

Memo 4C-3/172

To: Distribution

1976-07-26

From: *Lammer*
G. Lammer, H.D. Lemmel
for

Subject: Minutes of the 12th 4C-Meeting

Please find enclosed the Draft Minutes of the 12th 4C-Meeting. The Conclusions, Recommendations and Actions have been distributed as Memo 4C-3/170, the Appendices will be attached to the final INDC-report.

We would appreciate receiving comments, which should reach NDS not later than 31 August 1976.

Attachment

Distribution:

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L. Lesca, NDCC
V. Manokhin, CJD
H. Goldstein
A. Marcinkowski
S.N. Rapeanu

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INDC(NDS)-78/

Report on the Twelfth Four-Centre Meeting

Vienna, 26-27 April 1976

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FOREWORD

The Twelfth Annual Consultants' Meeting of the Four Neutron Nuclear Data Centres (twelfth "Four Centre Meeting") was held at the IAEA, Vienna, on Monday 26 April and Tuesday 27 April 1976. It was immediately followed by the Second Consultants' Meeting on Charged Particle Nuclear Data Compilation on 28-30 April 1976. Both meetings were closely related due to the discussions on the Exfor system commonly used for the exchange of both data types, and most of the participants of the first of the two meetings stayed for the second. Both meetings together can be regarded therefore as the First Consultants' Meeting of Nuclear Reaction Data Centres - though photonuclear reaction data were not a topic of the meeting.

The present document contains the minutes of the meeting of the Neutron Data Centres. The minutes of the subsequent Charged Particle Nuclear Data Meeting are contained in the document INDC(NDS)-77/ . Both documents include all the decisions on the Exfor system disregarding from which of the two meetings they resulted.

Twelfth Four-Centre Meeting

Vienna, 26-27 April 1976

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LIST OF PARTICIPANTS

Mr. V. Manokhin		}	CJD
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Mr. L. Lesca		}	NDCC
Mr. A. Schofield			
Mr. C.L. Dunford		}	NNCSC
Mr. N. Holden			
Mr. S. Pearlstein			
Mrs. P.M. Attree		}	NDS
Mrs. G. Lammer	(local secretary)		
Mr. H.D. Lemmel	(scientific secretary)		
Mr. A. Lorenz			
Mr. J.J. Schmidt	(chairman)		
Mr. O. Schwerer	(local secretary)		

Observers:

Mr. A. Marcinkowski			Institute for Nuclear Research Swierk, Poland
Mr. Rapeanu			Institute of Atomic Physics Bucharest, Romania
Mr. M.A. Khalil		}	NDS
Mr. R. Lessler			
Mr. K. Okamoto			
Mr. M. Vlasov			

LIST OF ABBREVIATIONS USED

CCDN	Centre de Compilation de données neutroniques; same as NDCC
CINDA	Computerized Index of Neutron Data, a specialized bibliography and data index on neutron nuclear data operated jointly by NNCSC, NDCC, NDS and CJD
CJD	Centr po Jadernym Dannym, the USSR Nuclear Data Center at F.E.I. Obninsk
CINDU	A catalogue of numerical nuclear data libraries available from NDS
CPND	Charged particle nuclear reaction data
EXFOR	Exchange Format, initially developed for the international exchange of neutron nuclear data, now being extended to charged particle nuclear data
INDC	International Nuclear Data Committee
INIS	International Nuclear Information System, a bibliographic system operated by the IAEA
NDCC	Neutron Data Compilation Centre (Centre de Compilation de Données Neutroniques - CCDN) of the OECD Nuclear Energy Agency at Saclay near Paris
NDS	IAEA Nuclear Data Section, Vienna
NNCSC	USA National Neutron Cross Section Center at the Brookhaven National Laboratory, Upton, N.Y.
SCISRS	NNCSC's internal system for handling experimental data
WRENDA	World Request List for Nuclear Data Measurements published by the IAEA

MINUTES

Opening

Prof. Shalnov, Director of the Division of Research and Laboratories, opened the meeting welcoming the participants on behalf of the Director General. He stressed that the services of the Agency's Nuclear Data Section to the developing countries are increasing due to the growing importance of nuclear energy and nuclear technologies in these countries, and that the services of the Nuclear Data Section would not be possible without the contributions from the other centers represented at this meeting. Mr. Pearlstein replied and acknowledged the role of the Nuclear Data Section in the development of the Four Centres cooperation.

Election of Chairman

Mr. Schmidt was elected to act as Chairman of the meeting. Mr. Lemmel, Mrs. Lammer and Mr. Schwerer acted as Scientific Secretaries.

Adoption of Agenda

After a brief discussion, the proposed Agenda as given on page VII was adopted.

