INDC(NDS)-110

International Atomic Energy Agency

INDC(NDS)-110
Dist.: G + Sp.

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

NRDC-Meeting Karlsruhe 1979

Report on the

FOURTH IAEA CONSULTANTS' MEETING OF NUCLEAR REACTION DATA CENTERS

Karlsruhe, Fed. Rep. of Germany, 8-13 October 1979

Including

the 15th FOUR-CENTERS MEETING OF THE NEUTRON DATA CENTERS

and

the 5th MEETING ON CHARGED PARTICLE NUCLEAR DATA COMPILATION

Edited by

H. D. Lemmel

January 1980
Rev. March 1980

IAEA NUCLEAR DATA SECTION, WAGRAMERSTRASSE 5, A-1400 VIENNA

Reproduced by the IAEA in Austria

April 1980

INDC(NDS)-110
Dist.: G + Sp.

Report on the
FOURTH IAEA CONSULTANTS' MEETING OF
NUCLEAR REACTION DATA CENTERS
Karlsruhe, Fed. Rep. of Germany, 8-13 October 1979

Including
the 15th FOUR-CENTERS MEETING
OF THE NEUTRON DATA CENTERS

and

the 5th MEETING ON CHARGED PARTICLE NUCLEAR DATA COMPILATION

Abstract

This report summarizes the 1979 coordination meeting of the national and regional nuclear reaction data centers, convened annually by the IAEA. The main topics are

- the international exchange of nuclear reaction data by means of the "EXFOR" system,
- the further development of this system,
- the sharing of the workload for a speedy and reliable data compilation,
- the exchange of specialized and evaluated data libraries,

with the goal of rendering data center services to data users, by means of computer retrievals and printed materials.

Edited by
H. D. Lemmel

January 1980
Rev. March 1980

Table of Contents

List of Appendices

List of Abbreviations used in this Document

CAJaD	Centr po dannym o stroenii atomnogo jadra i jadernykh reakcikh GKAE CCCP (Center for nuclear structure and reaction data of the USSR State Committee of the Utilization of Atomic Energy) at the Kurchatov Institute, Moscow.
CINDA	A specialized bibliography and data index on neutron nuclear data operated jointly by NNCSC, NDCC, NDS and CJD. The master file is maintained at NDCC. Publications are made by IAEA.
CJD	Centr po Jadernym Dannym, the USSR Nuclear Data Center at F.E.I. Obninsk.
Codata	Committee on Data for Science and Technology, of the International Council of Scientific Unions.
CPND	Charged-particle nuclear reaction data.
CSISRS	Cross-Section Information Storage and Retrieval System, the EXFOR-compatible internal system of NNDC.
DASTAR	DAta STorage And Retrieval system of NDS prior to EXFOR; now all converted into EXFOR.
ENSDF	Evaluated Nuclear Structure Data File
EXFOR	Exchange Format for the international exchange of nuclear reaction data
FIZ	Fachinformationszentrum Energie-Physik-Mathematik (Information Centre of the Fed. Rep. of Germany for energy, physics, mathematics) at Karlsruhe
ICPND	Integral charged-particle nuclear reaction data (including mainly cross-sections as function of energy, and thick-target yields)
INDC	International Nuclear Data Committee.
INIS	International Nuclear Information System, a bibliographic system operated by the IAEA.
Japanese Study Group	Study group for information processing in nuclear physics at the Tokyo Institute of Technology.
KaChaPaG	Charged particle nuclear data group at the Institute for Radiochemistry, Karlsruhe.
NDP	Nuclear Data Project at Oak Ridge for nuclear structure and decay data.
NDS	IAEA Nuclear Data Section, Vienna.
NEA	Nuclear Energy Agency of the OECD, Paris
NEA-DB	NEA Data Bank

NEANDC	Nuclear Data Committee of the OECD Nuclear Energy Agency
NEUDADA	NEUtron DAta Direct Access, the pre-EXFOR system of the NEA-DB (at that time: CCDN); now converted into EXFOR.
NND	Neutron Nuclear Data
NNDC	USA National Nuclear Data Center at the Brookhaven National Laboratory
NRDC	the Nuclear Reaction Data Centres
NRDF	Nuclear Reaction Data File system of the Japanese Study Group
NSDD	Nuclear Structure and Decay Data
OECD	Organisation for Economic Cooperation and Development, Paris
"Recent References"	The bibliography of the NDP published in "Nuclear Data Sheets"
SCISRS	Sigma Center (now NNDC) Information Storage and Retrieval System prior to EXFOR; now all converted into EXFOR.

Foreword

The Fourth Consultants' Meeting of Nuclear Reaction Data Centers was held by the IAEA at Karlsruhe, Federal Republic of Germany, in the week of 8–13 October 1979. It was hosted by the Karlsruhe Charged Particle Group of the Kernforschungszentrum Karlsruhe, and cosponsored by the Fachinformationszentrum Energie-Physik-Mathematik at Karlsruhe.

This Fourth "NRDC Meeting" combined the 15th "Four Centers Meeting" of the Four Neutron Nuclear Data Centers with the 5th "CPND" Meeting on Charged-Particle Nuclear Data Compilation. The preceding meeting in this series was held at the OECD in Paris, France, in the week 19–23 June 1978; see the NEA report INDC(NDS)-99 (NRDC-3).

Participants

Y. Abe Japanese Study Group	Research Institute for Fundamental Physics Kyoto University, Oiwake-cho Kitashirakawa, Sakyo-ku Kyoto 606, Japan Address until end of May 1980: c/o Centre de Recherches Nucléaires F-67000 Strasbourg
H. Behrens FIZ	Fachinformationszentrum Energie, Physik, Mathematik Ges.m.b.H. Kernforschungszentrum D-7514 Eggenstein-Leopoldshafen Germany, Federal Republic of
T. Burrows NNDC	National Nuclear Data Center Brookhaven National Laboratory Upton, New York 11973, U.S.A.
V. Bychkov CJD	Centr po Jadernym Dannym Fiziko-Energeticheskij Institut Obninsk, Kaluga Region, U.S.S.R.
F.E. Chukreev CAJaD	Centr po Atomn. i Jadern. Dannym Institut Atomnoi Energii I.V. Kurchatova 46 Ulitsa Kurchatova Moscow D-182, U.S.S.R.
S. Cierjacks KFK (part-time)	Institut für Kernphysik Kernforschungszentrum Karlsruhe Postfach 3640 D-7500 Karlsruhe, Germany, Fed. Rep. of
P. Johnston NEA-DB	NEA Data Bank B.P. No. 9 (Bât. 45) F-91190 Gif-sur-Yvette, France
H. Klewe-Nebenius Kachapag	Institut für Radiochemie Kernforschungszentrum Karlsruhe Postfach 3640 D-7500 Karlsruhe, Germany, Fed. Rep. of
H.D. Lemmel IAEA-NDS Sci. Secretary	Nuclear Data Section International Atomic Energy Agency P.O. Box 100 A-1400 Vienna, Austria
V.N. Manokhin CJD	Centr po Jadernym Dannym Fiziko-Energeticheskij Institut Obninsk, Kaluga Region, U.S.S.R.
H. Münzel Kachapag Chairman	Institut für Radiochemie Kernforschungszentrum Karlsruhe Postfach 3640 D-7500 Karlsruhe, Germany, Fed. Rep. of

S. Pearlstein NNDC	National Nuclear Data Center Building 197 D Brookhaven National Laboratory Upton, New York 11973, U.S.A.
G. Pfennig Kachapag	Institut für Radiochemie Kernforschungszentrum Karlsruhe Postfach 3640 D-7500 Karlsruhe, Germany, Fed. Rep. of
W. Rittberger FIZ (part-time)	Fachinformationszentrum Energie, Physik, Mathematik Ges.m.b.H. Kernforschungszentrum D-7514 Eggenstein-Leopoldshafen Germany, Federal Republic of
J.J. Schmidt IAEA-NDS	Nuclear Data Section International Atomic Energy Agency P.O. Box 100 A-1400 Vienna, Austria
N. Tubbs NEA-DB	NEA Data Bank B.P. No. 9 (Bât. 45) F-91190 Gif-sur-Yvette, France

Agenda

Part 1: on all Nuclear Reaction Data

1. Opening, election of chairman, adoption of agenda
2. Brief status reports of the Centers
3. Review of Actions from the previous Meeting
4. The EXFOR system: rules, Manual, Dictionaries, proposals, Protocol, compatibility with NRDF-2, etc.
   (all items of interest to neutron centers only to be discussed later in Part 4 of the Meeting)
5. Customer services:
   a. computer intelligible definition of error-types?
   b. edited Exfor formats
   c. computation formats
6. Future plans, relations to CODATA, etc.
7. Data Center activities in Data Base Management Systems
8. Nuclear Data Tagging and Flagging in INIS
9. Photonuclear Data
10. Nuclear Structure and Decay Data
11. Miscellaneous, Conclusions, etc.

Part 2: Discussions among Center Heads

21. Commitments and cooperation of centers, Protocol, CPND
22. Assessment of present work, scope, priorities and customer services
23. Planning and coordination of future specialists' meetings on nuclear data
24. Future changes in data needs and center scope
25. Date of the 1980 meeting in the US
26. Miscellaneous, Conclusions, etc.

Part 3: on Charged Particle Nuclear Data (CPND)

31. CPND Bibliography
32. Exchange of CPND, experiences with TRANS tapes
33. Publications and other plans
34. Miscellaneous, Conclusions, etc.

Part 4: on Neutron Nuclear Data

41. CINDA
42. WRENDA
43. EXFOR (remaining items from No. 4 above)
44. Evaluated data, covariances, SOKRATOR, ENDF/B, etc.
45. Exchange of EXFOR data, experiences with TRANS tapes
46. Miscellaneous, Conclusions, etc.

Agenda item 1. Opening, election of chairman, adoption of agenda

The Meeting was opened by Mr. Schmidt on behalf of the IAEA. He thanked the hosts at Karlsruhe for their hospitality and excellent organization of the meeting. He emphasized the growing importance of the Karlsruhe Charged Particle Group within the international nuclear data exchange. This was well demonstrated by the charged-particle data handbook produced by the Fachinformationszentrum Karlsruhe from the KaChaPag EXFOR files to be distributed later in the meeting.

Mr. Münzel, head of the Karlsruhe Charged-Particle Group, welcomed the participants on behalf of Prof. Böhm of the Kernforschungszentrum Karlsruhe.

Mr. Rittberger mentioned in his opening remarks that numerical and factual data banks become increasingly important but can be useful only in close international cooperation.

Mr. Münzel was elected chairman of the meeting.

The tentative agenda was approved with some minor modifications (see the preceding page).

Agenda item 2. Brief status reports of the Centres

Mr. Tubbs presented the Progress-Report of the NEA Data Bank, see Appendix 8.* He illustrated the activity and position of NEA-DB in the frame world of its customers, other data centers and committees, by a flow chart (working paper 2).* He introduced the new Information pamphlet of the NEA-DB (working paper 3).

NEA-DB expects to transmit about 250 EXFOR entries per year from compilation of new experimental data, however the current rate is 400 per year due to additional NEUDADA-EXFOR conversion. He explained the development of Computational Formats at NEA-DB (working paper 4).

Mr. Abe presented the Status Report of the Japanese Study Group, see Appendix 5. They have now gained some experience in CPND compilation in NRDF-2 format, which is in full operation for storage and retrieval. A bibliographic list of the works compiled was submitted as working paper 10.

NRDF-2 is in structure and in many details similar to EXFOR, but there is no automatic conversion from NRDF-2 to EXFOR or vice versa.

The meeting recommended to continue to study the compatibility between NRDF-2 and EXFOR; to encourage a Japanese participation in the international exchange of CPND by a NRDF/EXFOR conversion program; and to study possible obstacles, in particular those data-types compiled in NRDF-2 that have not yet been defined in EXFOR. See Action 64.

Mr. Abe explained that organization and financing of a Japanese data center are still uncertain.

---

* "Working papers" are not included in this document, except if an "Appendix" is referred to. A list of "working papers" submitted to the meeting can be found in Appendix 1.

Mr. Manokhin presented the CJD Progress Report, see Appendix 3. The transmission of CINDA entries and EXFOR data is continuing with a high degree of completeness, although there are at present temporary difficulties due to the transition to a new computer of the type EC-10/33.

The development of a USSR evaluated neutron data library in ENDF/B format is in progress, partly in cooperation with Dresden (Seeliger). He announced that another evaluated data file (on Pu-241 by V. Konshin) has just been transmitted. The meeting recognized the importance of the fact that USSR evaluations are now issued in ENDF/B format.

Mr. Chukreev presented the CAJaD Progress Report, see Appendix 2. They transmit now in regular intervals Exfor tapes with CPND from the USSR. The Exfor checkprogram received from Dunford is used, and also Pamela Attree's Exfor check program is used at the Moscow University. Calculations of (p,xn) reactions are being performed.

He reported about the creation of a Photonuclear Data Center at the Moscow University, which began to compile data in EXFOR format.

The meeting recognized this as an important development and recommended the use of the EXFOR system for photonuclear data. See Actions 53 and 54.

Mr. Lemmel presented the NDS Progress Report, see Appendix 7. He reminded the meeting to celebrate the 15th anniversary of CINDA as an international effort, and the 10th anniversary of EXFOR, which meanwhile developed to a well-functioning system with a high degree of completeness and reliability. See the summary of the contents of Exfor on page 4 of Appendix 7. He introduced the "Nuclear Data Newsletter" and the Documentation Series "IAEA-NDS-..." which had been started to improve the contacts and services to customers.

Mr. Schmidt gave a review of past and forthcoming meetings and conferences, see the attachment to Appendix 7.

Mr. Pearlstein presented the Progress Report of the NNDC, see Appendix 9. A large variety of materials were presented in working papers 12-19, 22, 26, 27, 33, 34, (see Appendix 1) about

- the May 1980 Symposium on 10-50 MeV neutron data (see attachment to Appendix 9)
- Exfor details
- updates of the EXFOR Manual and its Protocol
- maintaining the Manual by a text processor
- Data Base Management Software
- Sample Plots for CPND
- Standard Reference Nuclear Data

  etc.

Mr. Pearlstein announced the release of the entire ENDF/B-4 library and the following parts of ENDF/B-5:

standards,
dosimetry,
actinides,
fission products.

The new versions of the Manual and Documentation of ENDF/B-5 (ENDF-102 and ENDF-201) are in preparation and will have no restriction in distribution.

The meeting highly appreciated the release of these data.

Mr. Behrens presented the Status Report of FIZ. See Appendix 4, which in particular gives a summary of several important publications within the series Physik Daten/Physics Data. See also working paper 20.

Later in the Meeting, the activities and services provided were demonstrated in an excursion to the FIZ building.

Mr. MÜnzel and Mr. Klewe-Nebenius presented the KaChaPaG Status Report. KaChaPaG with a minimum of manpower, had increased the charged particle EXFOR file to 1600 reactions (including some contributions from CAJaD and NDS, not counting a TRANS tape just recently received fron NNDC). From this file KaChaPaG has started, in cooperation with FIZ, to produce a handbook on charged particle reaction data, of which a first volume with 800 pages plus a separate index volume was presented, published within the FIZ series 'Physics Data'.

The meeting recognized this as a most impressive application of the EXFOR system.

The activities of KaChaPaG were demonstrated later in the meeting by an excursion to the Kernforschungszentrum Karlsruhe, where also several nuclear data measurement facilities were visited.

See Appendix 6 for the KaChaPaG Status Report to the Meeting.

Agenda item 3. Review of Actions from the last Meeting

The actions listed in the Summary Record of the 1978 NRDC were reviewed. Those actions that were found to be continued, are included in the list of actions in the present document.

Agenda item 4. The EXFOR System

A Subcommittee was formed consisting of

Mr. Burrows
Mr. Bychkow
Mr. Johnston
Mr. Klewe-Nebenius
Mr. Lemmel
Ms. Pfennig

The Subcommittee discussed all pending EXFOR matters following the working paper 23 submitted by Mr. Lemmel. Various additional items were subsequently submitted by the other members of the Subcommittee. The conclusions are summarized in a separate chapter of this document (see Exfor Conclusions on page 23) and in Actions 61- 100.

Agenda item 5. Customer services

The discussions concentrated on possible improvements of the Exfor system for the benefit of its users. It was reported that Prof. Vonach, who uses Exfor data as a basis for data evaluation including covariance matrices, was not satisfied with the error information given in Exfor.

It was concluded to look into possibilities of introducing in Exfor computer-intelligible error types (see Exfor Conclusion 32). Even if more precise and computer-intelligible error definitions would intially be available only in a small fraction of Exfor data, this may nevertheless be of increasing value to Exfor customers.

It was however stressed that while improvements are desirable, it is also essential to keep the Exfor system simple.

Mr. Cierjacks proposed direct discussions between compilers, experimenters and data users at the next NRDC Meeting. See Action 112.

Edited Exfor Formats are now available at NDS and NNDC (working paper 14). NEA-DB now sends out data in EXFOR and no longer in NEUDADA format.

As Exfor was designed to be readable by educated center staff, edited formats for external customers are indeed necessary.

Computation formats derived from Exfor data are now available or under development at several centers, which should continue to keep each other informed about their progress (Action 69). It was recognized that there must be different computation formats for different purposes and data types (e.g. resonance-parameters compared to cross-sections), and that computation formats cannot be as flexible as to include all Exfor data without some loss of infrequent information (such as unsymmetric errors).

Agenda item 6. Future plans, relations to CODATA, etc.

Mr. Tubbs reports that generalized exchange formats for all types of numerical data are now being developed, with associated FORTRAN or PL1 programs, partly under the auspices of CODATA. Mr. Tubbs was asked to watch such developments and to distribute relevant information (Action 26).

Agenda item 7. Data Base Management Systems

Several centers have now Data Base Management Systems in operation. After a brief exchange of experiences it was decided that the centers should continue to keep each other informed about new developments (Action 24).

Agenda item 8. Nuclear Data Flagging in INIS

It was reported that INIS has started to use data flags to indicate whether the paper referred to, contains numerical data. However, these flags are not yet in general use which is needed before one can usefully retrieve on these flags.

Agenda item 9. Photonuclear Data

Mr. Chukreev reported about the creation of the Photonuclear Data Center at the Moscow State University. This will compile data up to the threshold of production of Pi-Mesons, concentrating on photonuclear reaction data for production of neutrons, protons and heavier nuclides. Mr. Chukreev will maintain close contacts to the new center, and Mr. Manokhin is in contact with them to render them assistance about the use of EXFOR.

Mr. Pearlstein reports on Mr. Fuller's Photonuclear Data Center at the National Bureau of Standards in Washington. This center is not very much computerized but it feeds essential data into the evaluated data files. It maintains a photonuclear bibliography to which the USSR probably already contributes and should continue to do so.

NNDC had transmitted their version of Berman's library of photoneutron reactions, converted into EXFOR format. A new version of Berman's library is expected to be released soon. NNDC will convert this into up-to-date EXFOR format and then transmit it to the other centers.

See Actions 51 - 54 about photonuclear data.

With respect to compiling photonuclear data into EXFOR, it was decided that this should be done in separate series of accession-numbers (e.g. starting with "M" for Moscow and "U" for NNDC). See EXFOR Conclusion No. 36.

Agenda item 10. Nuclear Structure and Decay Data

Mr. Abe reports that the Japanese Study Group encounters interrelation between differential CPND and NSDD, and between neutron polarization data and NSDD. The Japanese NRDF system covers nuclear reaction data and NSDD, and it is therefore difficult to use the EXFOR system.

Considering this difficulty, it was found important, to have a NRDF/EXFOR conversion program in operation at least for those reaction data that are coded in both systems, in order that the EXFOR centers and the Japanese Study Group can benefit from the data compiled in the other system.

It was emphasized that the US had two different systems in operation: EXFOR (resp. the EXFOR-compatible CSISRS) for experimental nuclear reaction data, and ENSDF for nuclear structure and decay data, and that this separation appeared useful, despite of the existing interrelations among these data types. ENSDF is documented in ORNL-5054 plus an NNDC report containing the computer-independent physics documentation. NNDC was requested to distribute this ENSDF documentation (Action 23).

It is expected that within the US the responsibility for ENSDF and the "Nuclear Data Sheets" will be transferred to NNDC.

See also EXFOR Conclusion 37.

Agenda items 21-26. Meeting of Center Heads

The Meeting of the Center Heads took place in a session parallel to the subgroup on EXFOR matters (see agenda items 4 and 43).

Some results of the Center Heads discussions were carried on in the plenary meeting, concerning in particular:

- the "Protocol" originally designed for the cooperation and commitments of the neutron data centers, should now contain two separate Sections: one for the technical matters of the EXFOR system, where all NRDC's are involved; and another on the commitments of the neutron data centers. See Actions 1, 28, 29 and Appendix 12.

- distinction of the various data categories in EXFOR: see EXFOR Conclusion 18/19.

- quality of compilation and the scope and priorities of data are summarized in various other parts of the Minutes, see in particular agenda item 45.

- re specialists meetings see Actions 2-6 and 11-16. It was emphasized that the Data Centers should keep close contacts with Specialists Meetings: to prepare data compilations and retrievals for such meetings, and to obtain feedback from such meetings. At Conferences the Data Centers should aim at more publicity, in particular by means of panels.

- re the 1980 NRDC Meeting see Recommendations/Actions 111-114.

Mr. Pearlstein reported, that a workshop on fission spectrum data, held at LASL in October 1978, recommended that fission spectrum data should be compiled at the data centers as a basis for subsequent analysis and evaluation. See working paper 13 which can be found on page 20 of Appendix 9. See also Action 81.

Agenda item 31. CPND Bibliography

Mr. Burrows reports on the 1979 edition of "The Bibliography of Integral Charged Particle Nuclear Data" published by NNDC as BNL-NCS-50640. This CINDA-type document was much appreciated by the meeting. It was agreed that the format and contents, the publication schedule and the distribution of the bibliography on magnetic tape was very satisfactory and should continue as before. Mr. Burrows asked for assistance in detecting errors; Mr. Münzel said that he had already sent some comments concerning minor items, but that he was very satisfied with this CPND Bibliography, although its scope was somewhat larger than that of KACHAPAG. See Actions 41-44.

