LEXFOR "Fission yields" and Related Dictionary Additions

(N. Otsuka, O. Schwerer, CP-D/807, 2013-09-27)

The following changes are proposed for LEXFOR "Fission Yields":

- Revision of "Yields of Correlated Fragment Pairs"
- Addition of "Energy Differential Fission Yield"
- Addition of "Quantities at Specific Total Kinetic Energy"
- Addition of "Quantities for Neutrons Emitted from a Specific Fragment"

Yields of Correlated Fragment Pairs

The Z and A of the correlated pair are entered under the field headings `ELEM1`, `MASS1`, and `ELEM2`, `MASS2`.

REACTION coding: `CRN` in SF5.

Example:

```
BIB
REACTION    (...(N,F)ELEM/MASS,IND/CRN,FY)
...
ENDBIB
COMMON
ELEM1       ELEM2
NO-DIM      NO-DIM
 56.         42.
ENDCOMMON
DATA
MASS1       MASS2       DATA
NO-DIM      NO-DIM      PC/FIS
 138.        104.        ...
 138.        105.        ...
 ...         ...         ...
ENDDATA
```

…

Energy Differential Fission Yield (*new section*)

REACTION coding: `FY/DE` in SF6.

Units: a code from Dictionary 25 with the dimension `FYDE` (e.g., `PC/FIS/MEV`)

Example:

`(98-CF-252(0,F),PRE,FY/DE,FF/LF+HF)`

Differential yield of fission fragments with respect to total kinetic energy

`(98-CF-252(0,F)MASS,PRE,FY/DE,LF+HF)`

Differential yield of fission fragments specified with respect to total kinetic energy

Quantities at Specific Total Kinetic Energy (*new section*)

Total kinetic energy dependence of prompt fission neutron quantities (e.g., multiplicities, average emission energy) which is not partial for the total kinetic energy (i.e., not additive for total kinetic energy).

REACTION Coding: TKE in SF6.

Example:

(…(0,F),PR,NU/TKE)	Prompt fission neutron multiplicities at the total kinetic energy specified.

Quantities for Neutrons Emitted from a Specific Fragment (*new section*)

If a prompt fission neutron quantity (*e.g.*, multiplicities, average emission energy) is given for a specific fragment (e.g., MASS in REACTION SF4) and the quantity is for neutrons emitted from the fragment specified, the branch code FRG is coded in SF5. Fragment mass dependence of such quantities $Q(A)$ for fissioning of compound (mass A_c) is characterized by asymmetry with respect to the half of the compound mass $Q(A_c\text{-}A) \neq Q(A)$ (*e.g.*, fragment mass dependence of fission neutron multiplicities known as "saw-tooth curve").

Example:

(…(0,F)MASS,PR,NU)	Multiplicities of the prompt fission neutrons emitted with the fragment whose mass is specified.
(…(0,F)MASS,PR/FRG,NU)	Multiplicities of the prompt fission neutrons emitted from the fragment whose mass is specified.

(End of proposals of LEXFOR revision)

The addition of the last new section is related to revision of 14065.002, 004 and 006 [1] in PRELIM.1391 as well as 14369.002-004 [2] in PRELIM.1393, and we propose the following new codes:

Addition to dictionary 31 (Branch codes)

FRG	Referring to fragment specified

Additions to dictionary 236 (Quantities)

PR/FRG,NU	Multiplicity of prompt fission neutrons emitted from the fragment specified
PR/FRG,NU/TKE	Multiplicity of prompt fission neutrons emitted from the fragment specified at a given total kinetic energy

References:

[1] H.R. Bowman et al., Phys. Rev, **129** (1963) 2133 (EXFOR 14065).
[2] J.S. Fraser et al., Ann. Rev. Nucl. Phys. **16** (1966)379 (EXFOR 14369).

Quantity	Reaction Type	Dim.	Subentries
PR/FRG,NU	NU	FY	14065.002, 14369.002-004
PR/FRG,NU/TKE	NUE	FY	14065.004, 006