**Nuclear Data Section**

**International Atomic Energy Agency**

**P.O.Box 100, A-1400 Vienna, Austria**

**Memo CP-D/1044**

**Date:** 22 April 2022

**To:** Distribution

**From:** N. Otsuka

**Subject: Draft of Revised EXFOR Formats Manual (NRDC 2021 A5)**

In fulfilment of Action 5 of the NRDC 2021 meeting, I prepared a draft of the updated EXFOR Formats Manual (IAEA-NDS-0207). All conclusions from NRDC 2016 to 2021 meetings are considered. The draft will be further revised by the end of May as per your comments .

Among the items listed under NRDC2021 A5, NRDC2018 C4 is for journal scanning responsibility, and this should create an additional action for NRDC Protocol update.

NRDC2017 C9 (Dictionary 227 description) and NRDC2019 C12 (creation of Dictionary 38) should create an additional action for EXFOR/CINDA Dictionary Manual update.

NRDC2019 C14 concludes only two keywords SUPPL-INF and HISTORY are allowed in the BIB section providing the supplemental information. However, the draft of LEXFOR “Supplemental Information" (WP2019-21) approved in the same conclusion also includes STATUS. Therefore the third item of SUPPL-INF description in the EFOR Formats Manual Chapter 7 was reformulated to: “The subentry having this keyword must be with NOCOMMON and NODATA, and without keywords other than STATUS and HISTORY.”.

**Updates of items listed under NRDC 2021 Action 5**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Paper** | **Concl.** | **Memo** | **Title** | **Chapt.** | **Remark** |
| WP2016-28 | C12 | CP-D/0874 | EXFOR Formats "DECAY-DATA" and "RAD-DET" | 6 |  |
| WP2016-29 | C13 | CP-D/0880(Rev.) | REACTION SF2=0 and nuclear quantities (NQ) | 6 |  |
| WP2016-30 | C15 | CP-D/0882 | Field identifier of LEVEL-PROP | 7 |  |
| WP2016-32 | C17 C18 | CP-D/0894(Rev.) | Non-informative description under ERR-ANALYS | 7 |  |
| WP2016-33 | C19 | CP-D/0896 | Two additions to LEXFOR “Isomeric flag” | 6 | Originally proposed for addition in LEXFOR |
| WP2016-34 | C20 | CP-D/0899 | EXFOR Formats Manual "Facility" | 7 |  |
| WP2017-08 | C7 | CP-C/0452 | Update of EXFOR Formats Manual, Page 7.26 | 7 |  |
| WP2017-09 | C8 | CP-D/0915 | Update of EXFOR Formats Manual "STATUS" | 7 |  |
| WP2017-31 | C20 | CP-D/0932 | Headings for incident projectile energy resolution (EN-RSL etc.) | 7 |  |
| WP2017-33 | C7 | CP-D/0920 | Update of EXFOR Formats Manual "REFERENCE" | 7 | Implementation of NRDC 2016 C22 |
| WP2018-08 | C8 | CP-D/0953(Rev.) | Revision of Formats Manual and LEXFOR | 7 | Implementation of NRDC2017 C21. |
| WP2018-09 | C9 | CP-D/0942 | EXFOR Formats Manual "BIB section" | 3 |  |
| WP2018-12 | C12 | CP-N/0143 | EXFOR Formats Manual "Reaction specification" | 6 |  |
| WP2019-08 | C6 | CP-D/0964 | LEXFOR "Sums" and EXFOR Formats "Sample" | 7 |  |
| WP2019-21 | C14 | CP-D/0965(Rev.) | New keyword - SUPPL-INF (supplemental information) | 7 |  |
| WP2019-27 | C17 | CP-C/0393 | Usage of RAD-DET and its relation to DECAY-DATA and PART-DET | 7 | Same proposal in WP2016-28 |
| WP2021-08 | C9 | CP-D/1011(Rev.) | Revision of EXFOR Formats Manual | 6, 7 |  |
| WP2021-10 | C11, C12, C13 | CP-D/1014 | Combination of particle codes and their order in REACTION SF7 | 6, 7 |  |
| WP2021-12 | C15 | CP-D/0982 | Presence of keyword ANALYSIS when REACTION SF9=DERIV | 7 |  |
| WP2021-34 | C43 | CP-D/0993(Rev.) | Combination of process and other codes in REACTION SF3 | 6 | See also CP-D/1036. |

**Other major updates**

**Chapter 2: BIB section**

**(*Addition of NRDC2019 Conclusion 18*)**

The BIB section contains the bibliographic information (*e.g.,* reference, authors), descriptive information (*e.g.*, neutron source, method, facility), and administrative information (*e.g.*, history) associated with the data presented. It is identified on an exchange file as that information between the system identifiers BIB and ENDBIB.

