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JEF-2.2

The Evaluated Neutron Nuclear Data Library of the NEA Data Bank

Summary of Contents

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Abstract: This document summarizes the contents of JEF-2.2, the Joint Evaluated File of neutron nuclear data compiled by the OECD Nuclear Energy Agency Data Bank, finalized in 1992 and released in 1993. The entire library or retrievals of selected materials are available from the IAEA Nuclear Data Section free of charge, either on CD-ROM, or online from NDIS, the interactive Nuclear Data Information System.

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

IAEA-NDS-documents 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-document 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:

a) Citing the evaluation of one material

Author(s), "Neutron reaction data evaluation of (nuclide)", report … (as quoted in the file) [or if no printed reference is known: Undocumented]. Data file JEF-2 MT 1234 Rev. 2 (date) by the Nuclear Energy Agency Data Bank. Data received on tape (or retrieved online) from the IAEA Nuclear Data Section (date).

b) Citing the entire library

Nuclear Energy Agency Data Bank, JEF-2, Joint Evaluated File version 2 (1992). See C. Nordborg, M. Salvatores, "Status of the JEF Evaluated Data Library", International Conference on Nuclear Data for Science and Technology, Gatlinburg, USA, 9-13 May 1994, Proc. American Nuclear Society (1994) p. 680. Data received on tape (or retrieved online) from the IAEA Nuclear Data Section (date).

c) Citing the format

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. 10/91 (Brookhaven National Laboratory 1991).

Contents

JEF-2.2

The Evaluated Neutron Nuclear Data Library
of the NEA Data Bank

Introduction: JEF-2.2, the Joint Evaluated File of neutron nuclear data, has been compiled at the NEA Data Bank in co-operation with several laboratories in the NEA Data Bank member countries. The version 1 in ENDF-5 format was finalized in 1986 and released in 1990 to the IAEA Nuclear Data Section for free distribution to scientists in IAEA member states. The present version 2.2 in ENDF-6 format was finalized in 1991 and released in the beginning of 1993.

The library contains primarily evaluations of neutron reaction data for 313 elements or isotopes from 1-H-1 to 99-Es-253 in the neutron energy range from 10^{-5} eV to 20 MeV. It is supplemented by four special data libraries.

References

C. Nordborg, M. Salvatores, "Status of the JEF Evaluated Data Library", International Conference on Nuclear Data for Science and Technology, Gatlinburg, USA, 9-13 May 1994, Proc. American Nuclear Society (1994) p. 680.

C. Nordborg, H. Gruppelaar, M. Salvatores, "Status of the JEF and EFF Projects", Int. Conf. Nuclear Data for Science and Technology, Jülich, Germany, 13-17 May 1991, Proc. Springer-Verlag (1992), p. 782.

Various details on the JEF database are published in JEF-reports which may be requested from the

OECD NEA Data Bank
Le Seine Saint-Germain
12, boulevard des Iles
92130 Issy-les-Moulineaux
France

Note: The present data library was called JEF-2 in Rev. 2 of this documentation. In the present Rev. 3 of this documentation it is, more correctly, called JEF-2.2. It is still the same data as released in the beginning of 1993. - The present Rev. 3 of this documentation includes the "pointwise" data files which have been released more recently.

Format

The format of JEF-2 is ENDF-6 which is described in detail in the report IAEA-NDS-76 Rev. 4.

Data processing computer codes

The following codes are available from the IAEA Nuclear Data Section, free of charge:

ENDF Pre-Processing Codes 2000 by D.E. Cullen and P.K. McLaughlin, 2000, for mainframe and PC. See document IAEA-NDS-39 Rev. 10.

ENDF Utility Codes from NNDC, version 6.10
See document IAEA-NDS-29 Rev. 7.

Not available from IAEA:

NJOY: This must be requested from the Radiation Shielding Information Center (RSICC), Oak Ridge National Laboratory, P.O. Box 2008, Oak/Ridge, TN, USA-37831.

Library Organization

The JEF-2 Library consists of the following parts.

