Conclusions and Actions of the NRDC 2022 Meeting

Conclusions

General	
C1	The next full NRDC meeting will be held in Vienna, Austria from 9 to 12 May 2023.
C2	The next technical NRDC meeting will be held in Vienna, Austria in the 2nd quarter of 2024.
C3	The next EXFOR compilation workshop will be held in Vienna, Austria from 13 to 16 December 2022.
EXFOR Statistics and Coverage	
C4	The Network finalized 551 new entries since the NRDC 2021 meeting (1227 new entries between the NRDC 2019 and 2021 meetings, and 448 new entries between the NRDC 2018 and 2019 meetings).
Manuals and Dictionary	
C5	EXFOR Formats Manual revised according to Action 5 of the NRDC 2021 meeting and CP-D/1044=WP2022-07 was approved.
C6	LEXFOR revised according to Action 6 of the NRDC2021 meeting and CP-D/1045=WP2022-08 was approved. In "other major updates", (1) 26-FE-0 must be 26-FE-58 in the example of "Activation", and (2) "REACTION code 3" must be "REACTION code".
C7	"X+* and not *+X" should read "*+X and not X+*" in Conclusions 43 of the NRDC 2021 meeting as proposed in CP-D/1036=WP2022-09.
C8	The headings ANG-AZ. ANG-AZ1 and ANG-AZ2 will be made obsolete. ANG-AZ-RL will be used instead of ANG-AZ as proposed in CP-D/1019=WP2022-10.
C9	The method code MASSP will be made obsolete. OLMS will be used for on-line mass separation of a product, and ASEP will be used for off-line mass separation as proposed in CP-D/1020=WP2022-11.
C10	Revised LEXFOR "Multiplicity and product yield" proposed in CP-D/1046=WP2022-12 was approved.

C11	Revised LEXFOR "Multiple reaction formalism" proposed in CP-D/1048=WP2022-13 was approved. This formalism can be used for production cross sections of various products from the same combination of the target nuclide and projectile only when they are based on the same systematics or theoretical considerations.
C12	Revised LEXFOR "Independent and cumulative data" proposed in CP-D/1042=WP2022-14 was approved. N.B. "conditional cumulative cross section" will replace "supracumulative cross section".
C13	The journal code EPJ/AS will be made obsolete. EPJ/A will be used instead. The issue number must be coded for both regular and supplemental issues of this journal published in Vols. 18-19, 22 and 24-28 as proposed in CP-D/1039=WP2022-15.
C14	Revised LEXFOR "Cross sections" (cross section integral over a given incident energy range) was approved as proposed in CP-D/1037=WP2022-16. The integral of the unfolded cross section (,SIG,,BRS) will be coded with ,INT,,BRS.
C15	The family flags (also known as family codes, see EXFOR Formats Manual Chapter 6) of Dictionary 24 must be kept because ZCHEX uses them as summarized in WP2022-17.
C16	Dictionary 227 (Nuclides and natural isotopic mixtures) will be produced from NUBASE files. (See F.G. Kondev et al., Chinese Phys.C,45(2021)030001 for NUBASE2020 evaluation.)
C17	The numerical data compiled with the status code BERMAN can be different from those tabulated in the article by the author.
C18	A new branch code EXL (excitation of low-lying levels) and new heading code E-EXC-MAXA (approximate upper limit of excitation energy, instead of E-EXC-MX-A) were approved as proposed in 4C-3/0420 Rev.=WP2022-29. The heading E-EXC-MAXA must be always explained under the keyword EN-SEC (e.g., "(E-EXC-MAXA,92-U-235) Neutron energy resolution (FWHM)".
C19	The heading NUMBER-CM will be made obsolete. The heading NUMBER will be used for fitting in both laboratory and centre-of-mass systems as proposed in CP-D/1021=WP2022-30.
C20	The new modifier D4PI (divided by 4 pi) and the quantity code ,SIG,,D4PI (cross section divided by 4 pi) were approved as proposed in CP-D/1021=WP2022-30.
EXFOR Coding Rule	
C21	The level number must be coded under the heading LVL-NUMB when the author provides it without the level energy in the source article (c.f. CP-D/1043=WP2022-26). Compilers should not take such level energies from another source (e.g., ENSDF).

