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2002/7

Index of Nuclear Data Libraries (2002)

available from the IAEA Nuclear Data Section

Version of 2002 (Archive)

O. Schwerer, H.D. Lemmel

Abstract: This document lists more than 100 nuclear data libraries together with references that give more detailed information about these libraries. The present version archives the catalogue of data libraries (IAEA-NDS-7) as of July 2002, including references to older data files, hardcopy documents and libraries which are no longer up to date but may be of occasional interest. For an up-to-date catalogue see the current document IAEA-NDS-7.

The data libraries include neutron cross-sections, resonance parameters, fission-product yields, nuclear structure and decay data, gamma-rays from radionuclides, data of nuclear reactions induced by charged particles or heavy ions, photonuclear data, photoatomic interaction data, and many others, partly with related data processing computer codes. All data and documentation references are available upon request from the IAEA Nuclear Data Section, free of charge on diskettes, CD-ROM, other computer media, or online through WWW, Telnet, or FTP file transfer.

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Nuclear Data Section
International Atomic Energy Agency
P.O. Box 100
A-1400 Vienna
Austria

e-mail: services@iaeand.iaea.org
fax: (43-1) 26007
cable: INATOM VIENNA
telex: 1-12645
telephone: (43-1) 2600-21710

Online: TELNET or FTP: iaeand.iaea.org
username: IAEANDS for interactive Nuclear Data Information System
usernames: ANONYMOUS for FTP file transfer;
FENDL2 for FTP file transfer of FENDL-2.0;
RIPL for FTP file transfer of RIPL;
NDSOVL for files saved in NDIS Telnet session

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 guideline:

When quoting a computer-based data library in a publication it is recommended

- to give first the print reference in which the author(s) describe(s) the generation of the data,
- to give thereafter the database reference which contains the numerical data, including the version of the database,
- and then to mention the data center or the online service from which the data were received.

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Index of Nuclear Data Libraries

available from the IAEA Nuclear Data Section as of July 2002

(For an up-to-date index see document IAEA-NDS-7)

Introduction

This document gives a brief summary of available computerized data libraries. Please contact the IAEA Nuclear Data Section for any additional information you need. Copies of entire data libraries or selective retrievals on CD-ROM, diskettes, other computer media or in printed form are available free of charge upon informal request.

Most major data libraries are now available online, either for interactive retrieval through WWW or the Telnet-based service "NDIS", or by downloading complete files through the Internet (WWW interface or FTP). For the libraries marked to be "available online", either the Internet address is given explicitly, or they can easily be found from the IAEA's "Nuclear Data Services" homepage under <http://www-nds.iaea.org>. See the following page for more information on the online services.

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Online Nuclear Data Service

WWW

The IAEA's Nuclear Data Services homepage under <http://www-nds.iaea.org> contains direct access to many databases as well as other relevant information, such as the Nuclear Data Newsletter, the IAEA Nuclear Data Guide (an online version of the present document), selected INDC reports in PDF format, an introduction to the tasks of the IAEA Nuclear Data Section, and links to relevant documents and codes, and to relevant external information resources.

Telnet - "Nuclear Data Information System (NDIS)"

This was the first online service of the IAEA Nuclear Data Section and contains Telnet access to EXFOR, ENDF (all major ENDF formatted evaluated nuclear cross section libraries), CINDA, ENSDF, NSR, NUDAT, Photo-atomic interaction data ("XRAY"), and some documents in PostScript format.

Sample login:

TELNET iaeand.iaea.org

IAEA Nuclear Data Section DS20 - OpenVMS Alpha V7.2-1

Username: **iaeands**

```
THE IAEA/NDS ONLINE DATA SERVICE
NUCLEAR DATA SECTION
INTERNATIONAL ATOMIC ENERGY AGENCY
.....
.....
```

Enter NDS assigned authorization code (or GUEST): **GUEST**
(or your authorization code if you have one)

Enter your last name (or DEFAULT or ?) **_____**

A detailed manual for the Telnet services is available in the document IAEA-NDS-150 (in hardcopy or electronically in PostScript format).

FTP

Various libraries, documents and computer codes can be downloaded by FTP file transfer. (Note that in most cases a WWW interface for downloading is available also.)

Procedure: FTP iaeand.iaea.org
User ANONYMOUS (no password required)

Other usernames (all without password) are:

FENDL2 for FENDL-2 files

RIPL for RIPL files

NDSOHL for files saved by user during a Telnet session under NDIS (see above).

1. Neutron nuclear data, experimental

EXFOR

Contents: All experimental neutron nuclear data and derived quantities such as resonance-parameters, fission-product yield data, as well as charged-particle induced nuclear reaction data (including some heavy ion data) and photonuclear data. Updated in monthly intervals. More than 3 million records. Computer retrievals available online (WWW or Telnet) or from IAEA-NDS on request. Complete library with retrieval interface available on CD-ROM as IAEA-NDS-CD-07, and with more powerful retrieval possibilities as EXFOR/ACCESS as IAEA-NDS-CD-09 (both version January 2001).

Summary documentation: IAEA-NDS-1 Rev. 6 ("Short Guide to EXFOR"). A more detailed introduction to the EXFOR format for users can be found in IAEA-NDS-206 ("EXFOR Basics Manual"), available in hardcopy or in PDF format from <http://www-nds.iaea.org/reports/nds-206.pdf>

Dictionaries (for data definition and abbreviations): updated quarterly, available in electronic form or as printed copy. - The version of Jan. 1995 is available as INIS microfiche as report IAEA-NDS-2. Interactive retrieval and plotting for EXFOR+ ENDF is available online with the ZVVIEW software under <http://www-nds.iaea.org/zvd/>.

Detailed documentation of format and compilation rules: EXFOR Systems Manual, IAEA-NDS-207, Rev. 2000 (available also in PDF format under <http://www-nds.iaea.org/reports/nds-207.pdf>)

Bibliography and data index: CINDA (book published once a year).
Computer retrievals available online (WWW or Telnet). Also available on CD-ROM.

CINDA formats: IAEA-NDS-9 Rev. 1.

CINDA compiler's manual: IAEA-NDS-109, Rev. 90/2

CSISRS: This is identical to EXFOR. In the U.S. online system CSISRS (= Cross-Section Information Storage and Retrieval System) is used instead of the internationally used term EXFOR. Much of the contents of EXFOR (in its status of the 1980's) was published in the book Neutron Cross-Sections by S.F. Mughabghab et al., U.S. National Nuclear Data Center, Academic Press, vol. 1: Neutron Resonance-Parameters and Thermal Cross-Sections, Part A Z=1-60 (1981), Part B Z=61-100 (1984), vol. 2: Neutron Cross-Section Curves (1988).

Resonance-Integrals and thermal activation cross-sections, a compilation by E.M. Gryntakis 1986, available on tape and in printed form as IAEA-NDS-64. See also Handbook on Nuclear Activation Data, IAEA Technical Report No. 273 (1987) p. 199.

Neutron Scattering Lengths, a compilation of experimental data and recommended values by L. Koester, H. Rauch, E. Seymann, published in Atomic Data and Nuclear Data Tables 49, 65-120, 1991. This is an update of the work first published under an IAEA contract in the report Jül-1755, Dec. 1981, now covering the literature up to the end of 1990. - A similar work was published earlier by V.F. Sears, report AECL-8490, June 1984. - For the 1981 version by Koester et al., see document IAEA-NDS-44, and a wall chart which was obtainable for 420.- Austrian Schillings from H. Bittermann, Atominstitut, Schüttelstraße 115, A-1020 Wien. The 1981 version is available on tape (internal code: NEUTSCATL), with 2 parts: 1. experimental data; 2. recommended values.

Old compilations of experimental neutron cross-section data can be found in

BNL-325, a report published in several editions and supplements from 1955 to 1976 by the U.S. National Nuclear Data Center, at that time called Sigma Center resp. National Neutron Cross-Section Center.

Musgrove library of strength-function data, see CINDU-11 p. 41.

2. ENDF format for evaluated nuclear data files

The internationally agreed format for data files of evaluated nuclear reaction data is ENDF-6. The earlier versions ENDF-5, ENDF-4 may still be in use.

ENDF was designed primarily for neutron reaction data with allowance for related decay data, fission-product yield data, photo-atomic interaction data and others. ENDF-6 also permits the inclusion of data for nuclear reactions induced by photons and charged particles.

ENDF-6 Format Manual: Available as document IAEA-NDS-76 Rev. 6. This is a reprint of the report ENDF-102 edited by P.F. Rose and C.L. Dunford, July 1990, including several revisions up to April 2001. Available online under <http://www-nds.iaea.or.at/ndspub/documents/endf/endf102/>

Many of the ENDF formatted data are available in different formats

- a) with resonance parameters;
- b) resonance parameters replaced by point data by means of the code RECENT (or a similar code);
- c) edited format, for easier legibility but not suitable for further computer processing; used mainly for printed listings of not too voluminous retrievals, but also data requested on magnetic tape can be provided in edited format.

ENDF-5 Format Manual: Available as document IAEA-NDS-75 Rev. 1. This is a reprint of the report BNL-NCS-50496 (ENDF-102) 2nd Edition Oct. 1979 by R. Kinsey, and updated with the report BNL-NCS-50496 (ENDF-102) 2nd Edition Revised Nov. 1983 by B.A. Magurno.

(Note: The report of Oct. 1979 by R. Kinsey exists as microfiche IAEA-NDS-10/102. The update pages of Nov. 1983 by B.A. Magurno exist as report IAEA-NDS-73.)

A brief introduction and summary of the ENDF format exists as document IAEA-NDS-10 Rev. 2.

ENDF-4 Format Manual: Available as document IAEA-NDS-74. This is a reprint of the report BNL-NCS-50496 (ENDF-102) revised by D. Garber, C. Dunford, S. Pearlstein, Oct. 1975.

3. ENDF data processing codes

The new ENDF data processing codes operate on ENDF-4, ENDF-5 and ENDF-6 formatted data files. Available from the IAEA Nuclear Data Section are:

ENDF Utility Codes from NNDC, version 6.13 (2002) for ENDF-6 (and ENDF-5). Included are the data checking codes CHECKER, FIZCON, PSYCHE; the code INTER for retrieving thermal cross-sections and some other data; graphical plotting subroutines PLOTEF, GRALIB, INTLIB; and the file maintenance and retrieval codes LISTEF, SETMDC, GETMAT, STANEF. This program package is designed for CDC, IBM, DEC and PC computers. Available online. See document IAEA-NDS-29.

The 2000 ENDF Pre-Processing Codes by D.E. Cullen ("PRE-PRO 2000"). Included are the codes ACTIVATE, CONVERT, MERGER, LINEAR, RECENT, SIGMA1, LEGEND, FIXUP, GROUPIE, DICTION, MIXER, VIRGIN, COMPLOT, EVALPLOT, RELABEL, SIXPAK.

Some of the functions of these codes are: to calculate cross-sections from resonance-parameters; to calculate angular distributions, group averages, mixtures of cross-sections, etc.; to produce graphical plottings and data comparisons. (As of 1996 all calculations in double precision.) The PREPRO2000 codes completely supersede all earlier versions. Working on all computers for all versions of ENDF formats. Available on CD-ROM or online from <http://www-nds.iaea.org/ndspub/endl/prepro/>

See document IAEA-NDS-39 Rev. 10.

This is supplemented by the following codes:

- PLOTTAB (a general plotting program) by D.E. Cullen, see documents IAEA-NDS-82 and -83 of June 1987.
- "Red's Natural Editor" (a program designed to edit FORTRAN programs) by D.E. Cullen, see document IAEA-NDS-149.

PLOT4: plot experimental data with or without related ENDF formatted data. See document IAEA-NDS-79 Rev. 1.

CONV45/CONV56: converting ENDF-4 to ENDF-5 and ENDF-5 to ENDF-format. See document IAEA-NDS-78.

EPICSHOW (Electron Photon Interactive Code - Show Data), 1998 Update, by D.E. Cullen. Interactive graphics code for viewing and interacting with neutron, photon, electron and light charged particle data. Available on CD-ROM. Brief description see IAEA-NDS-194.

ENDVER (ENDF File Verification Support Package). The ENDVER package can be used to convert EXFOR data into computational C4 format, display them and compare graphically with the contents of a specified evaluated data file. The package also contains utilities to retrieve selected materials from a master library in ENDF format, extract cross sections (including differential and double differential data) and output them in two-column PLOTTAB "curves" format. Available online.

WINENDF, CD-ROM (November 2001, IAEA-NDS-CD-04) contains all latest releases of comprehensive evaluated data Libraries (ENDF/B-VI Release 8, JENDL-3.2, JEF-2.2, BROND-2 and CENDL-2) and retrieval and merger system for MS Windows, Manuals and Documentation in PostScript, and the Utilities and Preprocessing Codes.

WinMerger, Visual Merging and Retrieval of Information from ENDF Format Libraries. Summary documentation: IAEA-NDS-30 (June 1998) by R. Paviotti Corcuera

Not available from IAEA:

NJOY: A system for processing ENDF formatted data files.

See the report by R.E. MacFarlane "The NJOY nuclear data processing system, version 91", LA-12740-M (1994). For a summary see document IAEA-NDS-119. This code package must be requested from the

Radiation Shielding Information Centre (RSIC)
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, TN, USA-37831

GRUKON: For the code GRUKON developed and used in Obninsk, Russia, see the report INDC(CCP)-344. This code must be requested from the

NEA Data Bank, Computer Program Library
Le Seine Saint-Germain
12 blvd des Iles
F-92130 Issy-les-Moulineaux, France

4. Evaluated neutron nuclear data: Comprehensive libraries

Five recent comprehensive data libraries for evaluated neutron reaction data are available. These are supplemented by two data libraries (FENDL/E and EFF) that had been developed for fusion applications but, of course, can be used for other applications as well. For a combined index of these seven see document IAEA-NDS-107 Rev. 10. Interactive retrieval and plotting for EXFOR+ ENDF is available online with the ZVVIEW software under <http://www-nds.iaea.org/zvd/>.

WINENDF, CD-ROM (November 2001, IAEA-NDS-CD-04) contains all latest releases of comprehensive evaluated data Libraries (ENDF/B-VI Release 8, JENDL-3.2, JEF-2.2, BROND-2 and CENDL-2) and retrieval and merger system for MS Windows, Manuals and Documentation in PostScript, and the Utilities and Preprocessing Codes.

BROND-2.2: USSR evaluated neutron data library, issued in 1992 in ENDF-6 format and updated in 1993. The library is available as basic data with resonance-parameters, and/or as point data where resonance-parameters have been converted to cross-sections.

Summary documentation see IAEA-NDS-90 Rev. 8.

CENDL-2.1, Chinese evaluated neutron data library issued in 1991, updated and supplemented in 1993 and 1995 with some minor revisions in 1997, in ENDF-6 format.

Summary documentation see IAEA-NDS-61, Rev. 4.

ENDF/B-6, the US evaluated nuclear data file released in 1990 in ENDF-6 format, with revisions released in 1991, 1993, 1995, 1997, 1998, 1999, 2000, and a final Release 8 with corrections up to September 2001. The library is available online (WWW and Telnet) as basic data with resonance-parameters, and/or as point data where resonance-parameters have been converted to cross-sections.

Also available on CD-ROM on IAEA-NDS-CD-04.

Summary documentation including information on a variety of specialized sublibraries, see IAEA-NDS-100 Rev. 11.

POINT2000, by D.E.Cullen. A temperature dependent version of the ENDF/B-VI, Release 7, library. Point-wise cross sections, given for 8 temperatures between 0 and 2100 Kelvin, in steps of 300 Kelvin, are available online.

JEF-2.2, the evaluated nuclear data library of the OECD Nuclear Energy Agency finalized in 1992 and released in 1993, in ENDF-6 format. Available in original form with resonance-parameters, and/or as "point data" where resonance-parameters have been converted to cross-sections.

Also available compressed on a set of PC diskettes.

Summary documentation see IAEA-NDS-120 Rev. 3.

JENDL-3.2, the Japanese evaluated nuclear data library released in 1989 and significantly updated in 1994, in ENDF-6 format. Both the basic file and the reconstructed pointwise data for 300 K temperature are available online (WWW and Telnet). Also included in the CD-ROM IAEA-NDS-CD-04 which contains all major ENDF-formatted libraries and some utility codes.

Summary documentation see IAEA-NDS-110 Rev. 5.

For the status of JENDL special purpose files see the report JAERI-M-91-032 (March 1991).

FENDL/E. Evaluated nuclear data library for neutron reactions photon production, and photo-atomic interactions for coupled neutron-photon transport calculations in fusion (and other) applications. Version 2.0 of February 1997. 57 materials from 1-H-1 to 83-Bi-209. Available (online or on CD-ROM) in 3 representations:

- a) original ENDF-6 format with resonance parameters; documentation by A.B. Pashchenko and H. Wienke, IAEA-NDS-175 Rev. 2 of June 1998
- b) FENDL/MG: processed by R.E. MacFarlane into multigroup data in GENDF and

MATXS format; documentation: IAEA-NDS-176 (April 1998).

- c) FENDL/MC: processed by R.E. MacFarlane into the ACE format needed for input to the Monte Carlo code MCNP4A; documentation: IAEA-NDS-176 (April 1998).

EFF-2.4, the "European Fusion File". Evaluated neutron nuclear data for 80 materials selected for the European Fusion Programme, with some new evaluations and many evaluations based on JEF-2, JENDL-3, or ENDF/B-4,5,6, including revisions up to May 1995. Maintained by H. Gruppelaar.