A. The neutron nuclear data library (also called "general purpose file"). See the table of contents on pages 5 to 18. It exists in two formats:

1. The basic file with the cross-sections in the resonance region given as resonance parameters.

2. The pointwise data file where the resonance parameters have been reconstructed to pointwise cross-section data for a temperature of 300 K.

   a) produced with the code RECENT
   b) produced with the code NJOY

Although the ENDF format permits the inclusion of data types other than the basic neutron reaction data, the data for the file numbers MF = 7,8, 23, and 27 were not included in the above neutron data library but were compiled in the following four separate libraries.

B. Special data libraries

3. Thermal Neutron Scattering Law Data
   See the document IAEA-NDS-121, Rev. 1.

4. Radioactive Decay Data
   See the document IAEA-NDS-122, Rev. 1.

5. Fission Product Yield Data
   See the document IAEA-NDS-123, Rev. 1.

6. Photo-Atomic Interaction Data
   This data library does not contain photonuclear cross-sections but rather cross-sections for coherent and incoherent photon scattering and pair production, photoelectric cross-sections, etc. It is the same as the ENDF/B-5 Photon Interaction Library which again is the same as the RSIC Photon Interaction Library of 1983. See the document IAEA-NDS-58 Rev. 2.

Size of the JEF-2 Neutron Data Library

The JEF-2 neutron data library was distributed in 9 "tapes" numbered 1 to 9 for the basic version with resonance parameters. The following table shows contents and size of these "tapes". Note that several of these "tapes" may be combined on a physical tape distributed by the IAEA Nuclear Data Section.

"Point data", i.e. data files where resonance-parameters have been converted to cross-sections, are available as output from the code RECENT, or as output from NJOY, both for 293K and 0.1% accuracy.

			# of records		
"tape"	nuclides	# of MAT's	basic file with res-pars	pointwise data from RECENT	pointwise data from NJOY
1	light elements 1-H to 23-V	34	121.869	92.082	158.129
2	structural materials 24-Cr to 30-Zn	21	124.495	274.658	298.620
	fission products and medium elements				
3	31-Ga to 47-Ag	76	59.883	354.599	512.933
4	48-Cd to 59-Pr	77	47.460	324.072	496.332
5	60-Nd to 65-Tb	37	35.159	239.161	395.388
		---	---------	----------	---------
		190	142.502	917.832	1.404.653
6	heavy elements 66-Dy to 83-Bi	27	62.837	226.003	344.986
	actinides				
7	90-Th to 92-U	11	36.116	273.678	400.471
8	93-Np to 94-Pu	12	24.139	155.751	249.009
9	95-Am to 99-Es	19	56.473	148.161	241.253
		---	---------	----------	---------
		42	116.728	577.590	890.733
	Total # of nuclides	314			
		===			
	Total # of records		568.431	2.088.165	2.938.992
			====	=====	=====
	size in Mbytes		45.5	166.6	248.2
			===	===	===

Online Service:	The data can be retrieved from NDIS, the interactive online Nuclear Data Information System
TELNET:	IAEAND.IAEA.ORG
Username:	IAEANDS
Online Manual:	IAEA-NDS-150 Rev. 95/10

Summary of contents of the JEF-2 Neutron Data Library

The following table includes the following colums

MAT: Material-number (accession-number)

Nucl.: Isotope or element

Lab: Institute of evaluators
(see the table at the end of this document)

Year: Approximate year of evaluation or major revision.
(Note: There may be additional modifications more recent than the quoted year!)

Origin: Original file and MAT-number when the evaluation was taken over from another data library.

Data:
- γ indicates that the evaluation includes gamma-production data
- RM Reich-Moore resonance parameters given
- cov covariance information given

Note that the year of evaluation or major revision indicated in the table of contents can be a rough approximation only. The staff of the NEA Data Bank (advised by the JEF Scientific Co-ordination Group) applied numerous small modifications which cannot be listed in detail. These are in particular:

- format conversions from ENDF-5 to ENDF-6;
- extrapolations to the full energy range down to 1.0E-5 eV and up to 20 MeV;
- correction of Q values and threshold energies;
- adjustment of background cross-sections;
- removal of radioactive decay data and fission yield data which were compiled in special data libraries.