C22	Data presented by authors must be compiled without numerical conversion. Compilers are encouraged to propose a new code (e.g., modifier, unit code) so that the data can be compiled without conversion. The conversion to a standard expression by compilers may introduce an error, and it should be done by computer codes processing EXFOR entries (c.f. Vidya Devi's presentation).
C23	The status code TABLE may replace a status code indicating conversion from another data library (e.g., SCSRS) only when the authenticity of the numerical data is confirmed (e.g., presence of the same numerical data in an article). See also CP-D/1041=WP2022-27.
C24	Revised LEXFOR "Fission yields" proposed in CP-D/1024=WP2022-31 was approved. The parameter code FY will not be combined with the branch code M+ or (M). Contribution of isomeric transition in the measured ground state fission product yields will be indicated by the branch code CUM instead.
C25	The heading MONIT-ERR is for the uncertainty in the monitor value, and not for the uncertainty in the quantity of interest propagated from the uncertainty in the monitor value. Only the fractional (%) uncertainty can be coded under MONIT-ERR when the absolute monitor value is unknown as proposed in CP-D/1026=WP2022-32.
C26	Revised LEXFOR "Flags", "General quantity modifiers" (AV-modifier) and "Status" were approved as proposed in CP-D/1031=WP2022-33. N.B. "alternative result" should read "complemental result".
C27	Conclusion 41 of the NRDC 2021 meeting will be amended to: When the numerical data are copied from a table or digitized from a figure of a reference, the table or figure number must follow the status code TABLE or CURVE and the code string of the reference under the keyword STATUS even if only one reference is coded under REFERENCE. Note that (1) the reference code string coded under STATUS and REFERENCE must be the same, and (2) the table/figure number must be in free text. when the STATUS format is extended for accommodation of the reference code under STATUS.
C28	The zeroth order Legendre coefficients will be compiled with ,SIG,,D4PI instead of ,DA,,LEG as proposed in CP-D/1021=WP2022-30 to utilize them as cross sections after multiplication by 4π by computer codes.
C29	The English translation will be the primary reference (=the reference coded on the first line of REFERENCE) when it exists.

Tools for Compilation and Dissemination

C30	(1) The NDS will keep copies of the non-English articles as they are available. (2) The originating centre is responsible to collect the original non-English article when its English translation exists.

C31	The "Recent EXFOR database updates" website maintained by NDS for preliminary tapes indicates absence of copies of their source articles in the NDS article collection. The originating centres are encouraged to help NDS to obtain such copies.
C32	A new version of EXFOR-Editor (Ver. 4.01) and an updated manual are available on the CNPD website.
C33	A new version of GSYS (Ver. 2.4.9) was released on 16 May 2022 on the JCPRG web page. A preliminary version of GSYS 2.6 (e.g. Ver.2.5.22) including new functions (e.g., Undo, Redo, resizable glass) is also available as a "development version" on the JCPRG website.
C34	A new threshold calculator "Tcalc" is available on the JCPRG website. It is included in the JCPRG EXFOR Compilation Tool to check presence of illegal REACTION SF3=X as reported in CP-D/1047=WP2022-34.
C35	η (neutron production factors) compiled in EXFOR can be compared with those calculated from ENDF files with PREPRO as demonstrated in 4C-3/0419=WP2022-35. N.B. The fourth line of the PREPRO input in the paper should cover all MT numbers belonging to absorption, those are library and reconstruction rules (MT.DAT) dependent.
C36	The Network supports X4Pro (fully relational EXFOR database) as a useful tool of EXFOR dissemination.
C37	Distribution and redistribution of the EXFOR Master File must be done with indication of (1) Version (date and URL), (2) citation of the reference article, and (3) copy right notice (e.g., "© 2022 The International Network of Nuclear Reaction Data Centres (NRDC)").

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 four months.
Manuals and Dictionaries		
A4	Otsuka	(Continuing action) Update Dictionaries every six months.

