INDC International Nuclear Data Committee

Summary Report of the Technical Meeting on
International Network of Nuclear Reaction Data Centres

IAEA Headquarters, Vienna, Austria
9 – 12 April 2019

Prepared by
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IAEA Nuclear Data Section, Vienna, Austria

and

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OECD NEA Data Bank, Boulogne Billancourt, France

June 2019
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Abstract

This report summarizes the IAEA Technical Meeting on the International Network of Nuclear Reaction Data Centres held at the IAEA Headquarters in Vienna, Austria from 9 to 12 April 2019. The meeting was attended by 16 participants representing 12 cooperative Centres from eight Member States (China, Hungary, India, Japan, Korea, Russia, Ukraine and USA) and two International Organisations (NEA, IAEA) as well as a participant from Kazakhstan. A summary of the meeting is given in this report along with the conclusions and actions.
Technical Meeting on International Network of Nuclear Reaction Data Centres
IAEA Headquarters, Vienna, Austria, 9 – 12 April 2019

from left to right
Viktor Zerkin, IAEA
Timur Zhokdybayev, Kazakhstan
Galina Päkulina, Russian Federation
Wang Jimin, China
Sophiya Taova, Russian Federation
Sung-Chul Yang, Republic of Korea
Olena Gritzay, Ukraine
Tetsuaki Tada, Japan
Michael Fleming, NEA
Arjan Koning, IAEA
Naohiko Otsuka, IAEA

Jean-Christophe Sublet, IAEA
Shin Okumura, IAEA
Sandor Takács, Hungary
Marina Mikhailiukova, Russian Federation
Vladimir Varlamov, Russian Federation
Masaaki Kimura, Japan
Otto Schwerer, Austria
Vidya Devi, India
Joseph (Mark) Mawdsley, IAEA
Svetlana Dunaeva, Russian Federation
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THE INTERNATIONAL NETWORK OF NUCLEAR REACTION DATA CENTRES

National, regional and specialized nuclear reaction data centres, coordinated by the International Atomic Energy Agency, cooperate in the compilation, exchange and dissemination of nuclear reaction data in order to meet the requirements of nuclear data users in all countries. At present, the following data centres participate in the network:

- **NNDC** US National Nuclear Data Center, Brookhaven National Laboratory, Upton, USA
- **NEA DB** OECD NEA Data Bank, Boulogne-Billancourt, France
- **NDS** IAEA Nuclear Data Section, Vienna, Austria
- **CJD** Russian Nuclear Data Centre, Institute of Physics and Power Engineering, Obninsk, Russia
- **CNDC** China Nuclear Data Centre, China Institute of Atomic Energy, Beijing, China
- **ATOMKI** Charged-Particle Nuclear Reaction Data Group, Institute for Nuclear Research (ATOMKI), Debrecen, Hungary
- **NDPCI** Nuclear Data Physics Centre of India, Bhabha Atomic Research Centre, Trombay, Mumbai, India
- **JAEA/NDC** Nuclear Data Center, Japan Atomic Energy Agency, Tokai-mura, Japan
- **JCPRG** Nuclear Reaction Data Centre, Hokkaido University, Sapporo, Japan
- **KNDC** Nuclear Data Center, Korea Atomic Energy Research Institute, Daejeon, Republic of Korea
- **CDEV** Centre for Photonuclear Experiments Data, Moscow State University, Moscow, Russia
- **CNPD** Centre of Nuclear Physics Data, Institute of Nuclear and Radiation Physics, Russian Federal Nuclear Center –All-Russia Research Institute of Experimental Physics, Sarov, Russia
- **UkrNDC** Ukrainian Nuclear Data Centre, Institute for Nuclear Research, Kyiv, Ukraine

A detailed description of the objectives of the network and the contributions of each Centre to these activities are given in INDC(NDS)-401 (Rev.6), "International Network of Nuclear Reaction Data Centres".
### PREVIOUS NRDC MEETINGS

