INTERNATIONAL ATOMIC ENERGY AGENCY

NUCLEAR DATA SERVICES

DOCUMENTATION SERIES OF THE IAEA NUCLEAR DATA SECTION

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ENDF/B-4

GENERAL PURPOSE FILE

1974

Summary of Contents and Documentation

Abstract

This document summarizes contents and documentation of the 1974 version of the General Purpose File of the ENDF/B Library maintained by the National Nuclear Data Centre (NNDC) at the Brookhaven National Laboratory. USA. The Library contains numerical neutron reaction data for 90 isotopes or elements. The entire Library or selective retrievals from it can be obtained on magnetic tape from the IAEA Nuclear Data Section.

0. Schwerer

March 1980
Revised April 1980
Revised May 1983
Revised December 1989

The file was revised to conform with ENDF/B format standards. The merged file was corrected for format errors to ensure, as far as possible, format compatibility.

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Note:

The IAEA-NDS-reports should not be considered as formal publications. When a nuclear data library is sent out by the IAEA Nuclear Data Section, it will be accompanied by an IAEA-NDS-report which should give the data user all necessary documentation on contents, format and origin of the data library .

IAEA-NDS-reports are updated whenever there is additional information of relevance to the users of the data library .

For citations care should be taken that credit is given to the author of the data library and/or to the data center which issued the data library .The editor of the IAEA-NDS-report is usually not the author of the data library .

Neither the originator of the data libraries nor the IAEA assume any liability for their correctness or for any damages resulting from their use.

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Citation guideline:

ENDF/B-4

General Purpose File

This is the 1974 version of the ENDF/B Library. For 90 materials all relevant cross sections and differential data (angular and energy distributions) of all relevant neutron-induced reactions are given in the energy range 10-5 eY to 20 KeY.

The entire library has 216885 records. it can be sent out on a single magnetic tape.

Using a density of 1600 bpi

Note that for the following ENDF/B files the more recent ENDF/B-5 version (1979) is available from IAEA-NDS:

ENDF/B-5 Standards File (^{l}H, ^{3}He, ^{6}Li, ^{10}B, ^{12}c, ^{197}Au, ^{235}U), see IAEA-NDS-15

ENDF/B-5 Dosimetry File (dosimetry reactions), see IAEA-NDS-24

ENDF/B-5 Fission Product File. see IAEA-NDS-25

ENDF/B-5 Actinides File, see IAEA-NDS-13

In Table 3 (page 5) the materials included in the ENDF/B-4 General Purpose File, their accession numbers (=MAT) and authors are listed.

Note: The ENDF/B-4 version distributed by the IAEA Nuclear Data Section before 1982 contained some mistakes that were corrected in the beginning of 1983.

The ENDF/B-4 Library is now available in two versions. The normal version contains data in the form of resonance parameters. In the version "ENDF/B-4-R" the resonance parameters have been converted by the code 'RECENT' to cross-sections as functions of energy assuming a temperature of O^{o}K.

This version has a size of 1.053.950 records requiring four magnetic tapes using a density of 1600 bpi and a blocking factor of 60.

Table 1 lists the tape lengths for the 4 parts of the "reconstructed file" for various combinations of density and blocking factor. Because of the large extent of the reconstructed version of the library requestors are encouraged to request specifically the material(s) needed and not necessarily the whole file.

TABLE 1

ENDF/B-IV GENERAL PURPOSE LIBRARY
RECONST) FILE

TABLE SHOWING LENGTH OF TAPE REQUIRED (IN FEET) FOR SPECIFIED DENSITIES AND BLOCKING FACTORS.

DENSITY (BPI)	BLOCKING FACTOR	PART 1 (MAT RANGE 1027-1139) 227830 RECORDS	PART 2 (MAT RANGE 1141-1196) 259278 RECORDS	PART 3 (MAT RANGE 1197-1275) 316204 RECORDS	PART 4 (MAT RANGE 1276-1297) 250638 RECORDS
6250	20	812	925	1128	894
	40	527	601	733	581
	60	433	493	600	476
1600	20	1518	1728	2108	1671
	40	1234	1404	1713	1358
	60	1139	1296	1581	1253
800	20	2468 *	2808 *	3425 *	2715 *
	40	2183	2485 *	3130 *	2402 *
	60	2088	2376	2899 *	2279

* STANDARD LARGE TAPE HAS 2400 FEET.

It should also be noted that in the reconstructed file, the usual limit of 5000 points per reaction type introduced in many processing programs, is far exceeded in many cases. Table 2 lists the number of points for the most important reaction types.

