NRDC action the List of EXFOR Outliers

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After NRDC meeting (2006), three lists of "Outliers in EXFOR database" were submitted by Emmeric Dupont (CEA Saclay). All articles were checked at NDS and the results were reported to the WPEC Subgroup 30 "Improving the Accessibility and Quality of the EXFOR Database" (WPEC SG-30).The preamble of the report is in Appendix of this paper.

Table: Current status of "EXFOR Outliers" (2008-09-16)

|	Not in error	Error		Not resolved	Total
		Corrected	To be corrected		
# of subentries	55 (41%)	57 (43%)	7 (5%)	15 (11%)	134

NDS did *not* ask corrections to compilers when

  1) The data are compiled as authors give in their publications (not compiler's mistake);

  2) The reason of the discrepancy cannot be resolved, because;

      * Numerical data were received by data centres, but they are not published;

      * Publications are not available (e.g. thesis);

      * Cannot identify the product nuclides (Decay data are missing.)

      etc.

Examples of compiler's action to "non-trivial" outliers

1. 13845.002 – Data point is compiled as author gives (Table available).
   Compiler's action (TRANS.1349): Data point is kept with the following comment:
   ```
   CRITIQUE   Data too large by a factor of ~100.
   ```
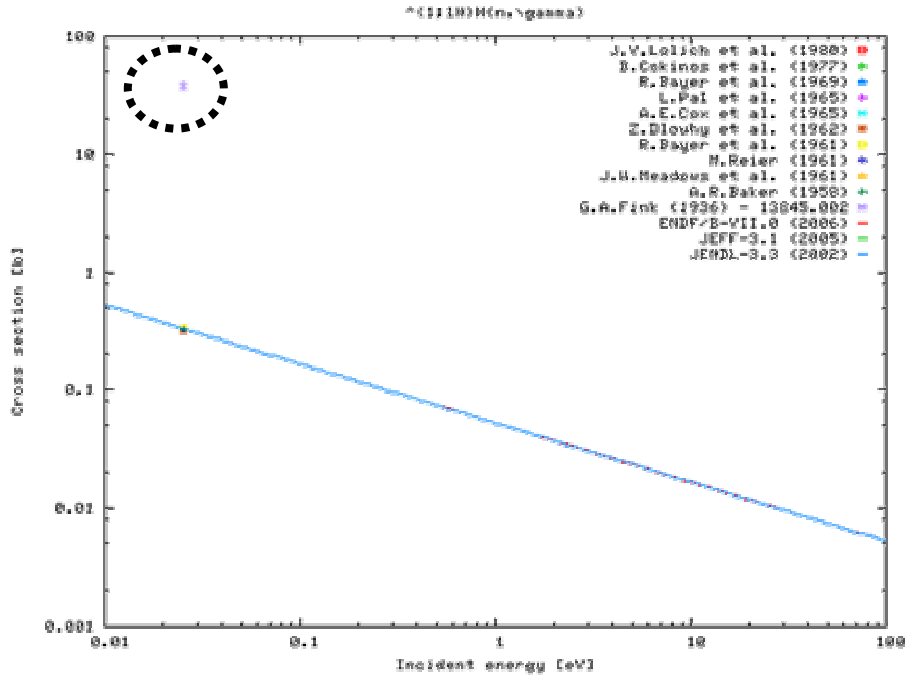

2. 20418.010 – One outlier in high resolution measurement (Data not in the article)
   Compiler's action (TRANS.2198):   One point was removed.
   ```
   HISTORY   (20080404A) M.M. One data line was deleted as wrong
                         "8.1355E-01 8.4492E-01 1.6738E-01"  .
   ```
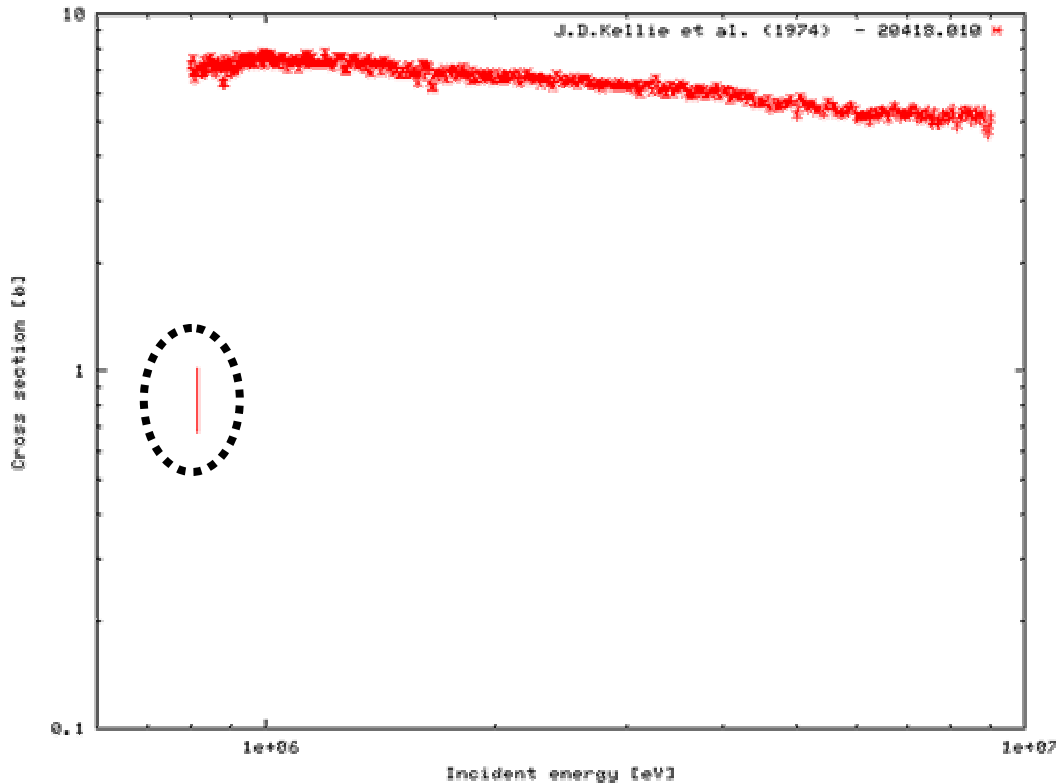
Requests to compilers:

1. Users will possibly repeat similar questions about the same outliers in future. But we should not waste our limited manpower for repetition of the same analysis. Therefore addition of following information for users (without deletion of whole data table) would be proposed:

   Example

   ```
   1)   CRITIQUE   Data value is higher than other works

   2)   COMMENT    By author: Few milligrams of enriched sample without

                   chemical separation

   3)   DECAY-DATA (60-ND-151,17.3MIN)

        STATUS    (OUTDT) T(1/2)= 12.44 min for 151Nd (Sept., 2008)
   ```

2. Parameters (decay data – especially half-lives in activation measurement -, monitor data) and technique (method, analysis etc.) used by authors should be compiled. They are sometimes useful to find the possible reason of deviation from other data points.

3. Source of data table should be clarified under STATUS ("Table x", "Fig. x", "sent from author" etc.). Difference of compiled data (possibly from private communication etc.) from data in the main publication is not enough reason to make correction.

F-tables from Arjan Koning

After the WPEC SG-30 meeting, we have received a report from Arjan Koning (NRG, Petten) "Automatic test of EXFOR with TALYS: Attempt 1". He calculated F values

$$F = 10^{\sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(\log\frac{\sigma_T^i}{\sigma_E^i}\right)^2}}$$

for 62140 EXFOR subentries (i: index for incident energy point, T and E stands for Theory (or Talys) and Experiment). Note that $F = \sigma_T / \sigma_E$ (if $\sigma_T > \sigma_E$) and σ_E / σ_T (if $\sigma_T < \sigma_E$) if there is one data point in the subentry. NDS is now analyzing his data file to find out efficient ways for compilation mistake detection.

Appendix: Reply to the "Outliers in EXFOR database"
(Submitted to WPEC SG-30 meeting June 4, 2008 at JAEA and revised)

Outliers in EXFOR data base   16 September, 2008

Emmeric Dupont (CEA Saclay) sent three lists of 95, 29 and 10 sub-entries - "Outliers in EXFOR database" – to the WPEC SG30 mailing list in January and May 2008, respectively. We have checked them in conjunction with other NRDC centres, and we summarize the results below. Both Dupont's comments and our reply are appended to this message.

Our checking can be summarized as follows:

	Total	Part 1 (Jan 2008)	Part 2 (May 2008)	Part 3 (June 2008)
Not in error	**55**	42	8	5
Error (corrected)	**57**	40	14	3
Error (to be corrected)	**7**	0	5	2
Not resolved yet	**15**	13	2	0
Total	**134**	95	29	10

- 55 (= 42 + 8 + 5) cases were found to be correct (in the sense that EXFOR reports the published results correctly, and there are no obvious misprints in the published data);

- 15 (= 13 + 2 + 0) cases cannot be resolved because compiled data were originally obtained directly from the authors (not shown in their articles), or we have yet to obtain the original articles (in reports, etc.);

- 64 (= 40 + 19 + 5) cases are errors in EXFOR → 57 cases from NNDC, NEA-DB, NDS, CJD, ATOMKI, CAJaD, and JCPRG have been corrected;

- many of the agreed errors are attributed to mistakes in either unit coding (35%), target nuclide coding (35%), or mistyping of the data table (18%);

- additional comments:

    1. One Argentine experimental group (Nasiff, *et al*.) adopted an unusual definition of cross section for natural targets (e.g. Bonesso, *et al.*, *Radioanal. Nucl. Chem.* **152**(1991)189, Eq.1) – their definition must be multiplied by the atomic weight to give the cross section as defined in EXFOR. This correction has been undertaken for D0046 and D0092.

    2. Jeronymo, *et al.*, *Nucl. Phys.* **47**(1963)157 give numerical data in Table 3 and plot them in Figs. 5-13. Data points in the figure for some reaction channels are different from those in the table. This is an example of a subentry for which verification is not straightforward (as also noted by Dupont).

    3. We found that some cross sections measured by β spectroscopy (B, B+ or B- under keyword DECAY-DATA) in the 1950s and 1960s give systematically higher cross sections than standard. Such deviations are discussed in Struwe, *et al. Nucl. Phys.* **A222**(1974)605. Correction (renormalization, etc.) of such experimental data sets obtained by the same experimental technique should be addressed by cross-section evaluators (i.e. EXFOR users).

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