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LIST OF ACRONYMS

ATOMKI  Nuclear Research Institute, Debrecen, Hungary
BARC  Bhabha Atomic Research Centre, Trombay, Mumbai, India
BNL Brookhaven National Laboratory, Upton, New York, USA
BROND Russian Evaluated Neutron Reaction Data Library
C4 Computational format for EXFOR data
CAJad Centre for Nuclear Structure and Reaction Data, Kurchatov Institute, Moscow, Russia
CDFE Centr Dannykh Fotojad. Eksp., Moscow State University, Russia
CENDL Chinese Evaluated Neutron reaction Data Library
CHEX EXFOR check program (originating from NNDC)
CIAE Chinese Institute of Atomic Energy, Beijing, China
CINDA A specialized bibliography and data index on nuclear reaction data operated by NRDC
CJD Russian Nuclear Data Centre, IPPE, Obninsk, Russia
CNDC China Nuclear Data Centre, CIAE, Beijing, China
CNPD Centre of Nuclear Physics Data at RFNC-VNIIEF, Sarov, Russia
CP... Numbering code for memos exchanged within the NRDC
CPND Charged-particle nuclear reaction data
CRP Coordinated Research Project (of the IAEA Nuclear Data Section)
CSEWG US Cross Section Evaluation Working Group
DOI Digital Object Identifier, e.g. for bibliographic references
EMPIRE A code system for nuclear reaction model calculations
ENDF-6 International format for evaluated data exchange, version 6
ENDF/B US Evaluated Nuclear Data File/B
ENSDF Evaluated Nuclear Structure Data File
EXFOR Format for the international exchange of nuclear reaction data
GSYS Data digitizing system by JCPRG
IAEA International Atomic Energy Agency, Vienna, Austria
IBANDL Ion Beam Analysis Nuclear Data Library, maintained at IAEA
INDC International Nuclear Data Committee
IPPE Institute of Physics and Power Engineering, Obninsk, Russia
IRDFF International Reactor Dosimetry and Fusion File, maintained by the IAEA-NDS
JAEA Japan Atomic Energy Agency
JANIS  Java Nuclear Information System of NEA-DB
JCPRG  Nuclear Reaction Data Centre, Hokkaido University, Sapporo, Japan
JEFF   Joint Evaluated Fission and Fusion File, coordinated by NEA-DB
JENDL  Japanese Evaluated Nuclear Data Library
KAERI  Korea Atomic Energy Research Institute, Daejeon, Korea
KNDC   Nuclear Data Center, KAERI, Daejeon, Korea
KINR   Kyiv Institute of Nuclear Research
LEXFOR Part of the EXFOR manual containing physics information for compilers
MBDAV  Management Board for the Development, Application and Validation of Nuclear Data and Codes
NDS    IAEA Nuclear Data Section, Vienna, Austria
NEA    OECD Nuclear Energy Agency, Boulogne-Billancourt, France
NEA-DB OECD/NEA Data Bank, Boulogne-Billancourt, France
NEANDC OECD/NEA Nuclear Data Committee
NNDC   National Nuclear Data Center, Brookhaven National Laboratory, USA
NRDC   International Network of Nuclear Reaction Data Centres
NRDF   Japanese Nuclear Reaction Data File
NSDD   International Network of Nuclear Structure and Decay Data Evaluators
NSC    OECD/NEA Nuclear Science Committee
NSR    Nuclear Science References, a bibliographic system
OECD   Organization for Economic Cooperation and Development, Paris, France
ORDER  EXFOR program for addition of record identification
PhND   Photonuclear data
RIKEN  Institute of Physics and Chemistry Research, Wako-Shi, Saitama, Japan
TALYS  A code system for prediction of nuclear reactions and generation of nuclear data
TRANS  Name of transmission tapes for data exchange in the EXFOR system
UKRNDC Ukraine Nuclear Data Centre at KINR, Kyiv, Ukraine
VNIIEF  Russian Federal Nuclear Centre, Sarov, Russia
WPEC   Working Party on International Nuclear Data Evaluation Co-operation
XTRACT EXFOR indexing program
X4TOC4 Conversion program from EXFOR to computational format “C4”
ZCHEX  Current version of CHEX, updated and maintained by NDS
4C...  Numbering code of memos exchanged among the four Neutron Data Centres
MEETING SUMMARY

1. Introduction
The IAEA Technical Meeting on the International Network of Nuclear Reaction Data Centres was held at the IAEA Headquarters in Vienna, Austria from 9 to 12 April 2019. The meeting was attended by 16 participants representing 12 cooperative Centres from eight Member States (China, Hungary, India, Japan, Korea, Russia, Ukraine and USA) and two International Organisations (NEA, IAEA) as well as a participant from (see Appendix A). Meetings of this network are held annually, with full meetings involving Centre Heads and technical staff every two years. (The last full meeting was held in May 2018 at the Global Centre for Nuclear Energy Partnership (GCNEP) in Bahadurgarh, Haryana, India.

Main topics of the present meeting were various statistics, manuals and dictionaries, compilation needs, quality control, coding rules as well as software and dissemination (see Appendix B). The results of the discussions were summarized in 27 conclusions and 78 actions (see Appendix C).

2. Brief Summary
2.1 Opening
A. Koning, Head of IAEA Nuclear Data Section welcomed the participants, and the participants introduced themselves. M. Fleming was elected as the chairperson, and the agenda was adopted.

2.2 Progress Reports
Progress reports from all 12 attending Centres were presented by M. Mikhailiukova, V. Varlamov, T. Tada, S. Taova, O. Gritzay, A. Koning, S.C. Yang, S. Takács, V. Devi, M. Fleming, Wang Jiming and B. Pritychenko, who highlighted the staffing, compilation, dissemination and other nuclear data related activities of interest to the network. See progress reports P2019-01 to P2019-11 (Appendix D) for further details.

2.3 EXFOR General
N. Otsuka presented the statistics of transmissions, journal scanning and preliminary tape checking. He reported that 448 new entries and 976 revised entries have been newly finalized since the last NRDC meeting.

S. Okumura reported that NDS regularly scans 40 journals since the last NRDC meeting. She emphasized that the journals in NRDC Protocol Appendix B (Scanning responsibility) and not regularly scanned by NDS must be scanned by other centres.

2.4 Manuals and Dictionaries
M. Mikhailiukova proposed a new LEXFOR chapter "Kerma factor", which was approved.

N. Otsuka proposed elimination of the sentence “the institute determining the compilation responsibility is given first.” from LEXFOR “Institute”, and it was approved.

