To: Distribution

4 November 1976

From: H.D. Lemmel HDL

Subject: Manual update dated October 1976

Note: This includes proposals to be included in the Manual unless an objection is received.

A. Protocol: At the eleventh 4C-Meeting 1975 (see INDC(NDS)-68 page 16) it has been agreed to consider the Protocol as part of the Manual (which hence consists of: Index, Protocol, Main Part I-IX, Lexfor, Examples). Therefore we agree that NNCSC also updates the Protocol as part of the Manual, but not without prior approval. Therefore we propose to change Section I. of the Protocol (page 8) to:

"I. CHANGES AND REVISIONS OF THIS PROTOCOL

1. Any change to this Protocol which is deemed necessary shall come into effect only after submission of a proposal in a 4C-Memo to be approved, either at a Meeting of centre representatives, or by 4C-Memos in the agreed manner, (that is if no objection is expressed within one month's time).

2. The centre responsible for the updating of this Protocol is the NNCSC."

On this ground we agree, exceptionally, to the changes made to the Protocol pages 5,7,8 except for the last two lines of page 7 dated October 1976, since this topic is dealt with elsewhere. We request that this page be retransmitted without the last two lines. In addition to revising Section I. of the Protocol, we propose to insert as paragraph H.3.f) on page 7 the text which has been agreed at the 1975 4C-Meeting (see INDC(NDS)-68 page 16). The two changes proposed should be included after 4 weeks in a Manual update unless an objection is received. Any further changes which a center regards necessary, may be proposed in 4C-Memos.

B. Rules for Manual updates: The rules for updating the Manual are described in Section H of the Protocol and on pages IX.4 and IX.5 of the Manual. For further clarification we propose to add on page IX.4 of the Manual:

"7. The centre responsible for updating the Manual may introduce changes for the purpose of editing. However, proposed Manual wordings submitted in 4C-Memos are entered in the Manual unchanged, unless an objection is expressed in due time. This centre is also responsible for maintaining the internal consistency of the Manual; that means, e.g., to check whether an agreed proposal entails changes (cross-references, etc.) in other parts of the Manual.

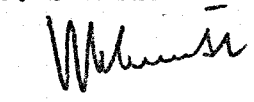
8. A change on a Manual page, as compared to its previous version, is marked by a vertical line in the left-hand margin. In addition, all changes which are not only a matter of editing, are also marked in the left-hand margin with the reference to the document where the change has been agreed (e.g. 4C-Memo number, page or item-number of the minutes of a meeting)."

Distribution:

S. Parlstein, NNCSC
L. Lesca, NDCC
V. Manokhin, CJD

NDS: P.M. Attree
H.D. Lemmel
R. Lessler
A. Lorenz
K. Okamoto
J.J. Schmidt
O. Schwerer
P.M. Smith
R. Yaghubian
file

Clearance: J.J. Schmidt



Explanation re 7.: Some confusion in Manual updates resulted from the fact that unapproved changes were made to approved proposals (see e.g. the Lexfor entry on Single-Level Resonance Parameters).

re 8.: This rule will not only make the supervision of the Manual updates easier but will also make the compilers, when receiving the updated pages, aware of important changes as distinct from the many cosmetic changes due to editing.

C. Further comments on the October 1976 update:

1. There were many old vertical lines not removed, so that it was sometimes tedious to find the changes.

2. On a too large number of resubmitted pages only some but not all of the errors marked in 4C-3/174 have been corrected.

3. Lexfor page DIFF-1): We propose to change this page as attached. We had not realized before that the code for the triple differential cross-section proposed by NNCSC had already been transmitted.

4. The changes made on the Lexfor pages on Isomeric States and Residual Nucleus are partly not correct. These changes appear to be, again, of a nature which would have required submission in a 4C-Memo before changing the Manual. We request that the page "RESID-NUC" is retransmitted without the "Note", and that the page "Isomeric States" is changed to the version of 4C-3/153 page 39 (as attached) which we regard as the last correct version.

5. Lexfor entry on Resonance Integrals: We noticed that the definition of the PAR modifier for resonance integrals does not agree with the definition of this modifier in Dict. 12. An expression such as NG,RI,PAR must be reserved for the resonance integral of a "partial reaction" in its accepted definition. We therefore propose to delete, in this Lexfor entry, the three lines on "Resonance integrals over smaller energy ranges". Such data seem to be sufficiently defined by their energy ranges and then do not require a modifier.