Summary documentation see IAEA-NDS-170.

FOND-2.2. Evaluated Neutron Data Library (Russian library of evaluated neutron data files for generating sets of constants in the ABBN constants system), by V.N. Koscheev, M.N. Nikolaev, A.M. Tsiboulia, G.V. Savoskina. Available on CD-ROM or online at <http://www-nds.iaea.or.at/reports/nds-199r1.pdf> with hyperlinks to data files for 679 materials in ENDF-6 format. Data were selected from various Russian and foreign libraries.

Some older data libraries for evaluated neutron reaction data are listed in the following Evaluations contained in these libraries are mostly of historical interest only and for intercomparison purposes. However, these libraries may contain selected data evaluations that are still valid in view of the fact, that not all evaluations contained in the above mentioned four comprehensive data libraries are new and up-to-date.

ENDL-84, LLNL Evaluated Neutron Data Library of 1984 in ENDF-5 format. Summary documentation: IAEA-NDS-11, Rev. 5.

INDL/V-85, IAEA Nuclear Data Library for Various neutron data evaluations in ENDF-5 format, 1985 version. With supplements. This includes primarily evaluated data that are not part of one of the comprehensive data libraries.
Summary documentation: IAEA-NDS-31, Rev. 3.

EXFOR-V ("VIEN"-) file, IAEA Evaluated Nuclear Data File for Various neutron data evaluations, in EXFOR format. This includes primarily evaluated data that are not part of one of the comprehensive data libraries, and also such evaluated data for which the ENDF format is less convenient. Indexed in CINDA as "VIEN-V..."
Summary documentation of contents: IAEA-NDS-34, Rev. 2.

ENDF/B-5, US Evaluated Neutron Data Library of 1979. Some revisions and supplements were issued in 1985/86 as ENDF/B-5.2.

Documentation of contents: Guide book for the ENDF/B-5 Nuclear Data Files, report EPRI-NP-2510 (= ENDF-328), July 1982. See also summary documentation compiled by R. Kinsey in report BNL-NCS-17541 (=ENDF-201), 3rd edition, July 1979, available as microfiche IAEA-NDS-10/201. For the summary documentation of ENDF/B-5.2 compiled by B.A. Magurno and P.G. Young see the report BNL-NCS-17541 (=ENDF-201) 3rd edition supplement 1, Jan. 1985.

For the evaluations contributed by the Los Alamos Scientific Laboratory (LASL) see document LA-7663-MS of Jan. 1979.

Available files: Standard nuclides
Actinides
Fission-product yields
Fission products: cross-sections and decay data
Activation reactions
Dosimetry reactions
Gas production cross-sections

For details see on the following pages under the respective headings.

ENDF/B-5 modifications 1986: Document IAEA-NDS-65. This is a computer-produced listing showing all records where the new version differs from the old version.

ENDF/B-4, US Evaluated Neutron Data Library of 1974.

Summary documentation: IAEA-NDS-23, Rev. 3.

- Available - in original form with resonance-parameters = 216.886 records
- as RECENT output, with resonance-parameters converted to cross-section = 1.053.950 records

ENDL-82, LLNL Evaluated Neutron Data Library of 1982, in ENDL Transmittal format.

Summary documentation: IAEA-NDS-54.

ENDL Transmittal Format, see IAEA-NDS-53, Rev. 1.

JENDL-2, (Rev. 1) Japanese Evaluated Nuclear Data Library of 1984 (supersedes JENDL-1 and preliminary version of JENDL-2).

Available in original version and as RESEND-output with resonance-parameters converted to cross-section data.

Summary documentation: IAEA-NDS-18, Rev. 3.

Detailed tables and curves see Y. Kikuchi, Draft of Guidebook for users of JENDL-2, Report JAERI-memo-59-066 (Feb. 1984).

UKNDL-80, UK Nuclear Data Library

Brief summary of format: IAEA-NDS-20, Rev. 2.

Summary of contents: IAEA-NDS-30.

Most recent version available: UKNDL-81.

KEDAK-4, Karlsruhe Evaluated Neutron Data Library

Brief summary of format and contents: IAEA-NDS-21, Rev. 4.

Documentation: B. Goel, B. Krieg, Status of the Nuclear Data Library KEDAK-4, October 1984. Report KfK-3838, Feb. 1985.

SOKRATOR, USSR Evaluated Nuclear Data Library

SOKRATOR Manual: INDC(CCP)-97.

Note: The IAEA Nuclear Data Section converted most of the data into ENDF/B-5 format. These data are included in INDL/V, see above. Meanwhile these data are superseded. For the new USSR Evaluated Nuclear Data Library, see "BROND" above.

5. Evaluated neutron nuclear data: Multigroup libraries

In general, multigroup nuclear data libraries for reactor calculations should be requested from the NEA Data Bank, Le Seine Saint-Germain, 12 blvd des Iles, F-92130 Issy-les-Moulineaux, France.

The IAEA Nuclear Data Section has presently only the following:

FENDL/MG-2.0 and FENDL/MC-2.0, the processed cross-section libraries for neutron-photon transport calculations. Evaluated neutron reaction data and photon-atom interaction cross sections for materials contained in the general purpose Fusion Evaluated Nuclear Data Library (FENDL/E-2.0) have been processed with the NJOY code system into VITAMIN-J multigroup structure, for use in discrete-ordinates transport codes, and into continuous energy ACE format, for use in the Monte Carlo transport code MCNP. Available online and on CD-ROM. Summary documentation: IAEA-NDS-176 (April 1998) by M. Herman and H. Wienke.

FENDL2/A-MCNP, FENDL2/A-VITJ_E and FENDL2/A-VITJ_FLAT. The FENDL-2 neutron activation cross-section data files, processed into the following three formats: continuous energy format as used by the Monte Carlo neutron/photon transport code MCNP4A; VITAMIN-J 175 multigroup format weighted with the VITAMIN-E weighting spectrum as used by the transmutation codes REAC*2/3 and FOUR ACES; VITAMIN-J 175 multigroup ENDF-6 format, with a flat weighting spectrum. The data are available from the IAEA Nuclear Data Section online or on CD-ROM. Summary documentation: IAEA-NDS-174 (March 1997) by A.B. Pashchenko and H. Wienke.

WIMKAL-88. The 1988 version of the WIMS-KAERI library of 69-group neutron cross-sections for thermal reactor design analysis with the WIMS code system; by Jung-Do Kim, Korea Atomic Energy Research Institute. The library contains data evaluations for more than 130 materials selected from ENDF/B-5, ENDF/B-4, JENDL-2 and some other sources. Summary of contents: IAEA-NDS-92.

WIMSD Nb Bi. WIMSD data for Nb and Bi derived from ENDF/B-6.1, JEF-2.2, JENDL-3.2, by JUNG-Do Kim, Choong-Sup Gil. Data on a PC diskette, 478 000 bytes. Tabular and graphical intercomparison and documentation: IAEA-NDS-152

For an earlier collection of multigroup cross-section data libraries see the document IAEA-NDS-32 Rev. 2 (1981).

6. Nuclear data standards for nuclear measurements

ENDF/B-6 Standards of 1987

Evaluated data in ENDF-6 format for H-1(n,n) integral and differential, He-3(n,p), Li-6(n,t), B-10(n, α), C(n,n) integral and differential, Au-197(n,q), U-235(n,f). A second file contains cross-section uncertainties and recommended values for the 2200 m/s neutron cross-sections of U-233, 235, Pu-239, 241, and $\bar{\nu}$ of Cf-252. The International Nuclear Data Committee recommended the ENDF/B-6 standards data as international reference standards.

Summary documentation: IAEA-NDS-88, Rev. 3.

XG Standards. X-ray and gamma-ray standards for detector calibration. See below under "Nuclear Structure and Decay Data". Also included in the handbook NEANDC-311.

1991 NEANDC/INDC Nuclear Standards File:

See the handbook NEANDC-311 = INDC(SEC)-101, Nuclear Data Standards for Nuclear Measurements. H. Condé (ed.).

It includes the ENDF/B-6 Standards, the XG Standards, and some other data.

Standard monitor reactions for neutrons, Z. Bödy. - See Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, Vienna 1987, p./29-82.

Properties of Neutron Sources. Proceedings of an IAEA Meeting, Leningrad, 1986. IAEA-TECDOC-410 (1987). K. Okamoto (ed.). Contents: 1. White neutron sources (pulsed); 2. Fast neutron fields; 3. Californium-252 prompt fission-neutron spectrum; 4. Monoenergetic sources and filtered beams; 5. 14 MeV neutron sources; 6. Medical applications; etc. - No computerized data files.

Cf-252 neutron spectrum. Evaluation of the californium-252 spontaneous fission neutron spectrum, by W. Mannhart, PTB Braunschweig, FRG, 1986/87.

Summary documentation: IAEA-NDS-98.

Compare also Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, Vienna 1987, p. 163-186.

This data set was also included in the ENDF/B-6 decay data library under MAT 9861.

Neutron cross-section standards for the energy region above 20 MeV.

No recommended data tables available yet. For a status report see report NEANDC-305, Paris 1991 (= proceedings of a meeting in Uppsala, 21-23 May 1991). Not available from IAEA, to be requested from the NEA Data Bank.

The following should be regarded as superseded:

ENDF/B-5 Standards, modification of 1986.

Documentation: a: IAEA-NDS-15, Rev. 2.

b: Standard reference and other important nuclear data by CSEWG, BNL-NCS-51123 (ENDF-300).

c: A.D. Carlson, M.R. Bhat (ed.): ENDF/B-V cross-section measurement standards, BNL-NCS-51619 (ENDF-301).

Note: the ENDF/B-5 standards are superseded by the ENDF/B-6 standards.

1982 INDC/NEANDC Nuclear Standards File:

See handbook IAEA Technical Report No. 227, Nuclear Data Standards for Nuclear Measurements, 97 pages.

7. Thermal neutron cross-sections, resonance-parameters, resonance integrals

ENDF-formatted libraries: Recent values of thermal neutron cross-sections and resonance integrals are in the data libraries BROND-2, CENDL-2, ENDF/B-6, JEF-2, JENDL-3 where, however, these values must be computed, for example with the code series LINEAR, RECENT, INTER. For JENDL-3 these values are tabulated in the report JAERI-M-90-099 pages 461-486. For the JENDL-3 Fission Product Library see the report JAERI-M-92-077 pages 453-488.- Note however, that the new version, JENDL-3.2, contains revised data for many nuclides.

JEF-2.2 INTER. From the JEF-2.2 point-data file tables of important cross-section values have been derived by the code INTER, including all cross-section values for 0.0253 eV, thermal Maxwellian, fission spectrum, 14 MeV, plus resonance-integrals and thermal g-factors. Available on tape or diskette.

JEF Report 14: For the ENDF-formatted data libraries JEF-2.2, ENDF/B-6 (after the 93 update), JENDL-3.2, BROND-2 and CENDL-2, this report lists the following quantities:

- 0.0253 eV cross-sections
- thermal Maxwellian average cross-sections
- resonance-integrals
- fission spectrum average cross-sections
- 14.0 MeV cross-sections.

The report is available from the NEA Data Bank.

Belanova: Handbook on neutron radiative capture cross-sections. T.S. Belanova, A.V. Ignatyuk, A.B. Pashchenko, V.I. Pljaskin. Energoatomizdat Moskva 1986. In Russian. Contents: (1) A table with nuclide, abundance/half-life, thermal cross-section, Westcott g-factor, resonance integral, 30 keV (n, γ) cross-section. (2) Average resonance parameters. (3) Group cross-sections 0-15 MeV for selected nuclides in tabular and graphical form. Available costfree as report INDC(CCP)-262.

Thermal neutron cross-sections and resonance-parameters:

See reports BNL-325 and the books "Neutron Cross-Sections" Academic Press), Vol.1,

Part A for Z = 1-60 (1981)

Part B for Z = 61-105 (1984)

containing thermal neutron cross-sections and resonance parameters. These books are not available from IAEA, and the corresponding data are not available on magnetic tape. Of these books the thermal neutron cross-section and resonance-integral data are available online within the **NUDAT** database which is described in chapter 31 of this document.

Neutron Resonance-Parameters from BNL-325, third edition, 1973. Available on tape in either standard format or edited format.

Description of content and format: IAEA-NDS-28.

UENDL/NAA, USSR Evaluated Nuclear Data Library for Neutron Activation Analysis.

Contains activation cross-sections for thermal neutron capture and absorption reactions, resonance integrals and some other data.

See under "Neutron Activation" for further details.

Gryntakis File 1986: Contains thermal activation cross-sections, resonance-integrals, main gamma-rays, half-lives, for all nuclides: IAEA-NDS-64. See also Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, p. 199-260.

g-factors as function of temperature for non- $1/v$ nuclides see E.M. Gryntakis, J.I. Kim, Radiochimica Acta 22 (1975) 128.

KORT 1981: Thermal neutron cross-sections, resonance- integrals and ν -bar of actinides. See report INDC(CCP)-185.

KORT 1988: Thermal neutron cross-sections and resonance-integrals of elements and isotopes up to 83-Bi-209. See report INDC(CCP)-327.

Neutron Scattering Lengths: L. Koester et al., journal Atomic Data and Nuclear Data Tables 49, 65-120, 1991. Compare in chapter 1 under "Neutron nuclear data, experimental".

8. Thermal neutron scattering law

ENDF/B-6 TSL2. The ENDF/B-6 thermal neutron scattering sublibrary, Release 2, by R.E. MacFarlane, 1995. 12 neutron moderator materials at 8 temperatures.
Summary documentation: IAEA-NDS-197, June 1995. Available online or on computer media.

JEF-2 TSL. The JEF-2 thermal neutron scattering law data library, by J. Keinert and M. Mattes, 1984. 5 neutron moderator materials.
Summary documentation: IAEA-NDS-121 Rev. 1, Sept. 1994

ENDF/B-6 TSL1. The ENDF/B-6 thermal neutron scattering sublibrary, Release 1, by J.U. Koppel and D.H. Houston, 1978. 10 neutron moderator materials. This is the same data library as in ENDF/B-3, but the format was converted to ENDF-6. It may be considered as superseded by Release 2 (see above), but it contains the one or other material that was not included in Release 2.
Summary documentation: IAEA-NDS-97 Rev. 1, Sept. 1990.
Available in ENDF-3 format or ENDF-6 format.

9. Actinides

Evaluated neutron reaction data for actinide nuclides are now included in the major ENDF formatted data libraries

- **BROND-2**
- **CENDL-2**
- **ENDF/B-6**
- **JEF-1**
- **JENDL-3**

See document IAEA-NDS-107 for a joint index to these libraries.

"MASLOV": Evaluated neutron reaction data for several Np, Am, Cm and Pu isotopes, 1994/1996/1997, in ENDF-6 format, by V. Maslov et al., Minsk, Belarus. - Summary documentation: IAEA-NDS-164, Rev. 3 (1998).

WIND and WIND-2: Neutron nuclear data library for isotopes of U, Np, Pu up to 100 MeV, with one file of proton reaction data for U-238 and a file for Pu-239 up to 2 GeV. By A.Ju. Konobejev et al., Obninsk, Russia. Summary documentation: IAEA-NDS-143 Rev. 1.

Theoretical Evaluation of Neutron and Proton Induced Fission Cross Sections for Pb - Pu Targets in Energy Range 20 - 200 MeV, by S. Yavshits, report IAEA-NDS-153 (February 2002). 9 proton induced and 12 neutron induced fission cross sections for nuclei from Pb-204 to Pu-239 have been evaluated in the Multi-Configuration Fission approach. Report and data available on diskette or online at <http://www-nds.iaea.or.at/reports/nds-153.pdf>

Earlier specialized libraries for neutron reaction data of actinides:

ENDF/B-5 Actinides (Rev. 86), summary documentation: IAEA-NDS-13, Rev. 5. Data available

- a) with resonance parameters
- b) resonance parameters replaced by point data

INDL/A-83 IAEA Nuclear Data Library of Actinide neutron data evaluations. Summary documentation: IAEA-NDS-12, Rev. 7. Graphical plots: IAEA-NDS-12, Rev. 7 part 2.

INDL/A Suppl. 86/5: Documentation IAEA-NDS-12 Suppl. 86/5. (Contains five Minsk evaluations (U and Pu isotopes).

These are meanwhile superseded.

For a special file on the Cf-252 spontaneous fission neutron spectrum see under "Standards".

10. Fission product yields

For experimental fission-product yield data see EXFOR; this now includes most of the data compiled earlier in separate files by Crouch and Meek/Rider.

There are three major files for evaluated fission-product yield data for a large number of "fissioning systems", i.e. actinides fissioning by thermal neutrons, fast neutrons, 14 MeV neutrons, or spontaneous fission.

Compilation and evaluation of fission yield nuclear data. Handbook IAEA-TECDOC-1168 (December 2000). Final report of a Co-ordinated Research Project 1991-1996. The appendices contain voluminous tables and also a computer program YCALC for calculating fission yields and are enclosed as a CD-ROM. Limited number of copies available cost-free to scientists from developing countries upon request.

ENDF/B-6 fission-product yield data: this is a separate ENDF/B-6 sublibrary which was released in September 1991 and updated in June 1993 and May 1995. It has two parts: one part for neutron induced fission, another part for spontaneous fission. Available online or on computer media.

Summary: see document IAEA-NDS-106 Rev. 3.

JEF-2/FPY, the JEF-2 fission-product yield data library by the NEA Data Bank, in ENDF-6 format. The evaluated data have been taken over from UKFY2, the UK fission-product yield data library by M. James and R. Mills.