Agenda item 32. CPND exchange

About the present status of the CPND EXFOR file see the first part in the KACHAPAG Status Report (Appendix 6) and the statistics on page 4 of Appendix 7. It was agreed that KACHAPAG should continue to maintain the master file for integral CPND.

KACHAPAG had no technical problems with CPND Trans-Tapes received from NDS and CAJaD. The Trans-Tape from NNDC was received only recently before the meeting, so that comments on it were premature.

Considering the growing size of the KACHAPAG master file, it was found desirable that no longer the entire file be transmitted but rather only additions and changes (Action 70).

As KACHAPAG's data scope is restricted to integral CPND, and as other centers had started to compile integral and differential CPND, often in the same EXFOR entry, the need arose for an easy computer-intelligible flagging system for distinguishing between integral and differential CPND. This need coincided with a similar need to distinguish between experimental and evaluated data in Exfor, and a corresponding scheme of flags was designed. See EXFOR Conclusions 18-19.

Agenda item 33. CPND publications

During the Meeting the first copies of the KACHAPAG handbook for integral CPND were distributed fresh from the press, which was produced by FIZ from the KACHAPAG master file as Physik Daten/Physics Data 15-1. This most impressive application of the EXFOR system requires some feedback to the EXFOR compilers, in particular with respect to the style and structuring of the free text. See EXFOR Conclusion 30 and Action 71.

Mr. Münzel announced that this handbook of numerical ICPND will be continued and supplemented by a graphical part with excitation functions.

Mr. Burrows reported that NNDC plans a "barn-book" for light-element and neutron-source reactions including also positron reactions. Mr. Howerton will soon bring out an evaluation of fusion-relevant reactions within his UCRL-50400 series.

Agenda item 34. CPND - Miscellaneous

NNDC had prepared a compilation of presently known CPND activities in various countries (Memo CP-C/55, which was a continuation and completion of CP-D/81). See Appendix 11. Participants were asked to check this list and to send corrections and additions (Action 45).

Agenda item 41. CINDA

The Archival Issue CINDA-A was published in Spring 1979, continuing the literature up to 1976. The question was discussed, what to do with eventual corrections or supplements to CINDA-A.

It was concluded that the CINDA 79 Supplement book will be a Supplement to the Spring issue CINDA 79 and will exclude supplements and corrections to the Archival Issue. Such corrections and supplements will, however, be available by means of computer retrievals from the master file. (Action 101).

It was noted that Cinda contains too many thermal neutron data that relate to solid state physics rather than to thermal scattering law data for reactor physics, which is the only type of such data accepted in Cinda. (Actions 22 and 102).

For other CINDA matters see Actions 103 to 107.

Mr. Johnston reports on the CINDA programming done, which includes a revised exchange procedure between NEA-DB and NNDC. NNDC will now update directly the area-1 part of CINDA. NEA-DB will continue to update areas 2-4, for which the new coverage file was now completed.

Agenda item 42. WRENDA

The chapter about WRENDA of the NDS Status Report (Appendix 7, p. 7) was presented as well as the draft of the introduction to WRENDA 79/80 (meanwhile published as INDC(SEC)-73).

In the discussion about the use of WRENDA it was felt that this document continues to be important for smaller and for developing countries, as a country like the US has its own system of defining priorities for data measurements.

Agenda item 43. EXFOR (neutron data matters)

The neutron data specific items of the EXFOR system were discussed by the same EXFOR subgroup as formed for agenda item 4. The results are included in the "EXFOR Conclusions" and in the Actions 81-100.

Mr. Johnston reports that the conversion of the NEUDADA file into Exfor was nearly completed and most of the converted data were already transmitted. There remains a tape of NEUDADA data of USSR origin, which was sent to CJD for conversion into EXFOR. NEA-DB already reviewed these data and removed all of those which already existed in EXFOR. Therefore, the remaining data (about 200 data sets) represent real gaps in EXFOR.

Mr. Manokhin replies that this tape was just recently reviewed at CJD, and that his staff was studying the NEUDADA format. He had noticed, however, that many of these data were old and some of the references not correct, so that checking of the data will be difficult in several cases. However, CJD will transmit the data in EXFOR as soon as possible. See Exfor Conclusion 38 and Action 90.

Agenda item 44. Evaluated Data

Mr. Pearlstein announced the release of several parts of ENDF-B/5 and of the entire ENDF-B/4 Library (see above under agenda item 2). There was some discussion about the covariances file associated to ENDF-B/5, of which the documentation would become available soon. The evaluators of the covariances require, that Exfor data are compiled with more accurate information on errors, corrections and standards (MONITOR), as also discussed elsewhere in the Minutes.

After the free release of ENDF/B-4 it was questioned, whether the UKNDL could now also be released. The main reason for the fact, that some parts of the UKNDL could not yet be distributed freely, was that it contained ENDF/B-4 data, for which the release was restricted. NEA-DB will contact the pertinent UK authorities (Action 40a).

Mr. Manokhin announced, that USSR evaluations were now issued in ENDF/B format, and some had already been transmitted (Pu-241 from Konshin)

Mr. Lemmel reported about the EXFOR-V-series which was devoted to important evaluated data that were not part of one of the established libraries. He also reported about the Agency's coordinated research programme about the Intercomparison of Actinide Neutron Nuclear Data Evaluations. The participants from 9 countries had started to produce actinide evaluations, which NDS compiles in an IAEA Nuclear Data Library for Actinides - INDL/A. The present status of this library is documented in IAEA-NDS-12.

Compilations of various nuclear data libraries available at their centers were presented by NEA-DB and NDS.

Agenda item 45. EXFOR: data exchange and experiences

The quality of the EXFOR TRANS tapes had much improved due to the increasing use of more sophisticated check programs. Errors encountered were regularly communicated to the originating center, sometimes with the explicit request of transmitting the corrected data. Therefore, there was no need to discuss any specific point at the meeting, in addition to those items mentioned in the "EXFOR Conclusions".

Mr. Schmidt then presented a paper by A.B. Smith entitled "Provision of Compiled Neutron Data", dated 2 August 1978. (See working paper 82 = NDS Memo 363). It reviews the quality of data center services in various aspects:

1. Speed of Response: no criticism.

2. Completeness of Data Files: The completeness was found varying but sometimes unacceptable.

In this respect, the meeting agreed that the completeness of EXFOR has much improved during the last few years. The completeness checks made at NDS, which had in the past shown serious gaps in important areas, recently indicated satisfactory completeness.

3. Superseded Data Sets not always deleted: Centers should remove superseded data from the system.

In this respect it was pointed out that EXFOR provides two mechanisms: either to overwrite superseded data by their new version, or to keep superseded and revised data on file, however distinguishable by a person-intelligible and computer-intelligible STATUS code. This way is preferred in certain cases for valid reasons, and data requestors have the option to obtain retrievals including or excluding superseded data.

4. Units and Dimensionality: Uniform dimensionality was preferred.

This problem is well known by the data-centers, and the need for deriving unified output formats from EXFOR is recognized at all centers and largely taken care of. EXFOR, being an exchange format, had been kept flexible

in order to be able to transmit even unusual data without difficulties, to reduce error sources at compilation time and to send out "author-proofs" close to the author's original. These principles of EXFOR were still considered valid, and the production of output formats from EXFOR is considered responsibility of each center according to its **user needs.**

5. Formats: simple user formats were requested.

This is well recognized by the centers, and several simple "computation formats" exist or are under development. It is now the feeling that different "simple user formats" are required, such as the BNL-325 format for resonance-parameters, or others which serve as the basis for listing and plotting cross-sections as function of energy.

The other items mentioned in A.B. Smith's paper, concerning

6. Ratio Values

7. Multiple Emission Processes

8. Multiple Retrievals

can be regarded as solved by the advanced EXFOR system with its improved REACTION formalism, "Pointers", etc. The finally mentioned problems of improving the documentation in the data files of

9. Errors, and

10. Standards

are well recognized and were discussed at the meeting in detail. With respect to errors compare also agenda item 5.a.

In general, the neutron data centers are in a permanent dilemma resulting from the limited manpower available:

- either to have a high degree of completeness and no backlog at the cost of a poorer analysis of corrections, errors, standards, method etc.

- or to compile less data but with careful review of corrections, errors, standards, method etc, including questions back to the author about such items missing in the publications.

The meeting agreed that at least top priority data, in particular standards and recent precision measurements of other important data should be compiled in EXFOR with careful error specifications. The matter should be discussed also with experimenters and evaluators possibly at the next NRDC Meeting in Brookhaven.

EXFOR Conclusions

For items 1-26, the discussions followed the NDS Working Paper 23. It should be noted that this Working Paper emerged from personal records of H. Lemmel and therefore contains subjective remarks, some of which were superseded or clarified already before the meeting.

Items 27-40 were brought up by the other participants or arose during the meeting.

1. Reformatting of Dictionary 2

The proposal of CP-C/62 is adopted in principle. There remains an Action to NNDC to revise the proposal of CP-C/62 with respect to the following items:

- on the proposed page VII.11 add explanations for the codes "OBS" and "OCODE+"
- review carefully details of the proposed codes to be added in Dictionary 2, in particular
  - change the expansion of "REACTION" to (QUANTITY MEASURED)
  - check whether "RCODE" for the Keywords ASSUMED and MISC-COL and "OCODE" for the keyword STATUS are correct in view of the check-program envisaged by NNDC

After this review, NNDC will send the final revision to NDS for inclusion in Dictionary 2.

2. Re Dictionary 4

The Manual wording on page VII.11a should read:

Dictionary 4. Type of reference

This Dictionary has normal format except that cols 56-61 of the explanation field are reserved for the term "DICT n" pointing to the dictionary number n which contains the reference codes to be used with the given reference-type. Cols 56-61 are blank when no dictionary applies.

3. Nuclide checking, Dict. 27, short-living isomers

The proposal of CP-D/89 is adopted. The wording marked in this memo by two vertical lines is entered on page VII.15a. In contrary to the statement in CP-D/89 NDS can start immediately entering the new flag in Dictionary 27.

Mr. Johnston reported another example where the nuclide checking with respect to the isomer extension may occasionally fail. When for differential data a light particle is coded in SF7, one would not expect

an isomer coded in SF4 even if isomers were involved. - No solution was found for this case, and it was accepted that nuclide checking though useful in the majority of cases cannot be made perfect.

4. Superheavy Elements

Action on CINDA centers to introduce in the CINDA file and in the CINDA book programs the formalism agreed earlier for unnamed heavy elements, and to keep each other informed about the implementation.

Action on all to continue to watch decisions by international bodies. It was reported that IUPAC had recommended, though not adopted, a system of 3-character element names. For reasons of format restrictions, these appear unrealistic for adoption in CINDA or Exfor.

5. Lab Dictionary

Action on NNDC to propose a code for the lab mentioned in CP-B/29. Action on Kachapag to correct the respective entry which, as there was no response from NNDC, had to be coded with a preliminary adopted lab code. (Note by editor: This matter was solved by correspondence in Jan.1980.)

6. Reference Coding

a. The formalism of multiple reference- identifications in the form of

REFERENCE ((....)=(.....))

is permitted for reports with more than one report code, and from now on also for reports containing conference proceedings:

((S,report-code)=(C,conf-code))

In the Manual the wording of memo 4C-3/179 will be inserted in chapter VIII under REFERENCE/Reports. Under REFERENCE/Conference the following wording will be added:

If a conference also has a report code, both may be given. However, the report code must come first. These multiple references may be given within a set of parentheses connected by an = sign: ((S,....)=(C,.....)).
NOTE: The data centers should provide the users with an appropriate expansion of the conference code.

(Note added by editor: see Memo CP-C/68 where the same formalism was proposed to be used also in other cases such as as

- a report being at the same time a thesis;
- a journal article being at the same time a conference paper.

This proposal seems to be logical and an appropriate Manual wording should be agreed. - **After distribution of the Draft of these Minutes no objection was received, so that the more general use of this formalism should be regarded as adopted.**)

b. The rule proposed in CP-D/84 saying that in reference subfields "which may have any content" commas and parentheses are excluded, is adopted. It should be added to the Manual in the way proposed in CP-D/84.

7. Reference: double journal-issue numbers

It was agreed that no special rules should be introduced for this case. The wording in the Manual should follow the proposal of CP-D/84.

8. Reference: Manual wording for journals

The wording proposed in CP-D/84 was adopted.

9. Status codes

a. Re WDRN conclusions were reached before the meeting and the Dictionary and Manual were updated accordingly.

b. The code NDD was adopted.
Action on NEA-DB to submit a Manual wording for the meaning of this code.

10. Polarization fitting coefficients

The codes for Dictionaries 34 and 36 were adopted as proposed in CP-C/63. However, the dimension codes are "B/SR" instead of "NO".

Action on NNDC to propose a revised Lexfor entry on this topic avoiding the explicit REACTION product proposed earlier and to improve the existing Lexfor entry on "Polarization".

11. Average Resonance Parameters

It was agreed that the Manual entry for MOMENTUM should remain as it is. That is, it is not required to specify ℓ for average level spacing. There is an action on T. Burrows to investigate the meaning of average level spacing when no angular momentum is given. The Lexfor definition for "D" will be revised as to permit also "D" data without specification of "ℓ".

12. Reaction Rate

It was agreed that there is need to code "Reaction Rate" data. The coding as proposed in CP-C/64 was adopted.
The Lexfor entry on Reaction Rates as proposed in CP-D/82 page 4 was adopted, however the prescribed coding must be revised to follow CP-C/64.

13. Spectrum averaged data

The codes KT for spectrum temperature and EN-MEAN for the mean-spectrum energy are added to Dictionary 24. The code EN-DUMMY is kept; it will be used instead of EN-MEAN where the mean-spectrum is not known.

The Lexfor entry for spectrum average must be revised to include the prescription for use of KT, EN-MEAN, and EN-DUMMY. Also the entry for Fission neutron-spectrum averaged cross sections should be modified to be consistent with the modification of spectrum average.

14. Energies of gamma-lines

The proposal on this topic contained in CP-D/82 page 2 was not accepted and was withdrawn. It will be clarified in the dictionary 24 that the column heading E may define energy values of a continuous spectrum as well as discrete energies of gamma lines. Explanation can be given in the BIB-Section under EN-SEC.

14a. Quantum Numbers

It was noted that spin, parity and angular momentum column-headings as presently coded in Exfor, currently refer only to nuclear resonances. Spins and parities of excited levels should be quoted in free text.

Mr. Bychkov mentioned, that in the case of neutron scattering these terms may be needed also for levels of the residual nucleus. When such data are to be coded in Exfor, a corresponding Lexfor entry should be submitted.

These statements should be added in Lexfor under "Quantum Numbers".

15. Excited States

After discussion, the proposals in CP-A/14 and CP-C/66 were withdrawn. The general conclusions were:

1. The branch code "PAR" combined with the keyword "EN-SEC" provides an adequate description of excited states.

2. The use of a different formalism to describe excited states compared to metastable states would cause confusion.

P. Johnston pointed out that the coding string under the REACTION keyword should not be considered the only place to describe the reaction in detail.

(Note by editor. See Memo CP-C/68, which recommends: If data are to be coded which cannot be uniquely specified by REACTION and EN-SEC, the discussion should be reopened; such data should not be coded into the present format with only free text explanation.)

16. Fission Isomers

After discussion, the proposal in CP-C/66 was withdrawn. The general conclusions were similar to those for item 15. For fission isomers, information supplementary to the REACTION code can be coded under DECAY-DATA.

17. Double differential data

The code DA/DA as proposed in memo 4C-2/111 is added to Dictionary 36 with the additional comment that this is to be used only when it is obvious to which particles it refers, as is the case for the reaction (n,2n). In other cases, the pertinent particles must be specified in REACTION SF7. Explanation will be given in Dictionary 36 but may be added also in Lexfor under "Differential Data".

18/19. Flagging of Different Data Types

Re: CP-B/30 (Discrimination between integral/differential data)
CP-C/59 (Inclusion of evaluated data into EXFOR)
(similar proposal in CP-A/13)

It was concluded to introduce a flag on both the ENTRY and SUBENTRY level to easy search for and discrimination between different data types in addition to the already existing discrimination of incident particles by accession number series.

a. CPND, NND, Photo-ND will be discriminated by differing center identifications as well as differing entrynumber series (Partly modified later in the meeting, see item 36.) They will be maintained and transmitted on separate files/tapes.

b. Discrimination between entries containing experimental or mixed experimental/evaluated data:
NND Centers will continue to compile only experimental data.
CPND/Photo-ND Centers insert a 'V' (right adjusted) in subfield N3 (col 44) of the ENTRY record if REACTION SF9 in at least one of the SUBENTRIES contains -EVAL or
-RECØM

Field N3 is left blank if REACTION SF9 of all SUBENTRIES contains one of the codes

-EXP
-CALC
-DERIV
-blank

c. Discrimination of data types on the SUBENTRY level is performed via a fixed position flag in field N3 of the SUBENTRY record in the case of CPND and Photo-ND:
- differential CPND: 'D' in col. 44
- evaluated data
(EVAL in REACTION SF9): 'E' in col. 43
- recommended data
(RECØM in REACTION SF9): 'R' in col. 42

Other possible flags will be introduced as necessity arises. These flags are inserted by the originating centers. Kachapag will insert the flags for all already transmitted CPND entries to be included into its file.

Item b. will be added in the Manual on page III.5 under ENTRY - N3.
Item c. will be added in the Manual on page III.6 under SUBENT - N3.

(Note by editor. Memo CP-C/68 indicates that field N3 of the ENTRY record is used by NNDC internally. Until the time that NNDC will have adjusted their programs, any flags in N3 of neutron data entries will continue to be considered as free text. It is understood that NNDC will start using these flags for CPND.

As pointed out in CP-B/31, the use of 'D' flags as described above, implies that a subentry must not contain both differential and integral data. A 'D' flag in the SUBENT record of subentry 001 means that all subentries of the entry contain differential data.)

20. Half-lives

In the case that NDS continues to compile cross-section relevant half-lives in Exfor (presently Exfor-D6 series), these should be removed from the D-series. They may eventually be included in the V-series. Kachapag is interested in receiving such entries in listing form.

21. Nuclear Quantities

It was decided that the nuclear quantities compiled in neutron-Exfor continue to be coded in the form described in the beginning of memo CP-D/87. In the Manual it is added in chapter VIII under REACTION/Reaction Product, that this is another case where the Reaction Product is not coded in SF4.
Action to all neutron data centers to review their nuclear-quantity entries in particular whether the correct nucleus has been entered, and eventually correct them. Based on this experience, proposals for more specific intructions for compilers to be included in Exfor would be welcome.

In the Lexfor entry "Nuclear Quantities" the following is added:

"Subentries with nuclear quantities should, if applicable, obtain the STATUS code (DEP accession-number) where the accession number refers to the subentry containing the reaction data from which the nuclear quantity was derived".

This new rule is not obligatory for already existing entries.

22. Gamma and particle multiplicity

The proposal of CP-C/61 is adopted. The definitions and coding of nu-bar and eta as well as the Lexfor entry "Neutron Yield" should remain unchanged.
A new Lexfor entry "Multiplicity" should be formulated on the basis of CP-C/61

- with a cross reference to "Neutron Yield"
- with the rule added that ",MLT,N" is used only in case of non-neutron induced reactions
- with explanation added to define the term "partial multiplicity".

Action on NNDC to propose a final wording for this Lexfor entry.

23. Asymmetry

NNDC noticed that the previous use of ASY in Exfor often agreed with the Lexfor entry on polarization, but that this code was also used for "asymmetry of fission fragments".

Action on NDS to review Dictionary 41 and eventually correct it. The code ASY should be reserved to cases related to polarization.

Action on NDS to formulate a proposal for coding the asymmetry of fission fragments.

24. Decay Flag under PART-DET

Action: Kachapag will include in the next TRANS tape an entry with decay flags entered under PART-DET, this being an example which cannot conveniently be coded without this formalism.

Action on receiving centers to review this entry and eventually approve the formalism of decay-flags under the keyword PART-DET. *)

25. R-Matrix Resonance-Parameters

Action on NNDC to supplement their very good Lexfor entries on Resonance-Parameters by a chapter on the R-Matrix Resonance Parameters introduced by NNDC earlier.

Action on NDS to update the explanation of the corresponding quantity codes in the Dictionaries accordingly.

26. Distribution of CP-Memos

Memo CP-D/78 on this topic was adopted. Subsequently it was suggested to increase the distribution by including also Prof. Ishkhanov, Head of Photonuclear Data Center, Centr Dannykh Fotojad. Eksp., Nauchno-Iss. Inst. Jad. Fiz., Moskovskij Gos. Universitet, Leninskije Gory, Moskva, USSR.

*) Note by editor: Memo CP-B/31 mentioned that in TRANS B008 a sample entry of this type was included and that no response was received. Kachapag therefore assumes that no centre had problems with this formalism. It is therefore hoped that the matter is solved.

The following items were discussed in addition to those mentioned in Working Document 23.

27. Multiple Monitors

The case presented by NNDC in Working Paper 27 was recognized as a case presently not foreseen in Exfor.
It was emphasized that the coding of Monitors is very essential for the purpose of automatized renormalization data. It was decided however, that cases as complex as the one presented, will not be suitable for automatized renormalization, and that therefore it is sufficient to code such cases in free text if a coding is not possible within the present rules. It was agreed that the present rules should not be changed.

28. Forbidden combinations of Keywords

It was found that the computer programs at the NND centers are not disturbed if old and new keywords show up together in the same subentry. Therefore page VIII.5 of the Manual about "Forbidden Keyword combinations" is cancelled. Some corresponding changes may be needed elsewhere in chapter VIII.

For retransmissions of old entries it remains desirable that these are fully converted to up-to-date Exfor. However, for practical reasons, corrections of old Exfor entries resulting in a mixture of old and new keywords are acceptable.

29. Spin Projection Data

Re CP-D/71 it was agreed that such data may be compiled in Exfor, with the REACTION specification supplemented in free text.

(Note by editor: See comment in Memo CP-C/68 requesting further clarification.)