Light elements

	MAT	Nucl.	Lab	Year	Origin	Data
	125	1-H-1	LANL	1971/89	ENDF/B-5 updated	γ
	128	1-H-2	LANL	1992	ENDF/B-6 updated	γ
1	131	1-H-3	LANL	1967	ENDF/B-4	
	225	2-He-3	LANL	1979/89	ENDF/B-5 updated	
1	228	2-He-4	LANL	1973	ENDF/B-4	
	325	3-Li-6	LANL	1977/89	ENDF/B-5 updated	γ
	328	3-Li-7	LANL	1981	ENDF/B-5, EFF-1	γ
	425	4-Be-9	LANL	1979	ENDF/B-5 updated	γ
	525	5-B-10	LANL	1989	ENDF/B-6	γ
	528	5-B-11	LANL	1989	ENDF/B-6	γ
	600	6-C-12	ORNL	1973/89	ENDF/B-5 updated	γ
1	725	7-N-14	LANL	1973	ENDF/B-4	γ
	728	7-N-15	JAERI	1988	JENDL-3	γ
	825	8-O-16	LANL	1991	ENDF/B-6	γ
	828	8-O-17	BNL	1978	ENDF/B-5	
1	925	9-F-19	ORNL	1974	ENDF/B-4	γ
	1122	11-Na-22	RCN	1982/85	RCN-2 updated	
	1125	11-Na-23	SRI-JPN	1989	JENDL-3	γ
1	1200	12-Mg	GRT, SAI	1974	ENDF/B-4	γ
	1325	13-Al-27	LANL, ENEA	1973/86	EFF-1 (ENDF/B-4 updated)	γ
	1400	14-Si	ORNL, ENEA	1974/86	EFF-1 (ENDF/B-4 updated)	γ
	1525	15-P-31	Fuji	1987	JENDL-3	
	1625	16-S-32	Fuji	1987	JENDL-3	
	1628	16-S-33	Fuji	1987	JENDL-3	

1 = same as JEF-1

Light elements (contd.)

	MAT	Nucl.	Lab	Year	Origin	Data
	1631	16-S-34	Fuji	1987	JENDL-3	
	1637	16-S-36	Fuji	1987	JENDL-3	
1	1700	17-Cl	GGA	1972	ENDF/B-4	γ
	1825	18-Ar-36	RCN	1982/85	RCN-2 updated	
	1831	18-Ar-38	RCN	1982/85	RCN-2 updated	
	1837	18-Ar-40	RCN	1982/87	RCN-2 updated	
1	1900	19-K	GGA	1967/74	ENDF/B-4	γ
1	2000	20-Ca	ORNL	1971/73	ENDF/B-4, 1195	γ
1	2200	22-Ti	BRC, ANL	1977	ENDF/B-5	γ
1	2300	23-V	ORNL	1972	ENDF/B-4	γ

1 = same as JEF-1

Structural materials

	MAT	Nucl.	Lab	Year	Origin	Data
	2425	24-Cr-50	ENEA	1991	new evaluation by F. Fabri et al. (replaces the JEF-1 evaluations by KFK and RCN)	γ,RM
	2431	24-Cr-52	ENEA	1991	- " -	
	2434	24-Cr-53	ENEA	1991	- " -	
	2437	24-Cr-54	ENEA	1991	- " -	
	2525	25-Mn-55	BNL	1974	ENDF/B-4 updated	γ
	2625	26-Fe-54	KFK, ENEA	1989	new evalutions by F. Fröhner, F. Fabri (replaces the JEF-1 evaluations by KFK and RCN)	γ,RM
	2631	26-Fe-56	KFK, ENEA	1989	- " -	γ,RM
	2634	26-Fe-57	KFK, ENEA	1989	- " -	
	2637	26-Fe-58	KFK, ENEA	1989	- " -	
1	2722	27-Co-58	RCN	1982	RCN-2	
1	2723	27-Co-58m	RCN	1982	RCN-2	
1	2725	27-Co-59	ANL	1982	ENDF/B-4, 1199 updated similar to ENDF/B-5	γ
	2825	28-Ni-58	ORNL	1991	ENDF/B-6	γ,RM,cov
	2828	28-Ni-59	ECN	1987	RCN	γ
	2831	28-Ni-60	ORNL	1989	ENDF/B-6	γ,cov
	2834	28-Ni-61	ORNL	1989	ENDF/B-6	γ,cov
	2837	28-Ni-62	ORNL	1989	ENDF/B-6	γ,cov
	2843	28-Ni-64	ORNL	1989	ENDF/B-6	γ,cov
	These Ni evaluations replace the JEF-1 evaluations by ECN.					
1	2900	29-Cu	SAI	1973/75	ENDF/B-4, 1295	γ
1	3025	30-Zn-64	RCN	1982	RCN-2, 4304	