   Sorry that we did not detect this inconsistency immediately when receiving the proposal for this Lexfor entry in memo 4C-1/77.

6. Some further comments can be found on the pages attached.

D. The following items should have been included in the October 1976 update:

Memo 4C-3/168 dated 76/6/4: NDS proposal on Dictionary updating re Manual page VII.1c. (Clearly marked on page 1 as to be included in the Manual!!)

Memo 4C-1/85 dated 76/8/5: NNCSC proposal on Multilevel Resonance Parameters.

It seems to us that none of the agreements reached via 4C-Memos during the last half year have been included in the Manual-update in due time and without reminder. Please note, that a few more proposals were contained in recent memos and are soon due for transmission as updated Manual pages.

October 1976

all 3 errors were pointed out already in 4C-3/174 page 8!

Only 2 of the 4 items mentioned in 4C-3/184 page 10 were taken care of! Why?

October 1976

3. The following procedure should be followed by each of the four centres in obtaining the agreement to every one of its proposals to change or revise EXFOR within the context of Paragraph H.2. above; all communications with regard to such proposal shall be in the form of Four-Centre Memos.

a) The initial proposal should be disseminated to all four centres.

b) The initiating centre shall then collect and digest all comments, suggestions and counter proposals.

c) In this review, the initiating centre shall consider such facts which would affect the EXFOR data base and associated computer codes.

d) The initiating centre shall then distribute a technical evaluation of alternatives to the other three centres.

e) After receiving the response to this technical evaluation, the initiating centre shall:

(i) In the case of general agreement, submit the proposed alteration to the centre responsible for the EXFOR Manual updating.

(ii) In the case of non-agreement, either retract the proposal, or submit it for inclusion in the agenda of the next Four-Centre Meeting.

4. The centre responsible for the updating of the EXFOR Manual is the NNCSC. Within one month after a decision has been made, this centre shall be responsible for producing a sufficient number of copies of the updated pages and distributing them in accordance with an established EXFOR distribution list.

In the case when there are no objections to a proposal by the date agreed upon, a decision shall be deemed to have been made at that date.

Where has this sentence been proposed? For this case items 7) and 8) of page IX.5 apply as well as Protocol item H.6. Retransmission requested omitting this sentence.

General structure of the exchange format

1. Each entry (work) falls naturally into two parts - bibliographic or descriptive information (alphanumeric) and data (numeric). In addition, the data for each entry is divided into sub-entries (sub-works). Further, common bibliographic or descriptive information and common data may be associated with the whole entry and/or each sub-set. A set of system-identifiers has been devised for separating these logical blocks of information within an entry.

2. Each item of bibliographic or descriptive information must be identified for retrieval purposes and a set of information-identifiers (keywords) has been devised for this purpose.

3. Each piece of information requiring coding (e.g., reference, laboratory, etc.) has these codes, enclosed in parentheses, following the identifier. A set of dictionaries is provided for these codes.

4. Unlimited free text is permitted with each information-identifier.

5. Common data, meaning data values which are common throughout the work or sub-set, are treated in a similar way to the data (see 6. below) except that individual items in common are not directly inter-related.

6. The data for a sub-set is presented in the form of a table of fixed field width, but with no positional meaning. Each table is preceded by its "column-heading" and "column-units". A data-set (sub-accession number) has at least a unique Z, A, Quantity.

7. Part of each record is reserved for record identification. This includes accession-number (entry), sub-accession number (sub-entry) and record number within sub-accession number. This will guarantee that each record may be uniquely referenced within the system (i.e., no two records will have the same identification).

8. Tags are used to indicate records altered since the previous transmission of a particular entry.

9. The record size is 80 characters to allow simple preparation and reference.

according to 4C-1/94 the last sentence was to be rewarded! (Trivial however.)

III.7

(12.) BIB N_1 N_2

This record must be the first one of each BIB-section if one is present. N_1 and N_2 are interpreted as:

N_1 - Number of keywords in the BIB-section (not countings pointers in column 11, compare page IV.3)

N_2 - Number of records in the BIB-section

(13.) ENDBIB N_1 N_2

do not deviate from agreed wording without strong reason!

