INTERNATIONAL ATOMIC ENERGY AGENCY

NUCLEAR DATA SERVICES

DOCUMENTATION SERIES OF THE IAEA NUCLEAR DATA SECTION

IAEA-NDS-100
Rev. 11, Nov. 2001

ENDF/B-VI
Release 8 (Last release of ENDF/B-VI)

The U.S. Evaluated Nuclear Data Library for Neutron Reaction Data

by the US National Nuclear Data Center
- 1990 including revisions up to Nov. 2001 -

Summary of contents

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Abstract: This document summarizes the contents of the general-purpose neutron data file of ENDF/B-VI, the U.S. Evaluated Nuclear Data Library, including supplements and revisions up to November 2001. The data library is in ENDF-6 format, either in the basic compact form with resonance parameters (50 Megabytes), or in point data form where resonance parameters have been converted to cross-sections (300 Megabytes). The entire library or retrievals of selected materials are available on magnetic media from the IAEA Nuclear Data Section free of charge. The library is also available online within NDIS, the Nuclear Data Information System, or from the WWW page of the Nuclear Data Section.

The ENDF/B-VI, Release 8 is the last release of the B-VI library. The release of the ENDF/B-VII library is scheduled for the year 2005.

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usernames: ANONYMOUS for FTP file transfer;
FENDL2 for FTP file transfer of FENDL-2.0;
RIPL for FTP file transfer of RIPL;
NDSONL for FTP access to files sent to NDIS "open" area.
Web: http://www-nds.iaea.org

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 guidelines:

a) *citing the evaluation of one material*

Author(s), "Neutron reaction data evaluation of …", report ... (place, year) [or, if no report is available: Undocumented]. Data file ENDF/B-VI MAT 1234 Rev. 2 (date) by the U.S. National Nuclear Data Center on behalf of the Cross-Section Evaluation Working Group. Data received on tape (or retrieved online) from the IAEA Nuclear Data Section.

b) *citing the entire library*

P.F. Rose (ed.), "ENDF/B-VI Summary Documentation", report BNL-NCS-17541 (ENDF-201), (Brookhaven National Laboratory 1991). Data Library ENDF/B-VI, update 1998, by the U.S. National Nuclear Data Center … etc. as above.

V. McLane (ed.), "ENDF/B-VI Summary Documentation Supplement 1"
"ENDF/HE-VI Summary Documentation", report
BNL-NCS-17541 (ENDF-201), 4th Edition.12/96.

c) *citing the format*

V. McLane, P.F. Rose, C.L. Dunford (ed.), "Data formats and procedures for the Evaluated Nuclear Data File ENDF-6", report BNL-NCS-44945 (ENDF-102) Rev 4/01 (Brookhaven National Laboratory 2001).

ENDF/B-6

The U.S. Evaluated Nuclear Data Library
for Neutron Reaction Data
- including revisions up to Nov. 2001 -

Introduction

The ENDF/B-6 Nuclear Data Library was compiled and released by the U.S. National Nuclear Data Center (NNDC) at the Brookhaven National Laboratory, on behalf of the U.S. Cross-Section Evaluation Working Group (CSEWG).

Note: The originators advise that the correct spelling is
ENDF/B-VI for the data library, and
ENDF-6 for its format.

As the Roman VI is not very practical for computerized logs, we use an Arabic 6 throughout.

The presently available version of ENDF/B-6 was released in Jan./ June 1990, with revisions and supplements released in September 1991, June 1993, May 1995, Feb 1997, Sep 1998, Jun 1999, Apr 2000 and Oct 2001. The main part of this library contains neutron reaction data for 329 materials from 1-H-1 to 99-Es-253 in the neutron energy range from 10^{-5} eV to 20 MeV or to 150 MeV. See the table of contents on the following pages. Evaluation summaries for many nuclides are given in the reports

P.F. Rose (ed.): ENDF/B-6 summary documentation, 4th edition of BNL-NCS-17541 (= ENDF-201), US National Nuclear Data Center, Oct. 1991.

V.McLane (ed.): ENDF/B-6 summary documentation, Supplement I, 4th edition of BNL-NCS-17541 (=ENDF-201), US National Nuclear Data Center, Dec.1996.

It is available

- in the basic format with resonance parameters;
- and/or in point data format where resonance parameters have been converted to cross-sections (temperature 300K).

The entire library is available as a series of files (tapes) which follow the NNDC protocol, the point data version is available for the entire library.

The materials that have been revised in 1991, 1993,1995,1997,1998,1999, 2000 and 2001 can be sent out separately.

The data is available online or on CD-ROM (on request).

Release conditions

The data library ENDF/B-6 has been released freely with the understanding

- that reprints of publications in which ENDF/B-6 data have been used;
- that results obtained when testing and inter-comparing benchmark data with ENDF/B-6 data; and
- that comments on data accuracies or deficiencies encountered in the data files

should be sent to:

Dr. C.L. Dunford
National Nuclear Data Center, Bldg. 197D
Brookhaven National Laboratory
P.O. Box 5000
Upton, New York 11973-5000, U.S.A.

with copy to: Dr. O.Schwerer
IAEA Nuclear Data Section
P.O. Box 100
A-1400 Vienna, Austria

Format:

The data library ENDF/B-6 is in ENDF-6 format which is documented in detail in the report IAEA-NDS-76, Rev. 5, which is essentially a reprint of the report BNL-NCS-44945 of July 1990 (ENDF-102), which was last updated in April 2001. For use of this data library a set of computer codes is required. Both, data library and computer codes are available on DAT cassette or CD-ROM from the IAEA Nuclear Data Section free of charge.

Available computer codes:

The ENDF Pre-Processing Codes "Pre-Pro2000" by D.E. Cullen.
See document IAEA-NDS-39 Rev. 10

ENDF Utility Codes release 6.11 by C.L. Dunford.
See document IAEA-NDS-29 Rev. 8

ENDVER The ENDF FileVerification Support Package by A.Trkov
See document IAEA-NDS-77 Rev. 0

Not available from IAEA:

NJOY: A system for processing ENDF formatted data files. For a summary see document IAEA-NDS-119. This code package must be requested from the

Radiation Shielding Information Computational Center (RSICC)
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, TN, USA-37831

Online access:

Interactive online access is possible within the IAEA Nuclear Data Information System.

(TELNET: IAEAND.IAEA.OR.AT, username: IAEANDS) or
Web (http://www-nds.iaea.org)

Library Organization:

The ENDF-6 format permits not only the inclusion of neutron-induced reaction data but also photon and charged-particle induced reaction data. However, these must be stored in separate sub-libraries. There are seven ENDF/B-6 sub-libraries for

incident neutrons: i.e. the ENDF/B-6 general library for neutron reaction data as summarized in the present document.

incident charged particles	see document IAEA-NDS-105
decay data	see document IAEA-NDS-108
photo-atomic interaction	see document IAEA-NDS-58
neutron thermal scattering law	see document IAEA-NDS-97
fission product yields (neutron induced, and spontaneous)	see document IAEA-NDS-106
ENDF/HE-6, a high-energy data library for incident neutrons and protons	see document IAEA-NDS-113

For neutron data there exist several "special purpose" libraries in addition to the general ENDF/B-6 library. These files need not be stored and maintained as separate data libraries but can be retrieved from the general ENDF/B-6 library with specific retrieval routines; however, they may as well be considered and stored as separate libraries. So far we have the following special-purpose libraries.

ENDF/B-6 standards; this includes selected reactions from 1-H-1, 2-He-3, 3-Li-6, 5-B-10, 6-C, 79-Au-197, 92-U-235.
See the summary given in IAEA-NDS-88.