1. Status report of the neutron data centres

Each centre presented its progress report including statistics for 1975. (These are attached as Appendices A, B, C, E). Some items were discussed following the progress reports:

On the NDCC report:

Dunford acknowledges the significant progress achieved at NDCC with the CINDA operations and with the transmission of EXFOR data. Schmidt expresses the wish that this may continue, despite of the planned organizational and personal changes within NDCC. Lesca points out that NDCC had several posts vacant during the past years, but that from May 1976 onwards, the staff at NDCC will be complete and that this situation is expected to last for at least two years. In future, it may be possible to save one or two persons for new tasks.

On the NNCSC report:

Apart from the progress-report, a list of recent NNCSC publications has been distributed (Appendix D).

Pearlstein reports that at NNCSC, increasing effort is devoted to the evaluation of neutron cross-sections of reactor constituents and the coordination of evaluation activities.

On the NDS report:

The evaluation of the 2200m/s data of the main fissile isotopes will be currently updated by Lemmel with continuing consultation of specialists but perhaps without a specialists' meeting, since little can be decided at a meeting. A revision of the evaluation presented at the 1975 Washington Conference does not seem appropriate before existing discrepancies have been clarified.

The two observers reported the following neutron data activities of their centres (progress reports attached as Appendices G and H.):

Rapeanu (Institute of Atomic Physics, Bucharest): The centre is involved in

- compilation and evaluation of neutron data for Be-9, O-16, D-2, D₂O, Th-232, U-233. The sources for the data are Cinda, preprints and data retrievals received from NDS, and also the authors of publications.
- measurement of thermal neutron cross-sections for several elements, in solid and liquid phase, by means of crystal spectrometer and time-of-flight.

Marcinkowski (Nuclear Data Group of the Institute for Nuclear Research, Swierk): The activities of the group include CPND. Selected neutron data (total and capture cross-sections in the thermal energy range) are being compiled and evaluated, in order to be used for reactor calculations.

In the discussion following these reports, the need for a feedback from customers about the quality of the data they receive from NDS was emphasized by Schmidt.

2. Cinda

2.a. Brief report of the Cinda indexers' seminar (Lesca)

(i) Following a proposal by L. Lesca, the Cinda indexers' seminar was organized by the NDCC Steering Committee, and was held on two days in November 1975, at NDCC, Saclay. Its objectives were:

- to bring together, for the first time, all the persons indexing in Cinda the literature from area 2;
- to familiarize the indexers with the whole Cinda system and its organization;
- to make attempts to officialize the Cinda indexing at the indexers' home-laboratories; and - last, not least -
- to improve the coverage and its control system.

The minutes of this seminar are published as a report of the NDCC.

(ii) This report was followed by a discussion between all participants about the usefulness and the drawbacks of an indexers' network system based on the good will of external coworkers as established in area 2. It was concluded

- that this structure gives insufficient possibilities to supervise the external Cinda indexers;
- that the literature scanning for Cinda should preferably be related to the data compilation in Exfor, both for blocking purposes and for the sake of completeness in Exfor; and
- that many external coworkers, who usually prepare Cinda entries shortly before the book deadline only, cannot be brought to a more regular Cinda indexing, which is often not regarded as part of their recognized duties.

For these reasons it was recommended to the NDCC Steering Committee that the Cinda scanning and indexing be centralized at NDCC (Recommendation 1)

(iii) Feedback from users: The foregoing discussion entailed the question to the users present at the meeting (Rapeanu, Marcinkowski) about the quality of Cinda. Both emphasized the usefulness of Cinda, but stated that several mistakes and gaps have been found. Lemmel requested that all mistakes found should be communicated to NDS (Actions 1 and 2).

Marcinkowski mentioned the special problem that publications which do not contain any data, can often not be recognized as such from the entry. This is particularly disturbing, when the publication quoted is difficult to obtain. It was therefore agreed that the four Centres advise their indexers that in all such cases the code 'NDG' should be included in the comment (Action 3).

(iv) In order to generally encourage the feedback from users, it was decided that formsheets for the communication of gaps and mistakes should be included in the Cinda book (Action 4).

2.b. Cinda indexers' manual

The final version of the Cinda Manual will soon be published at NDCC. It will consist of loose leaves, so that single pages can easily be replaced, and will be issued as a formal publication; about 150 copies will be printed (Lesca). Schofield reports that the Manual will be composed of two parts: a complete description of the Cinda system which concerns mainly the centres, and a kind of condensed "coding aid" which will mainly be used by the Cinda indexers.

The participants of the meeting expressed their appreciation of NDCC's effort in producing the Manual and of NDS' contributions to it.

2.c. Completeness, coverage control and related computer programmes

(i) Coverage control: In a general discussion, it was noted that the responsibility for the coverage in a centre's service area, and hence the coverage control, remains with each centre.

(ii) The coverage control systems at the different centres were reported and discussed: NDS is working on the development of a computerized coverage control system. It will be based on the use of coverage control entries, but the features incorporated will be partially different as compared to the old 'ZZ'-system. Details about the planned system are to be found in the "Summary Record of the Cinda Readers' Seminar".

At NDS, the coverage control presently consists of hand-written lists of the issues that have been scanned. NDS would participate in NDCC's coverage control system as soon as this is ready.