N. Otsuka demonstrated new web quantity dictionaries which relate the quantity name and REACTION SF3-SF8 (e.g., “Elastic scattering Rutherford ratio” → SF3=EL, SF6=DA and
SF8=RTH) to make EXFOR search for a specific quantity easier for those who are not familiar with the EXFOR rule, and performed demonstration using the JCPRG EXFOR web retrieval system (http://www.jcprg.org/exfor/).

2.5 CINDA
V. Zerklin reported that automatic updates of CINDA database using the EXFOR and NSR databases have been performed 8 times (from May 2018 to December 2018) after every update of NSR received from NNDC, and a MySQL dump of the complete CINDA database was sent to NNDC (USA), BARC (India), CNDC (China) and “Atomstandart” (Russia).

2.6 EXFOR Compilation Needs
B. Pritychenko reported the result of a cross-check between EXFOR and NSR for references containing fission yield data for spontaneous fission, photofission and neutron-induced fission. S. Okumura also reported the result of a cross-check between EXFOR and citation lists of ENDF-B/VI (England and Rider) and UKFY3 (Mills) evaluation reports for references containing fission yield data. Participants agreed to put an action to centres for compilation of the fission product yield data identified as missing in EXFOR during these assessments.

O. Gritzay propose a new keyword SUPPL-INF (supplemental information) and coding rules under this keyword for accommodation of supplemental numerical data such as neutron source spectra and neutron detection resolution (response) functions, and they were approved.

2.7 EXFOR Quality Control
V. Varlamov reported that Vestnik Moskovskogo Universiteta – Seriya III, Fizika i Astronomiya (VMU) published in 1948 to 1969 and 1996 to the present do not have volume numbers.

2.8 EXFOR Coding Rule
O. Schwerer reviewed the usage of the keyword RAD-DET and its relation to DECAY-DATA and PART-DET. After summarizing the difference between these three keywords and actual usage of RAD-DET in various EXFOR areas, he discussed relevant paragraphs in the EXFOR Formats Manual and LEXFOR, and also presented examples of good and redundant usage of RAD-DET. He finally proposed participants to check usage of RAD-DET whenever an entry containing this keyword is retransmitted, and to delete this keyword when it is redundant.

O. Schwerer pointed out the use of the branch code M- is confusing in many cases, and proposed to limit its use when it appears as CUM/M-. N. Otsuka supported his proposal, and proposed to use the branch code IND only in combination with the parameter code FY. These proposals were accepted after considering the comments on the usage of M- from S. Takács and S.C. Yang.

M. Mikhailiukova presented the same data set compiled in two subentries 41202.002 (STATUS=CURVE, uncertainties given for all data points) and 41224.002 (STATUS=SCSRS, uncertainties given except for three data points). The participants concluded that EXFOR 41224 will be merged into EXFOR 41202 after deletion of 41224.002.

2.9 Tools for Compilation and Dissemination
G. Pikulina introduced “TRANS mode” implemented in the EXFOR-Editor Ver.4.0. This mode allows users various operations for preparation of a tape (e.g., sorting, ordering, checking, plotting).
V. Zerkin presented and demonstrated recent developments of EXFOR-CINDA-ENDF-IBANDL web database retrieval system and other data services such as plotting of fission product yield related quantities via C4/C5 by ZVView and pdf database statistics.

2.10 Other Business

A. Lewis reported problems in the uncertainty information coded under the keyword ERR-ANALYS progress and proposed use of an uncertainty template for more consistent and complete reporting of the uncertainty information.

T. Zholdybayev reported progress in compilation of data measured by his institute. He reported that five new EXFOR entries were compiled from newly published articles since the last NRDC meeting. He also reported progress in compilation of data published in old articles by scanning (1) the Kazakh journal “Izvestya of Kazakh Academy of Science” (for creation of four new entries), and (2) preprints and laboratory logbooks kept in his institute (for revision of ten entries).

Wang Jimin (on behalf of Ge Zhigang) presented the preparation status of the ND2019 conference such as the committee members, statistics of abstracts and conference venue.

2.11 Closing

N. Otsuka proposed the dates and places for the next full NRDC meeting (Vienna, Austria, 18 to 22 May 2020) and the next technical NRDC meeting (Vienna, 2nd quarter of 2021), and they were approved.

The participants reviewed the draft of the Conclusions and Actions.

M. Fleming called an adjournment of the meeting, and the participants thanked for his excellent chairmanship.
# LIST OF PARTICIPANTS

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<tr>
<td>Russia</td>
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<td>Mr Vladimir VARLAMOV</td>
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<td>Ukraine</td>
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17
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AGENDA

Tuesday, 9 April 2019

9:30 – 13:00

1. Opening Items
   1.1 Welcome address 10 min A. Koning
   1.2 Self-introduction 10 min All
   1.3 Announcement 5 min L. Vrapcenjak
   1.4 Election of chairperson, adoption of the agenda, announcements