ENDF/B-6 dosimetry library: this includes selected reactions from 23 materials that are used for reactor neutron dosimetry by foil activation. This library has been released by NNDC in May 1990 on the tape number 901. See its table of contents towards the end of this document.

ENDF/B-6 neutron activation library: this includes selected reactions from 68 materials. This library has been released by NNDC in May 1990 on the tape numbers 902 and 903. See its table of contents on the last pages of this document.

1995 update:

In 1995 the following materials were updated:

1-H-2, 7-N-14, 13-Al-27. 48-Cd isotopes, 56-Ba isotopes, 62-Sm-144, 83-Bi-209. 92-U-235, 94-Pu-241, 95-Am-241.

1997 update:

In 1997 the following materials were added, replaced or updated:
1-H-2, 13-Al-27, 39-Y-89, 48-Cd isotopes, 64-Gd isotopes, 77-Ir isotopes, 92-U-235, 94-Pu-236.

1998 update:

In 1998 the following materials were added, replaced or updated:

1-H-1, 14-Si Isotopes, 24-Cr Isotopes, 25-Mn-55, 26-Fe Isotopes, 28-Ni Isotopes, 46-Pd Isotopes, 67-Ho-165, 82-Pb-208, 92-U Isotopes, 94-Pu-239, 95-Am-243.

1999 update:

In 1999 the following materials were added, replaced or updated:

1-H-1, 1-H-2, 6-C-0, 7-N-14, 8-O-16, 13-Al-27, 14-Si Isotopes, 15-P-31, 20-CA-0, 24-Cr Isotopes, 26-Fe Isotopes, 28-Ni Isotopes, 29-Cu-63, 29-Cu-65, 41-Nb-93, 74-W Isotopes, 82-Pb Isotopes

2000 update:

In 2000 the following materials were replaced or updated:

55-Cs-Isotopes, 56-Ba134, 59-Pr-141, 62-Sm-149, 63-Eu- Isotopes, 66-Dy- Isotopes, 71-Lu- Isotopes, 83-Bi-209, 96-Cm- Isotopes.

2001 update:

In 2001 the following materials were replaced, updated or added:

1-H-1, 2-He-4, 4-Be-9, 5-B-11, 7-N-14, 8-O-16, 9-F-19, 11-Na-23, 12-Mg-Nat, 13-Al-27, 14-Si-29, 16-S-Nat, 16-S-32, 17-Cl-35, 17-Cl-37, 19-K-Nat, 20-Ca-Nat, 21-Sc-45, 22-Ti-Nat, 23-V-Nat, 24-Cr-Isotopes, 25-Mn-55, 26-Fe-Isotopes, 28-Ni-Isotopes, 29-Cu-Isotopes, 37-Rb-87, 40-Zr-Isotopes, 42-Mo-95, 43-Tc-99, 44-Ru-101, 45-Rh-103, 46-Pd-105, 47-Ag-109, 50-Sn-120, 50-Sn-122, 50-Sn-124, 51-Sb-121, 51-Sb-123, 54-Xe-131, 60-Nd-143, 60-Nd-145, 62-Sm-147, 62-Sm-150, 62-Sm-151, 62-Sm-152, 64-Gd-152, 64-Gd-154, 64-Gd-155, 64-Gd-157, 74-W-Isotopes, 91-Pa-232, 92-U-232, 93-Np-236.

In the following summary of contents these modifications are indicated in **bold.**

Benchmark calculations

See, e.g.

Jung-do Kim, Choong-Sup Gil, Korea:

Thermal Reactor Benchmark Calculations using ENDF/B-6 based WIMS Cross-Section Library. 1991 Symposium on Nuclear Data, Tokai, JAERI, 28-29 Nov. 1991.

ENDF/B-6 main library

Summary of Contents

The following table includes the following columns

MAT: Material-number (accession-number)

Nucl: Isotope or element

Data: Some information on the data types included, or on the envisaged application of the data

Tape Rlsd: Under the heading "Tape Rlsd" the tape number is given under which the file has been distributed by NNDC.

Tape	Distribution date
100-103	26 Jan. 1990
104	30 Jan. 1990
105	31 Jan. 1990
106, 107	2 Feb. 1990
108	9 Feb. 1990
109, 110	6 Feb. 1990
111-114	20 Apr. 1990
115	8 June 1990
116	7 June 1990
117	6 June 1990
120-124	4 Sep. 1991
127, 128	22 June 1993
129	3 June 1993
134, 135	1 May 1995
137	22 Jan 1997
139-144	2 Sep 1998
145-153	3 Sep 1999
154-155	11 Apr 2000
156-163	**9 Sep 2001**

"Mod. 2: 134" means that Mod. 2 was distributed on tape 134.

Status: Under this heading information on the status of the data evaluation is given, as follows:

Status	Meaning
new	re-evaluated or extensively revised for ENDF/B-6
old	not re-evaluated for ENDF/B-6; only format conversion to ENDF-6 with perhaps correction of errors
old+	same, but new or revised delayed fission neutron yields and spectra were included
E4	taken over from ENDF/B-4
E5FP	taken over from the ENDF/B-5 fission-product library
E5A	taken over from the ENDF/B-5 actinides library V.2
E5A+	same, but new or revised delayed fission neutron yields and spectra were included

Please note that this "status" information cannot be more than an approximation. For more detailed information the introductory text for each material should be consulted.

ENDF/B-6

Summary of Contents

Light elements

MAT	Nucl.	Data	Tape Rlsd.	Status
125	1-H-1	Standard, Neutron transport, Gamma production 1998 Minor Modification 1999 Energy range extended from 100 to 150 Mev. **2001 Minor revision**	100 Rev. 120 Mod. 3: 142 Mod. 4: 145 **Mod. 5: 162**	new
128	1-H-2	Neutron transport, Decay Data, Gamma production File 6,MT=16:Second subsection added 1999 Minor modification below 50 Mev. New evaluation between 50 and 150 Mev.	116 Mod. 2: 134 Mod. 3: 137 Mod. 4: 145	new
131	1-H-3	Neutron transport	101	old
225	2-He-3	Standard, Neutron transport	116 Rev. 120	new
228	2-He-4	Neutron transport **2001 Minor revision**	101 **Mod. 1: 162**	old
325	3-Li-6	Standard, Neutron transport, Gamma production, Dosimetry	100 Rev. 120	new
328	3-Li-7	Neutron transport, Gamma production, Covariances, Activation	100	new
425	4-Be-9	Neutron transport, Gamma production, Activation, Double differential data (MF=6) **2001 Secondary Gamma spectra for radiative capture modified**	100 **Mod. 2: 156**	new
525	5-B-10	Standard, Neutron transport, Gamma production, Dosimetry, Activation	100 Rev. 120	new
528	5-B-11	Neutron transport, Gamma production, Activation, Double differential data (MF=6) **2001 Minor revision**	100 **Mod. 2: 162**	new
600	6-C	Standard, Neutron transport, Gamma production, Covariances 1999 Minor modification below 20 Mev. New evaluation between 20 and 150 Mev.	100 Rev. 120 Mod. 3: 145	new
725	7-N-14	Neutron transport, Gamma production 1993 revised in resonance region and extended to higher energies 1999 New evaluation between 20 and 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	116 Rev. 127 Mod. 3: 134 Mod. 4: 145 **Mod. 5: 156**	new
728	7-N-15	Neutron transport, Gamma production	116	new