NNCSC uses at present its own, more general coverage control system, from which the Cinda coverage list is extracted. Dunford suggests that NNCSC shall investigate the feasibility of taking part in the system to be developed by NDCC.

It was concluded that the development of a coverage control system at NDCC is important (Conclusion 1) and that NDCC should keep the other centres informed about the progress in this respect (Action 5).

The status of the Cinda-coverage should be communicated to NDS in time before each book-deadline, so that the section of the book 'last issues scanned' can be updated (Action 6).

(iii) Check of the completeness of the file: It was found that the coverage list cannot provide a reliable check of the completeness, for the following reasons:

- most of the report series do not have regular numbering, and often a centre receives only a fraction of the whole series. A definite answer to whether a report series has been completely assessed by the Cinda-indexers can only be received from the laboratories (Dunford);
- in future, the publications and series which contain Cinda relevant information only occasionally, will in many cases not be scanned by the Cinda-indexers but rather be covered with the help of INIS-retrievals. Each issue of Atomindex contains a list of reports that have been indexed in this issue, yet a similar coverage list for journals seems to be missing in Atomindex.

In this connection, Lesca pointed out that in NDCC's new coverage control system, flags will indicate whether a publication has been covered through INIS or by a Cinda indexer.

Lemmel considers it important that one can easily check in a coverage list whether a certain issue has been scanned or not.

The centres agreed to inform each other which series are scanned by Cinda indexers and for which series they rely on INIS retrievals. (Action 7)

Lesca opened the discussion about the completeness check of old entries, i.e. entries from pre-1976 publications. Following Pearlstein's recommendation that the effort in this respect should be limited, the following proposal was made:

An attempt should be made to detect and cover gaps in the main journal-series. Other missing entries could rather be detected by checking the literature cited in evaluation reports (Action 8). In order to facilitate the checking, NDCC will regularly provide a reference list retrieved from the current Cinda-file to the other centres (Action 9).

(iv) Status with respect to completeness: With respect to the coverage at CJD, Lemmel noted that the Soviet journals are well covered, whereas the situation with the reports (resp. so-called "pre-prints") from USSR does not seem to be satisfactory. Manokhin explained that CJD does not receive all Soviet reports, but steps are being taken to improve the coverage. Lemmel suggested that CJD send to NDS coverage control entries for laboratory reports resp. preprints (Action 10). For journals, coverage control entries have always been prepared by CJD and sent to NDS.

Holden reports that H. Goldstein is preparing a list of gaps he has found in Cinda. This list will be communicated to the other centres as soon as it is available (Action 11).

2.d. File maintenance, feedback listings, related computer programmes

NDCC will investigate the possibility of sending all Cinda listings in the same quantity-sort as in the book (Action 12).

It would also be desirable that in all Cinda listings the records within a block were sorted as they are in the book (Action 13).

Lemmel and Dunford wondered why a new entry that is assigned the hierarchy "main" would not supersede any earlier "main" entry of a block. Schofield explained that this is due to the structure of Cinda, which requires a "head-entry" for each block. A memo about this problem will be prepared by NDCC (Action 14).

2.e. Clean-up, blocking and related computer programmes

(i) Lemmel asked whether duplicate entries could be removed or at least detected automatically at NDCC. A computer program to this effect had been in successful operation at NDCC, but the program would require conversion to the new Cinda system. Although it was recognized that each centre is responsible for the clean-up in its area, the participants found that a computer checking of duplicates would be helpful (Action 15). A large number of duplications seems to exist in the file originating from the time that modifications or blocking could only be done by a "delete-and-reenter" operation. At least at NDS it was so far not possible to scan the file systematically for duplications.

(ii) In the course of the clean-up, NNCSC had created a great number of "No-book-flagged" entries. Lesca expressed the need to clarify and unify the philosophy of the "No-book-flag" use. It turned out that this

question has been dealt with and answered at the last Four Centres Meeting, but that the Cinda Manual did not yet contain the appropriate advise. The next update of the Cinda Manual should include a clear definition of the use of "No-book-flags" (Action 16) *.

(iii) Clean-up and blocking performed: NNCSC: About 85% of the post-1970 entries are now blocked; new entries will be blocked at the time when they are coded. Many Lab-codes have been corrected, ambiguities clarified, obsolete codes removed.

In future, the Cinda activities at NNCSC will have the following priorities: 1) coverage of new literature; 2) improvement of coverage control system; 3) corrections of entries via feedback; 4) blocking of data index lines not yet blocked; 5) entering and blocking of the missing data index lines.

NDCC: about 85% of the post 1970 entries are now blocked, entries from Japan having not yet been treated. The report-codes are still to be unified, which is of vital importance for the operation of NDCC's coverage control system. The correction can, to a certain extent, be done automatically.