This record must be the last one of each BIB-section if one is present. N_1 and N_2 are interpreted as:

N_1 - Number of records in BIB-section

N_2 - Presently unused (may be blank or zero)

(14.) NOBIB N_1 N_2

Positive indication that there is no BIB-section associated with the sub-work. N_1 and N_2 are interpreted as:

N_1 - Presently unused (may be blank or zero)

N_2 - Presently unused (may be blank or zero)

NOTE: The record identification (cols. 67-79) for these system-identifiers should contain the universal accession and sub-accession numbers of the sub-entry in which they are located, and the sequence number should naturally be assigned sequentially within the sub-entry.

SUMMARY OF SYSTEM IDENTIFIER RECORDS

The following similarities may be noted between system identifier records:

(1.) All /System Identifier/ and NO/System Identifier/ records are identical as far as the significance of N_1 and N_2.

(2.) The TRANS, ENTRY, SUBENT, and DICTION records all use N_1 to uniquely identify the unit (tape, work, sub-work, or dictionary, respectively) and use N_2 to signify a date (TRANS - date tape was generated; ENTRY, SUBENT, and DICTION - last alter date).

(3.) The BIB, COMMON, DATA, and XDATA records (the units that actually contain information) use N_1 and N_2 to define the contents of the information records.

(4.) All END/System Identifier/ records use N_1 to indicate the number of sub-units within the unit (ENDTRANS - the number of works; ENDENTRY - the number of sub-works; ENDSUBENT, ENDDICTION, ENDBIB, ENDCOMMON, and ENDDATA - the number of records). To be consistent at all levels (e.g., work, sub-work, record), the system identifier cards should not be included in the N, TOTAL (e.g., /System Identifier/and END/System Identifier/ cards are not included in the N, TOTAL for BIB, COMMON, and DATA (see examples on following pages). N_2 is presently unused on all END/System Identifier/ records.

Since the above four rules describe all of the system identifier records, only a small number of rules need be remembered.

The following hierarchy has been established on the tape:

(1.) The transmission will be one logical file

(A) Headed by . . . . . TRANS	CXXX	YYMMDD
(B) Ended by . . . . . ENDTRANS	N_1	N_2

CXXX - tape identification
YYMMDD - date tape was generated

N_1 - Number of works on the tape (including NOENTRY's)
N_2 - Number of dictionaries on the tape, if any

have the same footnote as on page III.14 and III.15 was to be added (4C-3/174 page 24)

2e 4C-3/174 page 26

(3) Free Text

BIB

Used to describe the bibliographic information. It may immediately follow the closing parenthesis of the machine retrievable information (if this is not present, it may begin immediately in Col. 12). The free text may be continued on to any number of records. Free text on continuation records must not begin before Col. 12 (Cols. 1-10 must be blank and Column 11 must be blank or contain a pointer). The free text may include parentheses if necessary, although, in order to avoid confusion a left parenthesis in text should not be placed in col. 12 (as this implies the opening parenthesis of machine retrievable information).

(4) Codes and Free Text

Free text following the codes must be completely self explanatory, and the codes must not be considered as part of the free text. The code is, in some cases, a retrievable abstract of the free text. The entering center should provide all free text associated with each code. If the coded information is not to be repeated in free text, a point is entered into the position immediately following the closing parenthesis. The point will serve as an indication to any 'edit' program that the coded information requires expansion.

The only exceptions to this rule are information associated with the keywords INSTITUTE, REFERENCE AND ISØ-/CMPD-/NUC-QUANT, where the coded information should not be repeated in the free text. No point is needed following the closing parenthesis. This means, one should not, for example, include the full name of the institute following the 7-character code; however, any additional information may follow in free text.

Note: If coded information is given under the key-word STANDARD, this need not be repeated in the free text.

The keywords AUTHOR, EXP-YEAR, HISTORY, ERR-ANNALYS, FLAG, HALF-LIFE, MISC-CØL are cases to which the above rules do not apply.

The free text must use clear English phrasing and no codes should be used within the free text.

(4) As explained on P.IV.3 under "(5) Pointers" a one-character pointer can be placed in the last (eleventh) column of any column-heading field if the corresponding column is to be linked to some other part of the same subentry or subentry 001. For example, if one of the quantities in COMMON is common to all values in a particular column in the DATA section, the same pointer should appear in the last column of the corresponding column-heading fields in the COMMON and DATA section as shown in the example of p.V.3.