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. Redundant information should be included only when there is a good reason specific to the entry.

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**Chapter 3: Coded (machine-retrievable) information**

**(*Replacement with more realistic examples*)**

…

Embedded blanks. For many information-identifier keywords, embedded blanks are explicitly forbidden in the codes. With those exceptions, embedded blanks in the coding are allowed if they follow a code from the dictionary. They are not permitted preceding any code except for the keywords AUTHOR, INSTITUTE and DECAY-DATA.

***Examples:*** ~~STATUS (DEP )~~

~~STATUS (DEP ,COREL)~~

METHOD (ACTIV )

DETECTOR (MAGSP ,MWPC)

AUTHOR (V.Sebastian, L.Weissman)

***Forbidden***: ~~STATUS (COREL, DEP)~~

DETECTOR (MAGSP, MWPC)

STATUS (DEP, 10048007)

**Chapter 4: COMMON Section**

**(*Two sentences copied from the description on DATA section*)**

…

In the common data table, only one value is entered for a given field, and successive fields are not integrally associated with one another. If more than six fields are used, the point data is continued on successive records (maximum of 3 records or 18 fields). The following record or records are then associated with the next point.

**Chapter 6: Reaction field**

**(*Removal of “of 2” added in Rev. 2011/01 by mistake*)**

…

Coding: This subfield contains one of the following:

1. A process code from Dictionary 30, *e.g.*, TOT.

For coding of SF3 in the case of scattering see **LEXFOR, Scattering**.

1. A particle code from Dictionary 33 with an “allowed SF3 flag” (3) ~~of 2~~, which may be preceded by a multiplicity factor with a value of 2→99.

A few other conclusions (e.g., NRDC2012 C13) are considered as well.

**Chapter 6: Reaction field (SF3)**

**(*Addition of NRDC 2019 Conclusion 22*)**

SF3. Process. In general, this field contains a process code or the particle(s) produced in the reaction with the exception of the reaction product (which is given in SF4), or a combination of the two (see Coding rules, following). SF3 must be different from SF2.

**Chapter 6: Reaction combination**

**(*Move of “Descriptions of frequently occurring REACTION combination” to LEXFOR “Sums” and “Ratios”*)**

…

~~Note that the reaction combination formalism is not used for certain frequently occurring sums, ratios, and products for which specific quantity codes have been introduced (see~~ **~~LEXFOR, Ratios, Sums, Products~~**~~).~~

***~~Examples~~*** ~~(Frequently occurring REACTION combination):~~

~~Data for natural target = Sum data for all contributing target nuclides~~

~~(46-PD-106(P,2P)45-RH-105-G,CUM,SIG,,A)+~~

~~(46-PD-108(P,X)45-RH-105-G,CUM,SIG,,A)+~~

~~(46-PD-110(P,X)45-RH-105-G,CUM,SIG,,A)~~

~~→(46-PD-0(P,X)45-RH-105-G,CUM,SIG)~~

~~Production = Sum of processes~~

~~(46-PD-102(P,D)46-PD-101,CUM,SIG)+~~

~~(46-PD-102(P,N+P)46-PD-101,CUM,SIG)~~

~~→ (46-PD-102(P,X)46-PD-101,CUM,SIG)~~

~~Scattering = Elastic scattering + inelastic scattering~~

~~(3-LI-7(N,EL)3-LI-7,,SIG)+~~

~~(3-LI-7(N,INL)3-LI-7,PAR,SIG)~~

~~→ (3-LI-7(N,SCT)3-LI-7,PAR,SIG)~~

~~Alpha value = Capture cross section / fission cross section~~

~~(92-U-235(N,G)92-U-236,,SIG)/~~

~~(92-U-235(N,F),,SIG)~~

~~→ (92-U-235(N,ABS),,ALF)~~

~~Resonance strength (Capture kernel)~~

~~((82-PB-208(N,EL),,WID,,G)\*(82-PB-208(N,G),,WID)/~~

~~(82-PB-208(N,TOT),,WID))~~

~~→ (82-PB-208(N,G),,WID/STR)~~

**Chapter 7: DECAY-DATA**

**(*Replacement of “abundance” with “intensity” according to NRDC 2021 Conclusion 22 thoroughly*)**

**Chapter 7: REFERENCE**

**(*Addition of NRDC 2012 Conclusion 13*)**

1. Presence is compulsory with coded information, with or without free text.

…

1. The issue#, month and day are preferably omitted unless they are essential to identify the article.

**Chapter 7: REFERENCE (Type A, B, C, J and K)**

**(*Addition of NRDC 2018 Conclusion 17*)**

Page (paper number) subfield: …. If omitted, ~~the following comma is also omitted~~ the absence must be indicated by including the separating comma.

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