NDS: Since a number of years all entries from areas 3 and 4 are blocked. Difficulties still exist when labs in areas 3 or 4 publish in journals of areas 1 or 2, for which entries are made by NNCSC or NDCC. NDS will have to request from NDCC at regular intervals retrievals for recent entries made by NNCSC and NDCC on papers by labs in areas 3 and 4 and review the blocking (Action 16a). Duplicates have not yet been removed systematically. The lab-codes of USSR, especially the many "CCP-" codes, have not yet been corrected.

Since the blocking is an essential feature of Cinda, it was concluded that, from 1 January 1976 onwards, the 3 centres responsible will currently block all entries (Conclusion 2).

In order to avoid future mistakes in coding laboratories, it was decided that all centres should send to NDS for inclusion in the Lab-Dictionary cross-references between related laboratories or between laboratories with similar names, and information whether and when a laboratory had changed its name (Action 17).

Dunford suggested that in case that a laboratory has changed its name, the old code should preferably be kept and the dictionary updated appropriately.

* NDCC should also note that a special use of the "No-book-flag" was discussed by the "Subcommittee on the indexing of evaluated data" (see Appendix I)

2.f. Index lines for Exfor and evaluated data

(i) Exfor index lines: Pearlstein was concerned about the space the Exfor index lines occupy in the book. Schmidt estimated that at present the number of Exfor lines roughly amounts to 10% of all entries. According to Dunford this number will be doubled, when all the data compiled before 1970 will have been converted to Exfor.

(ii) Index lines for evaluated data: The question whether and how the contents of large evaluated data libraries like ENDF should be indexed in Cinda was discussed in a Subcommittee. See Conclusions 3-5 and Actions 18-20.

2.g. Quantity definitions

Following discussions held in a subcommittee it was decided

- to change the quantity N3N to NXN (X 3), see Conclusion 6 and Actions 21-22;
- to introduce the new quantity FPB for fission product betas (Conclusion 7 and Action 22);
- to revise the definitions of LDL and TSL (Conclusions 8 and 11, Actions 24 and 25);
- to accept memo 4C-3/155 about resonance integrals (Conclusion 9);
- how to code metastable targets (Conclusion 10);
- to cancel the quantities REM and NPR as suggested in memo 4C-3/164 (Conclusion 12, Action 22a);
- to investigate the difficulties connected with introducing "neutron" as a target material (Conclusion 13, Actions 28 and 29).

NDCC is to inform Cinda indexers about these changes (Action 27) and to update the Cinda Manual accordingly (Action 26). NDS is to make the appropriate changes in the text pages of the Cinda book (Action 23).

2.h. Handbook section in the Cinda book

The handbook section as conceived at NDS for the book Cinda 76 has been distributed to all participants (see Appendix I). After a brief discussion whether this section should also include the non-neutron data handbooks, the proposed version was accepted. Two additional handbooks were proposed for inclusion (Action 30).

2.i. Publication schedule

Lemmel reported the recommendation of the 8th INDC-meeting: In view of the rapidly increasing paper-costs, the frequency of cumulative Cinda issues should be reduced as much as possible. In 1978, an 'archival' cumulative Cinda-volume shall be published, which will remain valid for about five years. During this time, currently updated supplements shall regularly be issued. A brief discussion about the 'cut-off year', i.e. the latest reference year to be included in the archival volume, and about possible publication modes for the part covering the new literature, remained without conclusions. Proposals for the publication schedule after 1978 should be worked out at the centres and circulated as 4C-memos (Action 31).

2.j. Miscellaneous

(i) NNCSC, NDCC and NDS are reminded to use the so-called "cosmetic" reader symbol where appropriate in order to reduce the noise in the supplement books (Action 31a).

(ii) Action 6 of the 11th Four Centres meeting requested "to document in a 4C-memo user reactions to Cinda (e.g. usefulness of blocking system) for use in evaluating the present Cinda-system". In the meantime NNCSC had requested, by means of a questionnaire, comments from Cinda users in USA and Canada. The results are documented in the memo 4C-1/67 (see Appendix K).

At this occasion, NNCSC updated the US distribution list for Cinda, which now includes about 200 persons in USA.

The users from USA and Canada were considered by the participants as being representative for the users elsewhere, and therefore no further enquiry will be undertaken.

(iii) Action 20 of the 11th Four Centres meeting was "to try to include Cinda-type indices in conferences and progress-reports". This practice should be continued. However, it was questioned whether such indices should not include all types of nuclear data rather than data of the Cinda scope only.

3. WRENDA

3.a. Report by NDS, INDC conclusions

The report by NDS is included in its Progress Report, Appendix E, section 9. Lessler added that the files for WRENDA 76 are essentially closed, the printed edition will be released in summer 1976.

Schmidt summarized the conclusions of the eighth INDC meeting:

- WRENDA should not only include requests for measurements, but also for evaluations and information.
- The previous data status comments shall be deleted. Instead, NDS would provide comments on WRENDA 76 using the reports by the technical Sub-committees on Standards and Discrepancies of INDC and NEANDC as guideline.
- Requests unreviewed for 2 years should be dropped.
- A two years publication cycle is proposed.
- A sequential number should be added on the left side of each request.