(5) The example on p.VI.2 illustrates the simplest type of table representing the dependent variable DATA as a function of the independent variable ANG (one-dimensional table). The rules for two - and more - dimensional tables require distinction between four data categories occurring in data tables, namely

- independent variables (EN, EN-MIN, EN-RES, E, ANG,...);
- dependent variables (DATA, RATIO,...);
- associated quantities (EN-ERR, ANG-RSL, DATA-ERR,...);
- additional information (STAND, MISC, FLAG, HL,...).

The division between different categories and families within categories are defined in the Data heading keyword dictionary. (see VIII.21)

DATA tables must be arranged as follows:

- All columns with <u>independent variables</u> precede the columns with <u>dependent variables</u>. Columns on the left-hand side of the first dependent-variable column are considered as independent-variable columns, except those with associated quantities.
- Columns with <u>additional information</u> are preferably placed after the last dependent-variable column but if they refer to a specific column they may be placed next to it.
  <u>Note</u>: Some data-heading keywords may be used either as independent variables or as additional information.
- Columns with associated quantities are placed right after the column they refer to.

If the COMMON section is included for EXFOR table must then look as follows.

VI.4

COMMON . . . ENDCOMMON
DATA independent variable(s) + associated quantities dependent variable(s) + associated quantities + additional information ENDDATA

If columns for more than one independent variable are needed they are to be arranged so that the rate with which the numbers change within each column increases from left to right. Obviously this rule cannot apply to associated-quantity columns. Values in a given independent-variable column must increase or decrease monotonically until the value in the preceding independent-variable column changes or the end of the table is reached.

Example

See also Example 13
(Example 13 however needs updating as proposed in 4C-3/153)

.
:
DATA

EN	EN-ERR	ANGLE	ANGLE-ERR	DATA
MEV	MEV	ADEG	ADEG	MB/SR
1.	.02	35.	10.	-
1.	.02	60.	10.	-
1.	.02	90.	10.	-
2.	.02	30.	5.	-
2.	.02	60.	5.	-
2.	.02	90.	5.	-
3.	.03	30.	5.	-
3.	.03	60.	5.	-
3.	.03	90.	5.	-

Cross-reference to this example also useful on p. VI.6

:
.
ENDDATA

4C-3/184
1976-11-4

CINDA 1)

CINDA-quantities

The correspondence between CINDA-quantities and EXFOR-quantities is given in the following list. In the EXFOR-formalism given below, a hyphen "-" stands for a quantity-subfield that may have any code or may be blank.

C I N D A		E X F O R
EVL	EVALUATION	no correspondence
TOT	TOTAL	TOT,-,-
SEL	ELASTIC	EL
DEL	DIFF ELASTIC	EL,-,- but excluding blank, POL, ASY or POT in the second subfield EL/RAD
POL	POLARIZATION	-,POL and -,ASY
POT	POTNTL SCAT	EL,POT
SIN	TOT INELASTC	INL
DIN	DIFF INELAST	INL,-,-,- but excluding INL
DNG	INELST GAMMA	ING,-,-
TSL	THRMLSCATLAW	THS,-,- BAS FAS COH,- INC,-
SCT	SCATTERING	SCT,-,-
SNE	NONELASTIC	NON,-,-
NEG	NONEL GAMMAS	GEM,-,-
REM	DISAPPEARANC	not defined
ABS	ABSORPTION	ABS,,-
RIA	RES INT ABS	ABS,RI
ACT	ACTIVATION	no correspondence
RIR	RES INT ACT	no correspondence
NG	N, GAMMA	NG,,-
RIG	RES INT CAPT	NG,RI
SNG	SPECT NGAMMA	NG,-,-,- but excluding RI and blank in second subfie[ld]
N2N	N2N REACTION	N2N,-,-,-
NXN	N3N REACTION	N3N,N4N, etc. N3N,-,-,- N4N,-,-,- etc as requested in 4C-3/174 p.5)
NEM	EMISS XSECT	NEM,-,-
NPR	N PRODUCTION	NPR,-,-

(see last Cinda book)

October 1976

expansions not up to date as already stated in 4C-3/174 p.5
further changes according to 4C-2/73

Differential Data

Differential cross-sections with respect to the angle between outgoing particle or gamma and incident neutron-beam are coded with "DA" in the second quantity-sub-field (function).

Differential cross-sections with respect to the energy of the outgoing particle or gamma are coded with "DE" in the second quantity-subfield.

