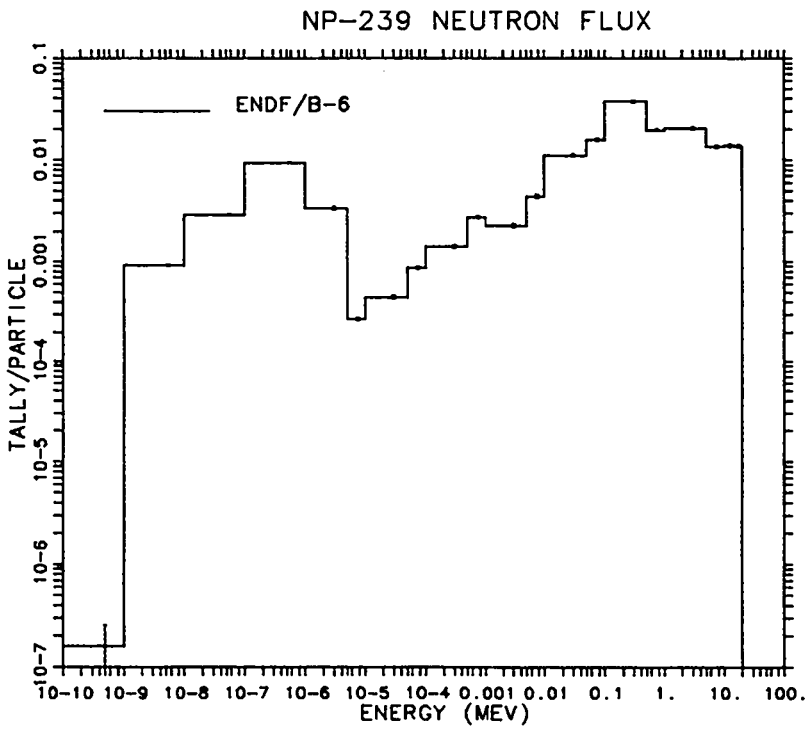

Fig. 279. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{239}Np sphere.

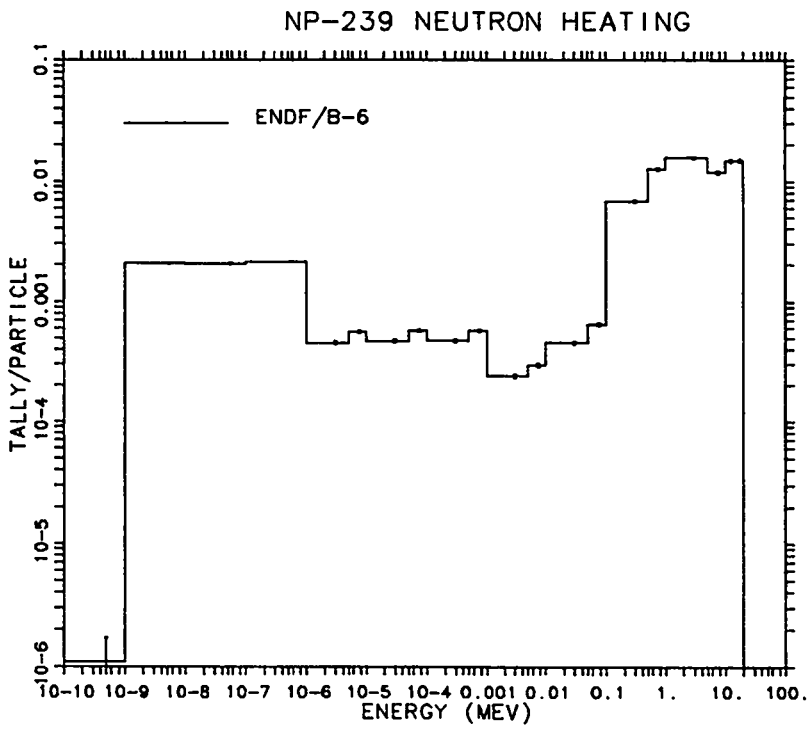

Fig. 280. Plot of ENDF/B-VI calculated neutron heating for the ^{239}Np sphere.

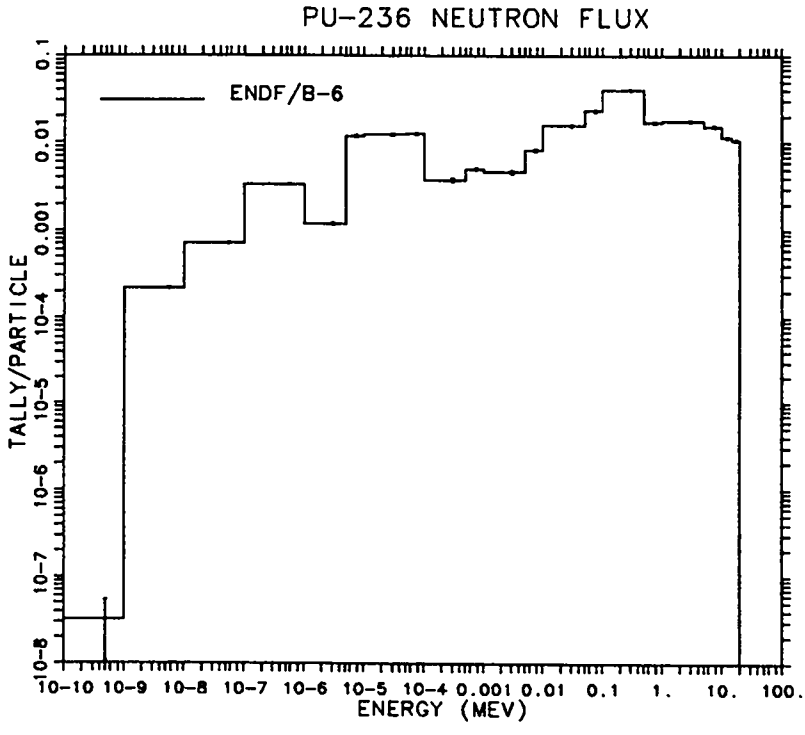

Fig. 281. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{236}Pu sphere.

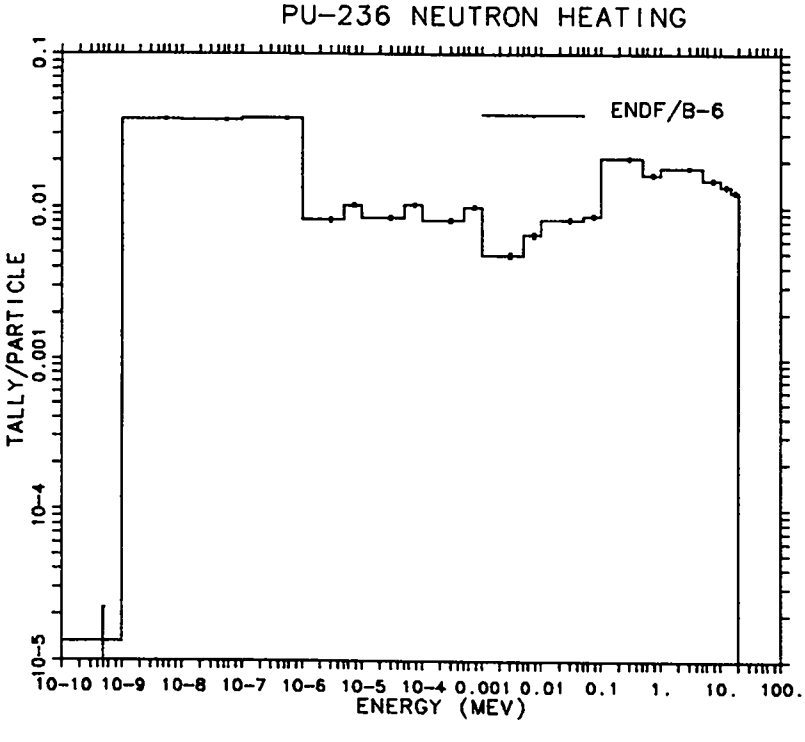

Fig. 282. Plot of ENDF/B-VI calculated neutron heating for the ^{236}Pu sphere.

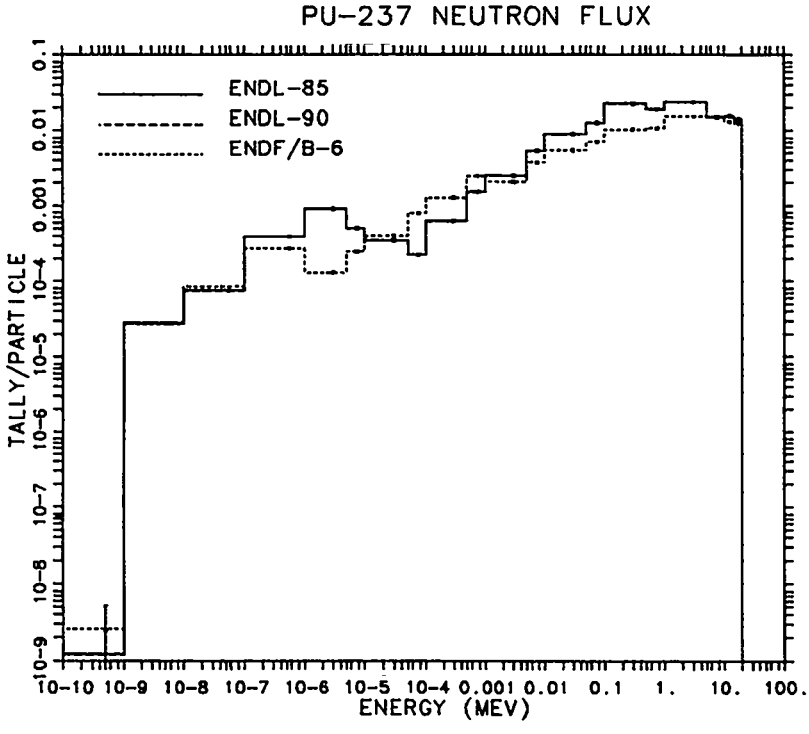

Fig. 283. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{237}Pu sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

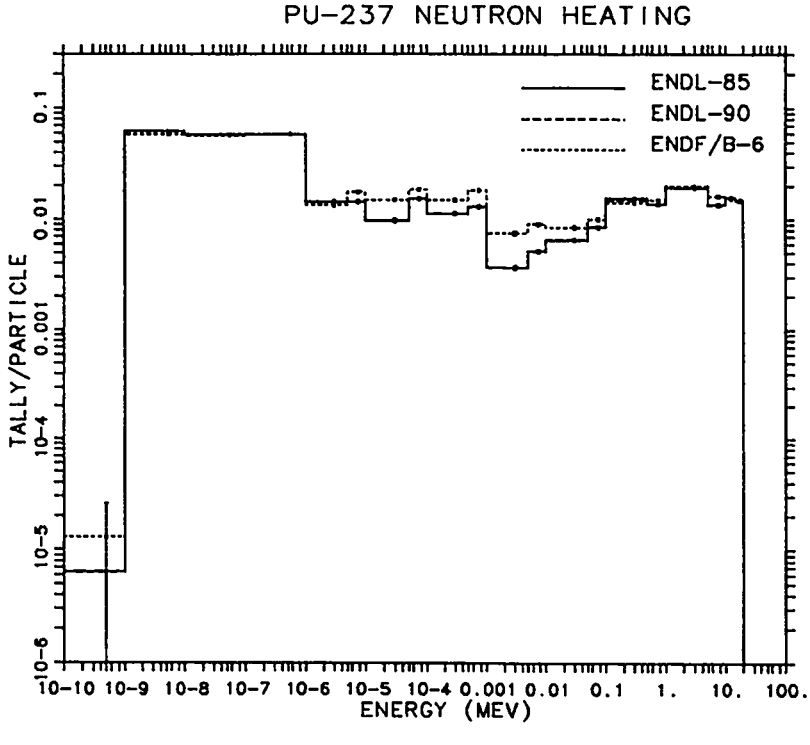

Fig. 284. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron heating for the ^{237}Pu sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

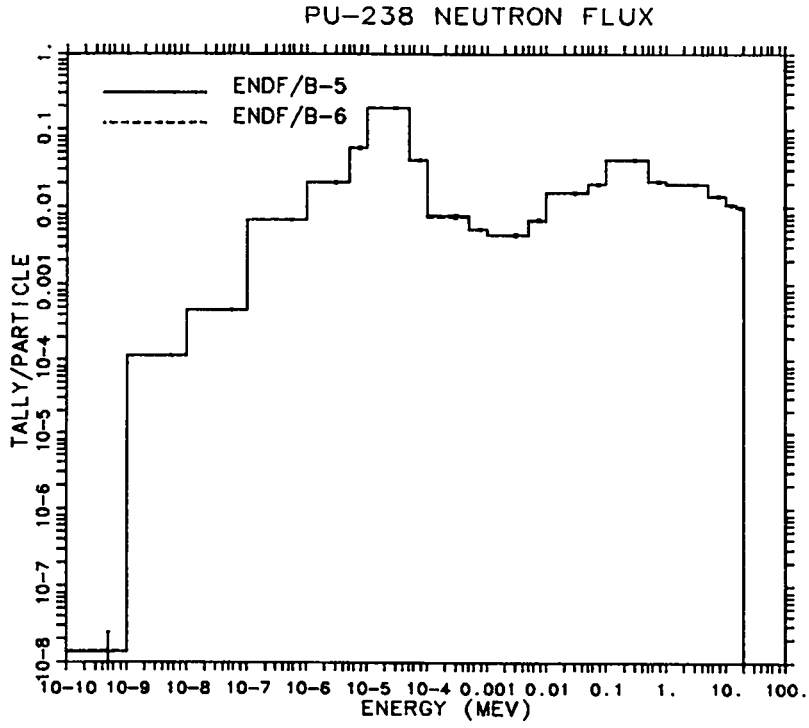

Fig. 285. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{238}Pu sphere.

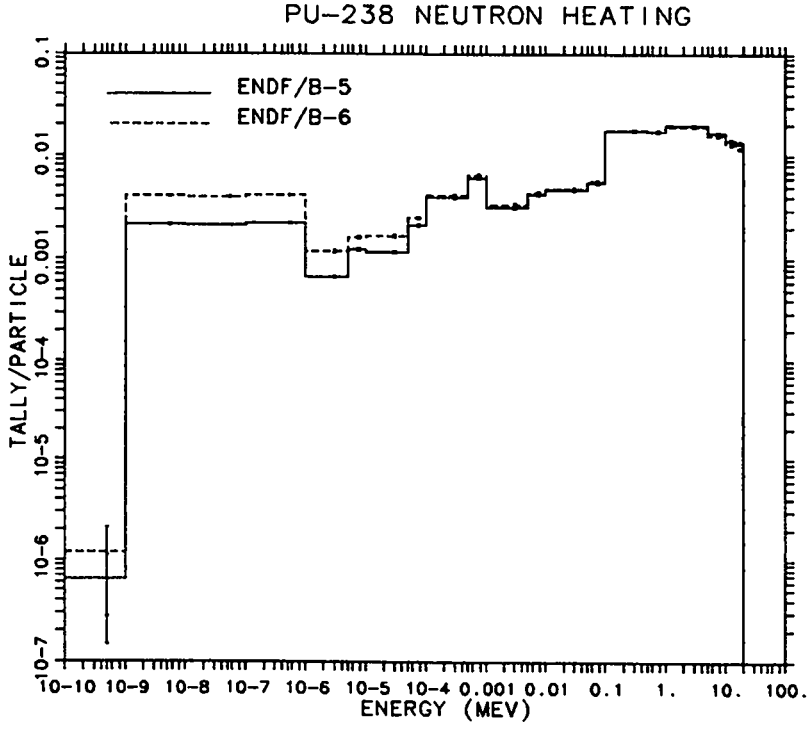

Fig. 286. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{238}Pu sphere.

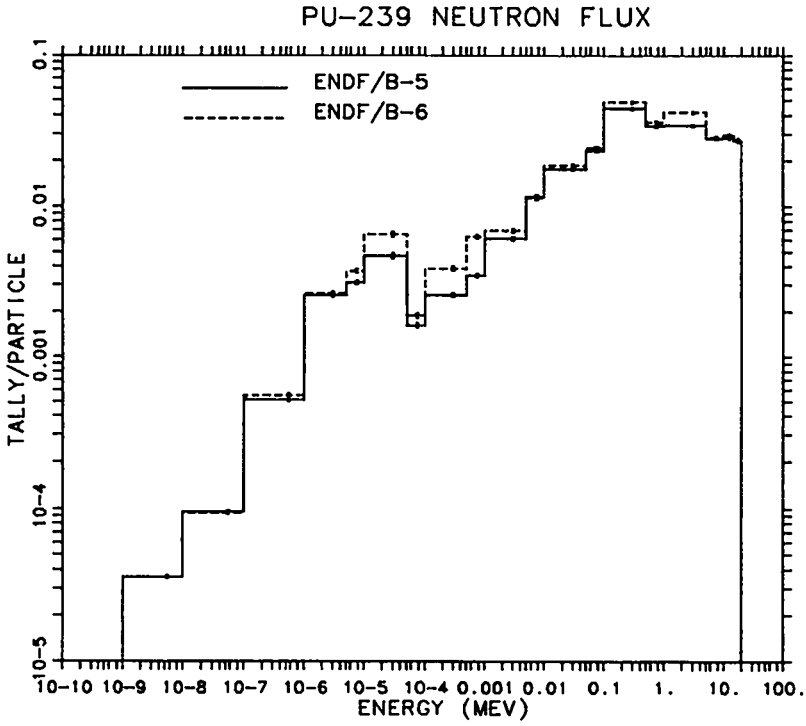

Fig. 287. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{239}Pu sphere.

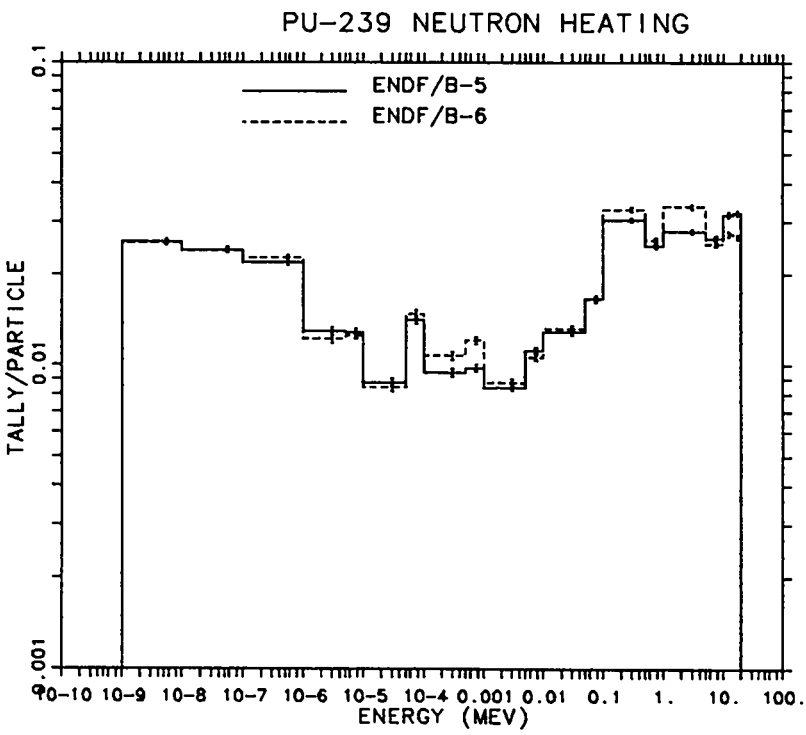

Fig. 288. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{239}Pu sphere.

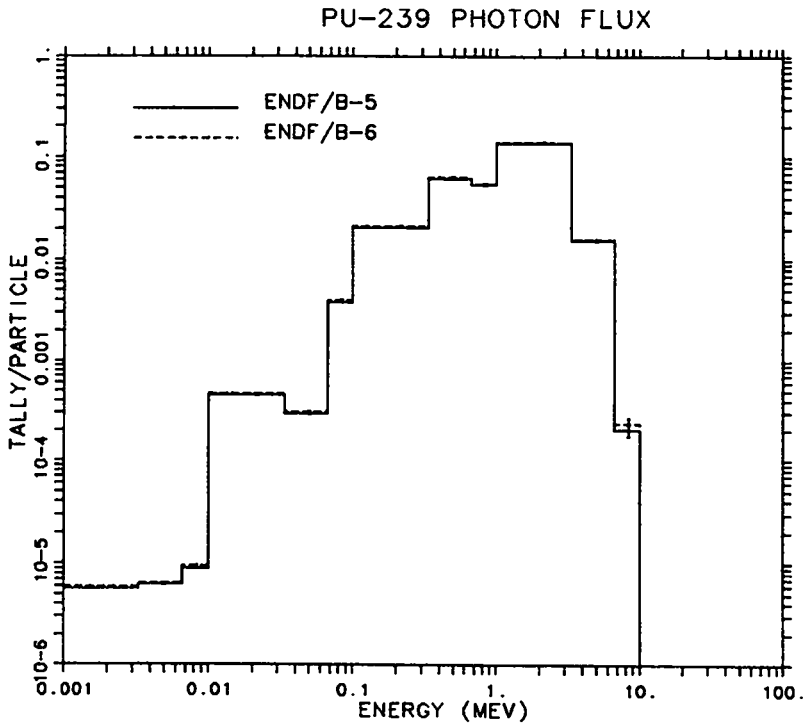

Fig. 289. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{239}Pu sphere.