3.b. Reports by other centres

NNCSC (Dunford): Discussions about the usefulness of WRENDA for USA are going on. At the USNDC-meeting in May 1976, potential changes in WRENDA supply from USA will be discussed. Perhaps it will be proposed that in future US-requests with priority "1" only shall be published. The pertaining conclusions of this meeting will be reported to NDS (Action 32).

NDC (Lesca): Only the Japanese and the French request lists have been reviewed adequately. The interest in WRENDA does not seem to be very great in area 2.

Marcinkowski: In Poland, WRENDA is used to determine and confirm the need for an experiment. It is therefore regarded as a very useful document.

Rapeanu: WRENDA has been used in Romania since a long time, both for deciding which experiments should be performed and for submitting requests. At this occasion, Rapeanu formulates an additional request, which will be taken care of in WRENDA 76.

In conclusion, Schmidt strongly recommends to reduce the number of requests in WRENDA, since many of them may have been fulfilled.

4. Evaluated data

4.a. Technical problems

(i) Lemmel reported that many of the evaluated data files received by NDS contain mistakes, mainly in the record identification part (e.g. blanks instead of zeros).

Another problem at NDS is the correction of transmitted files after small revisions by the originator. Since NDS does not have any updating programme, it would prefer to have the corrected version re-transmitted, rather than receive 4C-memos about the corrections to be performed. Pearlstein mentioned that a Fortran programme for updating evaluated data libraries was available. Dunford said, that NNCSC would be prepared to retransmit the corrected files, but NDS should define the smallest unit for retransmission.

(ii) Pearlstein asked the two observers about the format for evaluated data used in Romania and Poland:

Rapeanu: Besides the original formats of the libraries received, occasionally the Exfor-format is used also for evaluated data.

Marcinkowski: It is tried to follow the ENDF/B-format. Dunford mentions that the list of NNCSC publications (Appendix D) contains also a new manual for the ENDF/B-5 version.

Lemmel reported that a Czechoslovakian group is preparing a file of evaluated fission product nuclear data, but he does not know the format. In Hungary, group constants are being evaluated, input is accepted in all the formats of the major evaluated data libraries.

4.b. Documentation

When preparing CINDU-11, NDS encountered some difficulties in finding all documentations about evaluated data. Lemmel suggested that the exchange of information in this respect could still be improved.

Lesca replied that all such documents received at NDCC are immediately distributed to all centres.

Pearlstein points to the NNCSC Newsletter where all reports about evaluations are documented. Concerning ENDF, it is very difficult to gather the reports from the many different laboratories involved.

It was decided that the second part of Action 44 from the 11th Four-Centres-meeting "to inform other centres about documentations of evaluations" is to be continued (Action 33).

4.c. Exchange of information on status and quality

(i) Action 43 from the 11th Four-Centres-meeting "to try to get from users feedback information on status and quality of evaluated data files" is to be continued (Action 34).

(ii) Pearlstein raised the question about the feedback from area 3 concerning the evaluated data libraries. Lemmel answered that a questionnaire was attached to each dispatch, but replies were rarely received. However, the fact that all libraries are frequently requested indicates to a certain extent that users are satisfied.

Manokhin says that the quality of an evaluation cannot easily be judged without making a new evaluation.

(iii) Concerning CJD, Manokhin reports that the centre will publish a comparison between ENDF/B and the evaluations performed at CJD. A paper about a comparison between different evaluations has been presented at the 75 Kiev conference. CJD will send the preprints of this paper to NDS (Action 35), who will initiate its translation and distribute it to the other centres (Action 36).

4.d. Evaluations being done or to be released

The evaluation activities of the centres are included in the progress reports (Appendices A,B,C,E). The following points were added during the discussion:

Manokhin: The full files of Pu-240, He-3, He-4 and partial files of Pu-238, Am-243 and Cm-244 will be sent to NDS soon.

In Minsk, the evaluation of Pu-241 is completed. Full evaluations of Pu-242, U-233 and Th-232 are in process.

Rapeanu, Marcinkowski: The evaluations performed at both centres (see Sect. 1 of these minutes) are connected to thermal power reactor projects.

Lorenz: At the Transactinium Nuclear Data Meeting it was recommended to evaluate certain actinides. NDS investigated the possibilities of starting a cooperative project; groups from 5 or 6 countries are willing to participate in such a programme.

The first part of Action 44 from the 11th 4C-meeting - "evaluations and/or comparisons of available evaluations going on within the centre's area should be reported to the other centres as soon as possible" is still valid (Action 33).

5. Customer services

5.a. Request statistics

(i) The request statistics for area 1 and 3 are included in the progress reports (Appendices C,E).

(ii) Pearlstein proposed to examine the request statistics closely and to find out, whether there are some data or data-types that are never requested. These should perhaps not be compiled, or only upon request. Lesca mentioned that this question had already been discussed at NDCC, but there had been strong objections from the evaluators who had claimed to need all the neutron-data.

