

Memo 4C-3/123

To: Distribution

2 June 1975

From: *KO* *ML* *HDL*  
K. Okamoto + M. Lammer + H.D. Lemmel

Subject: Proposed Lexfor entry for "Delayed Fission Neutron Data" (2nd version)

After careful consideration of various cases we would like to submit the attached proposal for coding "Delayed Fission Neutron Data" in Exfor. The proposal is formulated in the form of a Lexfor entry.

The proposal includes some new codes for quantities, data headings and units. These are marked in the left-hand margin. Note that the proposed new quantities are, strictly speaking, not neutron-induced but decay quantities, similar as spontaneous fission, and are to be coded under NUC-QUANT.

Comments are welcome.

We would like to withdraw our memo 4C-3/121 of 13 May 1975, because the number of this memo is a duplication with the earlier issued 4C-3/121 on "Non-neutron EXFOR developed at Karlsruhe". The present memo 4C-3/123 includes a few additions to the version of 13 May 1975.

Attachment

Distribution:

L. Lesca, NDCC (5)  
S. Pearlstein, NNCSC (5)  
V. Manokhin, CJD (5)

NDS: P.M. Attree  
A. Calamand  
J. Lemley  
H.D. Lemmel  
A. Lorenz  
K. Okamoto  
✓ J.J. Schmidt  
G. Lammer  
file

Clearance: J.J. Schmidt *W. Schmidt*



3.) Energy spectrum of the delayed neutrons of a given group:

Quantity code: NU,DE,DL/PAR/REL

Unit: usually ARB-UNITS

Independent variables: HL1 and an energy range E-MIN to E-MAX.

(Other representations may be possible and should be considered whenever they occur.)

4.) Energy spectrum of all delayed neutrons together.

This is time dependent, due to the contributions from the different half-life groups.

Quantity code: NU,DE,DL/REL

Unit: usually ARB-UNITS

new Independent variables: E and TIME

For the quantities above the nucleus to be entered is the fissioning nucleus before the absorption of the incident neutron.

For spontaneous fission enter the fissioning nucleus, the quantity SF/NU instead of NU, and use the keyword NUC-QUANT instead of ISO-QUANT.

The following quantities are not properties of the fissioning nucleus but decay properties of the fission-product nucleus which is the "precursor" of the delayed neutron. Entries are therefore coded under the keyword NUC-QUANT and the Z-S-A of the precursor nucleus.

5.) The delayed neutron emission probability  $P_n$ .

The fission-product nucleus ( delayed neutron precursor, see Fig. above) decays by beta decay followed by neutron emission, and  $P_n$  gives the percentage of neutron decays relative to all decays of the delayed-neutron precursor.

new Quantity-code: ON,PE

Coded as: NUC-QUANT (Z-S-A,ON,PE) where Z-S-A is the precursor nucleus.

new Unit: N/100DIS = "neutrons per 100 disintegrations"

No independent variable.

(Note: the code ON was chosen in analogy to Wrenda where "O" denotes "no incident particle" or "spontaneous decay".)

6.) the energy spectrum of the neutrons emitted by a specific precursor.

new Quantity-code: ON,DE,REL

Coded as: NUC-QUANT (Z-S-A,ON,DE/REL) where Z-S-A is the precursor nucleus.

Unit: ARB-UNITS

Independent variable: E

Note: In the cases 5.) and 6.) the DL modifier is not given. DL refers to fission only and does not refer to the decay properties of the fission product nuclei.

The following formula applies for a given precursor nucleus:

<u>abs.del. n.yld</u>	<u>cum. yld</u>	*	<u>del.n.emiss.prob.</u>
fission	fission		decay
NU,,DL/PAR	= NF,YLD,CUM	*	ON,PE

numerical example:

$$\left. \begin{array}{l} 0.2 \text{ N/100F} \\ \text{or } 0.002 \text{ N/F} \end{array} \right\} = 1.2 \text{ NUC/100F} * 16.7 \text{ N/100DIS}$$

(End of Lexfor-Entry on Delayed Fission-Neutron Data)

Proposals for data units:

Units for Fission-Yields

In the Lexfor entry on Fission Yields the unit code PC/FIS (= percent per fission) was introduced earlier. After having introduced the unit-code GAM/100N, and in analogy with other unit-codes we are proposing, we suggest to replace the unit PC/FIS by the new code

new NUC/100F = fission product nuclei per 100 fissions (also called "percent per fission") summing up to a total of 200, respectively to a total of 100 if only one mass peak is considered.

The unit code PC/FIS would be marked as obsolete. This means that it can still occur in old entries but should no longer be used in new entries.

The existing Lexfor entry on Fission Yields should be changed accordingly.

Units for Neutron-Yields

new We suggest to introduce for nu-bar data the unit N/F (= neutrons per fission) instead of the previously used NO-DIM (which may continue to exist in old entries). This is in order to achieve consistency between delayed neutron yield data given usually in N/100F and the total neutron yield which is now to be given in N/F.

The existing Lexfor-entry on Nu-bar should be amended accordingly.