A5	Otsuka	(Continuing action) Propose a revised NRDC Protocol Appendix B "Scanning responsibility" for elimination of journals assigned to a centre but also scanned by NDS (c.f. WP2021-05).
A6	Zerkin Otsuka	(Continuing action) Propose a numbering scheme for compound codes defined in Dictionary 209.
A7	Otsuka	Release the updated EXFOR Formats Manual after the revisions proposed in 4C-4/0232=WP2022-07.
A8	Otsuka	Release the updated LEXFOR after the revisions proposed in 4C-4/0232=WP2022-08 as well as (1) CP-D/1046=WP2022-12 (Multiplicity and product yield), (2) CP-D/1048=WP2022-13 (Multiple reaction formalism), (3) CP-D/1042=WP2022-14 (Supracumulative cross section), (4) CP-D/1037=WP2022-16 (Cross sections), (5) CP-D/1024=WP2022-31 (Fission yields), (6) CP-D/1026=WP2022-32 (Errors), (7) CP-D/1031=WP2022-33 (Flags, General quantity modifiers, Status).
A9	Otsuka	Update Dictionaries 25 (data units) and 26 (unit families) to implement proper checking of the multiplicities and product yields by ZCHEX as proposed in CP-D/1046=WP2022-12.
A10	Otsuka	Make the journal code EPJ/AS obsolete in Dictionary 5 as suggested in CP-D/1039=WP2022-15.
A11	Otsuka	Develop a procedure to update Dictionary 207 (nuclides) with the NUBASE evaluation file instead of the Nuclear Wallet Cards and Atomic Mass Evaluation files.
A12	Otsuka	Add a new modifier DMN (divided by mass number of the target nucleus) and quantity ,SIG,,DMN (cross section divided by mass number of the target nucleus) for compilation of the cross section divided by the atomic number of the target nucleus. (c.f. Vidya Devi's presentation)
A13	Otsuka	Make the data heading NUMBER-CM obsolete in Dictionary 24 as suggested in CP-D/1021=WP2022-30.
A14	Otsuka	Add description on the restriction on the usage of MONIT-ERR in Dictionary 24 and LEXFOR "Entries" as suggested in CP-D/1026=WP2022-32.
A15	Otsuka	Submit a LEXFOR draft describing compilation of quasi-elastic scattering data (c.f. 4C-3/0420=WP2022-29).
CINDA		

A16	Zerkin	(Continuing action) Export EXFOR to CINDA, and distribute it to other Centres every month.
A17	Zerkin	Keep NRDC informed about the situation about import of NSR to CINDA.

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

A18	Pritychenko	(Continuing action) Compile with priority W.G. Alberts+,R,NUREG/CP-0029,433,1982 in CP-D/0838.
A19	Pritychenko	(Continuing action) Compile the thermal neutron-induced reaction data cited in Mughabghab's "Atlas of Neutron Resonances" and listed in 4C-3/0395.
A20	Foligno	(Continuing action) Compile G.N.Kim+,C,2002BRUSS,,613,2002 listed in 4C-3/0400=WP2016-16.
A21	Pritychenko	(Continuing action) Compile F. Bischoff,R,RPI-328-87,146,1966 listed in 4C-3/0404= WP2016-19.
A22	Pritychenko	(Continuing action) Compile P.L.Reeder+,J,PR/C,15,2108,1977 listed in 4C-3/0410=WP2018-20.
A23	Pritychenko	(Continuing action) Compile with priority R.G.Lanier+,R,UCAR-10062-89,71,1989 listed in CP-D/0725 Rev. (~WP2012-19).
A24	Pritychenko	(Continuing action) Compile with priority T.Mo+,J,NP/A,198,153,1972 listed in CP-D/0832 Rev.
A25	Pritychenko Tada Taova	(Continuing action) Compile with priority the light charged-particle induced isotope production cross sections listed in CP-D/0757.
A26	Pritychenko Tada	(Continuing action) Compile with priority the neutron source spectra listed in CP-D/0700 (Rev.3).
A27	Foligno Pritychenko Tada Varlamov	(Continuing action) Compile articles reporting experimental fission product yields and listed in CP-C/464, 465, 466 and CP-D/0979. Inform Devi if an article in the lists is not for EXFOR compilation. Transmit EXFOR entries relevant to these lists separately from other EXFOR entries.
A28	Pritychenko	(Continuing action) Compile deuteron-induced reaction data compiled by the Frascati group and listed in CP-D/0758.

A29	Devi Pritychenko Tada	Compile the data published in the four articles and requested by individual EXFOR users (J,NT,41,109,1978, J,NIM,157,567,1978, J,NP/A,173,273,1971 and C,2016KOLKAT,,314,2016).
A30	Gritzay	(Continuing action) 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. N.B. ^{95}Mo transmission and capture yields have been published in J,PR/C,88,041305,2013 and J,PR/C,105,054306,2022.
A32	Pritychenko	(Continuing action) Perform EXFOR completeness checking for the list of articles (4C-3/0401, 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.
A33	Zholdybayev	(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.)