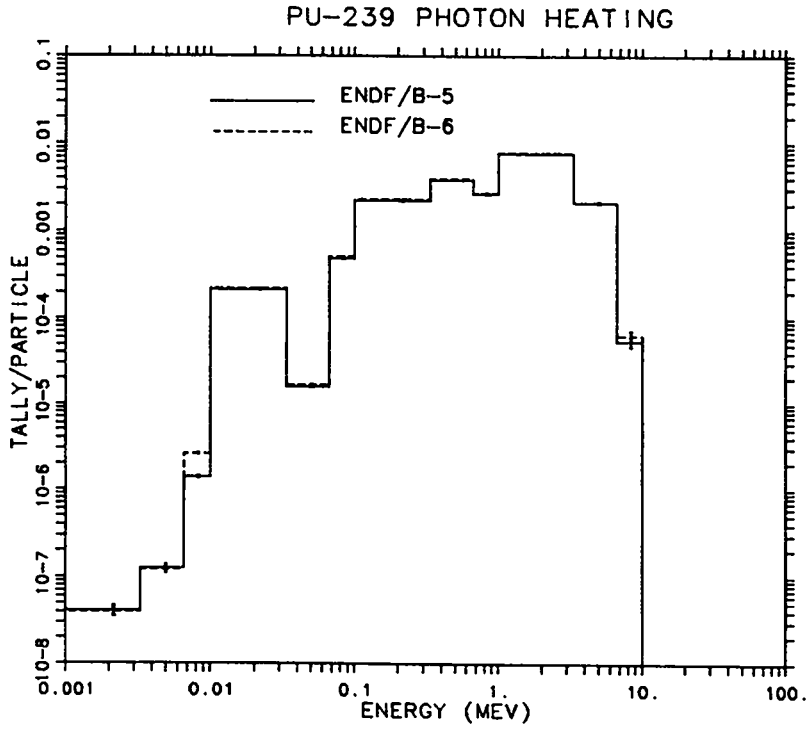

Fig. 290. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{239}Pu sphere.

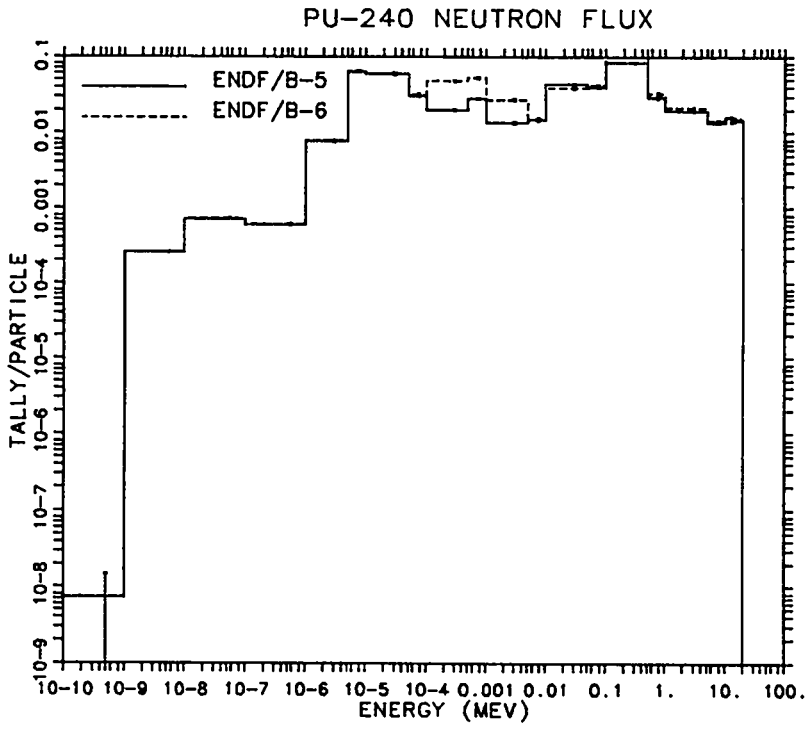

Fig. 291. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{240}Pu sphere.

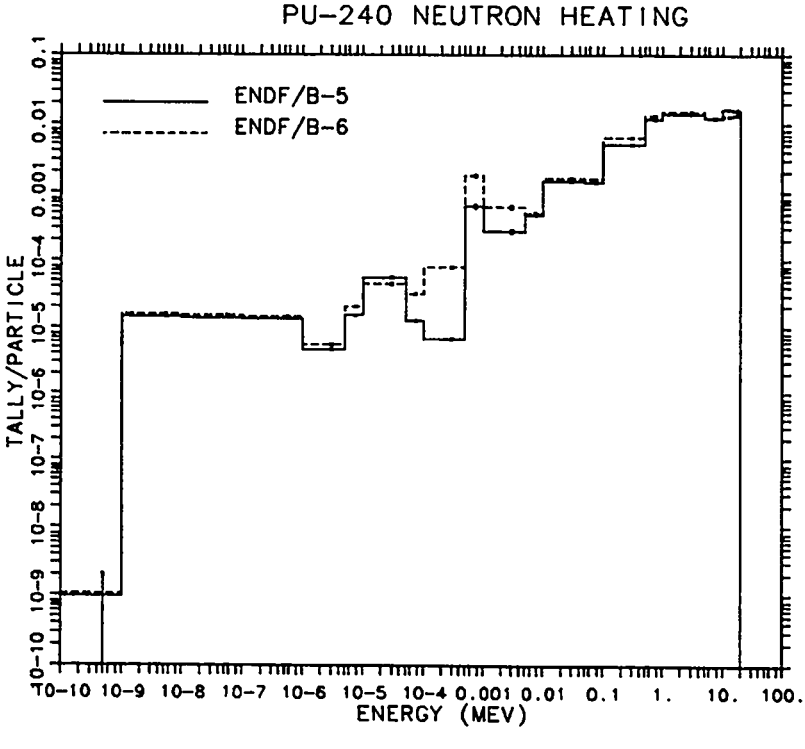

Fig. 292. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{240}Pu sphere.

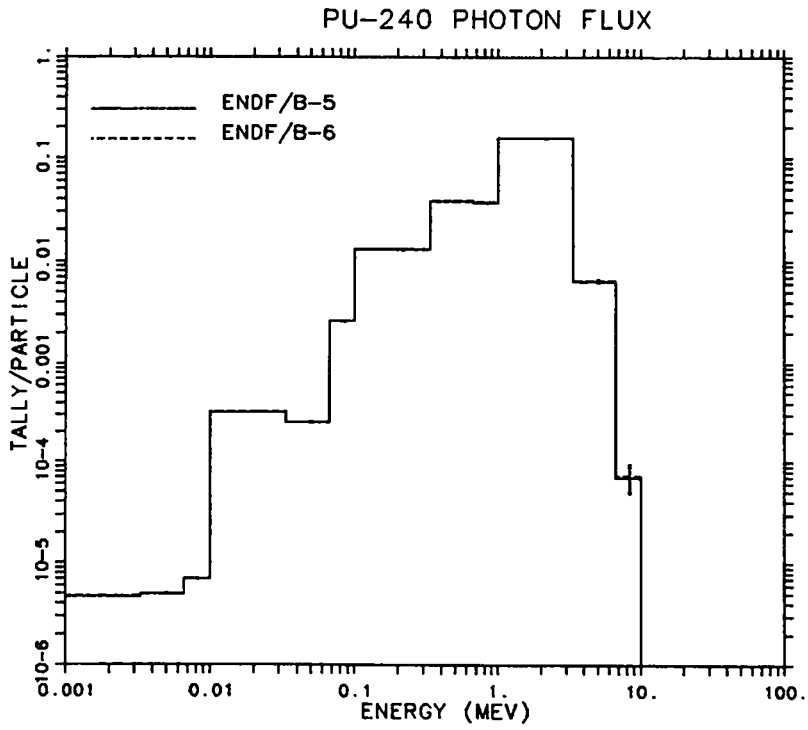

Fig. 293. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{240}Pu sphere.

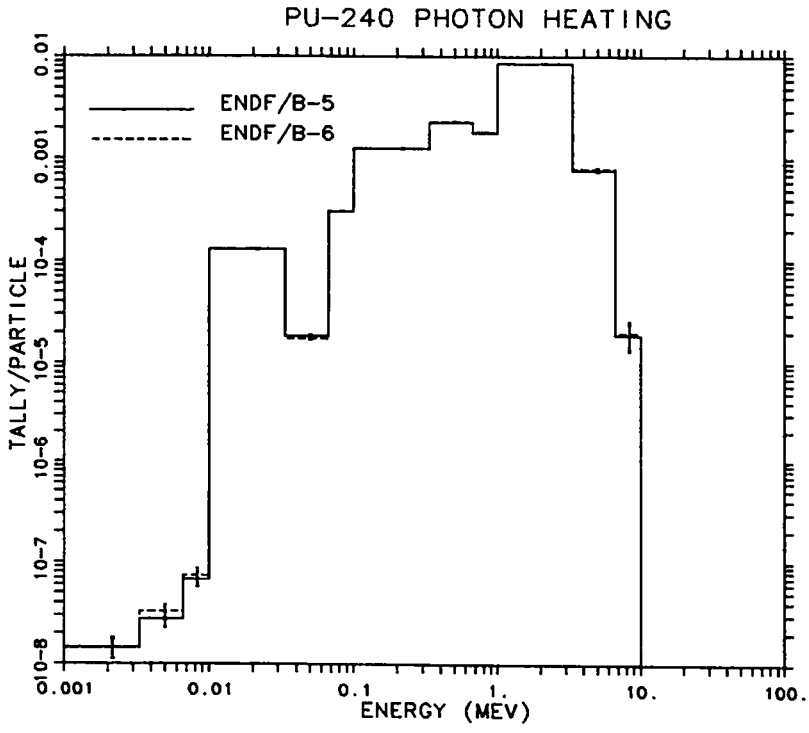

Fig. 294. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{240}Pu sphere.

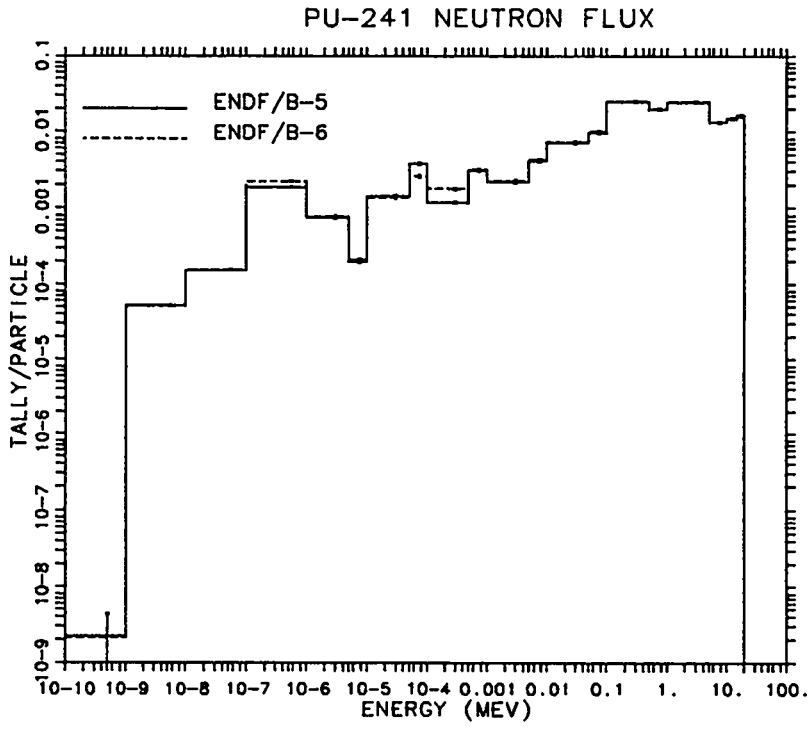

Fig. 295. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{241}Pu sphere.

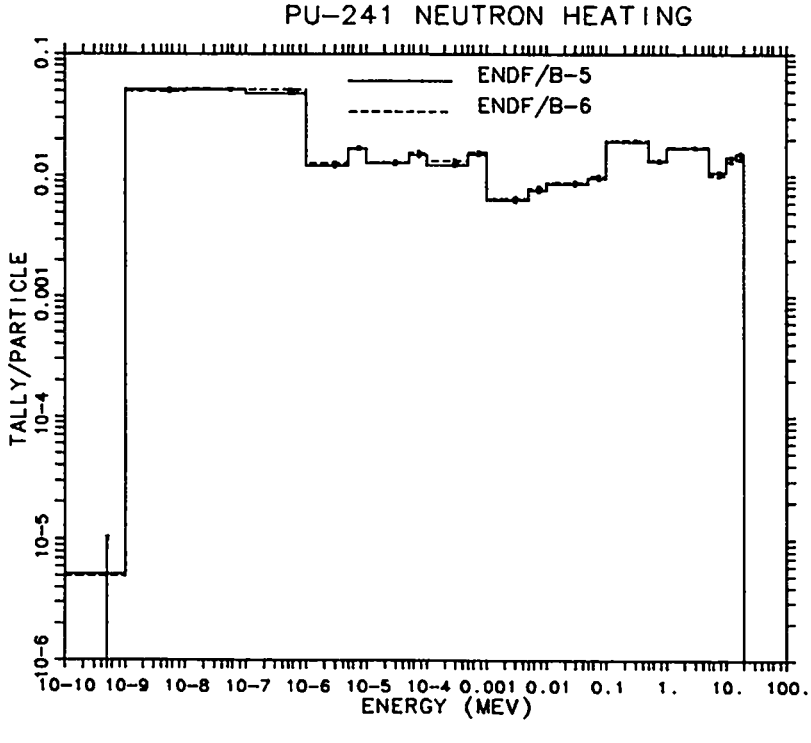

Fig. 296. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{241}Pu sphere.

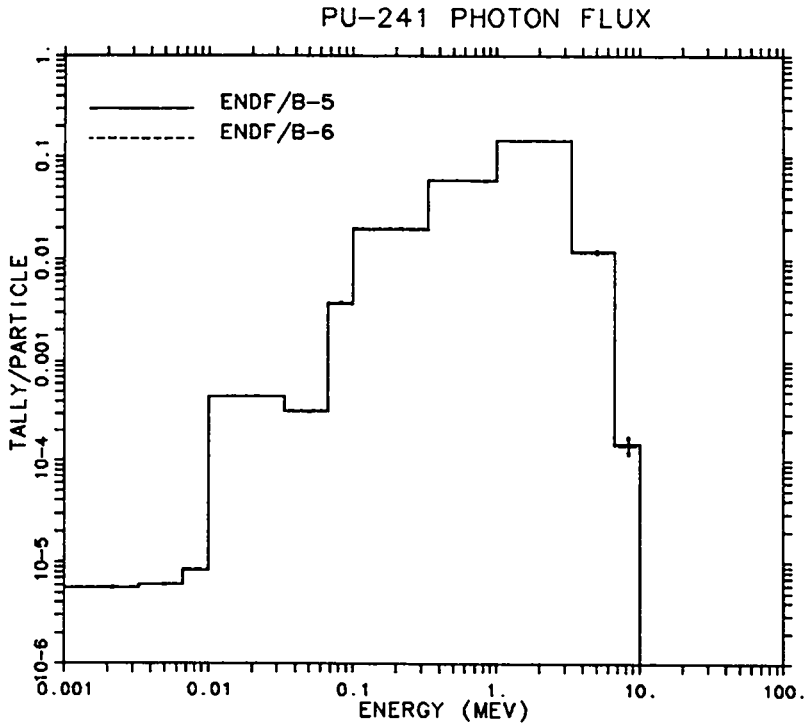

Fig. 297. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{241}Pu sphere.

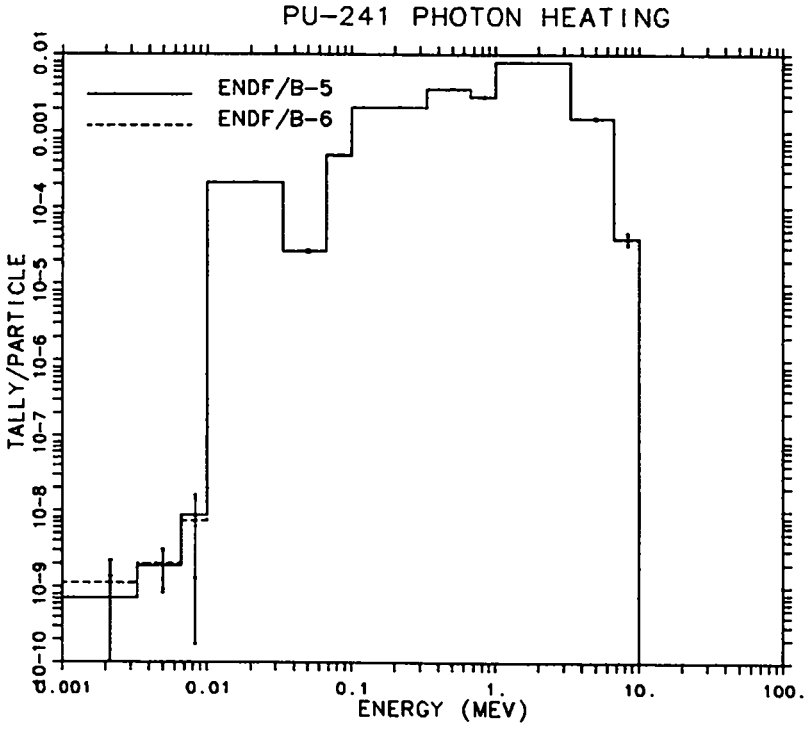

Fig. 298. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{241}Pu sphere.

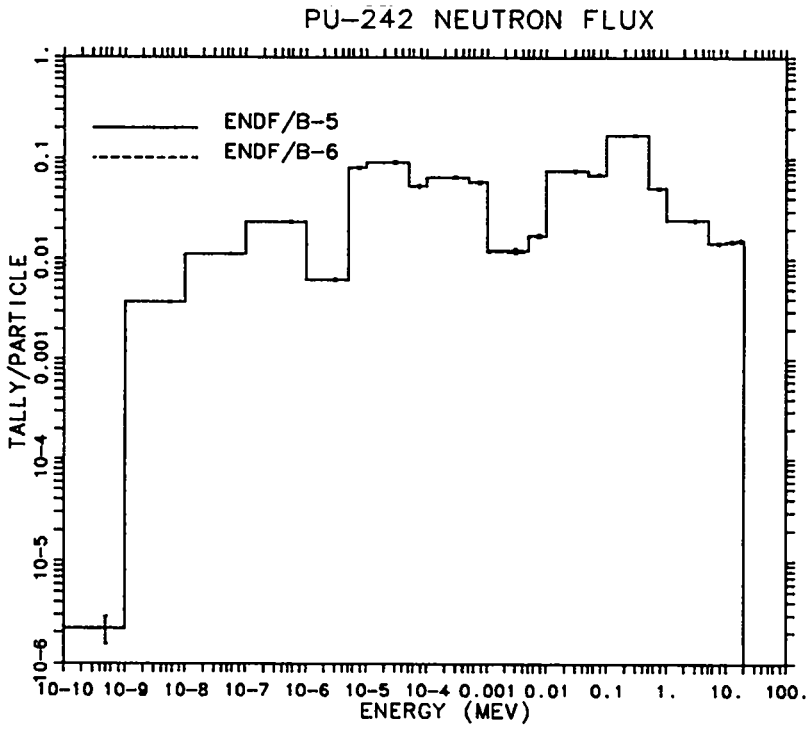

Fig. 299. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{242}Pu sphere.

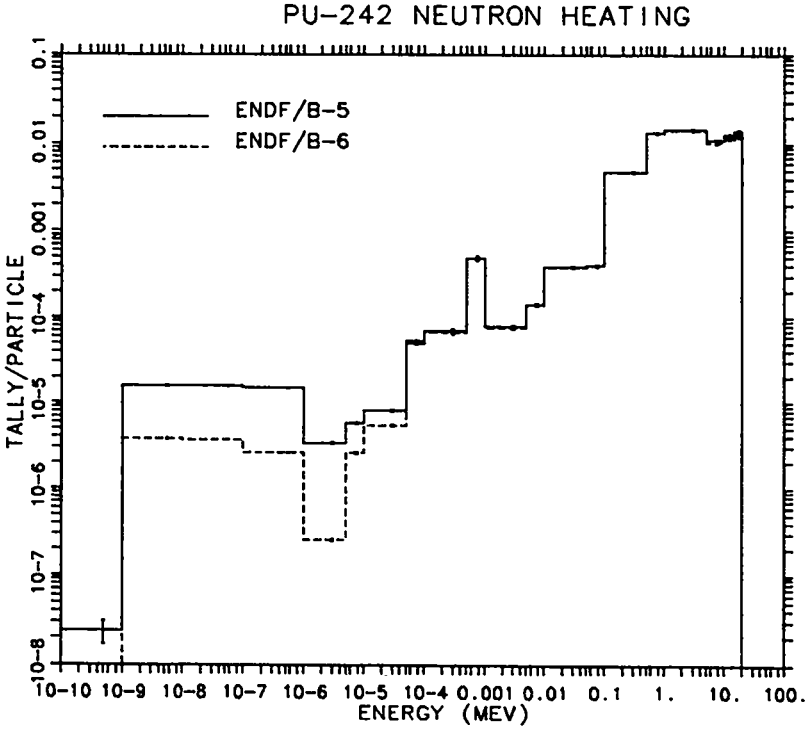

Fig. 300. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{242}Pu sphere.

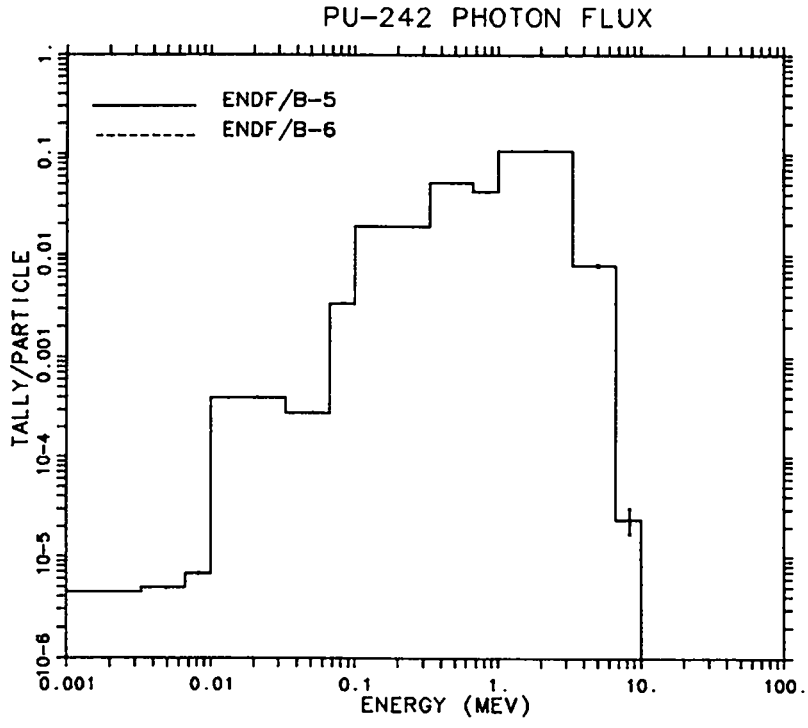

Fig. 301. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{242}Pu sphere.

