International Atomic Energy Agency

<u>INDC(NDS)-78</u>

Distr. G + Sp.

INDC   INTERNATIONAL NUCLEAR DATA COMMITTEE

Report on the Twelfth Four—Centre Meeting

Vienna, 26—27 April 1976

October 1976

IAEA NUCLEAR DATA SECTION, KÄRNTNER RING 11, A-1010 VIENNA

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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 common-
ly used for the exchange of both data types, and most of the partici-
pants 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 disre-
garding from which of the two meetings they resulted.

LIST OF PARTICIPANTS

Mr. V. Manokhin
Mr. V. Pronjaev
} CJD

Mr. L. Lesca
Mr. A. Schofield
} NDCC

Mr. C.L. Dunford
Mr. N. Holden
Mr. S. Pearlstein
} NNCSC

Mrs. P.M. Attree
Mrs. G. Lammer   (local secretary)
Mr. H.D. Lemmel   (scientific secretary)
Mr. A. Lorenz   } NDS
Mr. J.J. Schmidt   (chairman)
Mr. O. Schwerer   (local secretary)

Observers:

Mr. A. Marcinkowski   Institute for Nuclear
                                       Research
                                       Swierk, Poland

Mr. Râpeanu   Institute of Atomic Physics
                                       Bucharest, Romania

Mr. M.A. Khalil
Mr. R. Lessler
Mr. K. Okamoto   } NDS
Mr. M. Vlasov

Twelfth Four-Centre Meeting

Vienna, 26-27 April 1976

AGENDA

LIST OF ABBREVIATIONS USED

CCDN   Centre de Compilation de données neutroniques; same as NDCC

CINDA   Computerized Index of Neutron Data, a specialized biblio-graphy 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

CSISRS   NNCSC's internal system for handling experimental data; the previous system was known as SCISRS

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.

NND   Neutron nuclear reaction 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.

Schmidt reports about recent and future meetings on nuclear data (Appendix F).

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

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

- compilation and evaluation of neutron data for Be-9, O-16, D-2, D_2O, 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. Although, at the NDCC, an improvement in the contributions of many indexers has been noticed since the seminar was held, 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 (Răpeanu, 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.)   a complete description of the Cinda system which concerns mainly the centres, and

b.)   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: NDCC 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 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 co-
vered, whereas the situation with the reports (resp. so-called "pre-
prints") from USSR does not seem to be satisfactory. Manokhin ex-
plained 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 re-
cords 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 appro-
priate 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, ambigui-
ties clarified, obsolete codes removed.

          In future, the Cinda activities at NNCSC will have the follo-
wing priorities:
1) coverage of new literature;
2) entry of older missing references brought to NNCSC's attention;
3) correction of errors detected by users or the CCDN feedback program;
4) blocking of references and addition of data index lines relevant to
    EXFOR;
5) blocking of references and addition of data index lines for pre 1970
    experiments.

          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 ex-
tent, be done automatically.

          NDS: For 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 17a). Duplicates have not yet been re-
moved 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 con-
cluded 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 lab-
oratory had changed its name (Action 18).

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

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*
 NDCC should also note that a special use of the "No-book-flag" was dis-
 cussed by the "Subcommittee on the indexing of evaluated data" (see
 Conclusion 3)

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 19-20.

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.

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).

NDCC (Lesca): Although WRENDA has so far been published annually, at the CCDN it has always been felt that many countries were actually reviewing their request list every second year only. For example, the French and Japanese requests have been thoroughly revised this year, but remained unchanged in the last edition. The recent INDC proposal to adopt a 2-year publication cycle was therefore welcomed.

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 for 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 retransmitted, 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:

Râpeanu: 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 27-30.

(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:

-      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 until 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 <u>accession-numbers</u> 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)   <u>Memo 4C-1/80</u> about pointers and standards was accepted except for its last paragraph.

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

(iii)   <u>Memo 4C-3/148</u> about the use of the column headings ANG and ANG-CM in the same subentry, and the reply in <u>4C-1/70</u>, 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)   <u>Memo 4C-1/73</u>: The code "X" for X-rays under the keyword PART-DET has been accepted. *

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

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

(vi)   <u>Memo 4C-1/76</u> 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 dis-
cussion of reaction schemes in the extended Exfor (Second Meeting on
Charged Particle Nuclear Data).

(vii)   <u>Memo 4C-1/77</u>: 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 Ex-
for, 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 <u>use of multidimensional</u>
<u>tables.</u> 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 repre-
           sent 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 de-
rived 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 <u>(Action 48).</u>

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

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 relevant 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 G). 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 suggested that all new keywords except "REACTION" can be easily implemented, since only checking programs are affected. So one could consider implementing at an early date all new keywords except "REACTION". For this keyword many programs are affected and therefore a longer lead time would be required. The conversion from "ISO-QUANT" to "REACTION" formalism can probably be made automatically using a conversion dictionary.

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 ac-tivities.

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 national centre be invited to participate in a Four Centres meeting at IAEA ex-pense (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 <u>translation of the Nuclear Data Project</u> capture gamma-ray computerized data file into an Exfor-like format". 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 <u>capture gamma-ray compilations</u> being done in all areas". Some compilations of this type were included in CINDU-11, but the action should continue <u>(Action 60)</u>.

(vii)   Dunford reported that in about two years a new edition of <u>BNL-325, vol. I</u> 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.

RECOMMENDATIONS

1.   (about coding of Cinda entries at the centers)

CINDA has a long history of being a useful condensation of the bibliography to neutron data. Recent efforts to block entries pertaining to a single experiment, to improve literature coverage, and to correct older entries where required, have increased the usefulness of CINDA. This and the fact that CINDA has also become an index to experimental data files resulted in an increasing interest on the part of research scientists in the CINDA publication, its supplement, and its comprehensive and up-to-date coverage.

Because of

-   the need to combine the EXFOR and CINDA compilation for the blocking of relevant CINDA entries, a task which can be carried out only at the centres;

-   the fact that the coverage responsibility for both CINDA and EXFOR resides already within the centres; and

-   the need to have updates performed as often as possible and not only at the approach of the book deadline, in order to make the CINDA file adequate for "current awareness" searches;

the 4 centres strongly believe that the literature scanning, the preparation of CINDA entries and the Exfor compilation should be performed by the data centres.

2.   (about invitations to Four Centre meetings)

The participants confirmed that the annual Consultants' Meetings of the Neutron Data Centres could serve their purpose with optimum profit only when each Centre is represented by its head for discussing and deciding policy matters, and by a technical expert who is familiar with all technical matters to be discussed.

It was therefore recommended that the IAEA continue its previous practice of inviting two representatives from each centre to these meetings, and paying for them.

CONCLUSIONS re CINDA

Coverage Control in Cinda

C 1   The development of a coverage control system at NDCC is
considered important and should be given high priority.

Clean-up in Cinda

C 2   From 1 January 1976 onwards, all entries into Cinda are
currently blocked by the responsible centres.

Indexing Evaluated Data in Cinda (see also actions 18-20)

C 3   a. Documents and data index lines are entered under the
CINDA quantity "Evaluation" only, if they contain full
evaluations of all or most significant quantities. The
comment should contain some information whether the
evaluation is comprehensive or partial.

      b. If additional entries are made for individual quantities,
these get the no-book-flag.

      c. Evaluations of single quantities continue to be entered
under the relevant quantities and not under the quantity
"Evaluation".

      d. Documents reporting many evaluations contained in a
large library are entered in the handbook-section.

C 4   ENDF and ENDL are so far not indexed in Cinda. The matter
will be further reviewed.

C 5   Documents on evaluations which do not contain data are also
entered under the quantity "Evaluation" with a comment "No
data given". If such documents do not contain detailed data
but, for example, resonance parameters, an entry under "RES"
should be made in addition to the entry under "Evaluation".

Cinda quantities (and targets) (see also actions 21-29)

C 6   The quantity N3N is changed to NXN (where $x \geq 3$), to include
all reactions producing 3 or more neutrons. The comment
should state whether only N3N or also other reactions are
included. NDCC will retrieve, by area, N3N entries in card
image form, and send it to the relevant centres for appropriate
revision.

C 7   The quantity FPB (Fission Product Betas) is introduced, for
entry under the fissioning nucleus only, not under the
fission product nuclei. NDCC is to retrieve FPG entries by
area, and to send the retrievals to the centers for reviewing
them and adding FPB entries where necessary. These FPB entries
do not get the "cosmetic" indexer symbol.

C 8   From now on LDL entries are coded with the nucleus to which the quantity given refers. Explanation is given in the book indicating to users that old LDL entries still refer to the target nucleus. Level spacings derived from resonances are not entered under LDL. Old entries contain a lot of errors which should be tidied up as time allows. The use of LDL is restricted to LDL data deduced from energy distributions of gammas or particles from neutron induced reactions.

C 9   4C-3/155 about resonance-integrals is accepted.

C 10   Metastable targets are noted in comments.

C 11   With respect to TSL the definitions by Holden + Goldstein and the proposed Manual text by NDS is accepted and will be combined by NDCC.

C 12   Memo 4C-3/164 re REM and NPR is accepted.

C 13   NDCC shall investigate how "neutron" as a target can be entered in Cinda, and to contact NDS how this would affect the book printing program. NNCSC shall issue a Lexfor entry stating for which quantities the target "neutron" is entered.

Conclusions about the NND Exfor system

Rules specific to NND

1. The proposal contained in Memo 4C-1/76 section D about angular correlations and triple differential cross-sections is postponed until conversion from ISO-QUANT to REACTION formalism since the quantity codes proposed are too long for inclusion in dictionary 14.

2. Memo 4C-1/77 (dispatched 76/4/2) proposing a Lexfor entry on resonance integrals is accepted, except for the sentence "If no value of the cutoff energy is given it may be coded as 0.5 eV". In such case 0.5 eV may rather be entered under the column heading EN-MIN-APX Alternatively a comment on the cutoff energy may be entered in free text only until further information is received from the author.

   Also, the Note on page 2 of Memo 4C-1/77 should be revised such that all resonance integrals, disregarding whether they were directly measured or deduced from $\sigma(E)$ measurements, may be coded in Exfor with appropriate explanation in free text and under STATUS.

3. For data entered under NUC-QUANT the column heading EN must not be given. If the incident neutron energy is not irrelevant as may be the case for level density parameters, it may be entered in free text. (This is to be added on Manual-page VIII.16.)

4. Memo 4C-1/80 (dispatched 76-4-12) on pointers and standards was accepted (except for the last 3 lines which are discussed elsewhere in the present conclusions). The contents of this memo should be included in Lexfor under Standard. The column heading keywords STAND1 and STAND2 are not obsolete.