1 = same as JEF-1

Fission products and medium elements

MAT	Nucl.	Lab	Year	Origin	Data
3100	31-Ga	LLNL, RCN	1978/89	ENDL-78 + ECN	γ
3231	32-Ge-72	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3234	32-Ge-73	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3237	32-Ge-74	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3243	32-Ge-76	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3325	33-As-75	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3425	34-Se-74	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
3431	34-Se-76	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3434	34-Se-77	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3437	34-Se-78	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3443	34-Se-80	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3449	34-Se-82	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3525	35-Br-79	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3531	35-Br-81	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3625	36-Kr-78	BNL, RCN	1978/89	ENDF/B-5 + ECN	
3631	36-Kr-80	BNL, RCN	1978/89	ENDF/B-5 + ECN	
3637	36-Kr-82	BNL, RCN	1978/89	ENDF/B-5 + ECN	
3640	36-Kr-83	BNL, RCN	1978/89	ENDF/B-5 + ECN	
3643	36-Kr-84	BNL, RCN	1978/89	ENDF/B-5 + ECN	
3646	36-Kr-85	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
3649	36-Kr-86	BNL, RCN	1972/89	ENDF/B-5 + ECN	
3725	37-Rb-85	HEDL, BNL, RCN	1980/90	ENDF/B-5 + ECN	
3728	37-Rb-86	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
3731	37-Rb-87	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
3825	38-Sr-84	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
3831	38-Sr-86	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3834	38-Sr-87	HEDL, RCN	1974/89	ENDF/B-5 + ECN	

Fission products and medium elements (cont.)

MAT	Nucl.	Lab	Year	Origin	Data
3837	38-Sr-88	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
3840	38-Sr-89	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
3843	38-Sr-90	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
3925	39-Y-89	ANL, LLNL, RCN	1986/90	A.B. Smith	γ,cov
3928	39-Y-90	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
3931	39-Y-91	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
4000	40-Zr	LLNL, RCN	1978/89	ENDL-78 + ECN	γ
4025	40-Zr-90	JNDC, RCN	1977/89	JENDL-1 + ECN	
4028	40-Zr-91	ENEA, CEA, RCN	1976/89	original	
4031	40-Zr-92	JNDC, RCN	1977/89	JENDL-1 + ECN	
4034	40-Zr-93	ENEA, CEA, RCN	1982/89	original	
4037	40-Zr-94	JNDC, RCN	1977/89	JENDL-1 + ECN	
4040	40-Zr-95	ENEA, CEA, RCN	1976/89	original	
4043	40-Zr-96	ENEA, CEA, RCN	1976/89	original	
4125	41-Nb-93	ANL, LLNL, RCN	1974/89	ENDF/B-5 + ECN	γ
4128	41-Nb-94	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
4131	41-Nb-95	ENEA, CEA, RCN	1976/89	original	
4200	42-Mo	RCN	1984/86	RCN-3	
4225	42-Mo-92	HEDL, RCN	1980/91	ENDF/B-5 + ECN	
4231	42-Mo-94	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
4234	42-Mo-95	JNDC, RCN	1980/89	JENDL-1 + ECN	
4237	42-Mo-96	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
4240	42-Mo-97	JNDC, RCN	1980/89	JENDL-1 + ECN	
4243	42-Mo-98	ENEA, CEA, RCN	1985/89	original	
4246	42-Mo-99	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
4249	42-Mo-100	ENEA, CEA, RCN	1985/89	original	
4331	43-Tc-99	RCN	1978/89	RCN	

Fission products and medium elements (cont.)