30. Text editing

Mr. Klewe reported that for the printed version of Kachapag it is desirable to edit the free text of Exfor, which is limited to 55 characters per line, to longer lines. This is easily possible except for cases where the "free text" in Exfor is structured. Consequently, Kachapag will develop a mechanism to flag such structured text in order to exclude it from the editing mentioned above.

Action on Kachapag to communicate to the other centers their solution of the matter. The other centers feeding into the Kachapag master file may then proceed in the same way if they so decide.

31. Ion charges for fission-products

New data may demand a new column heading for ion charges of fission-products. Proposals should be submitted whenever a center wishes to compile such data.

32. Error analysis

Action on all to instruct their Exfor compilers to continue to give great care to compiling complete information on CORRECTION and ERR-ANALYS, for the benefit of data users, in particular data evaluators. Compilers should also be encouraged to add comments drawing the attention of Exfor users to any deficiencies in the quality of the data, if such information is available to the compiler.

It was recognized, that in view of the improving data processing facilities, it becomes more and more desirable to make the definition of error-types computer-intelligible, in particular with respect to systematic or statistical errors, and whether 1, 2 or 3 standard deviations are meant. A possible formalism could be:

```
ERR-ANALYS (DATA-ERR1,1SIG,STAT) free text
           (DATA-ERR2,1SIG,SYST) free text
```

It was recognized that such computer-intelligible error definition would be possible only in a small fraction of the cases, however, this may nevertheless be useful.

Action on all to consider this item, eventually try out practical examples at their centers and submit proposals.
It was also suggested that eventually a computer-intelligible flag could be introduced as a warning in case of data that should not be used without consideration of special remarks given in the free text.

It was found desirable that important remarks on the quality of the data should be given in a more standardized position of the BIB-Section, as they can be found presently under REACTION, CORRECTION, ERR-ANALYS, STATUS, COMMENT, METHOD and elsewhere. However no solution was found.

33. Feedback from evaluators

Action on all to encourage compilers to include in Exfor critical remarks on the Exfor data by evaluators.

Several possibilities are given:

- to use the keyword REL-REF
- to add the evaluator's revision of the data in the free text but leaving the original DATA Section unchanged
- to add an additional subentry containing the evaluator's revision, using the existing pair of STATUS codes OUTDT,RNORM

If different evaluators came to different results, of course both can be mentioned.

34. Dictionary 41

None of the NND centers intends a systematic conversion of old ISO-QUANT entries to REACTION formalism. This requires that dictionary 41 is complete with respect to all ISO-QUANT quantities existing in the files.

Action on NEA-DB to send to NDS a list of quantities they found missing in Dictionary 41.

35. USSR Photonuclear Data Center

On page IX.8 of the Manual it should be added that the USSR Photonuclear Data Center will be provided with magnetic tapes with data or dictionaries through CAJaD resp. CJD. The address which is to be added on page IX.6, is:

Prof. Ishkhanov, Head
Centr Dannykh Fotojad. Eksp.,
Nauchno-Issl. Inst. Jad. Fiz.
Moskovskij Gos. Universitet
Leninskije Gory, Moskva, USSR

36. Accession Numbers

The first digit (character) of the accession-numbers is to specify the originating centre and the incident particle.
The Photonuclear Data Center Moscow is suggested to use the character "M". NNDC will tentatively use the character "U" for the next revision of the Berman photonuclear data library to be transmitted soon.
Above text is to be added a page II.2 of the Manual.

37. NSDD

The principle was recognized that those NSDD that exist in Exfor are only in support of the reaction data.

38. USSR NEUDADA data

Action on CJD to compile in Exfor from the USSR NEUDADA data received from NEA-DB, those which are still important.
It was recognized that some of these data are old and can perhaps not be verified any more. In this case the data can eventually be taken as given in NEUDADA, using the STATUS code NDD.

It was noticed that some of the references in NEUDADA were wrong and that these data would probably be dropped.

39. Raw data

Action on NNDC to communicate in a CP-Memo their practice of headings at the top of raw data files supplementary to the Exfor data. Eventually one could then agree on a common format for such headings, which would make storage, retrieval and correlation of such data with Exfor easier.
Centers are encouraged to store "raw" data, according to the rules given in Lexfor under "NODATA" and "Raw Data".

40. CPND TRANS tapes

The centers receiving Kachapag tapes expressed their preference to receive, instead of the complete Kachapag file, only the entries that are new or revised since the last transmission.

Action on Kachapag to aim at implementing this, and to inform centers when they are ready.
Only at a later stage Kachapag will investigate to change over to tape transmission procedures identical to those among NND Centers.
Page IX.3 of the Manual must be kept up-to-date as matters develop.

41. Reaction Product

- Add in the Manual in chapter VIII under REACTION/Reaction Product to the definition of the Reaction Product:

  "In the case of two reaction products with equal mass, that one with larger Z is considered as the "heavier" product to be considered as "Reaction Product" in SF4".

- The formalism of coding "0-G-0" and "0-NN-1" is added in chapter VIII under REACTION/Reaction Product. As "0-G-0" anyway required exception programming, it is not intended to add it to Dictionary 27.

42. Magnetic tape formats

On page IX.8 of the Manual the acceptable tape densities are changed as follows:

NNDC	800, 1600, or 6400 bpi
NEA-DB	800 or 1600 bpi block size less than 3000 char.
KaChaPaG	1600 or 6400 bpi preferred, 800 bpi acceptable

Actions

These actions resulting from the Meeting are grouped as follows:

1. - 7.	Actions resulting from the Centre Head Discussions
11. - 29.	Miscellaneous actions, a) relevant to all centres
31. - 40.	b) relevant to neutron data centres
41. - 47.	CPND actions
51. - 54.	Actions about photonuclear data
61. - 79.	EXFOR actions, a) general
81. - 100.	b) relevant primarily to neutron data centers
101. - 107.	CINDA actions (relevant to neutron data centers only)
111. - 114.	Recommendations about the 1980 NRDC Meeting

Note: A number in parentheses in the column headed (cont) refers to a continuing action from the 1978 NRDC Meeting.

Actions resulting from the Centre Head Discussions

Nr.	Who?	What?
1.	Pearlstein	modify protocol so that reference is made to the EXFOR Manual concerning the exchange of evaluated CPND (Compare Actions 28 + 29)
2.	Pearlstein	include information on the planned IAEA Consultants' Meeting on Neutron Source Properties, 17-21 March 1980, Debrecen, Hungary, in the next edition of the NNDC Newsletter
3.	Münzel	send more detailed information on the planned Conference on "The Use of Nuclear Methods in Material Science", Frankfurt, FRG, to the other centers
4.	NDS *	inform NNDC and CAJaD about the charged particle neutron source reactions to be discussed at the Debrecen Meeting on Neutron Source Properties and provide such data compiled at NDS available to NNDC and CAJaD.
5.	NNDC, CAJaD *	compile with preference charged particle neutron source reaction data as specified in the last action and send them to NDS in time before the Debrecen Meeting
6.	NDS	produce a CPND index of the Debrecen Meeting Proceedings and send it to NNDC

*(Note by editor: Due to shortage of time this could not be done before the meeting. However, priority reactions as defined at the meeting will be communicated.)

Nr.	Who?	What?
7.	Tubbs	send one copy of the Proceedings of the Data Base Management Systems Study to both FIZ and NDS

Miscellaneous Actions

Nr.	Who?	(cont)	What?
11.	All Centres	(24) (82)	Provide a list of their intended meetings, that they know are planned before the end of 1980 (re NDS see attachment to Appendix 7)
12.	NNDC	(31)	Distribute the report of the Panel on Reference Nuclear Data
13.	NDS	(85)	Observe the developments of the INFCE Study and review consequences for data services
14.	All Centres	(12)	When centre staff attend specialists' meetings, collect and distribute papers relevant to other Centres' interests
15.	All		Inform other centres about availability or expected availability of new Conference Proceedings and how to obtain copies; possibly try to provide data centers with copies free of charge
16.	NEA-DB	(83)	Distribute the NEACRP/NEANDC high priority request list at the appropriate time
17.	All Centres	(2)	Inform other Centres about documentation of evaluations, and about evaluations and comparison of available evaluations in progress within the Centre's area
18.	All Centres	(3)	Try to obtain feedback from users about the Status and quality of evaluated data files
19.	All Centres	(4)	Provide other Centres with information about types of data - that should be assigned priority, - and those that are rarely or never requested
20.	All Centres	(10)	Inform other Centres when initiating a data review or special purpose compilation, so that appropriate data may be trasmitted with priority
21.	All Centres	(7)	Notify the other Centres of the existence of specialized compilations in any format
22.	Behrens		to summarize which data compilations exist for thermal neutron data in solid state physics, etc., and to send this to the Four Neutron Data Centers

Nr.	Who?	(cont)	What?
23.	NNDC		To summarize the present status of documentation, formats and codes of ENSDF and to make the material available to the NRDC network
24.	All Centres	(30)	Provide to the other Centres short reports on their experiences in development of Data Base Management Systems
25.	NNDC		Investigate whether the users of the EXFOR Manual can be supported by an automatic look-up aid
26.	Tubbs		Supply information about the CODATA Generalized Data Exchange Format
27.	All Centres		To continue to contact journal editors, references, supervisors of research contracts, and experimenters to the effect that data not numerically published be submitted to the data centers. Journal editors should also be influenced to the effect that all necessary details about the experimental description be included in the journals
28	NNDC		To distribute a revised Protocol as discussed in the Meeting (Note by editor: This revision, as received in December 1979, is included in this document as Appendix 12)
29	Others		To comment on the Protocol resulting from the preceding action

Miscellaneous Actions

relevant to neutron data centres

31.	NDS	(19)	Send 10 copies every 6 months of the updated lab. and ref. dictionaries to NEA-DB for the external CINDA indexers
32.	All Centres	(21)	Each Centre should try to make completeness checks on those data considered important by the Centre, and report the results to the other Centres
33.	All Centres	(23)	Give high priority to compilation of data relevant to proposed Specialists' meetings
34.	NNDC		To distribute the final version of working paper 19., which included preliminary versions of: - M.R. Bhat: Report on Standard Reference Data - N.E. Holden: Status of the Fundamental Constants

Nr.	Who?	(cont)	What?
35	All Centres	(95)	Send to NDS information concerning new references to compilations and evaluations on fission product nuclear data, for inclusion in the fission product compilation list.
36.	NNDC	(97)	Send to the other Centres the updated ENDF/B-5 fission product nuclear data library
37.	CJD	(87)	Contact Dr. Majorov at the Kurchatov Institute concerning documentation of thermal group cross sections, and send this documentation (FEDGROUP) to NDS
38.	NDS	(88)	Arrange translation of the thermal group cross section documentation and publication as an INDC report
39.	Tubbs		Try to obtain a Harwell Conference Proceedings for CJD
40.	NNDC		To provide their standard way of referencing ENDF/B data for inclusion in the Minutes of this meeting. (Note by editor: See Appendix 10)
40a	NEA-DB		To contact UK authorities for obtaining the permission for the free release of the entire UKNDL, as ENDF/B-4 is now freely available.

CPND Actions

41.	NNDC		To provide CAJaD with a list of USSR references presently included in the ICPND Bibliography
42.	CAJaD		To check that the ICPND Bibliography becomes more complete with respect to USSR and Dubna literature
43.	All		To send comments to NNDC about the tape format of the CPND bibliography
44.	All		To inform T. Burrows about any errors or other imperfections found in the contents of the ICPND Bibliography
45.	All		To review the NNDC compilation of CPND activities (see Appendix 11) and submit additions or revisions to NNDC
46.	NNDC		Subsequent to the result of the preceding action to distribute an updated version of the list of CPND activities
47.	KaChaPaG	(34)	Make the results of INIS cross checking for CPND available to the other Centres when available

Actions about Photonuclear Data

(Compare also Exfor Conclusions Nr. 18, 35, 36 and Recommendations 111-114 about the 1980 NRDC Meeting)

Nr.	Who?	(cont)	What?
51.	NNDC	(36)	To transmit the nes Berman library, when this becomes available, in Exfor format to the other centres
52.	USSR		The Meeting recommends the continuing contribution of the USSR into Fuller's Photonuclear Bibliography
53.	CAJaD, CJD		To continue contacts with the Moscow Photonuclear Data Centre;
			to stimulate the use of EXFOR for the compilation of photonuclear data;
			to assist the Ph.N.D.C. in the programming and use of the EXFOR system;
		(35)	to keep the other Centres informed of the progress made
54.	CAJaD and other Centres		For the time being, magnetic tapes for or from the Ph.N.D.C. should be sent through Dr. Chukreev

EXFOR actions, general

61.	NNDC		To update the EXFOR Manual (including Protocol and Lexfor) according to the "Exfor Conclusions"
62.	NDS		To update the EXFOR Dictionaries according to to the "Exfor Conclusions"
63.	NDS	(32)	Distribute a letter recommending the use of EXFOR as the compilation format for independent compilations
64.	IAEA KaChaPaG NEA-DB		To continue contacts with the Japanese Study Group with the goal of getting the EXFOR data exchange started; in particular to study the compatibility between NRDF-2 and EXFOR, and to study which data compiled at NRDF-2 have so far not yet been defined in EXFOR

(Compare also the "Actions about Photonuclear Data", to stimulate the use of EXFOR for photon-induced reaction data)

65.	NDS	(8)	Inform interested Centres of any significant changes in EXFOR

Nr.	Who?	(cont)	What?
66.	All Centres		If interested, send to NNDC specifications what statistical information is desirable to have about the Exfor data exchange
67.	NNDC		To investigate the possibility of producing regularly such Exfor statistics as requested in the preceding action
68.	All Centres		Inform the other centres about any changes in acceptable tape formats (compare Exfor Manual page IX.8 and Exfor Conclusion 42)
69.	All		Send to other centres representative samples of their special formats derived from EXFOR, i.e. edited format, computation format, format with data points merged by energy
70.	KaChaPaG		To aim at transmitting only new or revised entries (see Exfor Conclusion 40) (Note by editor: started with TRANS B008 of 79/11/29)
71.	KaChaPaG		To inform the other centres of their machanism to distinguish in computer intelligible form between structured and unstructured free text (see Exfor Conclusion 30)
72.	All		To consider the need and possibilities for specifying types of data-errors in computer-intelligible form and to submit proposals (compare Exfor Conclusion 32)
73.	All		To encourage Exfor compilers to include in Exfor critical remarks on the Exfor data by evaluators (see Exfor Conclusion 33)
74.	CAJaD (and/or NDS)	(29)	Prepare a LEXFOR entry defining data for which Monitor is not relevant
75.	All Centres	(1)	Review the EXFOR Lab. dictionary and provide NDS with information and cross-references about related Lab. codes for inclusion in the dictionary
76.	NNDC		To revise the proposal of CP-C/62 concerning Dictionary 2 (see EXFOR Conclusions Nr. 1)
77.	All Centres		To continue to watch decisions about naming of superheavy elements and communicate to other centres eventual implications on nuclide-coding in EXFOR (see EXFOR Conclusions Nr. 4)
78.	NNDC		To propose a final wording for the Lexfor entry "Multiplicity" (compare Exfor Conclusion 22)

Nr.	Who? (cont)	What?
79.	Centres receiving the KaChaPaG tape	To review and eventually approve the formalism of decay-flags under the Keyword PART-DET (compare Exfor Conclusion 24)

EXFOR actions

relevant to neutron data centres only

81.	Neutron Data Centres	To compile fission spectrum data in EXFOR with priority
82.	NEA-DB	To submit a Manual wording for the Status code 'NDD' (see Exfor Conclusion 9.b)
83.	NNDC	To propose revised Lexfor entries on "Polarization" and related fitting coefficients (see Exfor Conclusion 10)
84.	T. Burrows	To propose a revised Lexfor wording fo the "average level spacing", and distinguish the cases when this is given with or without specification of "ϱ".
85.	Neutron Data Centres	To review their entries of nuclear quantities and revise them according to the agreed rules (as confirmed or modified in Exfor Conclusion 21)
86.	NDS	To review Dict. 41 with respect to the code ASY, and to formulate a proposal for coding the asymmetry of fission fragments (compare Exfor Conclusion 23)
87.	NNDC	To add the R-Matrix Resonance Parameters to their Lexfor entries on Resonance Parameters (compare Exfor Conclusion 25)
88	All	To submit proposals for coding ion charges of fission-products, but only when such data are to be compiled (see Exfor Conclusion 31)
89.	NEA-DB	To send to NDS a list of quantities they found missing in Dictionary 41 (see Exfor Conclusion 34) (Note by editor: Partly done in letter of January 1980)
90.	CJD	To compile in Exfor the USSR NEUDADA data received from NEA-DB (see Exfor Conclusion 38)
91.	NNDC	To communicate in a CP-Memo their practice of headings at the top of raw-data files supplementary to Exfor (see Exfor Conclusion 39)

Nr.	Who?	What?
92	All	To send to other centers a list of "unobtainable" data sets for presentation to appropriate data committees
93	All	To provide organizers of specialists meetings with pertinent data retrievals, have them checked for completeness and communicate the gaps found to the other centers for fast compilation
94	NNDC	The same re the NEANDC sponsored meeting on important fast neutron capture cross-sections of fertile and fissile nuclides
95	NNDC	To check whether all experimental data that went into the ENDF/B-5 Standards file and its documentation, exist in EXFOR; communicate gaps found to the other centers for speedy compilation of these data
96	All	To give preference to verify the EXFOR completeness of the standard reactions and give special emphasis to their error specifications
97	All	To collect users' comments on EXFOR
98	All	To exchange users' documentations on EXFOR and its output formats
99	All	To report at the next meeting about users' difficulties with EXFOR, its output formats and their documentation
100	NDS	To draft a reply to A.B. Smith's paper

CINDA actions

relevant to neutron data centres only

Nr.	Who?	(cont)	What?
101.	NEA-DB		To exclude from the CINDA 79 Supplement book corrections or revisions to CINDA-A (Note by editor: done)
102.	All Centres		To advise their Cinda coworkers that thermal neutron data included in Cinda are restricted to data related to the Thermal Scattering Law of materials used in reactor physics. For other fields of physics working with thermal neutrons, Cinda indexers and Cinda users (by a note in the book introduction) should be referred to the compilations made known by Action nr. 22
103.	All Centres	(56)	Retransmit all entries for CINDA with the neutron as a target and index relevant EXFOR data
104.	NEA-DB, NDS NNDC		To introduce in CINDA file and book the formalism agreed earlier for unnamed heavy elements (see EXFOR Conclusions nr. 4)
105.	All Centres		To comment on the desirable contents of CINDA 80 with respect to filling eventual gaps, correcting errors, adding of Exfor index lines, etc., for pre-1976 Cinda entries
106.	NEA-DB		To distribute the proposed CINDA Manual update pages with the correction on page II.10.7 that under ref-type T only the name of an author is permitted. A retrieval should be prepared of all entries that have a report code entered under ref-type T; if these entries disturb the system, they should be corrected
107.	NEA-DB	(57)	Send the CINDA profile for INIS retrievals to NNDC and CJD

Recommendations about the 1980 NRDC Meeting

Nr.	Who? (cont)	What?
	The Meeting recommends . . .	
111.		that the Photonuclear Data Centres of Moscow and NBS be represented at the next NRDC- Meeting in the US
112.		To add to the agenda of future NRDC-Meetings direct discussions with experimentators and data users, and to hear their comments on EXFOR
113.		To have at the next meeting special topical discussions in addition to the normal agenda on data-center business
114.		That the next NRDC Meeting be held at the Brookhaven National Laboratory in the week 29.9 - 3.10.1980

A P P E N D I C E S

See page 3. for the Table of Appendices included in this document.

List of papers submitted to the Meeting

Note: The papers marked with an asterisk are included in the appendices of the present document. Copies of the others can be obtained, upon request, from the originator or from NDS

1. * Progress Report NEA-DB, see Appendix 8
2. Flow-Chart NEA-DB
3. Information Sheet "NEA-DB"
4. Computational Formats (Tubbs)
5. * Progress Report NNDC, see Appendix 9
6. * Kachapag Status Report, see Appendix 5
7. * CAJaD Progress Report, see Appendix 2
8. * NDS Status Report, see Appendix 7
   including: Nuclear Data Newsletter, issue 1
9. * Status Report of Japanese Study Group, see Appendix 6
10. Japanese CPND Compilation - BIB List
11. * CJD Progress Report, see Appendix 3
12. * Symposium on Neutron Cross-Sections (10-50 MeV), Brookhaven, May 1980
    Agenda see Attachment to Appendix 9
13. * NNDC: Fission Spectrum Data. See page 20 of Appendix 9.
14. V. McLane: Computation Format for NNDC Data Retrievals
15. V. McLane: Memo X-4 - 79/10
16. NNDC: Chapter 1, EXFOR Systems Manual (produced by a text processor)
17. C. Dunford: Implementation of Data Base Management Software at NNDC
18. NNDC: Sample Plots
19. Preliminary: M.R. Bhat: Report on Standard Reference Data (Introduction only) and
    N.E. Holden: Status of the Fundamental Constants
20. Information Sheet: Physik Daten
21. * Progress Report FIZ, see Appendix 4
22. Information Sheet: NNDC
23. NDS: Selected Exfor matters for discussion
    (Note: This is a copy from a private working file, which includes personal remarks that should be ignored. This file also includes some superseded items that were solved or clarified short before the meeting)
24. NDS: Selected matters for discussion
25. * NEA-DB: Customer services (Request statistics), an
    Attachment to Appendix 8

26. NNDC: Available tape formats
27. CP-C/28: Multiple Monitors
28. N. Tubbs: Syntax of EXFOR
29. Developments in Scientific Data Exchange
30. NEA-DB: Proposed CINDA MANUAL pages
31. Nuclear Data Computer Files available from the NEA-DB
32. NDS-Memo 363. A. Smith: Provision of Compiled Neutron Data (1978/8/2)
33. Draft for a revised Protocol (dated October 1979)
34. B.A. Magurno: Status of data testing of ENDF/B-5 Reactor Dosimetry File
35. Physik Daten/Physics Data Nr. 15-1 and Nr. 15-Index (1979): Karlsruhe Charged Particle Reaction Data Compilation, Entry 1-35
36. Information Services. FIZ, March 1979

CAJaD progress report.