5. The Lexfor entry on Single-Level Resonance Parameters proposed in 4C-1/78 (dispatched 76/4/12) was accepted with some minor modifications:

   - Under 1) Resonance energy: a) When the resonance energy is determined ... (instead of assigned)

   - 4 lines further below: omit the word "only"

   - Under 2) Resonance widths: keep the definition of Γ_γ from the previous Lexfor entry

   - last line of same page: write units throughout in the style of column-headings: EV, MILLI-EV, etc.

   - Under 3) Reduced neutron widths: the characters "nu" and "v" are inconsistent

   - omit the note: "E is in eV". In the formulae given E_0 may have any unit. Example: $E_0 = 1.2$ keV, then 1.2 keV/eV = 1200 which is to be entered in the formula.

   - Under 4) Peak cross-section: Add to the "Note" NF,RES,TER. (A probably preferable correction of NF,RES,TER into NF/PCS,,TER should be postponed until the conversion from ISO-QUANT to REACTION formalism.)

   - Under 5) Resonance area: the factor in front of the ratio is inconsistent and disagrees with previous Lexfor entry. NNCSC is asked to check what is correct. Also the units should be mentioned.

   - Under 6) Special representations: there is a typing error in the code SQ/SO.

6. The question of Fission Yield Standards (see proposed Lexfor entry in Memo 4C-3/122 of 75/5/13) was postponed until after the conversion from ISO-QUANT to REACTION formalism.

7. The "multiple-isoquant" formalism for is eric cross-sections (compare item 19. of the NND+CPND Exfor conclusions) was not yet accepted for NND.

Conclusions relevant to the NND and CPND Exfor systems

EXFOR structure

  * 1.   The SUBENT record may contain in fields N_4 - N_5 (cols.45-66) center internal
information which is of no interest to recipients of the entry. (Although
this is a KACHAPAG internal matter, this should be added in the Manual
on page III.6, in order that Exfor users may find an explanation of the
meaning of this field, and in order to avoid that this field is assigned
a different purpose.)

   2.   Col. 67 in the ENDTRANS record is to contain the number of character of the
originating center, followed by 9's in col. 68-79. (This applies for
center-to-center transmission tapes where throughout the tape col. 67
contains the code of the originating center. In other tapes which may
contain Exfor entries from various centers, the record identification
field cols, 67-79, of the ENDTRANS record should be such that it sorts
at the end of the tape. Compare Manual page III.3.) Action 23 of CPND meeting.

   3.   Trailing records to fill up the last block should be repetitions of the
ENDTRANS record.

   4.   It should be stated explicitly in the Manual (e.g. on page V.1. and VI.1.)
that in the COMMON and DATA sections the number of columns is unrestricted.

Pointers, etc.

   5.   Pointers may be used in subentry 001 if they apply to all following sub-
entries.

   6.   Compilers are reminded of the rule that a pointer in the BIB-Section refers
to all subsequent records until a new pointer or keyword is encountered.

   7.   If two different numerical results of the same quantity are obtained from
the same experiment by two different ways of analysis or normalization,
two separate subentries must be made, linked to each other by appropriate
STATUS information. The solution with pointers as illustrated in the
following example

```
        ISO-QUANT  (...)
        ANALYSIS  1(...)
                  2(...)
        ENDBIB
        DATA
        EN       DATA      1DATA      2
```

is so far not accepted by all centers and can therefore not be used in NND
Exfor transmission tapes.

   8.   In general pointers are used only when the data table contains more
than one DATA column. The different DATA columns are defined, by means of
pointers, either by the quantities coded under ISO-QUANT/REACTION or by
the parameters entered under COMMON. In addition, items of BIB information
may be labelled by the same pointers.

In the following example pointers may be used within a BIB Section even if
the data table contains only one DATA column without a pointer.

```
        DETECTOR  1(...)
                  2(...)
        PART-DET  1(...)
                  2(...)
```

(Note: NNCSC does not recommend the use of pointers in this case unless
linked to a multiple Iso-quant, but can accept such constructions.)

Dictionaries and codes

9. The code XR for X-rays is accepted in dictionary 13. The origin of the X-rays (K, L, M etc.) is not coded but may be given in free text.

10. The length of the codes in dictionaries 16-23 remains restricted to 5 characters. Action 18 of the CPND meeting.

11. The codes proposed in Memo CP-E/1, item 2, as addition to Dict. 22 on Detectors were accepted. However, the code for "position sensitive solid state detectors" was changed to PSSSD.

12. In dictionary 24 the keywords of the type HLn will continue to be given explicitly as HL1, HL2, HL3, etc., since check programs in various centers need to have these codes in dictionary 24. NDS will enter additional such keywords in dictionary 24 as they occur, and will enter for each of these keywords one or two additional varities, e.g. HL4 etc. in order to obtain more flexibility. (This is in reply to the proposal on the bottom of Memo 4C-1/80, dispatched 76/4/12). Action 22 of the CPND meeting.

13. The codes proposed in Memo CP-E/1, item 3, as additions to Dict. 25 on Units were accepted.

14. Dict. 25 on Units will continue to include all unit-keywords, and the idea to construct the unit-keywords from certain elements such as MU-, N-, P-, F- for micro, nano, pico, femto, was not accepted. However, whenever new unit-keywords are introduced, such prefixes should be used in a consistent manner.

15. The decay units DPS and MUCI/MUA are both entered in dict. 25. In Exfor entries preferably the same units should be used as given by the author.

16. The column-heading keyword RATIO and SUM are kept (SUM so far in CPND Exfor only). NDS should clarify their use. Action 12 of the CPND meeting.

Rules

17. The Lexfor entry on "Nearly monoisotopic elements" as proposed in item E of memo 4C-1/76 of 76-3-26 is accepted and shall be added to the Lexfor entry on "Monoisotopic elements". (Note by editor: On this Lexfor page the element symbols should be written consistently with capital characters only.)

18. If the coded information under DETECTOR starts with COINC, then all detector codes following in the same pair of parentheses refer to the coincidence arrangement. Any other detector to be coded must be given in a separate line, as for example

        DETECTOR (COINC, DET1, DET2). FOR XYZ RADIATION
        (DET3). FOR UVW RADIATION

In the parentheses describing the coincidence arrangement, a detector code may be given more than once.

(Note: This formalism was not formally adopted for NND. We believe however that it would not disturb any existing programs so that it should be acceptable also for NND.)

19. Isomeric ratios and sums are entered in addition to the partial isomeric cross-sections only when they were given by the author. For NND they are entered in separate subentries; for CPND the Multiple-Reaction formalism may be used for entering such data in a single subentry.

20. The revised Lexfor entry proposed in Memo 4C-3/162 of 76/4/7 about differential cross-sections relative to its value at a given angle, is accepted.

21. The rules for the use of the keyword ANALYSIS should be clarified in Dict.2.

22. The proposal about the coding of metastable states of the residual nucleus where the sequence number of the state obtained may be unknown, was accepted as proposed in CP-B/1 pages 1,2.

23. For certain keywords the prescription exists (Manual page IV.2) that any information given in parentheses must be repeated in free text. Thus, in an "edit" program the coded information may be ignored in these cases.

   If the compiler prefers not to repeat the coded information in the free text, a point is entered in the position following the closing parenthesis, or the entire field from the closing parenthesis up to column 66 are left blank. Both, the point or the blank field serve as an indicator to an "edit" program that the coded information requires expansion.

24. The proposal to allow in the DATA-section for semi-numerical data, such as "smaller than", 7/2-, X for a blank, etc., was not accepted, since this would create difficulties in programming and since not all computers accept a symbol like "smaller than".

25. The BIB-Section in Exfor has its name for purely historical reasons. It rather functions as a "TEXT"-Section containing bibliographic, physics and administrative (e.g. HISTORY) information. (This clarification should be added on the top of page IV.1 of the Manual.)

26. If original data are given together with deduced values within the same subentry using the "multiple-isoquant" resp. "multiple reaction" formalism with pointers, then a note "DEDUCED QUANTITY" or "DEDUCED FROM..." should be given in free text behind the isoquant/reaction concerned. In addition, under STATUS coded information is entered linked by pointers to the relevant REACTION resp. ISO-QUANT. Some details in the use of STATUS codes may have to be defined in this connection.

27. Different representations of the same variable must not be given within the same subentry unless they have different pointers. For example, the incident energy cannot be given in EV and ANGSTROM, or ANG-CM and ANG cannot both be given. (KACHAPAG is considering the usefulness of giving lab-system and center-of-mass system data in the same subentry and will eventually propose introducing this option at least for CPND.)

Conclusions about the CPND Exfor system

REACTION

1. The coding rules under the keyword REACTION appear to be practicable. No objection to this concept was received. (Action 15 from previous meeting, which was to test the feasibility of this concept, is regarded as fulfilled.)

2. For the codes used under the keyword REACTION the following dictionaries are introduced

Dict. 30	on	Process	in Subfield 3
Dict. 31	on	Branch	in Subfield 5
Dict. 32	on	Quantity measured	in Subfield 6
Dict. 34	on	Modifiers	in Subfield 8
Dict. 35	on	Data type	in Subfield 9

   The checking programs and the convenience of the compilers require to have a separate dictionary for each of the subfields. The contents of these dictionaries will be as specified in Memo CP-C/1, with some modifications as specified further below.

3. In subfield 3 of REACTION, two identical outgoing nuclides heavier than α are coded in the form 8-$\emptyset$-16+8-$\emptyset$-16. The proposals of coding this case in the form 2*8-$\emptyset$-16 or 2$\emptyset$-16 were not accepted, because the first case would require an extra programming branch for the star, and the second case would result in unsystematic coding of nuclides, since it was agreed to keep the Z-number for the target nucleus.

4. The code SEQ is introduced in dict. 31 (REACTION subfield 5: branch) indicating that the sequence of outgoing particles as specified in subfield 3 under REACTION is meaningful. In this case the general rule of coding outgoing particles in the sequence of increasing Z and A does not apply, and the residual nucleus is not necessarily the heaviest of the reaction products. (This decision also answers the proposal expressed in Memo CP-E/1 item 6).)

5. The codes M+, M-, and (M) are coded in the branch field and not in the modifier field under REACTION.

6. The code (CUM) in dictionary 31 (branch), which has a length of 5 characters instead of the usual 3, is accepted unless a code of this length creates too great difficulties in the programs of one of the centers. (Action 21 of the CPND meeting).

7. In Dictionary 32 (Quantity measured) the code YLD as proposed in Memo CP-C/1 was not accepted. The codes FY and PY are kept. PY is reserved for a product yield under undefined experimental conditions where SIG or TTY do not apply.

8. The codes proposed in Memo CP-E/1, item 1), for the "BRANCH" subfield under REACTION were not accepted since they were considered as not necessary for a unique description of the reaction and quantity measured.