Brief summary: IAEA-NDS-123 Rev. 1. Size: 46 000 records, available on tape. - The original UKFY2 file (see below) contains supplementary information such as chain yields, fractional independent yields, and bibliographic references: Available online or on computer media.

JENDL-3.2/FPY, the JENDL fission-product yield data library, has been compiled by T. Nakagawa in ENDF-6 format. The evaluated data have been taken over from JNDC-FP2, a special format data library (see below) documented in the reports JAERI-M-89-204 (1989) and JAERI-1320 (1990). Available online or on computer media.

The ENDF/B-6 fission-product yield data are largely based on the following:

"BRADY". Fission-product yields and fission-neutron data for minor actinides, by M.C. Brady, R.Q. Wright, T.R. England, 1991. A set of two PC diskettes.

The JEF-2 fission-product yield data are largely based on the following:

UKFY2, the UK Fission-Product Yield Library, version 2, 1991.

Summary see document IAEA-NDS-124.

For some fissioning systems that are not included in above data libraries the following file should be used which has been obtained from a theoretical thermodynamical model:

ASIYAD, fission-product yield library by A.F. Grashin reported at the 1988 Mito Nuclear Data Conference, and converted to ENDF-6 format by the Russian Nuclear Data Center, Obninsk.

Summary see document IAEA-NDS-133.

Chinese evaluated fission product yield library by Wang Dao et al., 1987. Summary see document IAEA-NDS-91.

ENDF/B-5 Fission-Product **Yield** data for 11 fissioning nuclides; latest version received in 1985.

Summary documentation: IAEA-NDS-62.

Additional specialized compilations:

Delayed fission-neutron yield data: see report NEACRP-L-323 (Dec. 1990) J. Blachot, M.C. Brady, A. Filip, R.W. Mills, D.R. Weaver, Status of delayed neutron data 1990. Data file not available on tape.

Review of fission product yields and delayed neutron data for selected actinides. Report NEANDC-300 by R.W. Mills. July 1990.

Importance of delayed neutrons in nuclear research, by S. Das. Report BARC/1993/E-003 (1993) and journal Progress in Nuclear Energy vol. 28 No. 3 (1994) p. 209-264.

11. Fission products - evaluated neutron reactions and decay data

ENDF/B-6 fission-product cross-sections: included in the ENDF/B-6 general purpose file, of which a retrieval for fission-product nuclei can be provided. Mostly identical with the ENDF/B-5 fission products library, but updated with several new evaluations. Available online. Summary see documents IAEA-NDS-100 Rev. 4 and IAEA-NDS-107 Rev. 6.

ENDF/B-6 fission product decay data: this is included in the separate ENDF/B-6 special purpose file for decay data.

JEF-2 fission-product cross-sections: included in the JEF-2 general purpose file, of which a retrieval for fission-product nuclei can be provided. Mostly identical with the ENDF/B-5 fission products library, but updated with several new evaluations. Available online. Summary see documents IAEA-NDS-120 Rev. 2 and IAEA-NDS-107 Rev. 8.

JEF-2 fission product decay data: Summary see document IAEA-NDS-122 Rev.1.

JENDL-3 fission-product cross-sections: Available online. For table of contents see document IAEA-NDS-107 Rev. 6.

JNDC-FP2. The JNDC Nuclear Data Library of Fission Products, second version has been received from the Japanese Nuclear Data Committee in February 1991. The library contains nuclear decay data and fission yield data for 1078 unstable and 149 stable fission product nuclides, and neutron cross-section data for 166 nuclides. The decay data include half-life, branching ratio, and total beta- and gamma-ray energies released per decay of each unstable nuclide. The fission yield data are given for 20 fissioning systems. The data library is in a free format, i.e. not ENDF format. Summary documentation: IAEA-NDS-51 Rev. 3 (March 1991) by O. Schwerer.

Absolute gamma branching ratios for fission-products. A comprehensive compilation by G. Rudstam, Studsvik, Sweden. Report INDC(SWD)-24, Nov. 1993. Data not available on tape.

Beta and gamma spectra of short-lived fission products. By G. Rudstam, P.I. Johansson, O. Tengblad, P. Angaard, J. Eriksen, published in the journal Atomic Data and Nuclear Data Tables 45 (1990) 239-320. Data file not available on magnetic tape.

Delayed-neutron branching ratios of precursors in the fission-product region. By G. Rudstam, K. Aleklett, L. Sihver, published in the journal Atomic Data and Nuclear Data Tables 53 (1993) 1-22. Data file not available on magnetic tape.

The following libraries are old and should no longer be used.

ENDF/B-5 Fission Products Library (Rev. 2), cross-sections and decay data for 877 fission-product nuclides. Two files: EN5.2-FP1, EN5.2-FP2. Summary documentation: IAEA-NDS-25, Rev. 2, with a Supplement sheet (1986). For the 1986-modifications see IAEA-NDS-65. Data are available

- a) with resonance parameters (on tape or on microfiche)
- b) resonance parameters replaced by point data (on tape)

Blachot's Library of fission-product decay data (1978)

Summary documentation: IAEA-NDS-17. For a more recent version see also below under "Nuclear structure and decay data".

Australian fission products, neutron cross-sections 1971 version available as point data and 127 group data, see CINDU-11 p. 49 and CINDU-11 Suppl. 1 p. 18. Revised version of 1979, point data only.

Bologna fission products, neutron cross-sections.

1971 version in UKNDL format: CINDU-11, p. 51

1977 version in ENDF/B format: CINDU-11, Suppl. 1, p. 16

UKFPDD-2, UKNDL fission-product decay data.

Documentation: A. Tobias and B.S.J. Davies, report RD/B/N-4942, Nov. 1980.

UKNDL-81 fission-product cross-sections, retrieved at NDS from UKNDL-81.

RCN-3, fission product cross-sections in KEDAK format, by ECN Petten, 1983. This supersedes most but not all of the previous version RCN-2. Those parts of ECN-2 that are still valid, have been extracted into the library RCN-2*. - Documentation see report IAEA-NDS-67.

Rider library of fission product yields. Most recent version 3B available as microfiche NEDO-12154-3C (1981) (ENDF-322). This contains some additions as compared to the version 3A available on magnetic tape: "Meek-Rider 1980".

BIBFP and BIBGRFP, the Czechoslovakian fission-product library of 1978. Yields, thermal cross-sections and resonance integrals, decay data. Summary documentation: IAEA-NDS-14. Not available on magnetic tape.

12. Neutron induced gamma-rays

Thermal Neutron Capture Gamma Rays, an online database by J.K. Tuli, is available from <http://www-nds.iaea.org.at/wallet/tnc/capgam.shtml>. Energies and intensities can be retrieved by target or by gamma energy. Based on ENSDF and a compilation by M.A. Lone.

Thermal Neutron Capture Data for A=1-25. Report INDC(CPR)-051 (July 2000) by Zhou Chunmei. New evaluation of level properties, prompt gamma rays and decay scheme properties. Available online at <http://www-nds.iaea.org.at/reports/indc-cpr-051.pdf>

Thermal Neutron Capture Data Update and Revision for Some Nuclides with A > 190. Report INDC(CPR)-055 (June 2001) by Zhou Chunmei.

Lone's library of prompt gamma-rays from thermal-neutron capture. It lists for all elements the prompt gamma-ray energies in the range from 23. to 10829. keV, in terms of gamma-rays emitted per 100 neutron radiative captures. File 1 sorted by gamma-ray energies; file 2 sorted by element first and then by gamma-ray energies. The file available contains more information than the original version published in Atomic Data and Nuclear Data Tables vol. 26 p. 511-560 (1981).

Summary documentation: IAEA-NDS-115.

This data library has been included in a PC-diskette attached to the IAEA Technical Report 357: Handbook on Nuclear Data for Borehole Logging and Mineral Analysis (1993).

Tuli's library of thermal-neutron capture gamma-rays. It lists for isotopes heavier than A=44 the prompt gamma-ray energies in the range from 0.1 to 11447. keV, in percent of the strongest gamma-ray of the same isotope. Retrieved from ENSDF in 1988, superseding an earlier version which was published as BNL-NCS-51647 (1983).
Summary documentation: IAEA-NDS-116.

Orphan's library of thermal-neutron capture gammas: A compilation by Gulf General Atomic, San Diego, of "Line and Continuum Gamma-Ray Yields from Thermal-Neutron Capture in 75 Elements". Authors: V.J. Orphan, N.C. Rasmussen. Not available on magnetic tape. Available as microfiches AD 717 639 = GA-10248 (July 1970).

Demidov's handbook

A.M. Demidov, L.I. Govor, Yu.K. Cherepancev, M.R. Akhmed, S. Al-Nadzhar, M.A. Al-Amili, N. Al-Assafi, N. Rammo:

Atlas of gamma-ray spectra from inelastic scattering of reactor fast neutrons. Moscow, Atomizdat 1978. Kurchatov Institute Moscow and Nuclear Research Institute Bagdad. Vol. 1: 3-Li to 42-Mo. Vol. 2: 44-Ru and up. In English, introduction also in Russian. (Had been distributed as INDC(CCP)-120, see <http://www-nds.iaea.org/reports-new/indc-reports/indc-ccp/indc-ccp-0120.pdf>)

Database not available on computer media.

Atlas of energy-angular distributions of photons produced in neutron interactions.

Report Yad. Konst. 1993(2) by A.I. Blokhin et al.

Contents: Brief introduction in Russian. Index to available experimental data. Bibliography. 255 figures of double differential cross-sections for 52 elements. 100 figures of gamma production cross-sections. Limited number of copies available costfree upon request.

13. Neutron activation - general

This chapter includes evaluated data files for neutron activation cross-sections for general use. See also the following chapter for application in dosimetry, and chapter 7 for thermal neutron activation cross-sections.

RNAL- Reference Neutron Activation Library. Evaluated data for 255 important neutron-induced reactions leading to radioactive products, selected from various libraries and reformatted to ENDF-6 format. The full library, individual reactions and comparison plots with experimental data from EXFOR are available online under <http://www-nds.iaea.org/ndspub/rnal/www/> or on CD-ROM.

FENDL/A-2.0, Comprehensive neutron cross section library for 13006 neutron activation reactions with 739 target nuclides from H to Cm in the incident energy range up to 20 MeV. The data are in ENDF format with some modifications. Compared to the previous version FENDL/A-1.1, many nuclides and reactions were added or revised. The evaluations were selected from major activation libraries including EAF-4.1, ADL-3, JENDL/A-3.2 and others. Available online and on CD-ROM. Summary documentation: IAEA-NDS-173. Plots of the FENDL/A-2.0 activation cross sections in comparison with experimental data retrieved from EXFOR are available online from <http://www-nds.iaea.org/fendl2apic/>. Interactive plotting with the ZVView package is provided.

EAF-2 ("European Activation File"). Neutron cross-section data for many thousand reactions. At present not available from IAEA. See J. Kopecky, D. Nierop, Contents of EAF-2. Report ECN-1-91-053 (1991).

ADL-3, Russian Activation Data Library, evaluated neutron activation cross-sections of 20049 excitation functions. Documentation: O.T. Grudzevich, A.V. Zeleneckij, A.V. Ignatyuk, A.B. Pashchenko, Catalogue of ADL-3 library, in: Yadernye Konstanty, issue 1993 (3-4). Copies available costfree. (180 pages of index, self-explanatory, with an introduction in Russian, abstract in English.) Data library available on tape. Summary documentation: IAEA-NDS-137.

Atlas of neutron capture cross sections. J. Kopecky et al.

Report INDC(NDS)-362, 370 pages. Plots of neutron capture cross sections in the energy range 10^{-5} eV - 20 MeV as evaluated and compiled in recent activation libraries, compared with available experimental values at thermal energy, 30 keV and 14.5 MeV, for 739 targets from H and Cm. Report available cost-free. The evaluated cross section data are available in pointwise ENDF-5 format and can be downloaded from the NDS WWW page (<http://www-nds.iaea.or.at>).

LLCRP. Excitation functions of 16 long-lived activation reactions of importance in fusion reactor technology. Available in slightly modified ENDF-5 format on computer media or by FTP file transfer. Summary documentation: INDC(NDS)-344.

UENDL/NAA, USSR Evaluated Nuclear Data Library for Neutron Activation Analysis of 1988, by V.M. Bychkov et al. It contains recommended values for activation cross-sections of 14,5 MeV energy neutrons and neutrons from U-235 and Cf-252 fission; for resonance integrals of capture, absorption and fission reactions; for thermal neutron capture and absorption reaction cross-sections; for effective resonance energy values; for the main gamma-ray energies of neutron capture and for their absolute intensities; for half-lives and abundance for all known nuclides. Available on a set of two low density PC diskettes. Documentation: IAEA-NDS-125 by A.B. Pashchenko.

ACTIV87. Fast Neutron Activation Cross-Section File by V.N. Manokhin, A.B. Pashchenko, V.I. Pljaskin, V.M. Bychkov, V.G. Pronyaev. This library contains evaluated cross-sections for 206 important fast- neutron induced activation reactions in the energy range from threshold up to 20 MeV. This file contains the numerical data of the graphical plots that had been published in the IAEA Handbook on Nuclear Activation Data (K.

Okamoto, ed.), IAEA Technical Report 273 (1987), pp 305-411.

A brief documentation of this data library is given in the report IAEA-NDS-96 (O. Schwerer, ed.).

ENDF/B-5 Activation file, (Rev. 2), neutron activation cross-sections and radioactive decay data for 127 nuclides from 1-H-3 to 96-Cm-242.

Summary documentation: IAEA-NDS-38, Rev. 1

ACTL-82 - LLNL evaluated neutron activation cross-section library of 1982, in **ENDL Transmittal** format.

Summary of contents: IAEA-NDS-55

Summary of format: IAEA-NDS-53

ACTL - LLNL evaluated neutron activation cross-section library 1978, in ENDF/B format.

Evaluation techniques, reaction index and format description by M.A. Gardner and R.J. Howerton, see UCRL-50400, vol. 18 (1978).

RCN-2.CP: Evaluated neutron cross-section library for 13 corrosion products, cover-gas nuclides and other nuclides in the primary cooling circuit of a fast power reactor, by H. Gruppelaar et al., ECN Netherlands, 1982. In KEDAK format.

Summary documentation: IAEA-NDS-68.

In the following, some data compilations are listed which are not available on computer media. See the quoted references.

Kabina file - A file of reference data for multiple-element thermal neutron activation analysis.

L.P. Kabina et al. (Leningrad), INDC(CCP)-216, Dec. 1983. Hard copy only, not on tape. (Based on decay data from ENSDF and thermal (n,gamma) cross-sections from BNL handbooks.)

14-MeV neutron activation cross-sections, see report ANL/NDM-89 (April 1985).

Data for 14-MeV neutron activation analysis, Z. B'dy, J. Csikai. -

See Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, Vienna 1987, p. 261-304.

Index of neutron-induced gamma-production data in ENDF-formatted files,

see report INDC(NDS)-189 by O. Schwerer, H.D. Lemmel (March 1987).

14-MeV neutron activation analysis, sensitivities and interferences,

see R. Pepelnik, J. of Radioanal. and Nucl. Chem. 112 (1987) 435.

14. Neutron activation - for dosimetry

IRDF-90, the International Reactor Dosimetry File, version 2 of Oct. 1993. Summary documentation: IAEA-NDS-141, Rev. 3. This includes internationally recommended cross-sections with covariance data for a selected set of activation reactions used for reactor neutron dosimetry by foil activation. About half of the reactions has been taken over from ENDF/B-6; the other half are original evaluations prepared for IRDF-90. Available online or on PC diskettes.

For an introduction see the textbook "Nuclear Data Guide for Reactor Neutron Metrology", by J.H. Baard, W.L. Zijp, H.J. Nolthenius, Kluwer Academic Publishers (1989). - Not available from IAEA.

For a survey of a number of properties of IRDF-90 data (first version of 1990) see the report ECN-I-91-004 by E.M. Zsolnay and H.J. Nolthenius.

For the processing of covariance data see, e.g., Sz. Czifrus: "Processing of ENDF-6 format resonance region covariance data using a new algorithm" in journal Kerntechnik 60 (1995) 4 p.152-156.

NMF-90, Neutron Metrology File, an integrated database for performing neutron spectrum adjustment calculations.

Documented in the reports IAEA-NDS-171 and INDC(NDS)-347 by N.P. Kocherov. It contains the IRDF database, together with 4 different adjustment codes, 6 data sets for reactor benchmark neutron fields, and utility codes for processing and plotting the input and output data. The package consists of 9 PC HD diskettes and code manuals. 10 Mb of disk space is required. Also available for downloading online.

Neutron Excitation Function Guide for Reactor Dosimetry, by O. Gritzay, M. Vlasov, L. Chervonna, V. Zerkov, N. Klimova, G. Kolota (January 2002). Intercomparison of 81 dosimetry reactions for 56 nuclides. Available on CD-ROM or online at <http://www-nds.iaea.or.at/reports/indc-ukr-005.pdf>

RRDF-98. Russian Reactor Dosimetry File. Cross sections and uncertainties for 22 reactions used for neutron flux dosimetry by foil activation. By K.I. Zolotarev, A.V. Ignatyuk, V.N. Manokhin, and A.B. Pashchenko. Summary documentation: IAEA-NDS-193 (March 1999). Data and documentation available online from <http://www-nds.iaea.or.at/reports/nds-193.htm>

ENDF/B-6 Dosimetry File: Partly superseded by IRDF-90. Not maintained as a separate data library; see the general ENDF/B-6 Library, documented in IAEA-NDS-100.