Double differential cross-sections are coded with "DA/DE" in the second quantity-subfield.

Triple differential cross-sections with respect to neutron energy and angle and proton energy are coded with "DA/DE/DE" in the second quantity subfield.

If it is not evident from the quantity-code which outgoing particle is referred to, this is indicated in the fourth quantity-subfield.

The indication whether the differential cross-section, the angle, or the energy is given in the lab-system or centre-of-mass system is not entered within the quantity-code but in the data-headings; see Centre-of-mass System.

If the differential cross-sections are given not in absolute units but in the notation

$$\frac{4\pi}{\sigma}\,\frac{d\sigma}{d\Omega}(\vartheta) \qquad \text{(dimensionless)},$$

this is indicated by the modifier "RS" (ratio over sigma) in the third quantity-subfield. If the differential cross-sections are given in any other arbitrary units, this is indicated by the modifier "REL" (relative) in the third quantity-subfield.

In the quantities-dictionary 14 the term "differential cross-section" refers always to angular distributions, whereas energy-distributions are called "spectrum".

Examples of quantity-codes:

EL,DA = $\frac{d\sigma_{el}}{d\Omega}$ [b/sr]

EL,DA,RS = $\frac{4\pi}{\sigma_{el}}\,\frac{d\sigma_{el}}{d\Omega}$ no dimension

NP,DA = differential (n,p) cross-section

NNP,DA,,N = (n,np), angular distribution of neutrons

NNP,DA,,P = (n,np), angular distribution of protons

INL,DE = differential with energy of outgoing neutrons

ING,DE = differential with energy of inelastic gammas

INL,DA/DE = $\frac{d^2\sigma_{in}}{dE'\,d\Omega}(E,E',\vartheta)$

Two examples of triple differential data have been transmitted:

NNP,DA/DE/DE,,N/P = a triple differential (n,np) cross-section; in this case one cannot specify in the quantity-code, to which of the outgoing particles the function "DA" refers; explanation must be given in free text.

NNP,DA/DE/DE,,N/N/P = differential with energy and angle of neutrons, differential with energy of protons. This code, however, is too long for entry in Dictionary 14. A final solution was postponed until adoption of REACTION formalism.

Isomeric States LX4-2 ISØMER

1. If the target-nucleus of a neutron-induced reaction is in a metastable state, this is indicated in the iso-quant with the codes "M1" for the first and "M2" for the second metastable state in the form:

ISO-QUANT (95-AM-242-M1,NF).

For target-nuclei in ground-state no isomer-code is given.

The half-life of the target nucleus in a metastable state should be given in CØMMØN or DATA. The target nucleus should be entered under the BIB keyword HALF-LIFE with the source of the half-life value given in free text.

HALF-LIFE (HL, 95-AM-242-M1). Free text. (see example 17 and page VIII.24).

2. If a partial cross-section is given leaving the residual nucleus in its ground-state or in a metastable state, this is indicated by a quantity-modifier; examples:

NP,,GND partial (n,p) cross section populating the ground-state of the residual nucleus; to be used only, when a metastable state exists, otherwise use NP,,PAR.

NP,,MS partial (n,p) cross section populating a metastable state of the residual nucleus;

The half-life of the residual nucleus should be given in CØMMØN or DATA. The residual nucleus should be entered under the BIB keyword HALF-LIFE with the source of the half-life value given in free text, as above.

For a residual nucleus in the ground state, where there exists one or more metastable states, the isomer code 'G' is given in the form:

HALF-LIFE (HL,95-AM-241-G)

(see example 17 and page VIII.24).

3. Isomeric ratios are coded as iso-quant ratios, for example:

ISO-QUANT ((Z-S-A,NP,,MS)/(Z-S-A,NP,,GND)), or

ISO-QUANT ((Z-S-A,NP,,MS)/(Z-S-A,NP)), etc.

The half-lives should be entered as above. (see Example 17)

See also EXFOR page VIII.24 (HALF-LIFE)

→ not correct

→ see also page RESID-NUC

October 1976

Introduction requested as 4C-3/153 page 39, while maintaining the original and desirable subdivision: 1.) target-nucleus, 2.) residual nucleus, 3.) partial cross-sections, 4.) isomeric ratios. (see next page)

4C-3/153
page 39

Isomeric States ISØMER

1. If the target-nucleus of a neutron-induced reaction is in a metastable state, this is indicated in the iso-quant with the codes "M1" for the first and "M2" for the second metastable state in the form:

ISO-QUANT (95-AM-242-M1,NF). For target-nuclei in ground-state no isomer-code is given. The isomer-codes should only be used if they are associated with a clear definition in free text.