9. If someone wishes to code ions in Exfor under REACTION or elsewhere, this will be done in the form 8-0-16(3+).

10. The "multiple-reaction" formalism with pointers may be used for the <u>isomeric</u> branches and ratios of the same reaction such that

> total reaction cross-section,
> partial cross-sections leading to isomeric states,
> sums and ratios of partial cross-sections

may all be entered in a single subentry, provided that the target nucleus, the incident particle and the outgoing particles are the same. This possibility is so far restricted to CPND.

Items other than REACTION

11. For other codes, the existing dictionaries are used. The existing <u>limitations in the length of codes</u> (up to 5 characters in Dictionaries 16-23) are left unchanged. (Action 18 of the CPND meeting).

12. Under the keyword <u>FACILITY</u> different pairs of facility codes and lab-codes of the form (FACIL, 3NNNLAB) must be coded on separate lines.

13. KACHAPAG had given some <u>monitor reactions</u> in coded form and some in free text only. It was claimed that sometimes monitors seem to be doubtful and that in such cases the free text was preferred. Meeting participants found this procedure not clear enough and suggested that an explanation in free text would be desirable, for example in the form of a "COMMENT BY THE COMPILER ...". It was then confirmed that monitor reactions should preferably be given in coded form supplemented, where necessary, by free text explanation.

14. <u>Alphabetic characters</u> (instead of a digit in NND Exfor) to be entered <u>in</u> <u>col. 67</u> and in the first position of accession-numbers, are accepted, despite of programming difficulties of some of the centers.

ACTIONS

Action	On	
1	Marcinkowski Rapeanu	to communicate to NDS all mistakes found in CINDA.
2	NDS	to forward any comments received under action 1 to the responsible centres.
3	all centres	advise Cinda-indexers to include in the comments "NDG" whenever appropriate.
4	NDS	include in the CINDA 76-Book and all further editions some form sheets for user-response.
5	NDCC	keep the other centres informed on the development of its new CINDA coverage control system.
6	all centres	inform NDS about their status of Cinda coverage before book dead-line.
7	all centres	currently inform the other centres which report- and journal- series are not directly scanned for Cinda, but covered through INIS-retrievals.
8	all centres	CINDA-coverage of old references: primarily gaps in main journal-series should be detected and covered. Other missing entries could rather be detected by checking the literature cited in evaluation reports.
9	NDCC	provide the other centres with a reference list to the current Cinda-file.
10	CJD	provide NDS with coverage control-entries of Soviet laboratory-reports.
11	Holden	communicate H. Goldstein's gap list to the other centres, as soon as it is available.
12	NDCC	look into the possibility of sending all CINDA-listings in the same quantity-sort as in the book.
13	NDCC	investigate the possibility of providing CINDA-listings where records within a block are sorted as in the book.
14	NDCC	to prepare a memo concerning the replacement of "main" entries in a Cinda block, and concerning the operations in a "headless" block.
15	NDCC	before the next 4C-meeting report to the other centres whether duplicates in the CINDA file can be eliminated automatically.
16	NDCC	clearly define the use of the "no book flag" in the Cinda-Manual, based on the minutes of the 11th and 12th 4C-meetings.

Action	On	
17 [1)	NDS	to request from NDCC at regular intervals CINDA retrievals of recent entries prepared by NNCSC and NDCC for papers by labs of areas 3 and 4, and to review the blocking of these entries.
18	all centres	review the lab-dictionary and provide NDS with information and cross-references about related labs and codes for inclusion in the Dictionary
19	NDCC	update the Cinda Manual according to Conclusion 3 about indexing of evaluated data
20	all centres	exchange views and information about existing practice in style and content of comments in data index lines.
21	NDCC	retrieve from Cinda, by area, the N3N and the FPG entries and send them to the centres responsible.
22	all centres	revise the N3N and FPG entries according to the Conclusions 6 and 7 about Cinda-quantities.
22a	NDS	replace REM and NPR entries by appropriate quantities.
23	NDS	change the definitions in the Cinda-book according to these conclusions.
24	all centres	advise the Cinda-indexers on the correct use of LDL, based on Conclusion 8.
25 [2)	NDCC	combine the definitions of TSL given by Holden and Goldstein, and by NDS, for inclusion in the Cinda-Manual.
26	NDCC	update the Cinda-Manual according to the revisions agreed in the Conclusions 6-12, i.e. for the quantities: NXN, FPB, RIA, RIR, RIG, LDL, TSL, REM and NPR; and for the metastable state of the target.
27 [2)	NDCC	issue a memo about the agreed revisions of quantity definitions, including the codes and internal numerical equivalents.
28	NDCC	investigate how "neutron" as a target can be entered in Cinda, and to contact NDS how this would affect the book printing programme.
29	NNCSC	issue a Lexfor entry stating for which quantities the target "neutron" is entered.

[1) Such retrievals will be made at NDS from every Cinda tape received.

[2) Done by Memo 4C-2/73.

Action   On

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30 [3] ✓ NDS		include the French Fission Product Library (Blachot) as well as ENDF-201 in the handbook section of the Cinda-book.
31 HDL all centres		prepare 4C-memos containing proposals for the future Cinda publication schedule from 1978 onwards, bearing in mind the recommendation of the 8th INDC-meeting of publishing an archival Cinda-book for the older literature.
31a NNCSC, NDCC		to remind Cinda indexers of using the "cosmetic" indexer symbols where appropriate in order to reduce the noise in the supplement books.
32 [4] Dunford		report to NDS about any changes in the submission of US WRENDA information after the May 1976 USNDC Meeting
33 all		(continuing action 44 from 11th 4C-meeting) to inform other centres about documentation of evaluations and about evaluations or comparisons of available evaluations going on within the centre's area.
34 ✓ all		(continuing action 43 from 11th 4C-meeting) try to get from users feedback information on status and quality of evaluated data files.
35 CJD		send the preprints of 75 Kiev Conference about comparison of different evaluations to NDS.
36 NDS		initiate translation of these reports and distribute to the other centres.
37 all centres		to provide the other centres with any information available about which types of data were never or rarely requested and whether preliminary data are needed by customers.
38 NDCC CJD NNCSC		respond to Memo 4C-3/165 concerning completeness in EXFOR.
39 all centres		communicate to the responsible centres any complaints on adequacy of experimental data supplied to users and to data specialists' meetings and conferences.
40 all centres		the members of centres who attend conferences or technical meetings should communicate any material on new data to the centres responsible.

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[3] Done in the CINDA 76/77 book.

[4] According to letter by C.L. Dunford of 16 August 1976, there will be no change in the USERDA publication policy concerning the US request list.

Action	On	
41	all centres	(continuing action 29 from 11th 4C-meeting) 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).

(action 31 from 11th 4C-meeting continuing)

42 — all centres — Compare the translated SCISRS-I data (50000 and 80000 series tapes) with regular Exfor entries and communicate correspondences. Continue to clean up the 50/80 000 series.

43 — CJD — apply the new check programme to the next EXFOR-tape and provide the other centres with the checking specifications used.

44 — NDCC / NDS / NNCSC — send the output of the checking of this tape to CJD.

45 — NDS — request from NDCC those EXFOR entries for retransmission where errors have been found.

46 — NDS — retransmit TRANS-Tape 3020 in 7-track format to CJD.

47 — NNCSC, NDCC, NDS — for the time being tapes sent to CJD should start with a short dummy file.

48 — Lemmel — write a Memo about compiling in EXFOR different results for the same isoquants obtained by different ways of analysis from the same experiment. Such data have to be entered into different sub-entries, related by some status code.

49 — all centres — when quoting errors, include in 4C-Memos precise reference to the EXFOR-Manual.

50 — NNCSC — transmit changes in the EXFOR Manual to the other centres at latest about one month after a 4 Center-decision has been agreed or after the draft minutes of a 4C-Meeting have been received.

51 — all centres — (action 25 from 11th 4C-meeting continuing) review Exfor Manuals in order to make them more compatible with checking programme specifications.

52 — all centres — (action 26 from 11th 4C-meeting continuing) Exfor user (e.g. experimentalists) Manuals prepared at each centre should be exchanged between centres for comments and suggestions.

53 — NNCSC — (action 28 from 11th 4C-meeting continuing) to investigate the possibility of restructuring EXFOR/LEXFOR manuals so as to separate the format material from the procedures material.

54 — all centres — send suggestions for reports to be referred to in the LEXFOR Manual to NNCSC.

Action   On

55	NNCSC	prepare detailed analysis of the problems involved in converting neutron-EXFOR to generalized EXFOR as a basis for an implementation schedule as soon as possible after the meetings.
56	all centres	(action 2 from 10th 4C-meeting continuing)

$$56 \quad \text{all centres} \quad (\text{action 2 from } 10^{th} \text{ 4C-meeting continuing})$$

55 /NNCSC — prepare detailed analysis of the problems involved in converting neutron-EXFOR to generalized EXFOR as a basis for an implementation schedule as soon as possible after the meetings.

56 /all centres — (action 2 from 10th 4C-meeting continuing)

    (a) Centres having received specialized compilations in any format should signal their existance to other centres.

    (b) Inform interested centres of any significant changes in EXFOR.

57 all centres — (action 29 from 10th 4C-meeting continuing) Requests from other centres should be acknowledged within a few days of receipt, giving a detailed status for each request, including "no data available" if applicable.

58 all centres — (action 30 from 10th 4C-meeting continuing) Inform the other centres when initiating a data review or special-purpose compilation, so that appropriate data may be transmitted with preference.

59 NNCSC — inform the other centres about the availability of the Nuclear Data Project capture gamma ray and other computerized data files.

THE CJD PROGRESS REPORT

1. From April 1975 the tapes 4022-4025 with 75 works have been sent to other centers. Other 65 works are in process. Thus the status of compiling into EXFOR is as follows:

Period	Total	Trans- mitted	In process	Data on request
1959-1975	423	281	85	57

The number of the works sent is 67%, and that sent and in process is 87% of the total number for the period shown in table. The automatizied card index of works suitable for compiling into EXFOR has been developed.

Following the decisions of the INDC the CJD provided first and foremost compilation of the values within interest of the technical subcommitties of the INDC.

2. The evaluation of full files of Cr and Ni is finished in the CJD. At present these data are in process of putting into the SOCRATOR format. The articles with a description of these evaluations are being written. The work on theoretical analysis of the threshold reactions in the frameworks of the statistical theory started.

3. After the 11th Four-Centre meeting the CJD has sent to the NDS full files of U-235, Fe, D, Erbium isotopes (Er-162, 164, 166, 167, 168, 170) as well as the 26-group constants system (BNAB-70) for 45 isotopes.

4. A comparison of group constants obtained from the evaluated UK data library (for Pu-239, U-238 and U-235) with the group constants of the BNAB system has been made. The results have been published in the proceedings of the 3-d Kiev Conference on Neutron physics. At present a comparison of neutron cross sections from the evaluated data library ENDL, SOKRATOR , ENDF/B - IV (for file available) is being carried out.