TABLE 2

ENDF/B-IV GENERAL PURPOSE LIBRARY
RECONSTRUCTED FILE

SUMMARY OF POINT COUNTS

MATERIAL	MAT	TOTAL	ELASTIC	FISSION	CAPTURE
62-SM-149	1027	7283	8590	0	7350
64-GD- 0	1030	5727	3269	0	6799
66-DY-164	1031	673	543	0	869
71-LU-175	1032	3991	3262	0	4651
71-LU-176	1033	4761	3202	0	5336
92-U -234	1043	7156	8464	61	9060
94-PU-238	1050	3868	4527	5139	5565
95-AM-241	1056	3338	1468	20943	3344
95-AM-243	1057	2472	1117	71	2956
75-RE-185	1083	6386	4068	0	8124
75-RE-187	1084	5210	3432	0	6529
1-H - 2	1120	40	40	0	271
45-RH-103	1125	44489	32134	0	74086
73-TA-182	1127	2042	1202	0	2596
74-W -182	1128	19324	26499	0	22727
74-W -183	1129	13528	12695	0	16571
74-W -184	1130	11448	14506	0	14211
74-W -186	1131	11936	15992	0	14711
43-TC- 99	1137	2984	2154	0	4553
47-AG-107	1138	9412	6042	0	14399
47-AG-109	1139	11331	8397	0	17700
55-CS-133	1141	29564	23552	0	48709
2-HE- 3	1146	301	59	0	0
17-CL- 0	1149	1684	1582	0	456
19-K - 0	1150	1476	1412	0	927
11-NA- 23	1156	2422	2435	0	2934
5-B - 11	1160	356	358	0	1418
94-PU-242	1161	6837	9030	99	9712
96-CM-244	1162	11636	12069	15898	16018
92-U -236	1163	8505	9376	42	12387
1-H - 3	1169	57	57	0	0
54-XE-124	1170	879	706	0	1431
54-XE-126	1171	432	184	0	1006
54-XE-128	1172	2694	2874	0	3958
54-XE-129	1173	15043	14059	0	21276
54-XE-130	1174	2246	2355	0	2853
54-XE-131	1175	9216	7406	0	13767
54-XE-132	1176	932	1019	0	1724
54-XE-134	1177	358	324	0	986
54-XE-136	1178	59	56	0	417
36-KR- 78	1181	526	446	0	825
36-KR- 80	1182	852	781	0	1244
36-KR- 82	1183	568	399	0	824
36-KR- 83	1184	879	645	0	1285
36-KR- 84	1185	905	1197	0	1649
36-KR- 86	1186	428	2243	0	761
41-NB- 93	1189	29767	20230	0	54417
28-NI- 0	1190	10307	9319	0	15118
24-CR- 0	1191	12040	11025	0	19569
26-FE- 0	1192	6616	5424	0	8820
13-AL- 27	1193	1800	1800	0	292
14-SI- 0	1194	1326	1233	0	307
20-CA- 0	1195	1910	1841	0	1998
23-V - 0	1196	2401	2353	0	733

TABLE 2 (continued)

MATERIAL	MAT	TOTAL	ELASTIC	FISSION	CAPTURE
25-MN- 55	1197	4491	4385	0	2634
27-CO- 59	1199	10452	10184	0	14506
92-U -233	1260	3277	1094	3683	4302
92-U -235	1261	10018	3847	11235	12396
92-U -238	1262	90984	69416	1973	139599
93-NP-237	1263	23775	10757	28203	30050
94-PU-239	1264	16500	11817	16594	21551
94-PU-240	1265	63111	80143	49163	71103
94-PU-241	1266	3371	1473	3575	4208
1-H - 1	1269	107	74	0	311
2-HE- 4	1270	81	81	0	0
3-LI- 6	1271	331	99	0	284
3-LI- 7	1272	182	100	0	268
5-B - 10	1273	354	132	0	0
6-C - 12	1274	262	308	0	207
7-N - 14	1275	942	852	0	310
8-O - 16	1276	983	1035	0	321
9-F - 19	1277	209	318	0	1815
12-MG- 0	1280	800	796	0	486
48-CD- 0	1281	4130	2826	0	8721
48-CD-113	1282	2819	2258	0	4812
79-AU-197	1283	22708	21084	0	32987
ZIRCALLOY-2	1284	9655	8917	0	17941
73-TA-181	1285	16143	12249	0	20781
22-TI- 0	1286	1042	898	0	389
42-MO- 0	1287	5316	3213	0	11312
82-PB- 0	1288	534	485	0	5165
4-BE- 9	1289	68	51	0	157
63-EU-151	1290	13228	8592	0	14252
63-EU-153	1291	10729	6267	0	12067
63-EU-152	1292	10662	6847	0	11244
63-EU-154	1293	8820	5015	0	9573
54-XE-135	1294	394	303	0	498
29-CU- 0	1295	5457	5306	0	5917
90-TH-232	1296	64941	70110	108	85670
91-PA-233	1297	5640	2206	98	6766