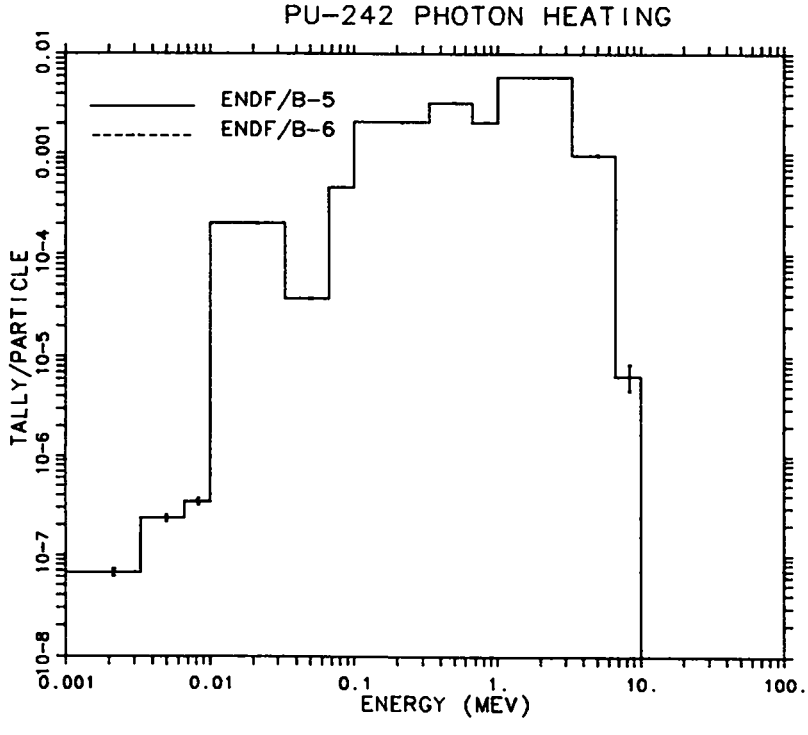

Fig. 302. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{242}Pu sphere.

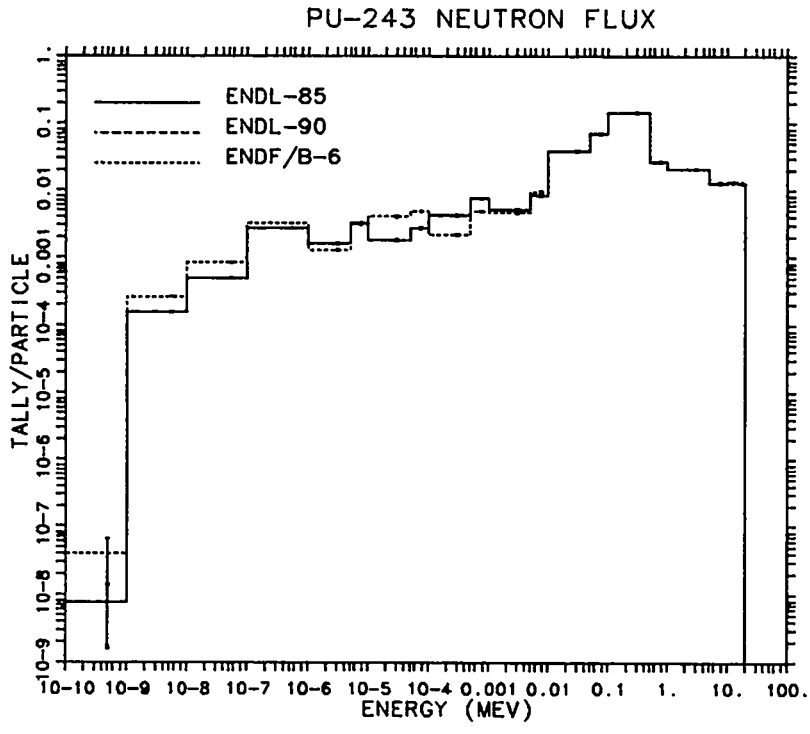

Fig. 303. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{243}Pu sphere.

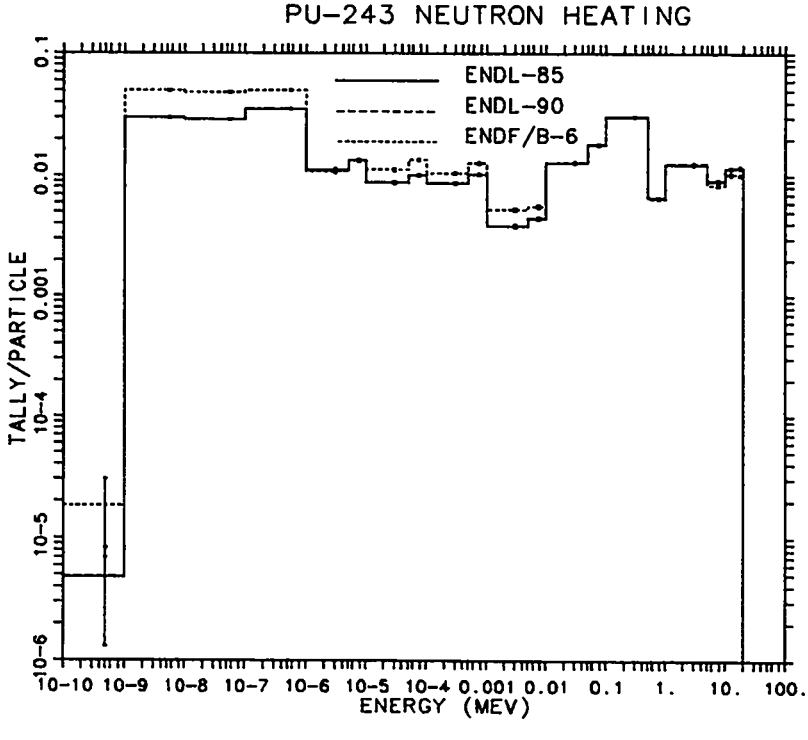

Fig. 304. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron heating for the ^{243}Pu sphere.

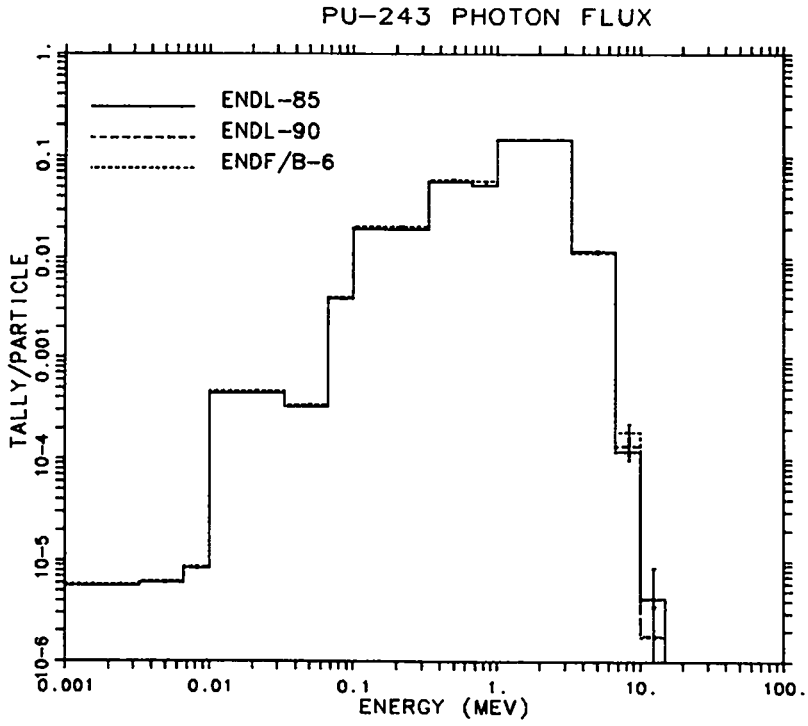

Fig. 305. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon flux for the ^{243}Pu sphere.

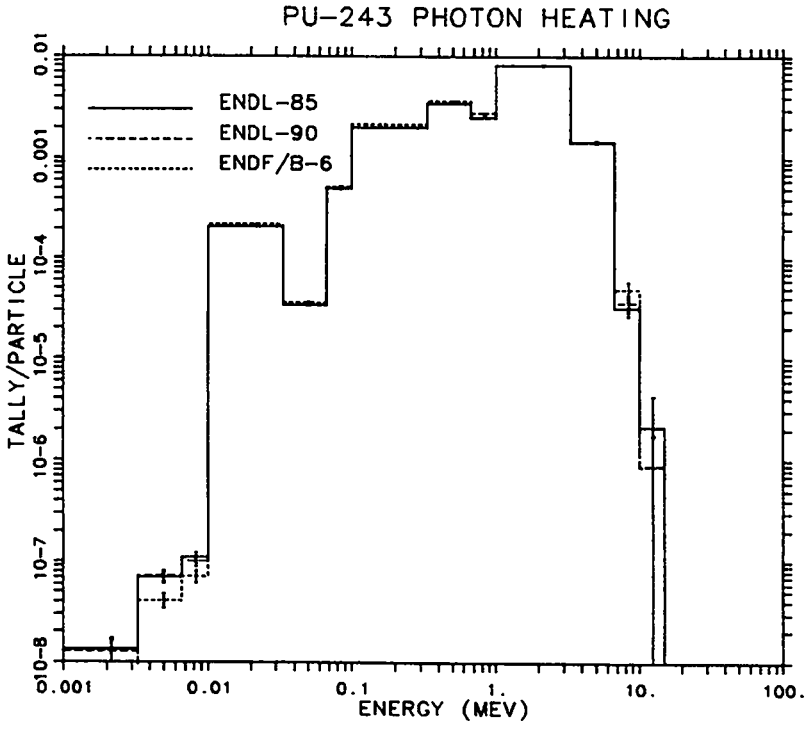

Fig. 306. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon heating for the ^{243}Pu sphere.

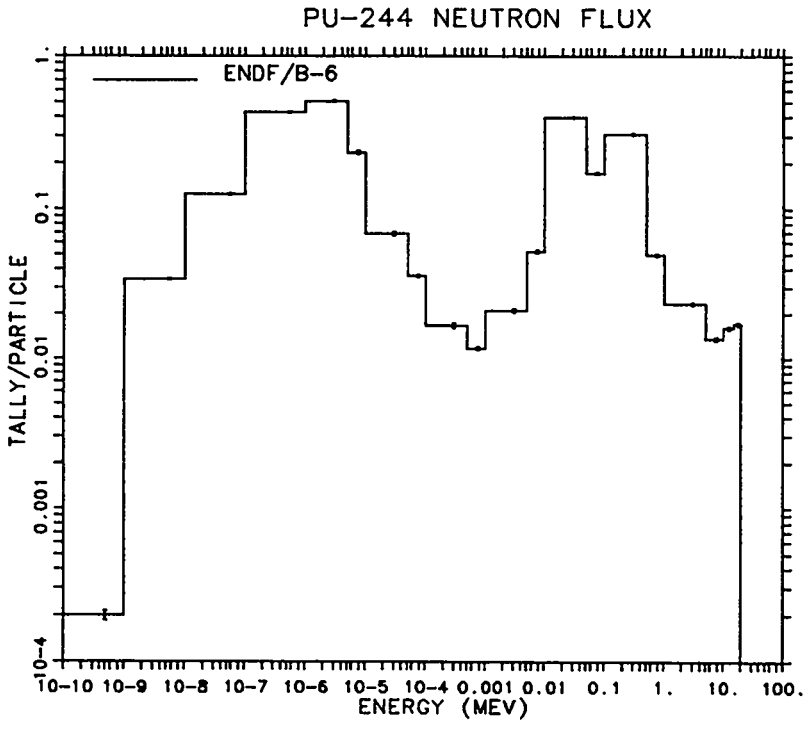

Fig. 307. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{244}Pu sphere.

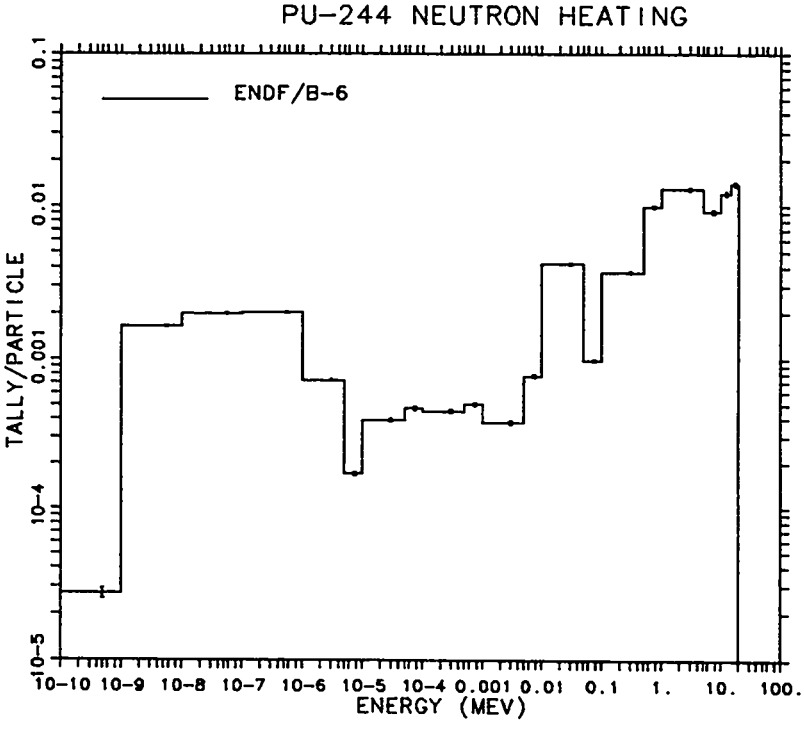

Fig. 308. Plot of ENDF/B-VI calculated neutron heating for the ^{244}Pu sphere.

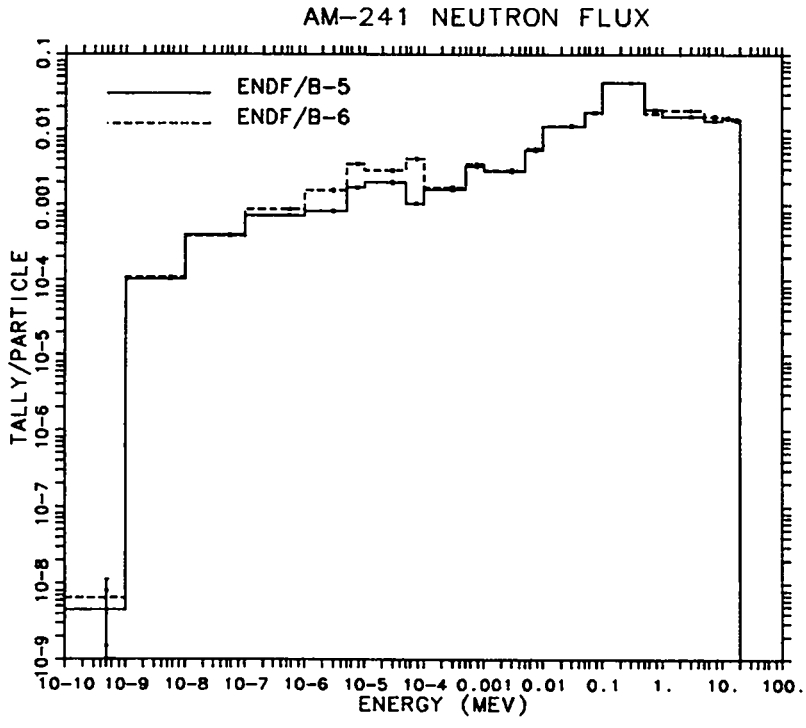

Fig. 309. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{241}Am sphere.

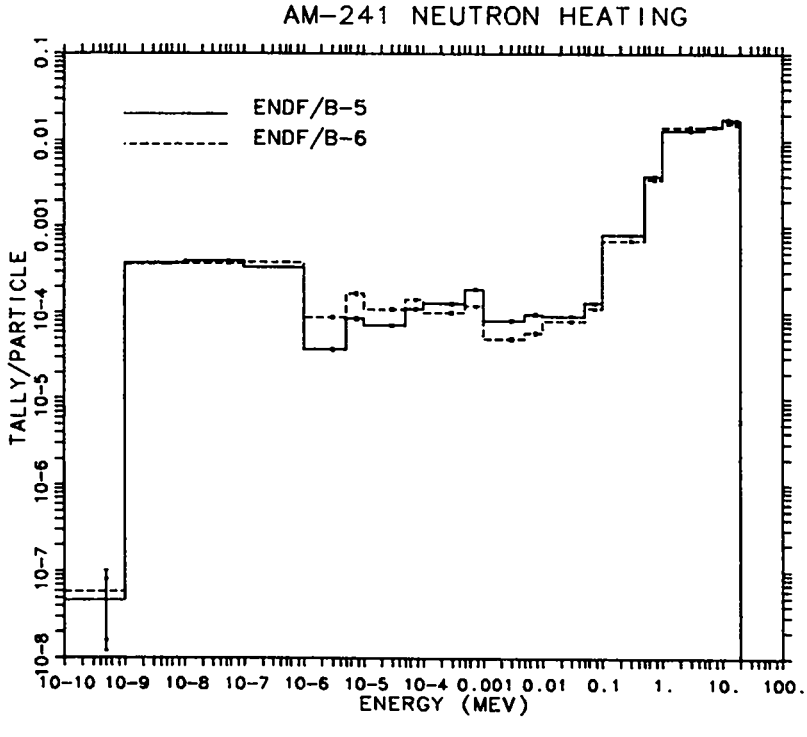

Fig. 310. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{241}Am sphere.

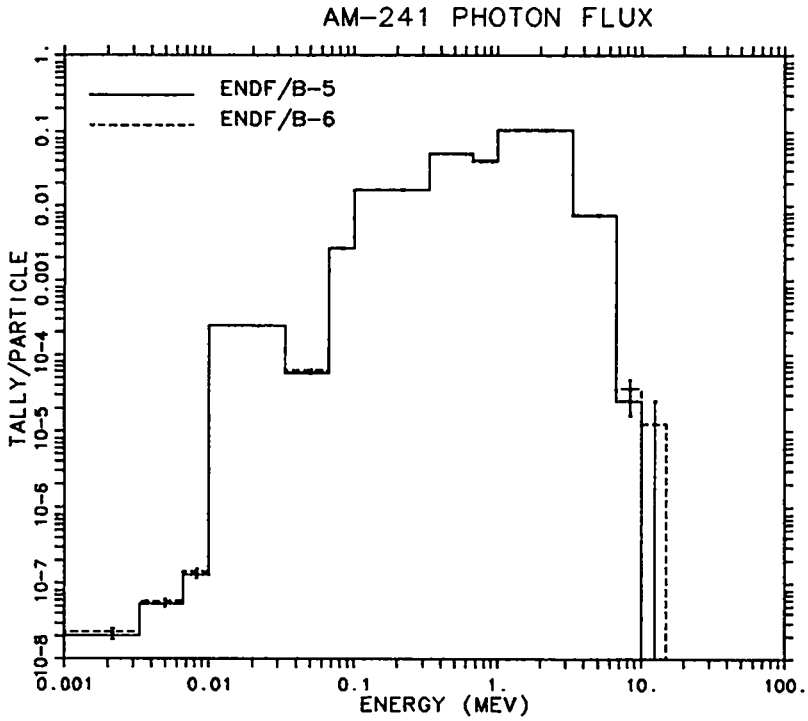

Fig. 311. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{241}Am sphere.

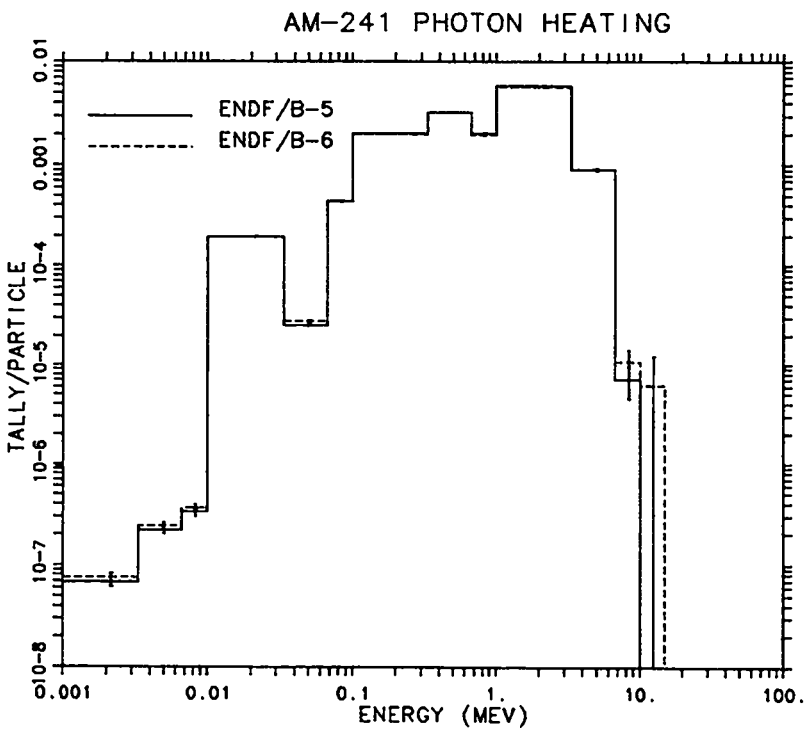

Fig. 312. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{241}Am sphere.