5. During the period after the 11th Four Centre meeting the following issues of "Jadernye konstanty" have been published: No. 17, 18, 19, 20. From issue No. 17 CJD is starting regu - lar sending into the NDS 35 copies. The CJD has prepared for edition the proceedings of Kiev conference on Neutron Physics.

6. In 1975 the CJD answered 110 requests on nuclear data:

on documents - 30,

on evaluated data - 58,

on experimental data - 22.

7. In 1975 the CJD published about 30 articles, preprints and reports on all directions of the CJD's activities. The CJD in heading the methodical activities on theoretical techniques in nuclear data evaluation.

List of data sets being compiled in CJD

No.	First author	Reference					Reaction	Element
1.	Tolstikov	AE	23	6	566	67	NG	GE-74, CS-133, OS-192
		YFI	6		11	68		
2.	Tolstikov	AE	24		187	68	NG	SE-80
		YFI	6		11			
3.	Fomushkin	YF	14		73	71	NF	BK-249, CF-249
4.	Salnikov	YK	6		189	69	NN	FE, CU,NB
5.	Djachenko	FEI-204				70	FRS,NF	PU-238
6.	Alkhazov	YF	15	1	22	72	NU	CM-244
7.	Vertebny	YFI	6		11	68	RES	GD
8.	Djachenko	YF	17	4	696	73	YLD,KEFRAG	PU-242
9.	Vorobeva	YF	10	3	491	69	FRS	U-235, U-238
10.	Dovbenko	YFI	6		3	68	NG	MN-55,GA-69,Ga-71,MO-98
11.	Yurova	AE	36	1	66	74	YLD,FRAG	U-238
12.	Petrzhak	YF	15	5	860	72	NF,YLD	NP-237, NP-238
13.	Groshev	IZY	34	4	768	70	NG	BA-136, BA-138
14.	Zakharova	YF	16	4	649	72	NF	U-235
15.	Maksjutenko	YF	13	2	293	71	NUD	PU-239, U-233
16.	Vorobjeva	YF	9	2	296	69	FRS	U-239
17.	Petrzhak	AE	33		2	72	YLD	PU-239, U-233
18.	Vertebny	UFZ	13	4	679	68	LDL	DY-162,HO-165,ER-162,164,166,167
19.	Bergman	KIEV	1		144	71	NG	RE
20.	Kovrigin	YF	19	4	715	74	LDL	SD

N	First author	Reference				Reaction	Element
21.	Vertebny	KIEV	2	104	73	SCAT,TOT	ND-142,143, 144, 145, 146,148,150
22.	Vertebny	UFZ	13	4 605	68	SCAT	HO,LU,DY
23.	Vertebny	AE	34	5 355	73	TOT,SCAT	V
24.	Vertebny	YFI	18	32	74	STF,NG	PT-190,192,194,196,198
25.	Ovechkin	KIEV	2	131	73	ACT	TC-99
26.	Zhuravlev	YK	19	3	75	NF,RIF	Isotopes of TH
27.	Belanova	AE	38	1 29	75	RES	AM-241
28.	Broder	IZV	32	2 254	68	DIN	V, MN
29.	Tolstikov	AE	24	65 76	68	NG	SN-122, SN-124, SB-121, SB-123
30.	Belanova	AE	37	5 437	74	RES	OS
31.	Dovbenko	AE	27	5 406	69		
		YFI	6	3	68	NG	MN-55, GA-69, GA-71, MO-98
32.	Salnikov	IZV	32	4 653	68	DIN	TN-232, U-235, U-238
33.	Broder	IZV	25	309	61	DNG	SB
34.	Vorobjeva	YK-15		3	74	NUBAR	U-238, PU-240, PU-241
35.	Dovbenko	YFI-17		38	74	NG	ZN-68
36.	Savin	YFI-20		11	75	NNF	AL,FE
37.	Belovicky	Leningrad		348	75	NP	PB, BI
38.	Aldea	YFI-17		28	74	NG	SM-148
39.	Bak	YFI-8			69		
		AE	28	4 359	70	RIF	U, PU, AM
40.	Petrzhak	KIEV	2	44	71	NUBAR	CF-252

No.	First author	Reference				Reaction	Element
41.	Karzhavina	YFI	17	30	74	RES	CD-111,13, GD-157,DY-161,163
42.	Nefedov	KIEV	4	155	73	NUD	CF-252
43.	Belanova	AE	38	6 430	75	RES	TA-181
44.	Panitkin	AE	39	1 17	75	NG	U-238
45.	Belanova	AE	39	5 369	75	RES	CM-244, CM-245, CM-246, CM-248
46.	Rjabov	AE	24	4 351	68	ALPHA	U-235, PU-239
		YFI		10			
47.	Zakharova	YF	18	4 710	73	NF	U-233, U-235
48.	Nurpeisov	FEI-543			74		
		AE	39	3 199	75	NUBAR	U-233, U-238, PU-239

CCDN PROGRESS REPORT TO THE

12TH 4-C MEETING

Vienna, 26-27th April, 1976

CCDN General Situation

During 1975, the CCDN continued to operate in the fields traditionally belonging to its mandate : compilation of experimental neutron data and of references to neutron data publications.

Several changes have, however, taken place both in the distribution of tasks among the physicists and, at operational level.

In particular, all technical problems ruled by the 4-C agreements have been concentrated in the hands of one physicist, the experimental data compilation group has been reinforced (2½ persons should work on this task when the full staff complement is available), and the compilation itself reorganized by the creation of a file based on progress reports, visits to conferences, personal contacts with laboratories, etc. which gives the history of all experiments under way or performed in the countries of the CCDN's zone. It is expected that this file - now almost complete - will allow the Centre to play a more active role in the collection of data. Finally, the computer operations connected with data compilation and exchange have been streamlined by the implementation of two programs, one of which produces data in both the EXFOR and NEUDADA formats in one run, and the other which converts incoming EXFOR tapes into the Centre's internal format.

CINDA

Following an action agreed at the last 4-C meeting, a special effort was made to thoroughly revise the CINDA entries, their blocking and completeness for the post 1970 publications.

The blocking required the implementation of the Kill-Link operation in the CINDA system.

Entries from all the CCDN countries (except Japan which was not covered owing to lack of time) have been blocked. It is estimated that for the CCDN zone only, some 5,000 blocks (>12,000 CINDA entries) have been moved and linked to other existing blocks (or entries).

Relations between the CINDA Readers and the CCDN have been reviewed and reinforced by a meeting to which all the indexers were convened. As a result, the coverage effort has been partially re-arranged, the main features of the new coverage control system have been submitted and approved, and the adoption of a few new quantities or the re-defining of some of those already existing have been discussed.

The coverage control system is now being implemented.

Experimental Data

With the implementation of the new program mentioned above, operations for compilation and conversion have been speeded up and the exchange with the other Centres is now running quite smoothly.

The exchange backlog of those data compiled in NEUDADA format during the period 1970-1974 has now been almost entirely discharged : only

the data stemming from two laboratories - München Technische Hochschule (MUN) and the National Physical Laboratory (NPL) Teddington [some 20 works with about 200 subworks] - remain to be converted.

The shortage of manpower (2 man years (physicists) of vacancy in 1975) prevented the CCDN from keeping up to date with the compilation of very recent data (post 1974). It is estimated that about 100 works constitute this backlog.

WRENDA

The CCDN collected about 250 new requests for measurements and forwarded them to NDS in the agreed format. 130 requests were withdrawn by the reviewers.

Service

The number of requests was of the same order of magnitude as in previous years : approximately 300 requests, of which

> 46% were for evaluated data,
> 44% were for experimental data,
> and 10% concerned CINDA.

LL/lat
22.4.1976

Progress Report

of

National Neutron Cross Section Center

to

the Twelfth Four Centres Meeting

April 26-27, 1976

I. CINDA

NNCSC has maintained regular literature coverage of neutron physics literature produced in the US and Canada during the past year. Our checking program for new CINDA entries has been implemented and upgraded on the basis of the extensive testing in the past year such that most errors on our entries are now due to bad block or serial numbers. Norman Holden, previously responsible for the literature coverage and CINDA entries, has been replaced by Gail Waite.

During the past year an extra 8 man-month effort was supplied on the CINDA activity in order to complete the blocking of all references to data transmitted by NNCSC in the regular EXFOR exchange, to add data index lines to the blocks and to add "no book" flags to obsolete references. More than 12,000 cards were transmitted to CCDN for processing between 1 December 1975 and 1 March 1976. All blocks for accession numbers below 10504 which have been transmitted on tapes 1001 through 1049 have been completed except for 10 accession numbers. In addition, most entries with the lab code USA have been reentered with the appropriate lab code. Confusion and inconsistent coding among MTR, ANC, AGN, AND PPO laboratory codes was eliminated as well as among ABD, BRL, NEL, and NDL.

During the next year we intend to revert to a one man-level for CINDA. In addition to the regular literature coverage which will include the creation of blocks for all new references, we shall complete the blocking related to all transmitted EXFOR accessions.

II. EXFOR

The activity in support of the experimental data library was supported at a two man-level during the past year. Thirteen EXFOR tapes were transmitted containing 152 new works and 150 revised works. The number of data set "in process" has been reduced by about 25%. Most of the revised EXFOR entries resulted from the extensive cross checking of EXFOR and CINDA during the CINDA clean up activity described above.

After completion of the library upgrade activity in support of the BNL-325 publication, a program to upgrade the SCISRS-I translation for area 1 was undertaken. This effort is nearly complete. All older data used in BNL-325, but missing from the library, were added. All bibliographic data (SAN001) has been checked and corrected where necessary. All data sets now pass successfully through our extensive checking

program. Remaining now is the reorganization of the data tapes by reference (rather than ZA) and the conversion of accession numbers to the 10000 series, after which the data will be transmitted to other centers. SCISRS-I translations for areas 2 through 4 will be corrected so that they pass successfully through our checking program and then retransmitted.

After completion of our checking program (specifications were distributed at the previous 4-C meeting), our large backlog of EXFOR transmission from the other centers was eliminated. In some cases, extensive corrections, particularly for those tapes coming from CJD were required.

Several man months effort has been expended to implement various features using "pointer". The results of our effort have been described in a 4-C Memo. Our implementation philosophy regarding "vector common" was to convert incoming data to the multi-dimensional table format, this being least disruptive to the multitude of processing programs as well as being the first step in generating a computation format.

Two revisions of the LEXFOR and EXFOR Manuals have been distributed.

During the next year, it is planned to upgrade the experimental data library with respect to resonance parameters so that all data referenced in the recent publication of BNL-325 Vol I will be in the library.