JENDL Dosimetry File 99 (JENDL/D-99). Available on CD-ROM. Data for 67 dosimetry reactions in pointwise and 641 group structure form. Figures in PDF format. Summary documentation: IAEA-NDS-140.

PRONDOS. Evaluations of selected neutron activation reactions for dosimetry by V.G. Pronyaev et al. 1988/89. Summary in document IAEA-NDS-142.

Other dosimetry reaction files may be included in the "General purpose evaluated neutron nuclear data".

The following should be regarded as superseded by more recent files:

IRDF-85, the International Reactor Dosimetry File. Summary documentation: IAEA-NDS-41, Rev. 1. This includes 640-group data derived from ENDF/B-5 Dosimetry File Rev. 2, ENDF/B-5 Gas Production File Rev. 2, some

evaluations from INDL/V, two radiation damage files for iron, and 10 benchmark neutron spectra. Available also as cross-sections without resonance-parameters. The cross-section data are superseded by IRDF-90. The benchmark neutron spectra remain of interest.

ENDF/B-5 Dosimetry File: Rev. 2 (1984). Also available as 620 group data. Summary documentation: IAEA-NDS-24, Rev. 2

DOSCROS84, dosimetry cross-sections by ECN Netherlands, in 640 group structure. Documentation by W.L. Zijp et al. in ECN-160. This data file is referred to in the book by J.H. Baard, W.L. Zijp, H.P. Nolthenius: "Nuclear Data Guide for Reactor Neutron Metrology"; Kluwer Academic Publishers, 1989. Whereas the book continues to be useful, many of the numerical data included should be replaced by more recent data such as IRDF-90.

BOSPOR-78 and **BOSPOR-80** threshold neutron reactions by F.E.I. Obninsk. These data were compiled by the IAEA Nuclear Data Section into ENDF/B-5 format. They are included in INDL/V (see above under item 4).

UKNDL-81 Dosimetry File: This was extracted by NDS from UKNDL-81. UKNDL format plus one additional character to allow for four digit DFN numbers.

DETAN74. Based on files by W.N. McElroy from HEDL (USA), prepared by A. Fabry from CEN/SCK Mol (Belgium), documented by H.C. Rieffe and H.J. Nolthenius from ECN Petten (Netherlands) in Report RCN-75-139, Oct. 1975.

15. Miscellaneous specialized neutron data libraries

INGDB-90: The international neutron nuclear database for geophysics applications. It contains selected neutron cross-section data, spectrum data of selected neutron sources, and the cross-section data processing codes LINEAR and GROUPIE.

Assembled by N.P. Kocherov and P.K. McLaughlin.

Summary see document IAEA-NDS-127.

The full information see N.P. Kocherov, IAEA Technical Report 357: Handbook on Nuclear Data for Borehole Logging and Mineral Analysis (1993).

SGNucDat, Version 2. Safeguards Nuclear Data for Windows. Contains the data of report INDC(NDS)-376 (1997). A: Actinide nuclear data (decay data, selected neutron cross-section data, fission-neutron data); B: fission-product nuclear data (decay data and selected neutron cross-section data); C: fission-product yield data. PC code by G. Pospischil. Data compiled by M. Lammer, O. Schwerer and N.P. Kocherov, documented in report IAEA-NDS-248, Rev. 1 (1997). Available online at <http://www-nds.iaea.or.at/sgnucdat/sgnuc.html>

Atlas of Neutron Capture Cross Sections. J. Kopecky et al. Report INDC(NDS)-362, 370 pages. Plots of neutron capture cross sections in the energy range 10^{-5} eV - 20 MeV as evaluated and compiled in recent activation libraries, compared with available experimental values at thermal energy, 30 keV and 14.5 MeV, for 739 targets from H to Cm. Report available cost-free. The evaluated cross section data are available in pointwise ENDF-5 format and can be downloaded from the NDS WWW page (<http://www-nds.iaea.org/ngatlas/main.htm>).

JENDL-3 Sublibrary for Gas Production by T. Nakagawa and T. Narita. Contains neutron-induced hydrogen and helium production cross-sections for elements from 3-Li to 41-Nb.

Summary documentation: IAEA-NDS-139

ENDF/B-5 Gas Production File, (Rev. 2). Neutron cross-sections for gas production for 18 elements or isotopes from 5-B-11 to 29-Cu. Summary documentation: IAEA-NDS-42, Rev. 1.

Data available on magnetic tape.

DAMSIG84 - Radiation damage cross sections by ECN Netherlands in 640 group structure. Documentation by W.L. Zijp et al. in ECN-159

Californium-252 spectrum averaged neutron cross-sections, W. Mannhart - See Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, Vienna 1987, p. 413-440.

Reaction cross-sections induced by 14.5 MeV neutrons and by Cf-252 and U-235 fission spectrum neutrons. Data tables by A.B. Pashchenko. Data considered up to the end of 1989. Report INDC(CCP)-323, English translation of the Russian report FEI-236. Compared to the Russian original, in the English translation a few numbers were updated by the author. Note a misprint: In the data tables, the column heading "14 MeV" should read "14.5 MeV". See <http://www-nds.iaea.org/reports-new/indc-reports/indc-ccp/indc-ccp-0323.pdf>

Brenner/Prael: Nonelastic interactions of neutrons between 15 and 60 MeV with carbon and oxygen, calculated differential secondary- particle production cross-sections, by D.J. Brenner and R.E. Prael. - Not available on tape. See Atomic Data and Nuclear Data Tables, vol. 41 nr.1 p.71-130 (Jan. 1989).

Neutron capture reaction rates at 30 keV, tabulation of calculated values for about 4000 nuclides. See the journal Physics Reports vol. 208 (1991) p. 267-394, J.J. Cowan et al., the r-process and nucleochronology. Data tabulation on tape available from authors, but not available from IAEA-NDS. - Note that the data were derived from theory and that they were not computed from available nuclear data libraries.

Neutron scattering lengths: see chapter 1, experimental neutron data.

21. Photonuclear data

IAEA Photonuclear Data Library (March 2000), contains recommended evaluated photonuclear cross section data for 164 isotopes for incident photon energies mostly up to 140 MeV. Handbook available as IAEA-TECDOC-1178. Data available online and on CD-ROM.

EXFOR, see documentation above under item 1. The EXFOR file contains in particular photo-neutron data (Berman Library) and selected other photonuclear data. At present, compilation continues primarily at the Photonuclear Data Center in Moscow. Selective retrievals available online, complete library on CD-ROM. Photoneutron and photofission data are indexed in CINDA.

Berman library of photoneutron cross-sections with monoenergetic photons. Included in EXFOR with accession-numbers starting from L0001. For the 1976 version see the report UCRL-78482, B.L. Berman, Atlas of photoneutron cross-sections obtained with monoenergetic photons. Also available as microfiche. For the 1988 version see S.S. Dietrich, B.L. Berman: Atlas of photoneutron cross-sections obtained with monoenergetic photons. See journal Atomic Data and Nuclear Data Tables, vol. 38 p. 199-338 (1988).

GDR - Giant dipole resonance-parameters for gamma-rays. A PC diskette by the Chinese Nuclear Data Center ("CENDL.GDR"), Su Zongdi et al., based on data by S.S. Dietrich and B.L. Berman, ADNDT 38 199 (1988).
Summary documentation by A.B. Pashchenko, see IAEA-NDS-145 Rev. 1
Compare under "CENPL" on p. 27 of this document.

An **atlas** of selected experimental data from EXFOR and evaluated data of **photoneutron and photofission cross-sections** has been prepared by A.I. Blokhin and S.M. Nasyrova (Obninsk).
Available as report INDC(CCP)-337 (1991).

Photonuclear cross-sections, B. Forkman, R. Petersson. - See Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, Vienna 1987, p. 631-811.

NBSIR 83-2742: Photonuclear Data-Abstract Sheets, 15 volumes (1983-1986), by E.G. Fuller and H. Gerstenberg, US National Bureau of Standards. Includes reproductions of graphs and tables from various publications (1955-1982).
The data scope includes photonuclear data, electron scattering and some ground-state particle capture reactions, e.g. (α, γ). The energy range covered is 0 to 150 MeV, but various data up to 4 GeV were also included. Data not available on magnetic tape.
The Nuclear Data Section has no spare copies of this report series but could provide upon request photocopies for selected reactions.

BOFOD, Russian evaluated photo-neutron data library, by A.I. Blokhin, N.N. Buleeva, S.M. Nasyrova, O.A. Pakhomova, S.V. Zbrodskaja, A.M. Cibulja. A detailed description of this data library, with tables and curves, is given in the journal Yadernye Konstanty 1992 (3-4) p. 3-54. Copies available, costfree. (5 pages of introductory text in Russian with an English abstract; the captions to tables and figures are self-explanatory.)

22. Photo-atomic interaction data

EPDL-97 The Evaluated Photon Data Library, 1997 version (EPDL97), is designed for use in photon transport calculations at Lawrence Livermore National Laboratory. This library includes photon interaction data for all elements with atomic number between $Z = 1$ (hydrogen) and 100 (fermium), including: photoionization, photoexcitation, coherent and incoherent scattering, and pair and triplet production cross sections. For use in applications data is provided for all elements over the energy range 1 eV to 100 GeV. EPDL97 completely supersedes the earlier 1989 version of EPDL(89) (see IAEA-NDS-158, Summary documentation to the EPDL) and it is highly recommended that users only use the most recent version of this library. The Evaluated Atomic Data Library (**EADL**), Evaluated Electron Data Library (**EEDL**) and Evaluated Excitation Data Library (**EXDL**) are included to allow consistent coupled photon-electron transport calculations. The data package is available from the IAEA Nuclear Data Section on CD-ROM (12 files, 74.2 MB). Summary documentation: IAEA-NDS-196 (August 1998).

ENDF/B-6 Photo-atomic Interaction Data "EN6-PHOTO". This is essentially identical to EPDL mentioned above. The main differences are: This library is in ENDF-6 format (EPDL has its own format). The energy range is from 10 eV to 100 MeV (EPDL goes up to 100 GeV). Available online or on computer media. For a summary description see the document IAEA-NDS-58 Rev. 3. In NDIS it is available online under the keyword XRAY. Selected materials from this library have been included in FENDL, the evaluated nuclear data library for fusion applications, see document IAEA-NDS-128.

JEF-2/Photo, the JEF-2 photo-atomic interaction data library containing pair production cross-sections, photoelectric cross-sections, coherent scattering cross-sections, atomic form factors, and other data for all elements from $Z=1$ to 100. It is based on the Livermore EPDL file and on the ENDF/B-6 Photo-Atomic data file. Compared to ENDF/B-6, the photo-electric cross-section data have been updated in 1990. - 260 000 records. Summary documentation: IAEA-NDS-58 Rev. 4. - Available online and on computer media.

X-ray fluorescence cross-sections. Tabulated calculated XRF cross-sections for K-shell X-rays for elements $Z=13$ to 92 and L-shell X-rays for $Z=35$ to 92, in the energy range from 1 to 200 keV. S. Puri et al. (Punjab University, India), in Atomic Data and Nuclear Data Tables 61, 289-311 (1995).

XMuDAt: Photon attenuation data on PC by R. Nowotny (August 1998). Computer program and data for use with Windows for calculation and presentation of mass attenuation, mass energy transfer and mass energy absorption coefficients in a photon energy range of 1 keV to 50 MeV for materials, their mixtures and compounds. For summary see report IAEA-NDS-195. The file XMuDAt.zip can be downloaded via a hyperlink from <http://www-nds.iaea.org/reports/nds-195.htm>

XCOM: Photon-cross-sections for scattering, photoelectric absorption and pair production, as well as total attenuation coefficients, in any element, compound or mixture, at energies from 1 keV to 100 GeV, on a set of two diskettes, by M.J. Berger and J.H. Hubbell, NBS Washington. Summary documentation see IAEA-NDS-89. Full report see M.J. Berger, J.H. Hubbell, XCOM: Photon cross-sections on a personal computer, NIST report - NBSIR 87-3597 (1987).

X-ray interactions. Photoabsorption, scattering, transmission, and reflection of x-rays in the energy-range 50 eV - 30 keV for all elements $Z = 1-92$. A data handbook with a textbook-similar introduction by B.L. Henke, E.M. Gullikson, J.C. Davis, Berkeley, published as vol. 54/2 of the journal Atomic Data and Nuclear Data Tables (1993).

Old data files that should be considered as superseded:

RSIC Photo-Atomic Interaction Library of 1983. This is the same as the ENDF/B-5 photon interaction library and the JEF-1 photon interaction library. Both are available from NDS in ENDF-5 format. Summary see document IAEA-NDS-58 Rev. 2. These should be superseded by the ENDF-6 version mentioned above, but may still be preferable to users not yet familiar with the ENDF-6 format.

X-ray cross-sections: For an old compilation see the report UCRL-50174 of 1969 (set of microfiches in the IAEA Library, copies available upon request). Authors are W.H. McMaster et al. from Livermore and J.H. Hubbell from the National Bureau of Standards.

ENDF/B-4 Photon-interaction library (1977). This was taken from Livermore and should be similar to the following:

ENDL photon-interaction cross-sections (1977)

Summary documentation: IAEA-NDS-58

Full tabulation and graphs: UCRL-50.400 Vol. 6 Rev. 2 (1978)

Superseded by EPDL, see above.

23. Charged-particle nuclear reaction data

See also Chapters 24 (Intermediate energy nuclear data) and 25 (Nuclear data for thermonuclear fusion)

EXFOR, compilation of experimental and evaluated nuclear reaction data induced by charged particles and heavy ions. Retrievals online (WWW or Telnet), complete database available on CD-ROM. Less complete than the neutron-induced reaction data in EXFOR. Special emphasis on: Integral cross-sections and thick target yields; Neutron source reactions; and miscellaneous other data, e.g. differential data, data for biomedical applications, and charged-particle induced fission data. See Chapter 1 for more information on EXFOR.

Charged-particle cross section database for medical radioisotope production (March 2000), developed under an IAEA Co-ordinated Research Project, contains recommended evaluated cross sections for 48 reactions induced by light charged particles with incident energies up to several tens of MeV (maximum 100MeV). Available online (WWW) and on CD-ROM, and as IAEA-TECDOC-1211.

NRDF, the Nuclear Reaction Data File of the Japan Charged-Particle Nuclear Reaction Data Group at the Hokkaido University, contains mainly differential charged-particle and heavy-ion induced reaction data measured in Japan. Some of this database has been converted and included in EXFOR, more conversions are under preparation. See M. Chiba et al, "A database translator of nuclear reaction data for international data exchange", in Journal of Information Science 12 (1986) p. 152-165.

FENDL/C-2.0: See Chapter 26.

Charged-particle induced neutron source reactions, see next chapter on "Nuclear data for thermonuclear fusion".

ENDF/B-6 charged-particle sublibraries, April 2000 version, contains cross sections for incident protons, deuterons and tritons, including fusion reactions between d,t, and He3 particles. Available online and on CD-ROM. Documentation see IAEA-NDS-105.

ENDF/B-6 High Energy Data File (1990): contains proton (and neutron) reaction data up to 1 GeV for 6-C-12, 26-Fe-56, 82-Pb-208, 93-Bi-209. See IAEA-NDS-113 Rev. 2.

DRSG-2000 (Monoenergetic neutron source reactions): see Chapter 25

NRABASE 2.0. Differential charged-particle cross sections for Ion Beam Analysis. Experimental data compiled in tabular and graphical form by A. Gurbich, Obninsk, Russia, under a contract with the IAEA Physics Section. PC database with display software.
Summary documentation: IAEA-NDS-201 (March 1997).

NNDC Evaluated Charged Particle Reaction Data Library, (1975). Selected p, d, and α induced reactions calculated for target nuclei with Z from 21 to 83, in an ENDF/B similar format.
Documentation of format and contents: IAEA-NDS-59, Rev. 1

Proton beam monitors, evaluated cross-sections. Report INDC(CCP)-330 by V.A. Vukolov and F.E. Chukreev.

Monitor reactions for radioisotope production, a status report on cross-sections. Report INDC(NDS)-218, Dec. 1989, by O. Schwerer and K. Okamoto.

Production of I-123, Xe-123 and Cs-123, a compilation of excitation functions for the production of radionuclides by charged-particle induced reactions. Report

INDC(JPN)-144, Oct. 1990, by A. Hashizume, Y. Tendow, K. Kitao.

TLAPrfl: Package for Calculation of Depth Profile for Thin Layer Activation, by G. Wallace. The package for Windows or DOS is available on diskette or online. For summary see IAEA-NDS-192 (September 1999)

Stopping power data: ESTAR, PSTAR, ASTAR, a PC package for calculating stopping powers and ranges of electrons, protons and helium ions in various materials, by M.J. Berger, NIST, Washington. Available on 2 diskettes (compressed); documentation see IAEA-NDS-144. For protons and alpha particles this work has been described in ICRU-report-49 which also contains tabulated data.

Stopping power data: POTAUS, a PC code for calculating the stopping power and range data of various beams in various materials, by F.E. Chukreev, CAJaD, Moscow. The code is based on P.G. Steward, report UCRL-18127 (1968). Available on diskette; documentation see IAEA-NDS-146.

Neutron yields from alpha-particle induced reactions on Li, Be, B, C, O, F up to 10 MeV. Tables of recommended data see report INDC(CCP)-331 by V.A. Vukolov and F.E. Chukreev.