The work I am going to report on was performed from May 1978 to September 1979 in CAJaD.

1. During this period the tapes A001,A002 with digital data for 25 papers, were sent. At present 60 more papers are being compiling. In compiling papers we do our best to find out all data, not only integrated ones as we beleive, that in future not only integrated data will be required. Therefore compilation takes more time, than we thought before. Besides, some delay in sending extracted data results from the fact, that we try to receive author's proof. We all know, that publications in journals have many misprint. It is impossible to correct all these misprints without the help of the authors. Unfortunately,I must say that it takes more time to receive author's proof, that I believe before. Nevertheless, we shall continue to cooperate with our authors in preparing compilations.

2.During this period we continued to improve checking programmes. I hope, that in future, we shall avoid making format mistakes noticed for the tape A001 by G.Lemmel.

3.During this period a new Photonuclear Data Center was opened at the Moscow University. It began to compile papers, published in Soviet journals, in format "Generalized EXFOR".

4.We are beginning to calculate integral cross sections for (p,xn) and other reactions at the energies greater than 20 Mev. We are going to systematically compare calculated and experimental data. I hope that we shall receive information to update the library "STARTER", prepared by S.Pearlstein for NNDC USA.

5. From May 1978 CAJaD answered 70 requests on charge particles nuclear data.

THE CJD PROGRESS REPORT

V.Manokhin, V.Bychkov

1. After the last NRDC Meeting in Paris (June 1978) CJD transmitted to other centres magnetic tapes TRANS 4033 - 4035 containing 64 entries, and magnetic tape with the corrected entries from TRANS 4029-4031. 50 works are in the process of compiling. The number of the works transmitted is 80% of the number of the works to be compiled.

2. CJD completes the work on a development of the evaluated data library of the threshold (n,p),(n,α),(n,2n) reactions for all stable isotopes in the incident neutron energy range from the threshold up to 20 MeV. A description of the evaluation for nuclei with $Z \geqslant 20$ including the excitation function curves and the tables of the recommended cross sections for the 14-15 MeV incident neutron energy have been published in "Nuclear Constants" (Issues 1(32), 2(33), 3(34) of current year).

3. A new version of the evaluated nuclear data file for natural iron (File number 2012) has been developed in cooperation with the Physics Section of the Technical University of Dresden. A description of the evaluation will be published in "Nuclear Constants".

4. CJD together with other coworkes from FEI carried out the work on the determination of nuclear data requirements for the transactinide burn-up and build-up calculations in fast reactors.

5. In CJD as before a great attention was paid to the development of theoretical methods of cross section calculations. A new method of the description and systematization of nuclear level densities has been developed. The level density modification influence on nuclear cross sections of various reactions have been investigated. A new method of description of the hard part of the neutron spectra from the (n,n'),(p,n) reactions in terms of the direct process theory has also been proposed.

6. The full evaluated data files for ^{241}Pu and ^{242}Pu have been received from Minsk (Institute of Heat and Mass Transfer). The files are in the process of cheking.

7. After the last centre meeting the issues of "Nuclear Constants" No. 28-34 have been published. During the period of June 1978-June 1979 CJD answered about 120 requests an nuclear data.

Anp.4
FIZ

10.10.79

FACHINFORMATIONSZENTRUM ENERGIE PHYSIK MATHEMATIK

Status Report

H. Behrens

1. Introduction

As you may know the Fachinformationszentrum is something like a National Information Center responsible for the field of energy, physics and mathematics. Data compilation and evaluation is, therefore, only a part of our activities. These activities in data compilation and evaluation are, on the other hand, directed to the whole field of physics and to some special fields of energy. Because of the scope of this meeting I will, however, restrict myself to those topics which are of relevance for the discussion here.

2. New Data Compilations

The following issues in the series Physics Data were published in the meantime:

3-3 (1978) : Datensammlungen in der Physik. Data Compilations in Physics.
H. Behrens, G. Ebel. 74 pages.
Supplement to No. 3-1 and 3-2 containing about 35o further references to tables and compilations.

1o-1 (1978) : Graphs of Neutron Cross Sections of Fission Product Isotopes from FPLIB 65/ENDF/B-IV.
M. Mattes

11-1 (1979) : Nucleon-Nucleon Scattering Data.
J. Bystricky, F. Lehar

12-1 (1979) :Handbook of Pion-Nucleon Scattering.
G. Höhler, F. Kaiser, R. Koch, E. Pietarinen

13-1 (1979) :Evaluation of the Cross Sections for the Reactions $^{24}Mg(n,p)^{24}Na$, $^{64}Zn(n,p)^{64}Cu$, $^{63}Cu\ (n,2n)^{62}Cu$ and $^{9o}Zr(n,2n)^{89}Zr$.
S. Tagesen, H. Vonach, B. Strohmaier

14-1 (1979) : Compilation of Data from Hadronic Atoms.
H. Poth

15-1 (1979) : Karlsruhe Charged Particle Reaction Data Compilation
15-2 (1979)
15-Index (1979) H. Münzel, H. Klewe-Nebenius, J. Lange, G. Pfennig, K. Hemberle,
Loosleaf-Collection, ca. 1200 pages.

3. Bibliography of Existing Data Compilations

As mentioned under 2 a further supplement (Physics Data issue 3-3 1978) has been issued to this worldwide survey of all existing physics data compilations, and another supplement is in print.

4. Charged Particle Reaction Data Compilation

A printed version (Physics Data 15, 1979) of the Kachapag Charged Particle Data Compilation (Institut für Radiochemie of the nuclear research center) has been published in the meantime. A corresponding computer routine for the phototype setting of the data from the Exfor format has been developed for that purpose.

5. The Evaluated Nuclear Structure Data File (ENSDF)

The contribution of the Fachinformationszentrum Energie, Physik, Mathematik to the international collaboration in the evaluation of nuclear structure data (ENSDF) was earlier reported. In the meantime the data on mass chain A = 86 have been published (J.W. Tepel, Nuclear Data Sheets 25 (1978) 553) and on two further chains, viz. A = 84 and 87 are in print and are to appear in Nuclear Data Sheets. Data on three further mass chains, viz. A = 85, 91 and 92 have been completed.

The bibliographic data file associated with ENSDF, the "Nuclear Structure References" of NSR, is implemented on our computer and enables us to decode references appearing in the ENSDF-file. The programmes needed for this operation were developed.

Several data analysis programmes (ADINF, LEVINF, OLGA) were developed at the Fachinformationszentrum Energie, Physik, Mathematik and programmes from Oak Ridge (MEDLIST, ANCOR, ADOPFIT, COMPARE, DATACK, GBRANCH, TRANLOC) were adapted to our Siemens 7.760 installation.

Status Report

of

Japanese Study Group

to

the Fourth Consultants' Meeting of NRDC

Karlsruhe, 8-13 October, 1979.

1. Data compilation has been started by the use of NRDF-2, which is a strage and retrieval system designed for CPND.
2. The plan of the Study Group is to compile CPND produced in Japan, as mentioned in the status report of 1976. As the first step the Study Group will compile those published in recent six years since 1973 to 1978. "Atomic Data and Nuclear Data Tables" and "Nuclear Data Sheets" are used for the survey of the data as well as the annual reports from active institutions. Thus the data file includes not only CPND published in scientific journals but also those appearing in the internal reports.
3. As for the formers the Study Group compiled 57% of them at the end of September 1979. It will cover 70% at the end of 1979
4. The source data coded in NRDF format will be available in the form of MT on the demand of the data center or the alternatives, but not of individual persons. A transformation program from NRDF-2 to the Generalized EXFOR and vice versa is not yet available. It will be prepared after summarizing discussion of the compilation experiences at an appropriate occasion.

5. Activities of CPND compilation are not yet put on a firm base, although efforts to establish Japanese data center for CPND are eagerly continued to the government.

KaCHaPaG Status Report

1. Compilations

During the last year the charged particle reaction file has grown up to about 1600 reactions from which about 150 originated from CaJad/Moscow and about 140 from NDS/Vienna. From these, about 50 new reactions were transmitted in TRANS A002 and about 130 in TRANS D002 + D003. KaChaPaG himself added about 500 new reactions since the last meeting.

It should be mentioned that the recently transmitted entries from CaJaD and NDS are not yet included in the master file, since they contain several subentries with differential data. In our last memo, we proposed a procedure how to include these subentries into the file by adding a flag for easy identification. If there is no general agreement to this proposal, we should discuss the problem at this meeting to find a solution.

Two transtapes have been sent out according to the usual schedule.

During the last half year the output of compilations was slightly reduced, since our group was and is strongly involved in

- preparing the printed version of the KaChaPaG-file,
- preparations for the planned graphical representation
- investigations about the systematics of excitation functions,
- preparing the new edition of the Karlsruhe Chart of Nuclides,

all without additional manpower. With the beginning of 1980, however, an additional full-time compiler will be available due to the help of the Fachinformationszentrum; thus, a real improvement of the manpower situation is expected.

2. EXFOR System

Due to the Paris agreements to the most important pending problems, fortunately the situation in the EXFOR system was in our opinion relaxed during the last year. As far as we see, there are only minor problems at least from the charged particle point of view which still have to be discussed or are yet pending.

However, some trouble arises from the fact that there is no completed and unified version of the manual available. We are yet working with two from time to time supplemented versions of this very important tool.

3. Printed Version of the KaChaPaG File

The preparation of the printed version of our ICPND file has grown up in the last months to nearly a full time job. A lot of bigger and smaller problems had to be solved preventing us from getting finished within the planned time. In the meantime, the index-volume is ready and the first data-sheet volume containing 380 sheets will be presented on this conference, I hope tomorrow. The second volume with further 400 sheets is in print and will be available within the next 4 weeks.

4. Book of Diagrams

A lot of time has been spent in the past with internal discussions and preparatory work for our planned book of diagrams i.e. an extensive graphical presentation of excitation functions and their systematics. I want to give a short impression of the goal of this compilation as we see it up to now.

In our opinion it is not sufficient for a large percentage of users of cross section compilations to be provided only with the anyway restricted set of experimental data, even if all of them would have been compiled. There will always remain a lot of gaps for which experimental data are missing, by what reason ever. These gaps should be filled at least by any kind of predictions which can provide the user whith an idea of what he should expect when planning an experiment with an unknown reaction. Thus, the final goal of this graphical compilation will be to provide experimental and predicted excitation functions for all reactions which are physically and practically reasonable.

The basis for all kinds of systematic predictions is a most general and good quality set of experimental data. One of our basic intentions, when we started ICPND-compilations at KaChaPaG, was, therefore, to make these data available for our future work on systematics.

The extrapolation to unknown data sets can be performed on several stages of quality and effort. A lower stage is a systematic extrapolation by means of a simple heuristic parametrization for position and shape of the excitation functions. A more sophistcated procedure makes use of theoretical models describing the physics contained in the respective reaction mechanism. This topic is now under study, while the first more simple procedure was mainly applied in the earlier systematics published in Landolt-Börnstein.

As we feel, the project of publishing such an universal compilation of measured and predicted reaction data must be performed in several stages. The final goal, however, will certainly be reached only within several years.

NDS Status Report to the 1979 NRDC Meeting

by

H. D. Lemmel

1. Oct. 1979

1. Staff

A few months ago, NDS could celebrate its 15th anniversary, when the Nuclear Data Group, started by Carl Westcott end of 1963 with Kim Ekberg and Eva Kiovsky, was called the Nuclear Data Unit after hiring in 1964 P.M. Attree, H.D. Lemmel and soon after Françoise Hirschbichler.

The years 1978/79 saw considerable staff fluctuations in the Nuclear Data Section, involving also two of our longest-serving staff. In summer 1978 Françoise Hirschbichler left and could be replaced only one year later by Henrietta Hendrickson from the Reactor Shielding Information Center (RSIC), USA. In the meantime Necmi DayDay, a new physicist from Turkey, took care of the data requests. End of 1978 Merkury Vlasov left the Section. He was replaced by Nikolai Kocherov from Leningrad. The new programme component of Atomic and Molecular Data for Fusion is expected to be finally approved by the end of 1979 with the consequence that one professional post will have to be transferred from the Nuclear Reaction Data Unit to the new Unit; as this post was anyway already frozen for a longer period, this change will have no serious consequences.

A significant change occurred in the Computer Unit of NDS, where due to an uncorrelated coincidence of events Pamela Attree, head of the Unit since the inception of the Agency's nuclear data programme, and the programme analysts Peter Smith and Hernan Marin-Guzman left and took positions in IAEA Safeguards and UNIDO. Two of these three posts will be filled in the near future, the third is being advertised. *)

2. CINDA

This year we are celebrating the 15th anniversary of Cinda as an international cooperation, though Prof. Goldstein's card file from which Cinda emerged, is considerably older. In 1964, a duplicate of the US Cinda file was established at Saclay, and Vienna transmitted its first few hundred Cinda entries, soon after followed by entries made in Obninsk. This year's Archival Issue of Cinda represents a respectable monument for 15 years of fruitful cooperation.

3. Cinda work at NDS

The Cinda operations continued smoothly and routinely (G. Lammer). Within the NDS working routines, the Cinda and Exfor operations are fully integrated with respect to current awareness and coverage of new literature.

NDS received the Cinda file from Saclay four times a year and used it for retrievals for internal purposes and occasionally for external customers.

*) Note added in proof: Meanwhile two posts were filled by D. Cullen (head of the Unit) and M. Seits.

The current Cinda work of area 3 is up-to-date. At the moment, however, the Agency's library is out of operation due to its move to the new HQ, but the resulting delay is expected to be minor and easy to overcome.

For the large scale coverage control, we are now using NEA-DB's ZZ file, keeping our own paper files only for about the last year and not for all report series. We would therefore like to request NEA-DB to send us a complete listing of all ZZ entries - or a tape - regularly, e.g., after each 'first' Cinda deadline. After the latest batch of ZZ entries will have been transmitted from NDS, the area 3 and 4 ZZ file can be assumed to be complete and up-to-date.

4. CINDA improvement program (GL)

The cleanup of area 3 Cinda entries for the archival issue had been completed by January 1979. Apart from obvious errors which could be corrected on the basis of the existing entries, the original literature was consulted in various cases, e.g. for dubious entries, such as: unusual isotopes, unusual energy range for a given quantity, or comment not fitting the given quantity; or when no author was given in the comment. Also, for some of the entries bearing as lab-code the country code, the original reference had to be checked to possibly find the correct lab code if this could not be guessed from authors' names and ZAQ.

A great effort was devoted to the proper blocking of unblocked area 3 entries, although the majority of area 3 entries was systematically blocked since many years simultaneously with data compilation and EXFOR indexing in Cinda.

'No book' flags have been attributed to superseded entries, abstracts and progress reports, and less important reports when the same information was available from a well known journal or report.

The old second line 'Z' entries have been replaced for area 3 and area 4 entries.

Concerning area-4 entries, NDS had received from CJD two quite voluminous batches of corrections, by which the labcode 'CCP' could be replaced by the correct labcode. Unfortunately, these replacements were far from being complete. NDS performed a lot of additional changes, again based on comparisons of ZAQ-author-lab. At the same time, the blocking within lab 'CCP' and with the corrected entries was done.

5. EXFOR

At this meeting we can celebrate the tenth anniversary of the Exfor system. Following a series of programmers' workshops, the prototype of Manual and Dictionaries for the "Centre-to-Centre Transmission Format" were formulated by P.M. Attree in October 1969 with essential contributions by D. Cullen, M. Goldberg and others. Essential features of the then existing neutron data systems SCISRS, NEUDADA and DASTAR were incorporated into a common system, which was approved in November 1969 at the Fifth "Four-Centres Meeting" in Moscow and given the name "EXFOR".

Although the system got meanwhile a number of revisions and refinements (in particular in the coding of the data definition under the keyword

REACTION), its principles are still the same.

To our knowledge it can be said that EXFOR is the first, and still today the only functioning truly international exchange system for numerical data (as distinct from bibliographic data). In these ten years the Exfor files exchanged have grown to about 44 000 data sets (Exfor subentries) with 2.5 million numerical data records. In the field of neutron data we have reached a respectable degree of completeness and reliability although a few gaps are still known. For charged-particle and photo-nuclear data, the importance of Exfor is fast increasing, and it is hoped that additional data centers will join the cooperation.

We believe that the definitions of the Exfor system have reached a final stage, and that the system as it is, functions most satisfactorily. But even a well running machine needs some servicing from time to time, and that is what we shall have to do when discussing a lot of little Exfor details during this meeting.

6. Exfor compilation at NDS (KO)

Recently we celebrated the 500th Exfor entry made at NDS. Meanwhile we have compiled

550 entries, containing
4000 subentries, containing
55000 numerical data records

The compilation of new neutron data in Exfor continued (K. Okamoto, N. DayDay, G. Lammer, O. Schwerer), and also some gaps could be filled by compiling older entries. Some gaps are still known to exist for India and Pakistan. Again, contacts with the authors were taken important resulting in a number of corrections and supplements to published data. Several authors acknowledged the critical review of their data by NDS during the compilation.

Transmission tapes were sent to the other centers in regular intervals.

In addition to neutron data, the following data types were compiled in a non-systematic way, and only if the data were considered of top importance:

- Exfor V-series: evaluated neutron nuclear data that are not available in ENDF/B, UKNDL or KEDAK format. (According to the request statistics, these data were requested and sent out frequently.)

- Exfor D-series: charged-particle nuclear data, integral and differential, when considered important as neutron source reactions.

- trial entries were made to compile some experimental, evaluated or recommended half-lives, when these are basic to the interpretation of important neutron data experiments.

Contents of EXFOR as of September 1979

	data sets (Exfor subentries)	numerical data records	total records (data + text)
neutron nuclear data, experimental	42 000	2.4 million	3.0 million
- " - , evaluated	200	26 000	30 000
charged particle nuclear data	1 300	11 000	39 000
photonuclear data	370	21 000	25 000
nuclear quantities and decay data (nuclear temperature, spontaneous fission spectra, etc)	460	5 300	10 000
	44 000	2.5 million	3.1 million

Notes:

1. A "data set" is usually defined as an "Exfor subentry" containing for one nucleus a certain cross section type as a function of energy resulting from one experiment. The size of a data set varies between one data point and several thousand data records. For certain data types, in particular double differential data, resonance-parameters, etc, the definition of a "data set" is varying, as different arrangements in Exfor are possible.

2. The statistics exclude superseded data sets. Data once compiled and transmitted, are often subsequently revised by the author. The data are then retransmitted, whereby the superseded data are erased at all centers automatically.

7. Exfor Dictionaries (OS)

Dictionary transmissions have been continued in a regular 3-months rhythm. Since the last Nuclear Reaction Data Centers' Meeting in June 78 4 dictionary transmission tapes (9033 through 9036) have been sent out. On an average 3 dictionary updates have been made between any 2 transmissions. The nuclide-dictionary 27 has been included into the regular dictionary transmissions.

The dictionaries 27 (nuclides) and 36 (coding of data definitions under the keyword REACTION) have a special role as they do not contain, like the other dictionaries, all permitted codes, but rather a collection of code-combinations that exist in the file. Consequently, these two dictionaries are being updated most frequently.

A number of dictionary updates had to be held back for many months, as the explanation given together with the codes proposed was sometimes insufficient and the response to our inquiries was sometimes very slow.

8. Corrections of incoming Exfor TRANS tapes (OS)

All incoming TRANS tapes are checked by the NDS check program which produced a list of error messages. Using this report the important errors (i.e. errors disturbing our indexing or other programs or leading to wrong interpretations of the data given) are corrected at NDS, wherever possible, before merging the TRANS tape into the NDS Exfor master file. When important errors cannot be corrected at NDS (because of missing information or because restructuring of an entire subentry is required) we request retransmissions from the originating centre. An extract of the list of error messages with explanatory comments on corrections to be made is sent to the originating centre. A compilation of frequently occurring errors in REACTION coding and the structure of entries (which partly lead to time-consuming correction procedures) was given in Memo 4C-3/233 of 1979-04-12.

9. Exfor Manual

According to an action from the last Data Centers Meeting we assisted in updating the NNDC Exfor Manual, however only with partial success. We cannot regard the maintenance of the NNDC Manual as sufficiently speedy and reliable as required by our compilers and programmers. We therefore cannot regard it as the official Exfor Manual as it is supposed to be. Consequently it was decided that the updating of the NDS Exfor Manual will continue. Large parts of both Manuals are identical. However, essential details seem to be more up-to-date and more practical in the NDS Manual.

10. Documentation and customer services

In September 1979 the first issue of our "Nuclear Data Newsletter" appeared in order to intensify the contacts to data users in our service area. This has the functions to advertise the services and functions of NDS in general and to publicize news about Cinda, Exfor, evaluated data, documents, meetings etc.

This newsletter, which must be kept brief but has a very wide distribution, is supplemented by a documentation series called "IAEA Nuclear Data Services" with the report code "IAEA-NDS-...". An index to the present status of this series is attached. The series will contain, for each data library, a document summarizing contents, format and documentation as needed by a customer when receiving from NDS a data retrieval. These documents will be small and distributed as Xerox copies, so that they can be updated easily whenever some news about a library comes to our attention.

This flexible system of the widely distributed Newsletter plus the documentation series will replace our previous CINDU catalogue which was a useful document but too tedious to update.

The first issues of the documentation series contain a thorough documentation of the Exfor system and programs as operated at NDS.

11. Request Statistics

The Request Log system and the Data Dissemination Log have been redesigned on a different basis. The system has been re-programmed, but not yet all parts of it are in full operation. Due to this transition, the statistics do not exactly correspond to the tables presented in earlier years.

A "request" still corresponds normally to an "incoming letter", which however may contain "subrequests" if different categories, e.g. "evaluated data" and "documents" are wanted. This is about the same as previously. However, more often than so far, a request will be defined as "standing request". This means: if a customer asks for data of a specific reaction, he will receive immediately a retrieval of the data that are on hand. But in addition, his request profile will be kept in the system as a "standing request" for a reasonable period. During this period his request profile will be compared with incoming new data, so that he will be kept up-to-date in the field of his interest.