III. ENDF

During the past year the Fission Product and Dosimetry files from ENDF/B-IV have been released for international distribution. Work is progressing on the production of ENDF/B-V, due for completion in late 1977. Already finished are the standard cross sections.

IV. Custom Services

The statistics for requests processed between 1 January 1975 and 1 January 1976 are attached.

With completion of the SCISRS-I translation clean up, we will at last start work on an improved retrieval system and computation format for experimental data.

V. Evaluations

The evaluation of (n, particle) cross sections of all the stable isotopes of nickel, chromium and manganese from threshold to 20 MeV has been completed. In addition, the resolved resonance region of manganese has been fitted up to 250 keV. These will be used as parts of the evaluations for the elements nickel, chromium and manganese for ENDF/B-V.

VI.   Publications

The new edition of **BNL**-325 Vol. II is now in press and should be available in the summer 1976. Summary documentation (ENDF-201) of ENDF/B are now available. The Codes and Formats Manual (ENDF-102) will be available in April. A new publication of decay schemes for fission product nuclides based on ENDF/B-IV data will be available before the end of 1976.

VII.   Charged Particle Data Center

The decision has been made to move charged particle data compilation activities in the US to the NNCSC. As envisioned starting in the fall of 1977, the center will organize and maintain a bibliographic data base for CPND within the limitations agreed by the international CPND network. Some limited data compilation will be done in support of the KFK effort. Also some evaulation activity for data needed in fusion and medical applications will be initiated.

VIII. Nuclear Structure Data Compilation and Evaluation

In March 1976, a network of data centers was established to promote the timely evaluation nuclear structure and decay data. NNCSC has assumed responsibility for the organization and operation of the network and for providing the interface with any international evaluation activities. In addition NNCSC will provide customer services and do some A-chain evaluations and perform some horizontal evaluations.

IX.   Secretariat to ERDA-NDC

In May of 1975, NNSCS was assigned the duties of the secretariat to ERDA-NDC. As such, the Head of NNCSC is Secretary to ERDA-NDC and the center will be responsible for nuclear committee document distribution within the US and for the coordination of all ERDA-NDC documents.

Request Statistics

TABLE Ia

1 Jan. 1975 to 31 Dec. 1975

Area 1

Number of requests for data

Country Origin	Experimental	Evaluated	Bibliographic	Codes	Documents	Total
USA	124	187	11	20	105	447
Canada	4	3	0	2	6	15
Total	128	190	11	22	111	462

Request Statistics

TABLE Ib

1 Jan. 1975 to 31 Dec. 1975

Area 1

Number of requests for data

Originating Orgainzation	Experimental	Evaluated	Bibliographic	Codes	Documents	Total	Total Previous Year
Government Lab	89	96	9	13	48	255	158
University	23	43	2	1	31	100	99
Industry	12	48	0	6	26	92	79
Other	4	3	0	2	6	15	3
Total	128	190	11	22	111	462	339

Request Statistics

TABLE Ic

1 Jan 1975 to 31 Dec. 1975

Area 1

Number of requests for data

Request Disposition	Experimental	Evaluated	Bibliographic	Codes	Documents	Total	Total Previous Year
Fulfilled	128	190	11	22	111	459	338
Partially Fulfilled	1	0	0	0	0	0	1
Unfulfilled	0	3	0	0	0	3	0
Standing	0	0	0	0	0	0	0
Total	128	190	11	22	111	462	339

Data Dissemination

TABLE II

1 Jan. 1975 to 31 Dec. 1975

Area 1

Data Type			Amount		
Experimental	23,154	Data Sets	containing	1,320,049 Data Points
Evaluated (Total)	11,711	Data Files		
ENDF	8,628	Data Files		
OTHER	3,083	Data Files		
Bibliographic	101	CINDA Entries		
Codes and	111	codes		
Documents	173	documents		
Miscellaneous	60	Requests		

TABLE III

ZQA REQUEST STATISTICS

1 Jan. 1975 to 31 Dec. 1976

Area 1

ELEMENT	TOTAL (TOT)	ELAS. SCAT. (EL)	INEL. SCAT. (INL)	OTHER SCAT. (C/S)	RES. PAR. (RES)	GAMMA & NEUTRON EMISSION (NG)	CHARGED PARTICLE EMISSION (NX)	FISSION (NF)	OTHERS	TOTAL REQUESTS
1-H	5	4		6		8			1	24
2-He	1	1					3			5
3-Li	10	13	10	9	2	19	11		16	90
4-Be	5	5	4	1		4	7		1	27
5-B	3	5	5	2	3	5	19		7	49
6-C	11	14	8	5	7	25	18		6	94
7-N	2	4	3		2	15	21		2	49
8-0	3	7	5		3	17	16		1	52
9-F	1	1	1			3	5		1	12
10-Ne							3			3
11-Na	2	3	3	5	4	18	6		9	50
12-Mg		1	3			16	11			31
13-Al	2	5	4			12	29		1	53
14-Si						9	6			15
15-P						2	6			8
16-S	2	2	2	3	5	10	41		2	67
17-Cl						4	5		1	10
18-Ar	2	1				5	8			16
19-K						6	11		1	18
20-Ca		2	1			15	18			36
21-Sc	1					3	2			6
22-Ti						4	16		1	21
23-V	7	3	4			11	9			34
24-Cr						5	2			7
25-Mn	5	2	2	6	19	17	19		3	73
26-Fe	1	7	2			11	14		1	36
27-Co						5	8		1	14
28-Ni		3	1			11	37		2	54
29-Cu	1	3	2			13	8		2	29
30-Zn						8	12			20
31-Ga						3	2			5

ELEMENT	TOTAL (TOT)	ELAS. SCAT. (EL)	INEL. SCAT. (INL)	OTHER SCAT. (C/S)	RES. PAR. (RES)	GAMMA & NEUTRON EMISSION (NG)	CHARGED PARTICLE EMISSION (NX)	FISSION (NF)	OTHER	TOTAL REQUEST
32-Ge						7	4		1	12
33-As						1	1		1	3
34-Se						4	2		1	7
35-Br		1				4	3		1	9
36-Kr						8	1			9
37-Rb						5	1			6
38-Sr						7	1		1	9
39-Y						2	2			4
40-Zr	7	10	4	4	22	25	28		12	112
41-Nb	3	5	3	4	4	9	6		5	39
42-Mo	1					10	3			14
43-Tc						4	1			5
44-Ru						14	4		1	19
45-Rh						4	2		1	7
46-Pd						5	5		2	12
47-Ag						21	2		3	26
48-Cd	1	1	2			18	4		1	27
49-In	1	2	8	1		18	2		3	35
50-Sn	1	1	1			10	1		1	15
51-Sb						6			1	7
52-Te						9	6		1	16
53-I						11	1		1	13
54-Xe						13				13
55-Cs						14	4		4	22
56-Ba	1	1	2			10	1		1	16
57-La	4					7	1		1	13
58-Ce	3	1				9	2		2	17
59-Pr	7	4	2		8	24	8			53
60-Nd	31	16			22	39	17		2	127
61-Pm	2					4				6
62-Sm	10	6	1		14	30	13		4	78
63-Eu	4				4	17	8		6	39
64-Gd	8	12	1	5	29	38	27		7	127
65-Tb	1					2	1		1	5

ELEMENT	TOTAL (TOT)	ELAS. SCAT. (EL)	INEL. SCAT. (INL)	OTHER SCAT. (C/S)	RES. PAR. (RES)	GAMMA & NEUTRON EMISSION (NG)	CHARGED PARTICLE EMISSION (NX)	FISSION (NF)	OTHER	TOTAL REQUEST
66-Dy	2					8	12		6	28
67-Ho	4					6	4		2	16
68-Er	1		1			10	11		1	24
69-Tm	1					9	2		1	13
70-Yb	2					12	11		1	26
71-Lu						3	6		3	12
72-Hf	9	2	2	1	9	21	25		14	83
73-Ta						14	3		1	18
74-W						28	3		3	34
75-Re						17	3		3	23
76-Os							9		1	10
77-Ir						14	3		1	18
78-Pt						1	10			11
79-Au	1		1			21	6		3	32
80-Hg						2	2		1	5
81-Te						3	4		1	8
82-Pb	1	1	1	1		1	2			7
83-Bi	1	1	1			2	2			7
88-Ra										
89-Ac						1				1
90-Th	1	2	3	5		12	2	21	3	49
91-Pa								1		1
92-U-000	1	1	1	2		3		1	1	10
92-U-230								2		2
92-U-231								2		2
92-U-232	1					3		4		8
92-U-233	1	1			1	6		31	3	43
92-U-234	1			1		2		7	1	12
92-U-235	3	3	2	2	1	13	2	81	8	115
92-U-236	2	1		2	6	4		10		25
92-U-237								3	1	4
92-U-238	2	1	2	1		19	2	21	1	49
92-U-oxi	1								1	2

ELEMENT	TOTAL (TOT)	ELAS. SCAT. (EL)	INEL. SCAT. (INL)	OTHER SCAT. (C/S)	RES. PAR. (RES)	GAMMA & NEUTRON EMISSION (NG)	CHARGED PARTICLE EMISSION (NX)	FISSION (NF)	OTHER	TOTAL REQUEST
93-Np	3	2		2	3	8	1	11	4	34
94-Pu-000										
94-Pu-238	3	1		1	2	6		14	4	31
94-Pu-239	2	2	2	3	6	12	1	31	9	68
94-Pu-240	1	1	1	1		2		20	1	27
94-Pu-241	1					4		25	1	31
94-Pu-242	3	2		2	5	6		8	3	29
94-Pu-243						2		3		5
94-Pu-244					1	1		3		5
94-Pu-245						1				1
95-Am	4	1			3	10		21	3	42
96-Cm	1	2			1	3		18	5	30
97-Bk						1		4		5
98-Cf						4		6		10
99-Es						1		1		2
TOTAL	202	170	102	75	186	989	661	348	215	2948

RECENT NNCSC PUBLICATIONS

1.	Neutron Cross Sections (Third Ed.) Mughabghab, S. F. and Garber, D. I. Volume 1, Resonance Parameters. BNL-325, July 1973

Garber, D. I., Kinsey, R. R. Volume 2, Neutron Cross Sections. BNL-325, . in press

2.	Garber, D. I. et al. Angular Distributions in Neutron-Induced Reactions. Volume 1, Z=1 to 20.

3.	Garber, D. I. et al. Angular Distributions in Neutron-Induced Reactions. Volume 2, Z=21 to 100.

4a.	Data Formats and Procedures Manual for the ENDF Neutron Cross Section Library. BNL-50274 (ENDF-102)

4b.	Description of the ENDF Processing Codes and Retrieval Subroutines. BNL-50300 (ENDF-110)

4c.	M. R. Bhat, ENDF Processing Codes for the Resonance Region. BNL-50296 (ENDF-110), June 1971

4d.	Garber, D.I. ENDF/B Summary Documentation. BNL-17541 (ENDF-201), 2nd Edition, October 1975

4e.	CSEWG, Benchmark Specifications. BNL-19302 (ENDF-202), November 1974.