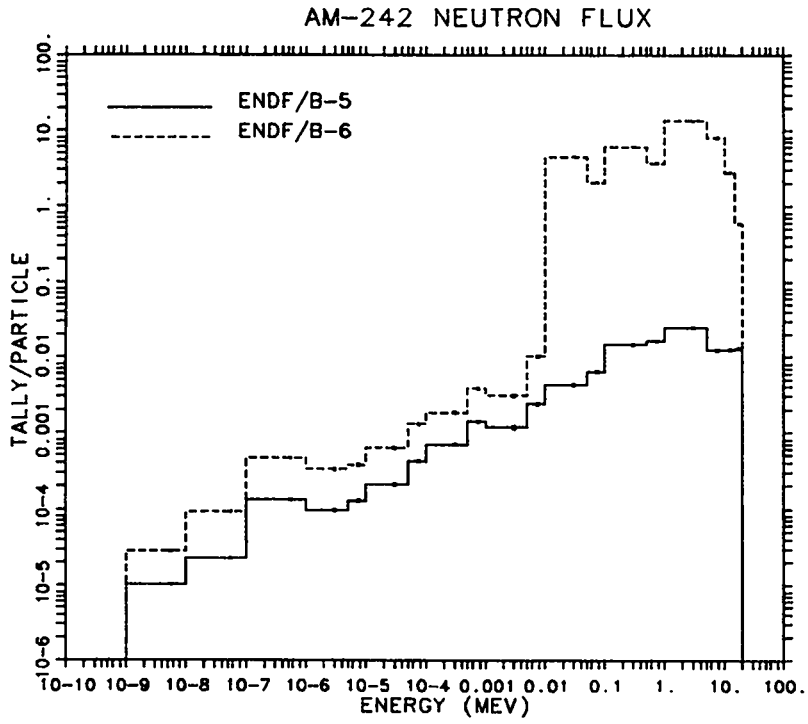

Fig. 313. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{242}Am sphere.

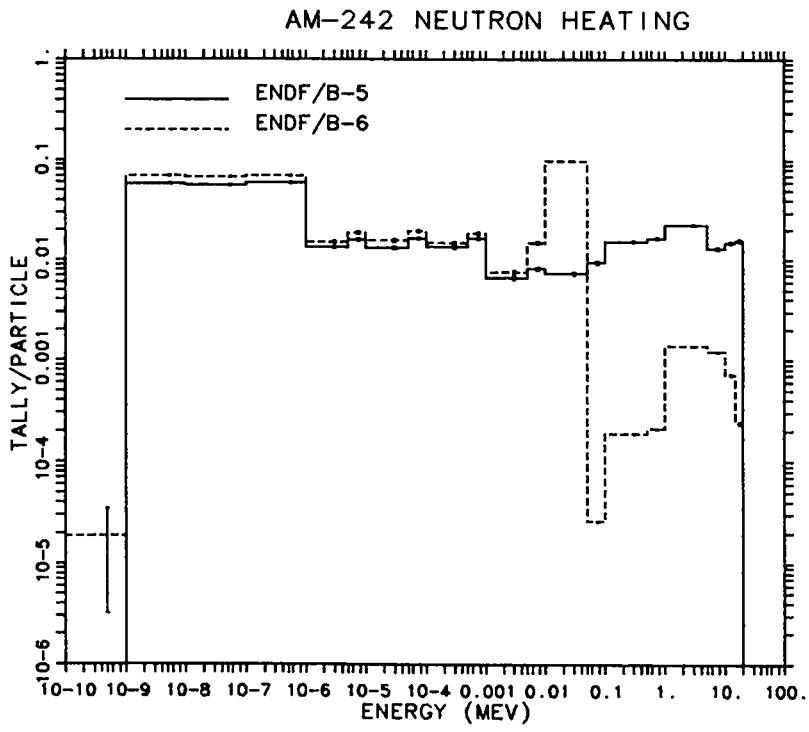

Fig. 314. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{242}Am sphere.

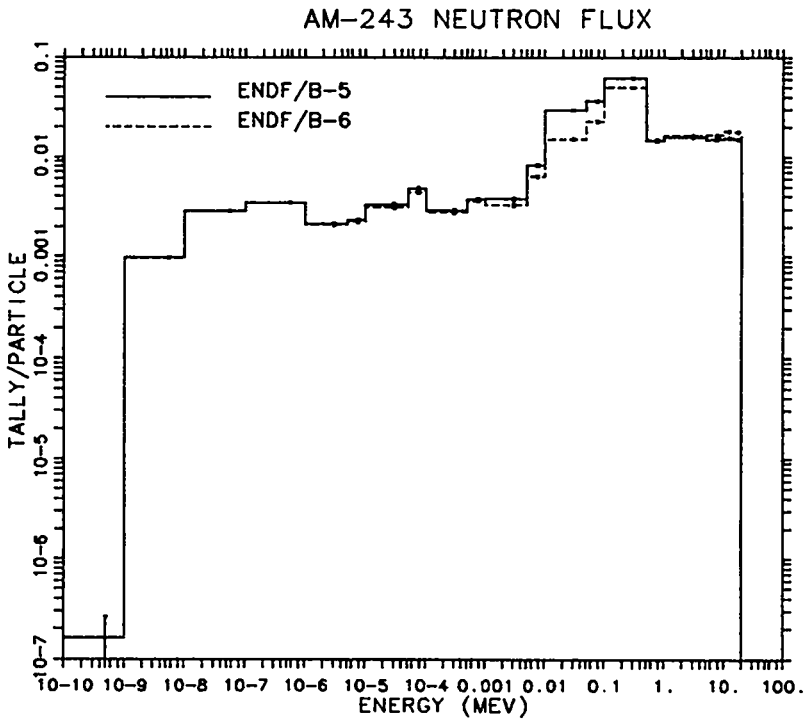

Fig. 315. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{243}Am sphere.

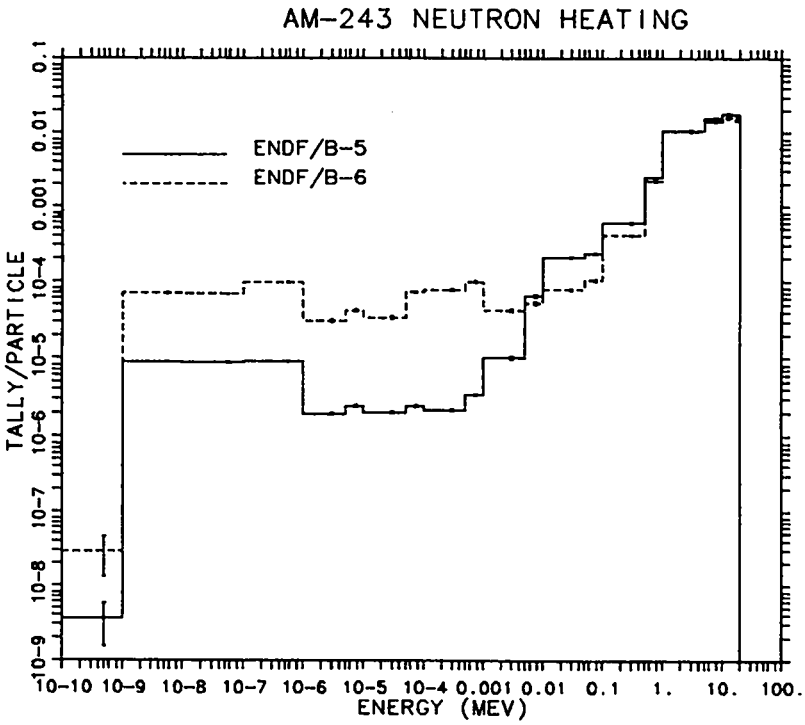

Fig. 316. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{243}Am sphere.

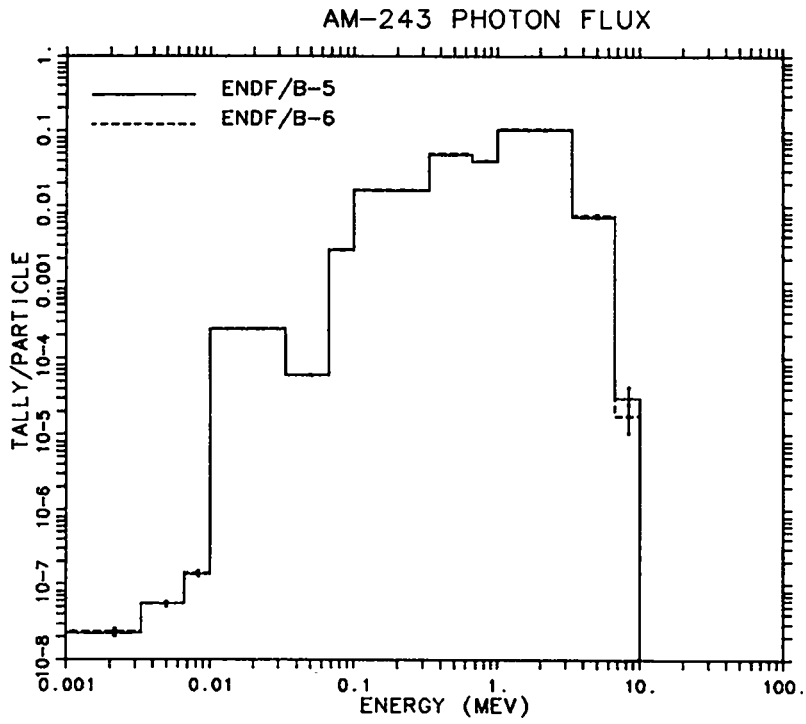

Fig. 317. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{243}Am sphere.

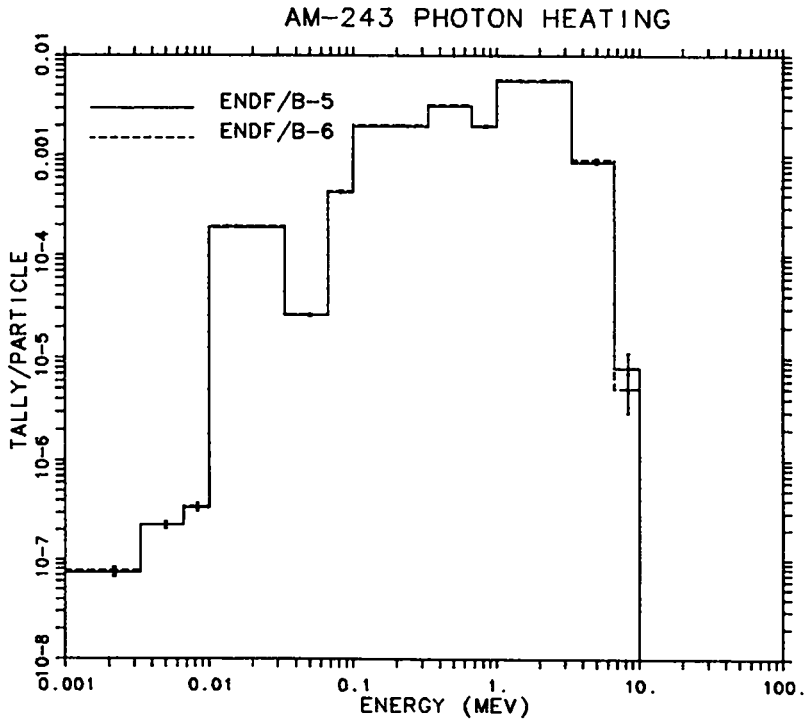

Fig. 318. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{243}Am sphere.

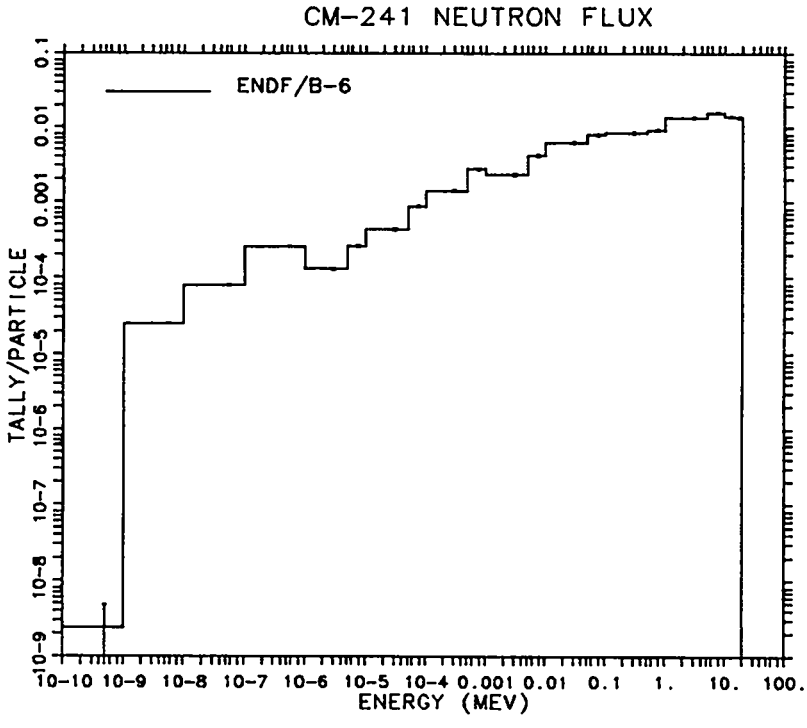

Fig. 319. Plot of ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{241}Cm sphere.

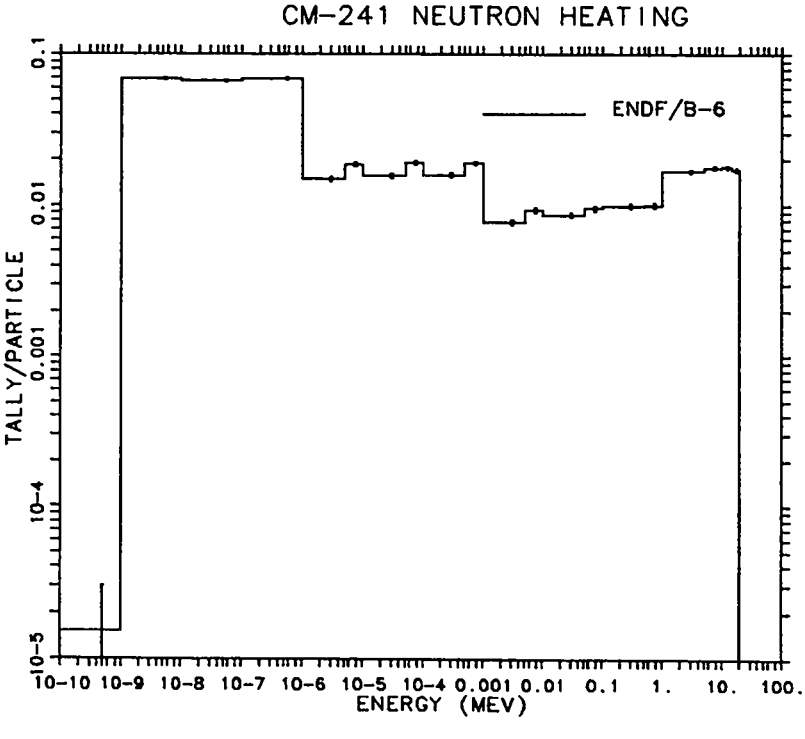

Fig. 320. Plot of ENDF/B-VI calculated neutron heating for the ^{241}Cm sphere.

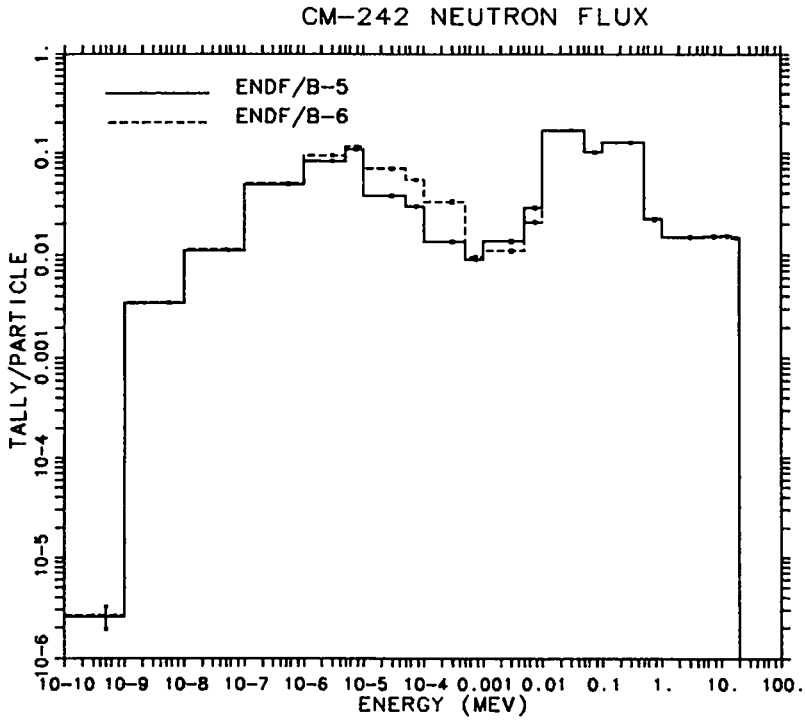

Fig. 321. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{242}Cm sphere.

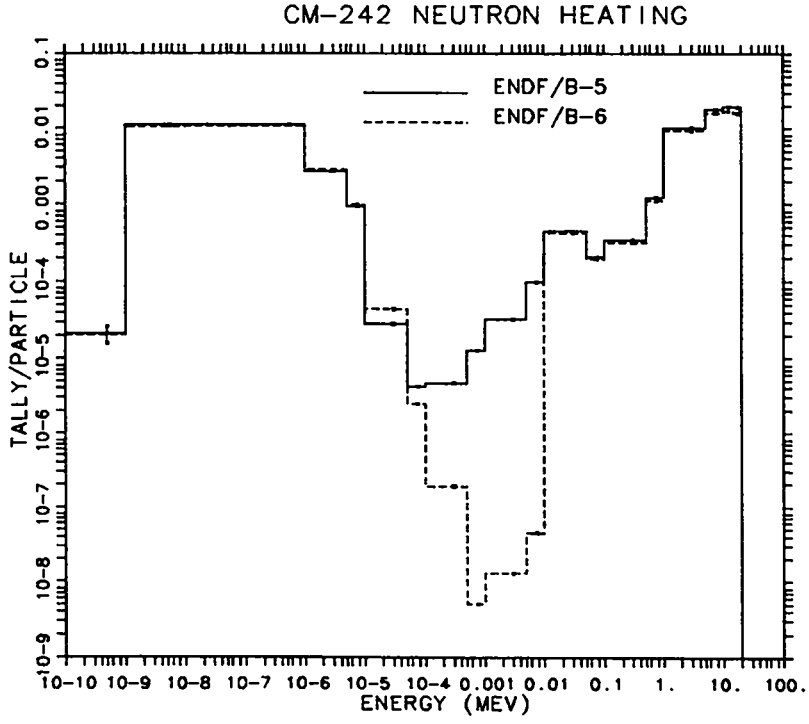

Fig. 322. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{242}Cm sphere.

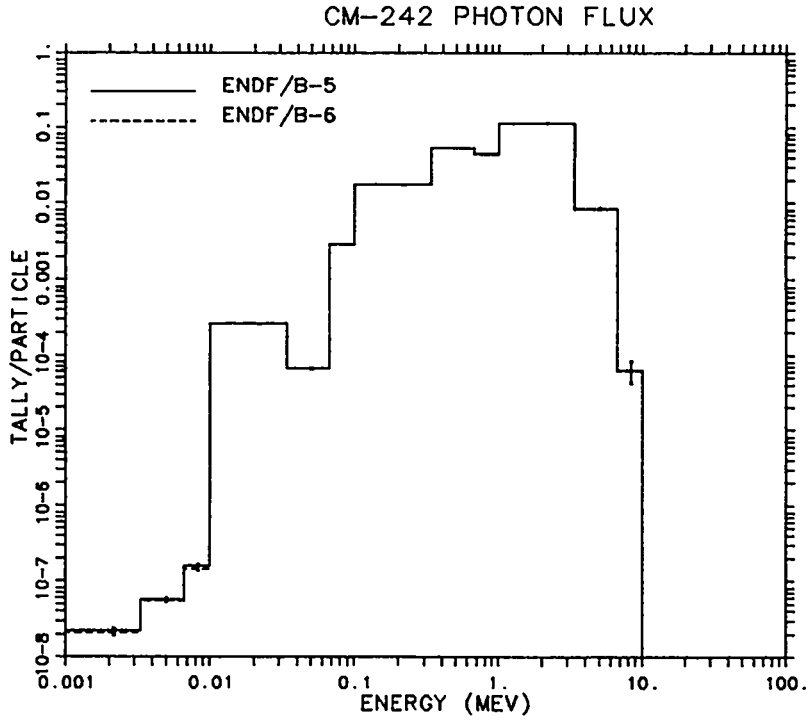

Fig. 323. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{242}Cm sphere.

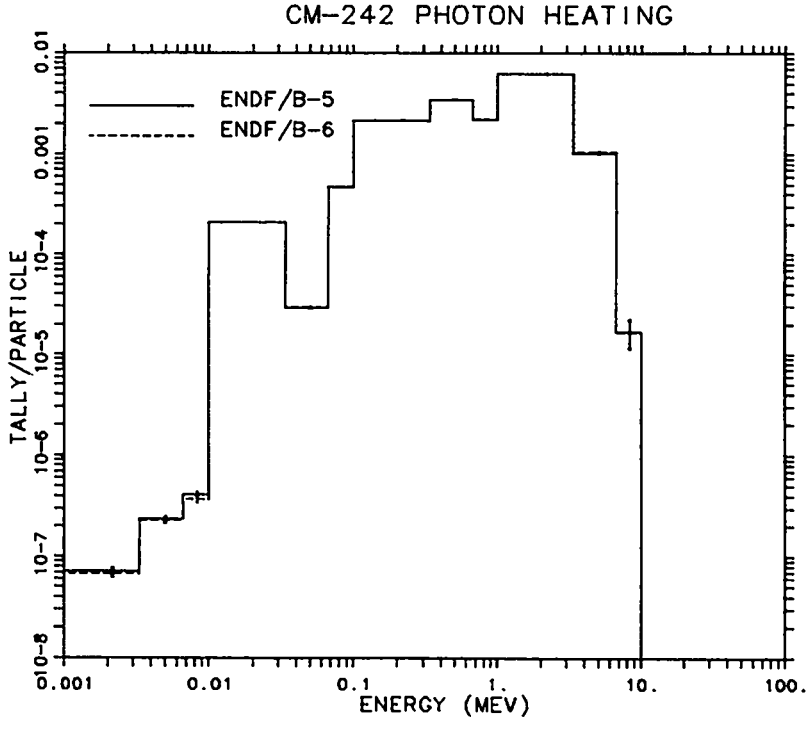

Fig. 324. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{242}Cm sphere.