Okamoto raised the question whether preliminary data are needed and really worth to be compiled?

It was concluded that for both these points the centres should provide each other with any background information available before the next Four Centres Meeting (Action 37).

(iii) Pearlstein asked how the customers processed multidimensional tables. Lemmel answered that in area 3 only listings have been requested so far; the planned computation-format foresees only two-dimensional tables.

6. Neutron-Exfor

Conclusions about Exfor coding rules can be found on pages

(i) Lemmel opened the discussion by presenting two 4C-memos concerning the completeness of Exfor: Memo 4C-3/159 on the completeness of P-31 data, and Memo 4C-3/165 on the completeness of keV fission data, containing also completeness statistics derived from these two memos. As a rough result, the latter memo states the following completeness:

Approx. 50% for important data, less than 40% for less important data.

In the discussion following, most participants rejected these figures. The main arguments were:

- The completeness of Exfor cannot be checked from the Cinda-entries as it was done in the case of P-31, since these may be erroneous.
- Many of the references mentioned in memo 4C-3/165 contain superseded or unreliable data.
- In particular, the case of P-31 had been checked at NNCSC; it was found that from area 1 actually 2 old data-sets were missing. At NDCC, the completeness of the keV fission data had been checked and the completeness had been found to amount to about 85%.

The discussion was concluded by the decision that CJD, NDCC and NNCSC would respond to Memo 4C-3/165 in 4C-memos. (Action 38).

(ii) Pearlstein suggested a method to detect important data that are missing in Exfor: Whenever a data specialists meeting or conference is held in a centre's area, this centre should supply the participating evaluators with the pertaining Cinda-retrievals and Exfor-data. In case of any complaint about the adequacy of the experimental data supplied, this should be communicated to the other centres (Action 39).

(iii) Some experience with feedback from evaluators could already be reported:

Manokhin: Both Nikolaev's group in Obninsk and Konshin's group in Minsk were satisfied with the data available in Exfor or NEUDADA.

Dunford: Feedback was received about heavy metals and structure materials for fast reactors; it resulted in some corrections of the data, but no major gaps were detected.

Evaluators participating in the last Task Force Meeting were supplied with experimental data. The reaction is to be awaited.

Lesca: When sending fission-related data to evaluators, letters asking about the adequacy of these data have been attached. Out of 7, 3 positive and no negative answers were received. He suggests to provide the evaluators participating in the meeting on "Differential and Integral Nuclear Data Requirements for Shielding Calculations" which will be held in Vienna, in October 1976, with up-to-date data compilations.

(iv) In this connection, Okamoto recommended that, if a member of one centre attends a conference or a technical meeting, he should communicate any material on new data to the centres responsible. This was accepted (Action 40).

(v) The next item discussed, was the "Delinquency list" which was to be prepared according to Action 31 from the 10th Four Centres meeting. It was decided that exact book-keeping about the measures taken to get the data, and informing the other centres when data are not available, was sufficient. The delinquency list was dropped.

(vi) In a review of the actions from the last Four Centres meeting concerning the completeness of Exfor, the following was decided.

Action 29 - "It would be desirable for all centres to send a status list of Exfor entries when sending a Trans-tape (status list to include data sets compiled but not yet transmitted and data sets being compiled)" is to be continued (Action 41).

(vii) Action 31 - "To compare the translated SCISRS-I data with present Exfor files (see "List of Actions") is to be continued. (Action 42).

6.b. Experience with exchange tapes, review of errors

(i) Dunford discussed the memo 4C-1/79 about 3 trans-tapes of the 40000-series. Generally, many corrections have to be applied to the trans-tapes received from CJD.

Attree mentioned similar problems, although at NDS only the formal requirements for the input into the files are checked.

Manokhin explained that an insufficient check-programme had been used so far. The Exfor-tapes to be transmitted in 1976 will be checked by a newly developed checking-programme; the checking specifications used will be communicated to the other centres (Action 43).

In reply, the other 3 centres will send the output of their checking of these tapes to CJD (Action 44).

(ii) A computer list of errors found by NDCC in trans-tapes processed in 1975 has been distributed during the meeting. All these errors had been detected by the centre's check-programme. Schofield announced a memo 4C-2/72 where these errors are discussed.

Dunford explained that NNCSC's check-program is currently being improved, and that a feedback from other centres was considered as very helpful.

(iii) Lemmel mentioned that till now NDS had only received 3 retransmissions from area 2. Schofield asked NDS to send a 4C-memo requesting from NDCC those Exfor-entries for retransmission where errors have been found (Action 45).

(iv) Manokhin reported that the computer terminal at CJD is now connected to a new computer which requires a 7-track format for tapes. He requested NDS to retransmit TRANS-3020 in 7-track format to CJD (Action 46).

Also, the first few records of a tape can at present not be read due to computer problems. CJD will probably ask for retransmission of some subentries. Dunford suggested that until these problems are solved, the centres transmit their tapes with a short dummy first file (Action 47).