PNESD - Proton Nucleus Elastic Scattering Data by H. Leeb (1978).
Summary documentation: IAEA-NDS-22

Handbook: K.A. Keller, J. Lange and H. Mhnzel; Excitation Functions for Charged-Particle induced Nuclear Reactions. Landolt-B'rnstein Series Group I, Vol. 5b, Springer Verlag, Berlin (1973) pp. 1-493.
These data are not available in a computerized form.

Charged-particle activation cross-sections and thick target yields. See Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, Vienna 1987, p. 441-630.

Thick Target Yields: Yield of radionuclides from proton, deuteron, alpha-particle and He-3 reactions. P.P. Dimitriev (Energoatomizdat, Moscow 1986). English translation: report INDC(CCP)-263, costfree.
Data not available on magnetic tape.

CPX, experimental charged-particle reaction data compiled in 1962/67 by McGowan et al. This library (excepting the differential data) was checked by Kachapag against publications, doubtful and superseded data were deleted. The resulting file as published in Physik-Daten/Physics-Data 15-5 was included in EXFOR (accession-numbers starting with P...).

ECPL-86 - the LLNL evaluated charged-particle data library, for 14 target isotopes from 1-H-1 to 8-O-16, in ENDL Transmittal format.
Summary of contents: IAEA-NDS-56
Summary of format: IAEA-NDS-53

24. Intermediate energy nuclear data

a. Reactions induced by neutrons

MENDL-2, the Russian cross-section data library for transmutation and activation of materials irradiated by neutrons with energies up to 100 MeV. Yu.N. Shubin et al., report INDC(CCP)-385. - Available on tape from the IAEA Nuclear Data Section. Summary documentation: IAEA-NDS-136.

WIND and WIND-2: Neutron nuclear data library for isotopes of U, Np, Pu up to 100 MeV, with one file of proton reaction data for U-238 and a file for Pu-239 up to 2 GeV. By A.Ju. Konobejev et al., Obninsk, Russia. Summary documentation: IAEA-NDS-143 Rev. 1.

BISERM v.2: Nuclear Data Library for Evaluation of Radiation Effects in Materials Induced by Neutrons of Intermediate Energies. By Yu.A. Korovin et al., Obninsk, Russia. The library contains neutron displacement cross sections as well as hydrogen and helium production cross sections for 259 stable nuclei from Al-27 to Bi-209 at neutron energies up to 1 GeV. The data are in slightly modified ENDF-6 format. Available on PC diskette. Summary documentation: IAEA-NDS-203 (March 1997).

b. Reactions induced by neutrons and charged particles

Theoretical Evaluation of Neutron and Proton Induced Fission Cross Sections for Pb - Pu Targets in Energy Range 20 - 200 MeV, by S. Yavshits, report IAEA-NDS-153 (February 2002). 9 proton induced and 12 neutron induced fission cross sections for nuclei from Pb-204 to Pu-239 have been evaluated in the Multi-Configuration Fission approach. Report and data available on diskette or online at <http://www-nds.iaea.or.at/reports/nds-153.pdf>

ENDF/B-6 High Energy Data File (1990/1993): contains four sets of neutron and proton reaction data up to 1 GeV for 26-Fe-56 (1990) and 6-C-12, 82-Pb-208, 93-Bi-209 (1993). See IAEA-NDS-113 Rev. 1.

EXFOR: Includes experimental data for reactions induced by intermediate-energy neutrons and charged particles, though the compilation does not claim completeness. Retrievals to be requested from the data centers. These data are included in the NDIS Online System.

np and pp cross-sections up to 350 MeV, internationally recommended standard reference data. The data can be obtained from VL40, an energy-dependent partial-wave representation which can be accessed on-line through TELNET. See report NEANDC-311 (1992), the 1991 NEANDC/INDC Nuclear Standards File, p. 17.

c. Charged-particle induced reactions

WIND: The WIND library for neutron reaction data (see above), includes one file of proton reaction data for U-238.

MENDL-2P. Proton reaction data library for nuclear activation by Yu.N. Shubin et al., Obninsk, Russia. This library includes calculated proton cross-sections in ENDF-6 format for 505 nuclei (Z=13-84) for energies up to 200 MeV. The total number of reactions is 87196. Available on a set of PC-diskettes (compressed), on CD-ROM or by FTP. Summary documentation: IAEA-NDS-204.

Levkovski. Handbook by V.N. Levkovski: Cross-sections of medium mass nuclide activation ($A=40-100$) by medium energy protons and alfa particles ($E=10-50$ MeV). Moskva 1991. The book is in Russian. An English language abstract and table of contents is attached. The many tables and graphs are understandable without knowledge of Russian. - The book contains the experimental results of activation cross-sections for more than 500 nuclear reactions. The data have been measured on the cyclotron of the Nuclear Physics Institute of the Academy of Sciences of Kazakhstan. Most of them have not yet been published elsewhere. - The book can be obtained from Dmitri Levkovski, Russia, 140012, Moscow region, Lubertsy, 1-Pankovski proezd 1-2-17, Tel. (095)554-4789, e-mail Internet dima@misis,msk,su. The cross-section data from this book have been compiled in EXFOR by F.E. Chukreev, Nuclear Data Center of the Moscow Kurchatov Institute, and are included in the NDIS Online System as part of EXFOR. See the EXFOR entry number A0510 with 542 subentries.

Carlson compilation. Proton-nucleus total reaction cross-sections and total cross-sections up to 1 GeV. Tables of all directly measured data. By R.F. Carlson, Univ. of Redlands, California. Published in Atomic Data and Nucl. Data Tables 63 (1996) p. 93-116.
Not available as a computer file.

d. Literature:

Report INDC(NDS)-245 (1991). Intermediate energy nuclear data for applications. Proceedings of an IAEA meeting, 9-12 Oct. 1990. N.P. Kocherov (ed.)

Report JAERI-M-92-39. Proceedings of a JAERI meeting in high energy nuclear data, 3-4 Oct. 1991. T. Fukahori (ed.)

Report NEA/NSC/DOC(93)-6 (1993). Requirements for an Evaluated Nuclear Data File for Accelerator-Based Transmutation. A.J. Koning.

Report HEDL-TME-81-37 (1982). F.M. Mann, Transmutation of alloys in the MFE facilities as calculated by REAC (a computer system for activation and transmutation).

Production of Radionuclides at Intermediate Energies, H. Schopper (ed.), handbooks published in the Landolt-Börnstein series by Springer-Verlag, Heidelberg, Germany. (Not available from IAEA.)

- protons on targets He to Br: vol. I/13 a (1991)
- protons on targets Kr to Te: vol. I/13 b (1992)
- protons on targets I to Am: vol. I/13 c (1993)
- protons on misc. targets (Suppl.): vol. I/13 d (1994)
- pions and antiprotons on nuclei: vol. I/13 e (1994)
- deuterons, tritons, He-3 nuclei on nuclei: vol. I/13 f (1995)

25. Nuclear data for thermonuclear fusion

ENDF/B-6 charged-particle sublibraries, April 2000 version, contains cross sections for incident protons, deuterons and tritons, including fusion reactions between d,t, and He3 particles. Available online and on CD-ROM. Documentation see IAEA-NDS-105.

FENDL/C-2.0, (March 1997). Integrated cross section evaluations and processed data for the fusion reactions H-2 (d,n)He-3, H-2(d,p)H-3, He-3(d,p)He-4, H-3(t,2n)He-4, and H-3(d,n)He-4, in ENDF-6 format. The data for the first four reactions are extracted from ENDF/B-6 (unchanged from previous version FENDL/C-1.0), while the data for the H-3(d,n)H-4 reaction were replaced with an improved evaluation by G.M. Hale and M. Drosog. Available on magnetic tape or by FTP file transfer. Summary documentation: IAEA-NDS-177.

SaBa: Library of Evaluated and Experimental Data on Charged Particles for Fusion Applications, contains data for 52 reactions with a set of data processing procedures. See Report IAEA-NDS-191 by A.G. Zvenigorodskij et al. (December 1999)

DROSG-2000. Monoenergetic neutron source reactions, by M. Drosog, University of Vienna. The diskette database, previously known as DROSG-87 and DROSG-96, was extended significantly and contains now 56 reactions and various new features. The package contains the basic data and several FORTRAN programs for calculation of neutron yields, and white source properties. A detailed documentation is included. The database with programs (in compressed form) is also available online from <http://www-nds.iaea.org/drosg2000.html>

GRAZ-87. A data library for evaluated nuclear reaction cross-sections and reaction rates for charged-particle reactions with light isotopes ($Z=1$ to 5), with related computer codes, by R. Feldbacher, INDC(AUS)-12, 1987. Documentation of the tape see IAEA-NDS-86.

Nuclear physics constants for thermonuclear fusion, a reference handbook by S.N. Abramovich, B.Ya. Guzhovskij, V.A. Zherebtsov, A.G. Zvenigorodskij. The Russian original by Atominform can be obtained from the Collection Laboratory, P.O. Box 971, Moscow, USSR-127434. An English translation by A. Lorenz is available as report INDC(CCP)-326. This handbook contains tabular cross-section data for all relevant interactions of p, d, t, He3 and α particles on the light nuclei from 1-H-1 to 4-Be-9.

26. Nuclear data selected for fusion programs

FENDL-2. Several nuclear data files have been released and processed for the ITER fusion programme:

FENDL/A-2.0 Processed Files. (FENDL2/A-MCNP, FENDL2/A-VITJ_E, FENDL2/A-VITJ_FLAT). Pointwise cross sections (any resonance parameters contained in the original data files were converted to cross sections) for 13006 activation reactions for 739 target nuclides (including metastable states), processed for use with the Monte Carlo neutron/photon transport code MCNP, and as VITAMIN-J 175 multigroup data weighted with the VITAMIN-E neutron weighting spectrum and with a constant (flat) weighting spectrum. Available online and on CD-ROM.
Summary documentation: IAEA-NDS-174 (March 1997).

FENDL/C-2.0, (March 1997). Integrated cross section evaluations and processed data for the fusion reactions H-2 (d,n)He-3, H-2(d,p)H-3, He-3(d,p)He-4, H-3(t,2n)He-4, and H-3(d,n)He-4, in ENDF-6 format. The data for the first four reactions are extracted from ENDF/B-6 (unchanged from previous version FENDL/C-1.0), while the data for the H-3(d,n)H-4 reaction were replaced with an improved evaluation by G.M. Hale and M. Drosig. Available online and on CD-ROM.
Summary documentation: IAEA-NDS-177.

FENDL/D-2.0. Decay properties (decay type, decay energy, half-life) for 1867 nuclides and isomers, taken from the EAF-4.1 decay library. The data, in ENDF-6 format as well as processed into MNCNP and REAC-compatible formats, are available online and on CD-ROM. Summary documentation: IAEA-NDS-178 (March 1997).

FENDL/E-2.0: Selected evaluated neutron, photon interaction and photon production cross sections in ENDF format. See Chapter 4.

EFF. Several neutron nuclear data files have been selected for the European Fusion Programme: see chapter 4.

Superseded:

INDL/F-83 - evaluated neutron reaction data library for INTOR fusion calculations, containing evaluations selected from ENDF/B-4, ENDF/B-5, ENDF-78. Two formats, either with resonance parameters, or as RECENT output. Summary documentation, IAEA-NDS-57

27. Nuclear model parameters

RIPL - Reference Input Parameter Library for theoretical calculations of nuclear reactions. Contains: Atomic Masses and Deformations; Discrete Level Schemes; Average Neutron Resonance Parameters; Optical Model Parameters; Level Densities (Total, Fission, Partial); Gamma-Ray Strength Functions; Continuum Angular Distributions. Incident and outgoing particles can be n, p, d, t, 3-He, 4-He, and gamma with energies up to about 100 MeV. Developed as a project co-ordinated by IAEA. Available online and on CD-ROM. A detailed description is given in IAEA-TECDOC-1034 (1998).

EVLDF - "Evaluation data file", for storing basic data on nuclei, level scheme, deformation parameters, level density parameters and optical model parameters, by T. Fukahori and T. Nakagawa.

Not available at IAEA. See report INDC(NDS)-335 p. 7. - Format description by T. Nakagawa see report INDC(NDS)-335 p. 21.

CENPL - "Chinese evaluated nuclear parameter library". Six sublibraries for

- masses and ground state constants
- discrete level schemes and gamma branching ratios
- level densities
- giant dipole resonance parameters for gamma strength functions (see "GDR" on p. 21 of this document)
- fission barrier parameters
- optical model parameters.

Not available at IAEA (except for "GDR"). Description by Su Zongdi et al. see report INDC(NDS)-335 p. 47-95, and Chin. J. of Nucl. Phys. 17(3) p.271-276.

Table of Nuclear Root Mean Square Charge Radii (June 1999) by I. Angeli.. The tables and a brief summary of the data evaluation are given in IAEA-NDS-163 (also available online under <http://www-nds.iaea.org/reports/nds-163.pdf>), the full report in INDC(HUN)-033 (September 1999).

Nuclear Charge Radii, see also: journal "Atomic Data and Nuclear Data Tables" vol. 60 Number 2, July 1995.

28. Nuclear model codes

In general requests for nuclear model computer codes should be addressed to the NEA Data Bank, Le Seine Saint-Germain, 12 blvd des Iles, F-92130 Issy-les-Moulineaux, France.

Mentioned here are only some codes which were converted for use on a personal computer at the IAEA Nuclear Data Section, or which were produced or updated in connection with an IAEA research contract or IAEA coordinated research project.

ALICE-87 (Livermore), precompound nuclear model code. Documentation for PC see IAEA-NDS-93.

Note that ALICE-91 now exists which should be requested from the NEA Data Bank.

EMPIRE-II, Modular System of Codes for Nuclear Reaction Calculations (co-ordinated by M. Herman, IAEA). EMPIRE-II is a system of FORTRAN codes linked through a number of bash scripts that with a few key strokes and mouse clicks performs comprehensive calculations of nuclear reactions using combination of the most important reaction mechanisms. Available on CD-ROM or online at <http://www-nds.iaea.or.at/empire/>

ICAR (Bologna), code for combinatorial calculations of level densities. Documentation for PC see IAEA-NDS-94.

SCAT2 (Bruyères-le-Châtel), optical nuclear model code. Documentation for PC see IAEA-NDS-99.

STAPRE (Vienna), statistical pre-equilibrium code. Documentation for PC see IAEA-NDS-99.

PEGAS (Bratislava), PC version of a highly sophisticated pre-equilibrium code based on the unified model of nuclear reactions, by E. Beták and P. Obložinský.
See report INDC(SLK)-1.

PEQAG (Bratislava), PC version of a fully pre-equilibrium computer code with gamma-emission, by E. Beták.
See report INDC(CSR)-16.

31. Nuclear structure and decay data

FENDL/D-2.0. Decay properties (decay type, decay energy, half-life) for 1867 nuclides and isomers, taken from the EAF-4.1 decay library. The data, in ENDF-6 format as well as processed into MNCNP and REAC-compatible formats, are available online and on CD-ROM.

Summary documentation: IAEA-NDS-178 (March 1997).

ENSDF, evaluated nuclear structure and decay data file available online or on magnetic tape. Published in the journal "Nuclear Data Sheets". For a summary of its philosophy, content and uses see document IAEA-NDS-104. For the network of cooperating data centers in this field see report INDC(NDS)-296 (1993). A Manual for Preparation of Data Sets see J.K. Tuli, The evaluated nuclear structure data file (ENSDF), report BNL-NCS-51655 Rev. 87 (April 1987). Procedures Manual for ENSDF see BNL-NCS-40503 (Oct. 1987).

For a brief description of ENSDF and instructions for the online service see IAEA-NDS-150 chapter 7.

Re ENSDF Physics Processing Codes, instructions for A-chain evaluations, and ENSDF Dictionaries see document IAEA-NDS-40; ENSDF analysis codes see IAEA-NDS-52.

For a related bibliography, "NSR", see chapter 22 of this document.

Note: ENSDF can be accessed online. Offline copies on computer media can be made available as well, but their use and continuous update procedures require extensive training. - Many data files that are derived from ENSDF are available.

Isotope Explorer (previously VuENSDF), is a 32-bit Windows program for retrieving, displaying, listing, manipulating and searching nuclear structure and decay data. Information from the Evaluated Nuclear Structure Data file (ENSDF) and the Table of Isotopes databases (nuclear structure data, radioactive decay data and super deformed bands data) is available for viewing with Isotope Explorer.

Isotope Explorer is very flexible with regard to data sources: it can access the Table of Isotopes databases directly via the Internet from the Berkeley or Lund servers; it can use locally stored data (e.g. from the Table of Isotopes CD-ROM); and it can operate as a helper application for WWW browsers, allowing data in the ENSDF format available on the WWW to be accessed remotely.

The Isotope Explorer is available via the Internet from the Isotopes Project (<http://ie.lbl.gov/isoexpl/isoexpl.htm>) and the Lund Nuclear Data Service (<http://www.fysik.lu.se/nucleardata/isoexpl/isoexpl.htm>) web sites.

NUDAT. This is a database in which essential data have been extracted from ENSDF in a user friendly form. The database is accessible online (for a PC version, see PCNUDAT below). It includes for each nuclide

- adopted levels and gamma-ray energies
- half-lives and other properties of ground and metastable states
- decay radiations.

For these data NUDAT is updated frequently, and simultaneously with ENSDF.

In addition, NUDAT includes thermal neutron cross-sections and resonance-integral data of the book "Neutron Cross-Sections" (1981/1984), see chapter 7 of this document.

Summary documentation: IAEA-NDS-205

PCNUDAT. A PC package which displays the data contained in the online system NUDAT, Release 2.7, October 1998, by Robert R. Kinsey.