2. Progress Reports
   2.1 CJD (Obninsk, Russia) 10 min P2019-01 M. Mikhailiukova
   2.2 CDFE ((Moscow, Russia) 10 min P2019-02 V. Varlamov
   2.3 JCPRG (Sapporo, Japan) 10 min P2019-03 T. Tada
   2.4 CNPD (Sarov, Russia) 10 min P2019-04 S. Taova
   2.5 UkrNDC (Kyiv, Ukraine) 10 min P2019-05 O. Gritzay
   2.6 NDS (Vienna, Austria) 10 min P2019-06 A. Koning
   2.7 KNDC (Daejeon, Korea) 10 min P2019-07 S.C. Yang
   2.8 ATOMKI (Debrecen, Hungary) 10 min P2019-08 S. Takács
   2.9 NDPCI (Mumbai, India) 10 min P2019-09 V. Devi
   2.10 NEA DB (Paris, France) 10 min P2019-10 M. Fleming
   2.11 CNDC (Beijing, China) 10 min P2019-11 Wang Jimin
   2.12 NNDC (Upton, USA) 10 min B. Pritychenko

14:00 – 18:00

3. EXFOR Statistics and Coverage
   3.1 Transmission statistics since the last NRDC meeting 10 min WP2019-02 N. Otsuka
   3.2 Status of new article compilation (A1) 10 min WP2019-03 N. Otsuka
   3.3 Statistics of review and finalization of preliminary tapes 10 min WP2019-04 S. Okumura
   3.4 New publications scanned by NDS 10 min WP2019-05 S. Okumura
   3.5 Retroactive scanning of regularly scanned journals (CP-D/972) 10 min WP2019-06 S. Selyankina
   3.6 Progress in correction of items on Feedback List (A2) 10 min WP2019-07 N. Otsuka
   3.7 Other actions (A3) 10 min Chairperson

4 Manuals and Dictionary
4.1 LEXFOR “Sums” and EXFOR Formats “Sample” (A8, CP-D/964) 10 min WP2019-08 N. Otsuka
4.2 REACTION codes with SF6=POL and SF8=ASY (CP-D/970) 10 min WP2019-09 N. Otsuka
4.3 Chapter "Kerma factor" for LEXFOR (4C-4/219) 10 min WP2019-10 M. Mikhailiukova
4.4 LEXFOR “Institute” (CP-D/976) 20 min WP2019-11 N. Otsuka
4.5 New web quantity (CP-D/975) 20 min WP2019-12 N. Otsuka
4.6 New codes proposed by NEA DB (CP-N/146, CP-N/147, CP-N/149) 10 min WP2019-13 M. Fleming
4.6 Other actions (A4-A7, A9-A12) 10 min WP2019-01 Chairperson

160 min

Wednesday, 10 April 2019

9:30 – 13:00

5 CINDA
5.1 Status of CINDA database (A13) 10 min WP2019-14 V. Zerkin

6 EXFOR Compilation Needs
6.1 Compilation of articles from completeness checking (A14) 10 min WP2019-15 N. Otsuka
6.2 Completeness checking for articles published in JET (Vols. 1 to 127, CP-D/971) 10 min WP2019-16 S. Selyankina
6.3 Results of scanning of 57MOSCOW and 60MOSCOW (CP-F/018) 10 min WP2019-17 S. Dunaeva
6.4 Compilation of articles with priority (A15-A25) 10 min WP2019-18 N. Otsuka
6.5 EXFOR/NSR completeness checking: Fission product yields (CP-C/464, CP-C/465, CP-C/466) 20 min WP2019-19 B. Pritychenko
6.6 Experimental fission product yields adopted in ENDF and UKFY evaluation but missing in EXFOR (A29) 20 min WP2019-20 S. Okumura
6.7 New keyword - SUPPL-INF (A32, CP-D/965 Rev) 10 min WP2019-21 O. Gritzay
6.8 Atomic data compilation in EXFOR Library (CP-C/468) 20 min WP2019-22 B. Pritychenko
6.9 Other actions (A26-A28, A30-A31, A33) 10 min WP2019-01 Chairperson

140 min

20
14:00 – 18:00

7  EXFOR Quality Control

7.1 Pending corrections (A34-A44) 10 min WP2019-23 N. Otsuka
7.2 Volume numbers for VMU (Vestnik Moskovskogo Universiteta - Seriya III, Fizika i Astronomiya) (A49, CP-M/036) 10 min WP2019-24 V. Varlamov
7.3 Bibliographic errors in EXFOR (CP-N/148) 10 min WP2019-25 M. Fleming
7.4 Other actions (A45-A48, A50-A54) 20 min WP2019-01 Chairperson

8  Software and Dissemination

8.1 Functionality enhancement of the EXFOR-Editor software package for experimental nuclear data compilation into the EXFOR format 20 min WP2019-26 G. Pikulina
8.2 Recent development of “EXFOR-CINDA-ENDF-IBANDL” Web database retrieval system, PDF database, Web tools and software (A71-A80) 50 min V. Zerkin
8.3 2D image calibration in digitizing process (A81) 90 min V. Zerkin
8.4 Other actions (A56-A70, A82-A83) 10 min WP2019-01 Chairperson

170 min

19:00 –
Social dinner (Georgsaal, Salm Bräu - Rennweg 8, 1030 Wien)

Thursday, 11 April 2019

9  EXFOR Coding Rule

9.1 Usage of RAD-DET and its relation to DECAY-DATA and PART-DET (CP-C/393) 30 min WP2019-27 O. Schwerer
9.2 Coding isomeric cross sections (CP-C/467) 30 min WP2019-28 O. Schwerer
9.3 Simplification of REACTION codes for independent (IND) quantities (CP-D/977) 30 min WP2019-29 N. Otsuka
9.4 Pn value determined as ratio of delayed neutron multiplicity to fission yield (4C-3/414 Rev.) 10 min WP2019-30 N. Otsuka

