Memo CP-D/230

25 September 1992

To: Distribution

From: H.D. Lemmel, O. Schwerer, H. Wienke

Subject: Draft of the Conclusions and Actions of the Technical NRDC Meeting, Vienna, 1-3 September 1992

Please find attached the draft of the Conclusions and Actions (with Introduction and summaries of the network of nuclear reaction data centers, the manpower situation and the co-ordination of the CPND centers) resulting from the September 1992 NRDC Meeting.

If you have comments, changes or additions, please transmit them as soon as possible but not later than 15 November 1992.

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Consultants' Meeting on
Technical Aspects of the Co-operation of
Nuclear Reaction Data Centers

IAEA Headquarters, Vienna, Austria
1-3 September 1992

Introduction

The IAEA Nuclear Data Section convenes in anuual intervals co-ordination meetings of the Network of the Nuclear Reaction Data Centers. The last meeting, with center heads and technical staff present, took place in Obninsk, Russia, 7-11 October 1991. See the report INDC(NDS)-262. The present meeting was attended by technical staff only to discuss technical matters of the nuclear data compilation and exchange by means of the jointly operated computerized systems CINDA, EXFOR, ENDF and others.

Traditionally, for these technical meetings, the participants used to attend at their own cost. Under the present conditions this would not have been possible for some of the centers. Despite of the difficult financial situation of the Agency, it was possible to provide financial support to some of the participants.

Two Russian participants attended from CJD Obninsk and CAJaD Moscow. Unfortunately, it was not possible to support three Russian participants. Therefore, the Moscow Photonuclear Data Center was, unfortunately, not represented at this meeting. Dr. Varlamov will, however, have the opportunity to travel to the US Nuclear Data Center in Brookhaven in October, so that photonuclear data matters can be discussed there.

For the first time, a representative from the ATOMKI Institute in Debrecen, Hungary, participated in the network meeting. It is hoped that the participation of this group will bring additional ideas into the network, to the goal to produce charged-particle nuclear reaction data files for several applications. The need for such specialized data files has been emphasized already years ago by several Agency meetings in the fields of proton-beam monitoring, medical applications, and intermediate energy data.

It was appreciated that the Chinese Nuclear Data Center was represented by two participants, one for neutron data, the other for charged particle data.

Two Japanese charged particle data activities at the RIKEN institute and at the Sapporo University were represented. It is hoped very much that both will find continuing support for their activities.

Last but not least the representatives from the National Nuclear Data Center in Brookhaven and from the NEA Data Bank shall be mentioned. With these two centers the Agency's Nuclear Data Section had very close contacts in the past year when the new VAX computer was installed and many of the database management systems were transferred from the VAX computers at Brookhaven and Saclay to our VAX computer. The phase of transition from the IBM to the VAX computer is not yet finished, and some of the technical implications were on the agenda for discussion at the present meeting.

The Network of Nuclear Reaction Data Centers and Manpower Situation at the Centers

The network of Nuclear Data Centers

National and regional nuclear reaction data centers, co-ordinated by the International Atomic Energy Agency, co-operate in the compilation, exchange and dissemination of nuclear reaction data, in order to meet the requirements of nuclear data users in all countries. A brief summary of the data centers network is given below.

The nuclear reaction data centers:

NNDC	-	US National Nuclear Data Center, Brookhaven, USA
NEA-DB	-	OECD/NEA Nuclear Data Bank, Saclay, France
NDS	-	IAEA Nuclear Data Section
CJD	-	Centr po Jadernym Dannym (= Nuclear Data Centre), Obninsk, Russia
CAJaD	-	Centr po Dannym o Stroenii Atomnogo Jadra i Jadernykh Reakcikh (= Nuclear Structure and Nuclear Reaction Data Centre), Moscow, Russia
CDFE	-	Centr Dannykh Fotojad. Eksp. (= Centre for Experimental Photonuclear Data), Moscow, Russia
CNDC	-	Chinese Nuclear Data Centre, Beijing, P.R. of China
ATOMKI	-	Nuclear Data Group of the ATOMKI Institute, Debrecen, Hungary
RIKEN	-	Nuclear Data Group, RIKEN Institute of Physical and Chemical Research, Wako-Shi, Japan
JCPRG	-	Japan Charged-Particle Nuclear Reaction Data Group, Sapporo, Japan
JAERI	-	Nuclear Data Center of the Japan Atomic Energy Research Institute, Tokai-Mura, Japan

1. Neutron Nuclear Data

1.a Bibliography and Data Index CINDA:
Input prepared by NNDC, NEA-DB, NDS, CJD, CNDC
Handbooks published by IAEA
Online services by NNDC, NEA-DB (and NDS from 1992)