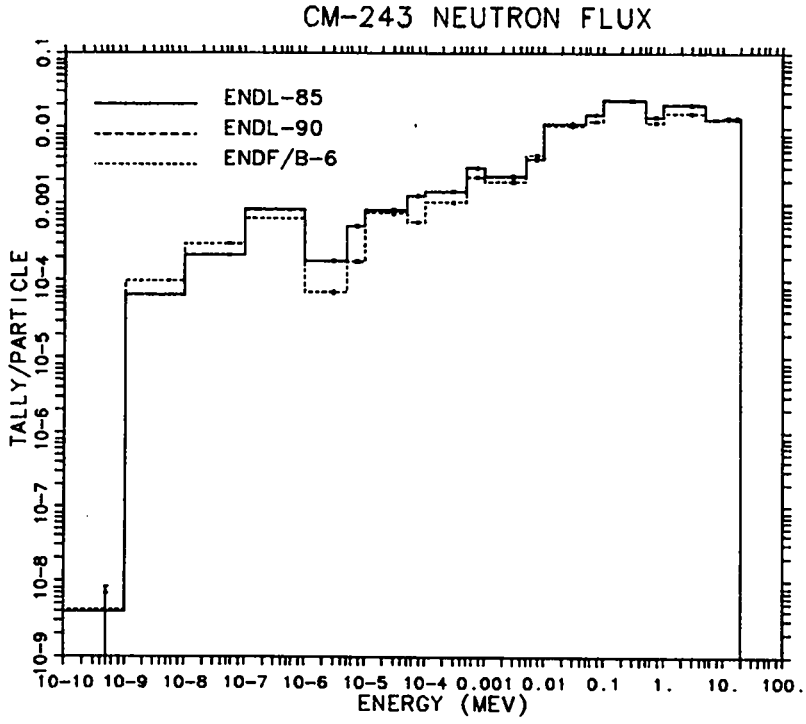

Fig. 325. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{243}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

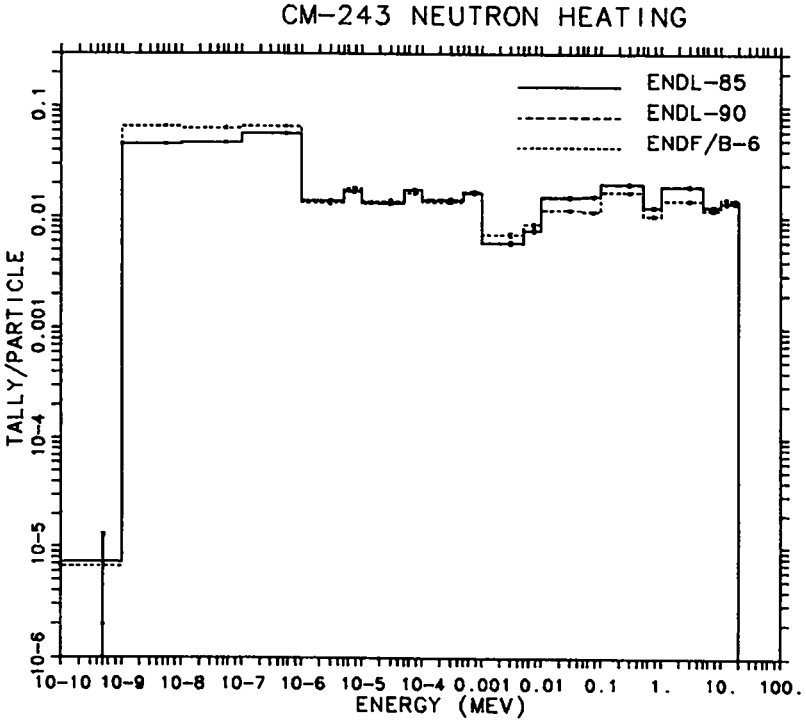

Fig. 326. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron heating for the ^{243}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

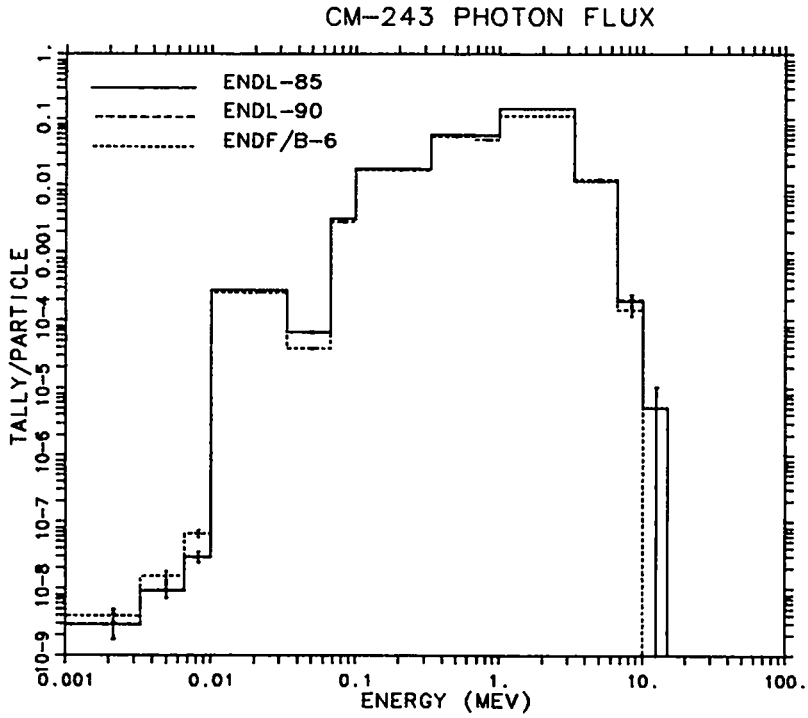

Fig. 327. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon flux for the ^{243}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

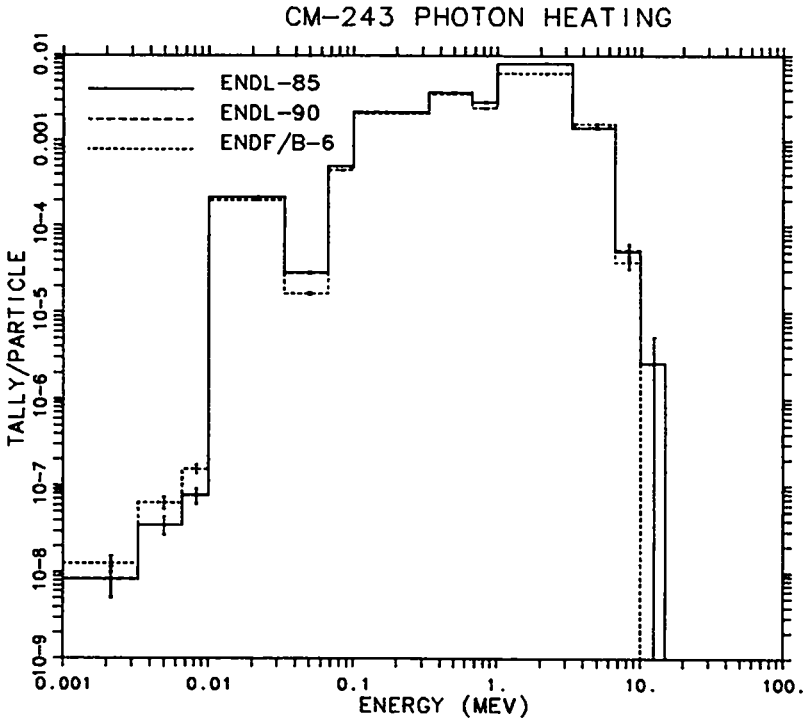

Fig. 328. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon heating for the ^{243}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

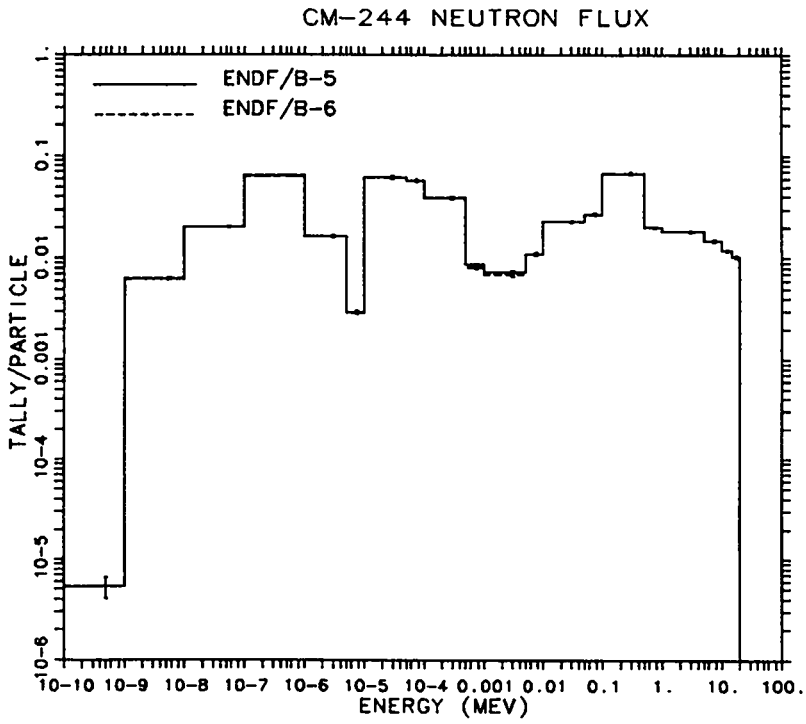

Fig. 329. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{244}Cm sphere.

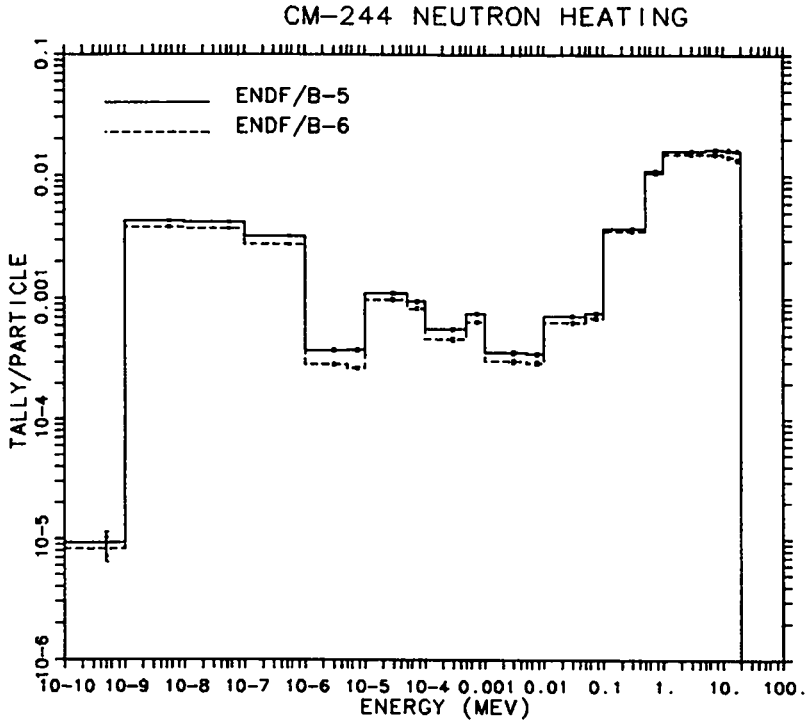

Fig. 330. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{244}Cm sphere.

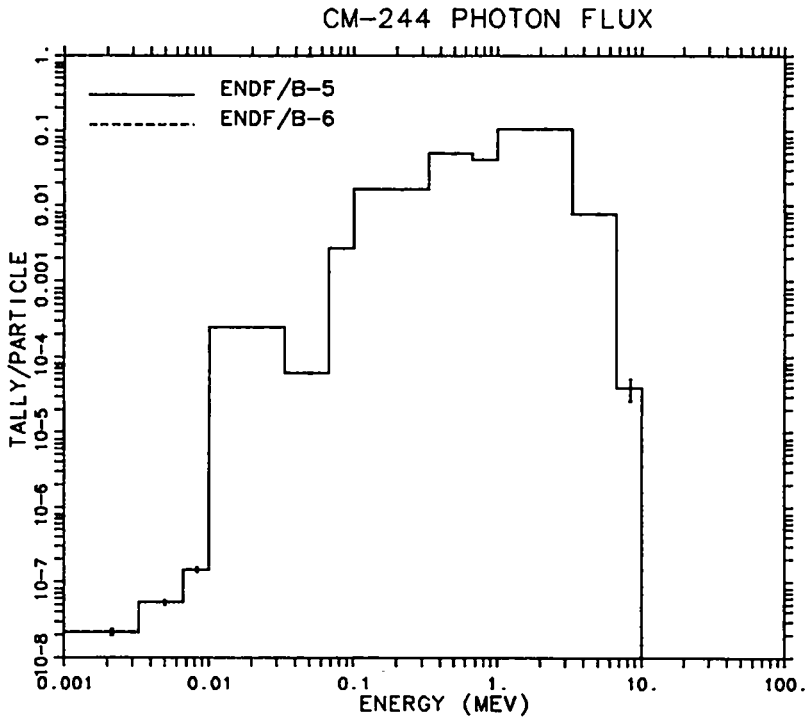

Fig. 331. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{244}Cm sphere.

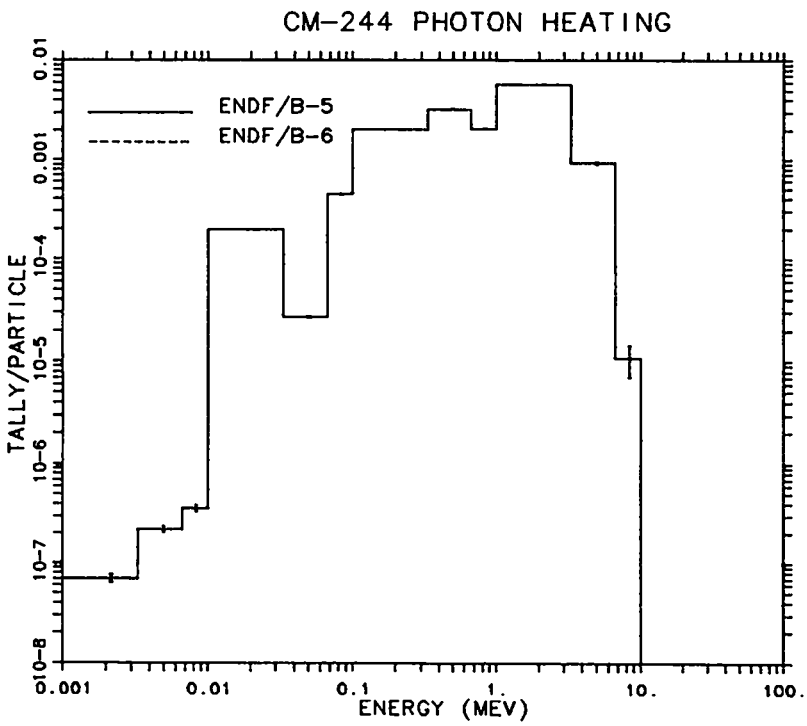

Fig. 332. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{244}Cm sphere.

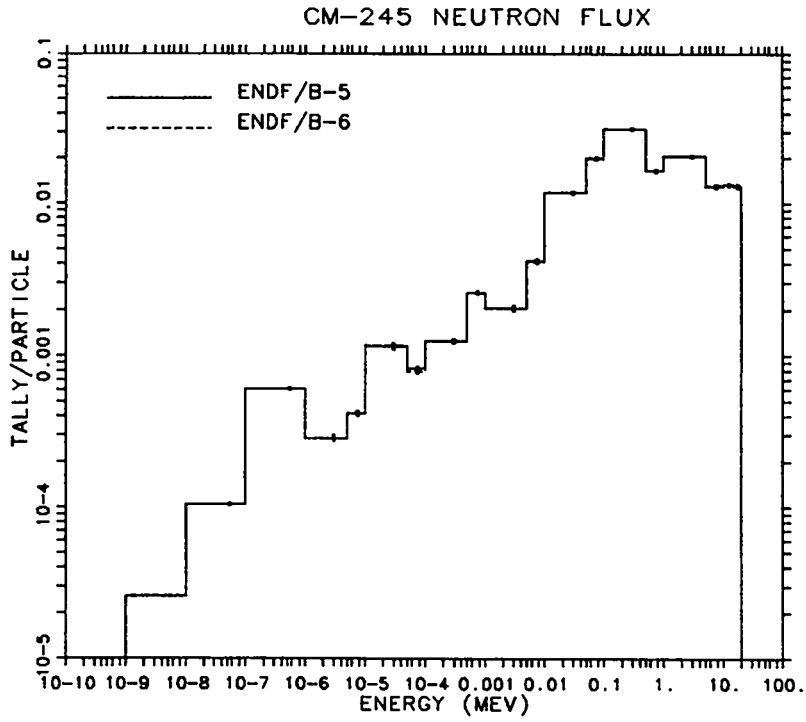

Fig. 333. Plot of ENDF/B-V and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{245}Cm sphere.

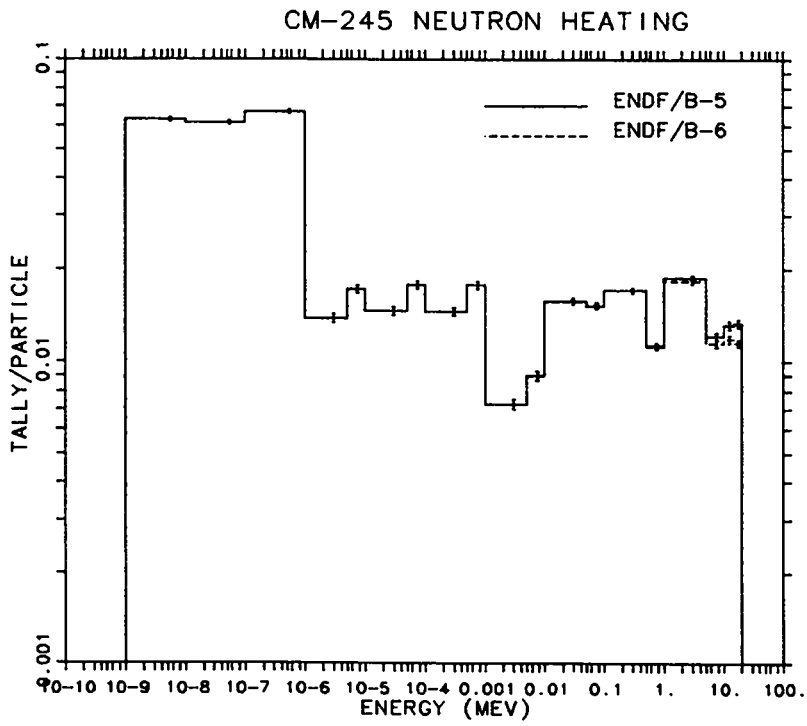

Fig. 334. Plot of ENDF/B-V and ENDF/B-VI calculated neutron heating for the ^{245}Cm sphere.

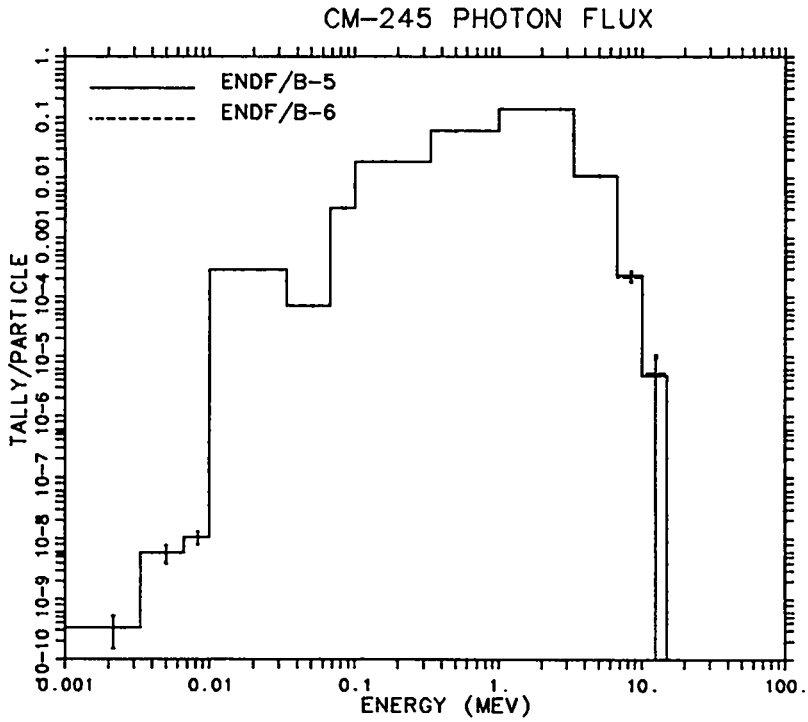

Fig. 335. Plot of ENDF/B-V and ENDF/B-VI calculated photon flux for the ^{245}Cm sphere.