21
9.5 Illegal REACTION SF2=SF3 (CP-D/960) 10 min WP2019-31 N. Otsuka
9.6 Status code NCHKD (CP-D/973) 20 min WP2019-32 N. Otsuka
9.7 Fission yield ratios (isomeric ratio and fractional yield) (CP-D/974) 10 min WP2019-33 N. Otsuka
9.8 Conference proceedings published in report series (CP-D/968) 10 min WP2019-34 N. Otsuka
9.9 Discussion of data from Subents 41202.002 and 41224.002 (4C-4/222) 10 min WP2019-35 M. Mikhailiukova
9.9 Other actions (A55) 10 min WP2019-01 Chairperson

14:00 – 18:00

10. Other items
10.1 EXFOR: fortified to better serve 30 min J.-C. Sublet
10.2 Incorporation of uncertainty templates into EXFOR 30 min A. Lewis
10.3 Compilation of experimental nuclear reaction data from Central Asia 10 min WP2019-36 T. Zholdybayev

80 min

Friday, 12 April 2019

9:30 – 13:00

11. Closing
11.1 Dates and places of next meetings 10 min N. Otsuka
11.2 Review of actions and conclusions 60 min Chairperson
11.3 Closing address 10 min

80 min
CONCLUSIONS AND ACTIONS

Conclusions

General

C1  The next full NRDC meeting will be held in Vienna, Austria between 18 and 22 May 2020 (4 or 5 days). N.B. 1 July 2020 is the 50th anniversary of the first EXFOR exchange.

C2  Each Centre will be encouraged to submit an item for addition in the agenda of the planned 50th anniversary session of the next full NRDC meeting (e.g., short presentation about the history of the relation between the centre and NRDC).

C3  The next technical NRDC meeting will be held in Vienna, Austria in the 2nd quarter of 2021.

C4  The next EXFOR compilation workshop will be held in Vienna, Austria in the 4th quarter of 2020.

EXFOR Statistics and Coverage

C5  NNDC will scan each issue of IMP/E, and provide the results to NDS.

Manuals and Dictionary

C6  Revision of EXFOR Formats Manual “SAMPLE” and LEXFOR “Sums” (CP-D/964 =WP2019-08) was approved after replacing “412 keV gamma” with “412 keV prompt gamma”.

C7  Revision of LEXFOR “Polarization” (CP-D/970=WP2019-09) was approved.

C8  Addition of LEXFOR “Kerma factors” (4C-4/219=WP2019=10) was approved.

C9  Revision of LEXFOR “Institute” (CP-D/976=WP2019-11) was approved after the elimination of the sentence “The sequence of the institutes should be the same as in the primary reference.”.

C10 Two new dictionaries (Dictionaries 114 and 115) are ready for testing by retrieval systems.

C11 New codes (TER,FY,,RES; CI/AECMEV; ISP,SIG; ,DA,,RS/TMP) proposed by NEA Data Bank (CP-N/146, 147 and 149=WP2019-13) were approved.

C12 Creation of Dictionary 38 (Supplemental information) proposed in CP-D/965 Rev=WP2019-21 was approved.
EXFOR Compilation Needs

C13 Completeness of fission product yields in EXFOR was checked by two independent methods – (1) checking of EXFOR against NSR (CP-C/464, 465 and 466=WP2019-19), and (2) checking of EXFOR against citation lists of evaluation summary by Mills for UKFY and England & Rider for ENDF (WP2019-20).

C14 New keyword SUPPL-INF (supplemental information) and relevant update of manuals (EXFOR Formats Manual “REACTION” and “SUPPL-INF” as well as LEXFOR “Supplemental information”) proposed in CP-D/965 Rev=WP2019-21 were approved. Note that only two keywords SUPPL-INF and HISTORY are allowed in the BIB section providing the supplemental information.

C15 The ENDF library community needs an experimental atomic reaction database for validation purposes.

EXFOR Quality Control

C16 Volume numbers of VMU (Vestnik Moskovskogo Universiteta – Seriya III, Fizika i Astronomiya) are absent for the issues published in 1948 to 1969 and 1996 to the present.

EXFOR Coding Rule

C17 Revisions of the EXFOR Formats Manual and LEXFOR proposed by Memo CP-C/393=WP2019-27 were approved.

C18 Redundant information should be included only when there is a good reason specific to the entry. Furthermore, the length of a BIB section should not be increased when neither additional information nor a better explanation is offered - this makes the entry less user friendly. (c.f. CP-C/393=WP2019-27)

C19 Revision of LEXFOR “Independent and cumulative data” proposed in Memo CP-D/977 Rev. (= WP2019-29 Rev.) was approved.

C20 The branch code IND will be used only when SF6=FY.

C21 Revisions of LEXFOR “Data type” and “Delayed fission neutrons” proposed in Memo 4C-3/414 Rev.=WP2019-30 were approved.

C22 The code coded in REACTION SF2 cannot be repeated in REACTION SF3 (c.f. CP-D/960=WP2019-31).

C23 The expansion of the status code NCHKD will be “authenticity not confirmed”. The code is used only when there is no other status code applicable (e.g., NDD, SCSRS). However, the data tabulated or plotted by other than the experimentalist will not be compiled in the future. Revision of LEXFOR “Status” proposed by Memo CP-D/973=WP2019-32 was approved.
Revision of LEXFOR “Ratios” and “Fractional” as well as dictionary updates proposed in Memo CP-D/974=WP2019-33 were approved.