1.b Experimental data exchanged in EXFOR format:
Input prepared by NNDC, NEA-DB, NDS, CJD
Online services by NNDC, NEA-DB (and NDS from 1992)

1.c Data Handbooks based on EXFOR published by NNDC

1.d   Evaluated data exchanged in <u>ENDF</u> format:
        NNDC, NEA-DB, NDS, CJD, CNDC, JAERI and others. Main data
        libraries:

BROND-2 (Russia)	IRDF-90 (IAEA)
CENDL-2 (China)	JEF-2 (NEA)
ENDF/B-6 (USA)	JENDL-3 (Japan)

        Online services for BROND, ENDF/B-6, JEF, JENDL-3 by NNDC, NEA-DB
        (and NDS from 1992)

1.e   Computer <u>retrieval services</u> upon request of customers:
        NNDC, NEA-DB, NDS, CJD

1.f   <u>WRENDA</u>: compilation of requested data that are known with insufficient
        accuracy. Compiled by NNDC, NEA-DB, NDS, CJD, published by IAEA

2.   Charged Particle Nuclear Data (including heavy-ion reaction data)

2.a   <u>Bibliography</u> published by NNDC *)

2.b   Numerical data exchanged in <u>EXFOR</u> format:
        Input prepared by CAJaD, RIKEN, CNDC, ATOMKI (from 1992), NDS,
        NNDC, JCPRG
        Online services by NNDC, NEA-DB (and NDS from 1992)

2.c   <u>Data Handbooks</u> based on EXFOR published by NDS, CAJaD

2.d   Computer <u>retrieval services</u> upon request of customers:
        NNDC, NEA-DB, NDS, CAJaD

3.   Photonuclear Data

3.a   Numerical data exchanged in <u>EXFOR</u> format:
        Input prepared by CDFE, occasional contributions from NNDC, NDS
        Online services by NNDC, NEA-DB (and NDS from 1992)

3.b   <u>Bibiliography</u> published by CDFE

3.c   Computer <u>retrieval services</u> upon request of customers:
        NNDC, NEA-DB, NDS, CAJaD

*)   Discontinued in 1990; partly incorporated in the bibliographic system "NSR" for
        nuclear structure and decay data.

Manpower situation at the
Neutron Reaction Data Centers

NNDC:

After a sharp decrease in the annual number of neutron data measurements in the early 1980's, the situation has stabilized at a level of about 110 data sets (= EXFOR subentries) per year in the period 1987 to present. The reduced manpower at NNDC is used such that most but not all data are compiled in EXFOR. CINDA has a noticeable lack of completeness. (NDS has been entering some part of the CINDA compilation).

NEA-DB:

The decrease in the annual number of neutron data measurements in West Europe and Japan occurred less drastic than in the US. The present rate (1989 to present) may be at a level of 270 data sets per year. The completeness of compilation seriously suffered from a half year's post vacancy. The manpower may be hardly sufficient to cover new data, but not to catch up with the accumulated backlog.

NDS:

The rate of data measurements in the NDS service area (countries outside OECD and former USSR) is strongly fluctuating, e.g. 60 data sets in 1988 compared to 160 in 1989. After a post vacancy a year ago the compilation manpower at present is adequate. Some backlog from the vacancy period is still being worked on.

CJD:

The average rate of data measurements in the former USSR countries is around 120 data sets per year with some fluctuations. The manpower will be adequate after a vacant post for CINDA will have been filled. The main problem is the continuing delay in the compilation and transmission of new data due to communication problems.

Programming manpower:

A lack of programming manpower is encountered in all centers to an extent that important updates in data processing computer codes, specifically codes for data checking and data plotting, as well as code changes required for new data types, cannot be implemented.

Conclusion:

Centers are urged to find means, e.g. by hiring consultants, to do urgent programming (jointly for all those centers that use a VAX computer) and to do the compilation backlog. It is emphasized that the EXFOR neutron reaction database represents an enormous value which will deteriorate fast if it is not kept up-to-date.

Appriximate manpower at the Centers

	NNDC	DB	NDS ⁻	CJD	CNDC
CINDA + EXFOR compilation and file maintenance	1	0.5	2	1.5	3
evaluated files in ENDF format	0.5	0.75	2	10	6
services to customers	1.25	0.5	2.5	1	3

→ Numbers should be treated wit caution: For example, most of the evaluation work for ENDF formatted files is done in the center in the case of CJD, and externally in the case of NNDC and DB. Centers have different specialities such as CINDA book production at NDS. Customer services are mostly on-line at NNDC and DB, and by shipment of tapes at the other centers.