CSEWG, Benchmark Testing of ENDF/B-IV (ENDF-230) Vol. I and Vol. II, Informal Report. In press.

5.	Bhat, M. R., Magurno, B. A., Pearlstein, S. and Scheffel, F.M. Nuclear data for CTR Related Projects. BNL-19344 (ENDF-212), Oct. 1974.

6.	Bhat, M. R. Multi-level Effects in Reactor Calculations and the Probability Table Method. Proc. of the CSEWG Resonance Region Subcommittee Meeting, Brookhaven National Laboratory, May 8, 1972. Bhat, M. R. Editor, BNL-50387 (ENDF-187), July 1973.

7.	Bhat, M. R., Goldberg, M. D., Kinsey, R. R., Prince, A., and Takahashi, H. Neutron and Gamma Ray Production Cross Sections for Silicon. BNL-50379 (ENDF-186), March 1973.

8.	Bhat, M. R. Neutron and Gamma Ray Production Cross Sections for Nickel. BNL-50435 (ENDF-207), Oct. 1974.

9.	Bhat, M. R. and Prince, A. Evaluated Neutron Cross Sections for ^{107}Ag, ^{109}Ag, and ^{133}Cs. BNL-50383 (ENDF-163), April 1973.

10.	Takahashi, H. Evaluation of the Neutron and Gamma Ray Production Cross Sections of ^{151}Eu and ^{153}Eu. BNL-19455 (ENDF-213), Nov. 1974.

11.	Takahashi, H. Evaluation of the Neutron Cross Section for ^{152}Eu and ^{154}Eu. BNL-19456 (ENDF-214), Nov. 1974.

Publications (cont'd)

12.   Bhat, M. R. and Mughabghab, S. F. Evaluated Neutron Cross Sections for the Stable Isotopes of Xenon. BNL-50374 (ENDF-185), February 1973

13.   Mughabghab, S. F., Prince, A., Goldberg, M. D., Bhat, M. R. and Pearlstein, S. Evaluated Neutron Cross Sections of ^{197}Au. BNL-50439 (ENDF-215), Oct. 1974.

14.   Prince, A., Drake, M. K., and Hlavac, P. An Analysis of the ^{239}Pu Neutron Cross Sections from 20 keV to 20 MeV. BNL-50388 (ENDF-190), April 1973.

15.   Takahashi, H. Evaluation of the Neutron and Gamma Ray Production Cross Sections for ^{55}Mn. BNL-19454 (ENDF-208), Nov. 1974.

16.   Mughabghab, S. F., Krieger, T. J. Neutron Cross Sections of ^{59}Co below 100 keV. BNL-NCS-50468 (ENDF-229), April 1975.

17.   Edited by Pearlstein, S. Seminar on ^{238}U Resonance Capture. BNL-NCS-50451 (ENDF-217). March 1975.

18.   Edited by Magurno, B. A. ENDF/B-IV Dosimetry File. BNL-NCS-50446 (ENDF-216). April 1975

19.   NNCSC, Secretariat. Reports to the ERDA Nuclear Data Committee. BNL-NCS-20406, ERDA/NDC-2. May 1975

20.   Magurno, B. A. ENDF/B-IV Cross Section Measurement Standards BNL-NCS-50464 (ENDF-225) Aug. 1975.

21.   BNL Study Group. Study on the Compilation and Evaluation of Nuclear Structure and Charged Particle Reaction Data. BNL-NCS-20573. Oct. 1975 (Request through ERDA - Division of Physical Research)

22.   Pearlstein, S. Evaluated Nuclear Data Files. Advances in Nucl. Sci. and Technology, 8, 115-139 (1975)

23.   Pearlstein, S. Resonance Region Analysis Without Resonance Parameters. BNL-19715. Nucl. Sci. and Engineering: 58, 354-360 (1975)

24.   Rothenstein, W. Thermal Reactor Lattice Analysis Using ENDF/B-IV Data with Monte Carlo Resonance Reaction Rates. BNL-20446 Nuclear Science and Engineering (In press)

In most cases publications are available through:

Brief NDS Report to the 1976 4C-Meeting

1. STAFF

1.1 Since the last 4C-Meeting A. Calamand and J. Lemley left the Section.

1.2 New staff are: R. Lessler, who works on Wrenda and the targets-and-samples program. R. Yaghubian, who has previously been working as a temporary consultant and has now a fixed-term appointment, works on data compilation and request services. O. Schwerer, who is also involved in data compilation and request services.

1.3 For 1977 a new physicist's post is likely to become available. This will be devoted to neutron data in order to cover the increasing workload of data request services.

1.4 A new unit for Atomic and Molecular Data for Fusion is envisaged for 1977 within the Nuclear Data Section.

2. CHANGE OF PREMISES

2.1 In the new premises at Wasagasse, three kilometers away from the IAEA main building, NDS was, for several months, separated from the computer. Many compilation activities and request services got seriously delayed during this period.

2.2 Meanwhile NDS has its own RJE station for card input and printer output, linked to the Agency's computer by a telephone line. This serves most of the needs of NDS except for magnetic tape handling. Repeatedly there were difficulties resulting from transporting tapes to and back between Wasagasse and computer.

2.3 Since the staff has to travel frequently between Wasagasse and Kärntnerring, NDS encounters an effective loss of manpower between 5 and 10 percent.

3. CINDA

3.1 CINDA75 and its Supplement were published. The printing of CINDA76 is presently in a crisis, because the Linotron machine at Frankfurt has given up its ghost. Several other machines are presently under consideration. We still have the hope that the publication date of CINDA76 will be delayed not more than two weeks.

3.2 The Cinda coverage of areas 3 and 4 has been reported in Memo 4C-3/158 of 1976-3-4. There are no significant gaps except, perhaps, for some USSR lab reports. A number of Cinda relevant articles from rare report series and theses has been found from INIS retrievals.

3.3 Considerable Cinda clean-up has been done for area 3. The Exfor data index lines are up to date. However, since much of the clean-up was done before the LINK operation became effective, we have the problem of a disturbing number of duplications. Also a number of recent entries made at NNCSC and NDCC for labs of area 3 could not yet be blocked systematically.

3.4 At the 1975 INDC Meeting the two-years publication cycle of Cinda has been approved for the 1976/77 period. The centers have been urged however, to issue in 1978 an archival volume which would remain valid for a longer period, supplemented by periodical issues for new literature only.

4. EXFOR

4.1 Compilation of Exfor data continued. Presumably, NDS is quite complete for newest data. However, the backlog accumulated during the 1974 period when several posts were vacant, could not yet be worked off.

4.2 The Exfor check program and the Exfor Edit program for customers have been improved.

4.3 The NNCSC Exfor tapes converted from SCISRS-1 were quite important for many data requests. However, not yet all of them have been worked into our master file.

4.4 The Exfor/Cinda dictionaries were frequently updated, without delay, whenever a new code was introduced.

4.5 The NDS Exfor Manual is still maintained separately from the official NNCSC Exfor Manual, though after the last NNCSC updates both Manuals have again become more similar.

5. CUSTOMER SERVICES

5.1 CINDU-11, the new catalogue of data available from NDS, has been issued. Its character has changed completely. Previous issues of CINDU had indexed Dastar and Exfor data in detail, a function which has now been taken over by Cinda. The new issue of CINDU gives only more general information on the numerical data libraries available, which include

    experimental neutron data (5 libraries)
    evaluated neutron data (ca. 15 libraries, depending on the
        definition of the term "library")
    photonuclear data (1 library)
    charged-particle nuclear data (2 libraries)
    nuclear structure and decay data (4 libraries).

5.2 The request statistics is attached. NDS now receives, on average, one request per working day. Out of these there are about

    1 request per week for evaluated data
    1 request per week involving retrievals from Exfor
    3 requests per week of more trivial nature requesting a document
        or a single data set.

Compared to the calendar year 1974 (which admittedly was low due to vacant posts) the data request and dissemination statistics have about doubled.

6. EVALUATED DATA

6.1 Several new evaluated data files were received from the other centers and are gratefully acknowledged.

6.2 The processing of evaluated data takes an increasing amount of time at NDS, part of which could be saved if there were fewer mistakes in the data transmitted.

6.3 NDS has started a file in Exfor format for selected important evaluated data which are not part of one of the established evaluated data libraries. The file has the name VIEN (= various international evaluated neutron data) and its accession numbers start with the character V. VIEN data will be transmitted outside the normal Exfor transmission.

7. DOCUMENTS

7.1 For a list of documents translated and/or distributed by NDS see INDC(SEC)-53/U (June 1976).

8. DATA REVIEWS

8.1 The full report (planned as INDC(NDS)-64) on the third IAEA evaluation of the 2200 m/s and thermal Maxwellian neutron data of the main fissile isotopes, a summary of which had been presented at the 1975 Washington Conference, could not be completed, mainly due to the less efficient working conditions at Wasagasse.

8.2 The work on the review of threshold reactions for reactor neutron dosimetry continues.

9. WRENDA

9.1 WRENDA75 has been published in June 1975. WRENDA76 is being prepared.

9.2 New or changed requests have been received from France, Sweden, Switzerland, Japan, UK, Germany F.R., Netherlands (all these through NDCC), Australia, Bulgaria, German Dem.Rep.

The requests from USA and USSR remained mostly unchanged.

9.3 NNCSC and NEA transmitted the requests according to actions 21 and 22 from last 4C-Meeting.

Exfor compilation statistics at NDS

Between 20 April 1975 and 20 April 1976 NDS transmitted in 5 transmission tapes

                    44 new entries

                    22 revised entries.

On 20 April 1976 there were, considering post-1970 data,

    6 entries in process

  15 entries for which numerical data were requested from authors but not yet received

  15 works known yet no action was taken

   ? works existing but not yet discovered by compilers (mainly data from area 3 published outside area 3).

NDS has transmitted 323 entries, excluding revisions, including pre-1970 data.

The Exfor compilation workload at NDS during the years is shown below. The figure attached shows the number of Exfor subentries and records produced <u>per month</u>. The 1972 peak is due to Dastar-Exfor conversion. The 1974 valey is due to vacant posts; NDS could not yet catch up with the backlog acuumulated during this period, the amount of which has not yet been analyzed. The two sharp peaks in 1975 are due to the compilation and later revision of the DDR nonelastic data. In 1976 compilation suffered from work devoted to an increasing number of requests.
The present contents of the Exfor Library is shown in the attached table2, which however excludes the 50000 to 80000 series.