A34	Pritychenko	(Continuing action) Replace REACTION SF3=A with EL in C0753.002 (CP-D/0960=WP2019-31).
A35	Pritychenko	(Continuing action) Revise DECAY-DATA and DECAY-MON records including EC (electron capture) listed in CP-D/0989=WP2021-07.
A36	Pritychenko Tada	(Continuing action) Revise REACTION SF3 and SF7 listed in Appendices 1, 2 and 3 of CP-D/1014=WP2021-10 (Combination of particle codes and their order in REACTION SF7).
A37	Pritychenko	(Continuing action) Revise REACTION SF8 listed in Memo CP-D/1007=WP2021-15 (LEXFOR "Fitting Coefficients").
A38	Pritychenko	(Continuing action) Replace EL and INL in REACTION SF3 of 12373.008 with SCT (Memo CP-D/0991=WP2021-26).
A39	Devi Tada	(Continuing action) Revise entries involving isomers of Nb-102, Tc-102, Rh-108, Sb-128 and Sb-132 according to Appendix of Memo CP-D/1009 (Rev.)=WP2021-28.
A40	Foligno Pritychenko	(Continuing action) Revise entries involving several variable atomic and/or mass numbers listed in CP-D/0984 in WP2021-31.
A41	Pritychenko	(Continuing action) Revise entries relevant to 511 keV gamma emission listed in CP-D/1005=WP2021-33.

A42	Pritychenko	Replace X+A in REACTION SF3 of T0178.003 with A+X as listed in CP-D/0993(Rev.)=WP2021-34.
A43	Foligno Pritychenko, Tada	Add the issue numbers for Vols. 18-19, 22 and 24-28 of EPJ/A and EPJ/AS articles (and also replace EPJ/AS with EPJ/A if EPJ/AS is coded) as proposed in CP-D/1039=WP2022-15.
A44	Tada	Replace ,INT,,BRA with ,INT,,BRS in K2191.007-010 as listed in CP-D/1037=WP2022-16.
A45	Pritychenko Tada	Replace X with an appropriate code or code combination REACTION SF3 of entries listed in CP-D/1017=WP2022-24.
A46	Pritychenko	Add -G in REACTION SF4 of C1762.002 and eliminate M+ in REACTION SF5 of T0196.031 as suggested in CP-D/1023=WP2022-25.
A47	Foligno Pritychenko Tada Taova	Revise entries relevant to assessment of suspicious E-LVL values as listed in CP-D/1043=WP2022-26.
A48	Devi Pritychenko	Replace TABLE with SCSRS or update the free text unless the numerical data are published in source articles as listed in CP-D/1041=WP2022-27.
A49	Devi Foligno Pritychenko Tada Varlamov	Replace the extra heading DATA with an appropriate one as listed in CP-D/1027=WP2022-28.
A50	Devi Foligno	Replace IND/M+ with CUM in subentries 21592.010-011, 32789.005 and B0153.003 (CP-D/1024=WP2022-31).
A51	Foligno	Add the comments (1) and (2) on 23046.002 in "Note added by NDS" of INDC(GER)-0053 in this subentry.
A52	Devi Foligno Mikhailiukova Pritychenko	(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.
A53	Foligno	(Continuing action) Provide a report on mistakes in bibliographies and spells on each preliminary tape.

A54	Pritychenko	(Continuing action) Revise EXFOR entries compiling data sets from ORELA 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.

A55	Soppera	(Continuing action) Provide JANIS Import Log created from the EXFOR Master File to Otsuka on a regular basis.
A56	Otsuka	(Continuing action) Assess the JANIS Import Log provided by Soppera as above, and register important errors to the EXFOR Feedback System.
A57	Zerkin	Provide ZCHEX output from an EXFOR Master File to Otsuka.
A58	Otsuka	Assess the ZCHEX output from an EXFOR Master File provided by Zerkin as above, and (1) register important errors to the EXFOR Feedback System, and (2) suggest Zerkin updates of ZCHEX to eliminate unnecessary messages.
A59	Otsuka	Propose corrections of entries compiling neutron quasi-elastic scattering datasets based on 4C-3/0420=WP2022-29 and newly introduced codes E-EXC-MAXA and EXL.
A60	Otsuka	Review the neutron quasi-elastic scattering cross sections for natural target nuclides and total scattering cross sections similar to the review summarized in Memo 4C-3/0420=WP2022-29.
EXFOR Coding Rule		
A61	Takács Otsuka	Check presence of the cross sections compiled as total (=ground state plus metastable state) independent production cross sections but deviation of the measured values from the actual total cross sections may be non-negligible.
A62	Varlamov Otsuka	Review the usage of (G,TOT), (G,ABS), (G,SCT) and (G,N) for the cross sections declared as "absorption cross sections" or "total cross sections" by the authors.
A63	Zerkin Otsuka	Propose an extension of the code field for the keyword STATUS to accommodate the reference code string.
Tools for Compilation and Dissemination		