Light elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
825	8-O-16	Neutron transport, Gamma production 1999 Minor modification below 20 Mev. Energy range extended from 20 and 150 Mev. **2001 New Evaluation Neutron Transport, Gamma production for energies upto 150Mev**	116 Mod. 2: 145 **Mod. 3: 163**	new
828	8-O-17	Neutron transport, Activation BNL 1978, Magurno	101	old
925	9-F-19	Neutron transport, Gamma production, Covariances **2001 Secondary Gamma spectra for radiative capture modified**	115 **Mod. 1: 156**	new
1125	11-Na-23	Neutron transport, Gamma production, Covariances, Activation **2001 Secondary Gamma spectra for radiative capture modified**	101 Rev. 120 **Mod. 1: 156**	old
1200	12-Mg	Neutron transport, Gamma production **2001 Secondary Gamma spectra for radiative capture modified**	101 **Mod. 1: 156**	old
1225	12-Mg-24	Activation, Dosimetry	101	old
1325	13-Al-27	Neutron transport, Gamma production, Covariances, Activation, Dosimetry File 1: Thermal values added File 3: Corrected interpolation range 1999 New evaluation between 20 and 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	101 Mod. 1: 134 Mod. 2 :137 Mod. 3: 145 **Mod. 1: 156**	old
1400	14-Si	Neutron transport, Gamma production, Covariances	116	old
1425	14-Si-28	Neutron transport, Gamma production, Covariances 1998 1999 Energy range extended from 100 to 150 Mev.	New: 139 Mod. 2: 146	new
1428	14-Si-29	Neutron transport, Gamma production, Covariances 1998 1999 Energy range extended from 20 to 150 Mev. **2001 Minor revision in resolved resonance region**	New: 139 Mod. 2: 146 **Mod. 3: 162**	new
1431	14-Si-30	Neutron transport, Gamma production, Covariances 1998 1999 Energy range extended from 20 to 150 Mev.	New: 139 Mod. 2: 146	new
1525	15-P-31	Neutron transport, Gamma production, Activation 1999 Energy range extended from 20 to 150 Mev.	101 Mod. 1: 146	old

Light elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
1600	16-S	Neutron transport, Gamma production **2001 Secondary Gamma spectra for radiative capture modified**	101 **Mod. 1: 156**	old
1625	16-S-32	Neutron transport, Gamma production, Activation **2001 Secondary Gamma spectra for radiative capture modified**	101 **Mod. 1: 156**	old
1700	17-Cl	Neutron transport, Gamma production GGA 1972	101	E4
1725	**17-Cl-35**	**2001 New Evaluation, Neutron Transport, Gamma Production**	**New: 163**	**new**
1731	**17-Cl-37**	**2001 New Evaluation, Neutron Transport, Gamma Production**	**New: 163**	**new**
1837	18-Ar-40	Activation	101	old
1900	19-K	Neutron transport, Gamma production GGA 1967/74 **2001 Secondary Gamma spectra for radiative capture modified**	101 **Mod. 1: 156**	E4
1931	19-K-41	Activation	101	old
2000	20-Ca	Neutron transport, Gamma production ORNL 1971/73 1999 New evaluation between 20 and 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	101 Mod. 1: 146 **Mod. 2: 156**	E4
2125	21-Sc-45	Neutron transport, Gamma production, Dosimetry, Activation Note: Tape 101 (1990) contained activation data only. The data on tape 127 (1993) are a new evaluation **2001 Secondary Gamma spectra for radiative capure modified**	(101) New: 127 **Mod. 1: 156**	new

Structural Materials

MAT	Nucl.	Data	Tape Rlsd.	Status
2200	22-Ti	Neutron transport, Gamma production BRC+ANL 1977, Rept. ANL/NDM-28 (1977) **2001 Secondary Gamma spectra for radiative capture modified**	102 **Mod. 1: 156**	77E5
2225	22-Ti-46	Dosimetry, Activation	102	old
2228	22-Ti-47	Dosimetry, Activation	102	old
2231	22-Ti-48	Dosimetry, Activation	102	old
2237	22-Ti-50	Activation	102	old
2300	23-V	Neutron transport, Gamma production, Covariances ANL 1988, Rept. ANL/NDM-105 **2001 Secondary Gamma spectra for radiative capture modified**	103 **Mod. 1: 156**	1988
2425	24-Cr-50	Neutron transport, Gamma production, Covariances, Activation, Double differential data (MF=6) 1998 Files 1 and 6 corrected and updated 1999 Energy range extended from 20 to 150 Mev. Minor correction to MT=451 **2001 Secondary Gamma spectra for radiative capture modified**	111 Rev. 122 Mod. 3: 139 Mod. 4: 153 **Mod. 1: 157**	new
2431	24-Cr-52	Neutron transport, Gamma production, Covariances, Activation, Double differential data (MF=6) 1999 Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	111 Rev. 122 Mod. 3: 147 **Mod. 1: 157**	new
2434	24-Cr-53	Neutron transport, Gamma production, Covariances, Double differential data (MF-6) 1999 Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	111 Rev. 122 Mod. 3: 147 **Mod. 1: 157**	new
2437	24-Cr-54	Neutron transport, Gamma production, Covariances, Activation, Double differential data (MF=6) 1998 Files 1 and 6 corrected and updated 1999 Energy range extended from 20 to 150 Mev. Minor correction to MT=451 **2001 Secondary Gamma spectra for radiative capture modified**	111 Rev. 122 Mod. 3: 139 Mod. 4: 153 **Mod. 1: 157**	new
2525	25-Mn-55	Neutron transport, Gamma production, Covariances, Dosimetry, Activation, Double differential data (MF=6) 1998 Files 1 and 6 corrected and updated 1999 Minor correction to MT=451 **2001 Secondary Gamma spectra for radiative capture modified**	114 Mod. 2: 140 Mod. 2: 153 **Mod. 3: 158**	new

Structural Materials (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
2625	26-Fe-54	Neutron transport, Gamma production, Covariances, Dosimetry, Activation, Double differential data (MF=6) 1998 Files 1 and 6 corrected and updated 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev. Minor correction to MT=451 **2001 Secondary Gamma spectra** **for radiative capture modified**	112 Rev. 123 Mod. 3: 140 Mod. 4: 153 **Mod. 5: 158**	new
2631	26-Fe-56	Neutron transport, Gamma production, Covariances, Dosimetry, Activation, Double differential data (MF=6) 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra** **for radiative capture modified**	112 Rev. 123 Mod. 3: 148 **Mod. 4: 158**	new
2634	26-Fe-57	Neutron transport, Gamma production, Covariances, Double differential data (MF-6) 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra** **for radiative capture modified**	112 Rev. 123 Mod. 3: 148 **Mod. 4: 158**	new
2637	26-Fe-58	Neutron transport, Gamma production, Covariances, Dosimetry, Activation, Double differential data (MF=6) 1998 Files 1 and 6 corrected and updated 1999 Minor correction to MT=451 **2001 Secondary Gamma spectra** **for radiative capture modified**	112 Rev. 123 Mod. 3: 140 Mod. 3: 153 **Mod. 4: 158**	new
2725	27-Co-59	1989 A. Smith et al. Neutron transport, Gamma production, Covariances, Dosimetry, Activation 1992: Rev. in thermal and resonance region.	103 Rev. 129	89/92
2825	28-Ni-58	Neutron transport, Gamma production, Covariances, Dosimetry, Activation, Double differential data (MF=6) 1999 Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra** **for radiative capture modified**	113 Rev. 124 Mod. 3: 149 **Mod. 4: 159**	new
2828	28-Ni-59	Activation	113	new
2831	28-Ni-60	Neutron transport, Gamma production, Covariances, Dosimetry, Activation, Double differential data (MF=6) 1999 Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra** **for radiative capture modified**	113 Rev. 124 Mod. 3: 149 **Mod. 4: 159**	new