Conference proceedings published in CEA-CONF, CONF, NBS-SPEC-PUB or STI/PUB report should be coded with the conference code.

EXFOR 41224 will be merged into EXFOR 41202 after deletion of 41224.002 (4C-4/222=WP2019-35).

Tools for Compilation and Dissemination

The CNPD EXFOR-Editor has a new function to assemble EXFOR entries to prepare a TRANS tape.

The EXFOR leaflet was edited by CNPD, which has been printed by CNDC and distributed via the NRDC.

Compilers are encouraged to inform the NSR compiler(s) if EXFOR entries are deleted or modified in such a way that affects the NSR database.

Actions

EXFOR Statistics and Coverage

A1 All (Standing action) Give the highest priority to compilation of new articles.

A2 All (Standing action) Correct erroneous entries listed on the EXFOR Feedback List according to the indicated priorities. All urgent corrections must be done by the next meeting.

A3 Otsuka (Continuing action) Send transmission statistics and correction statistics to centres every three months.

Manuals and Dictionaries

A4 Otsuka (Continuing action) Update Dictionaries every four months.
A5  Otsuka  (Continuing action) Revise the EXFOR Formats Manual for

(1) “DECAY-DATA” and “RAD-DET” (CP-D/874=WP2016-28),
(2) “Reaction specification” (CP-D/880 Rev.=WP2016-29, CP-D/896=WP2016-33, CP-N/143=WP2018-12),
(3) “LEVEL-PROP” (CP-D/882=WP2016-30),
(4) “ERR-ANALYS” (CP-D/894 Rev.=WP2016-32),
(5) “FACILITY” (CP-D/899=WP2016-34),
(6) “REFERENCE” (CP-C/452=WP2017-08, CP-D/920=WP2017-33, CP-D/953Rev=WP2018-08, NRDC2018 Conclusion 4),
(7) “STATUS” (CP-D/915=WP2017-09),
(8) “INC-SPECT” (CP-D/932=WP2017-31),
(9) BIB Section (CP-D/942=WP2018-09),
(10) “SAMPLE” (CP-D/964=WP2019-08),
(11) “REACTION” and “SUPPL-INF” (CP-D/965 Rev.=WP2019-21).

A6  Otsuka  (Continuing action) Revise LEXFOR for

(1) "Thermal Neutron Scattering" (4C-3/403 =WP2016-08),
(2) “Fission Yields” (CP-D/895=WP2016-09),
(3) “Thick- and thin-target yields” (CP-D/893=WP2016-31),
(4) “Isomeric flags” (CP-D/896=WP2016-33),
(5) “Status” (CP-D/904=WP2016-35, CP-C/443=WP2016-36),
(6) “Sample” (CP-D/928=WP2017-35),
(7) “Multilevel Resonance Parameters” (CP-D/953Rev=WP2018-08),
(8) “Reference” (CP-D/953Rev=WP2018-08),
(9) "Thermonuclear reaction rate" (CP-D/956=WP2018-11),
(10) “Sums” (CP-D/964=WP2019-08),
(11) “Polarization” (CP-D/970=WP2019-09),
(12) “Kerma factor” (4C-4/219=WP2019-10),
(13) “Institute” (CP-D/976=WP2019-11),
(15) “Decay data” and “Outgoing particles” (CP-C/393=WP2019-27),
(16) “Independent and Cumulative data” (CP-D/977 Rev.=WP2019-29 Rev.),
(17) “Data type” and “Delayed fission neutrons” (4C-3/414 Rev.=WP2019-30) but removing SF5=IND,
(18) “Status” (CP-D/973=WP2019-32),
(19) “Ratios” (CP-D/974=WP2019-33),
(20) “Fission yields” (CP-D/974=WP2019-33).

A7  Zerkin Fleming  (Continuing action) Summarize the role of family flags (also known as family codes, c.f. EXFOR Formats Manual Chapter 6) in ZCHEX (c.f. WP2017-11) and verify their potential use in JANIS.
A8 Otsuka  Propose a revised NRDC Protocol Appendix B “Scanning responsibility” for elimination of journals assigned to a centre but also scanned by NDS (c.f. WP2019-05).

A9 Zerkin Otsuka  Propose a numbering scheme for compound codes defined in Dictionary 209.

A10 Otsuka  Check if we can make the process code EC (electron capture) obsolete.


**CINDA**

A12 Zerkin  (Continuing action) Export EXFOR to CINDA, and distribute it to other Centres every month.

A13 Zerkin Sublet  Keep NRDC informed about the situation about import of NSR to CINDA.

**EXFOR Compilation Needs**

(Underlined items are registered in the Article Allocation List.)

A14 Fleming  (Continuing action) Compile with priority the articles cited in the NACRE II (an update and extension of European Compilation of Reaction Rates for Astrophysics) listed in Tables 1 and 2 of CP-D/833.

A15 Pritychenko  (Continuing action) Compile with priority articles related to the neutron dosimetry cross sections listed in the second table of CP-D/838.

A16 Pritychenko  (Continuing action) Compile the thermal neutron-induced reaction data cited in Mughabghab’s “Atlas of Neutron Resonances” and listed in 4C-3/395.