A64	Foligno	(Continuing action) Make available on the NEA Data Bank web site the EANDC and NEANDC reports compiled in EXFOR and not available as INDC reports.
A65	Pikulina	(Continuing action) Continue development and testing of the EXFOR-Editor and InpGraph in cooperation with NDS and other data Centres.
A66	All	(Continuing action) Provide Pikulina feedback on EXFOR-Editor and InpGraph.
A67	Suzuki	(Continuing action) Continue development and testing of GSYS in cooperation with NDS and other centres.
A68	All	(Continuing action) Provide Suzuki feedback on GSYS.
A69	Soppera	(Continuing action) Continue development and testing of the JANIS TRANS Checker in cooperation with NDS and the other centres.
A70	All	(Continuing action) Provide Soppera feedback on JANIS TRANS Checker.
A71	Bhattacharyya	(Continuing action) Keep centres informed about the progress in development of the EXFOR-I editor.
A72	Nayak	(Continuing action) Monitor progress in development of the EXFOR-I editor.
A73	Otsuka	(Continuing action) Provide EXFOR News every month and consider updates to the IAEA NDS website.
A74	Otsuka	(Continuing action) Support update of the Japanese editor (HENDEL) as time permits.
A75	Zerkin	(Continuing action) Update ZCHEX based on comments from compilers.
A76	All	(Continuing action) 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.
A77	Zerkin	(Continuing action) Develop and distribute the program package including a standalone platform independent program to generate X4+ from a standalone EXFOR entry.
A78	All	(Continuing action) Consider to use the X4+ format for author approval, and also send feedback to Zerkin.
A79	Zerkin	(Continuing action) Continue development of the EXFOR upload web tool.

A80	Zerkin	(Continuing action) Produce: (a) EXFOR Master file with Dictionary-236 and X4Map after every database update, and (b) Dictionaries in MS Access after every Dictionaries update (see also A4).
A81	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.
A82	Zerkin Pritychenko	(Continuing action) Continue joint development of the EXFOR and NSR databases.
A83	Jin Suzuki Pikulina Zerkin	(Continuing action) Study problems in 2D calibration of original pictures, and process of approval of results of digitizing using plotting facilities.
A84	Foligno Devi Pritychenko	(Continuing action) Finalize and submit EXFOR entries including covariance data provided by Zerkin (WP2017-Z3).
A85	Pritychenko	(Standing action) Provide NSR database to Zerkin with the name aliases to improve the search of EXFOR entries by the author name (WP2014-53).
A86	All	(Continuing action) Preparing for NRDC-2023 discussion about policy (methods/formats) of off-line dissemination of EXFOR data by NRDC members to external users' communities and conditions/requirements for further re-distribution (Zerkin's presentation-3 of the NRDC 2021 meeting).
A87	All	(Continuing action) Investigate possibility for opening public Web access to lab reports of the institutes of EXFOR-Area responsibility.
A88	Zerkin	(Continuing action) Submit a memo explaining how to use EXFOR Database Update Error Report and other tools to avoid duplication.
A89	Pritychenko Zerkin Otsuka	(Continuing action) Investigate assignment of Digital Object Identifiers (DOI) for EXFOR data sets using DataCite and one of EXFOR formats. Start a pilot project and produce several DOI for EXFOR data sets. Report results at the next NRDC meeting in 2022.
A90	Zerkin	Collaborate with the IAEA INIS Unit for technical matching of the pdf databases maintained by NDS and the Unit.
A91	Zerkin	Arrange a letter to IPPE for opening public access from the NDS web retrieval system to IPPE reports.

A92	Zerkin	Prepare a manual describing the EXFOR database related tools available on the NDS web site.
A93	Zerkin	Provide training of the X4Pro (fully relational EXFOR database) in the EXFOR Workshop in December 2022.
A94	Pritychenko	To investigate NNDC library for missing private communication relevant to EXFOR compilation.
A95	Vrapcenjak	Collect articles coded under REFERNECE of newly submitted preliminary tapes but missing in the NDS article collection.
A96	All	Collaborate with Vrapcenjak for collection of articles coded under REFERENCE of newly submitted preliminary tapes but missing in the NDS article collection.