Structural Materials (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
2834	28-Ni-61	Neutron transport, Gamma production, Covariances, Activation, Double differential data (MF=6) Minor revision, file 2 1999 Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	113 Rev. 124 Rev. 144 Mod. 4: 149 **Mod. 5: 159**	new
2837	28-Ni-62	Neutron transport, Gamma production, Covariances, Activation, Double differential data (MF=6) 1998 Files 1 and 6 corrected and updated 1999 Energy range extended from 20 to 150 Mev. Minor correction to MT=451 **2001 Secondary Gamma spectra for radiative capture modified**	113 Rev. 124 Mod. 3: 140 Mod. 4: 153 **Mod. 5: 159**	new
2843	28-Ni-64	Neutron transport, Gamma production, Covariances, Activation, Double differential data (MF=6) 1999 Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	113 Rev. 124 Mod. 3: 149 **Mod. 4: 159**	new
2925	29-Cu-63	Neutron transport, Gamma production, Covariances, Dosimetry, Activation, Double differential data (MF=6) 1993: minor corrections 1999 Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	114 Rev. 129 Mod. 4: 150 **Mod. 5: 160**	new
2931	29-Cu-65	Neutron transport, Gamma production, Covariances, Dosimetry, Activation, Double differential data (MF=6) 1993: minor corrections 1999 Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	114 Rev. 129 Mod. 4: 150 **Mod. 5: 160**	new
-	30-Zn	no data		-

Medium elements

MAT	Nucl.	Data	Tape Rlsd.	Status
3100	31-Ga	Neutron transport, Gamma production	102	old
3231	32-Ge-72	Fission product	102	E5FP
3234	32-Ge-73	Fission product 1993: minor corrections	102 Rev. 129	E5FP
3237	32-Ge-74	Fission product	102	E5FP
3243	32-Ge-76	Fission product	102	E5FP
3325	32-As-75	Fission product	102	E5FP
3425	34-Se-74	Fission product	102	E5FP
3431	34-Se-76	Fission product	102	E5FP
3434	34-Se-77	Fission product	102	E5FP
3437	34-Se-78	Fission product	102	E5FP
3443	34-Se-80	Fission product	102	E5FP
3449	34-Se-82	Fission product	102	E5FP
3525	35-Br-79	Fission product	102	E5FP
3531	35-Br-81	Fission product	102	E5FP
3625	36-Kr-78	Neutron transport, Fission product	102	E5FP
3631	36-Kr-80	Neutron transport, Fission product	102	E5FP
3637	36-Kr-82	Neutron transport, Fission product	102	E5FP
3640	36-Kr-83	Neutron transport, Fission product	102	E5FP
3643	36-Kr-84	Neutron transport, Fission product	102	E5FP
3646	36-Kr-85	Fission product	102	E5FP
3649	36-Kr-86	Neutron transport, Fission product	102	E5FP
3725	37-Rb-85	Neutron transport, Fission product	102	E5FP
3728	37-Rb-86	Fission product	102	E5FP
3731	37-Rb-87	Neutron transport, Fission product **2001 Minor revision**	102 **Mod. 1: 162**	E5FP
3825	38-Sr-84	Fission product	102	E5FP
3831	38-Sr-86	Fission product	102	E5FP
3834	38-Sr-87	Fission product	102	E5FP
3837	38-Sr-88	Fission product	102	E5FP
3840	38-Sr-89	Fission product	102	E5FP
3843	38-Sr-90	Fission product	102	E5FP
3925	39-Y-89	Neutron transport, Gamma production, Covariances Files 1 and 5 updated	103 Mod.2: 137	new
3928	39-Y-90	Fission product	102	E5FP

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
3931	39-Y-91	Fission product	102	E5FP
4000	40-Zr	Neutron transport	104 Rev. 120	old
4025	40-Zr-90	Neutron transport, Activation	104	old
		2001 Minor revision	**Mod. 1: 162**	
4028	40-Zr-91	Neutron transport, Activation	104	old
		2001 Minor revision	**Mod. 1: 162**	
4031	40-Zr-92	Neutron transport, Activation	104	old
		2001 Minor revision	**Mod. 1: 162**	
4034	40-Zr-93	Fission product	104	old
4037	40-Zr-94	Neutron transport, Activation	104	old
		2001 Minor revision	**Mod. 1: 162**	
4040	40-Zr-95	Fission product	104	old
4043	40-Zr-96	Neutron transport	104	old
		2001 Minor revision	**Mod. 1: 162**	
4125	41-Nb-93	Neutron transport, Gamma production, Dosimetry, Covariances Nb-93(n,n')Nb-93m see D.L. Smith, L.P. Geraldo, ANL/NDM-117 (Nov. 1990). All other reactions see A.B. Smith, D.L. Smith, R.J. Howerton, ANL/NDM-88 (March 1985). 1999 New evaluation for energy between 1 and 150 Mev.	116 Rev. 120 Mod. 3: 150	new
4128	41-Nb-94	Fission product	104	old
4131	41-Nb-95	Fission product	104	old
4200	42-Mo	Neutron transport, Gamma production	104	old
4225	42-Mo-92	Activation	104	E5FP
4231	42-Mo-94	Fission product	104	E5FP
4234	42-Mo-95	Fission product	104	E5FP
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	
4237	42-Mo-96	Fission product	104	E5FP
4240	42-Mo-97	Fission product	104	E5FP
4243	42-Mo-98	Activation	104	E5FP
4246	42-Mo-99	Fission product	104	E5FP
4249	42-Mo-100	Activation	104	E5FP
4325	43-Tc-99	Fission product	104	E5FP
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
4425	44-Ru-96	Fission product	104	E5FP
4431	44-Ru-98	Fission product	104	E5FP
4434	44-Ru-99	Fission product	104	E5FP
4437	44-Ru-100	Fission product	104	E5FP
4440	44-Ru-101	Fission product revised 1993 in thermal and resonance region	104 Rev. 127	E5FP/93
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	
4443	44-Ru-102	Fission product revised 1993 in thermal and resonance region	104 Rev. 127	E5FP/93
4446	44-Ru-103	Fission product	104	E5FP
4449	44-Ru-104	Fission product	104	E5FP
4452	44-Ru-105	Fission product	104	E5FP
4455	44-Ru-106	Fission product	104	E5FP
4525	45-Rh-103	Fission product	104	E5FP
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	
4531	45-Rh-105	Fission product	104	E5FP
4625	46-Pd-102	Neutron Transport 1998 New evaluation	(104) New: 141	new
4631	46-Pd-104	Neutron Transport 1998 New evaluation	(104) New: 141	new
4634	46-Pd-105	Neutron Transport 1998 New evaluation	(103) New: 141	new
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	
4637	46-Pd-106	Neutron Transport 1998 New evaluation	(104) New: 141	new
4640	46-Pd-107	Fission Product	103	E5FP
4643	46-Pd-108	Neutron Transport 1998 New evaluation	(104) New: 141	new
4649	46-Pd-110	Neutron Transport 1998 New evaluation	(104) New: 141	new
4725	47-Ag-107	Neutron transport, Activation	104	E5FP
4731	47-Ag-109	Neutron transport, Activation	104	E5FP
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	
4737	47-Ag-111	Fission product	104	old