A17 Pritychenko  (Continuing action) Compile with priority prompt fission neutron multiplicities listed in CP-D/871.

A18 Fleming Pritychenko  (Continuing action) Compile articles presented in Reactor Dosimetry Symposia listed in 4C-3/400=WP2016-16.


A20 Pritychenko  (Continuing action) Compile Pn values adopted in Rudstam’s review (4C-3/410=WP2018-20).
A21 Pritychenko Tada  
(Continuing action) Compile with priority the proton-induced isotope production cross sections listed in CP-D/725 Rev. (~WP2012-19). Notify Okumura if the assigned centre does not compile the high energy (E > 1 GeV) data in the list.

A22 Pritychenko Taova  
(Continuing action) Compile with priority the articles related to ion beam analysis application listed in CP-D/832 Rev.

A23 Pritychenko Tada Taova  
(Continuing action) Compile with priority the light charged-particle induced isotope production cross sections listed in CP-D/757. Notify Okumura if the assigned centre does not compile the high energy (E > 1 GeV) data in the list.

A24 Pritychenko Tada  
(Continuing action) Compile with priority the neutron source spectra listed in CP-D/700 (Rev.3).

A25 Devi Fleming Gritzay Mikhailiukova Okumura Pritychenko Tada Varlamov Wang  
Compile articles reporting experimental fission product yields and listed in CP-C/464, 465 and 466. Inform Okumura if an article in the lists is not for EXFOR compilation. Transmit EXFOR entries relevant to these lists (and WP2019-20) separately from other EXFOR entries.

A26 Fleming Devi Mikhailiukova Wang Okumura Pritychenko  
Compile articles reporting experimental fission product yields and listed in WP2019-20. Inform Okumura if an article in the list is not for EXFOR compilation. New and revised EXFOR entries relevant to these lists must be transmitted separately from other EXFOR entries. Transmit EXFOR entries relevant to this list (and CP-C/464, 465 and 466) separately from other EXFOR entries.

A27 Pritychenko  
Compile deuteron-induced reaction data compiled by the Frascati group and listed in CP-D/758.

A28 Gritzay  
Compile articles published in the “Nuclear Spectroscopy and Structure” (Nucleus) conference proceedings and listed in CP-D/881.

A29 Gritzay Okumura Taova  
Compile articles published in JEL and listed in CP-D/952.

A30 Gritzay  
Compile data measured with filtered neutrons measured at the KINR research reactor with numerical neutron spectra.

A31 Pritychenko  
(Continuing action) Monitor availability of P.E. Koehler’s time-of-flight spectra on DVDs received from ORELA in 2015 for EXFOR compilation.
A32 Pritychenko  (Continuing action) Compile $^{238}\text{U}(n,f)$ cross sections in Table 4.6 of Zchariah W. Miller’s thesis (Univ. of Kentucky, 2015).

A33 Fleming Sublet  (Continuing action) Receive the experimental fission product yield data collected by Robert Mills. Identify the numerical data sets missing in EXFOR once they are received.

A34 Pritychenko  (Continuing action) Perform EXFOR completeness checking for the list of articles (4C-3/401, articles cited in S. Mughabghab’s “Atlas of Neutron Resonances”) to identify articles missing in EXFOR, and assign responsibility of compilation of the identified articles to centres by a memo.

A35 Zhokdybayev  (Continuing action) Scan domestic publications (e.g., journals, laboratory reports) to identify articles for EXFOR compilation.

**EXFOR Quality Control**  
(Underlined items are registered in the EXFOR Feedback List.)

A36 Varlamov  (Continuing action) Correct reference code for VMU, and add its English translation (MUPB) under REFERENCE in M0293.001 as listed in CP-F/015=WP2018-26.

A37 Mikhailiukova  (Continuing action) Add English translation information of Russian journals (KSF, FCY, ZET, ZTF) under REFERENCE as listed in Memo CP-D/957=WP2018-24.

A38 Mikhailiukova Varlamov  (Continuing action) Correct reference codes including the year of publication in the volume number field listed in Memo 4C-4/216. (N.B. CJD reported progress in correction in Memo 4C-4/218).

A39 Fleming Mikhailiukova Pritychenko  Revise REACTION codes coded with SF6=POL and SF8=ASY listed in Memo CP-D/970=WP2019-09.


A41 Pritychenko  Revise illegal REACTION codes (SF2=SF3) listed in CP-D/960=WP2019-31.

A42 Okumura  Revise EXFOR entries having STATUS=NCHKD listed in CP-D/973=WP2019-32.

A43 Mikhailiukova  Check if TABLE can replace NCHKD by checking the source articles for 15 entries listed in CP-D/973=WP2019-32.
Replace the report code with conference code in EXFOR 13224 (CP-D/968=WP2019-34).

Merge EXFOR 41224 into EXFOR 41202 after deletion of 41224.002 (4C-4/222=WP2019-35).

(Continuing action) Consider addition of numerical data which are not superseded (SPSDD) and suitable for digitization, but still unobtainable (UNOBT) for neutron-induced reaction data published in old literature for $^1$H, $^{16}$O, $^{56}$Fe, $^{235}$U, $^{238}$U and $^{239}$Pu.