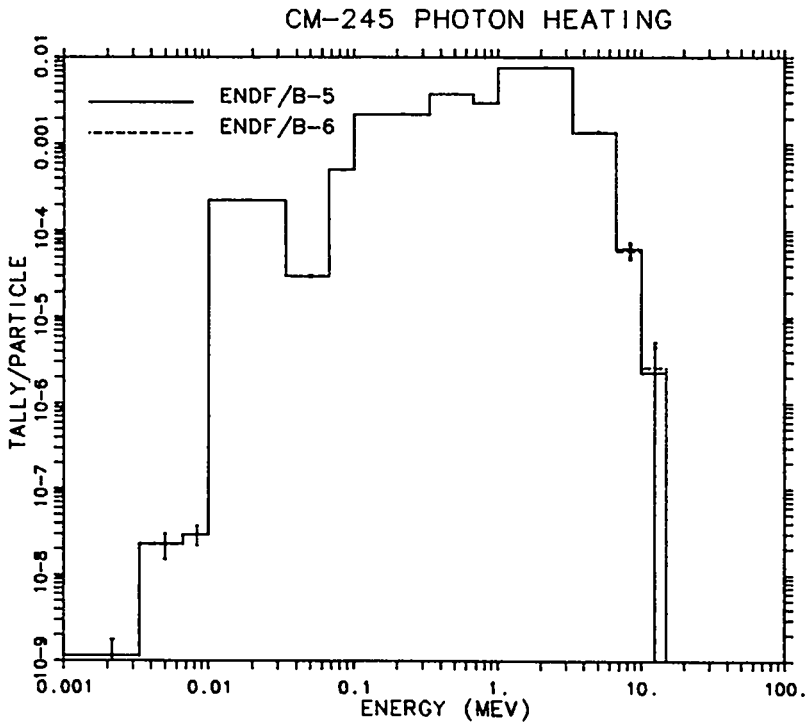

Fig. 336. Plot of ENDF/B-V and ENDF/B-VI calculated photon heating for the ^{245}Cm sphere.

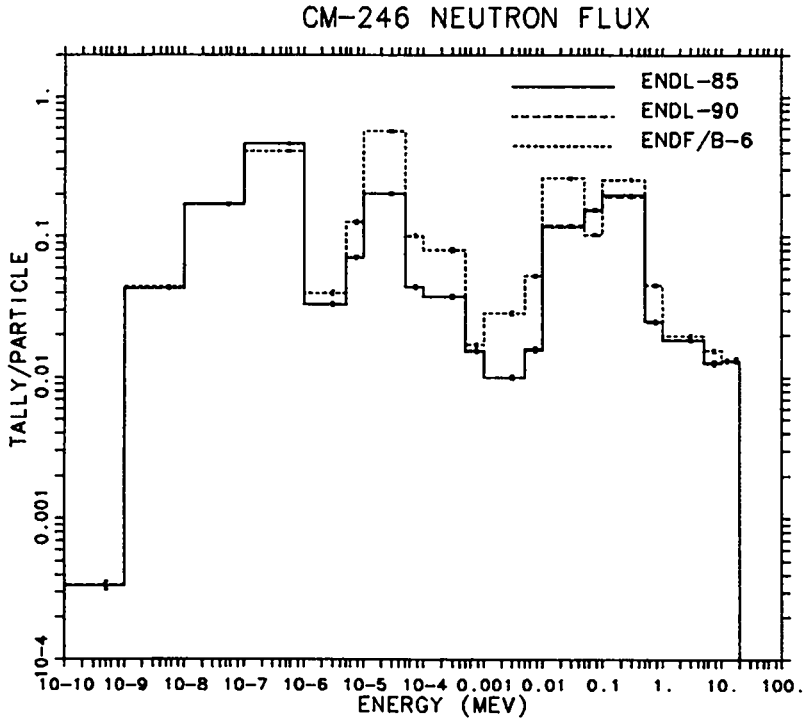

Fig. 337. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{246}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

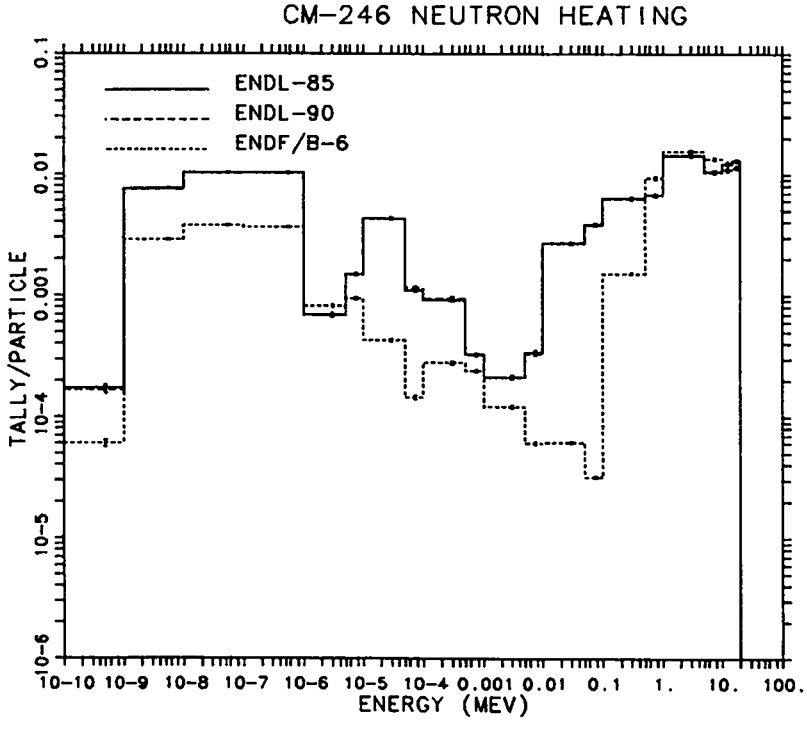

Fig. 338. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron heating for the ^{246}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

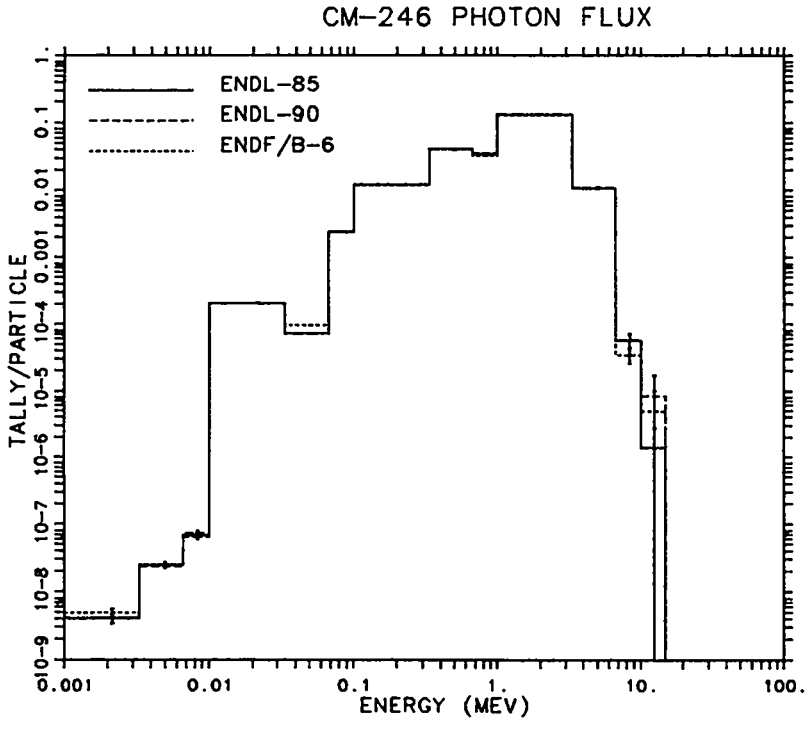

Fig. 339. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon flux for the ^{246}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

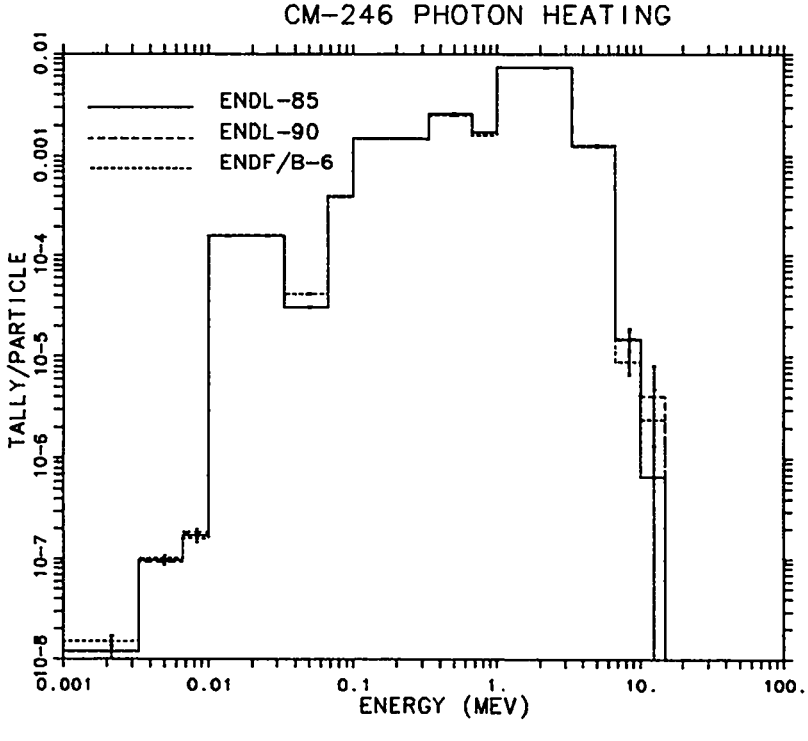

Fig. 340. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon heating for the ^{246}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

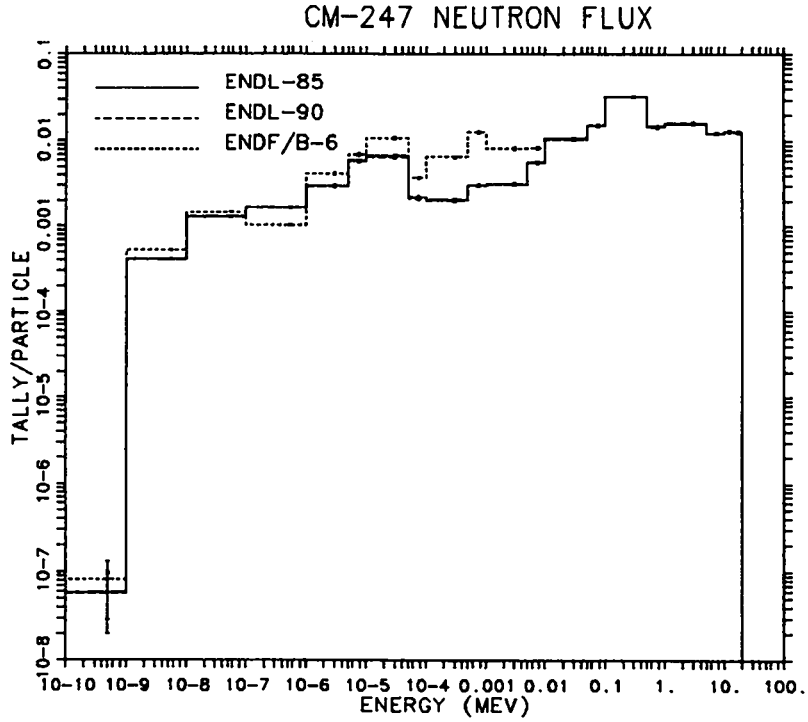

Fig. 341. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{247}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

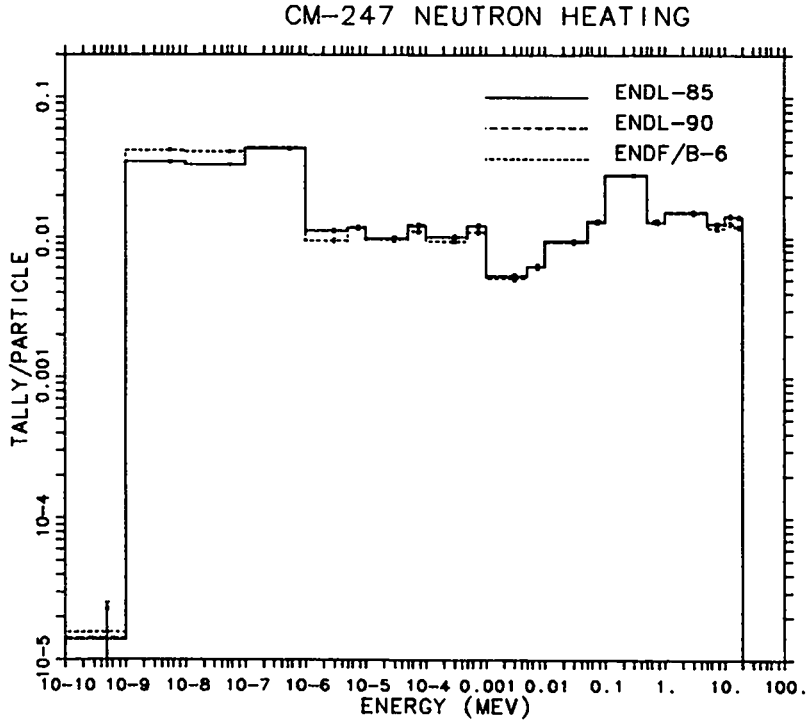

Fig. 342. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron heating for the ^{247}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

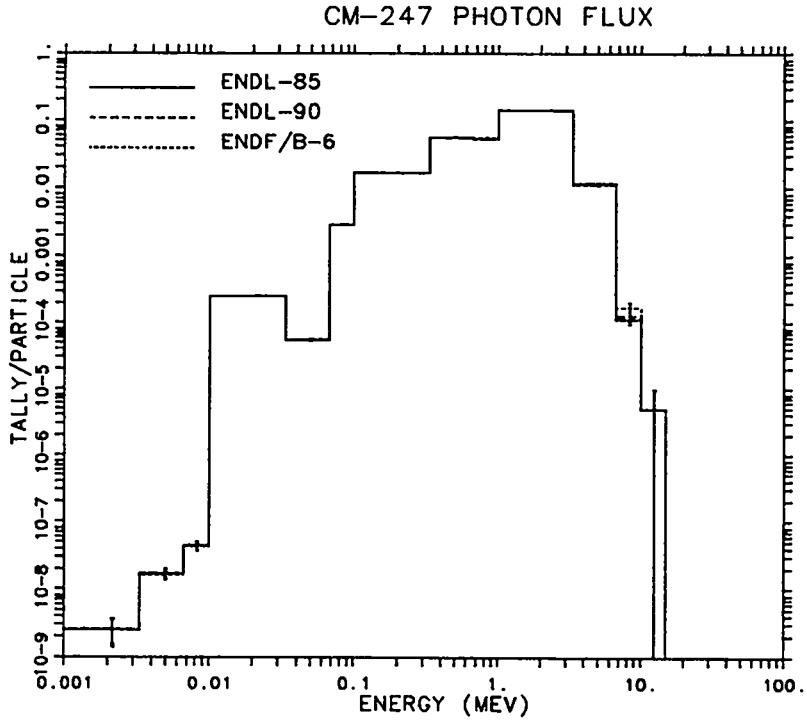

Fig. 343. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon flux for the ^{247}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

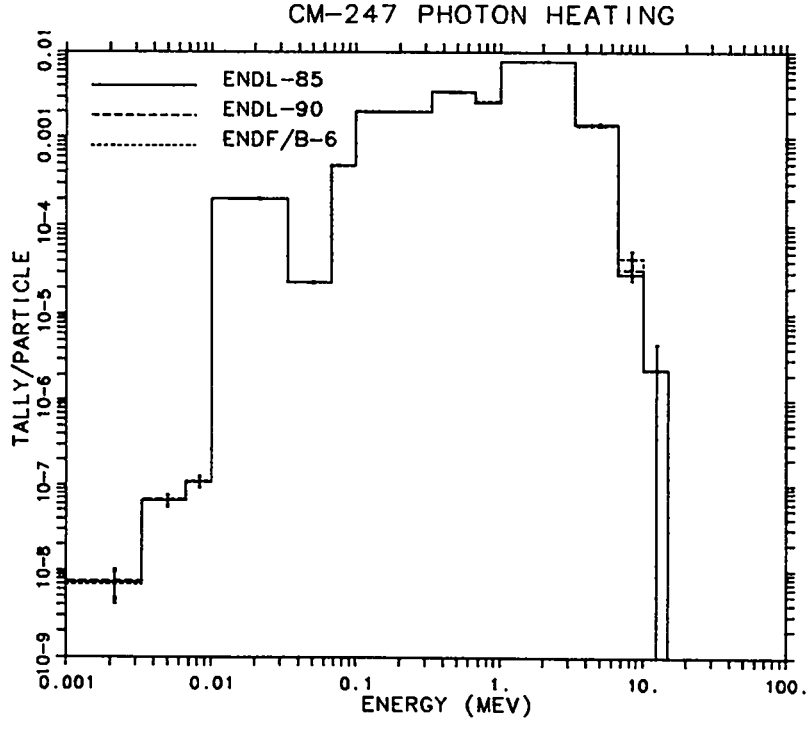

Fig. 344. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon heating for the ^{247}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

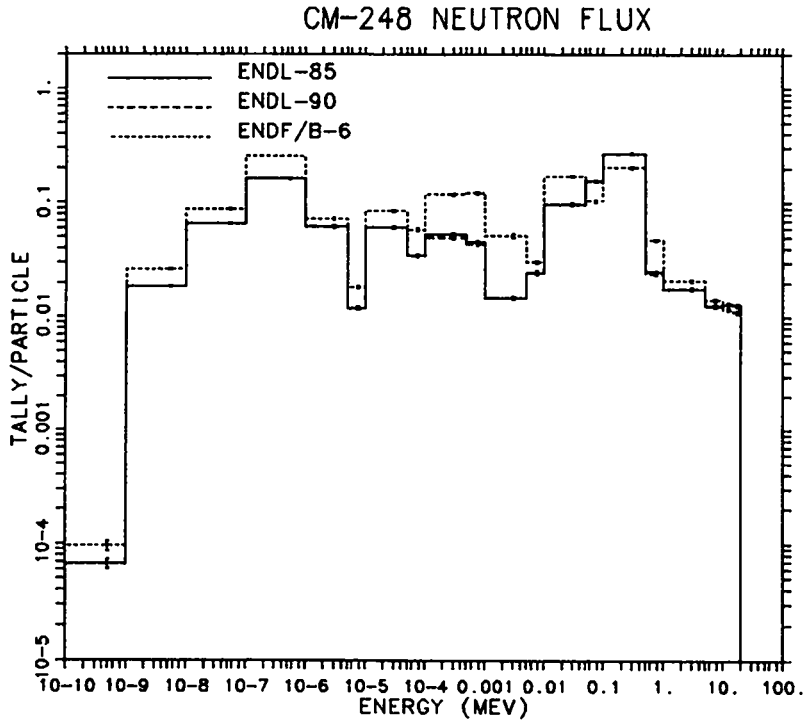

Fig. 345. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{248}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

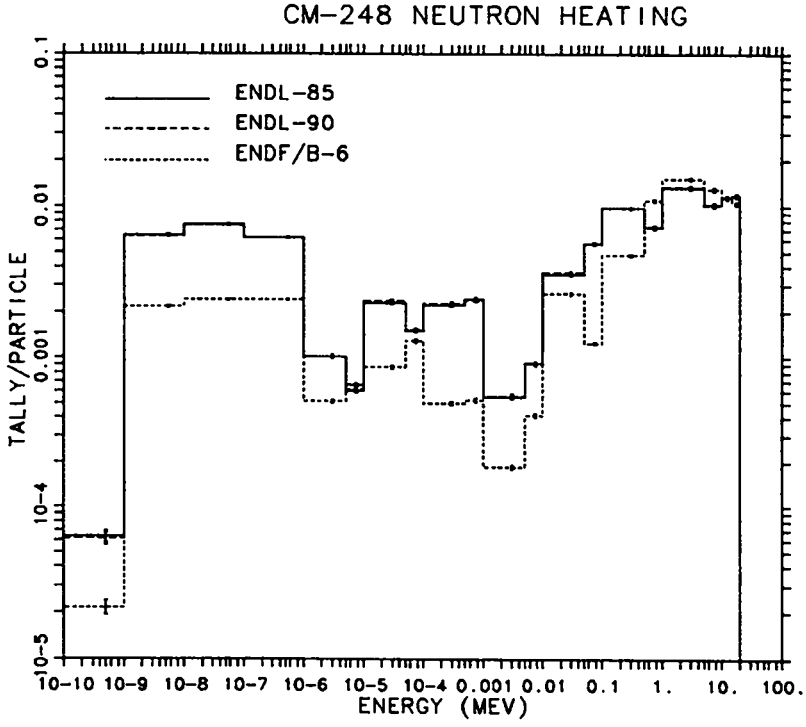

Fig. 346. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated neutron heating for the ^{248}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

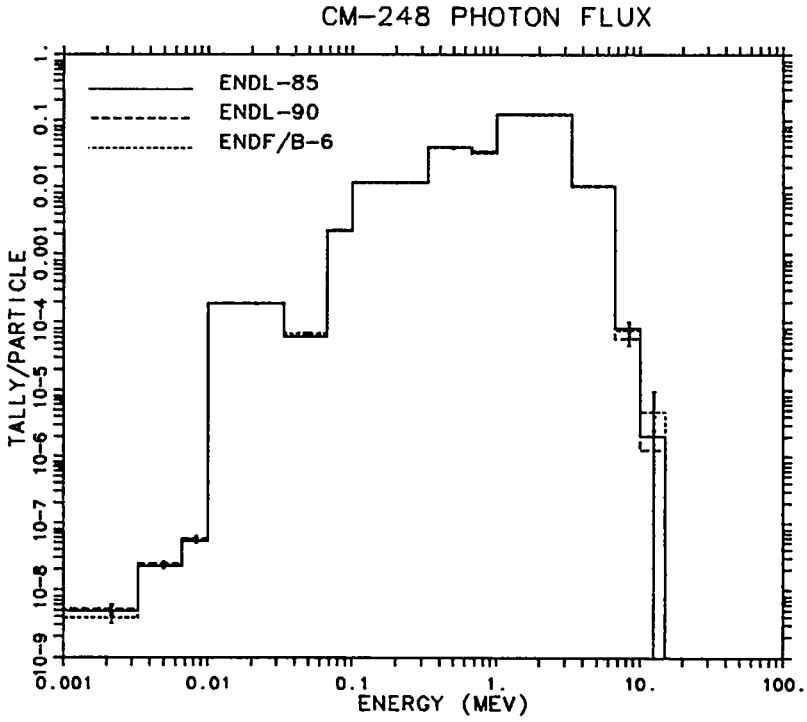

Fig. 347. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon flux for the ^{248}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

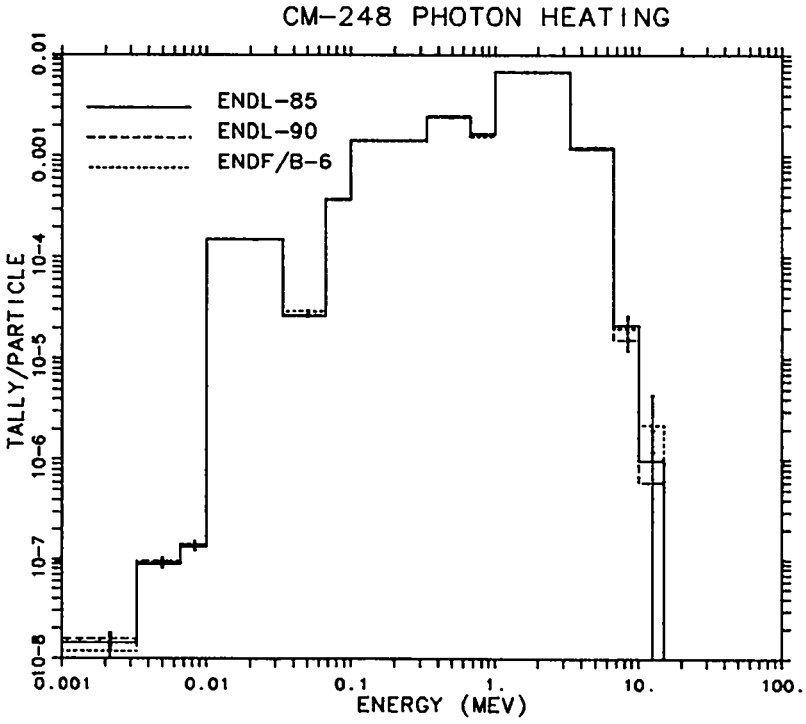

Fig. 348. Plot of ENDL-85, ENDL-90, and ENDF/B-VI calculated photon heating for the ^{248}Cm sphere. Neither ENDL evaluation is the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library does not contain a recommended evaluation for this isotope.