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
(4800)	(48-Cd)	(Neutron transport) Superseded!	(104)	(old)
4825	48-Cd-106	Neutron transport, Fission product revised 1993 in thermal and resonance region File 1: Comments added	104 Rev. 127 Mod. 1: 134 Mod. 4: 137	E5FP/93
4831	48-Cd-108	Neutron transport, Fission product revised 1993 in thermal and resonance region File 1: Comments added	104 Rev. 127 Mod. 1: 134 Mod. 4: 137	E5FP/93
4837	48-Cd-110	Neutron transport, Fission product revised 1993 in thermal and resonance region File 1: Comments added	104 Rev, 127 Mod. 1: 134 Mod. 4: 137	E5FP/93
4840	48-Cd-111	Fission product	104 Mod. 1: 134	E5FP
4843	48-Cd-112	Neutron transport, Fission product revised 1993 in thermal and resonance region File 1: Comments added File 3, MT=4: Obsolete code deleted	104 Rev. 127 Mod. 1: 134 Mod. 4: 137	E5FP/93
4846	48-Cd-113	Neutron transport, Fission product	104 Mod. 1: 134	E5FP
4849	48-Cd-114	Neutron transport, Fission product revised 1993 in thermal and resonance region File 1: Comments added Scattering radius changed	104 Rev. 127 Mod. 1: 134 Mod. 4: 137	E5FP/93
4853	48-Cd-115m	Fission product	104	E5FP
4855	48-Cd-116	Fission product, Neutron transport revised 1993 in thermal and resonance region File 1: Comments added	104 Rev. 127 Mod. 1: 134 Mod. 4: 137	E5FP/93
4900	49-In	Neutron transport, Gamma production, Covariances A.B. Smith, ANL, ANL/NDM-116 (1990)	116	new
4925	49-In-113	Fission product	116	E5FP
4931	49-In-115	Activation, Dosimetry A.B. Smith, ANL, ANL/NDM-115 (1990)	116	new

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
5025	50-Sn-112	Fission product	105 Rev. 120	E5FP
5031	50-Sn-114	Fission product	105 Rev. 120	E5FP
5034	50-Sn-115	Fission product	105	E5FP
5037	50-Sn-116	Fission product	105	E5FP
5040	50-Sn-117	Fission product	105	E5FP
5043	50-Sn-118	Fission product	105	E5FP
5046	50-Sn-119	Fission product	105	E5FP
5049	50-Sn-120	Activation	105	E5FP
		2001 Converted from ENDF/B-V	**Mod. 1: 162**	
5055	50-Sn-122	Activation	105	E5FP
		2001 Converted from ENDF/B-V	**Mod. 1: 162**	
5058	50-Sn-123	Fission product	105	E5FP
5061	50-Sn-124	Activation	105	E5FP
		2001 Converted from ENDF/B-V	**Mod. 1: 162**	
5064	50-Sn-125	Fission product	105	E5FP
5067	50-Sn-126	Fission product	105	E5FP
5125	51-Sb-121	Fission product	105	E5FP
		2001 New Evaluation. Neutron Transport	**Mod. 1: 163**	
5131	51-Sb-123	Fission product	105	E5FP
		2001 New Evaluation. Neutron Transport	**Mod. 1: 163**	
5134	51-Sb-124	Fission product	105	E5FP
5137	51-Sb-125	Fission product	105	E5FP
5140	51-Sb-126	Fission product	105	E5FP
5225	52-Te-120	Fission product	105	E5FP
5231	52-Te-122	Fission product	105	E5FP
5234	52-Te-123	Fission product	105	E5FP
5237	52-Te-124	Fission product	105	E5FP
5240	52-Te-125	Fission product	105	E5FP
5243	52-Te-126	Fission product	105	E5FP
5247	52-Te-127m	Fission product	105	E5FP
5249	52-Te-128	Fission product	105	E5FP
5253	52-Te-129m	Fission product	105	E5FP
5255	52-Te-130	Fission product	105	E5FP
5261	52-Te-132	Fission product	105	E5FP

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
5325	53-I-127	Neutron transport, Gamma production, Activation Note: Tape 105 (1990) contained activation data only. The data on tape 127 (1993) are new evaluation.	(105) New: 127	new
5331	53-I-129	Fission product	105	E5FP
5334	53-I-130	Fission product	105	E5FP
5337	53-I-131	Fission product	105	E5FP
5425	54-Xe-124	Neutron transport	105	E5FP
5431	54-Xe-126	Neutron transport	105	E5FP
5437	54-Xe-128	Neutron transport	105	E5FP
5440	54-Xe-129	Neutron transport	105	E5FP
5443	54-Xe-130	Neutron transport	105	E5FP
5446	54-Xe-131	Neutron transport	105	E5FP
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	
5449	54-Xe-132	Neutron transport	105	E5FP
5452	54-Xe-133	Fission product	105	E5FP
5455	54-Xe-134	Neutron transport	105	E5FP
5458	54-Xe-135	Fission product	105	E5FP
5461	54-Xe-136	Neutron transport	105	E5FP
5525	55-Cs-133	Neutron transport	105	E5FP
		2000 Re-evaluation	Mod 1: 154	
5528	55-Cs-134	Fission product	103	new
		2000 Re-evaluation	Mod 2: 154	
5531	55-Cs-135	Fission product	105	E5FP
		2000 Re-evaluation	Mod 1: 154	
5534	55-Cs-136	Fission product	105	E5FP
5537	55-Cs-137	Fission product	105	E5FP
5637	56-Ba-134	Fission product	103	new
		2000 Re-evaluation	Mod 2: 154	
5640	56-Ba-135	Fission product	103	new
5643	56-Ba-136	Fission product	103	new
5646	56-Ba-137	Fission product	103	new
5649	56-Ba-138	Neutron transport, Gamma production	105 Mod. 2: 134	old
5655	56-Ba-140	Fission product (The retransmission in tape 134 Contains a correction to the text only)	105, 134	old

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
5728	57-La-139	Activation	105 Rev. 120	E5FP
5731	57-La-140	Fission product	105	E5FP
5837	58-Ce-140	Fission product	105	E5FP
5840	58-Ce-141	Fission product	105	E5FP
5843	58-Ce-142	Fission product	105	E5FP
5846	58-Ce-143	Fission product	105	E5FP
5849	58-Ce-144	Fission product	105	E5FP
5925	59-Pr-141	Neutron transport	105	E5FP
		2000 Re-evaluation	Mod 1: 154	
5928	59-Pr-142	Fission product	105	E5FP
5931	59-Pr-143	Fission product	105	E5FP
5349	53-I-135	Fission product	105	E5FP
6025	60-Nd-142	Fission product	105	E5FP
6028	60-Nd-143	Neutron transport revised 1993 in thermal and resonance region **2001 MF=2 Resonance parameters revised**	105 Rev. 127 **Mod. 3: 161**	E5FP
6031	60-Nd-144	Fission product	105	E5FP
6034	60-Nd-145	Neutron transport revised 1993 in thermal and resonance region **2001 MF=2 Resonance parameters revised**	105 Rev. 127 **Mod. 3: 161**	E5FP
6037	60-Nd-146	Neutron transport	105	E5FP
6040	60-Nd-147	Fission product	103 Rev. 120	new
6043	60-Nd-148	Neutron transport	105	E5FP
6049	60-Nd-150	Neutron transport	105	E5FP
6149	61-Pm-147	Neutron transport, Fission product	103 Rev. 120	new
6152	61-Pm-148	Fission product	106	E5FP
6153	61-Pm-148m	Fission product	106	E5FP
6155	61-Pm-149	Fission product	106	E5FP
6161	61-Pm-151	Fission product	106	E5FP