TABLE 3

ENDF/B-4 GENERAL PURPOSE FILE

Sym	Mat	Lab	Author	Reviewer
$^{1}_{1}H$	1269	LASL	Stewart	Howerton
$^{2}_{1}H$	1120	BNW	Leonard	
$^{3}_{1}H$	1169 °	LASL	Stewart	
$^{3}_{2}He$	1146 °	LASL	Stewart	
$^{4}_{2}He$	1270 °	LASL	Nisley	
$^{6}_{3}Li$	1271	LASL	Labauve	Leonard
$^{7}_{3}Li$	1272 °	LASL	Labauve	Howerton
$^{9}_{4}Be$	1289	LLL	Howerton	Weisbin
$^{10}_{5}B$	1273	LASL	Hale	Leonard
$^{11}_{5}B$	1160 °	GE,BNL	Cowan	D.T.S.
$^{12}_{6}C$	1274	ORNL	Perey	Labauve
$^{14}_{7}N$	1275	LASL	Young	Labauve
$^{16}_{8}O$	1276	LASL	Young	Labauve
$^{19}_{9}F$	1277	ORNL	Perey	Grimesy
$^{23}_{11}Na$	1156	WARD	Paik	D.T.S.
$_{12}Mg$	1280	SAI	Drake	Fu
$^{27}_{13}Al$	1193	LASL	Young	Roussin
$_{14}Si$	1194	ORNL	Perey	Bhat
$_{17}Cl$	1149 °	GGA	Allen	D.T.S.
$_{19}K$	1150 °	GGA	Drake	D.T.S.
$_{20}Ca$	1195	ORNL	Perey	Maerker

Sym	Mat	Lab	Author	Reviewer
$^{}_{22}Ti$	1286	LLL	Howerton	Roussin
$^{}_{23}V$	1196	ORNL	Penny	Young
$^{}_{24}Cr$	1191	BNL	Prince	Maerker
$^{55}_{25}Mn$	1197	BNL	Takahashi	Roussin
$^{}_{26}Fe$	1192	ORNL	Perey	Stewart
$^{59}_{27}Co$	1199	BNL	Krieger	Cobb
$^{}_{28}Ni$	1190	BNL	Bhat	Maerker
$^{}_{29}Cu$	1295	SAI	Drake	Perey
$^{78}_{36}Kr$	1181	BNL	Prince	Livolsi
$^{80}_{36}Kr$	1182	BNL	Prince	Livolsi
$^{82}_{36}Kr$	1183	BNL	Prince	Livolsi
$^{83}_{36}Kr$	1184	BNL	Prince	Livolsi
$^{84}_{36}Kr$	1185	BNL	Prince	Livolsi
$^{86}_{36}Kr$	1186	BNL	Prince	Livolsi
Zirc-2 *	1284	BNW	Leonard	Cobb
$^{93}_{41}Nb$	1189 °	ANL	Smith	Muir
$^{}_{42}Mo$	1287	LLL	Howerton	Roussin
$^{99}_{43}Tc$	1137	B+W	Livolsi	D.T.S.
$^{103}_{45}Rh$	1125	B+W	Livolsi	D.T.S.
$^{107}_{47}Ag$	1138	BNL	Bhat	D.T.S.
$^{109}_{47}Ag$	1139	BNL	Bhat	D.T.S.
$^{}_{48}Cd$	1281 °	UK,BNL	Pearlstein	Wheeler
$^{113}_{48}Cd$	1282	UK,BNL	Pearlstein	Wheeler