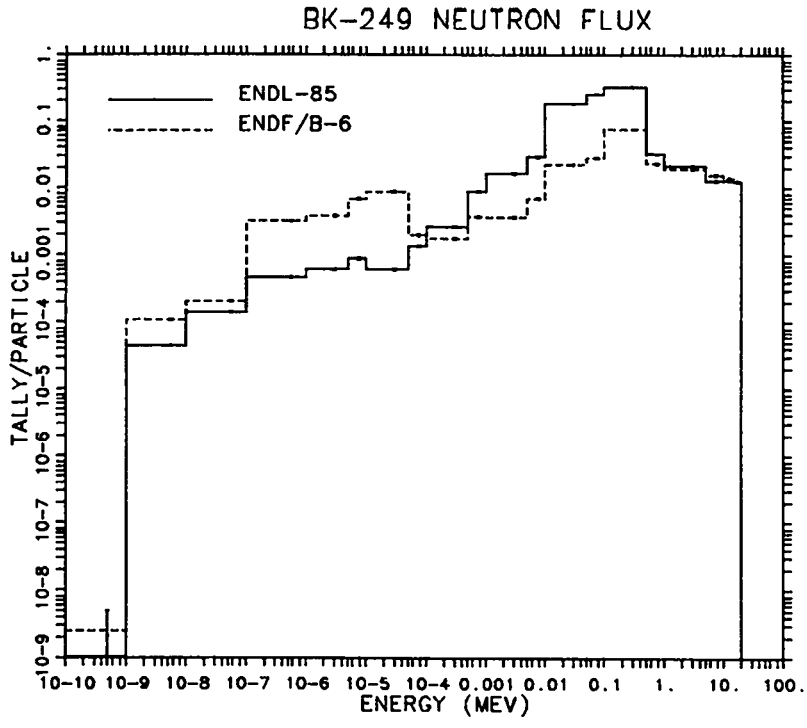

Fig. 349. Plot of ENDL-85 and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{249}Bk sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

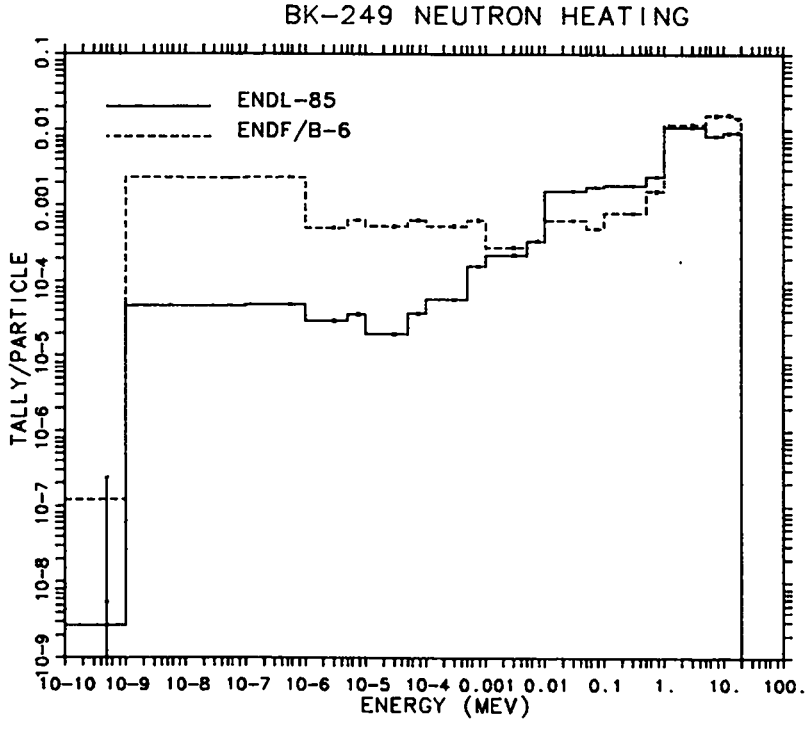

Fig. 350. Plot of ENDL-85 and ENDF/B-VI calculated neutron heating for the ^{249}Bk sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

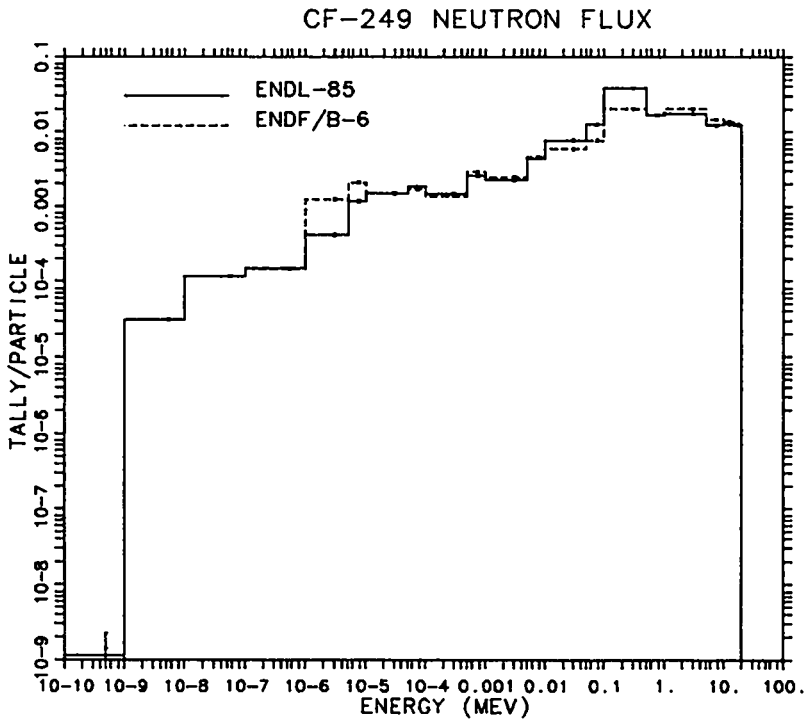

Fig. 351. Plot of ENDL-85 and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{249}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

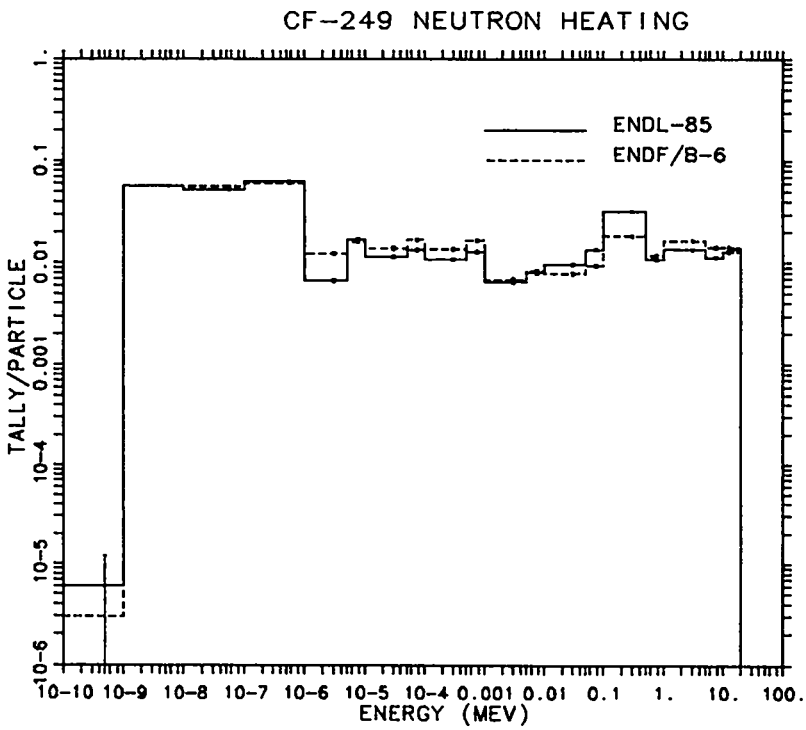

Fig. 352. Plot of ENDL-85 and ENDF/B-VI calculated neutron heating for the ^{249}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

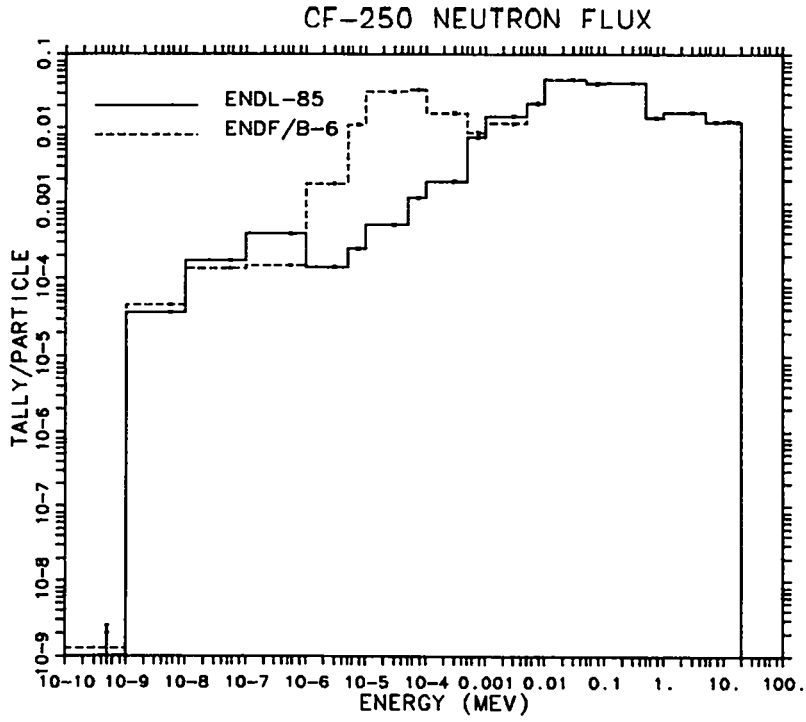

Fig. 353. Plot of ENDL-85 and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{250}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

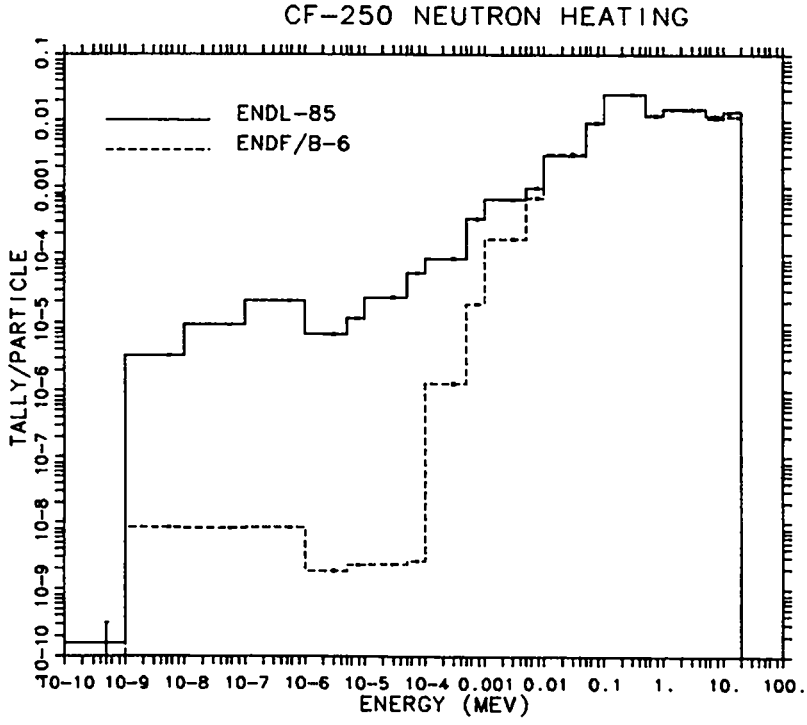

Fig. 354. Plot of ENDL-85 and ENDF/B-VI calculated neutron heating for the ^{250}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

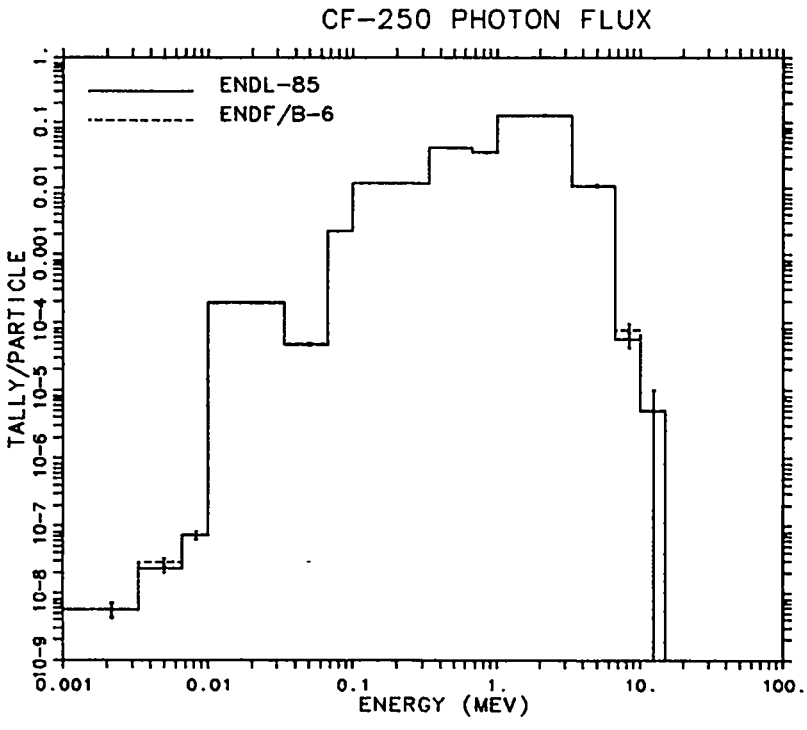

Fig. 355. Plot of ENDL-85 and ENDF/B-VI calculated photon flux for the ^{250}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

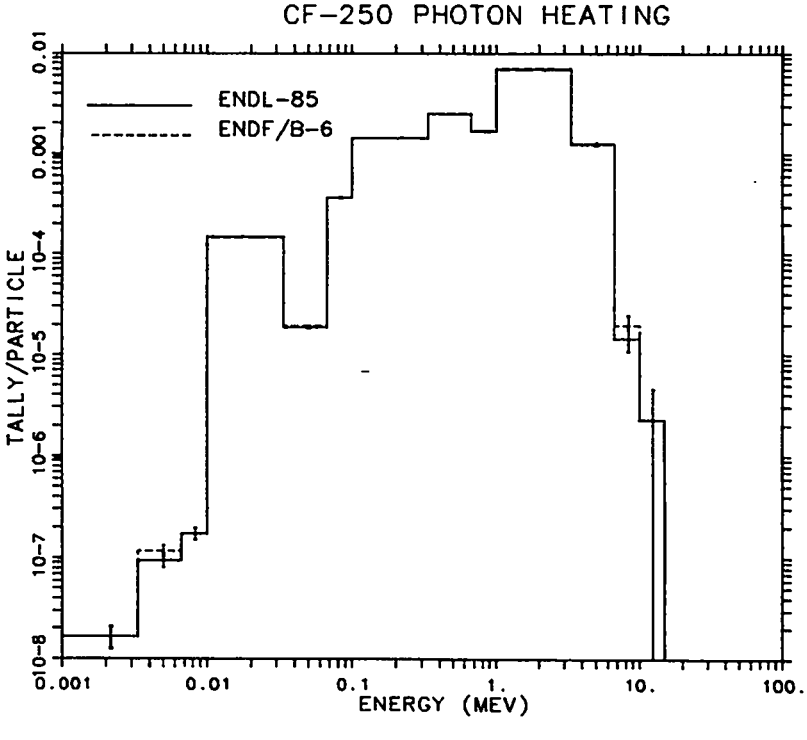

Fig. 356. Plot of ENDL-85 and ENDF/B-VI calculated photon heating for the ^{250}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

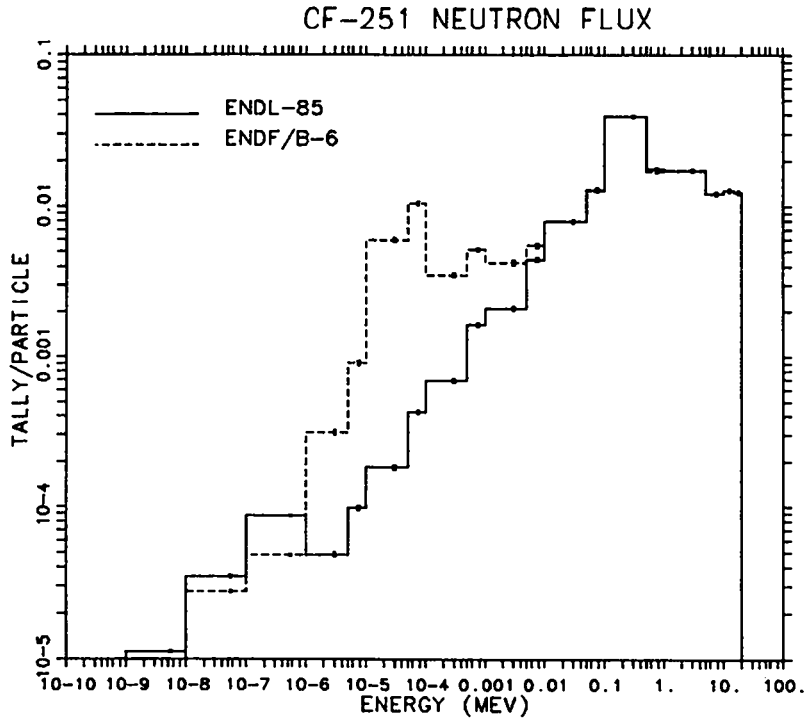

Fig. 357. Plot of ENDL-85 and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{251}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

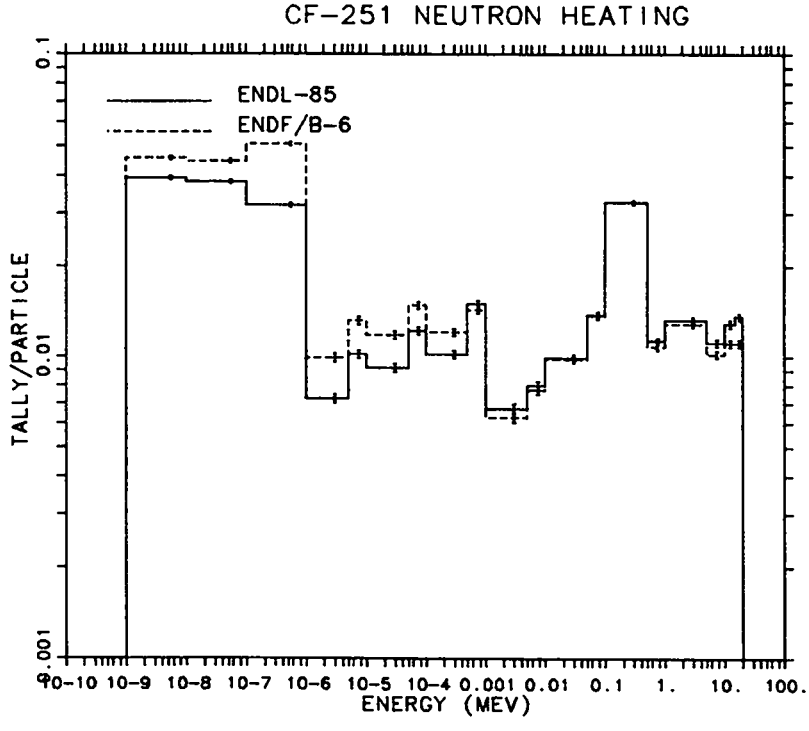

Fig. 358. Plot of ENDL-85 and ENDF/B-VI calculated neutron heating for the ^{251}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