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
6225	62-Sm-144	Fission product	106 Mod. 2: 134	E5FP
6234	62-Sm-147	Neutron transport, Fission product	103	new
		2001 MF=2 Resonance parameters revised	**Mod. 2: 161**	
6237	62-Sm-148	Fission product	106	E5FP
6240	62-Sm-149	Neutron transport	106	E5FP
		2000 Re-evaluation	Mod 1: 154	
6243	62-Sm-150	Fission product revised 1993 in thermal and resonance region **2001 MF=2 Resonance parameters revised**	106 Rev. 127 **Mod. 3: 161**	E5FP
6246	62-Sm-151	Neutron transport, Fission product	103 Rev. 120	new
		2001 MF=2 Resonance parameters revised	**Mod. 3: 161**	
6249	62-Sm-152	Neutron transport revised 1993 in thermal and resonance region **2001 MF=2 Resonance parameters revised**	106 Rev. 127 **Mod. 3: 161**	E5FP
6252	62-Sm-153	Fission product	106	E5FP
6255	62-Sm-154	Fission product	106	E5FP
6325	63-Eu-151	Neutron transport, Gamma production	103	new
6328	63-Eu-152	Neutron transport, Fission product	103	new
6331	63-Eu-153	Neutron transport, Gamma production	103	new
		2000 Re-evaluation	Mod 2: 154	
6334	63-Eu-154	Neutron transport, Fission product	103	new
		2000 Re-evaluation	Mod 2: 154	
6337	63-Eu-155	Neutron transport, Fission product 2000 Re-evaluation	103 Rev. 120 Mod 3: 154	new
6340	63-Eu-156	Fission product	106	E5FP
6343	63-Eu-157	Fission product	106	E5FP

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
6425	64-Gd-152	Neutron transport New evaluation	106 New: 137	new
		2001 Minor revision	**Mod.1: 162**	
6431	64-Gd-154	Neutron transport New evaluation	106 New: 137	new
		2001 Minor revision	**Mod.1: 162**	
6434	64-Gd-155	Neutron transport	106	old
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	
6437	64-Gd-156	Neutron transport	106	old
6440	64-Gd-157	Neutron transport	106	old
		2001 MF=2 Resonance parameters revised	**Mod. 1: 161**	
6443	64-Gd-158	Neutron transport	106	old
6449	64-Gd-160	Neutron transport	106	old
6525	65-Tb-159	Fission product	106	E5FP
6528	65-Tb-160	Fission product	106	E5FP
6637	66-Dy-160	Fission product	106	E5FP
		2000 Re-evaluation	Mod 1: 154	
6640	66-Dy-161	Fission product	106	E5FP
		2000 Re-evaluation	Mod 1: 154	
6643	66-Dy-162	Fission product	106	E5FP
		2000 Re-evaluation	Mod 1: 154	
6646	66-Dy-163	Fission product	106	E5FP
		2000 Re-evaluation	Mod 1: 154	
6649	66-Dy-164	Neutron transport, Activation 2000 Re-evaluation	106 Mod 1: 154	old
6725	67-Ho-165	Neutron transport, Gamma production 1998 Minor corrections to files 1 and 2	103 Mod. 4: 143	new
6837	68-Er-166	Fission product	103	new
6840	68-Er-167	Fission product	103	new
-	69-Tm	no data	-	-
-	70-Yb	no data	-	-
7125	71-Lu-175	Neutron transport	106	old
		2000 Re-evaluation	Mod 1: 154	
7128	71-Lu-176	Neutron transport 2000 Re-evaluation	106 Mod 1: 154	old

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
7200	72-Hf	Neutron transport Note: This evaluation for natural hafnium should be considered as superseded because it does not agree with the revisions of the isotopic evaluations.	106	old
7225 7231 7234 7237 7240 7243	72-Hf-174 k 72-Hf-176 72-Hf-177 72-Hf-178 72-Hf-179 72-Hf-180 m	Neutron transport Note: Above Hf isotopic evaluations are based on ENDF/B-5 but were extensively revised in the thermal and resonance region in 1993.	106 Rev. 127	new
7328	73-Ta-181	Neutron transport, Gamma production, Activation	106	old
7331	73-Ta-182	Neutron transport	106	old
7400	74-W	Neutron transport, Gamma production ENDF/B-5 evaluation; several corrections in 1991	107 Rev. 120	old
7431	74-W-182	Neutron transport, Gamma production, Activation 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	107 Mod. 1: 151 **Mod. 2: 160**	old
7434	74-W-183	Neutron transport, Gamma production 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	107 Mod. 1: 151 **Mod. 2: 160**	old
7437	74-W-184	Neutron transport, Gamma production, Activation 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	107 Mod. 1: 151 **Mod. 2: 160**	old
7443	74-W-186	Neutron transport, Gamma production, Activation 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev. **2001 Secondary Gamma spectra for radiative capture modified**	107 Mod. 1: 151 **Mod. 2: 160**	old

Medium elements (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
7525	75-Re-185	Neutron transport, Covariances	115	new
7531	75-Re-187	Neutron transport, Covariances	115	new
-	76-Os	no data	-	
7725	77-Ir-191	Neutron transport, Gamma production	New: 137	new
7731	77-Ir-193	Neutron transport, Gamma production	New: 137	new
7925	79-Au-197	Standard, Neutron transport, Gamma production, Covariances, Dosimetry, Activation. 1991: a Q-value corrected; comments added.	108 Rev. 120	new
-	80-Hg	no data	-	-
-	81-Tl	no data	-	-
8231	82-Pb-206	Neutron transport, Gamma production, Covariances 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev.	115 Mod. 1: 152	new
8234	82-Pb-207	Neutron transport, Gamma production, Covariances. 1991: revised resonance parameters. 1999 Minor modification below 20 Mev. Energy range extended from 20 to 150 Mev.	115 Rev. 120 Mod. 1: 152	new
8237	82-Pb-208	Neutron transport, Gamma production, Covariances 1998 New evaluation 1999 Minor modification below 30 Mev. Energy range extended from 30 to 150 Mev.	115 New: 142 Mod. 1: 152	new
8325	83-Bi-209	Neutron transport, Gamma production, Covariances, Activation 2000 Energy range extended from 20 to 150 Mev.	108 Mod. 1: 134 Mod. 2: 155	new
84-Po to 89-Ac		no data	-	-