MAT	Nucl.	Lab	Year	Origin	Data
4425	44-Ru-96	HEDL, RCN	1980/89	ENDF/B-5, + ECN	
4431	44-Ru-98	HEDL, RCN	1980/89	ENDF/B-5, + ECN	
4434	44-Ru-99	HEDL, RCN	1974/89	ENDF/B-5, + ECN	
4437	44-Ru-100	HEDL, RCN	1980	ENDF/B-5 + ECN	
4440	44-Ru-101	RCN	1986	RCN	
4443	44-Ru-102	HEDL, RCN	1980/89	ENDF/B-5, 9331, modification by NEA-DB 1983, + ECN	
4446	44-Ru-103	ENEA, CEA, RCN	1985	original	
4449	44-Ru-104	RCN	1986/89	RCN	
4452	44-Ru-105	HEDL, INEL, RCN	1979/89	ENDF/B-5, + ECN	
4455	44-Ru-106	HEDL, INEL, RCN	1979/89	ENDF/B-5, + ECN	
4525	45-Rh-103	RCN	1982/89	RCN-3, 4503	
4531	45-Rh-105	HEDL, INEL, RCN	1979/89	ENDF/B-5+ ECN	
4625	46-Pd-102	HEDL, RCN	1980/89	ENDF/B-5	
4631	46-Pd-104	RCN	1982/89	original	
4634	46-Pd-105	ENEA, RCN	1983/89	original	
4637	46-Pd-106	RCN	1982/89	original	
4640	46-Pd-107	RCN	1982/89	original	
4643	46-Pd-108	RCN	1982/89	original	
4649	46-Pd-110	RCN	1982/89	original	
4725	47-Ag-107	HEDL, BNL, RCN	1978/89	ENDF/B-5	
4731	47-Ag-109	RCN	1980/89	original	
4737	47-Ag-111	HEDL, INEL, RCN	1979/89	ENDF/B-5	
4800	48-Cd	BNL, RCN	1974/89	ENDF/B-4 + ECN	
4825	48-Cd-106	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
(4482	48-Cd-108	HEDL	1974	ENDF/B-5, 9442)	

This JEF-1 evaluation is missing in JEF-2.

Fission products and medium elements (cont.)

MAT	Nucl.	Lab	Year	Origin	Data
4837	48-Cd-110	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
4840	48-Cd-111	ENEA, RCN	1977/89	original	
4843	48-Cd-112	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
4846	48-Cd-113	BNL, HEDL, RCN	1979/89	ENDF/B-5 + ECN	
4849	48-Cd-114	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
4852	48-Cd-115m	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
4855	48-Cd-116	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
4925	49-In-113	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
4931	49-In-115	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5025	50-Sn-112	RCN	1982/89	original	
5031	50-Sn-114	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
5034	50-Sn-115	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5037	50-Sn-116	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5040	50-Sn-117	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5043	50-Sn-118	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5046	50-Sn-119	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5049	50-Sn-120	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5055	50-Sn-122	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5058	50-Sn-123	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5061	50-Sn-124	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5064	50-Sn-125	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5067	50-Sn-126	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5125	51-Sb-121	HEDL, RCN, RCN	1980/89	ENDF/B-5 + ECN	
5131	51-Sb-123	HEDL, RCN, RCN	1980/89	ENDF/B-5 + ECN	
5134	51-Sb-124	HEDL, INEL, RCN	1979/90	ENDF/B-5 + ECN	
5137	51-Sb-125	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5140	51-Sb-126	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5225	52-Te-120	HEDL, RCN	1980/89	ENDF/B-5 + ECN	

Fission products and medium elements (cont.)

MAT	Nucl.	Lab	Year	Origin	Data
5231	52-Te-122	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5234	52-Te-123	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5237	52-Te-124	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5240	52-Te-125	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5243	52-Te-126	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5246	52-Te-127m	HEDL, INEL	1979/89	ENDF/B-5 + ECN	
5247	52-Te-128	JNDC, RCN	1977/89	JENDL-1 + ECN	
5252	52-Te-129m	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5255	52-Te-130	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5261	52-Te-132	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5325	53-I-127	RCN	1980/89	original	
5331	53-I-129	RCN	1982/89	original	
5334	53-I-130	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5337	53-I-131	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5349	53-I-135	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5425	54-Xe-124	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5431	54-Xe-126	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5437	54-Xe-128	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5440	54-Xe-129	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5443	54-Xe-130	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5446	54-Xe-131	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5449	54-Xe-132	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5452	54-Xe-133	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5455	54-Xe-134	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5458	54-Xe-135	BNW, RCN	1975/89	ENDF/B-5 + ECN	
5461	54-Xe-136	BNL, RCN	1978/89	ENDF/B-5 + ECN	
5525	55-Cs-133	RCN	1982/89	original	

Fission products and medium elements (cont.)