In 1978 the total number of requests received was about 50% more than in 1977, and that more or less for all of the five request categories: evaluated data, experimental data, documents, bibliographies (in particular CINDA retrievals), computer codes related to the evaluated data files. In 1979 the figures were somewhat lower for the first half of the year; but for the rest of the year significantly more requests are expected, due to our intensified contacts to potential customers by means of the new "Nuclear Data Newsletter", and due to the increasing collections of evaluated data, in particular with the release of the total of ENDF/B-4 and parts of ENDF/B-5.

See the detailed statistics in the attachment.

12. WRENDA (D.W.M.)

WRENDA 79/80, to be issued in November 1979, will reflect numerous recent changes to the WRENDA master-file of requests. It is the first major file update since the production of WRENDA 76/77. To summarize the changes (now complete), 465 requests listed in WRENDA 76/77 were withdrawn, 487 were modified and 573 new requests were added, bringing the total number of current requests to 1780, a net increase of 108.

The number of fission reactor related requests remains about the same as before, but the number of fusion requests increased from 328 to 449. As recommended at the 9th INDC meeting in May 1977, requests for all applications will be combined into a single, unified list in the WRENDA report. Because of this reorganisation of the list, most of the descriptive material in the report has been rewritten.

Other changes to the list include a reduction in the amount of space devoted to status comments. The only status comments listed in WRENDA 79/80 will be short comments, provided by the NDS, to indicate which data are under review by technical subcommittees of the INDC and NEANDC.

A third aspect worth noting is an increase in the number of requests for high-energy neutron data, typically up to 50 MeV. Some of these new high-energy requests specify reactions previously not allowed by the WRENDA system, a fact which accounts for most of the 12 new reaction types recently added to the WRENDA "quantities" table.

The issue of WRENDA 81/82 is planned for the summer of 1981. Thus, the data centers should be receiving "country retrievals" to begin the next WRENDA update cycle in August 1980. NDS plans to issue an updated set of WRENDA input instructions at about the same time.

13. The Data Index System

We were always convinced at NDS that data retrievals are made most economically through a Data Index file extracted from the actual data files, both connected by the accession-numbers only.

We have now a Data Index System in operation which indexes all our data files: Exfor data automatically, non-Exfor data by hand. Eventually, the indexing of ENDF/B formatted data will be programmed.

The information stored in the index system includes Accession No., Reaction, Institute, Reference, No. of data points, Status, Author, and other items. Selective retrievals on all of these parameters can be made, including each individual subfield of the REACTION string.

Each incoming Exfor TRANS tape is routinely indexed when being merged into the Exfor master file. The evaluated data libraries kept at NDS are only gradually being included in the index system.

Evaluated data are indexed by converting reaction-type numbers to Exfor REACTION codes. But complete evaluations of neutron-induced reactions may be indexed by means of artificial Exfor-type REACTION codes such as (N,ALL), as usually no more detailed retrievals occur in these cases. More detailed indexing can be done later as soon as actual data requests demonstrate the need for further detail.

14. Programming

During the past year the computer programming concentrated on

- improvements in the EXFOR check program; all centers are familiar with the output as a feedback to their TRANS tapes,
- reorganizing the Request Log system described above,
- the Data Index System described above.

In addition to the actual programming, systematic documentation of it was completed to prepare for the change of programming staff. See the list of IAEA-NDS-documents.

At the new building, NDS will keep the presently existing Remote Job Entry station. We will have in addition three Visual Display Units (VDU) plus a hard-copy printer. Initially these will be used primarily

- for accessing the Index;
- for correcting Exfor entries and other data files;
- for maintaining the data Request Log;
- for maintaining the address file and distribution profiles;
- for the input to the "International Bulletin on Atomic and Molecular Data for Fusion".

Already now all these VDU processes are in operation.

15. List of Attachments

1. Nuclear Data Newsletter, Nr.1, Sept.1979
   (not included in this document)
2. Index to the NDS Documentation Series "IAEA-NDS-..."
3. Request Statistics for the Period 1.1.1978 - 30.6.1979
4. Introduction to WRENDA 79/80
   (not included in this document, see INDC(SEC)-73)
5. NDS Meetings 1979-1982

INTERNATIONAL ATOMIC ENERGY AGENCY

NUCLEAR DATA SERVICES

DOCUMENTATION SERIES OF THE IAEA NUCLEAR DATA SECTION

Index to the IAEA-NDS- Documentation Series as of March 1980

The first titles of this series (#1 - 9) document the EXFOR system and its computer programs and operations at NDS. These documents are internal manuals and are distributed to the outside in general only through the INIS microfiche service - with the exception of IAEA-NDS-1, which is a short guide to Exfor sent out to data center customers together with each Exfor data retrieval.

The other documents (# 10 and up) are brief summary descriptions of contents and formats of data libraries distributed by NDS, and will be sent out together with these libraries. These documents will be updated frequently in order to collect all the information received at the data center about a given library.

The existence of these documents will be advertised in the "Nuclear Data Newsletter".

IAEA-NDS-

#	Title, Author or Editor	Date of Issue
1	Short Guide to EXFOR A. Calamand, H.D. Lemmel	1974 (7 pages)
2	EXFOR Dictionaries, Edition on behalf of the cooperating data centres by O. Schwerer, P.M. Attree, H.D. Lemmel, P.M. Smith (this revision available as INIS microfiche)	79/6 (154 pages)
3	NDS EXFOR manual H.D. Lemmel, editor	79/6 (302 pages)
4	System Specifications for the NDS EXFOR System P.M. Attree, P.M. Smith	79/6
5	System Specifications for the NDS Dictionary System P.M. Attree, P.M. Smith	79/9 (59 pages)
6	System Specifications for the NDS Data Index System P.M. Attree, P.M. Smith	79/9 (68 pages)

10	ENDF/B Format M.A. Khalil	75/1 (13 pages)
11	ENDL-78, LLL Evaluated Nuclear Data Library 1978, Contents and Documentation O. Schwerer	79/7 (7 pages)
12	INDL/A - IAEA Nuclear Data Library for Evaluated Neutron Reaction Data of Actinides. Contents and Documentation H.D. Lemmel	79/4 (5 pages)
13	ENDF/B-V Actinides, Contents and Documentation N. Kocherov	79/7
14	BIBFP and BIBGRFP, the Czechoslovakian Fission-Product Library, Cross-Sections and Group Data N. DayDay	(in preparation)
15	ENDF/B-5 Standards Library, Contents and Documentation N. DayDay	80/3
16	ENDF/C Format	(in preparation)
17	BLA-78, Blachot's Library of Fission-Product Decay Data, Content & Documentation N. DayDay	79/8 (12 pages)
18	JENDL-1, the Japanese Evaluated Nuclear Data Library, Contents and Documentation N. DayDay	(in preparation)
19	JULGAM N. DayDay	(in preparation)
20	UKNDL Format	79/11
21	Quick Guide to KEDAK Library M.A. Khalil	78
22	PNESD - Proton Nucleus Elastic Scattering Data H. Leeb, Vienna, Jan. 78 Edited by N. DayDay	79/12
23	ENDF/B-4 General Purpose File 1974 Summary of Contents and Documentation O. Schwerer	80/3
24	ENDF/B-V Dosimetry File Contents and Documentation N. DayDay	80/3

IAEA-NDS-AM-Documents

Subseries "IAEA-NDS-AM.." issued by the Atomic and Molecular Data Unit of NDS

#	Title, Author or Editor	Date of Issue # of pages
AM 1	Description of Card Input and Formats to the International Bulletin on Atomic and Molecular Data for Fusion K. Katsonis, F.J. Smith	1979/5/7 (40 pages)
AM 2	Procrustes - A Criterion used to Determine the Relevance to Fusion of Atomic and Molecular Data K. Katsonis, F.J. Smith	1979/7/20 (18 pages)
AM 3	Record Format - Variable Length Record Format used to Store the Index to Atomic and Molecular Data for Fusion R.E. Seamon, F.J. Smith, J. Rumble	1979/9/17 (73 pages)
AM 4	Compendium of Structure and Collision Data in the First 8 Issues of the International Bulletin on Atomic and Molecular Data for Fusion K. Katsonis, F.J. Smith	1979/9/19 (165 pages)

TABLE

SUMMARY OF NDS REQUEST STATISTICS

REQUEST FOR		EVALUATED DATA	EXPERIMENTAL DATA	DOCUMENTS AND REPORTS	BIBLIOGRAPHIES	COMPUTER CODES	TOTAL
1978	Neutron Reactions	63 (50, 10)	47 (33, 11)	74 (74)	11 (1, 10)	2 (1)	197
	Nuclear Structure	26 (16, 10)	20 (10, 10)	10 (10)	-	-	56
	Charged Particle	5	9 (2)	1 (1)	1 (1)	-	16
	Photoneutron	-	1	1 (1)	-	-	2
	Other	1 (1)	7 (2)	42 (42)	-	26 (20)	75
	Total	95	84	128	12	28	347
1979 Jan. - June	Neutron Reactions	24 (18)	13 (11)	41 (40, 1)	2 (2)	4 (3)	84
	Nuclear Structure	2 (1)	-	7 (7)	1 (1)	-	10
	Charged Particle	-	2 (2)	-	1 (1)	-	3
	Photoneutron	1 (1)	-	1 (1)	1 (1)	-	3
	Other	-	-	3 (3)	-	-	3
	Total	27	15	52	5	4	103

Note: The first number in the parenthesis indicates the number of fulfilled requests whereas the second, the number of standing requests.

TABLE

SUMMARY OF NDS INCOMING REQUEST STATISTICS

		EVALUATED DATA	EXPERIMENTAL DATA	DOCUMENTS AND REPORTS	BIBLIOGRAPHIES	COMPUTER CODES	TOTAL
1978	Area 1	-	1 (1)	18 (31)	-	-	19 (32)
	Area 2	14 (25)	17 (33)	34 (53)	6 (6)	2 (5)	73 (122)
	Area 3	75 (175)	61 (178)	72 (119)	4 (4)	26 (100)	238 (576)
	Area 4	6 (19)	5 (8)	4 (4)	2 (2)	-	17 (33)
	Total	95 (219)	84 (220)	128 (207)	12 (12)	28 (105)	347 (763)
1979 Jan. - June	Area 1	1 (2)	1 (2)	9 (9)	-	-	11 (13)
	Area 2	3 (23)	2 (5)	10 (25)	2 (4)	-	17 (57)
	Area 3	19 (61)	9 (29)	30 (60)	2 (5)	3 (21)	63 (176)
	Area 4	4 (4)	3 (5)	3 (10)	1 (1)	1 (1)	12 (21)
	Total	27 (90)	15 (41)	52 (104)	5 (10)	4 (22)	103 (267)

Note: Numbers in parenthesis indicate the number of subrequests

TABLE

NUCLEAR REACTION DATA REQUESTS FROM NDS SERVICE AREA

COUNTRY	1978			1979 Jan.-June		
	EVALUATED DATA	EXPERIMENTAL DATA	TOTAL	EVALUATED DATA	EXPERIMENTAL DATA	TOTAL
India	17	19	36	2	2	4
Romania	10	5	15	-	1	1
Pakistan	7	5	12	2	1	3
German Dem. Rep.	5	3	8	1	2	3
Hungary	5	4	9	2	-	2
Israel	3	5	8	2	-	2
Brazil	4	3	7	1	1	2
Poland	3	3	6	2	-	2
Bangladesh	1	4	5	-	-	-
Czechoslovakia	4	1	5	2	-	2
Yugoslavia	4	1	5	1	-	1
Peru	2	2	4	-	-	-
South Africa	2	1	3	2	1	3
Iran	1	1	2	-	-	-
Iraq	2	-	2	1	-	1
Korea, Rep. of	1	1	2	1	-	1
Sierra Leone	1	1	2	-	-	-
Argentina	1	-	1	1	-	1
Australia	-	1	1	-	-	-
Cuba	1	-	1	1	-	1
Ghana	-	1	1	-	-	-
Guatemala	1	-	1	-	-	-
Indonesia	1	-	1	-	-	-
Mexico	1	-	1	1	1	2
Egypt	1	-	1	1	1	2

TABLE

EVALUATED DATA "BEST SELLERS"

(Requests for full Libraries)

LIBRARY	1978	1979 Jan.-June
ARAMACO	1	-
BOLOGNA F.P.	1	-
CZECHOSLOVAKIAN F.P.	2	1
DETAN-74	-	1
DEVILLERS F.P.	2	2
ENDF/B-IV 7 STANDARDS	11	2
ENDF/B-IV F.P.	6	2
ENDF/B-IV DOSIMETRY	10	3
ENDL-2 DOSIMETRY	1	-
ENDL-76	6	-
ENDL-76 DOSIMETRY	1	2
ENDL-78	3	2
ENSDF-77	3	-
ENSDF-78	5	-
ENSDF RECENT REF.	-	1
EURLIB	1	-
FRENDL	-	2
JENDL-1	1	2
JUELGAM-75	1	-
JUELGAM-78	2	1
KEDAK-3	10	2
SAND-2	2	2
SOKRATOR	3	-
UKNDL	8	2

Planned IAEA/NDS Meetings 1979

Date	Place	Type of Meeting	Title	Resp. Officer
March 26 - 30	Vienna	Consultants' Meeting (5 days)	Delayed Neutron Properties See INDC(NDS)-107	O. Schwerer
2 - 5 May 1979	CEN Laboratory, Cadarache, France	Second Advisory Group Meeting on TND co-sponsored by OECD-NEA (4 days)	Transactinium Isotope Nuclear Data (TND) To be publ. as IAEA-TECHDOC	A. Lorenz
30 April / 1 May	CEN Laboratory, Aix-en-Provence	Second Research Co-ordination Meeting (2 days)	Intercomparison of Evaluations of Actinide Neutron Nuclear Data See INDC(NDS)-104	H.D. Lemmel
30 April / 1 May	CEN Laboratory, Aix-en-Provence	Second Research Co-ordination Meeting (2 days)	Measurement and Evaluation of Transactinium Isotope Nuclear Decay Data See INDC(NDS)-105	A. Lorenz
8 - 13 October	KFK Karlsruhe, Fed. Rep. Germany	Consultants' Meeting (6 days)	Fourth Annual Nuclear Reaction Data (4C + CPND) Centre Meeting	H.D. Lemmel
Oct. 22 - 26	Knoxville, USA	IAEA/NDS Cooperation in International Conference, sponsored by US-DOE (5 days)	International Cross Section and Technology Conference	J.J. Schmidt

NDS MEETINGS PLANNED FOR 1980

Date	Duration	Location	Type of Meeting	Title	Responsible Staff
January 28-February 22	4 weeks	ICTP Trieste, Italy	Training Course	Advances in Nuclear Theory for Applications	J.J. Schmidt, N. DayDay
April 21 - 25	5 days	Vienna	Advisory Group	Nuclear Structure and Decay Data	A. Lorenz
March 17-21	5 days	Debrecen, Hungary	Consultants	Neutron Source Properties	K. Okamoto see p.5
May 19-22	4 days	Paris, France	Technical Committee	Atomic and Molecular (A+M) Data for Fusion	K. Katsonis
May 23-24	2 days	Paris, France	Consultants	A+M Data Centre Network	Head of A+M Data Unit
June 12-13	2 days	Vienna, Austria	Research Co-ordination	Intercomparison of Actinide Neutron Nuclear Data Evaluations	H.D. Lemmel
June 12-13	2 days	Vienna, Austria	Research Co-ordination	Measurement and Evaluation of Transactinium Isotope Nuclear Decay Data	A. Lorenz
June 16-20	5 days	Vienna, Austria	Technical Committee	11th Meeting of the International Nuclear Data Committee (INDC)	J.J. Schmidt, A. Lorenz
Sept.29 - Oct. 3	5 days	Brookhaven, USA	Consultants	Fifth Annual Nuclear Reaction Data Centre Meeting	H.D. Lemmel

NDS Meetings planned for 1981

Type of Meeting	Title
Conference (possible IAEA Cooperation)	International Conference on Neutron Physics and Nuclear Data (EURATOM-CBNM)
Technical Committee	12th Meeting of INDC (Fall in Vienna)
Advisory Group	Nuclear Data for Radiation Damage (May 1981)
Consultants'	Uranium and Plutonium Resonance Parameters
Consultants'	Sixth Annual Meeting of the Nuclear Reaction Data Centres (Fall in Vienna)
Consultants'	Meeting of the Atomic and Molecular (A+M) Data Centre Network
Research Coordination	Intercomparison of Actinide Neutron Nuclear Data Evaluations
Research Coordination	Measurement and Evaluation of Transactinium Isotope Nuclear Decay Data
Research Coordination *	A+M Data Evaluation

* New project to be organized in 1980.

NDS Meetings planned for 1982

Type of Meeting	Title
Training Course	Nuclear Physics for Applications
Advisory Group	Biomedical Nuclear Data
Advisory Group	Meeting of the Nuclear Structure and Decay Data Network
Consultants'	Seventh Annual Meeting of the Nuclear Reaction Data Centres (USSR)
Consultants'	U-235 Fast-fission Cross Sections
Consultants'	Meeting of the Atomic and Molecular (A+M) Data Centre Network
Research Coordination	Intercomparison of Actinide Neutron Nuclear Data Evaluations
Research Coordination	Measurement and Evaluation of Transactinium Isotope Nuclear Decay Data
Research Coordination	14 MeV Nuclear Data Measurements
Research Coordination	A+M Data Evaluation

Consultants' Meeting on Neutron Source Properties
Debrecen, Hungary, 17-21 March 1980

INFORMATION SHEET

1. Introduction

In view of the considerable improvement in the accuracy and consistency of the properties of neutron sources relevant to neutron metrology achieved in recent years, the International Nuclear Data Committee at its recent meetings recommended that a meeting on Neutron Source Properties be held in 1980. In response to this recommendation, the IAEA Nuclear Data Section, with the support of the Hungarian authorities, in co-operation with the Institute of Experimental Physics of the Kossuth Lajos University acting as the host, plans to hold a Consultants' Meeting on "Neutron Source Properties" during the week 17-21 March 1980 in Debrecen, Hungary.

2. Objectives

In addition to high-lighting current important developments in this field, the meeting will have the following specific objectives:

- To review the requirements and status of all properties and data on neutron sources such as mono-energetic neutron-producing reactions, white source neutron spectra, spontaneous fission neutron spectra, gamma-neutron and alpha-neutron sources, filtered neutron beams and thermal and epi-thermal pile neutron beams. The neutron energies to be covered extend from thermal to 40 MeV and above. Plasma neutron sources are not to be included,

- to identify the uncertainties in the properties of neutron sources and the corrections needed to improve the accuracy and consistency of neutron measurements, and

- to formulate specific technical recommendations for future work and its coordination.

3. Organization

To meet these objectives, the meeting will be organized around seven review topics, listed in the attached programme. The review papers are to be comprehensive and concise surveys focussing on recent developments. Reviewers have been requested to include proposals for specific recommendations for needed future work, which could be discussed

further at the meeting and form part of the final conclusions and recommendations. In addition to the review papers, it is expected that several papers, primarily on recent experimental developments, will be contributed.

Following the presentation and discussion of the review and contributed papers during the first part of the meeting, detailed discussions will be conducted in plenary and by working groups. Working groups will be responsible to formulate a final concise report on the present status and requirements concerning neutron source properties and data, and to issue a set of conclusions and recommendations for the measurement or evaluation of specific properties and data, with an indication of priorities and required accuracies.

Contributed papers

Contributed papers on any of the topics listed in the programme should be sent to the Scientific Secretary (Dr. K. Okamoto, Nuclear Data Section, IAEA (new address: Vienna International Centre, P.O. Box 100, A-1400 Vienna)) so as to be received at the IAEA not later than 31 January 1980.

Working Language: English, no interpretation will be available.

Publication of Proceedings

Subject of the approval of the Agency's Publication Committee, the proceedings of this meeting, including the review papers, the working group reports, and the conclusions and recommendations are planned to be published.

4. Participation

It is expected that the meeting will bring together about 25-30 specialists. In addition to the seven reviewers invited to attend this meeting, other experts wishing to participate in this meeting at their own cost and to present a contributed paper, should inform the Scientific Secretary not later than 15 December 1979.

IAEA Consultants' Meeting on Neutron Source Properties

Debrecen, Hungary 17 - 21 March 1980

PRELIMINARY PROGRAMME

The programme of this meeting is based essentially on proposal by the Standards Sub-Committee of the INDC and numerous comments and suggestions from INDC, NEANDC and other competent experts in the field.

Introductory Address

A. Neutron Sources with Continuous Spectra

I. Radioactive neutron sources

a) Be (α,n) Sources

1. Intensities	Intensity
2. Intensity comparisons	
3. α half-lives	
4. (long term) stability	
5. Measured spectral distributions	Spectrum
6. Be (α,n) cross sections, α-stopping power	
7. Calculated spectral distributions	
8. Corrections for spectral perturbations	

b) (γ,n) Sources

1. Intensities	Intensity
2. Intensity comparisons	
3. Half-lives	
4. (long term) stability	
5. Average energy and line shape	Spectrum
6. Corrections for 'structural' material	

c) Spontaneous fission sources (with emphasis on Cf-252)

1. Fission-Spectrum distribution	Spectrum
2. Delayed neutrons	
3. Corrections for spectral perturbations	
4. Half-lives for fission and α-decay, $\bar{\nu}$	Intensity
5. Fabrication of (high intensity) sources	
6. Intensity comparisons	
7. Absolute calibration	
8. Use as pseudo-pulsed source	
9. Experimental difficulties when used as a standard	

II. Accelerator-based White Sources (VdG, Cyclotrons, Linacs ...)

1. Applications of White Sources and common experimental peculiarities
2. Comparison of spectra and intensity of the various Sources
3. Target configurations
4. Spectral distributions
5. Time resolution
6. Background control
7. (Lead slowing-down spectrometer)

III. Thermal and Epithermal Reactor Beams and Fields

1. Central thimbles and through-tubes
2. Thermal columns
3. Reference cavities
4. Monochromators and spectrometers

B. Monoenergetic Sources

I. From Charged Particle Reactions [$^{3}H(p,n)$, $^{2}H(d,n)$, $^{3}H(d,n)$, $^{7}Li(p,n)$, $V(p,n)$...]

1. Zero degree production cross sections
2. Angular dependence
3. Background neutrons from internal break-up and other sources
4. Unwanted effects from polarization
5. Experimental techniques: targets, windows, beam-stops, cooling, backings
6. Measuring techniques
7. Application for efficiency determinations
8. Comparison of experimental line width, intensity etc. of different reactions
9. Special aspects of C-W facilities for the production of 14 MeV neutrons

II. Reactor- and Accelerator-based Filtered Beams

1. Spectral distributions and purity
2. Monitoring techniques

Progress Report for the NEA DATA BANK

(Taken from the document SEN/DATA(79)5 dated 17 Sept. 1979 of the OECD-NEA Steering Committee for Nuclear Energy)

INTRODUCTION

The present report is written in mid-September, some seven weeks before the date fixed for the return of the IBM 370/125 computer, and the formal end of the "conversion period" in which all the functions taken over from CCDN and CPL have to be adapted to the new computing environment of the Data Bank.