The half-life of the target nucleus in a metastable state should be entered under the bibliographic keyword HALF-LIFE and the numerical value given in CØMMØN or DATA.

HALF-LIFE (HL,95-AM-242-M1). Free text. (see example 17 and page VIII.24)

4C-3/139

2. If the residual nucleus is in a metastable state, this may be indicated under the BIB keyword "RESID-NUC" either in parentheses or in free text:

either RESID-NUC (95-AM-242-M) plus any other free text

or RESID-NUC 95-AM-242M plus any other free text.

When the residual nucleus is coded in parentheses:
- the isomer code G for the ground-state is only given, when the nuclide has a metastable state,
- no isomer code is given for an unspecified state.

The half-life of the residual nucleus should be entered under the bibliographic keyword HALF-LIFE and the numerical value given in CØMMØN or DATA.

(see example 17 and page VIII.24)

3. If a partial cross-section is given leaving the residual nucleus in its ground-state or in a metastable state, this is indicated by a quantity-modifier; examples:

NP,,GND partial (n,p) cross section populating the ground-state of the residual nucleus; to be used only, when a metastable state exists, otherwise use NP,,PAR.

NP,,MS partial (n,p) cross section populating a metastable state of the residual nucleus.

4. Isomeric ratios are coded as iso-quant ratios, for example:

ISO-QUANT ((Z-S-A,NP,,MS)/(Z-S-A,NP,,GND)), or

ISO-QUANT ((Z-S-A,NP,,MS)/(Z-S-A,NP)), etc.

We see no reason for omitting item 2 which, obviously, had only to be amended.

MONOISOTOPIC ELEMENTS MONO

Monoisotopic elements should be entered using their appropriate atomic weight.

A list of monoisotopic elements follow:

Z- S- A
4-BE- 9
9- F- 19
11-NA- 23
13-AL- 27
15- P- 31
21-SC- 45
25-MN- 55
27-CO- 59
33-AS- 75
39- Y- 89
41-NB- 93
45-RH-103
53- I-127
55-CS-133
59-PR-141
65-TB-159
67-HO-165
69-TM-169
79-AU-197
83-BI-209
90-TH-232

We had requested to remove blanks! trivial however

Nearly Monoisotopic elements may be entered with the A-number of their main isotope in the case where there is no noticeable influence from trace isotopes on the data presented. This is the case for total and elastic scattering cross sections. However, special care should be taken in the case of the capture cross section or in the case of partial cross sections which may lead to levels in one of the trace elements.

Following is a list of nearly monoisotopic elements:

1-H -1
2-HE-4
6-C-12
7-N-14
8-Ø-16
23-V-51
57-LA-139
73-TA-181

Note: Elements which do not occur naturally must always be entered with the isotope number:

43-Tc
61-Pm
$84 \leq Z \leq 89$
91-Po
$93 \leq Z$

October 1976

REL

Relative

Data that are not given in absolute units but in some arbitrary units. are marked by the modifier "REL" in the third quantity-subfield and by the data-units keyword "ARB-UNITS". (Note, that a ratio defined under "ISO-QUANT", which does not require the modifier "REL" has usually the unit "NO-DIM"). The modifier "REL" can be attached to any quantity given in dictionary 14, and quantity-codes carrying this modifier are not entered in dictionary 14. Compare Example 5.

The quantity NG,SPC can be regarded as an abbreviation of NG,DE,REL and may therefore be combined with the data-units "ARB-UNITS" without attaching to the quantity code the modifier "REL".

Unfortunately, this sentence which was taken from an NDS X4 Manual update, turned out to be not correct. SPC denotes gamma intensities as function of gamma-energy and incident neutron energy. This may be normalized (GAM/100N) without REL modifier, or relative and then with REL and ARB-UNITS. Thus, this sentence should be dropped again. I am sorry!

Hans

October 1976

RESID-NUC RESID

Under the keyword "RESID-NUC", a description of this residual nucleus, and pertinent information regarding its characteristics may be given. The residual nucleus may be given in coded ISOTOPE formalism or in free text. (See EXFOR manual, page VIII.20). This keyword is not obligatory. No dictionary exists.