6.c. Assigning of accession-numbers, superseded data, etc.

(i) NNCSC (Dunford): The clean-up of the 50000-series is almost finished. Many errors were corrected, and new, previously missing, data were added. This series will be retransmitted as regular 10000-series. An index for the correspondence between the 50 000 and the new 10 000 series, as well as ISO-QUANT indices to the new 10 000 series will be sent to the other 3 centres (See Action 42).

The 60 000 to 80 000 series will be corrected and retransmitted on request, but they will not be reorganized.

(ii) Lemmel mentioned that the assignment of accession-numbers was not uniform. In some cases, e.g. the same experiment has got 3 different accession-numbers. He also requested that superseded data be either replaced by the new data, or that cross-references be made.

Dunford stressed that uniform assignment of accession-numbers is particularly important when Cinda is used as an index to Exfor. In future, more care should be taken of these problems.

Concerning the superseded data, NNCSC usually enters the superseding data in new subentries, keeping the old ones at their place.

6.d. Pending proposals

Various 4C-memos about proposed conventions or changes in Exfor were discussed:

(i) Memo 4C-1/80 about pointers and standards was accepted except for its last paragraph.

(ii) Memo 4C-1/78 proposing a Lexfor entry on Single-Level Resonance Parameters was essentially accepted except for a few minor revisions.

(iii) Memo 4C-3/148 about the use of the column headings ANG and ANG-CM in the same subentry, and the reply in 4C-1/70, that this would mean to include multiple representations of the same variable in Exfor was extensively discussed. Okamoto mentioned a similar problem when both the time of flight and the energy were given in a paper.

It was eventually concluded that, whenever a paper gives the same data in two different representations or units, those values which were more directly obtained should be compiled. If important, the fact that a second presentation is given should be noted in free text in the BIB section, as well as the formula relating the two data sets. The case of time of flight and energy should perhaps be further investigated.

(iv) Memo 4C-1/73: The code "X" for X-rays under the keyword PART-DET has been accepted. *

(v) Re memos 4C-3/128 and 4C-1/76 about coding of half-lives in Exfor, no decision was made. The matter will be further investigated.

* The code has been changed to "XR" during the Second Meeting on Charged Particle Nuclear Data.

(vi) Memo 4C-1/76 about particle designators for angular correlations and triple differential cross-sections. The proposal involves technical problems for the Dictionary 14; it will be brought up again in the discussion of reaction schemes in the extended Exfor (Second Meeting on Charged Particle Nuclear Data).

(vii) Memo 4C-1/77: The Lexfor entry for resonance integrals was accepted, except for the sentence: "If no value of the cutoff energy is given, it may be coded as 0.5eV". This sentence should be omitted.

(viii) The rule included in the Lexfor update of June 1975 - "Data.... under NUC-QUANT should not be given an incident energy" was discussed. Dunford pointed out that an incident energy should only be given in Exfor, if the result is clearly depending on it. Lemmel suggested that the energy, if given in the publication, should then be entered in the free text. The rule itself was accepted.

(ix) Pearlstein raised the question of the use of multidimensional tables. NNCSC wishes that the use of pointers and vector-common be not extended any further, giving the arguments that

- the system would become too complicated, processing would be difficult;
- since Exfor is the main output format, a subentry should represent one unit of retrieval;
- for the consideration of further extensions, the generalized Exfor system should be borne in mind;
- it is recognized that it may be favourable to compile the data close to the format used by the author, in order to get the author's proof more easily. However, a separate compilation format could take care of this demand, but the exchange format should not be affected.

A preliminary agreement was reached, that different data even for the same ISO-QUANT and the same experiment, e.g. when they are derived by different methods of analysis, would be entered in different subentries. Lemmel will write a memo about the status code to be used to relate these data (Action 48).

(x) It was emphasized that precise reference to the Exfor Manual should be included in all 4C-memos quoting errors (Action 49).

6.e. Manual updating

(i) Lemmel acknowledged the great effort done at NNCSC in updating the Exfor-Manual. He mentioned, however, that more care should be taken to avoid or correct small errors.

It was recognized that the speed of transmission of Manual pages had considerably improved since the last Four Centres Meeting. It was agreed that in future NNCSC would transmit changes in the Exfor Manual at latest about one month after a Four Centres decision has been agreed or after the draft minutes of a Four Centres Meeting have been received (Action 50).

(ii) Lemmel stated that probably several 4C-memos were related to Action 25 of the last Four Centres Meeting - "to review Exfor Manuals in order to make them compatible with checking programme specifications". This action is still to be continued (Action 51).

(iii) Concerning the Action 26 of the 11th Four-Centres-Meeting - "to exchange between the centres Exfor user Manuals prepared at each centre.....", Lemmel reported that the "edited" Exfor-format as released by NDS has been circulated as 4C-memo -3/136 and the information sheet about Exfor has been included in CINDU-11. The action is to be continued (Action 52).