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Sym	Mat	Lab	Author	Reviewer
$^{124}_{54}Xe$	1170	BNL	Bhat	Schenter
$^{126}_{54}Xe$	1171	BNL	Bhat	Schenter
$^{128}_{54}Xe$	1172	BNL	Bhat	Schenter
$^{129}_{54}Xe$	1173	BNL	Bhat	Schenter
$^{130}_{54}Xe$	1174	BNL	Bhat	Schenter
$^{131}_{54}Xe$	1175	BNL	Bhat	Schenter
$^{132}_{54}Xe$	1176	BNL	Bhat	Schenter
$^{134}_{54}Xe$	1177	BNL	Bhat	Schenter
$^{135}_{54}Xe$	1294	BNW	Leonard	D.T.S.
$^{136}_{54}Xe$	1178	BNL	Bhat	Schenter
$^{133}_{55}Cs$	1141	BNL	Bhat	D.T.S.
$^{149}_{62}Sm$	1027	BNW	Leonard	D.T.S.
$^{151}_{63}Eu$	1290	BNL	Takahashi	Schenter
$^{152}_{63}Eu$	1292	BNL	Takahashi	Schenter
$^{153}_{63}Eu$	1291	BNL	Takahashi	Schenter
$^{154}_{63}Eu$	1293	BNL	Takahashi	Schenter
$^{}_{64}Gd$	1030	ANL	Pennington	D.T.S.
$^{164}_{66}Dy$	1031 *	BNW	Leonard	
$^{175}_{71}Lu$	1032 *	BNW	Leonard	
$^{176}_{71}Lu$	1033 *	BNW	Leonard	
$^{181}_{73}Ta$	1285 *	LLL	Howerton	Young

Sym	Mat	Lab	Author	Reviewer
$^{182}_{73}Ta$	1127 *	AI	Otter	
$^{182}_{74}W$	1128 *	AI,LASL	Alter	
$^{183}_{74}W$	1129 *	AI,LASL	Alter	
$^{184}_{74}W$	1130 *	AI,LASL	Alter	
$^{186}_{74}W$	1131 *	AI,LASL	Alter	
$^{185}_{75}Re$	1083 *	GE	Henderson	D.T.S.
$^{187}_{75}Re$	1084 *	GE	Henderson	D.T.S.
$^{197}_{79}Au$	1283	BNL	Goldberg	Leonard
$^{}_{82}Pb$	1288	ORNL	Perey	Livolso
$^{232}_{90}Th$	1296	B+W	Wittkopf	Mathews
$^{233}_{91}Pa$	1297	BAPL	Young	D.T.S.
$^{233}_{92}U$	1260	BAPL	Weston	
$^{234}_{92}U$	1043	GGA	Drake	D.T.S.
$^{235}_{92}U$	1261	TASK F.	Stewart	Hutchins
$^{236}_{92}U$	1163	SRL	Mccrosson	D.T.S.
$^{238}_{92}U$	1262	TASK F.	Paik	Stewart
$^{237}_{93}Np$	1263	ANC,LASL	Smith	Carlson
$^{238}_{94}Pu$	1050	AI	Alter	D.T.S.
$^{239}_{94}Pu$	1264	TASK F.	Hutchins	Paik
$^{240}_{94}Pu$	1265	TASK F.	Hummel	Mccrosson
$^{241}_{94}Pu$	1266	TASK F.	Hummel	Hunter

Sym	Mat	Lab	Author	Reviewer
$^{242}_{94}Pu$	1161	AI,ANC	Alter	D.T.S.
$^{241}_{95}Am$	1056	ANC	Smith	D.T.S.
$^{243}_{95}Am$	1057	ANC	Smith	D.T.S.
$^{244}_{96}Cm$	1162	AI,ANC	Alter	D.T.S.

* Zirc-2 = Zircalloy

° = These evaluations were included in ENDF/B-V (1979) unchanged or with minor modifications only; they are listed in the Summary Documentation of ENDF/B-V with evaluation dates of 1974 or earlier.

Documentation:

D. Garber, ENDF/B Summary Documentation, Report BNL-17541
(= ENDF-201, 2nd edition), October 1975.

Summaries are contained also in the file itself at the beginning of each material.

For a number of materials there are more detailed documentaions available in separate reports (for these references see BNL-17541 and CINDA).

Data tabulations, graphical plots and characteristic cross-section values (thermal, l/E, Watt-spectrum) see also H.Ch. Rieffe, H.J. Nolthenius, report RCN-75-157, Petten, Dec. 1975.

ENDF/B-IV format:

A complete description of the ENDF/B-IV format, including all physical definitions required for the processing of more complicated data types (e.g. differential data) is given in the report BNL-NCS- 50496 (ENDF-102), October 1975.

For quick reference of the ENDF/B format (File Numbers and Reaction Type Numbers of the most important data types) see the document IAEA-NDS-I0.

Note: Listings of all ENDF/B format data can also be requested in "edited format". Such listings provide all necessary quantity headings, units, etc. and are self-explanatory.