MAT	Nucl.	Lab	Year	Origin	Data
5528	55-Cs-134	ANC, HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5531	55-Cs-135	ENEA, RCN	1975/86	original	
5534	55-Cs-136	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5537	55-Cs-137	ENEA, RCN	1977/89	original	
5637	56-Ba-134	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5640	56-Ba-135	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5643	56-Ba-136	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5646	56-Ba-137	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5649	56-Ba-138	ENEA, RCN	1982/89	original	
5655	56-Ba-140	ENEA, RCN	1982/89	original	
5728	57-La-139	RCN	1980/89	original	
5731	57-La-140	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5837	58-Ce-140	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
5840	58-Ce-141	ENEA, RCN	1976/91	original	
5843	58-Ce-142	ENEA, RCN	1976/89	original	
5846	58-Ce-143	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5849	58-Ce-144	ENEA, RCN	1976/89	original	
5925	59-Pr-141	RCN	1982/89	original	
5928	59-Pr-142	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
5931	59-Pr-143	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
6025	60-Nd-142	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
6028	60-Nd-143	ENEA, RCN	1979/90	original	
6031	60-Nd-144	RCN	1978/89	original	
6034	60-Nd-145	RCN	1978/89	original	
6037	60-Nd-146	RCN	1978/90	original	
6040	60-Nd-147	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
6043	60-Nd-148	RCN	1978/90	original	
6049	60-Nd-150	HEDL, BNL, RCN	1980/89	ENDF/B-5 + ECN	

Fission products and medium elements (cont.)

MAT	Nucl.	Lab	Year	Origin	Data
6149	61-Pm-147	RCN	1979/89	original	
6152	61-Pm-148	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
6153	61-Pm-148m	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
6155	61-Pm-149	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
6161	61-Pm-151	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
6225	62-Sm-144	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
6234	62-Sm-147	RCN	1977/89	original	
6237	62-Sm-148	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
6240	62-Sm-149	RCN	1977/89	original	
6243	62-Sm-150	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
6246	62-Sm-151	ENEA, RCN	1979/89	original	
6249	62-Sm-152	RCN	1978/89	original	
6252	62-Sm-153	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
6255	62-Sm-154	HEDL, RCN	1974/89	ENDF/B-5 + ECN	
6325	63-Eu-151	BNL, RCN	1977/89	ENDF/B-5 + ECN	γ
6328	63-Eu-152	BNL, RCN	1973/89	ENDF/B-5 + ECN	
6331	63-Eu-153	BNL, RCN	1978/89	ENDF/B-5 + ECN	γ
6334	63-Eu-154	BNL, RCN	1973/89	ENDF/B-5 + ECN	
6337	63-Eu-155	ENEA, RCN	1976/89	original	
6340	63-Eu-156	HEDL, INEL, RCN	1979/89	ENDF/B-5 + ECN	
6343	63-Eu-157	HEDL, RCN	1980/89	ENDF/B-5 + ECN	
6431	64-Gd-154	HEDL, RCN	1974/89	ENDF/B-4 + ECN	
6434	64-Gd-155	JNDC, RCN	1977/91	JENDL-1 + ECN	
6437	64-Gd-156	ENEA, RCN	1976/91	original	
6440	64-Gd-157	JNDC, RCN	1977/89	JENDL-1 + ECN	
6443	64-Gd-158	HEDL, RCN	1974/89	ENDF/B-4 + ECN	
6449	64-Gd-160	HEDL, RCN	1974/89	ENDF/B-4 + ECN	

Fission products and medium elements (cont.)

MAT	Nucl.	Lab	Year	Origin	Data
(4649	64-Gd	NEA-DB	1986)	sum of isotopic files, with energy distribution for inelastic continuum taken from ENDL-84	
Note: This file existed in JEF-1 but was not included in JEF-2					
6525	65-Tb-159	ENEA, RCN	1976/88	original	
6528	65-Tb-160	HEDL, INEL	1979	ENDF/B-5, 9858	
No change compared to JEF-1					