The major programming job has been the construction of an integrated CINDA/EXFOR data base on the PDP 11/70 satellite computer, conversion of data for loading on this data base, and writing appropriate output programs. In contrast, all the software brought from CPL for the computer program service work was written for an IBM 370/165 computer, and could be relatively simply installed on the large CISI machines. It is for this reason that rather more space is devoted in this report to development work for nuclear data handling, since this was the work which had to be finished within the conversion period. It will be seen that the combination of new software and a reorganisation of working methods has allowed an important gain in efficiency on the data side : it is hoped that reprogramming and perhaps associated gains in productivity on the computer program side of the Data Bank can be achieved in 1980.

Although the possibility still exists of hidden errors in the new software, and there has been a certain amount of trouble with the PDP 11/70 hardware, both of which may cause delays, it is possible to be confident that the conversion will be completed by the end of October, and that the 370/125 computer may safely be sent away at that time.

I. COMPUTER PROGRAM SERVICES

Routine Program Testing and Customer Services

The output of computer programs tested and packages sent out to customers has, during 1979, been running steadily and at approximately the same level as 1978. 730 requests were answered in the first eight months of 1979 (610 complete packages, the rest for documentation only), with material of U.S. and non-U.S. origin requested in proportions very similar to 1978 of 60%/40%. So far, 70 programs have been tested (corresponding to an annual rate just over 100 programs/year).

The queue of requests needing an answer currently stands at 194, referring to 126 programs. 80 of these requests are for 54 programs which have not yet reached the Data Bank, while out of the 72 programs remaining, some 24 are at various stages of testing and packaging, and 48 are awaiting test. All these figures fluctuate with time, but one which is unusual is that for programs requested but not yet available to the Data Bank. This is attributed to delays in sending in programs, perhaps due to the rather limited number of laboratory visits undertaken during the conversion, rather than to any refusal to put the programs at our disposal. The fairly long queue of programs awaiting test should be reduced in 1980.

Program testing work was transferred very smoothly during 1978 to the large computers of the CISI Saclay installation, along with the master file maintenance and administrative programs which have run satisfactorily but rather expensively on these disproportionately powerful computers. The 360/91, used for much testing work because of its very reasonable charges for CPU activity, is being replaced in September by an IBM 3033. We have been assured that this change will not result in increased job execution costs.

Restrictions on Computer Program Availability

At the request of the Data Bank Committee, the Secretariat has prepared a statement for submission to the Steering Committee for Nuclear Energy recommending a more liberal approach in Member countries to program sharing through the Data Bank. The draft statement and a covering note by the Secretariat are included as Appendix 1. /Document No. NE(79)237.

The problems in program availability do not appear in the statistics given above, since users and indeed the Data Bank are not usually informed about programs unavailable for exchange. The publicity given by the Data Bank to new programs in its abstracts publications is limited to programs already in the Data Bank's collection, or which have been offered to it. The problem of availability centres on the strictness with which the various definitions of "commercial value" are applied to programs on the fringe of industrial applications, and more recently on a tendency to reserve the updated versions of some major programs for bilateral exchange rather than distribution through the software centres.

Internal Development Programming for Computer Program Services

During the "conversion period" proper, only the most basic functions for handling the Data Bank's distribution of tested programs are being transferred from the large IBM computers to the PDP 11/70. The programs for retrieving from the compressed file, and for tape copying work (which has required a generalised tape copying routine to be written for the PDP 11/70, to supplement the very limited tape handling capacities of the standard DEC software) are being re-written for the 11/70. It had proved somewhat inconvenient to run these jobs, which required both frequent tape changes and the use of unlabelled tapes, at the CISI installation.

In 1980 the preparation of program abstracts, and the regular administrative information needed to follow the progress of program testing and requests, will be reprogrammed for the 11/70. Both these jobs are well suited to the direct on-line preparation of input material, and will be included in a second "minor" data base, separate from the major neutron data base for reasons of security against programming and operator errors.

SECU and Publicity of non-U.S. Programs

A third SECU bulletin (Service on Experience in Code Utilisation) has been issued, containing some 15 contributions relating to the earlier SECU study on Shielding and Cross-Section Calculation Programs.

A seminar is to be held at the National Energy Software Centre, ANL, to publicise some non-US program packages expected to be of interest in the U.S., but little known there. The pressure of work at the end of the conversion period has made it preferable to postpone the seminar until early 1980.

The regular information appearing in "News from the Data Bank", about the current program collection and new additions to it, will be supplemented by an update of the European program abstracts, now in preparation.

II. NUCLEAR DATA ACTIVITIES

The nuclear data work of the Data Bank has been very much influenced by two deadlines: the publication of the archival edition of CINDA, and the need to prepare as much as possible of the earlier data stored in NEUDADA format for exchange under EXFOR conventions before the IBM 370/125 computer was sent back. The work done in preparing the archival edition of CINDA has naturally proved extremely valuable in recompiling these older data, as well as in reducing the preparatory work needed for new data compilations.

Data Compilation in CINDA and EXFOR

1979 saw the end of a concentrated effort by all four neutron data centres to improve the consistency and quality of the CINDA index to neutron data publications. An archival publication of the complete file was prepared at the Data Bank in April 1979 and has been printed in three volumes (two volumes up to 1976, and one supplement 1977-1979) by IAEA. A first update of this supplement will be made in October 1979.

The PDP 11/70 computer with its multiuser timesharing operating system and file editing facilities has allowed a new approach to compilation of experimental neutron data into the EXFOR format. An interactive data compilation program was installed and tested during the Spring of 1979, and has much improved the speed with which data can be compiled in EXFOR and reduced the number of errors to be eliminated before an exchange tape can be transmitted to the other data centres and merged in our own data base.

Including recompilations from the older NEUDADA file, which could be partially automated by computer transposition of the existing data tables, supplemented by descriptions newly added to EXFOR standards, compilation is running at an annual rate of approximately 400 EXFOR works/year. Where the compilation effort is directed entirly to new compilations, a rate of perhaps 250 compilations/year may be achieved, which is slightly in excess of the increased rate at which new experimental work is now being published.

Conversion of the NEUDADA file was begun with those data sets containing larger data tables, where computer transposition of these tables to EXFOR would save labour. So far, at the Data Bank, all NEUDADA data sets containing more than 20 data points have been recompiled, and the smaller data sets are being listed for manual transfer to the PDP 11/70 after the return of the IBM computer. Some 15,000 data points remain to be reviewed, and we hope to finish this work early in 1980.

A similar effort has recently been finished by NNDC and NDC/IAEA in conversion of the old SCISRS file, so that we can expect that by early 1980 each of the four neutron nuclear data centres will have, for the first time, identical experiental data files. This is obviously of great importance for the consistency of nuclear data evaluations in all countries.

.Requests for nuclear data from the Data Bank are currently running at about 40 per month, split evenly between experimental and evaluated nuclear data. The number of requests has shown a steady increase over the last five years, articularly for evaluated data. A catalogue of data files available from the Data Bank has recently been prepared, and published in NNDEN/25. Copies of the current list, including several new files acquired in 1979 and some selected files from ENDF/B V, can be obtained from the Data Bank on request.

Customer Service on Nuclear Data

The change in the data storage system for experimental data has produced some changes in the way data is presented to physicists. Experimental nuclear data is now stored in the EXFOR format in which it is compiled and exchanged between the four centres. While this development is a very natural one from the point of view of more efficient data handling and file maintenance (one physicist was employed nearly full-time on NEUDADA, in addition to the work carried out in EXFOR), the need remains for a fixed field "line-by-line" format for sorting, merging and graphical display of data sets for which treatment is required. A "computational" format, similar in conception to that of NEUDADA, but with some improvements better to accommodate double differential cross-sections, has been developed and is described in NNDEN/26. An interim user guide for numerical data has been prepared, very similar to this description but including dictionaries of reaction type codes, etc., and can be obtained on request from the Data Bank. Users of NEUDADA should find that only minor modifications to their programs are necessary in order to accept data in the new format.

One application of this new format is an adaptation for the PDP 11/70 of programs written by Prof. Vonach's group for "best fit" evaluation of threshold cross-sections, including covariance information, and using data retrieved directly from the integrated data base. Documentation on these Fortran programs can be obtained on request, and they may be used by visitors to the Data Bank. Alternatively, copies of the source programs can be supplied for implementation elsewhere.

In collaboration with Dr. Blachot of CEN Grenoble, the ENSDF file and associated retrieval programs have been implemented on the IBM 370/168 computer on the CISI site. This will allow French physicists collaborating in Nuclear Structure Data evaluation work ready access to the existing data atno cost to the Data Bank.

Conversion Work for Data Handling

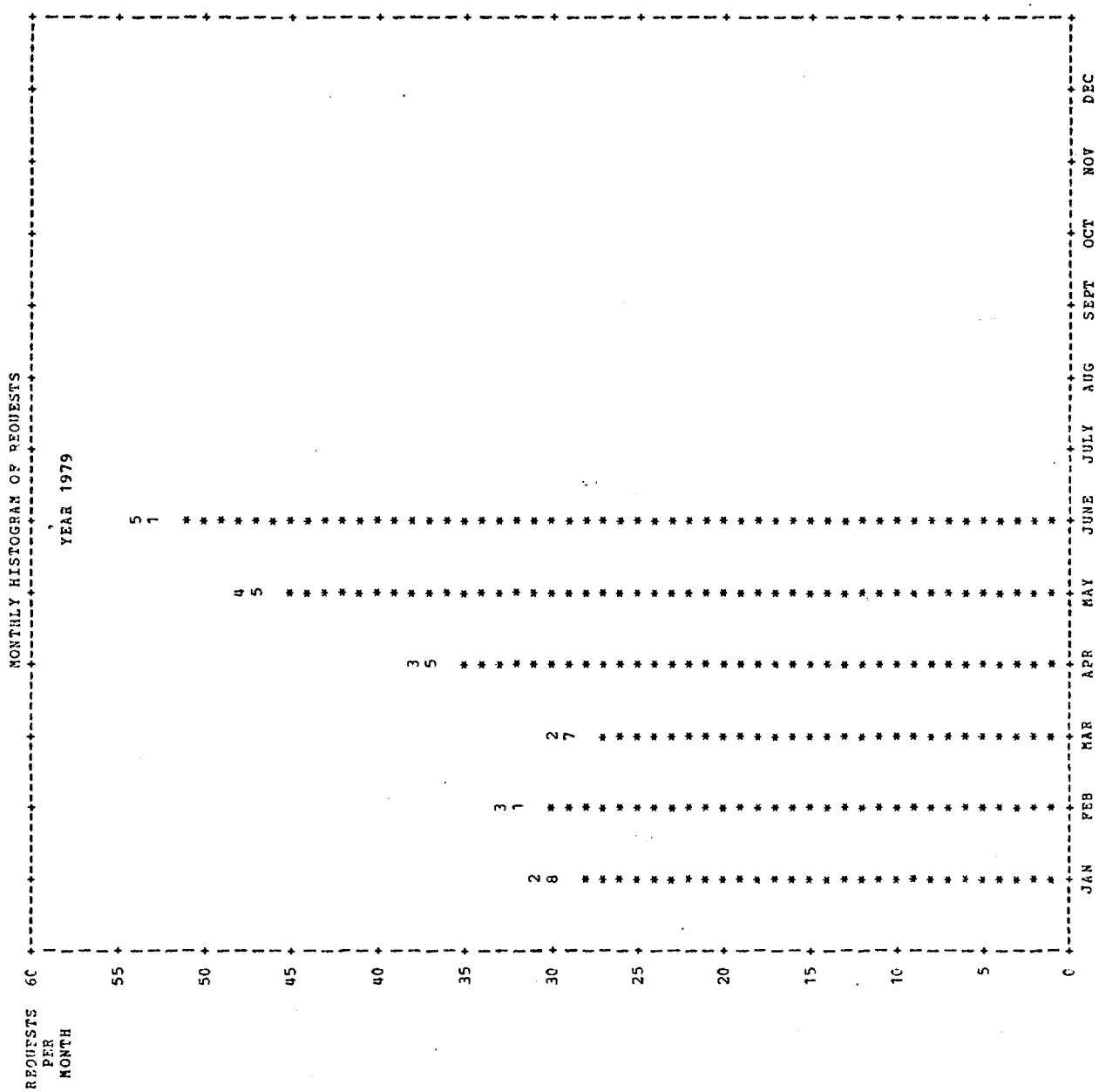
While programming work has been slowed down by software problems with the DBMS-11 data management system, and some hardware faults on the PDP 11/70, a full CINDA/EXFOR data base has been loaded (in early September 1979). As is explained elsewhere, several man-months work remain to transfer some computer program service work to the 11/70, while the important effort of documentation and establishment of good working procedures in our timesharing environment can be neglected only at the price of reversion to chaos within a few years. Most of this "tidying up" will be carried out in 1980.

Computer program development is under way for storage and selective retrieval from all the major evaluated data files. Retrievals will be available in original format tapes, edited listings and eventually in the same computational (plotting) format adopted for the experimental neutron cross section data.

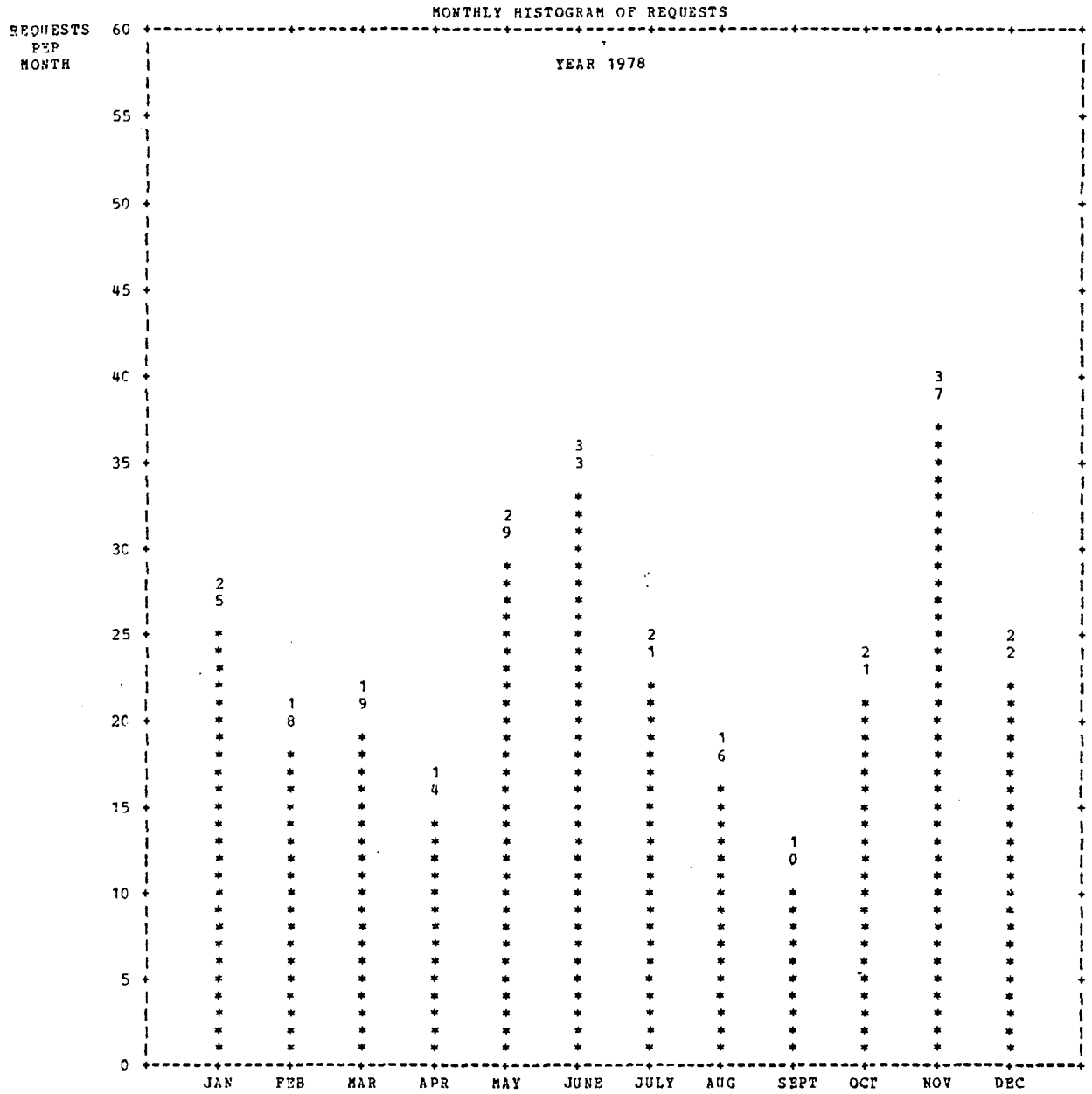
Neutron Data Publications

Besides its work on the archival edition of CINDA, the Data Bank has participated in the preparation of a new edition of the World Requests for Experimental Nuclear Data (WRENDA) which is currently being printed by IAEA. New requests and modifications to existing requests from NEA Member countries were coded at the Data Bank for the updating of the Master File held at NDS/IAEA. The scope of this edition is somewhat wider than that covered by the NEACRP/NEANDC "highest priority" list, but all these requests have been entered in WRENDA.

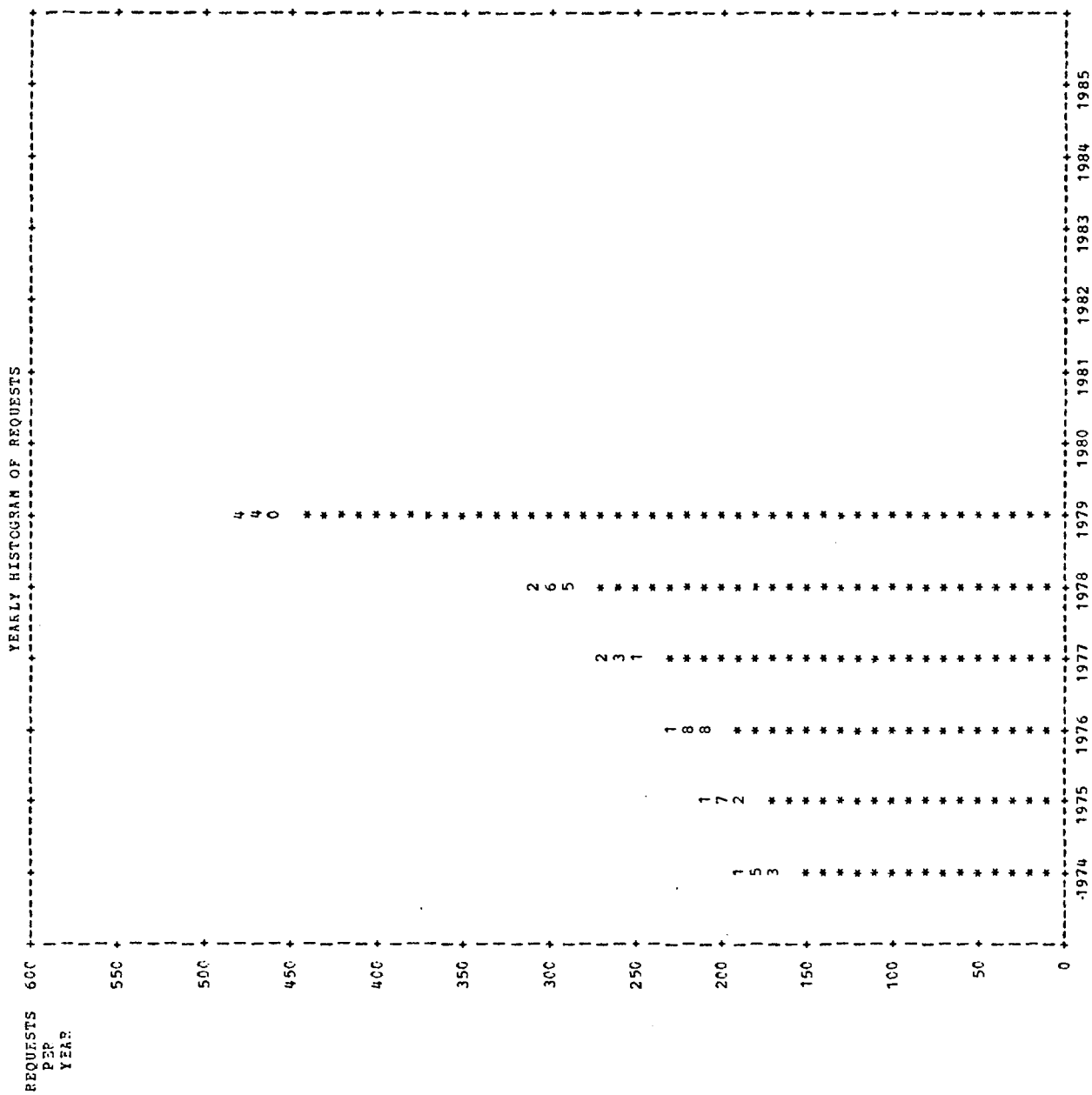
A minor innovation has been the inclusion of some information about the Data Bank services in NNDEN/25 and 26. As effort becomes available to develop the necessary index extraction programs operating on the data base, more neutron data information may be included in "News from the Data Bank"



REMARKS : 15 REQUESTS IN MAY FROM PARTICIPATION E.GRYNTAKIS IN THE CADARACHE MEETING FOR TRANS-NUCLIDES.
8 REQUESTS IN JUNE FROM VISITS C.NORDBORG TO LABORATORIES IN SWEDEN.
11 REQUESTS IN JUNE FOR THE RECENT RECIEVED ENDF/B-V TAPES.