Actinides

MAT	Nucl.	Data	Tape Rlsd.	Status
9034	90-Th-230	Neutron transport	110	E5A
9040	90-Th-232	Neutron transport, Gamma production, Covariances, Dosimetry, Activation	109	E5A+
9131	91-Pa-231	Neutron transport, Activation	109	E5A+
9134	**91-Pa-232**	**2001 New Evaluation. Neutron Transport, Transmutation**	**163**	**new**
9137	91-Pa-233	Neutron transport	110	E5A+
9219	92-U-232	Neutron transport	109	E5A+
		2001 New Evaluation. Neutron Transport Transmutation	**Mod. 2: 163**	
9222	92-U-233	Neutron transport, Gamma production, Transmutation	109	old+
9225	92-U-234	Neutron transport	109	E5A+
9228	92-U-235	Neutron transport, Gamma production, Standard, Dosimetry, Covariances. 1991: Extensive change of resolved resonance parameters; uncertainties of fission cross-sections (used as international standard) are listed; Covariance files were removed (new file not yet available); and other changes. 1993: Energy release in fission (MT=458) was added 1995: New ovariances 1997**:** File 1:Comments updated Prompt nubar updated 1998: New evaluation of resonance region	117 Rev. 121 Rev. 128 Mod. 4: 135 Mod. 5: 137 Mod. 6: 144	new
9231	92-U-236	Neutron transport	108	new
9234	92-U-237	Neutron transport, Gamma production 1993: minor corrections Rev. 129	109	E5A+
9237	92-U-238	Neutron transport, Gamma production, Activation, Dosimetry 1991: Covariance files were removed (new files not yet available) 1993: Energy release in fission (MT=458) was added. Resonance region improvements. 1998: Minor corrections to files 1 and 2	117 Rev. 121 Rev. 128 Mod. 4:142	new
9343	**93-Np-236**	**2001 New Evaluation. Neutron Transport, Transmutation**	**163**	**new**
9346	93-Np-237	Neutron transport, Gamma production, Dosimetry, Covariances. 1991: Angular distribution data removed.	117 Rev. 121	new
9349	93-Np-238	Neutron transport 1993: Minor corrections	109 Rev. 129	E5A+
9352	93-Np-239	Neutron transport	108	new

Actinides (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
9428	94-Pu-236	Neutron transport New evaluation	110 New: 137	new
9431	94-Pu-237	Neutron transport	110	E5A
9434	94-Pu-238	Neutron transport	109	E5A+
9437	94-Pu-239	1989 Young, Weston, Poenitz Neutron transport, Gamma production, Dosimetry, Covariances 1993: Energy release in fission (MT=458) was added. Resonance region improvements. 1998: Minor corrections to files 1 and 2	117 Rev. 128 Mod. 3: 142	89/93
9440	94-Pu-240	Neutron transport, Gamma production, Covariances. 1991: Deletion of MF=33, MT=18. 1993: Energy release in fission (MT=458) was added.	108 Rev. 121 Rev. 128	new
9443	94-Pu-241	Neutron transport, Decay data, Gamma production, Covariances. 1991: Covariances removed 1995: New covariances	108 Rev. 121 Mod. 3: 135	new
9446	94-Pu-242	Neutron transport, Gamma production, Covariances	109	E5A+
9449	94-Pu-243	Neutron transport, Gamma production 1993: Minor corrections	110 Rev. 129	E5A
9452	94-Pu-244	Neutron transport	110	E5A
9543	95-Am-241	Neutron transport,Decay data, Gamma production, Covariances, Activation 1993: Energy release in fission (MT=458) was added. 1995: New covariances	108 Rev. 128 Mod. 3: 135	new
9546	95-Am-242	Neutron transport 1991: Delayed fission-neutron spectrum (which was for Am-242m) was removed.	109 Rev. 121	E5A+
9547	95-Am-242m	Neutron transport, Gamma production 1991: Delayed fission-neutron spectrum added.	110 Rev. 121	E5A+
9549	95-Am-243	Neutron transport, Gamma production 1998: New evaluation for energy range from 0.042 to 30 Mev. Mod. 2	108 New: 143	new

Actinides (cont.)

MAT	Nucl.	Data	Tape Rlsd.	Status
9628	96-Cm-241	Neutron transport	110	E5A
9631	96-Cm-242	Neutron transport, Gamma production	109	E5A+
9634	96-Cm-243	Neutron transport, Gamma production	110	E5A
		2000 New evaluation	New: 155	
9637	96-Cm-244	Neutron transport, Gamma production	110	E5A
9640	96-Cm-245	Neutron transport, Gamma production 1993: minor corrections	109 Rev. 129	E5A+
		2000 New evaluation	New: 155	
9643	96-Cm-246	Neutron transport, Gamma production 1993: minor corrections	110 Rev. 129	E5A
		2000 New evaluation	New: 155	
9646	96-Cm-247	Neutron transport, Gamma production 1993: minor corrections	110 Rev. 129	E5A
9649	96-Cm-248	Neutron transport, Gamma production	110	E5A
9752	97-Bk-249	Neutron transport	108	new
9852	98-Cf-249	Neutron transport	108	new
9855	98-Cf-250	Neutron transport, Gamma production 1993: minor corrections	110 Rev. 129	E5A
9858	98-Cf-251	Neutron transport, Gamma production 1993: minor corrections	109 Rev. 129	E5A+
9861	98-Cf-252	Neutron transport, Gamma production 1991: Delayed fission-neutron spectra (which were for spont. fiss.) were removed. 1993: minor corrections	109 Rev. 121 Rev. 129	E5A+
9864	98-Cf-253	Neutron transport (total, elastic, fission, capture only) 1993: minor corrections	110 Rev. 129	E5A
9913	99-Es-253	Neutron transport (total, elastic, capture only)	110	E5A

The ENDF/B-6 Activation Library

From the general ENDF/B-6 Library data for the following reactions are included in the ENDF/B-6 Activation Library. This Library has a size of 23003 records.

Some explanations:

cov. = covariance data are included

(n,γ)RP = the neutron capture cross-section is given, but in the resolved resonance region it must be computed from the resonance parameters.

MAT	Nuclide	data
128	1-H-2	(n,γ)
328	3-Li-7	(n,γ) with cov.
425	4-Be-9	(n,γ),(n,p), (n,d),(n,a)
525	5-B-10	(n,p),(n,a)
528	5-B-11	(n,a)
725	7-N-14	(n,2n),(n,p) with cov.,(n,t)
728	7-N-15	(n,γ),(n,p),(n,d),(n,a)
825	8-O-16	(n,p) with cov.
828	8-O-17	(n,p),(n,a)
925	9-F-19	(n,2n) with cov.,(n,γ)RP with cov.
1125	11-Na-23	(n,2n),(n,γ)RP,(n,p),(n,a), all with cov.
1225	12-Mg-24	(n,p)
1325	13-Al-27	(n,2n),(n,γ)RP,(n,p),(n,a), all with cov.
1525	15-P-31	(n,γ)RP,(n,p)
1625	16-S-32	(n,p)
1837	18-Ar-40	(n,γ)RP
1931	19-K-41	(n,p)
2125	21-Sc-45	(n,γ)RP with cov.,(n,2n)
2225	22-Ti-46	(n,p) with cov.
2228	22-Ti-47	(n,np) with cov.,(n,p) with cov.
2231	22-Ti-48	(n,np) with cov.,(n,p) with cov.,(n,a)
2237	22-Ti-50	(n,a)
2425	24-Cr-50	(n,2n),(n,np),(n,γ)RP,(n,p),(n,d)
2431	24-Cr-52	(n,2n) with cov.,(n,p)
2437	24-Cr-54	(n,γ)RP,(n,a)
2525	25-Mn-55	(n,2n),(n,γ)RP,(n,p),(n,a), all with cov.
2625	26-Fe-54	(n,2n),(n,np),(n,γ)RP,(n,p),(n,a), all with cov., and (n,d)
2631	26-Fe-56	(n,2n) with cov.,(n,p) with cov.
2637	26-Fe-58	(n,γ)RP
2725	27-Co-59	(n,2n),(n,p),(n,a), all with cov., and (n,γ)RP
2825	28-Ni-58	(n,2n),(n,np),(n,p),(n,d),(n,a), all with cov., and (n,γ)RP
2828	28-Ni-59	(n,γ)RP,(n,p),(n,a)
2831	28-Ni-60	(n,2n) with cov.,(n,p) with cov.
2834	28-Ni-61	(n,2p)
2837	28-Ni-62	(n,γ)RP,(n,p),(n,d),(n,a)
2843	28-Ni-64	(n,na)
2925	29-Cu-63	(n,2n),(n,p),(n,a), all with cov., and (n,γ)RP
2931	29-Cu-65	(n,2n) with cov.,(n,γ)RP,(n,t)
4025	40-Zr-90	(n,2n),(n,p)
4028	40-Zr-91	(n,p)
4031	40-Zr-92	(n,γ)RP
4037	40-Zr-94	(n,γ)RP,(n,2n)
4125	41-Nb-93	(n,γ)RP with cov.,(n,2n) with cov.,(n,a)
4225	42-Mo-92	(n,γ)RP