Heavy elements

	MAT	Nucl.	Lab	Year	Origin	Data
1	6637	66-Dy-160	HEDL	1974	ENDF/B-5	
1	6640	66-Dy-161	HEDL	1974	ENDF/B-5	
1	6643	66-Dy-162	HEDL	1974	ENDF/B-5	
1	6646	66-Dy-163	HEDL	1974	ENDF/B-5	
1	6649	66-Dy-164	BNW	1967	ENDF/B-3	
1	6725	67-Ho-165	HEDL	1974	ENDF/B-5	
1	6837	68-Er-166	HEDL	1974	ENDF/B-5	
1	6840	68-Er-167	HEDL	1974	ENDF/B-5	
1	7125	71-Lu-175	BNW	1967	ENDF/B-4	
1	7128	71-Lu-176	BNW	1967	ENDF/B-4	
	(4721	72-HF	NEA-DB	1986)	sum of isotopic	
	Note: This file existed in JEF-1 but was not included in JEF-2, although there seems to be no change in the isotopic files		taken from ENDL-84		files, with energy distribution for inelastic continuum	
1	7225	72-Hf-174	UK, JAERI	1982	resonance region: UKNDL-81 above: JENDL-2	
1	7231	72-Hf-176	UK, JAERI	1982	"	
1	7234	72-Hf-177	UK, JAERI	1982	"	
1	7237	72-Hf-178	UK, JAERI	1982	"	
1	7240	72-Hf-179	UK, JAERI	1982	"	
1	7243	72-Hf-180	UK, JAERI	1982	"	
1	7328	73-Ta-181	LLNL	1972	ENDF/B-4	γ
1	7331	73-Ta-182	AI-AEC	1971	ENDF/B-4	
1	7431	74-W-182	AI, LANL	1973	ENDF/B-4	γ
1	7434	74-W-183	AI, LANL	1973	ENDF/B-4	γ
1	7437	74-W-184	AI, LANL	1973	ENDF/B-4	γ
1	7443	74-W-186	AI, LANL	1973	ENDF/B-4	γ

1 = same as JEF-1

Heavy elements (cont.)

	MAT	Nucl.	Lab	Year	Origin	Data
1	7525	75-Re-185	GE	1968	ENDF/B-4	
1	7531	75-Re-187	GE	1968	ENDF/B-4	
1	7925	79-Au-197	BNL	1977	ENDF/B-5	
1	8200	82-Pb	ORNL, RCN	1971/86	ENDF/B-4 updated for EFF by Gruppelaar	γ
1	8325	83-Bi-209	BRC	1982	no documentation in the file; see 82ANTWERP 655 and CEA-N-2284, 130	γ

1 = same as JEF-1

Actinides

	MAT	Nucl.	Lab	Year	Origin	Data
1	9034	90-Th-230	HEDL	1977	ENDF/B-5	
1	9040	90-Th-232	BNL	1974	ENDF/B-4	
1	9131	91-Pa-231	HEDL	1977	ENDF/B-5	
1	9137	91-Pa-233	HEDL, INEL	1978	ENDF/B-5	
1	9219	92-U-232	HEDL	1977	ENDF/B-5	
1	9222	92-U-233	BAPL	1974	ENDF/B-4	
1	9225	92-U-234	BNL, HEDL	1978	ENDF/B-5	
	9228	92-U-235	Cadarache, by E. Fort and H. Tellier, based on the ENDF/B-6 evaluation	1990	ENDF/B-6 updated	γ,cov
1	9231	92-U-236	BNL, HEDL	1978	ENDF/B-5	
1	9234	92-U-237	BNL et al.	1976	ENDF/B-5	
1	9237	92-U-238	M. Sowerby et al.	1989	original	γ,cov
1	9346	93-Np-237	CAD	1981/91	original, INDC(FR)-42 (n,2n) cross-sections updated in 1986 and 1991	
1	9349	93-Np-238	SRL	1975	ENDF/B-5	
	9352	93-Np-239	JNDC	1976/84	JENDL-2 updated	
1	9428	94-Pu-236	HEDL, SRL, INEL	1978	ENDF/B-5, 8436	
1	9431	94-Pu-237	HEDL, INEL	1978	ENDF/B-5, 8437	
	9434	94-Pu-238	CAD	1982/91	INDL/A - 4948, slightly modified	
	9437	94-Pu-239	CAD, ORNL	1990	original	RM
	9440	94-Pu-240	JNDC	1979/91	JENDL-2 updated	
	9443	94-Pu-241	ORNL/CAD Derrien, KFK Fröhner, with some data from JENDL-2	1979	original	
	9446	94-Pu-242	NAIG, KFK, BRC	1981/84	JENDL-2 Rev. 1, modified by F. Fröhner	

1 = same as JEF-1

Actinides (cont.)