Summary documentation: IAEA-NDS-162.

MIRD - Medical Internal Radiation Dose Tables. Tables of nuclear and atomic radiations from nuclear decay and decay scheme are produced online from the Evaluated Nuclear

Structure Data File (ENSDF) for the specified nuclide. Output may be either HTML-formatted tables and GIF drawings or PostScript tables and drawings. Available online from <http://www-nds.iaea.org/formmird.html>

RADLST, a program calculating decay radiations from ENSDF. The calculated decay radiations are included in NUDAT, see above. - T.W. Burrows, The program RADLST, report BNL-NCS-52142 (1988).
See also IAEA-NDS-104.

NUCHART. A PC package which displays nuclear decay data from ENSDF/NUDAT, including a search routine for assigning gamma-ray energies to radionuclides. NUCHART for Windows, version 1.2 of Feb. 1995, by V. Osorio and H. Peraza, IAEA Physics Section. Documentation: IAEA-NDS-161. Available on a set of PC diskettes or by FTP.

Table of Isotopes, 8th edition 1996, by R.B. Firestone, Lawrence Berkeley National Laboratory, USA. It contains nuclear structure and decay data for over 3100 nuclides with masses from 1 to 272. It contains in handbook form data from ENSDF (Evaluated Nuclear Structure Data File) maintained by the U.S. National Nuclear Data Center and updated by the nuclear data evaluators of the U.S. Nuclear Data Network and the Nuclear Structure and Decay Data Evaluators Network of the IAEA. The bulk of the book contains nuclear structure and decay data (levels, gamma-rays, etc.) In graphical and tabular form for all nuclides, sorted by mass number A and atomic number Z. It is supplemented by various additional data tables such as nuclear spectroscopy standards, atomic data, transition probabilities, range and stopping power data, and others. 3200 pages in two volumes, with a CD-ROM containing the same data. - **Not available from IAEA**. To be ordered through scientific book shops or from the publisher, John Wiley and Sons Inc., 605 3rd Avenue, New York, NY-10158. - Note: this book will serve as an international reference book for at least the next decade, similar to the previous edition which had been published by Mike Lederer in 1978. For those nuclides, however, where the evaluated data will be updated due to new and more precise experimental data, the Online Services should be consulted to obtain the most up-to-date information.

NUBASE. New database for experimentally known nuclear properties, by G. Audi, O. Bersillon, J. Blachot, A.H. Wapstra. Available from the Atomic Mass Data Center (AMDC), see below. **Not available from IAEA**. - NUBASE contains mass, isomeric excitation energy, half-life, spin, parity, decay modes and intensities for more than 3000 nuclides. Published in the journal Nuclear Physics, Vol A624 (1997), pp. 1-124. Available by anonymous FTP from csnftp.in2p3.fr, directory /pub/symfond/audi/mass, or consult the AMDF web site at <http://csnwww.in2p3.fr/amdc/>.

JEF-Report 13, OECD Nuclear Energy Agency, August 1994. This report of 328 pages contains tabulations retrieved from the radioactive decay data library and the fission yield data library of JEF-2.2, the Joint Evaluated nuclear data File, version 2.2, of the NEA Data Bank. It also contains an intercomparison of the main decay parameters (half-life, Q-value and average gamma, beta and alpha energies) in the data libraries JEF-2.2, ENDF/B-6, and JNDC-2. While many of the decay data are in agreement, because they originate from a common source (i.e. ENSDF), there are significant discrepancies between the three data libraries for many nuclides. A limited number of copies of this report is available, costfree, from the IAEA Nuclear Data Section.

"XG Standards" - Decay data for radionuclides used as calibration standards, "X-Ray and Gamma-Ray Standards for Detector Calibration", produced by the participants of an IAEA Co-ordinated Research Project 1986-1990, IAEA-TECDOC-619 (1991). The recommended values are contained on a PC diskette "XG Standards" by Hartmut Lemmel 1991 documented in IAEA-NDS-112 Rev. 1 (1991). - H.D. Lemmel (ed.). The recommended values are also quoted in the handbook NEANDC-311 "Nuclear Data Standards for Nuclear Measurements", 1991 NEANDC/INDC Nuclear Standards File, H. Condé (ed.). This supersedes preliminary publications by A. Lorenz in several INDC(NDS)-reports and in the Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, Vienna 1987, p. 187-198.

EME, data library of electron emissions. A handbook in two volumes, in French, issued in 1995 by the Laboratoire Primaire des Rayonnements Ionisants (LPRI) Saclay, B.P. Nr. 52, 91193 Gif-Sur-Yvette, France. - For 194 radionuclides energies and intensities of electron emissions are given, in nuclide sort and energy sort. The data are mostly from LPRI evaluations, in some cases from ENSDF. - At present not available from IAEA; contact the issuing institute.

Decay data of radionuclides are tabulated in the Chart of Nuclides 1992 of the Japanese Nuclear Data Committee, unnumbered report with fold-out map.

ENDF/B-6 decay data, see document IAEA-NDS-132. It includes radioactive decay data for 265 nuclides, and the fission neutron spectrum of ⁹⁸Cf-252 evaluated by W. Mannhart (compare under "Nuclear data standards" and document IAEA-NDS-98).

JEF-2/DD, the JEF-2 radioactive decay data library by the NEA Data Bank, in ENDF-6 format, containing decay data for 2345 radionuclides. The data, which were compiled by the JEF Decay Data Working Group, were mostly taken over from UK decay data files and from ENSDF.

Brief documentation: IAEA-NDS-122 Rev. 1. Available online and on magnetic tape.

PHYSICO - Nuclear Structure Calculation Tools - HSICC and LOGFT calculate internal conversion coefficients and Log ft values for beta and electron capture decay, average beta energies, and capture fractions. Available online from <http://www-nds.iaea.org/physco/>

PANDORA, version 5.3 (Dec. 1991), a PC version of an ENSDF checking code to be used by ENSDF evaluators, is available on a PC diskette.

"Nuclear Wallet Cards", (January 2000), a booklet by J.K. Tuli, US National Nuclear Data Center, Brookhaven National Laboratory, Upton NY, USA-11973. It lists for all known nuclides and some of their isomers the natural abundance or the half-life and decay mode. Also included are spin and parity assignments and the mass excess. The data are included in NUDAT, see above. An appendix lists fundamental physics constants. This booklet can be obtained free of charge from the author at the address given above. - Limited number of copies available costfree from the IAEA Nuclear Data Section.

ENDF/B-6 decay data library, contains all pertinent decay data for all nuclides occurring in the ENDF/B-6 neutron reaction data library, specifically fission-product nuclei, radionuclides resulting from neutron activation, and actinides. Summary documentation see IAEA-NDS-108.

Specific Activities of Radionuclides. See the report LA-12981 (Aug. 1995) by Jim Clow et al: "Table of DOE-STD-1027-92 Hazard Category 3 Threshold Quantities for the ICRP-30 List of 757 Radionuclides". This report on hazard threshold for radiological protection contains a table of specific activities for radionuclides in Ci/g as a U.S. standard for safety analysis.

Decay Data of the Transactinium Nuclides. Values for half-lives and emission probabilities for alpha particles and selected gamma rays, recommended by an IAEA Coordinated Research Programme on the measurement and evaluation of transactinium isotope decay data. IAEA Technical Report 261 (1986). This handbook has a salesprice of 400,- Austrian Schillings. A limited number of copies is available free of charge to scientists in developing countries.

UKPADD-2: Activation product decay data, by A.L. Nichols, AEA Harwell, UK. It includes, in ENDF-6 format, comprehensive decay scheme data for 236 activation product nuclides: half-life; total decay energy (Q-value); branching fractions; alpha-particle energies, and emission probabilities; beta-particle energies, emission probabilities and transition types; gamma-ray energies, emission probabilities and internal-conversion coefficients; spontaneous fission data including prompt and gamma-ray spectra. - PC diskette. - Documentation: IAEA-NDS-134 (same as AEA-RS-5449, March 1993). (History: The first version had been published in the report AERE-R-8903 (1989), A.L. Nichols: Radioactive-

nuclide decay data for reactor calculations; activation products and related isotopes.)

Strengths of gamma-ray transitions in nuclei A = 5-44, by P.M. Endt, in the journal Atomic Data and Nuclear Data Tables 55, 171-197 (1993). Not available on magnetic tape.

ENSGAM. A PC database for about 15000 gamma rays from 2777 radioactive nuclides derived from ENSDF by P. Ekström and L. Spanier, Lund University, Sweden.
Documentation: IAEA-NDS-118.
A set of 6 PC diskettes available costfree from IAEA Nuclear Data Section.

"Strong-gammas". A PC database of strong gamma-rays emitted from radionuclides, extracted from ENSDF as of Sept. 1993, by T. Narita, T. Ichimiya, and K. Kitao (JAERI), compare the tabulation that was published in the report JAERI-M-94-059 (1994).
Summary of contents: IAEA-NDS-111, Rev. 1.

An extract from an earlier version of this database (report JAERI-M-92-051, 1992), for all gammas with intensities higher than 5% has been included in a PC diskette attached to the IAEA Technical Report 357: Handbook on Nuclear Data for Borehole logging and Mineral Analysis (1993).

Catalog of gamma-rays unplaced in radioactive decay schemes. Compilation extracted from ENSDF. Report JAERI-M-91-037 by T. Narita and K. Kitao. At the IAEA Nuclear Data Section only the report is available, not the computer file.

Kondrashov Gammas. A PC database for gamma-rays from radionuclides, by V. Kondrashov. 16682 gamma lines from 749 nuclides. Either ASCII text file or in MS Word. Designed for use with the code DIMEN. Origin of the database: Publication 38 of the "International Commission on Radiological Protection", Moscow, Energoatomizdat, 1987.
Summary documentation: IAEA-NDS-172.

UKHEDD-1 - Radioactive heavy element decay data for reactor calculations in ENDF/B format, by UK Chemical Nuclear Data Committee, A.L. Nichols, M.F. James. 125 nuclides 80-Hg-206 to 99-Es-253, 35949 records. Full report: AEEW-R-1407 (Dec. 1981). Summary Documentation: IAEA-NDS-60
Note: This is superseded by UKHEDD-2 issued in Spring 1992.

Internal conversion coefficients: Compilation of experimental values of internal conversion coefficients and ratios for nuclei with $Z > 60$, by H.H. Hansen, CBNM Geel. Report Physik Daten/Physics Data Nr. 17-2, 1985. Data not available on tape.

Decay alphas: Recommended energy and intensity values of alpha particles from radioactive decay. A consistent set of recommended energy and branching values, evaluated by A. Rytz, Bureau International des Poids et Mesures, France. Not available on tape. See Atomic Data and Nuclear Data Tables 47, 205-239 (1991).

Decay alphas: Catalog of alpha particles from radioactive decay. Compilation by W. Westmeier and A. Merklin. See Physikdaten/Physics Data No. 29-1 (1985). Not available on tape.

SGNucDat, Version 2. Safeguards Nuclear Data for Windows. Contains the data of report INDC(NDS)-376 (1997). A: Actinide nuclear data (decay data, selected neutron cross-section data, fission-neutron data); B: fission-product nuclear data (decay data and selected neutron cross-section data); C: fission-product yield data. PC code by G. Pospischil. Data compiled by M. Lammer, O. Schwerer and N.P. Kocherov, documented in report IAEA-NDS-248, Rev. 1 (1997). Available online at <http://www-nds.iaea.or.at/sgnucdat/sgnuc.html>

Beta and antineutrino decay of radionuclides. A handbook by V.G. Aleksankin, S.V. Rodichev, P.M. Rubcov, P.A. Ruzhanskij, F.E. Chukreev, Moscow, Energoatomizdat 1989. 100 pages text in Russian, 700 pages of energies and intensities of beta and antineutrino radiations plus other decay parameters for all radionuclides. Neither the book

nor the data file are available from IAEA.

CDRL-82 and **ENSL-82**. Evaluated nuclear structure library. On tape or microfiche. See UCRL-50400, vol. 23, plus addendum, also IAEA-NDS-37.

Blachot library: Decay data for heavy nuclides, fission products and activation products, with program package. J. Blachot, Sept. 1982. Three data files plus 3 computer codes (EDIBIB, TRIGAL, ISOTAB).

Jülich Decay Gamma Data File (1979): Compilation of gamma and X-rays for 2055 radionuclides. Main purpose: Evaluation of gamma-ray spectra. Summary documentation: IAEA-NDS-19 Rev. 2.

See also the report Jül-Spez-34 (April 1979) by G. Erdtmann and W. Soyka: The radionuclide gamma ray data file "GAMDAT-78".

GAMCAT, gamma and alpha rays from radioactive decay. A PC-diskette database offered by the Fachinformationszentrum Karlsruhe, D-7514 Eggenstein-Leopoldshafen 2, for a sales price of 980.- DM, plus tax. Not available from IAEA. Compare document IAEA-NDS-117. This database is based on the following publications:

1. U. Reus, W. Westmeier: Catalog of Gamma Rays from Radioactive Decay; Atomic Data and Nuclear Data Tables Vol. 29 p. 1-406 (1983); this superseded the earlier publication by U. Reus, W. Westmeier, I. Warnecke: Gamma-Ray Catalog, report GSI-79-2 (1979), which is available from IAEA-NDS on tape under the library name GSIGAM79.
2. W. Westmeier, A. Merklin: Catalog of Alpha Particles from Radioactive Decay; Physik-Daten/Physics Data no. 29-1 (1985).

ENDF/B-5 Actinide Decay Data: Available as microfiche INEL-RLB-FXUB-TRA or included in the ENDF/B-5 Actinides library (see above under "Actinides").

Spontaneous fission data: Yields and spectra of fission neutrons and fission products, see EXFOR.

Nuclear quantities such as nuclear temperatures, level density parameters, spin cut-off factors, see EXFOR (Chapter 1) and RIPL (Chapter 27).

Japanese gamma-ray spectrum data library of fission product nuclides, see report JAERI-1311, March 1988, by J. Katakura and T. Yoshida.

Fission product decay data

See above under "Fission products - evaluated neutron reactions, yields and decay data".

Radioactive Decay Data Tables, a handbook of decay data for application to radiation dosimetry and radiological assessments, by David C. Kocher, Oak Ridge, (1981). Not available from IAEA-NDS.

Superseded:

Table of Radioactive Isotopes, by E. Browne, R.B. Firestone (Lawrence Berkeley Laboratory), John Wiley & Sons, New York, 1986.

32. Gamma ray analysis

IDGAM, A PC code and database to identify isotopes in a radioactive sample by their gamma rays. Diskette by R. Paviotti Corcuera, M. de Moraes Cunha, K.A. Jayanti, Sao José dos Campos, Brazil. It uses the database "Strong gammas" (see preceding chapter) by T. Narita et al. with about 6000 gamma lines. Documentation: IAEA-NDS-135.

GAMQUEST, a computer program to identify gamma rays, by E. Browne, Lawrence Berkeley Laboratory, USA. Not available from the IAEA. - This program is especially suited to the analysis of samples produced by neutron activation, and of environmental samples containing radioactive pollutants. It searches a large database of over 60 000 gamma rays to identify the spectral lines from samples. It runs on the VAX/6610 computer cluster of the Lawrence Berkeley Laboratory and can be accessed from individual accounts of through Hepnet, Internet, or World Wide Web networks. - Documentation see report LBL-35715.

NUCHART. A PC package which displays nuclear decay data from ENSDF/NUDAT, including a search routine for assigning gamma-ray energies to radionuclides. NUCHART for Windows, version 1.2 of Feb. 1995, by V. Osorio and H. Peraza, IAEA Physics Section. Documentation: IAEA-NDS-161. Available on a set of PC diskettes, or via FTP.

Handbook: C. Vylov et al., Spectra of radioactive nuclides radiation, measured with semiconductor detectors. Atlas of measured spectra. Reports ZfK-399 and ZfK-505, 1983.

GANAAS. A PC software for gamma spectrum analysis, activity calculations and neutron activation analysis, by the IAEA Physics Section. A set of four HD diskettes and a software handbook IAEA/CMS-3. The package uses the thermal neutron cross-section data by E. Gryntakis et al. (Handbook of Nuclear Activation Data, IAEA Technical Report 273, 1987, p. 199) and fast neutron cross-sections by R. Pepelnik (unpublished). Available also via FTP.

33. Nuclear constants, Charts of Nuclides

Chart of the Nuclides 2000, Japanese Nuclear Data Committee and Nuclear Data Centre, JAERI, 2000. Available cost-free on request.

Chart of The Nuclides, issued by **General Electric and Knolls Atomic Power Laboratory** (15th edition, revised to 1996, by J.R. Parrington, H.D. Knox, S.L. Breneman, E.M. Baum, F. Feiner). It consists of a wall chart and a booklet "Nuclides and Isotopes" and can be ordered from: Lockheed Martin Distribution Services, 10525 Chester Road, Cincinnati, Ohio 45215, USA. e-mail: nuclides.chart@lmco.com. Web page with order forms: www.ssts.lmco.com/nuclides. A limited number of copies is available from IAEA cost-free for scientists in developing countries.

Karlsruher Nuklidkarte (Karlsruhe chart of Nuclides), 6th ed. 1995, by G. Pfennig, H. Klewe-Nebenius, W. Seelmann-Eggebert. A: wall chart, B: desk copy with a fold-out chart and introductory text in German, English, Spanish and French. The chart contains many "new" nuclides; all nuclear half-lives and other included parameters have been updated. It can be ordered from "Marktdienste Haberbeck", Industriestrasse 17, D-32791 Lage/Lippe, Germany. Fax: +49-5232-68445. The sales price is about DM 40,- per set plus shipment costs, with price reductions for multiple orders. A limited number of copies is available from IAEA costfree for scientists in developing countries.