Table 1

Number of subentries transmitted by NDS

	new	revised
1971	384	8
1972	1905	228
1973	1211	180
1974	765	27
1975	1283	759
1976 until April	93	85

Exfor subentries (= data sets) produced
per month (incl. revisions)

80

Area 3

60

40

20

1971   1972   1973   1974   1975

Exfor records produced per month
(incl. revisions)   6000

Area 3

5000

4000

3000

2000

1000

1971   1972   1973   1974   1975
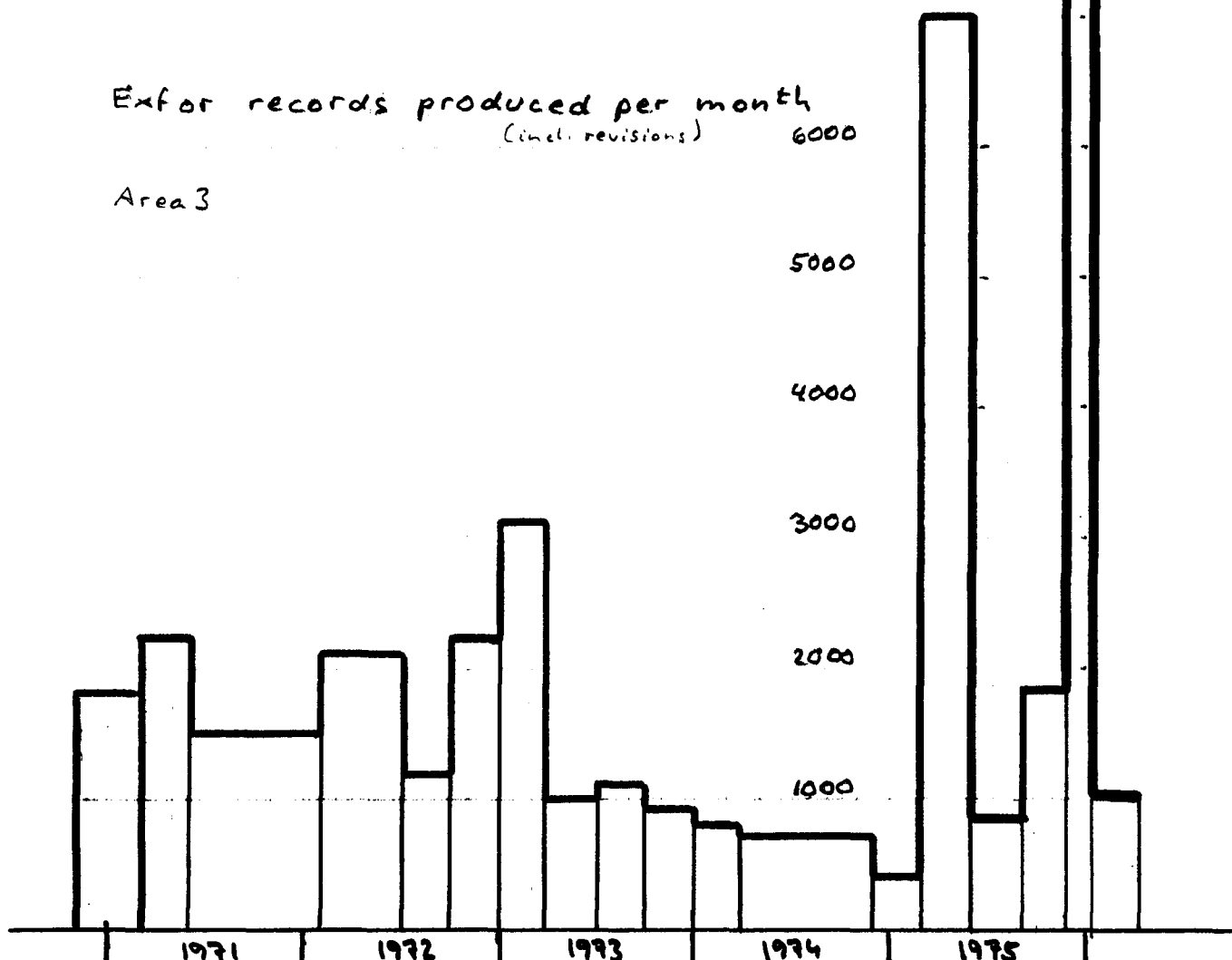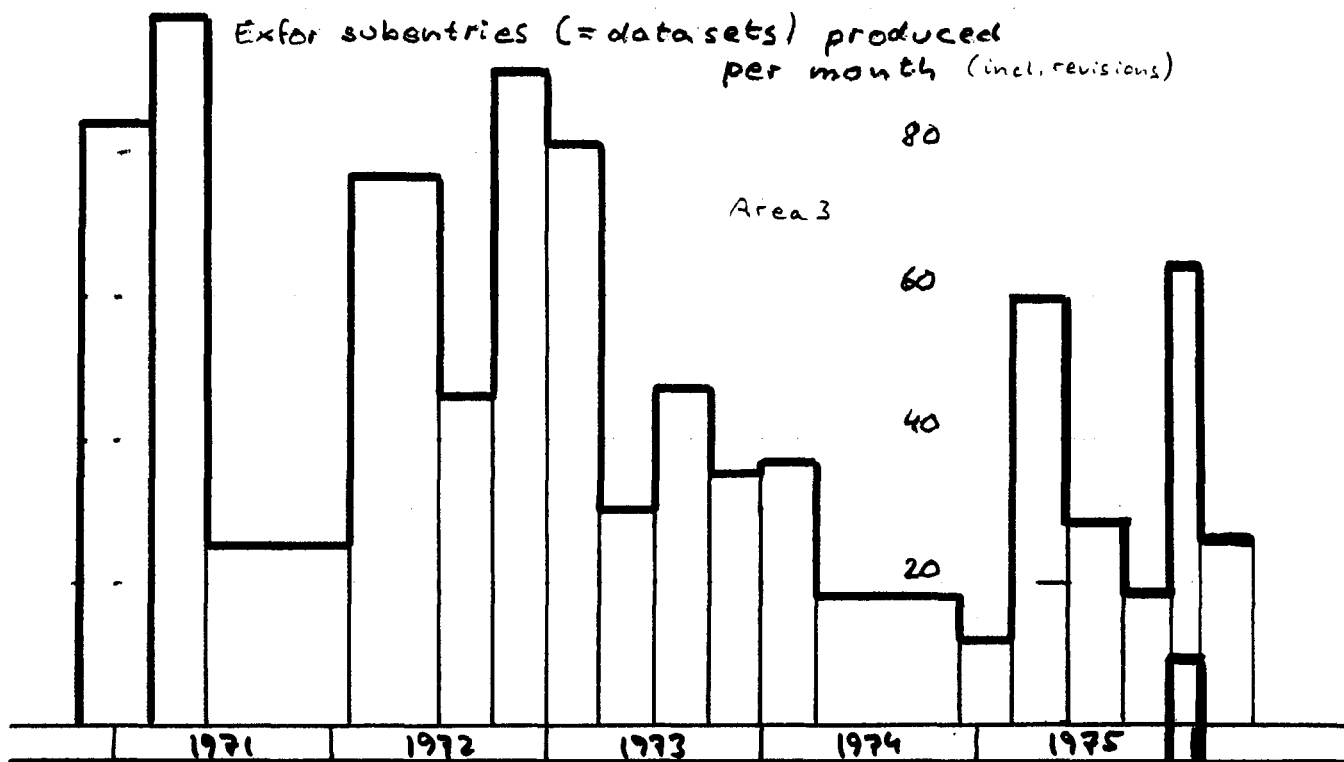
Table 2

Contents of Exfor Library 12 April 1976

	area 1	area 2	area 3	area 4	areas 1-4
Number of entries *	511	506	323	261	1601
subentries *	5720	3820	2364	2288	14200
data records *	537 ooo	639 ooo	40 5oo	45 5oo	1.3 million
Total records transmitted **	723 ooo	732 ooo	121 ooo	96 ooo	1.7 million

* excluding revisions

** including revisions

Last Exfor tapes included: 1050   2028   3020   4024

R E Q U E S T   S T A T I S T I C S

TABLE Ia

1 Apr. 1975 - 31 Mar. 1976

AREA 3

Country origin	Experimental	Evaluated	CINDA retrievals	RENDA retrievals	Documents	Total (75)	Total previous year (74)
AREA 1							
NNCSC		3				3	2
USA	1	2			22	25	13
Canada							2
AREA 2							
NDCC	4	3	3			10	16
AUS	2	2			1	5	5
BLG					2	2	1
CCE				1		1	
CER		1				1	
FR					7	7	8
GER	1				16	17	3
ITY					3	3	
NED		1				1	1
SAC							1
SWD	1				1	2	2
SWT					2	2	4
TUK		1			1	2	
UK	1	1			7	9	3
AREA 3							
ARG	1	4			1	6	2
AUL	3					3	2
BAN	3	1			1	5	2
BZL	2				1	3	2
CSR	1	2			6	9	7
DDR	2	3			4	9	8
HKG	1					1	
HUN	2	2	1		1	6	5
IAE	1	1			2	4	1
IND	3	2			12	17	14
ISL	3	4	1	1	5	14	7
KOR					1	1	1
MEX	1				1	2	
PAK	1	1			1	3	
PHI		1				1	
POL	3	4			2	9	4
RUM	1	3			2	6	4
SAF	1	3			1	5	3
UAR	1	1			2	4	2
YUG		1			1	2	4
VEN							1
ISPRA		1				1	
ZZZ	1					1	

Country origin	Experimental	Evaluated	CINDA retrievals	RENDA retrievals	Documents	Total (75)	Total previous year (74)
<u>AREA 4</u>							
CJD	4	1			2	7	3
CCP	2	2			11	15	1
DUB							1
T O T A L	47	51	5	2	119	224	135

R E Q U E S T   S T A T I S T I C S

TABLE Ic

1 Apr. 1975 to 31 Mar.1976

AREA 3

Request Disposition	Number of requests for data					Total	Total Previous Year
	Experimental	Evaluated	CINDA retrievals	RENDA retrievals	Documents	Total	
Fulfilled	31	29	5	2	109	176	119
Partially Fulfilled	5	11			2	18	7
Unfulfilled		2				2	2
Pending	11	9			8	28	7
TOTAL	47	51	5	2	119	224	135

STATISTICS
TABLE II
AREA 3

DISSEMINATION STATISTICS

TABLE II

1 Apr. 1975 to 31 Mar. 1976

AREA 3

Data Type	Data Sets *	Amount (previous year)	Data Points	(prev. year)
Experimental (total)	3064	(1690)	303 944	(118.657)
Exfor 1-4	1892		192 602	
Exfor 5-8	1035		60 393	
Karlsruhe C.P. Library	33		480	
Musgrove Lib. of strength function	29		916	
NNCSC Photo-neutron Lib.	70		49 538	
Dastar	5		15	
EVALUATED (TOTAL)	5408	2583		

Copy of entire available library
disseminated
(included under "Data Sets")

AUL + BOL	281	1 x
BOYAD	55	
DASTAR	396	1 x
DEVILLERS	635	1 x
CHARGED PART-ENDF	612	2 x
ENDF/B-IV 7 st.	40	4 x
ENDF/B-Fiss. Prod.	1650	2 x
ENDF/B-Dosimetry	139	3 x
ENDF/B-Dosimetry Group	54	2 x
French ENDF	1	
KEDAK	133	2 x
LLLENDL	367	3 x
MUSGROVE		
SAND II	258	4 x
UK	588	6 x
	5408	

* Data Set = either one Exfor subentry (not counting subentry 001)
or one total or partial DFN, Mat. number, etc. of an
evaluated data library.