(iv) Action 28 of the 11th 4C-meeting - "to investigate the possibility of restructuring Exfor/Lexfor Manuals so as to separate the format material from the procedures material" should be continued (Action 53).

(v) Referring to Action 41 of the 11th 4C-meeting, Dunford stated that some of the Cinda entries for C-12 and O-16 actually contain information on natural C and O, since the contribution of C-13 and O-17, 18 is not quite negligible for certain data types.

(vi) Concerning the "RAW"data, no action will be taken at NNCSC, unless pertaining proposals are received.

(vii) Dunford suggested that extensive physical explanations, like the one on fission-yields, should not be included in the Lexfor Manual. Instead, some kind of Exfor-Monographs could be published about certain topics, which would be referred to on the respective Lexfor-Manual page. The centres agreed that they would send suggestions for reports to be referred to in the Lexfor Manual to NNCSC (Action 54).

6.f. Generalized Exfor for neutron-data

(i) Dunford presented the paper "Views of NNCSC on the Adoption of New Keywords for Neutron Exfor" (Appendix L). This paper recommends that the neutron Exfor adopt the following keywords, which were suggested by Muenzel for the Charged Particle-Exfor, effective as of the next Four-Centres Meeting:

- the keyword "REACTION", which would allow to specify reactions with more than 2 outgoing particles, and the residual nucleus;
- the keyword "MONITOR", which would be particularly helpful in specifying fission-yield standards;
- the keyword "DECAY-DATA", which would allow for the coding of all decay data in machine retrievable form;
- the keyword "ADD-RES" for "Additional Results".

For the required changes of the dictionary, a draft has been worked out at NNCSC (Dunford).

(ii) A discussion about the way and schedule of implementing these changes in neutron-Exfor followed:

Dunford proposed a cutoff date for the use of the new keywords, especially for "REACTION" instead of "ISO-QUANT", although a computer translation from one keyword to the other should in most cases be possible. He pointed out that the changes required are rather simple and concern only the check-programme.

Schmidt said that NDS would not be able to change the programmes during the next year.

Lesca reported that NDCC would in principle be prepared to accept the Charged Particle-Exfor.

Lemmel proposed that the generalized Exfor system be agreed upon as soon as possible, but an implementation schedule be set up for gradually converting the neutron Exfor to the generalized Exfor.

As a basis for this implementation schedule, Dunford agreed to prepare a detailed analysis of the problems involved in the conversion (Action 55).

7. Miscellaneous

(i) Pearlstein asked the other centres, whether measurers in their area were coding their data in Exfor format:

Schmidt: I. Angeli from Debrecen, Hungary, is presently making an attempt. A group from the "Technische Universitaet Dresden" in DDR would also be interested.

Pronjaev: No experience in that respect has yet been made in USSR; attempts will be promoted.

Lesca: There are no intentions at NDCC to initiate such activities.

Pearlstein: Some positive experience has been made at USA, NNCSC will continue to stimulate measurers to code in Exfor.

(ii) Pearlstein expressed the opinion that, in view of the still ongoing development of the Four Centres' activities in the neutron data field, a two days duration of the Four Centres meeting was definitely too short. He felt that many points of discussion could not really be concluded due to the shortage of time. He proposed that the next Four Centres meeting be scheduled for at least 3 days, perhaps overlapping with the beginning of the 3rd Charged Particle Nuclear Data meeting. This view was shared by all the participants.

(iii) The participants noticed with concern that, for the first time, only one person per centre had been invited to this Four Centres meeting. They confirmed that each centre needed to delegate at least two persons:

- the head of the centre, or his representative, who is responsible for the centre's policy; and
- a technical expert who is well acquainted with all technical matters discussed. Therefore it was recommended to the IAEA that, as in the past, two persons from each centre be payed as participants in a Four Centres meeting (Recommendation 2).

(iv) The Actions 2, 29 and 30 from the 10th Four Centres meeting about information to be exchanged between the centres are continuing. (Actions 56, 57, 58).

(v) Action 34 of the last Four Centres meeting asked NNCSC "to investigate the feasibility of translation of the Nuclear Data Project capture gamma-ray computerized data file into an Exfor-like format". Dunford said that the Nuclear Data Project format is not computer processable and therefore difficult to translate. In addition, most of the data in the computer file are recommended values. He agreed to investigate and inform the other centres about the availability of the Nuclear Data Project capture gamma-ray file and other computerized data files (Action 59).

(vi) Action 36 from the 11th Four Centres meeting requested NDS - "to provide each centre with a listing of capture gamma-ray compilations being done in all areas". Some compilations of this type were included in CINDU-11, but the action should continue (Action 60).

(vii) Dunford reported that in about two years a new edition of BNL-325, vol. I will be available. Related experimental data should be compiled in Exfor. The recommended values of the third edition are available on tape, together with a format description.

8. Next Four Centres meeting

The next meeting was proposed to be held together with the meeting on Charged Particle Nuclear Data Compilation, on 25-29 April, at Obninsk resp. Moscow, following the Kiev Conference on Neutron Physics.