Memo 4C-3/221

To: Distribution
From: P.M. Attree and H.D. Lemmel   10 March 1978

Subject: "Raw" data

Reference: Memo 4C-2/103 of 78/2/3

Note: Manual update proposed.

        We believe that it is one of the functions of a data-centre to
collect "raw" data, which mainly include transmission data and reaction
yield data, including "counts" or data given in "barns" but not yet fully
corrected.

        There exists a related Lexfor entry on "RAW data", see Memo 4C-2/36,
(which is missing in the NNDC Manual). This needs a revision in its
last sentence, where it said so far: "The STATUS should be given as
(PRELM). If possible, the data should be replaced by the corrected
cross-section data later on".

        This statement is superseded for two reasons:

-       there may be preliminary as well as final "raw" data;

-       it seems to be the common understanding that "raw" data and cross-
        sections and resonance parameters should all be stored, where
        feasible.

See the proposed revision of this Lexfor entry attached.

        The handling of such "raw" data creates special problems, in
particular:

-       it is often voluminous (e.g. the "raw" data from the Australian
        ORELA experiment may have about 2 million data lines, which is more
        than the entire EXFOR library from areas 1 - 4 at the end of 1977);

-       the authors are often reluctant to release such data for wide
        distribution, as would be the case for a normal EXFOR entry.

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We therefore would like to follow the procedure introduced by NNDC
in entries 10081 (065 - 070). That is, to store the "raw" data on
special archival tapes as submitted by the authors (which may be called,
e.g., EXFOR SUPPL NDS 001), and to prepare "NODATA" entries with a cross-
reference to the archival tape. (See entries 30429 and 30430 on our next
transmission tape, to be distributed soon). This requires a revision
of the Lexfor entry "NODATA" for which a proposal is attached.

In the following cases "NODATA" Exfor entries may be transmitted which
do not contain numerical data in the DATA section;

1.) <u>Unobtainable data</u>: In the case where a center is aware that data
exist, but the center is unable to obtain the data, a "NODATA" entry
should be made in Exfor to inform the other centers (and their users)
of the status of the data. This will eliminate many repeated requests
for the same data and needless bookkeeping concerning data which will
be entered into the system with extensive delays or not at all. Under
STATUS the code (UNOBT) is entered followed by free text giving, if
known, the date when the data may be expected to be released, or the
reason why the data cannot be obtained.

2.) <u>Voluminous "raw" data</u>: (Compare LX4: Raw data)
Voluminous files of "raw" data may be stored on special archival tapes.
A "NODATA" Exfor entry is then transmitted giving under STATUS a cross-
reference to the special archival tape, the approximate number of
records, and information how to obtain the data upon request. In case
that the author so wishes, a warning is given in free text that the
raw data should be used only after consultation with the author.

In both cases the <u>BIB</u> section of the "NODATA" entry should be prepared
as usual, containing at least the obligatory keywords (see page VIII.4).

The <u>COMMON</u> section should contain minimum and maximum of the incident-
particle energy, if known.

The <u>DATA</u> section is replaced by the system identifier NODATA (compare
page III.9). The system identifier NODATA cannot occur in subentry 001
so that, as usual, an entry consists of a minimum of two subentries.

"Raw" data are experimental data which are not yet reduced to the final form but still contain, for example, contributions from detector efficiency, instrumental resolution, or sample thickness.

Although such data are of little use to normal data-center customers, it has been recognized that "raw" data should be stored by the data-centers. Such data would then be available

- for re-analysis when improvements in analysis techniques are made; and

- for realistic assessments of data errors becoming increasingly important to evaluators.

(See recommendation by the NEANDC/NEACRP meeting on neutron data for structural materials, Geel, Dec.1977.)

The following types of "raw" data have been encountered so far. They are coded in Exfor by adding the modifier "RAW" to the quantity code for the related cross-section.

(a) measured transmissions,

$$\langle e^{-n\bar{\sigma}_T} \rangle = 1 - n\langle\bar{\sigma}_T\rangle + \frac{1}{2} n^2 \langle\bar{\sigma}_T^2\rangle -+ \ldots \; ;$$

(b) reaction yields,

$$\langle y_r \rangle = \langle (1-e^{-n\bar{\sigma}_T})\bar{\sigma}_r/\bar{\sigma}_T + \sum_{i=1}^{\infty} y_{r,i} \rangle \; ;$$

where $\langle\ldots\rangle$ denotes resolution broadening, n is the sample thickness in nuclei/barn, $\bar{\sigma}_T$ and $\bar{\sigma}_r$ are the Doppler-broadened, abundance-weighted total and partial reaction cross sections, respectively, and $y_{r,i}$ is the reaction yield from neutrons scattered i times before inducing the reaction of type r, e. g. fission, scattering or radiative capture.

Note that for thin samples ($n\bar{\sigma}_T \ll 1$) the following simple relations with the (broadened) cross sections exist:

$$-\frac{1}{n} \ln \langle e^{-n\bar{\sigma}_T} \rangle \simeq \langle\bar{\sigma}_T\rangle , \qquad \frac{1}{n} \langle y_r \rangle \simeq \langle\bar{\sigma}_r\rangle .$$

Data may be given as "counts" or as uncorrected cross-sections in "barns".

If additional cases are encountered they must be included explicitly under this LEXFOR entry.

In any case, explanation in free text is required.

If possible, the raw data should be supplemented by the corrected cross-section data and/or resonance parameters, with appropriate cross-referencing. Voluminous sets of raw data may be stored on special archival tapes referenced in EXFOR in "NODATA" entries. See LX4: NODATA.