DISSEMINATION STATISTICS   TABLE II (continued)

		previous year
Documents (total)	19574	16 946
individual requests	119	
Distr. of INDC docs } Distr. of other docs }	19465	

TABLE III

Z A Q R E Q U E S T S T A T I S T I C S

1 Apr. 1975 – 31 Mar. 1976

AREA 3

Element	A	All	TOT	SEL DEL	SIN DIN	NG SNG	NF	N2N NA ND NT	NP	RES	Other
ALL											|||
MANY												
MANY											
MANY											

Element	A	All	TOT	SEL DEL	SIN DIN	NG SNG	NF	N2N NA ND NT	NP	RES	Other
ALL											|||
MANY											
H		||										
D												
Li											
Be											
B											
C											
N											
O											
F											
Na											
Mg											
Al											
Si											
P											
Cl											
K											
Ca											
Sc											
Ti											
V											
Cr											
Mn											
Fe											
Co											
Ni											
Cu											
Zn											
Y											

Note: This table consists of handwritten tally marks in the data cells. Tally mark counts by element and column (A, All, TOT, SEL DEL, SIN DIN, NG SNG, NF, N2N NA ND NT, NP, RES, Other):

- ALL — Other: |||
- MANY — SEL DEL: |; N2N: |; Other: |
- H — All: ||; Other: |
- D — All: |; Other: |
- Li — SEL DEL: ||; SIN DIN: ||; NG SNG: ||; N2N: |; Other: |
- Be — SEL DEL: |; SIN DIN: |; NG SNG: |; N2N: |; Other: |
- B — NG SNG: ||; N2N: ||; NP: |||
- C — All: |; TOT: |; SIN DIN: ||||; NG SNG: |||||; N2N: ||||||; NP: ||||; Other: ||
- N — All: |; TOT: |; SEL DEL: |; SIN DIN: |; NG SNG: |; N2N: ||; NP: |; Other: |
- O — All: |; TOT: |; SEL DEL: |; SIN DIN: |; NG SNG: |; N2N: |; Other: |
- F — SEL DEL: |; SIN DIN: |; NG SNG: |; NP: |
- Na — All: ||; NG SNG: |||||; N2N: ||; NP: |||; RES: |
- Mg — NG SNG: ||||; N2N: ||||; NP: |||||||
- Al — A: |; NG SNG: ||||; N2N: |||||; NP: |||
- Si — NG SNG: |||; N2N: |||||; NP: ||||||; Other: ||
- P — TOT: ||; N2N: |; NP: ||||
- Cl — TOT: ||; NG SNG: ||; N2N: |||||; RES: |; Other: |
- K — NG SNG: |||; NP: ||||; Other: |||
- Ca — NG SNG: |||||||||; N2N: |||||||||; NP: |||||||; Other: |
- Sc — TOT: ||; NG SNG: ||; N2N: ||
- Ti — SEL DEL: ||; SIN DIN: ||; NG SNG: |||; N2N: |||||; NP: ||||||||; Other: |
- V — SEL DEL: |||; SIN DIN: ||; NG SNG: |; N2N: |; Other: |
- Cr — A: |; SEL DEL: ||; SIN DIN: |; NG SNG: |; Other: |
- Mn — All: ||; NG SNG: ||||; N2N: |||||; NP: ||; RES: |; Other: |
- Fe — All: |; SEL DEL: ||; SIN DIN: ||; NG SNG: |||||; N2N: |||||; NP: |||||||||; RES: ||; Other: |||
- Co — SEL DEL: |; SIN DIN: |; N2N: |; NP: |; RES: |
- Ni — A: |; SEL DEL: ||; SIN DIN: ||; NG SNG: |; N2N: ||||; NP: ||||||; Other: |
- Cu — A: |; TOT: ||; NG SNG: |||||; N2N: ||||||||||; NP: |||||; RES: |; Other: |
- Zn — TOT: |; N2N: |||; NP: ||||
- Y — TOT: ||; NG SNG: ||

TABLE III
Z A Q   R E Q U E S T   S T A T I S T I C S   (continued)

Element	A	All	TOT	SEL DEL	SIN DIN	NG SNG	NF	N2N NA ND NT	NP	RES	Other
Zr		‖	‖						‖	╎	
Nb				╎	╎	╎					╎
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Pu	239	‖					╎				╎
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Cm	245	‖									
Cf	252	‖									

NDS report about past and future meetings on nuclear data

(J.J. Schmidt)

In the general context of nuclear data required for the development of nuclear energy (fission and fusion reactors) the following meetings were held in the past year or are planned in the near future.

1. In cooperation with the OECD Nuclear Energy Agency, the IAEA Nuclear Data Section (NDS) convened an Advisory Group Meeting on Transactinium Isotope Nuclear Data (TND) at Karlsruhe, FRG, from 3-7 November 1975. The meeting achieved a comprehensive survey of the needs and status of thermal, resonance and fast neutron cross sections and nuclear decay parameters of the transactinium isotopes. One of the basic recommendations which resulted from the meeting was to initiate internationally coordinated programmes to measure, calculate and evaluate needed TND which would span the next ten years. The principal aim of this effort would be to improve the status of TND required for nuclear technology. The proceedings of the meeting will be published as part of the IAEA Technical Report Series.

2. In cooperation with the International Centre for Theoretical Physics (ICTP) in Trieste, IAEA/NDS convened a Consultants Meeting on the Use of Nuclear Theory in Neutron Nuclear Data Evaluation at the ICTP in Trieste, 8-12 December 1975. The meeting reviewed the status and use of nuclear theories, models and computer codes in the computation and evaluation of neutron data needed for fission and fusion reactor design, with particular consideration of the requirements of developing countries. The scope of the meeting covered neutron resonance and statistical theory, capture mechanism, nuclear level densities, optical model, pre-compound decay and fission theory. The meeting recommended an extented seminar on nuclear theory and nuclear model computer codes for applications. This seminar will be held in 1977, probably at ICTP Trieste (nuclear theory part) and at the Centro di Calcolo in Bologna (computer codes part). The proceedings of the Consultants Meeting will be published as part of the IAEA Technical Report Series.

3. In the pursuit of its programme to improve the reliability of nuclear data needed for reactor neutron dosimetry IAEA/NDS will convene a Consultants Meeting on Integral Cross Section Measurements in Standard Neutron Fields for Reactor Dosimetry in Vienna from 15-19 November 1976. The meeting forms part of a coordinated programme to improve reactor dosimetry neutron data by using integral results from benchmarks. Its goal is to identify and eliminate existing discrepancies between diffe-

rential and integral data by testing differential data in integral measurements using carefully selected standard neutron fields over all energy ranges important to reactor dosimetry, and to arrive eventually at an internationally recommended set of neutron cross sections for reactor dosimetry.

4. Following the October 75 IAEA/NEA Meeting on Sensitivity Studies and Calculational Methods for Shielding in Paris, the IAEA Nuclear Power and Reactor Division, in cooperation with IAEA/NDS and OECD NEA, will hold a Technical Committee Meeting on Differential and Integral Nuclear Data Requirements for Shielding in Vienna, from 12-15 October 1976. The main purposes of the meeting will be to identify the nuclear data requirements for shielding on the basis of detailed sensitivity studies and to review the status of experimental and evaluated data needed for shielding.

5. A second Advisory Group Meeting on Fission Product Nuclear Data (FPND) is planned to be held by IAEA/NDS at RCN Petten, Netherlands, from 5-9 September 1977 (tentative date). The programme is currently being worked out in correspondence with the community of FPND users and producers. The main objective of the meeting will be to review the progress in FPND research and reliability since the FPND panel held in Bologna in November 1973. NDS has started a report series on progress in FPND which is being issued in regular intervals. The first issue of this series, INDC(NDS)-70, was published in November 1975.

6. IAEA/NDS will co-sponsor an International Specialists Symposium on Neutron Standards and their Application which the National Bureau of Standards intends to convene in Washington D.C. in March 1977. This meeting will review the status and progress in the knowledge of neutron data used for neutron cross section and neutron flux measurements.

Views of NNCSC on the Adoption of New Keywords for Neutron EXFØR

Use of keyword REACTIØN in Neutron EXFØR

1.) <u>Light Nuclei Reactions</u> Current EXFØR rules limit the number of outgoing particles (except neutrons) to two. For some light-nuclei reactions it is important to specify exactly which reaction is being measured. For example, $Li^7(n,2n)Li^6$, and $Li^7(n,2nd)\alpha$ which now are artificially differentiated.

2.) Any reaction for which more than 2 outgoing particles are measured cannot be specified in neutron EXFØR.

3.) Cross sections measured on an elemental target leading to production of a specific isotope could be specified using the REACTIØN coding. Presently in neutron EXFØR the information may only be coded by using the keyword RESID-NUC.

Ex: Z-S-0(N,X)Z'-S'-A'

4.) For fission yields measured relative to the yield for a given nucleus, the standard could be easily specified.

Ex: MØNITØR (92-U-235(N,F)FF,CUM,YLD,MØ99,EXP)

5.) We have come across a problem in specifying in EXFØR isomeric cross sections leading to the ground state of the residual nucleus. The problem of differentiating measurements which include the decay from the metastable state from those which do not has been taken care of in charged-particle EXFØR by introducing the branch codes M+,M-,(M).

Use of keyword DECAY-DATA in neutron EXFØR

Adopting the Charged-Particle EXFØR keyword DECAY-DATA would allow for the coding of all decay data in machine retrievable form which is expecially important for activation experiments. In the present neutron EXFØR this is either unwieldy impossible. The data do not really belong in a data table as they are not variables in the experiment and would most usefully be entered into the bibliography.

Use of keyword ADD-RES in neutron EXFØR

We think the addition of a keyword for additional results would be very useful, especially for the case of data which we may wish to compile at some future

date. This saves having to store this information in auxillary systems and it may be of some use to users.

We recommend that the neutron EXFØR adopt the new CPND keywords effective as of the next Four-Centres Meeting. We further recommend that NDS prepare, and distribute, new dictionaries in six months for comment.