REMARKS : 8 REQUESTS IN NOVEMBER FROM VISITS E.GRYNTAKIS TO LABORATORIES IN F.R. OF GERMANY.



REMARKS : FOR THE YEAR 1979 THE VALUE GIVEN IS THE ESTIMATED ONE OF TABLE 3.

Progress Report of the

National Nuclear Data Center
to the

Fourth Nuclear Reaction Data Centers Meeting

Karlsruhe FRG

October 8-12, 1979

I. General

Three new staff members have been added since our last report to the Reaction Data Centers Network. Our two programmers, Jean Burt and John Guthy have left and been replaced by Don Swinford and Paul Dempsey. The open EXFOR compiler position was filled by Mike Fanelli. The DEC-1091 computer and peripherals described in our last report, was installed in March 1979 and is performing up to expectations. Program conversion problems were minor.

II. WRENDA

The biennial review and updating of the United States Nuclear Data Request List was completed in January 1979. A complete set of U.S. entries in WRENDA format was submitted to NDS at that time.

III. CINDA

In January 1979, NNDC completed its review and correction of Area 1 entries. Corrections were sent to NEADB in time for the archival CINDA publication. All old data translated from SCISRS-I to EXFOR was indexed during this review. Extensive contributions to this effort were made by the personnel in the Physics and Support Groups.

The normal CINDA compilation activity has continued. Three special indices were prepared for the NEANDC Meeting on Data of Higher Pu and Am Isotopes, the Third International Symposium on Neutron Capture Gamma Ray Spectroscopy and the 1979 DOE-NDC Status Reports.

In the coming year we intend to index ENDL and those parts of ENDF/B which have been released for general distribution and expect to prepare indices for the Knoxville conference and the 1980 DOE-NDC Status reports.

With the completion of the 1979 CINDA Supplement, NNDC will assume full responsibility for the Area 1 entries in the CINDA master file. Updates to these entries will be transmitted at regular intervals to NEADB in the agreed exchange format. NNDC will continue to receive updates for areas 2, 3, and 4 from NEADB but now in the new exchange format. NNDC is now prepared to offer back-up to NEADB on both file maintenance and book tape generations. More details on our system are given in our separate DBMS Systems report.

IV. EXFOR

In the period June 1978 through September 1979, 16 transmission tapes (TRANS 1087-1102) have been sent out containing 226 new entries and numerous corrected entries. 152 post-1970 data sets have been compiled.

A check of EXFOR versus CINDA has been done in connection with the CINDA cleanup and a list of Area 1 data not in EXFOR has been produced. The references are being checked and missing data compiled on a time available basis.

V. Evaluated Data Neutron Data

The General Purpose File for ENDF/B has been released. ENDF/B-V data files for cross-section standards, dosimetry and actinides are available for unrestricted distribution. The fission product file which will also have general availability is expected to be ready for release by the end of 1979. All materials have passed extensive computer checking and review by experienced evaluators. The files are now being tested against benchmark experiments.

Work is in progress toward defining a more general ENDF format to handle non-neutron projectile as well as other additional reaction properties. Further tests on the format are in progress to test its practicability.

VI. Charged Particle Nuclear Data

CPND Bibliography

The bibliography is continuing to grow at an accelerated rate. As of the last week of September, 1979, it had increased in size approximately 30% over the size as of January 31, 1979.

The 1979 edition of BNL-NCS-50640 has been published and distributed. There were no changes in format over the 1978 edition. The rapid growth in the size of this publication will probably mean some major format or publication changes in future editons.

A tape of the current contents of the file has been distributed on a periodic basis to KACHAPAG, CAJaD, CJD, NDS, LRL along with the latest format manuals.

A DBMS system is being designed for the bibliography and should be operational by January, 1980.

McGowan-Milner Data File

The index to this file should be completed by the end of 1979 (e.g. brought up to CPND bibliography standards).

The many requests for data from the CPX data file has required the development of a set of simple Fortran programs which use the contents of the index to retrieve specific data sets from the data file.

Data of interest to our CPND evaluation activities will be translated into EXFOR.

Howerton Data File

Since this file is fairly limited in scope (i.e. scattering data for target and incident $A \leq 4$), the entire file is sent to satisfy any requests for data contained in it.

Experimental CPND Compilation

The first TRANS tape of CPND compiled at the NNDC containing experimental data on the (d,n) and related reactions was sent to KACHAPAG in the last week of September. Since CAJaD and NDS are also actively compiling CPND, copies of the tape were sent to these two centers.

VI. Charged Particle Nuclear Data (cont)

Work is in progress to collect experimental data on nuclear reactions of interest to nuclear medicine. The evaluation of T (d,n) reactions was discontinued because several other groups are already planning to evaluate this reaction.

VII. Photonuclear Reaction Data

The expected release of a new version of the Berman library has not occurred. Therefore, the conversion and transmission in EXFOR was not completed as promise.

VIII. Customer Services

The request statistics for the January 1, 1978 to December 1, 1978, are attached.

A computation format for σ vs. E cross sections data has been developed and output is produced in either a table format or a self-contained line format.

Improvements have been made on the computation format for resonance parameters, based on experience over the past year.

IX. Publications

The ENDF/B-V Formats and Procedures Manual (ENDF-102) and the ENDF/B-V Summary Documentation (ENDF- 201) are now in press.

The fourth edition of BNL-325, Vol. 1 Resonance Parameters will be published in two parts. Part I, Z=60, and Part 2, Z=61-100. It is anticipated that the first part will be completed sometime this fall while the second part in July of 1980. The recommended resonance parameters are based on experimental data stored in CSISRS library. A computer program retrieves the data from the library, transforms it into a standard from (such as $g\Gamma_n$ values) groups the data according to resonance energy and $g\Gamma_n^o$ values, then extracts a weighted and unweighted average with internal and external errors.

Some of the new features include the following:

1. An expanded introduction emphasing the systematics of average s- and p- wave radiative widths and neutrons strength functions.

2. Emphasis on average level spacings for s- and p-wave resonances. A staircase plot is produced by the computer and a least square fit is made, from which an average level spacing is obtained. Inspection of this plot enables the evaluator to determine the neutron energy E_n beyond which levels are being missed. Subsequently, a least square fit is produced in the energy region E_1-E_n. In addition, a most probable value of the spacing D* is computed in this energy region.

3. New quantities which have not been included previously will be recommended. These include the γ-ray strength functions for s- and p- wave resonances; incoherent scattering cross sections, 30 keV Maxwellian average capture cross sections, and the calculated capture and fission cross sections from positive s-wave resonances with spins I+1/2 and I-1/2.

IX. Publications (cont)

4. A visual indication of energy regions in which no measurements were carried out will be made.

5. The recommended resonance parameters are cast into an ENDF format. Spins of resonances which have not yet determined are randomly assigned so as to follow the (2J+1) level dinsity formula. The ENDF computer codes (with minor changes) can then be used to operate on the recommended resonance parameters to calculate (1) capture, scattering, and total cross sections, (2) absorption, capture, and fission resonance integrals, (3) average capture widths, etc.

6. Parameters of bound levels are determined in order to achieve consistency between measured and calculated capture cross sections and coherent scattering lengths.

X. Future Meetings

Symposium on Neutron Cross Sections from 10-50 MeV will be held at BNL, May 12-14, 1980. The meeting will review progress since the last symposium in May 1977, and will assess the current status of data and evaluations

kh

Request Statistics

TABLE 1A

1 Jan. 1978 to 30 June 1979

Area 1

Number of requests for data

Country Origin	Experimental Neutron and Charge Particle Data	Evaluated Neutron and Charge Particle Data	Bibliographic Neutron and Charged Particle Information	All Codes	All Documents	Total
USA	148 (33)	396 (114)	35 (6)	61 (23)	611 (348)	1251(524)
Canada	3 (1)	5 (4)	1 (1)	0 (0)	25 (13)	34 (19)
Foreign	—	—	—	30 (7)	276 (167)	306 (174)
Total	151 (34)	401 (118)	36 (7)	91 (30)	912 (528)	1591 (717)

Values in ( ) are the 1 Jan. 1979 to 30 June 1979 contributions to the total.

Request Statistics

TABLE 1B

1 Jan. 1978 to 30 June 1979

Area 1

Number of Request for Data

Originating Organization	Experimental Neutron and Charge Particle Data	Evaluated Neutron and Charge Particle Data	Bibliographic Neutron and Charge Particle Information	All Codes	All Documents	Total	Total 1/1/77 – 12/31/77
Government Labs.(US)	94(16)	184(54)	25(3)	30(12)	235(138)	568(223)	334
University(US)	26(6)	44(15)	4(0)	12(8)	185(119)	271(148)	99
Industry(US)	28(11)	168(45)	6(3)	19(3)	191(91)	412(153)	160
Foreign	3*(1)	5*(4)	1*(1)	30**(7)	301**(180)	340(193)	12
Total	151(34)	401(118)	36(7)	91(30)	912(528)	1591(717)	605

*Canada

**All foreign request

Values in ( ) are the 1 Jan. 1979 to 30 June 1979 contribution to total.

Request Statistics

TABLE 1C

1 Jan. 1978 to 30 June 1979

Area 1

Number of Request for Data

Request Disposition	Experimental Neutron and Charge Particle Data	Evaluated Neutron and Charged Particle Data	Bibliographic Neutron and Charged Particle Information	All Codes	All Documents	Total	Total 1/1/77 12/31/77
Fulfilled	151(34)	401(118)	36(7)	91(30)	912(528)	1591(717)	605
Partially Fulfilled	0	0	0	0	0	0	0
Unfulfilled	0	0	0	0	0	0	0
Standing	0	0	0	0	0	0	0
Total	151(34)	401(118)	36(7)	91(30)	912(528)	1591(717)	605

Values in ( ) are the 1 Jan. 1979 to 30 June 1979 contribution to the total.

Request Statistics

TABLE II

1 Jan. 1978 to 30 June 1979

Area 1

Data Dissemination

EXPERIMENTAL		
Neutron	28,893 (7,752) Data Sets	Containing 1,921,334 (329,178) points
Charged Particle	7(3) Request	
EVALUATED		
Neutron*	4,742 (2,541) ENDF Materials	
Charged Particle	1(0) Charge Particle Evaluated Data File	
BIBLIOGRAPHIC		
Neutron	55 (6) CINDA Entries	
Charged Particle	13 (9) Requests	
OTHER		
Codes	346 (76) Total Number	
Documents**	2,582 (2,042) Total Number	
Miscellaneous	27 (5) Requests	

*Does not include CSEWG Distribution.

**Does not include documents sent from Distribution List.

Values in ( ) are 1 Jan. 1979 to 30 June 1979 contribution to the take.

Request Statistics

TABLE III

1 Jan. 1978 to 31 Dec. 1978

Area 1

EXPERIMENTAL NEUTRON DATA

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 REQUEST
1-H	11	6	0	23	0	10	0	0	4	54
2-He	6	4	0	3	2	3	2	0	2	22
3-Li	11	9	7	12	29	19	21	0	11	119
4-Be	4	2	1	3	5	4	3	0	3	15
5-B	4	3	3	5	11	8	7	0	9	50
6-C	14	6	2	6	12	9	4	0	4	57
7-N	6	6	1	0	4	4	8	0	0	29
8-O	8	4	2	4	13	9	7	0	2	49
9-F	2	1	1	3	10	4	4	0	1	26
10-Ne	3	3	0	5	14	1	4	0	1	31
11-Na	2	1	2	3	9	17	9	0	3	46
12-Mg	5	3	3	3	24	12	7	0	3	60
13-Al	3	2	2	5	9	7	7	0	2	37
14-Si	4	5	3	1	1	5	3	0	2	24
15-P	2	1	1	4	5	5	5	0	2	25
16-S	4	2	2	3	22	16	9	0	3	61
17-Cl	4	1	3	3	20	10	5	0	3	49
18-Ar	2	3	0	6	5	4	5	0	1	26
19-K	4	1	3	5	15	11	14	0	4	57
20-Ca	12	6	2	1	42	16	7	0	4	90
21-Sc	4	1	1	3	15	10	3	0	1	38
22-Ti	12	11	3	8	64	28	15	0	6	147
23-V	7	3	2	5	14	10	4	0	4	49
24-Cr	8	3	5	4	37	17	10	0	3	87
25-Mn	2	0	0	0	8	12	5	0	3	30
26-Fe	9	6	5	10	33	15	16	0	6	100
27-Co	3	3	2	4	10	7	4	0	2	35
28-Ni	8	8	6	11	42	21	33	0	5	134

TABLE III (cont)

ELEMENT	TOTAL (TOT)	ELAS. SCAT. (EL)	INEL. SCAT. (INL)	INEL. SCAT. (C/S)	RES. PAR. (RES)	GAMMA & NEUTRON EMISSION (NG)	CHARGED PARTICLE EMISSION (NX)	FISSION (NF)	OTHERS	TOTAL REQUEST
29-Cu	4	3	2	5	20	29	18	0	2	83
30-Zn	3	3	4	2	36	23	15	0	2	88
31-Ga	2	2	0	2	21	8	3	0	2	40
32-Ge	2	5	5	2	26	20	5	0	3	68
33-As	2	1	1	2	8	4	4	0	1	23
34-Se	2	5	6	3	44	19	6	0	3	88
35-Br	5	4	1	2	29	14	5	0	4	64
36-Kr	5	6	0	2	11	24	5	0	1	54
37-Rb	6	1	1	3	25	13	9	0	1	59
38-Sr	3	4	0	0	9	6	2	0	1	25
39-Y	2	1	0	0	5	5	0	0	0	13
40-Zr	6	6	0	0	28	14	10	0	1	65
41-Nb	2	3	0	0	5	4	1	0	1	16
42-Mo	9	8	0	0	32	16	9	0	1	75
43-Tc	1	1	0	0	3	2	0	0	0	7
44-Ru	5	7	0	0	15	12	0	0	0	39
45-Rh	2	2	0	0	5	4	0	0	0	13
46-Pd	2	1	0	0	5	8	0	0	0	16
47-Ag	6	2	3	7	35	17	4	0	3	77
48-Cd	17	20	7	6	100	33	8	0	2	193
49-In	6	4	5	2	27	17	9	0	2	72
50-Sn	9	14	7	3	107	30	5	0	2	177
51-Sb	4	3	0	0	11	11	0	0	0	29
52-Te	8	8	0	0	25	17	1	0	0	59
53-I	1	2	0	0	6	4	0	0	0	13
54-Xe	7	12	0	0	0	1	0	0	0	20
55-Cs	2	0	0	0	27	11	1	0	1	42
56-Ba	7	7	2	0	29	14	0	0	1	60
57-La	2	0	0	0	8	5	0	0	0	15
58-Ce	1	2	0	0	5	5	2	0	0	15
59-Pr	2	1	0	0	5	2	0	0	0	10
60-Nd	9	8	0	0	30	17	1	0	0	65

TABLE III (cont)

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 (NG)	OTHERS	REQUEST
61-Pm	1	1	0	0	1	1	0	0	0	4
62-Sm	6	7	0	0	21	6	5	0	0	45
63-Eu	2	0	0	0	6	6	0	0	0	14
64-Gd	6	7	0	0	24	16	0	0	0	53
65-Tb	2	1	0	0	4	3	0	0	0	10
66-Dy	2	7	0	0	19	11	0	0	0	39
67-Ho	1	0	0	0	0	0	0	0	0	1
68-Er	2	0	0	0	0	2	0	0	0	4
69-Tm	1	0	0	0	0	0	0	0	0	1
70-Yb	1	0	0	0	0	0	0	0	0	1
71-Lu	1	0	0	0	0	1	0	0	0	2
72-Hf	1	0	0	0	0	2	0	0	0	3
73-Ta	1	0	0	0	0	2	0	0	1	4
74-W	12	6	5	3	21	15	13	0	6	81
75-Re	1	0	0	0	0	2	0	0	1	4
76-Os	1	0	0	0	0	0	0	0	0	1
77-Ir	1	0	0	0	0	2	0	0	1	4
78-Pt	1	0	0	0	0	2	0	0	0	3
79-Au	1	0	0	0	0	13	0	0	1	15
80-Hg	2	4	5	1	41	11	0	0	2	66
81-Te	1	0	0	0	0	1	0	0	1	3
82-Pb	7	6	5	5	29	14	2	0	6	74
83-Bi	2	2	1	0	0	2	0	0	1	8
88-Ra	0	0	0	0	0	0	0	0	0	0
89-Ac	0	0	0	0	0	0	0	0	0	0
90-Th	2	0	0	0	0	7	0	6	0	15
91-Pa	0	0	0	0	0	0	0	1	0	1
92-U-000	0	0	0	0	0	0	0	0	0	0
92-U-230	0	0	0	0	0	0	0	0	0	0
92-U-231	0	0	0	0	0	0	0	0	0	0
92-U-232	0	0	0	0	0	0	0	2	0	2
92-U-233	7	3	0	2	54	7	0	13	7	93

TABLE III (cont)

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 REQUEST
92-U-234	1	2	0	1	6	0	0	5	1	16
92-U-235	3	2	1	0	3	7	0	59	1	76
92-U-236	1	1	0	0	2	1	0	4	0	9
92-U-237	0	0	0	0	0	0	0	2	1	3
92-U-238	1	1	1	0	0	18	0	19	2	42
92-U-oxi	0	0	0	0	0	0	0	0	0	0
92-U-239	0	1	0	0	0	2	0	5	0	8
93-Np	0	0	0	0	0	1	0	5	0	6
94-Pu-000	0	0	0	0	0	0	0	0	0	0
94-Pu-238	0	0	0	0	0	0	0	0	0	0
94-Pu-239	1	1	0	0	0	1	0	25	3	31
94-Pu-240	3	3	2	4	13	4	0	17	1	47
94-Pu-241	3	0	0	0	0	3	0	15	1	22
94-Pu-242	2	1	0	2	7	5	0	11	2	30
94-Pu-243	0	0	0	0	0	0	0	0	0	0
94-Pu-244	0	0	0	0	0	0	0	2	0	2
94-Pu-245	0	0	0	0	0	0	0	0	0	0
95-Am	2	0	0	0	12	6	0	7	1	28
96-Cm	0	0	0	0	0	0	0	5	0	5
97-Bk	0	0	0	0	0	0	0	0	0	0
98-Cf	0	0	0	0	0	0	0	9	0	9
99-Es	0	0	0	0	0	0	0	0	0	0
100-Fm	0	0	0	0	0	0	0	2	0	2
TOTAL	390	306	126	202	1480	877	364	214	168	4,127

Request Statistics

TABLE IIIA

1 Jan. 1979 to 30 June 1979

Area 1

EXPERIMENTAL NEUTRON DATA

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 REQUEST
1-H	1	0	0	0	0	6	0	0	0	7
2-He	0	0	0	0	0	2	0	0	0	2
3-Li	4	5	5	7	21	14	13	0	5	74
4-Be	0	0	0	0	0	1	5	0	0	6
5-B	0	0	0	1	0	3	2	0	3	9
6-C	0	0	0	0	1	3	0	0	0	4
7-N	0	0	0	0	0	1	0	0	0	1
8-O	0	0	0	0	0	2	0	0	0	2
9-F	0	0	0	0	0	2	0	0	0	2
10-Ne	0	0	0	0	0	1	0	0	0	1
11-Na	0	0	0	0	1	10	0	0	0	11
12-Mg	0	0	0	0	0	8	5	0	0	13
13-Al	0	0	0	0	1	1	5	0	0	7
14-Si	0	0	0	0	0	5	6	0	0	11
15-P	0	0	0	0	0	2	0	0	0	2
16-S	1	0	0	0	0	11	0	0	0	12
17-Cl	0	0	0	0	0	5	0	0	0	5
18-Ar	0	0	0	0	0	4	0	0	0	4
19-K	0	0	0	0	0	4	0	0	0	4
20-Ca	0	0	0	0	0	7	0	0	0	7
21-Sc	0	0	0	0	0	5	2	0	0	7
22-Ti	0	0	0	0	0	12	8	0	0	20
23-V	0	0	0	0	0	6	2	0	0	8
24-Cr	0	0	0	0	0	12	0	0	0	12
25-Mn	0	0	0	0	0	11	0	0	0	11
26-Fe	4	3	3	1	32	26	31	0	3	103
27-Co	0	0	0	0	0	6	0	0	0	6
28-Ni	0	0	0	0	0	16	14	0	0	30

TABLE IIIA (cont)

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 REQUEST
29-Cu	0	0	0	0	0	18	5	0	0	23
30-Zn	0	0	0	0	0	16	0	0	0	16
31-Ga	0	0	0	0	0	3	0	0	0	3
32-Ge	0	0	0	0	0	5	0	0	0	5
33-As	0	0	0	0	0	2	0	0	0	2
34-Se	0	0	1	0	0	8	0	0	0	9
35-Br	0	0	0	0	0	3	0	0	0	3
36-Kr	2	2	0	3	30	25	9	0	2	73
37-Rb	1	0	0	0	0	7	0	0	0	8
38-Sr	0	0	1	0	0	7	0	0	0	8
39-Y	0	0	0	0	0	5	0	0	0	5
40-Zr	0	0	0	0	0	7	2	0	0	9
41-Nb	0	0	0	0	0	3	0	0	0	3
42-Mo	0	0	0	0	0	10	0	0	0	10
43-Tc	0	0	0	0	0	3	0	0	0	3
44-Ru	0	0	0	0	0	11	0	0	0	11
45-Rh	0	0	1	0	0	4	0	0	0	5
46-Pd	0	0	0	0	0	7	0	0	0	7
47-Ag	0	0	3	0	0	9	0	0	1	13
48-Cd	0	0	2	0	0	12	0	0	0	14
49-In	0	0	3	0	0	8	0	0	0	11
50-Sn	0	0	1	0	70	10	0	0	0	81
51-Sb	0	0	0	0	0	6	0	0	0	6
52-Te	0	0	0	0	0	9	0	0	0	9
53-I	0	0	0	0	0	7	0	0	0	7
54-Xe	0	0	0	0	0	18	0	0	0	18
55-Cs	0	0	0	0	0	4	0	0	0	4
56-Ba	0	0	3	0	0	13	0	0	0	16
57-La	0	0	0	0	0	4	0	0	0	4
58-Ce	3	3	2	6	4	22	6	0	8	54
59-Pr	0	0	0	0	0	3	0	0	0	3
60-Nd	0	0	0	0	0	6	0	0	0	6