The residual nucleus should always be included in coded form in the case where the quantity given is measured on an isotopic mixture, but leads to a specified residual nucleus.

Note: In the case of a partial reaction to an isomeric state, the residual nucleus should be coded under the keyword HALF-LIFE.

See Isomeric States.

retransmission requested without the "Note".

This turns the rule upside down!
Primarily the residual nucleus is to be coded under RESID-NUC of course, and a half-life under HALF-LIFE. Only when it is not clear to which nucleus the HL refers, the relevant nucleus is added under HALF-LIFE.

Resonance Integrals RESØN

Definition: Index of epithermal reaction by a material in a reactor flux.

Function code: RI

Example: ABS,RI

The energy limits are specified under the data-heading keywords EN-MIN and EN-MAX.

Infinitely dilute resonance integrals for a 1/E spectrum are defined as:

$$I_r = \int_{E_c}^{\infty} \sigma_r (E) \frac{dE}{E}$$

where E_c = cutoff energy near the lower limit of the epithermal region.

These are usually measured as cadmium ratios where E_c is the cadmium cutoff energy which is dependent on the thickness of the cadmium cover.

In some cases, an upper limit is given for the energy (e.g. 10 MeV) and should be coded. When an upper limit is not given EN-MAX may be omitted.

Resonance integrals over smaller energy ranges, where the sum over the partial energy ranges given from the cutoff energy to the maximum energy is equal to the total resonance integral, should be coded with the quantity modifier "PAR".

Reduced resonance integrals, where the 1/v part has been subtracted, should be coded with the quantity modifier "RNV".

Note: Resonance integrals calculated from resonance parameters should not be coded in EXFØR.

For further detail see:

N.P. Baumann, DP-817 (1963)

→ This is inconsistent with the general definition of "PAR" in Dict. 12 and should be deleted (although explicitly approved at 4C-Meeting). See proposal in front of this memo.

October 1976

4C-3/184
1976-11-42 SINGLE-2 (see 4C-3/174)

22

I do not know what this means in BNL-325 p. xi P.68
Are there other reduced neutron-widths at other energies?

3) Reduced neutron widths are defined at 1 eV as follows:

$$\Gamma_n^{\ell} = \frac{\Gamma_n}{\nu_\ell \sqrt{E_o/1\ \text{eV}}}$$

where: E_o is the resonance energy in eV, see BNL-325 p xi

ν_ℓ is the penetration factor for the nucleus.

These three bits are trivial now. But this example shows clearly that this Lex/Lw entry should have been entered exactly as proposed in 4C-1/78 and with exactly the changes agreed at the 4C-Meeting. Any unauthorized change was to be avoided.

Or more specifically:

For s-wave resonances (ν_o=1):

$$\Gamma_n^{o} = \frac{\Gamma_n}{\sqrt{E_o/1\ \text{eV}}} \qquad (1)$$

For p-wave resonances:

$$\Gamma_n^{1} = \frac{\Gamma_n}{\sqrt{E_o/1\ \text{eV}}} \left(1+\frac{1}{k_o^2 R^2}\right) \qquad (2)$$

where: k_o = wave number

R = nuclear radius

The missing page number SINGLE-2 had been indicated already in 4C-3/174!!

Quantity code: EL/WID,RED

The angular momentum should be specified under the data heading keyword 'MOMENTUM L'. (See Example 3).

The units are that of energy, e.g., eV or millieV.

Note: Some authors give the reduced neutron-width (for s-wave neutrons) as

$$\Gamma_n^{(o)} = \frac{\Gamma_n}{\sqrt{E_o}} \qquad (3)$$

which has the dimension of the square-root of an energy, e.g. $\sqrt{\text{eV}}$. (Compare: Hennies, 66PARIS Vol. 2, page 333). For consistency, only definition (1) with the dimension of an energy should be used in EXFOR, the numerical values of definitions (3), and (1) being anyway identical except for the dimensions.

4) Peak cross section is defined as cross-section at peak of the resonance assuming the line shape in a Breit-Wigner formalism, corrected (where important) for instrumental and temperature effects. The peak cross section for s-wave neutrons can be expressed by:

total: $\sigma_o = 4\pi\lambda_o^2\, g\, \frac{\Gamma_n}{\Gamma}$

partials: $\sigma_{or} = \sigma_o \frac{\Gamma_r}{\Gamma}$