MAT	Nuclide	data
4243	42-Mo-98	(n,γ)RP
4249	42-Mo-100	(n,γ)RP
4725	47-Ag-107	(n,γ)RP,(n,p)
4731	47-Ag-109	(n,γ)RP,(n,2n)
4931	49-In-115	(n,γ)RP with cov.,(n,n')m with cov.,(n,g)m
5049	50-Sn-120	(n,γ)RP
5055	50-Sn-122	(n,γ)RP
5061	50-Sn-124	(n,γ)RP
5325	53-I-127	(n,γ)RP,(n,2n)
5728	57-La-139	(n,γ)RP
6649	66-Dy-164	(n,γ)RP
7328	73-Ta-181	(n,γ)RP,(n,2n),(n,p)
7431	74-W-182	(n,2n)
7437	74-W-184	(n,γ)RP,(n,a)
7443	74-W-186	(n,γ)RP,(n,2n),(n,a)
7925	79-Au-197	(n,γ)RP,(n,2n),(n,3n)
8231	82-Pb-206	(n,2n) with cov.,(n,t),(n,a)
8237	82-Pb-208	(n,γ)RP with cov.
8325	83-Bi-209	(n,γ)RP with cov.,(n,2n) with cov.
9040	90-Th-232	(n,γ)RP,(n,2n)
9131	91-Pa-231	(n,γ)RP
9222	92-U-233	(n,2n)
9237	92-U-238	(n,γ)RP with cov.
9543	95-Am-241	res.pars. with cov.,(n,γ) with cov.

The ENDF/B-6 Dosimetry Library

From the general ENDF/B-6 Library data for the following reactions are included in the ENDF/B-6 Dosimetry Library. This Library has a size of 15887 records.

Some explanations:

cov. = covariance data are included

(n,γ)RP = the neutron capture cross-section is given, but in the resolved resonance region it must be computed from the resonance parameters.

MAT	Nuclide	data
325	3-Li-6	(n,t)
525	5-B-10	(n,a)
1225	12-Mg-24	(n,p)
1325	13-Al-27	(n,p) with cov.,(n,a) with cov.
2125	21-Sc-45	(n,γ)RP with cov.,(n,2n)
2225	22-Ti-46	(n,p) with cov.
2228	22-Ti-47	(n,np) with cov.,(n,p) with cov.
2231	22-Ti-48	(n,np) with cov.,(n,p) with cov.
2525	25-Mn-55	(n,2n) with cov.
2625	26-Fe-54	(n,p) with cov.
2631	26-Fe-56	(n,p) with conv.
2637	26-Fe-58	(n,γ)RP
2725	27-Co-59	(n,a) with cov.,(n,γ)RP
2825	28-Ni-58	(n,2n) with cov.,(n,p) with cov.
2831	28-Ni-60	(n,p) with cov.
2925	29-Cu-63	(n,2n) with cov.,(n,a) with cov.,(n,γ)RP
4931	49-In-115	(n,γ)RP with cov.,(n,n')m with cov.,(n,γ)m
7925	79-Au-197	(n,2n),(n,γ)RP
9040	90-Th-232	(n,f)RP with cov.
9228	92-U-235	(n,f)RP with cov.
9237	92-U-238	(n,f)RP with cov.
9346	93-Np-237	(n,f)RP
9437	94-Pu-239	(n,f)RP

The data in the ENDF/B-6 Libraries for Activation resp. for Dosimetry are identified by the following MF/MT numbers.

	Cross-Section		Covariances	
reaction	**MF**	**MT**	**MF**	**MT**
resonance parameters	2	151	32	151
(n,2n)	3	16	33	16
(n,3n)	3	17	-	-
(n,f)	3	18	33	18
(n,na)	3	22		
(n,np)	3	28	33	28
(n,γ)	3	102	33	102
(n,p)	3	103	33	103
(n,d)	3	104	33	104
(n,t)	3	105	-	-
(n,He3)	3	106	-	-
(n,a)	3	107	33	107
(n,2p)	3	111	-	-
(n,n')m	10	4	40	4
decay data of product	8	4	-	-
ratio (n,γ)m/(n,γ)	9	102	-	-
decay data of product	8	102	-	-

Note that (n,n')m had been coded in ENDF/B-5 under MF/MT = 3/51 = partial inelastic to the first level, which is not correct.

The ENDF/B-6 Fission-Products Cross-Section Data

Whereas ENDF/B-5 had a separate library (ENDF/B-5-FP) containing neutron cross-sections and decay data for fission-product nuclides, the ENDF/B-6 main library includes the fission-product nuclei; it includes, however, only the cross-section data but not the decay data. There is a separate ENDF/B-6 sublibrary for decay data.

For most of the fission-product isotopes the ENDF/B-5 neutron data were not re-evaluated for ENDF/B-6. The following lists summarize the differences between ENDF/B-5-FP and ENDF/B-6:

Compared to the released version of ENDF/B-5-FP, ENDF/B-6 has new evaluations for:

39-Y-89
46-Pd-105
49-In-115
55-Cs-134
56-Ba isotopes 134-138, 140
60-Nd-147
61-Pm-147
62-Sm-147, 151
67-Ho-165
68-Er-166, 167

Evaluations for the following isotopes were missing in the released version of ENDF/B-5-FP but are now included in ENDF/B-6:

40-Zr-isotopes 90-96
41-Nb-isotopes 93-95
63-Eu-isotopes 151-155
64-Gd-isotopes 152, 154-158, 160
66-Dy-164

Someone who wishes to have only the ENDF/B-6 subfile for fission-product neutron cross-sections and not the entire ENDF/B-6 library, is invited to send his request to the IAEA Nuclear Data Section. He will receive a special ENDF/B-6 retrieval for the fission-product isotopes only. This will include all materials from MAT 3231 (32-Ge-72) to MAT 6840 (68-Er-167) but without the natural elements that occur in this range.

The ENDF/B-6 Actinides Data

Whereas ENDF/B-5 had a separate library containing neutron cross- sections and decay data for actinides, the ENDF/B-6 main library includes the actinide nuclei; it includes, however, only the cross-section data but not the decay data. There is a separate ENDF/B-6 sublibrary for decay data.

For many of the actinides the ENDF/B-5 neutron data (version V.2 of 1986) were not re-evaluated for ENDF/B-6. The following lists summarize the differences between ENDF/B-5 Actinides V.2 and ENDF/B-6:

Compared to the released version of the ENDF/B-5 Actinides Library, ENDF/B-6 has new evaluations for

92-U-235, 236, 238
93-Np-237, 239
94-Pu-239
95-Am-241, 243
96-Cm-243, 245, 246
97-Bk-249
98-Cf-249

Evaluations for the following nuclides were not included in the released version of the ENDF/B-5 Actinides Library but were now included in ENDF/B-6:

92-U-233
93-Np-239
94-Pu-240, 241

Fission product yields (neutron induced and spontaneous) are given in separate sublibraries.