	MAT	Nucl.	Lab	Year	Origin	Data
1	9449	94-Pu-243	BNL et al.	1976	ENDF/B-5	
1	9452	94-Pu-244	HEDL, SRL, INEL	1978	ENDF/B-5	
	9543	95-Am-241	KFK, CAD	1981/89	partly from KEDAK-4, partly from CAD, updated	
1	9546	95-Am-242	JAERI	1980	JENDL-2	
	9547	95-Am-242m	KFK, Fröhner	1982/91	KEDAK-4, with modifications	
1	9549	95-Am-243	AERE	1980/84	UKNDL-2 with minor corrections	
1	9628	96-Cm-241	HEDL	1978	ENDF/B-5	
1	9631	96-Cm-242	ENEA, Menapace	1982/84	original, see INDC(ITY)-7	
	9634	96-Cm-243	ENEA, Menapace	1982/88	original, see RT/FI(81)23, with small corrections	
	9637	96-Cm-244	KFK	1983/89	KEDAK-4 with modifications	
	9640	96-Cm-245	ENEA, Menapace	1982/88	original, see RT/FI(81)24, with small corrections	
	9643	96-Cm-246	BNL, SRL, LLNL	1976/88	ENDF/B-5 updated	
	9646	96-Cm-247	BNL, SRL, LLNL	1976/88	ENDF/B-5 updated	
	9649	96-Cm-248	BNL, SRL, LLNL	1978/88	ENDF/B-5 updated	γ
	9752	97-Bk-249	BNL, SRL, LLNL	1976/88	ENDF/B-5 updated	
	9852	98-Cf-249	BNL, SRL, LLNL	1976/88	ENDF/B-5 updated	
	9855	98-Cf-250	BNL, SRL, LLNL	1976/88	ENDF/B-5 updated	
	9858	98-Cf-251	BNL, SRL, LLNL	1976/88	ENDF/B-5 updated	
	9861	98-Cf-252	BNL, SRL, LLNL	1976/88	ENDF/B-5 updated	
	9864	98-Cf-253	SRL	1975/88	ENDF/B-5 updated	
	9917	99-Es-253	BNL, SRL	1976/88	ENDF/B-5 updated	

1 = same as JEF-1

List of lab-codes

AEC	US Atomic Energy Commission
AERE	Atomic Energy Research Establishment, Harwell, UK
AI	Atomic International, Canooga Park, USA
ANC	Aerojet Nuclear Company, Idaho, USA
ANL	Argonne National Laboratory, USA
BAPL	Bettis Atomic Power Laboratory, USA
BNL	Brookhaven National Laboratory, USA
BNW	Pacific (Battelle) Northwest Laboratory, USA
BRC	C.E.N. Bruyères-le-Châtel, France
CAD	C.E.N. Cadarache, France
CEA	C.E.N. Bruyères-le-Châtel, France
ENEA	ENEA Centro Ricerche Energia, Bologna, Italy
Fuji	Fuji Electric Co. Ltd., Japan
GE	General Electric Company, USA
GGA	Gulf General Atomic, San Diego, USA
GRT	Gulf Radiation Technology, San Diego, USA
HEDL	Hanford Engineering Development Laboratory, USA
INEL	Idaho Nuclear Engineering Laboratory, USA
JAERI	Japan Atomic Energy Research Institute
JNDC	Japanese Nuclear Data Committee
KFK	Kernforschungszentrum Karlsruhe, Germany
LANL	Los Alamos National Laboratory, USA
LLNL	Lawrence Livermore National Laboratory, USA
NAIG	Nippon Atomic Industry Group, Japan
NEA-DB	Nuclear Energy Agency Data Bank
ORNL	Oak Ridge National Laboratory, USA
RCN	Netherlands Energy Research Foundation ECN, Petten (previously Reactor Centrum Netherlands
SAI	Science Application Inc., Lajolla, USA
SRI	Ship Research Inst., Japan
SRL	Dupont Savannah River Laboratory, USA
UK	United Kingdom