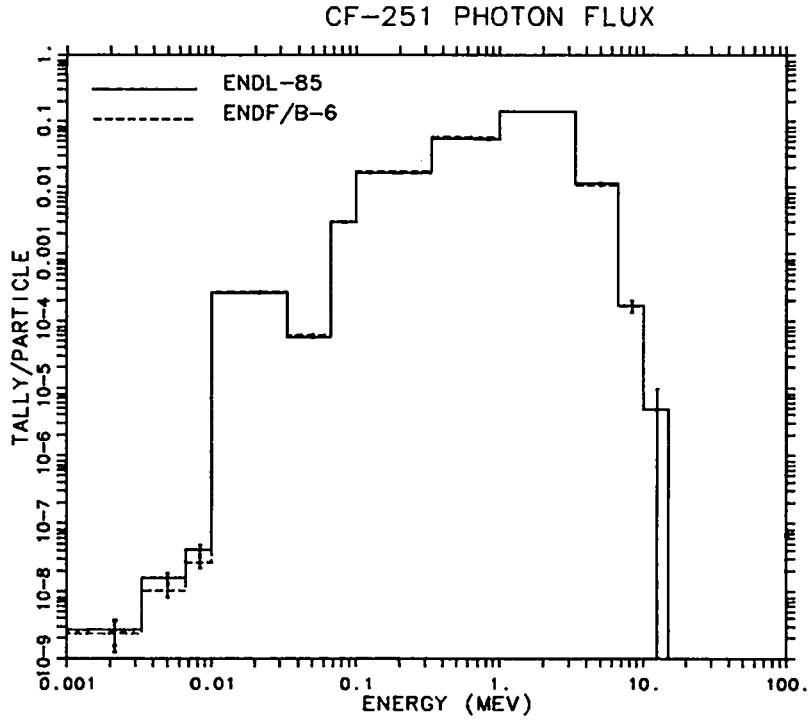

Fig. 359. Plot of ENDL-85 and ENDF/B-VI calculated photon flux for the ^{251}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

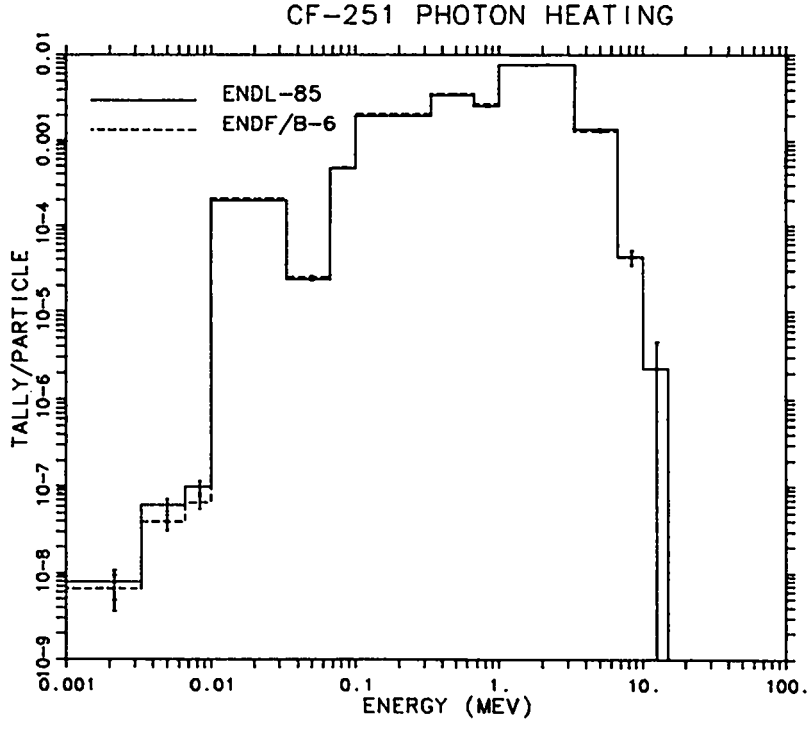

Fig. 360. Plot of ENDL-85 and ENDF/B-VI calculated photon heating for the ^{251}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

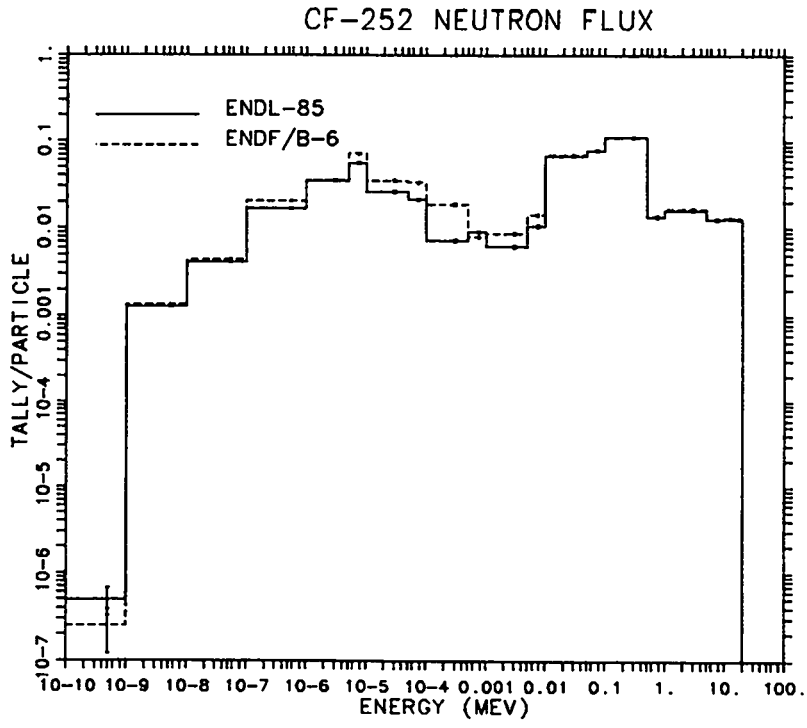

Fig. 361. Plot of ENDL-85 and ENDF/B-VI calculated neutron flux for a 10000 cm radius ^{252}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

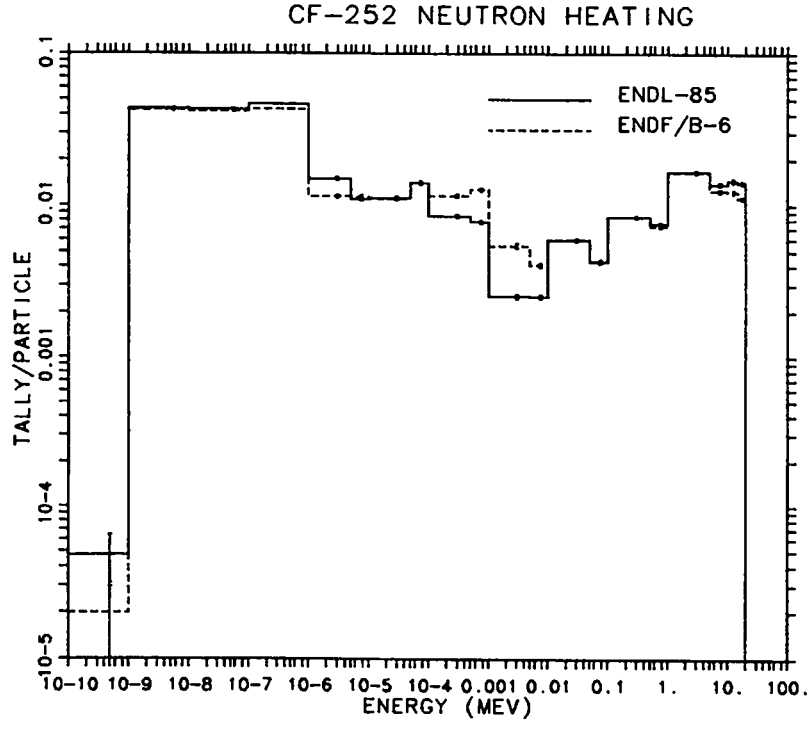

Fig. 362. Plot of ENDL-85 and ENDF/B-VI calculated neutron heating for the ^{252}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

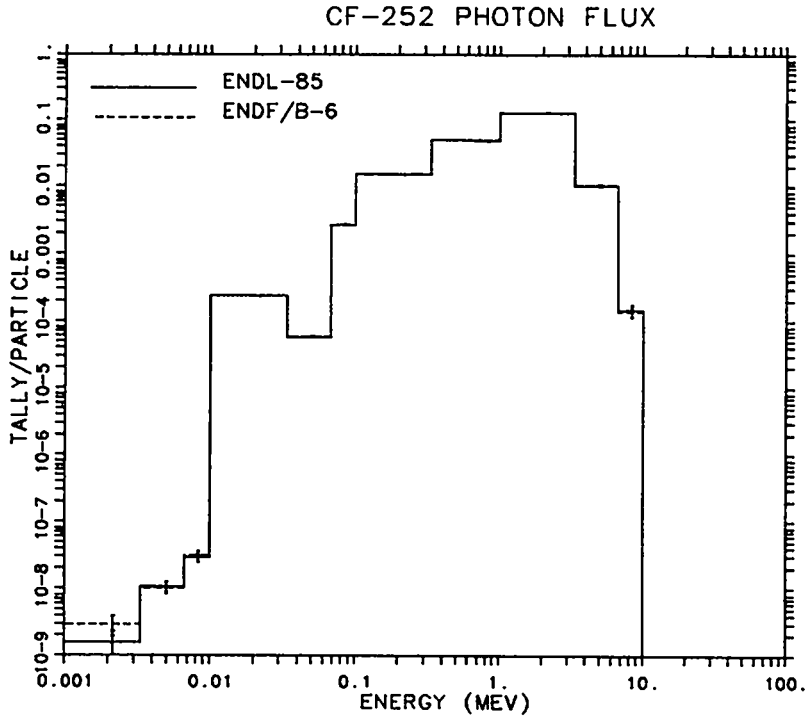

Fig. 363. Plot of ENDL-85 and ENDF/B-VI calculated photon flux for the ^{252}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

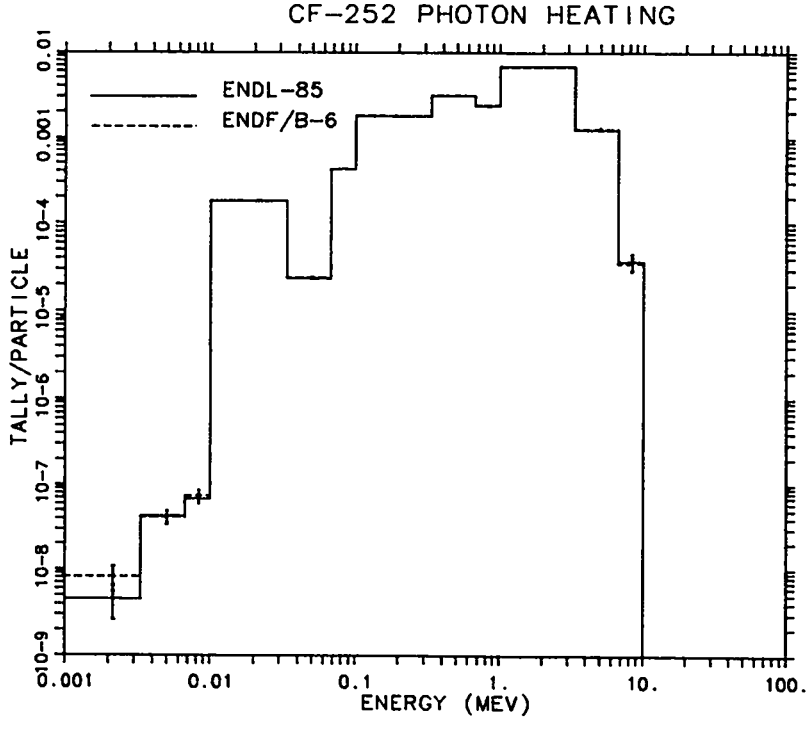

Fig. 364. Plot of ENDL-85 and ENDF/B-VI calculated photon heating for the ^{252}Cf sphere. The ENDL-85 evaluation is not the MCNP Recommended Evaluation for this isotope. The MCNP Recommended Library contains no recommended evaluation for this isotope.

V. CONCLUSIONS

The new MCNP ENDF60 library contains 124 nuclides, 14 of which have been previously unavailable for MCNP. Each nuclide has a ZAID identifier of .60c. All nuclides have been subjected to pseudo-infinite media calculations, and compared to the MCNP Recommended Data Set, or against the best possible evaluation, with the exception of these 14 new nuclides. The advances in NJOY processing have been utilized, as in the improvement of nucleus recoil effects, altering the low-energy neutron heating results such as in ^{1}H, ^{59}Co, Mg, Ti, and others (Table II). Other evaluations now include photon production, as in ^{11}B, ^{45}Sc, ^{89}Y, ^{197}Au, and ^{237}Np.

Overall, 48% of the evaluations in the ENDF60 data set are new evaluations, and can usually be considered improvements on older data sets, but this decision must be left to the individual user. This report is meant to provide the comparisons for an informed choice as to the proper data set to be utilized in specific applications. Other reports[4,8,7] document the testing performed for the ENDF60 library which benchmarked it against experimental data or other libraries. However, these cover only 47 of the 124 ZAIDs, which are listed in Table IV showing which ZAIDs are in which report. This report, in addition to a forthcoming report comparing photon production for the MCNP data libraries,[6] is intended to provide additional information to the user for nuclides which were not compared to experimental data.

TABLE IV. **MCNP ENDF60 Library Experimental Benchmark Coverage.**

ZAID	Livermore Ref.[8]	Iron Ref.[7]	Critical Ref.[4]
^{1}H	√	√	√
^{2}H	√		
^{6}Li	√	√	
^{7}Li	√	√	
^{9}Be	√		
^{10}B		√	√
^{11}B		√	√
C	√	√	√
^{14}N	√	√	√
^{16}O	√	√	√
^{19}F	√		√
^{23}Na	√	√	√
Mg	√	√	√
^{27}Al	√	√	√
Si	√	√	√
^{31}P	√	√	√
^{32}S	√	√	√
K		√	
Ca	√	√	
Ti	√		√
^{50}Cr	√	√	√
^{52}Cr	√	√	√
^{53}Cr	√	√	√
^{54}Cr	√	√	√

TABLE IV (cont.) **MCNP ENDF60 Library Experimental Benchmark Coverage.**

ZAID	Livermore Ref.[8]	Iron Ref.[7]	Critical Ref.[4]
^{55}Mn	√	√	√
^{54}Fe	√	√	√
^{56}Fe	√	√	√
^{57}Fe	√	√	√
^{58}Fe	√	√	√
^{58}Ni	√	√	
^{60}Ni	√	√	
^{61}Ni	√	√	
^{62}Ni	√	√	
^{64}Ni	√	√	
^{63}Cu			√
^{65}Cu			√
^{206}Pb	√		
^{207}Pb	√		
^{208}Pb	√		
^{234}U			√
^{235}U			√
^{236}U			√
^{238}U			√
^{239}Pu			√
^{240}Pu			√
^{241}Pu			√
^{242}Pu			√

References

1. P. F. Rose and C. L. Dunford, Editors, "ENDF-102 Data Formats and Procedures for the Evaluated Nuclear Data File ENDF-6," Brookhaven National Laboratory report BNL-NCS-44945 (July 1990).

2. J. F. Briesmeister, Ed. "MCNP–A General Monte Carlo N-Particle Transport Code, Version 4A," Los Alamos National Laboratory report LA-12625-M (November 1993).

3. J. S. Hendricks, S. C. Frankle, and J. D. Court, "New Data for MCNP," *Trans. Am. Nuc. Soc.* **71**, (1994).

4. J. S. Hendricks, S. C. Frankle, and J. D. Court, "ENDF/B-VI Data for MCNP," Los Alamos National Laboratory report LA-12891 (December 1994).

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Appendix:
MCNP Input Decks

A. Introduction

The following input decks were used to produce the previous results. The major difference between input decks is the source definition. In most cases, the input decks are similar enough to list only representative examples. In the cases were the results are similar, a table will follow giving the similar input decks. When the differences are major, either the differences will be delineated, or a new input deck will be fully listed.

B. ^{1}H Input Deck

```
H-1 Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0    0      0     0   0  0 0  0  0  1
nps 5000
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1 1001.60c  1
prdmp 2j -1
```

^{1}H Similar Input Decks.

^{2}H ^{3}H

C. ^{3}He Input Deck

```
He-3 Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-9 1.e-8 1.e-7 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1   0     1     1     1     1     1     1    1   1 1 1  1  1  1
nps 100000
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1 2003.60c 1
prdmp 2j -1
```

^{3}He Similar Input Decks.

^{4}He

D. ^{6}Li Input Deck

```
Li-6 Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      2     2     2     1   1 1 1  1  1  1
nps 1000000
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1 3006.60c 1
prdmp 2j -1
```

^{6}Li Similar Input Decks.

^{7}Li	^{14}N	^{19}F	Silicon	Calcium
^{9}Be	^{15}N	^{23}Na	^{31}P	^{45}Sc
^{11}B	^{16}O	Magnesium	Sulfur	Zirconium
Carbon	^{17}O	^{27}Al	^{32}S	^{99}Tc

E. ^{10}B Input Deck

```
B-10 Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-9 1.e-8 1.e-7 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      4     4     4     2     2     2     1   1 1 1  1  1  1
nps 100000
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1 5010.60c 1
prdmp 2j -1
```

^{10}B Similar Input Decks.

Chlorine	^{89}Y	^{129}I	^{151}Eu	^{158}Gd	^{183}W
Potassium	^{93}Nb	^{133}Cs	^{153}Eu	^{160}Gd	^{184}W
Titanium	Molybdenum	^{134}Cs	^{152}Gd	^{165}Ho	^{186}W
Vanadium	^{107}Ag	^{135}Cs	^{154}Gd	Hafnium	^{185}Re
^{55}Mn	^{109}Ag	^{136}Cs	^{155}Gd	^{181}Ta	^{187}Re
^{59}Co	Indium	^{137}Cs	^{156}Gd	^{182}Ta	^{197}Au
Gallium	^{127}I	^{138}Ba	^{157}Gd	^{182}W	^{209}Bi

F. Chromium Input Deck

```
Cr Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-9 1.e-8 1.e-7 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      4     4     4     2     2     2     1   1 1 1  1  1  1
nps 10000
cut:n j 1.e-10
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1   24050.60c .04345
     24052.60c .83790
     24053.60c .09500
     24054.60c .02365
prdmp 2j 1
```

G. Iron Input Deck

```
Fe Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      2     2     2     1   1 1 1  1  1  1
nps 50000
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1   26054.60c .059
     26056.60c .9172
     26057.60c .021
     26058.60c .0028
prdmp 2j -1
```

H. Nickel Input Deck

```
Ni Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-9 1.e-8 1.e-7 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      4     4    4      2     2     2     1   1 1 1  1  1  1
nps 50000
cut:n j 1.e-10
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1   28058.60c .6827
     28060.60c .2610
     28061.60c .0113
     28062.60c .0359
     28064.60c .0091
prdmp 2j -1
```

I. Copper Input Deck

```
Cu Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-9 1.e-8 1.e-7 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      4     4     4     2     2     2     1   1 1 1  1  1  1
nps 50000
cut:n j 1.e-10
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1   29063.60c .6917
     29065.60c .3083
prdmp 2j 1
```

J. ^{206}Pb Input Deck

```
Pb Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      2     2     2     2   2 2 2  2  2  2
nps 10000
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1   82206.60c .241
     82207.60c .221
     82208.60c .524
prdmp 2j -1
```

K. ^{230}Th Input Deck

```
Th-230 Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-9 1.e-8 1.e-7 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      4     4     4     2     2     2     1   1 1 1  1  1  1
nps 50000
cut:n j 1.e-10
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1 90230.60c 1
nonu
prdmp 2j 1
```

^{230}Th Similar Input Decks.

^{232}Th	^{235}U	^{239}Np	^{241}Pu	^{242}Am	^{249}Cf
^{231}Pa	^{236}U	^{236}Pu	^{242}Pu	^{243}Am	^{250}Cf
^{232}U	^{238}U	^{237}Pu	^{243}Pu	^{241}Cm	
^{233}U	^{237}Np	^{238}Pu	^{244}Pu	^{242}Cm	
^{234}U	^{238}Np	^{240}Pu	^{241}Am	^{249}Bk	

L. ^{239}Pu Input Deck

```
Pu-239 Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n,p 1 0
vol  1  1
mode n p
sdef erg=d1
si1 1.e-9 1.e-8 1.e-7 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1   0     2     2     2     2     2     2    2   2 2 2  2  2  2
nps 50000
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15    20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1 94239.60c 1
nonu
prdmp 2j -1
```

M. ^{243}Cm Input Deck

```
Cm-243 Infinite medium ENDF/B-VI
1 1 1 -1
2 0 1

1 so 10000

imp:n 1 0
vol  1  1
mode n p
phys:p j 1
sdef erg=d1
si1 1.e-9 1.e-8 1.e-7 1.e-6 1.e-5 1.e-4 1.e-3 .01 .1 1 5 10 15 20
sp1 0      4     4     4     2     2     2     1   1 1 1  1  1  1
nps 50000
cut:n j 1.e-10
e4      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e6      1.e-9 1.e-8 1.e-7 1.e-6 5.e-6 1.e-5 5.e-5 1.e-4
        5.e-4 1.e-3 5.e-3  .01   .05   .1    .5   1
          5    10    15     20
e14  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
e16  1.e-3 3.33e-3 6.67e-3 .01 .0333 .0667 .1 .333 .667 1 3.33 6.67 10 15 20
f4:n 1
f14:p 1
f6:n 1
f16:p 1
m1 96243.60c 1
nonu
prdmp 2j 1
```

^{243}Cm Similar Input Decks.

^{244}Cm	^{247}Cm	^{251}Cf
^{245}Cm	^{248}Cm	^{252}Cf
^{246}Cm		

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