Chart of Nuclides 1996 issued by JNDC and JAERI-NDC, compiled by T. Horiguchi et al. Desk chart showing decay modes and half-lives. Supplemented by five tables (periodic table of elements; fundamental constants; γ -ray energy and intensity standards; β -particle energies and intensities; isotopic abundances and thermal neutron cross sections). A limited number of copies is available cost-free from IAEA. For a WWW version (containing additional data) see <http://cracker.tokai.jaeri.go.jp/CN96/index.html>.

Strasbourg Chart of the Nuclides 1992 by M.S. Antony, Centre de Recherches Nucléaires et Université Louis Pasteur, F-67037 Strasbourg Cédex 2, France. The chart contains a new independent evaluation of nuclear half-lives and selected decay properties. It can be ordered from above address for a small fee in favour of a welfare association. A limited number of free copies has kindly been made available to the IAEA Nuclear Data Section for scientists in developing countries, upon request.

NUDAT - Nuclear levels, decay radiations, half-lives and other properties extracted from ENSDF (see chapter 31), plus thermal neutron cross-sections and resonance integrals from the book "Neutron Cross-Sections" (1981/1984) (see chapter 7). Accessible only online; instructions see IAEA-NDS-150 chapter 8.

NUCHART. A PC package which displays nuclear decay data from ENSDF/NUDAT, including a search routine for assigning gamma-ray energies to radionuclides. NUCHART for Windows, version 1.2 of Feb. 1995, by V. Osorio and H. Peraza, IAEA Physics Section. Documentation: IAEA-NDS-161. Available on a set of PC diskettes or via FTP.

NUBASE. New database for experimentally known nuclear properties, by G. Audi, O. Bersillon, J. Blachot, A.H. Wapstra. Available from the Atomic Mass Data Center (AMDC), see below. Not available from IAEA. - NUBASE contains mass, isomeric excitation energy, half-life, spin, parity, decay modes and intensities for more than 3000 nuclides. Published in the journal Nuclear Physics, Vol A624 (1997), pp. 1-124. Available by anonymous FTP from csnftp.in2p3.fr, directory /pub/symfond/audi/mass, or consult the AMDF web site at <http://csnwww.in2p3.fr/amdc/>.

Atomic Masses 1995. The 1995 atomic mass evaluation by G. Audi and A.H. Wapstra.

Available online or on tape. Summary documentation IAEA-NDS-47, Rev.3. Published in Nucl. Phys. A595 (1995) p. 409-480. Available online from <http://www-nds.iaea.org/ndspub/masses/>

This supersedes earlier versions:

A.H. Wapstra et al. Nucl. Phys. A432 (1985) pages 1ff, 55ff, 140ff, 185ff.

The 1988 update has been published by A.H. Wapstra, G. Audi, R. Hoekstra, "Atomic masses from (mainly) experimental data", in Atomic Data and Nuclear Data Tables 39, 281-287 (1988), Compare also the following item:

Nuclear Masses (Möller). A data file by P. Möller et al. including nuclear masses as computed by P. Möller [see At. Data Nucl. Data Tables 39, 225-233 (1988)] and the nuclear masses compiled by A.H. Wapstra et al. [see At. Data Nucl. Data Tables 39, 281-287 (1988)]. Summary documentation: IAEA-NDS-147, Rev. 1, Feb. 1992.

Note: Möller data should be used for nuclides, which are not in the Wapstra file.

Nuclide Guide, a handbook in Russian and English by T.V. Golashvili, V.P. Chechev, A.A. Lbov, Atominform Moscow 1995. It contains, for all known nuclides, properties of ground and isomeric states, mass, half-life, decay modes, intensities, particle energies, and the energies of the dominating decay gammas. - Not available from IAEA. The book can be obtained from V.P. Chechev, Khlopin Radiyevy Institut, 194021 Sankt-Petersburg, Russia, fax (812)247-80-95.

Table of Nuclear Root Mean Square Charge Radii (June 1999) by I. Angeli. The tables and a brief summary of the data evaluation are given in IAEA-NDS-163 (also available online under <http://www-nds.iaea.org/reports/nds-163.pdf>), the full report in INDC(HUN)-033 (September 1999).

Isotopic abundances of the elements, 1989. See the journal Pure and Applied Chemistry 63(7) p. 991-1002 (1991). - Literature survey of isotopic abundance data for 1987-1989 by N.E. Holden, report BNL-NCS-43162 (1989).

Computer Chart, microfiche produced by NNDC in March 1982, based on ENSDF, ENDF/B-5, NNDC book "Neutron Cross-Sections", Atomic Masses by Wapstra 1977, and Isotopic Abondements by Holden 1981.

Nuclear Properties, J.K. Tuli. See Handbook on Nuclear Activation Data, IAEA Technical Report Series No. 273, Vienna 1987, p. 3-28.

Fundamental Physical Constants: 1986 recommended values by E.R. Cohen, B.N. Taylor, Codata Bulletin Nr.63 (Nov.1986). The tables of recommended values were reproduced in IAEA-NDS-50. An extract is included also in the booklet "Nuclear Wallet Cards", see preceding chapter.

Chart of Stable Atomic Nuclei, with attached periodic table of elements, in Chinese. Booklet with fold-out chart.

34. Atomic Data

EADL, the evaluated Atomic Data Library of the Lawrence Livermore National Laboratory, USA. Available on CD-ROM together with EPDL-97, see Chapter 22.

Atomic and molecular data for radiotherapy and radiation research. IAEA-TECDOC-799 (750 pages), N. Kocherov (ed.). Final report of Coordinated Research Project. Contents: Particle therapy in cancer management; heavy ion therapy. Ionization by fast charged particles. Electron collision cross-sections. Low energy electron interaction with condensed matter. Photoabsorption, photoionization, photodissociation cross-sections. Collision processes between ions and molecules. Stopping powers, ranges, and straggling. Yields of ionization and excitation in irradiate matter. Track structure quantities. ESTAR, PSTAR, ASTAR; computer programs for calculating stopping powers and ranges for electrons, protons, and helium ions - Limited number of copies available costfree upon request.

Note: For "Atomic and Molecular Data" and interaction of fusion plasma with wall materials ("PMI data"), which are not topic of the present index, contact the A+M Unit of the IAEA Nuclear Data Section, and the on-line system AMDIS, <http://www-amdis.iaea.org/>

Particle reflection from surfaces - a recommended database. Report INDC(NSD)-249 (1991) by E.W. Thomas, R.K. Janev, J.J. Smith.

35. Bibliographic files, WRENDA, etc.

CINDA, bibliography and database index for experimental and evaluated neutron reaction data. It also includes references to (γ,n) , (γ,f) and spontaneous fission. It includes an index to EXFOR data and to the more important evaluated neutron reaction data libraries. Handbook published annually. Retrievals available online (WWW or Telnet). Complete database available on CD-ROM.

CINDA formats:

- Summary see IAEA-NDS-9.
- CINDA Coding Manual, Rev. by S. Webster, IAEA-NDS-109 Rev. 90/2

The complete CINDA handbook consists of

- CINDA-A (1935-1987) published in 5 volumes in 1990, plus CINDA2000 (1988-2000).

NSR (Nuclear Science References) an international bibliography of nuclear data maintained in support of the network of nuclear structure data evaluators who produce the ENSDF database; see chapter 20 of this document. This bibliography is published regularly under the title "Recent References" in the journal "Nuclear Data Sheets". The NSR database which is updated quarterly, is searchable online in the IAEA NDIS system.

Reference: W. Bruce Ewbank, The Nuclear Structure References (NSR) file, report ORNL-5397 (1978).

Format: S. Ramavataram and C.L. Dunford, Nuclear Structure References Coding Manual, report BNL-NSC-51800 (1984), U.S. National Nuclear Data Center.

For a brief description of NSR with instructions for the online service see IAEA-NDS-150, chapter 6.

Photonuclear Data/Fotojadernye Dannye, a bibliography published by the USSR Photonuclear Data Center in Moscow, in English and Russian.

A complete index 1955-2000 is available online at <http://depni.sinp.msu.ru/cdfe/services/pnidescr.html>

Special issues: $(\gamma,x\gamma)$ reactions, 1985

Photodisintegration of Lithium, 1984 and 1986

Photofission of heavy nuclei, 1983

Index 1976-1980 (1982)

Index 1976-1985 (1986)

Index 1986-1990, published as report INDC(CCP)-348 (1993)

Index 1976-1995 (1996)

AMBDAS: Atomic and Molecular Bibliographic Data Base. AMBDAS contains searchable bibliographic references for the following A+M Data Unit publications:

1. International Bulletin on Atomic and Molecular Data for Fusion, vol. 1 (1977) through vol. 58 (2000).

2. CIAMDA I (1980). (Period covered: 1950-1979)

3. CIAMDA II (1987). (Period covered: 1980-1986)

4. CIAMDA III (1998). (Period covered: 1987-1997)

A bibliographic search can be performed using the AMDIS system, available online at <http://www-amdis.iaea.org/AMBDAS/>

IAEA-NDS-Documentation Series

See document IAEA-NDS-0 for an index to the IAEA-NDS-documents summarizing format and contents of nuclear data libraries.

OLDER DATABASES AND REPORTS

"Papyrus NSR", a CD-ROM version of NSR as of December 1993, for use on IBM/PC. "Papyrus NSR" is the result of a collaboration between Lund University, Sweden, and the Isotopes Project, Lawrence Berkeley Laboratory. Contains the entire NSR file as of

December 1993 with over 130 000 fully-searchable references. Distributed by Edgardo Browne, Isotopes Project, Bldg. 50A, Room 6120, Berkeley, California 94720, U.S.A

Bibliography of integral charged-particle nuclear data, including index to EXFOR data. Handbook published as BNL-NCS-50640, 4th ed. March 1980 with two supplements March 1981 and March 1982, then discontinued. Available on tape:

- File 1 March 1980, 39 000 records. (= BNL-NCS-50640,4th ed.)
- File 2 March 1980 - March 1981, 6 000 records. (= Suppl. 1)
- File 3 May 1981 - Nov. 1981, 1 400 records. (= Suppl. 2)
- File 4 Nov. 1981 - Sept. 1982. (unpublished)

Then continued in a revised format as BNL-NCS-51771 (1st edition) April 1984, covering literature scanned from 1 March 1982 to 31 March 1984, continued annually. It does no longer include an index to EXFOR data. In 1990 this series was discontinued. The last issue is BNL-NCS-51771, first edition, supplement 5, Dec. 1989.

Photonuclear reaction data, bibliographic index 1955-1992, report JAERI-M-93-195. This index which has a format close to CINDA (see above), contains bibliographic references not only for photonuclear reaction data in the narrower sense but also for the inverse reactions, i.e. gamma producing reactions induced by neutrons, protons, deuterons, tritons, He3 and alpha particles, and also electron scattering and electron induced nuclear reactions.

WREND A - World request list for measurements of nuclear data that are known with insufficient accuracy only.
WREND A 93/94 published as INDC(SEC)-104.

WREND A Supplement: Requests for fission yield measurements.
M. Lammer, ed. Report INDC(SEC)-105.

INDC/NEANDC "joint discrepancy file 1990". Compilation of nuclear data discrepancies.
B.H. Patrick, N.P. Kocherov, eds. Report INDC(NDS)-235.

51. Proceedings of the Trieste Courses and Workshops on Nuclear Data and Reactor Physics

Starting in 1978, nuclear data related courses were held at the International Centre for Theoretical Physics, Trieste, Italy. The proceedings of the earlier courses (1978-1982) were published as IAEA reports. Unless a full-size copy is still available, these can be requested as INIS-Microfiches.

The proceedings of the courses between 1986 and 1998 are not available from IAEA. They have been published by the World Scientific Publishing Co., P.O. Box 128, Farrer Road, Singapore 9128. U.S. Office: Suite 1B, 1060 Main Street, River Edge, NJ 07661. U.K. office: 57 Shelton Street, Covent Garden, London WC2H 9HE.

From the year 2000, the proceedings are being published within the ICTP lecture notes series. These are available both as hardcopies and electronically from the ICTP web site.

2000

Nuclear Reaction Data and Nuclear Reactors: Physics, Design and Safety.
13 March - 24 April 2000
Editors: N. Paver, M. Herman and A. Gandini
ICTP Lecture Notes Series, Volume V -Parts 1 & 2 (ISBN 92-95003-08-X) - Dec 2001
http://www.ictp.trieste.it/~pub_off/lectures/vol5.html

1998

Nuclear Reaction Data and Nuclear Reactors: Physics, Design and Safety.
23 February - 27 March 1998
Editors: P. Oblozinsky, A. Gandini. World Scientific, Singapore.

1996

Nuclear Reaction Data and Nuclear Reactors: Physics, Design and Safety.
15 April - 17 May 1996.
Editors: A. Gandini, G. Reffo. World Scientific, Singapore.

1994:

Nuclear Reactors, Physics, Design and Safety.
11 April - 13 May 1994.
Editors: A. Gandini, S. Ganesan, J.J. Schmidt.
World Scientific, Singapore.

1992:

Computation and Analysis of Nuclear Data Relevant to Nuclear Energy and Safety.
10 Feb - 13 March 1992.
Editors: M.K. Mehta, J.J. Schmidt.
World Scientific, Singapore.

1990:

Reactor Physics Calculations for applications in nuclear technology.
12 Feb - 16 March 1990.
Editors: D.E. Cullen, R. Muranaka, J.J. Schmidt.
World Scientific, Singapore.

1988:

Applied Nuclear Theory and Nuclear Model Calculations for Nuclear Technology Applications. 15 Feb - 19 March 1988.
Editors: M.K. Mehta, J.J. Schmidt.
World Scientific, Singapore.

1986:

Applications in Nuclear Data and Reactor Physics. 17 Feb - 21 March 1986.
Editors: D.E. Cullen, R. Muranaka, J.J. Schmidt.
World Scientific, Singapore.

1982:

Nuclear theory for applications. 25 Jan - 19 Feb 1982.
Report IAEA-SMR-93. Copies still available, costfree.

1980:

Nuclear theory for applications. Jan/Feb 1980.

Report IAEA-SMR-68.

1978: Nuclear theory for applications. 17 Jan - 11 Feb 1978.
Report IAEA-SMR-43.

1975: Nuclear theory in neutron data evaluation. Consultants' Meeting, Trieste 1975.
Report IAEA-190, 2 vols.

52. Selected Nuclear Data Handbooks Available from the IAEA Nuclear Data Section

Charged-particle cross-section database for medical radioisotope production:

Diagnostic radioisotopes and monitor reactions
IAEA-TECDOC-1211, 2001

Compilation and evaluation of fission yield nuclear data
IAEA-TECDOC-1168, 2000

Handbook on photonuclear data for applications
IAEA-TECDOC-1178, 2000

Handbook for calculations of nuclear reaction data.
Reference input parameter library (RIPL)
IAEA-TECDOC-1034, 1998

Atlas of Neutron Capture Cross Sections
Report INDC(NDS)-362, 1997

Handbook of nuclear data for safeguards
Report INDC(NDS)-376, 1997

Nuclear data standards for nuclear measurements
Report NEANDC-311 = INDC(SEC)-101, 1992

X-ray and gamma-ray standards for detector calibration
IAEA-TECDOC-619, 1991, report 1994

Handbook on nuclear activation data
IAEA Tech. Rep. 273, 1987, reprint 1995

Decay data of the transactinium nuclides
IAEA Tech. Rep. 261, 1986, reprint 1995

Monitor reactions for radioisotope production
Report INDC(NDS)-218, 1989

Review of (p, pion-) cross-sections and yields up to 70 GeV.
Report INDC(NDS)-183, 1986

Properties of neutron sources
IAEA-TECDOC-410, 1987

Atomic and molecular data for radiotherapy and radiation research
Report IAEA-TECDOC-799, 1995

Handbook on nuclear data for borehole logging and mineral analysis
IAEA Tech. Rep. 357, 1993

**53. INDC reports on IAEA meetings and on selected nuclear data topics.
Copies available from the IAEA Nuclear Data Section.**

Many recent INDC reports are available online in PDF format from http://www-nds.iaea.org/indc_sel.html. Some relevant older reports, which are still available as hardcopies, are listed below.

Nuclear data centres coordination

Coordination of the Nuclear Reaction Data Centres, V.G. Pronyaev, O. Schwerer, eds.
Report INDC(NDS)-383 (1998) 149 pages.

Coordination of the Nuclear Reaction Data Centres (Technical Aspects).
O. Schwerer, H. Wienke, eds.
Report INDC(NDS)-374 (1997) 141 pages.

Coordination of the Nuclear Reaction Data Centres. O. Schwerer, H.D. Lemmel, eds.
Report INDC(NDS)-360 (1996).

The Nuclear Data Centres Network. H.D. Lemmel, ed.
Report INDC(NDS)-359 (1997) 36 pages.

Coordination of the Nuclear Structure and Decay Data Evaluators Network. Report on a meeting in Budapest, Hungary, 14-18 October 1996. Edited by D.W. Muir.
Report INDC(NDS)-363.

Papers presented at the IAEA Specialists' Meeting on the development of an international nuclear decay data and cross-section database. Vienna, 24-28 October 1994. H.D. Lemmel, ed.
Report INDC(NDS)-329 (1994) 152 pages.