TABLE IIIA (cont)

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
61-Pm	0	0	0	0	0	5	0	0	0	5
62-Sm	0	0	0	0	0	11	0	0	0	11
63-Eu	0	0	0	0	0	5	0	0	0	5
64-Gd	0	0	0	0	0	8	0	0	0	8
65-Tb	0	0	0	0	0	1	0	0	0	1
66-Dy	0	0	0	0	0	9	0	0	0	9
67-Ho	0	0	0	0	0	1	0	0	0	1
68-Er	0	0	0	0	0	7	0	0	0	7
69-Tm	0	0	0	0	0	3	0	0	0	3
70-Yb	0	0	1	0	1	9	0	0	0	11
71-Lu	0	0	1	0	0	3	0	0	0	4
72-Hf	0	0	2	0	0	9	0	0	0	11
73-Ta	1	0	2	0	0	4	0	0	0	7
74-W	0	0	4	0	0	8	0	0	0	12
75-Re	0	0	0	0	0	4	0	0	0	4
76-Os	0	0	1	0	0	8	0	0	0	9
77-Ir	0	0	1	0	0	3	0	0	0	4
78-Pt	0	0	0	0	0	6	0	0	0	6
79-Au	0	0	1	0	0	9	0	0	0	10
80-Hg	0	0	0	0	0	6	0	0	0	6
81-Te	0	0	0	0	0	3	0	0	0	3
82-Pb	0	2	4	0	0	7	0	0	0	13
83-Bi	1	1	1	1	6	8	3	0	2	23
86-Rn	0	0	0	0	0	1	0	0	0	1
88-Ra	0	0	0	0	0	3	0	0	0	3
89-Ac	0	0	0	0	0	1	0	0	0	1
90-Th	1	0	0	0	0	7	0	0	0	8
91-Pa	0	0	0	0	0	3	0	0	0	3
92-U-000	0	0	0	0	0	1	0	0	0	1
92-U-230	0	0	0	0	0	0	0	0	0	0
92-U-231	0	0	0	0	0	0	0	0	0	0
92-U-232	0	0	0	0	0	1	0	0	0	1
92-U-233	1	0	0	0	0	2	0	1	1	5

TABLE IIIA (cont)

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
92-U-234	0	0	0	0	0	1	0	0	0	1
92-U-235	1	1	1	0	0	4	0	19	0	26
92-U-236	0	0	0	0	0	1	0	0	0	1
92-U-237	0	0	0	0	0	0	0	1	0	1
92-U-238	1	0	0	0	0	7	0	6	1	15
92-U-oxi	0	0	0	0	0	0	0	1	0	1
92-U-239	1	0	0	0	0	0	0	2	0	3
93-Np	0	0	0	0	0	4	0	1	0	5
94-Pu-	0	0	0	0	0	0	0	0	0	0
94-Pu-238	0	0	0	0	0	1	0	0	0	1
94-Pu-239	0	0	0	0	0	0	2	1	0	3
94-Pu-240	0	0	0	0	0	3	0	0	0	3
94-Pu-241	0	0	0	0	0	1	0	2	0	3
94-Pu-242	0	0	0	0	0	3	0	0	0	3
94-Pu-243	0	0	0	0	0	1	0	0	0	1
94-Pu-244	0	0	0	0	0	1	0	0	0	1
94-Pu-245	0	0	0	0	0	1	0	0	0	1
95-Am	0	0	0	0	0	6	0	3	0	9
96-Cm	0	0	0	0	0	9	0	0	0	9
97-Bk	0	0	0	0	0	1	0	0	0	1
98-Cf	0	0	0	0	0	6	0	0	0	6
99-Es	0	0	0	0	0	2	0	0	0	2
100-Fm	0	0	0	0	0	0	0	0	0	0
TOTAL	23	17	44	19	167	669	120	37	26	1,122

Symposium on Neutron Cross Sections
from 10-50 MeV

May 12-14, 1980

PROPOSED DRAFT AGENDA

May 12 a.m. I. Introductory Remarks

Overview of the 10-40 MeV Symposium and what has been done since then. A.B. Smith (ANL)

May 12 a.m. II. Intense High Energy Neutron Sources and their Characteristics

Session Chairman: H.H. Barschall (U of Wis)
Review Speaker: L.R. Greenwood (ANL)
Workshop Chairman: C.D. Bowman (NBS)

May 12 p.m. III. Differential Data Including Dosimetry Reactions

Session Chairman: J.D. Anderson (LLL)
Review Speaker: John Browne (LASL)
Workshop Chairman: F. G. Perey (ORNL)

May 13 a.m. IV. FMIT Related Problems-Shielding and Materials Damage Studies

Session Chairman: C.R. Head (DOE)
Review Speaker: Lee Carter (HEDL) (Shielding)
Review Speaker: D. Doran (HEDL) (Materials Damage)
Workshop Chairman: R.E. Schenter (HEDL)

May 13 p.m. V. Nuclear Model Codes and Data Evaluation

Session Chairman: Ed Arthur (LASL)
Review Speaker: Don Gardner (LLL)
Workshop Chairman: P.G. Young (LASL)

May 14 a.m. IV. Plenary Session-Presentation and Discussion of Workshop Reports

Session Chairman: S. Pearlstein (BNL)

May 14 noon Adjournment

BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

DATE: September 28, 1979

TO: Reaction Data Center

FROM: NNDC

SUBJECT: Fission Spectrum Data

A workshop on fission spectrum data, their analysis and evaluation was held at the National Nuclear Data Center on October 23, 1978 with Leona Stewart (LASL) as Chairman. As a result of the ensuing discussion, it was realized that fission spectrum data should be available at cross section data centers for subsequent analysis applying multiple scattering and other corrections. Such corrected data could then be used to carry out an evaluation to arrive at a set of best parameters for representing the spectrum. In this connection, the difficulty of obtaining such data was mentioned and NNDC was charged by the Chairman and members of the workshop to collect and maintain such data in its files in cooperation with other data centers.

REFERENCE GUIDELINES FOR ENDF/B

Case I: Use of ENDF/B evaluations in a secondary manner, where many elements are used together, or other cases where NO CONCLUSIONS ARE DRAWN CONCERNING QUALITY OF EVALUATIONS. In this case we propose the following form for ENDF/B-V.

> "ENDF/B Summary Documentation, BNL-NCS-17541 (ENDF-201), 3rd Edition (ENDF/B-V), edited by R. Kinsey, available from the National Nuclear Data Center, Brookhaven National Laboratory, Upton, N.Y. (July 1979)."

Case II: Use of ENDF/B evaluations in a direct manner, for example comparing measured results with evaluated results, or ANY CASE WHERE CONCLUSIONS ARE DRAWN ABOUT AN EVALUATION FOR A PARTICULAR MATERIAL. We propose, for ^{12}C from ENDF/B-V as an example:

> "ENDF/B data file for ^{12}C (MAT 1306,MOD 1), evaluation by C.Y. Fu and F.G. Perey (ORNL), BNL-NCS-17541 (ENDF-201), 3rd Edition (ENDF/B-V), edited by R. Kinsey, available from the Brookhaven National Laboratory, Upton, N.Y. (July 1979)."

Case III: Use of ENDF/B evaluations to generate a multigroup library. In this case we propose that the report describing the library contain a table which includes the following information for each evaluation:

Material	MAT,MOD	Authors	Institution

This table may contain in addition other useful information concerning the multigroup library. Finally, a general reference should be given of the type described in Case I.

As shown in Cases II and III, a correct reference would contain the material name, MAT number, author list and institution(s), along with a reference to the Summary Documentation. In addition, for ENDF/B-Version V, updates will be allowed to the evaluations prior to the release of ENDF/B-VI. Thus, references to ENDF/B-V evaluations should also contain the appropriate MOD number, which serves to define the current status of an evaluation. All of this information is readily available in File 1 of each evaluation. The only exception to the above cases would be where a published document, prepared by the authors of the evaluation, is available. This document should then be referenced directly.

ENCLOSURE B

Charged-Particle Data Activities
(arranged by activity)

Bibliographic

Nuclear Data Project
National Nuclear Data Center-primarily integral data

Compilation

Karlsruhe Charged-Particle Data Group
- Integral Charged Particle Nuclear Data

Centr po Atomn. i Jadern. Dannym
- Charged Particle Data from the USSR

Nuclear Data Section, IAEA
- Primarily evaluated neutron-source reaction data

Japanese Study Group
- Differential Charged-Particle Nuclear Data

National Nuclear Data Center
- Experimental neutron-source reaction data
- Excitation functions for accelerator-produced radionuclides of interest to medicine (planned)

Nuclear Data Group, I.B.J.
- Charged-particle reaction data on neon targets

Nuclear Physics Division, Harwell
- Charged-particle nuclear data relevant to ion-beam analysis

Atom institut der Österreichischen Univ.
- Proton scattering data on all nuclides
- α-scattering data on all nuclides (planned)

Lawrence Livermore Laboratory
- Charged-particle scattering data for targets and projectiles with $Z \leq 4$.
- Other charged-particle nuclear data relevant to fusion (planned)

Argonne National Laborataory
- Planned cooperative effort with Lawrence Livermore

Evaluations or Calculations

Karlsruhe Charged Particle Data Group
- Calculation by use of systematics or global parameters of excitation functions

National Nuclear Data Center
- Evaluation of excitation functions for accelerator-produced radionuclides of interest to medicine (planned)

Lawrence Livermore Laboratory
- Evaluation of 25 charged-particle reactions of interest to fusion
- Extension of this effort to other fusion-related reactions (planned)

Evaluations or Calculations (cont.)

Los Alamos Scientific Laboratory
- R-Matrix evaluation of 19 fusion-related reactions.

Nuclear Engineering Dept., University of Illinois
- Calculation of fusion-related excitation functions.

Dept. of Physics, California Institute of Technology
- Calculation of excitation functions relevant to fusion and astrophysics

Argonne National Laboratory
- R-Matrix analysis of charged-particle reactions on lithium targets (Elwyn group)
- Planned cooperative effort with LLL (Smith group)

Nuclear Engineering Dept., University of Wisconsin (H.H. Barschall and R.W. Conn)

They are primarily interested in obtaining or producing energy-transfer matrices for the various fusion fuel cycles. They may be doing some evaluations in support of this interest.

Dept. of Physics, California Institute of Technology (W.A. Fowler)

This group has an ongoing experimental and calculational program to provide cross section and reaction rate data of interest to fusion and astrophysics.

Argonne National Laboratory

There is one group (Elwyn et al.) which has an ongoing measurement and evaluation program of charged-particle reactions on Lithium targets. Another group (A.B. Smith et al.) is planning a cooperative program with R.J. Howerton's group at Lawrence Livermore Laboratory (see above for details).

Nuclear Data Project, Oak Ridge National Laboratory

While the Data Project does not compile or evaluate reaction data per se, it does index in Recent References references containing both integral and differential charged-particle nuclear data.

PROTOCOL FOR COOPERATION BETWEEN THE NUCLEAR REACTION DATA CENTERS FOR THE SYSTEMATIC EXCHANGE OF NEUTRON DATA INFORMATION

Original Draft - April 1972

Revised - April 1977, June 1978, October 1979 *)

A. DEFINITIONS

1. Neutron Data Information in the context of this protocol is defined to mean measured microscopic experimental data which have resulted from neutron physics experiments, and their associated bibliographic and physical descriptive information.

2. Charged Particle Data Information, in the context of this protocol, is defined to mean experimental or evaluated microscopic data which have resulted from nuclear physics experiments for incident charged particles with mass greater than or equal to one, and their associated bibliographic and physical descriptive information.

3. Photonuclear Data Information, in the context of this protocol, is defined to mean experimental or evaluated microscopic data which have resulted from nuclear physics experiments for incident gamma rays with all reaction products having a mass greater than or equal to one, except for outgoing gamma rays, and their associated bibliographic and physical descriptive information.

4. The Exchange Format, or EXFOR, is a computer-compatible set of agreed upon definitions and conventions, designed for the transmission of nuclear reaction data information between nuclear reaction data centers.

5. The EXFOR Manual, comprising the currently agreed set of EXFOR definitions, conventions, formats and codes, is designed to serve as the basis and guide for the description and coding of nuclear reaction data information in EXFOR and for data transmission between nuclear reaction data centers.

6. EXFOR data is defined as all nuclear reaction data information coded and exchanged in EXFOR.

*) Note by editor: The version reproduced here was received at NDS with letter from NNDC dated 20 March 1980 taking into account the comments expressed in Memo CP-B/31 dated 3 March 1980.

B. THE FOUR NEUTRON DATA CENTERS

1. Service Areas

The responsibility for the collection, compilation and dissemination of neutron data information is shared among the four major neutron data compilation centers, each being responsible for a defined service area.

The four centers and their respective service areas are:

a) The National Nuclear Data Center (NNDC), at the Brookhaven National Laboratory (USA), services the USA and Canada.

b) NEA-Data Bank (NEA-DB), at Saclay (France), services the non-American member Countries of the OECD.

c) The USSR Center po Jadernym Dannym (CJD) at Obninsk (USSR) services the USSR.

d) The IAEA Nuclear Data Section (NDS) in Vienna (Austria) services IAEA Member States not included in the service areas of the above three centers, that is, countries in Eastern Europe, Asia, Africa, South and Central America, and Australia and New Zealand.

2. Four-Center Commitment

a) Within the scope of this protocol each center is expected to compile the data measured in its service area as fast and as thoroughly as possible.

b) The four centers agree that "new" data should be coded in EXFOR (where new is defined as data collected by the centers at the time of, or after, formal transmission of data was initiated). This does not preclude the transformation of "old" data into EXFOR.

c) Each center may compile data measured outside its service area. Regular transmission of EXFOR data from any one center shall include data only from its own service area.

d) Each center shall keep an archival copy of the latest version of each of the EXFOR entries which it originated and shall be ready to provide the data to any center should it be required.

C. NUCLEAR REACTION DATA CENTERS (NRDC)

1. Additional Centers

For the purposes of exchanging nuclear reaction data, in addition to the four neutron data centers, additional centers or groups are included. The composite group of centers is named the Nuclear Reaction Data Centers (NRDC). Additional groups defined to date are:

a) Charged Particle Nuclear Data Group (KACHAPAG) at Karlsuhe (Fed. Rep. of Germany)

b) Centr po Dannym o Stroenii Atomnogo Jadra i Jadernukh Reakcikh GKAE CCCP at the Kurchatov Inst., Moscow (USSR)

2. Nuclear Reaction Data Center Commitment

a) All matters concerning the exchange of neutron data must be agreed to by the four centers.

b) All matters that affect EXFOR in general must be agreed to by the Nuclear Reaction Data Centers.

c) For non-neutron data there is no requirement for completeness.

D. IMPLEMENTATION OF EXFOR

1. Implementation schedule

a) The date after which all "new" neutron data should be coded into EXFOR is 1 July 1970.

b) Data tapes will be exchanged regularly between the four neutron data centers at a maximum interval of three months, with the possibility to transmit timely data at more frequent intervals. If deemed necessary, a stricter, or less rigid schedule could be agreed upon at any time in the future.

2. Method of data transmission

a) EXFOR data will be transmitted in accordance with the conventions laid down in the EXFOR Manual.

b) Only the character set specified in the EXFOR Manual is permitted.

c) The working language of EXFOR shall be English, and all free text comments within all EXFOR entries shall be English.

3. Scope of transmitted data

a) The general scope of EXFOR data will be all experimental microscopic nuclear reaction data.

b) Modifications to the general scope of EXFOR data can be adopted only as a result of an agreement between the NRDC.

E. CORRECTIONS, REVISIONS AND DELETIONS OF TRANSMITTED EXFOR ENTRIES

1. Corrections or revisions

In the event of partial corrections or revisions of an EXFOR entry, at least the subentry containing the correction shall be transmitted by the originating center to the other centers, in accordance with the conventions laid down in the EXFOR Manual.

2. Accession numbers used

Once transmitted, no accession or subaccession number should be reused for another entry or subentry. The accession number of a deleted entry (subentry) should not be used for another entry (subentry).

F. EXFOR DICTIONARIES

1. Updating of Dictionaries

a) To prevent duplications and conflicts, the NDS is responsible for the coordination and the updating of the EXFOR dictionaries.

b) Alterations (meaning additions, corrections or deletions) to EXFOR dictionaries can be termed consequential, which would entail changes in transmitted data, and thus required NRDC approval, or inconsequential, which would not entail changes in transmitted data or NRDC approval. Without exception, all changes to Dictionaries 1, 2, 4, 10, 11, 12, 16, 24, 28, 29, 30, 31, 32, 33, 34 and 35 are consequential and require NRDC approval.

c) Consequential Dictionary Alterations

Alterations of EXFOR dictionary entries which entail changes to data already transmitted cannot be implemented without specific NRDC approval.

d) Inconsequential Dictionary Alterations

Proposals for alterations of EXFOR dictionary entries which do not entail changes to data already transmitted, and which do not fall in the Dictionary list given in F.1.b., above, should be submitted by the centers to NDS, together with their mnemonic terms and definitions, via CP Memo. NDS shall transmit the approved dictionary entries to all centers simultaneously, in the form of photocopies of the input forms used for the NDS dictionary update program.

e) In their function to update EXFOR dictionaries, the NDS is given some latitude in reformulating the definition, but must not change the meaning without the approval of the originating center. In questionable cases NDS shall consult with the other centers for their opinions. It is the responsibility of each Center to update its own sets of Dictionaries.

2. Routine Transmission of Dictionaries

The NDS will transmit a complete set of dictionaries to the other centers every three months, as a separate EXFOR transmission.

G. COMPILERS' MANUAL

1. The EXFOR Compilers' Manual, LEXFOR, is designed as a companion to the EXFOR Manual giving more detailed guidelines for compilers on the specification and compilation of the data to be transmitted in EXFOR, as mutually agreed on by the data centers. Included are definitions of physics terms, their nomenclature and interrelations.

2. Changes and revisions to LEXFOR follow the same procedures as with the EXFOR Manual (see section I. below), in accordance with the conventions laid down in the EXFOR Manual.

3. The center responsible for the updating of LEXFOR is the NNDC.

H. EXFOR COMMUNICATIONS BETWEEN CENTERS

Three forms of documents are used for the proper distribution and referencing of all documentation on EXFOR.

1. CP Memos for the communication of proposals, programming details and other general considerations which touch upon the overall aspect of EXFOR. This series of memoranda are numbered as follows:

   Memo-CP-n/m

   (where n is the center identification number, and m the chronological memo number within the center).

2. Four-Center Memos for the communication of details dealing only with neutron data or other Four-Center (non-EXFOR) matters, e.g. WRENDA, CINDA.

3. Exchange Format Memos for the transmittal of updating EXFOR Manual pages. This series of memoranda is issued by the NNDC only, to each of the other three centers, and is numbered as follows:

   Memo-X4-m

   (where m is the chronological memo number).

I. CHANGES AND REVISIONS OF EXFOR

1. No changes in the structure of EXFOR will be allowed without NRDC agreement.

2. If any one of the NRD centers proposes an alteration which would result in changes of the EXFOR structure and content, it will be the responsibility of the center originating such proposal to obtain NRDC agreement, following the procedure outlined in Paragraph I.3, below.

3. The following procedure should be followed by each of the NRDC in obtaining the agreement to every one of its proposals to change or revise EXFOR within the context of Paragraph I.2, above; all communications with regard to such proposal shall be in the form of CP Memos.

   a) The initial proposal should be disseminated to all NRD centers.

   b) In the case where there is discussion on a proposal, the initiating center shall then collect and digest all comments, suggestions and counter proposals.

   c) In this review, the initiating center shall consider such facts which would affect the EXFOR data base and associated computer codes.

   d) The initiating center shall then distribute a technical evaluation of alternatives to the other centers.

   e) After receiving the response to this technical evaluation, the initiating center shall:

      (i) In the case of positive agreement of the six participating centers, submit the proposed alteration to the center responsible for the EXFOR Manual updating.

      (ii) Otherwise, submit it for inclusion in the agenda of the next NRDC meeting.

4. Proposals for changes to be considered at NRDC meetings should be sent out one month prior to the meeting date to allow center personnel time to review them.

5. Whenever decisions are made which require Manual changes, the new updates are to be prepared and sent out at most by one month after the draft minutes are received. The proposed changes should be written into the minutes in such a way that they can be inserted directly into the Manual if they are accepted.

6. The center responsible for the updating of the Manuals is the NNDC. Within one month after a decision has been made, this center shall be responsible for producing a sufficient number of copies of the updated pages and distributing them in accordance with an established EXFOR distribution list.

7. The center responsible for updating the Manual may introduce changes for the purpose of editing. However, proposed Manual wordings submitted in CP-Memos are entered in the Manual unchanged, unless an objection is expressed in due time. This center is also responsible for maintaining the internal consistency of the Manual; that means, e.g., to check whether an agreed proposal entails changes (cross-references, etc.) in other parts of the Manual.

8. A change on a Manual page, as compared to its previous version, is marked by a vertical line in the left-hand margin. The date of the latest revision to that page is given in the lower right-hand corner.

9. Further details on changes and revisions to EXFOR are laid down in the EXFOR Manual.

J. CHANGES AND REVISIONS OF THIS PROTOCOL

1. Any change to this Protocol which is deemed necessary shall come into effect only after submission of a proposal and approval at an NRDC meeting.

2. The center responsible for the updating of this Protocol is the NNDC.