(Continuing action) Check the n-p scattering data set in EXFOR 22207.002 (G. Fink) against G. Fink's thesis (e.g., reference frame – lab or c.m.).

(Continuing action) Provide a report on mistakes in bibliographies and spells on each preliminary tape.

(Continuing action) Revise EXFOR entries compiling data sets from OREALA 40 m flight station listed in the Appendix of 4C-3/407=WP2017-30 by addition of
1) the corrigendum under REFERENCE of the common subentry,
2) STATUS=OUTDT to each data subentry with the correction factor in free text.

(Continuing action) Submit a revised Memo CP-D/933 by addition of the remark to each subentry from Takács.

(Continuing action) Following A45, revise the REACTION codes of the thick target considering the changes proposed in Appendix of CP-D/933=WP2017-28 once the originating centre receives extraction of Revised Memo CP-D/933 from Otsuka. Revised entries must be assembled in a preliminary tape without including other entries to make trace of corrections at NDS easier.

(Continuing action) Provide JANIS Import Log created from the EXFOR Master File to Otsuka on a regular basis.

(Continuing action) Assess the JANIS Import Log provided by Soppera as above, and register important errors to the EXFOR Feedback System.

Check if the usage of REACTION SF5=CUM/M- and (CUM)/M- in the EXFOR Master is consistent with CP-D/977 Rev.=WP2019-29 Rev.

Tools for Compilation and Dissemination

Make available on the NEA Data Bank web site the EANDC and NEANDC reports compiled in EXFOR and not available as INDC reports.
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<tr>
<td>A56</td>
<td>Pikulina</td>
<td>Continue development and testing of the EXFOR-Editor and InpGraph in cooperation with NDS and other data Centres.</td>
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</tr>
<tr>
<td>A57</td>
<td>All</td>
<td>Provide Pikulina feedback on EXFOR-Editor and InpGraph.</td>
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</tr>
<tr>
<td>A58</td>
<td>Kimura</td>
<td>Continue development and testing of GSYS in cooperation with NDS and other centres.</td>
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</tr>
<tr>
<td>A59</td>
<td>All</td>
<td>Provide Kimura feedback on GSYS.</td>
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</tr>
<tr>
<td>A60</td>
<td>Soppera</td>
<td>Continue development and testing of the JANIS TRANS Checker in cooperation with NDS and the other centres.</td>
<td></td>
</tr>
<tr>
<td>A61</td>
<td>All</td>
<td>Provide Soppera feedback on JANIS TRANS Checker.</td>
<td></td>
</tr>
<tr>
<td>A62</td>
<td>Bhattacharyya</td>
<td>Keep centres informed about the progress in development of the EXFOR-I editor.</td>
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<tr>
<td>A63</td>
<td>Nayak</td>
<td>Monitor progress in development of the EXFOR-I editor.</td>
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<td>A64</td>
<td>Otsuka</td>
<td>Provide EXFOR News every month and consider updates to the IAEA NDS website.</td>
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<tr>
<td>A65</td>
<td>Otsuka</td>
<td>Support update of the Japanese editor (HENDEL) as time permits.</td>
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</tr>
<tr>
<td>A66</td>
<td>Zerkin</td>
<td>Update ZCHEX based on comments from compilers.</td>
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</tr>
<tr>
<td>A67</td>
<td>All</td>
<td>Provide feedback to NDS on the existing ZCHEX version (on bugs as well as desired additions.). Bugs must be reported with sample entries which are checked and not checked properly by ZCHEX.</td>
<td></td>
</tr>
<tr>
<td>A68</td>
<td>Zerkin</td>
<td>Develop and distribute the program package including a standalone platform independent program to generate X4+ from a standalone EXFOR entry.</td>
<td></td>
</tr>
<tr>
<td>A69</td>
<td>All</td>
<td>Consider to use the X4+ format for author approval, and also send feedback to Zerkin.</td>
<td></td>
</tr>
<tr>
<td>A70</td>
<td>Zerkin</td>
<td>Continue development of the EXFOR upload web tool.</td>
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A71 Zerkin  (Continuing action) Every four months produce an EXFOR distribution with (a) full Dictionary distribution; (b) EXFOR in C4 and XC4 format; (c) Dictionaries in MS Access; (d) X4Map.

A72 Zerkin  (Continuing action) Continue development of the additional database encompassing correction factors and relevant comments for suspect/erroneous data (X4-evaluated) presented in WP2010-19; keep NRDC informed about results, impact and usage statistics of the database.

A73 Mikhailiukova Dunaeva Zerkin  (Continuing action) Clarify the requirements for the introduction of flags to indicate articles published in conference proceedings where the data are not available from the authors on the EXFOR Compilation Control System web page.

A74 Zerkin Okumura  (Continuing action) Consider translation of fission yields in EXFOR to a C4-like format in consultation with experts in the field.

A75 Zerkin Pritychenko  (Continuing action) Continue translation from EXFOR to NSR.

A76 Jin Kimura Pikulina Zerkin  (Continuing action) Study problems in 2D calibration of original pictures, and process of approval of results of digitizing using plotting facilities.

A77 Fleming Okumura Pritychenko  (Continuing action) Finalize and submit EXFOR entries including covariance data provided by Zerkin (WP2017-Z3).

A78 All  (Standing action) Provide Zerkin a list of name aliases to improve the search of EXFOR entries by the author name (WP2014-53).
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