Measurements of nuclear data

Co-ordinated research programme on measurement and analysis for 14 MeV neutron-induced double-differential neutron emission cross sections needed for fission and fusion reactor technology. Summary report of the 3rd and final RCM organized by the IAEA and held at Chiang Mai, Thailand, 31 March - 1 April 1992. Wang Dahai, ed.
Report INDC(NDS)-272 (1993) 161 pages.

The influence of target and sample properties on nuclear data measurements. IAEA Advisory Group Meeting in co-operation with the International Nuclear Target Development Society (INTDS), Darmstadt, Federal Republic of Germany, 5-9 September 1988. K. Okamoto, ed.
Report INDC(NDS)-213 (1988) 74 pages.

IAEA Specialists' Meeting on the influence of target and sample properties on nuclear data measurements (in co-operation with the Central Bureau of Nuclear Measurements (CBNM) and the International Nuclear Target Development Society (INTDS).
Summary report. K. Okamoto, ed.
Report INDC(NDS)-200 (1988) 59 pages.

Status reviews of 14 MeV neutron induced cross sections: measurements and calculations (text of lectures delivered during the second Research Co-ordination Meeting (Gaussig, GDR, November 1983) for the co-ordinated research programme on measurement and evaluation of 14 MeV neutron nuclear data needed for fission and fusion reactor technology. M.K. Mehta, ed.
Report INDC(NDS)-173 (1985) 129 pages.

Nuclear models for nuclear data evaluation

Summary report of the third Research Coordination Meeting on development of reference input parameter library for nuclear model calculations of nuclear data (phase I: starter file), ICPT, Trieste, Italy, 26-29 May 1997. Prepared by P. Oblozinsky.

Report INDC(NDS)-372 (1997) 45 pages.

Proceedings of the IAEA meeting on basic and applied problems of nuclear level densities. Brookhaven, 11-15 April 1983. M.R. Bhat, ed.

Report BNL-NCS-51694 (1983) 400 pages.

Development of reference input parameter library for nuclear model calculations of nuclear data. Texts of papers presented at the 1st RCM organized by the IAEA in co-operation with ENEA, Bologna and held at Cervia (Ravenna), Italy, 19-23 September 1994. P. Oblozinsky, ed.

Report INDC(NDS)-335 (1995) 166 pages.

Methods for the calculation of neutron nuclear data for structural materials of fast and fusion reactors. Texts of papers presented at the final meeting of a Co-ordinated Research Programme organized by the IAEA and held in Vienna, 20-22 June 1990. D.W. Muir, ed.

Report INDC(NDS)-247 (1991) 278 pages.

Status review of methods for the calculation of fast neutron nuclear data for structural materials of fast and fusion reactors. Texts of invited papers presented during the second Research Co-ordination Meeting, Vienna, 15-17 February 1988. V. Goulo, ed.

Report INDC(NDS)-214 (1989) 125 pages.

Proceedings of the IAEA Research Co-ordination Meeting on methods for the calculations of neutron nuclear data for structural materials in co-operation with the Centro di Calcolo del ENEA, Bologna, Italy, 7-10 October 1986. V. Goulo, ed.

Report INDC(NDS)-193 (1988) 165 pages.

Proceedings of the IAEA Consultants' Meeting on nuclear data for structural materials, 2-4 November 1983, Vienna, Austria. D.E. Cullen, ed.

Report INDC(NDS)-152 (1984) 174 pages.

Nuclear data processing

A study into the reliability of collapsing SAND-II 640 multigroup data into Vitamin-J 175 multigroup cross sections. H. Wienke.

Report INDC(NDS)-337 (1995) 9 pages.

Preparation of processed nuclear data libraries for thermal, fast and fusion research and power reactor applications. IAEA meeting, Vienna, 8-10 December 1993. Texts of 12 papers. S. Ganesan, ed.

Report INDC(NDS)-317 (1994) 260 pages.

Update of the WIMS-D4 nuclear data library. Status report of the IAEA WIMS library update project. Compiled by S. Ganesan.

Report INDC(NDS)-290 (1993) 188 pages.

Covariance methods and practices in the field of nuclear data. Proceedings of an IAEA Specialists' Meeting on covariance methods and practices in the field of nuclear data held in Rome, Italy, 17-19 November 1986 (in co-operation with NEA/OECD). V. Piksaikin, ed.

Report INDC(NDS)-193 (1988) 118 pages.

Report on the IAEA cross section processing code verification project. D.E. Cullen.

Report INDC(NDS)-170 (1985) 113 pages.

Activation cross-sections

Activation cross sections for the generation of long-lived radionuclides of importance in fusion reactor technology. Final report of a coordinated research programme. Edited by A.B. Pashchenko.

Report INDC(NDS)-344 (1997) 37 pages.

Establishment of an international reference data library of nuclear activation cross sections. Summary report of the 2nd RCM organized by the IAEA in coordination with the Instituto de Fusion Nuclear, Madrid, and held in Madrid, Spain, 13-16 May 1996. Prepared by A.B. Pashchenko.

Report INDC(NDS)-361 (1997) 29 pages.

Activation cross sections for the generation of long-lived radionuclides of importance in fusion reactor technology. Texts of papers presented at the third and final Research Coordination Meeting organized by the IAEA in co-operation with the V.G. Khlopin Radium Institute, St. Petersburg, Russia and held in St. Petersburg, 19-23 June 1995. A.B. Pashchenko, ed.

Report INDC(NDS)-243 (1996) 195 pages.

Activation cross sections for the generation of long-lived radionuclides of importance in fusion reactor technology. Texts of papers presented at the second Research Coordination Meeting organized by the IAEA in co-operation with TSI Research and Westinghouse Hanford Company and held in Del Mar, California, USA, 29-30 April 1993. Compiled by A.B. Pashchenko.

Report INDC(NDS)-286 (1993) 155 pages.

Comparison of the evaluations of the cross sections for the neutron dosimetry reactions Au-197(n,2n)Au-196, Co-59(n,2n)Co-58, Nb-93(n,2n)Nb-92m. José Martinez-Rico.

Report INDC(NDS)-285 (1993) 14 pages.

Activation cross sections for the generation of long-lived radionuclides of importance in fusion reactor technology. Texts of papers presented at the first meeting of a Co-ordination Research Programme organized by the IAEA and held in Vienna, 11-12 November 1991. Wang Dahai, ed.

Report INDC(NDS)-263 (1992) 159 pages.

Activation cross sections for the generation of long-lived radionuclides of importance in fusion reactor technology. Proceedings of an IAEA Consultants' Meeting held at Argonne National Laboratory, Argonne, Illinois, USA, 11-12 September 1989.

Wang Dahai, ed.

Report INDC(NDS)-232 (1990) 99 pages.

Neutron induced photon production

Summary report of the 3rd Research Coordination Meeting on measurement, calculation and evaluation of photon production data. Bled, Slovenia, 29 Sept. - 3 Oct. 1997. P. Oblozinsky, ed.

Report INDC(NDS)-375.

Summary report of the 2nd Research Coordination Meeting on measurement, calculation and evaluation of photon production data. Vienna, Austria, 21-24 May 1996. P. Oblozinsky, ed.

Report INDC(NDS)-357 (1996) 56 pages.

Measurement, calculation and evaluation of photon production data. Texts of papers presented at the 1st RCM organized by the IAEA in co-operation with ENEA, Bologna and held at ENEA, Bologna, Italy, 14-17 November 1994. P. Oblozinsky.

Report INDC(NDS)-334 (1995) 145 pages.

Measurement, calculation and evaluation of photon production cross sections. Proceedings of the Specialists' Meeting organized by the IAEA and co-sponsored by the Czechoslovak Atomic Energy Commission. Smolenice, CSFR, 5-7 February 1990. N.P. Kocherov, ed.

Report INDC(NDS)-238 (1990) 194 pages.

Neutron dosimetry and radiation damage

Final report on the REAL-84 exercise. W.L. Zipj, E.M. Zsolnay, H.J. Nolthenius.
Report INDC(NDS)-212 = ECN-212 (1988) 99 pages.

Nuclear data for radiation damage estimates for reactor structural materials. Proceedings of an IAEA Consultants' Meeting held in Santa Fe, New Mexico, USA, 20-22 May 1985. V. Piksaikin, ed.
Report INDC(NDS)-179 (1986) 186 pages.

Neutron dosimetry system SAIPS: Manual for users and programmers (version 87-02). M.A. Berzonis, Kh.Ja. Bondars, A.M. Niedritis.
Report INDC(CCP)-285 (1988) 38 pages.

Radioisotope production

Summary report of the second Research Coordination Meeting on development of reference charged-particle cross section database for medical radioisotope production. National Accelerator Centre, Faure, Cape Town, South Africa, 7-10 April 1997. P. Oblozinsky, ed.
Report INDC(NDS)-371 (1997) 45 pages.

Status report of monitor reactions for radioisotope production. O. Schwerer, K. Okamoto.
Report INDC(NDS)-218 (1989) 281 pages.

Proceedings of the IAEA Consultants' Meeting on data requirements for medical radioisotope production in co-operation with the Institute of Physical and Chemical Research (RIKEN), Tokyo, Japan, 20-24 April 1987. K. Okamoto, ed.
Report INDC(NDS)-195 (1988) 199 pages.

Status on the compilation of nuclear data for medical radioisotopes produced by accelerators. D. Gandarias-Cruz, K. Okamoto.
Report INDC(NDS)-209 (1988) 123 pages.

Radiation therapy

Status of nuclear data needed for radiation therapy and existing data development activities in member states. Summary report of a Consultants' Meeting held at IAEA Headquarters Vienna, Austria, 9-11 December 1996. N. Kocherov, ed.
Report INDC(NDS)-365 (1997) 24 pages.

Nuclear Geophysics

Nuclear data for applied nuclear geophysics. Proceedings of a Consultants' Meeting on nuclear data for applied nuclear geophysics, organized by the IAEA, held in Vienna, 7-9 April 1986. V. Piksaikin, A. Lorenz, eds.
Report INDC(NDS)-184 (1987) 182 pages.

High resolution gamma-ray spectroscopy for well logging. K. Przewlocki, W.R. Mills, W.W. Givens.
Report INDC(NDS)-162 (1985) 108 pages.

Proceedings of the IAEA Consultants' Meeting on nuclear data for bore-hole and bulk-media assay using nuclear techniques, Krakow, Poland, 14-18 November 1983. K. Okamoto, ed.
Report INDC(NDS)-151 (1984) 348 pages.

Actinides nuclear data

Comparison of evaluations for U-235 and Pu-239,240,241,242 with integral measurements. A. Trkov.

Report INDC(YUG)-11 (1988) 77 pages.

Status of thorium cycle nuclear data evaluations: comparison of cross-section line shapes of JENDL-3 and ENDF/B-VI files for Th-230, Th-232, Pa-231, Pa-233, U-232, U-233 and U-234. S. Ganesan, P.K. McLaughlin.

Report INDC(NDS)-256 (1992) 138 pages.

IAEA Consultants' Meeting on the U-235 fast neutron fission cross section, and the Cf-252 fission neutron spectrum, Smolenice, CSSR, 28 March - 1 April 1983. H.D. Lemmel, D.E. Cullen, eds.

Report INDC(NDS)-146 (1983) 254 pages.

Handbook: Radiation and decay characteristics of long-lived radionuclides. V.P. Chechev, F.E. Chukreev.

Report INDC(CCP)-338 (1990/91).

Physics of fission neutron emission

Contributions to the theory of fission neutron emission. D. Seeliger, H. Märten, A. Ruben.

Report INDC(GDR)-57 (1990) 38 pages.

Nuclear data for neutron emission in the fission process. Proceedings of a Consultants' Meeting organized by the IAEA and held in Vienna, 22-24 October 1990.

S. Ganesan, ed.

Report INDC(NDS)-251 (1991) 252 pages.

Physics of neutron emission in fission. Proceedings of a Consultants' Meeting on Physics of neutron emission in fission organized by the IAEA and held in Mito City, Japan, 24-27 May 1988. H.D. Lemmel, ed.

Report INDC(NDS)-220 (1989) 339 pages.

Progress in fission-product nuclear data

M. Lammer, ed.

Issue 15	Report INDC(NDS)-379	(1998)	130 pages.
Issue 14.	Report INDC(NDS)-304	(1994)	119 pages.
Issue 13.	Report INDC(NDS)-222	(1990)	99 pages.
Issue 12.	Report INDC(NDS)-191	(1988)	100 pages.
Issue 11.	Report INDC(NDS)-168	(1985)	73 pages.
Issue 10.	Report INDC(NDS)-155	(1984)	75 pages.
Issue 9.	Report INDC(NDS)-143	(1983)	172 pages.
Issue 8.	Report INDC(NDS)-130	(1982)	186 pages.
Issue 7.	Report INDC(NDS)-116	(1981)	166 pages.
Issue 6.	Report INDC(NDS)-113	(1980)	134 pages.
Issue 5.	Report INDC(NDS)-102	(1979)	91 pages.
Issue 4.	Report INDC(NDS)-95	(1978)	99 pages.
Issue 3.	Report INDC(NDS)-86	(1977)	107 pages.
Issue 2.	Report INDC(NDS)-75	(1976)	57 pages.
Issue 1.	Report INDC(NDS)-70	(1975)	59 pages.

Fission reactor decommissioning

International benchmark calculations of radioactive inventory for fission reactor decommissioning. N.P. Kocherov, ed.

Report INDC(NDS)-355 (1996) 98 pages.

Nuclear data requirements for fission reactor decommissioning. Proceedings of the Advisory Group Meeting organised by the IAEA, Vienna, Austria, 7-11 September 1992. N.P. Kocherov, ed.

Report INDC(NDS)-269 (1993) 122 pages.

Nuclear fusion technology

Extension and improvement of the FENDL library for fusion applications (FENDL-2). Report on an IAEA Advisory Group Meeting, IAEA Headquarters Vienna, Austria, 3-7 March 1997. M. Herman and A.B. Pashchenko, eds.

Report INDC(NDS)-373 (1997) 38 pages.

Nuclear data for neutron multiplication in fusion-reactor first-wall and blanket materials. Texts of papers presented at the AGM organized by the IAEA in cooperation with Southwest Institute of Nuclear Physics and Chemistry (SWINPC) and held in Chengdu, China, 19-21 November 1990. Compiled by A.B. Pashchenko, D.W. Muir.

Report INDC(NDS)-281 (1993) 128 pages.

Nuclear data for fusion reactor technology. Proceedings of a conference in Karlsruhe, Germany, 23 October 1991. S. Cierjacks, ed.

Report KfK-5062 (1992) 120 pages.

Intermediate energy nuclear data

Intermediate energy nuclear data for applications. Proceedings of the Advisory Group Meeting organized by the IAEA, Vienna, 9-12 October 1990. N.P. Kocherov, ed.

Report INDC(NDS)-245 (1991) 200 pages.

Photonuclear data

Summary report of the 1st Research Coordination Meeting on compilation and evaluation of photonuclear data for applications, Obninsk, Russia, 3-6 December 1996. P. Oblozinsky, ed.

Report INDC(NDS)-364 (1997) 43 pages.

54. International Conferences on "Nuclear Data for Science and Technology"

Proceedings **NOT** available from IAEA, except for 1973, 1970, 1966.

1997 in Trieste, Italy. G. Reffo, A. Ventura, C. Grandi (eds.), two volumes by Italian Physical Society, 1997.

1994 in Gatlinburg, Tennessee, U.S.A. J.K. Dickens (ed.), two volumes by American Nuclear Society, 1994.

1991 in Jülich, Germany. S.M. Qaim (ed.), publ. by Springer-Verlag, Germany, 1992.

1988 in Mito, Japan. S. Igarasi (ed.), publ. by Saikon Publishing Co., 1988.

1985 in Santa Fe, N.M., U.S.A., "Nuclear Data for Basic and Applied Science", 1985.

1982 in Antwerp, Belgium. K.H. Böckhoff (ed.), publ. by D. Reidel Publishing Co., 1983.

1979 in Knoxville, Tennessee, U.S.A., "Nuclear Cross-Sections for Technology", J.L. Fowler, C.H. Johnson, C.D. Bowman (eds.), publ. by U.S. Dept. of Commerce as NBS Special Publ. 594, 1980.

1975 in Washington, D.C., U.S.A., "Nuclear Cross-Sections and Technology", R.A. Schrack, C.D. Bowman (eds.), publ. by U.S. Dept. of Commerce as NBS Special Publ. 425, 2 vols., 1975.

1973 in Paris, France, "Applications of Nuclear Data in Science and Technology", published by IAEA as STI/PUB/343, 2 vols., 1973.

1971 in Knoxville, Tennessee, U.S.A., "Neutron Cross-Sections and Technology", J.A. Harvey, R.L. Macklin (eds.), publ. by U.S. Dept. of Commerce as CONF-710301, 2 vols., 1971.

1970 in Helsinki, Finland, "Nuclear Data for Reactors", J.J. Schmidt, V. Konshin (eds.), published by IAEA as STI/PUB/259, 2 vols., 1970.

1968 in Washington, D.C., U.S.A., "Neutron Cross-Sections and Technology", D.T. Goldman (ed.), publ. by U.S. Dept. of Commerce as NBS Special Pub. 299, 2 vols., 1968.

1966 in Paris, France, "Nuclear Data for Reactors", published by IAEA as STI/PUB/140, 2 vols., 1967.

1966 in Washington, D.C., U.S.A., "Neutron Cross-Section Technology", P.B. Henning (ed.), publ. by U.S. Atomic Energy Commission as CONF-660303, 2 vols., 1966.