**Nuclear Data Section**

**International Atomic Energy Agency**

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

**Memo 4C-3/414 (Rev.)**

**Date:** 10 January 2019

**To:** Distribution

**From:** N. Otsuka

**Subject: Pn value determined as ratio of neutron yield to fission yield**

PRELIM.2268 is specialized for transmission and retransmission of EXFOR entries for Pn values in old publications. Rudstam gives a very good review of such experimental data published in 1960s and 1970s [1].

**1. Addition of an example of “derived data” in LEXFOR “Data Type”**

An old method seen in PRELIM.2268 is to derive the Pn value by

1. measuring the yield of the delayed neutrons emitted from a specific fission product nuclide (precursor) νd(Z,A), and then
2. dividing νd(Z,A) by the fission product yield, namely Pn(Z,A)=νd(Z,A)/FPY(Z,A).

Rudstam introduced this method as an “indirect method” in his presentation at 1979 Vienna meeting [1], and concluded that “Branching ratios determined by indirect methods involving estimated yields must be regarded with caution.” I suggest addition of the following example as derived data in LEXFOR ”Data Type”:

Pn value obtained as the ratio of the measured delayed neutron yield to the estimated fission yield.

The Pn values obtained by this method are listed with “Estimated fission yields” in Ref. [1].

**2. Yield of delayed neutrons emitted from a fission product nuclide specified**

νd(Z,A) can be independent (i.e., neutrons emitted from the directly formed fission fragments) or cumulative (i.e., neutrons emitted from the directly or indirectly formed fission fragments). Therefore DL,NU must be accompanied with a branch code (e.g., IND, CUM) when it appears with a nuclide code (or ELEM/MASS) in REACTION SF4. The REACTION code of the following subentries in PRELIM.2268 must be corrected:

20521.002, 20879.007, 22047.005, 23349.002, 23350.004, 23351.002, 23353.003, 23353.005-006, 23354.006, 23356.002-005, 23357.004-007, 23357.009, 23360.015, 23362.003, 23362.004

The same comment is applied to 41300.002 and 41377.002-003.

Addition of these quantities in LEXFOR “Delayed fission neutrons” is proposed:

**Delayed Fission Neutron Yield for a Given Precursor Nuclide**

The cumulative and independent delayed fission neutron yields are the delayed neutron yields from an individual precursor including or excluding its formation via radioactive decay and isomeric transition, respectively.

**REACTION Coding**: (…(N,F)...,DL/CUM,NU) or (…(N,F)...,DL/IND,NU)

**Reference**

[1] G. Rudstam, INDC(NDS)-107, p69 (1979).

**Distribution:**

a.koning@iaea.org

abhihere@gmail.com

aloks279@gmail.com

cgc@ciae.ac.cn

dbrown@bnl.gov

draj@barc.gov.in

fukahori.tokio@jaea.go.jp

ganesan555@gmail.com

gezg@ciae.ac.cn

imai@nucl.sci.hokudai.ac.jp

iwamoto.osamu@jaea.go.jp

j.c.sublet@iaea.org

jmwang@ciae.ac.cn

kaltchenko@kinr.kiev.ua

kenya.suyama@oecd.org

l.vrapcenjak@iaea.org

manuel.bossant@oecd.org

masaaki@nucl.sci.hokudai.ac.jp

michael.fleming@oecd.org

mmarina@ippe.ru

nicolas.soppera@oecd.org

n.otsuka@iaea.org

nrdc@jcprg.org

odsuren@gmail.com

ogritzay@kinr.kiev.ua

ogrudzevich@ippe.ru

otto.schwerer@aon.at

pikulina@expd.vniief.ru

pritychenko@bnl.gov

s.selyankina@iaea.org

samaev@obninsk.ru

sbabykina@yandex.ru

scyang@kaeri.re.kr

selyankina@expd.vniief.ru

sonzogni@bnl.gov

stakacs@atomki.hu

stanislav.hlavac@savba.sk

sv.dunaeva@gmail.com

taova@expd.vniief.ru

tarkanyi@atomki.hu

vvvarlamov@gmail.com

v.zerkin@iaea.org

vidyathakur@yahoo.co.in

yolee@kaeri.re.kr

zholdybayev@inp.kz