The Co-ordination of the CPND Centers

The active CPND centers compiling integral CPND in EXFOR, are now:

(1) **CAJaD**, Russia
(2) **CNDC**, China
(3) **ATOMKI**, Hungary
(4) **RIKEN**, Japan
(5) **NDS**, IAEA (few data at low priority)
(6) **NNDC**, USA (few data at low priority)

In addition, differential CPND are converted from the Japanese NRDF file into EXFOR by

(7) **JCPRG**, Japan

Centers (1) to (6) have overlapping fields of interest, so that a simple formula for compilation responsibilities is not possible.

The overall co-ordination responsibility to avoid duplication remains with F. Chukreev, CAJaD. It is realized, however, that there are communication problems as long as CAJaD cannot be reached by FAX or e-mail. As an interim measure, it is recommended to contact CAJaD through V. Varlamov, CDFE, FAX 0959395034, e-mail VARLAMOV@COMPNET.NPIMSU.MSK.SU, but to send a copy also by normal mail for safety.

A. The main interest is in proton beam monitor reactions and in reactions for medical radioisotopes production. In this area it is assumed that centers (1) to (4) give priority for compiling data from their own country.

If, for example, ATOMKI wishes to have in EXFOR some Japanese data, this data should be requested from RIKEN; only in the case that RIKEN has no manpower to compile and transmit the requested data fast, this should be compiled at Debrecen.

When wishing to compile data from other countries, each center should inform the other centers of this intention, so that these centers avoid to start compilation of the same data at the same time. CAJaD has the responsibility to check for duplication and inform the centers accordingly.

B. Interest exists also in the compilation of the following data types:

- Neutron source reactions: NDS, NNDC, CAJaD
- Reactions for activation analysis and thin layer activation techniques: ATOMKI
- Intermediate energy data: CAJaD
- Differential CPND: JCPRG

In these cases centers should undertake appropriate consultations with F. Chukreev and among the centers to avoid incidental duplication of compilation.

CONCLUSIONS and ACTIONS

D = Dictionary update required
M = Exfor Manual update required
P = Programming required
L = Lexfor update required
C = CINDA manual update required

General matters

1) Act CJD   Transmit the group data libraries derived from BROND to the other centers.

2) Act Blokhin   Send summary of the CJD decay data file to Lemmel for the ENSDF meeting in November 92.

3) Act NDS   To intensify and widen the cooperation of CPND centers.

4) Act NDS   Request to Chukreev for more information of the evaluation method of charged-particle data.

5) Concl.   CJD continues to remain responsible for data compilation from and data center services to the previous USSR countries.

6) Act NDS   Try to make publications from the previous USSR countries in the nuclear data field known to other centers.

7) Concl.   Next NRDC meeting: Paris 18-22 October 1993.

Nuclear data systems on the VAX

D   **8) Act NDS**   Omit those dictionaries relevant only for the obsolete ISO-QUANT formalism (10-12, 14, 41) from the next transmission.

9) Act NDS   NDS will make an effort to send 2 update files for the dictionaries, a VAX version and an IBM version, to the other data centers. The details of the VAX update file still have to be worked out.

M   **10) Concl.**   Optionally, free text may be sent in EXFOR in lower case. (Note 1: Free text does NOT include AUTHORs!, Note 2: The VAX dictionaries contain some lower case already)

P   11) **Recom All**   Each center is invited to update the (VAX) EXFOR check program and other programs, and transmit the suggested updates to the originating data center. The originating center will transmit the corrected version, when approved, to other centers. The other centers should be informed of any updates before they are performed/sent, in order to avoid duplication of programming.

EXFOR, general

D   12) **Concl.**   Memo CP-S/9208 is accepted with the modification: A-BNT- is replacing BNTA-; the report code BNAL is not needed. The entry in TRANS-S005 containing BNAL will be retransmitted by CNDC.

D   13) **Concl.**   New country codes, as proposed in memos CP-D/228 and CP-D/229, are approved.

   14) **Act Blokhin**   To clarify status of Dubna institute (still international?).

   15) **Act CJD**   To inform NDS whenever an institute name is changed.

P   16) **Concl.**   It is confirmed that the unit-keyword MEV/A is accepted in EXFOR; this requires programming for converting it to MeV in indexing and plotting programs (memo CP-D/225).

L,D 17) **Act McLane**   To update and submit dictionary 36 entries on photonuclear quantities (with expansions) and to make appropriate changes in Lexfor entry. (See memo CP-C/200 and reply in CP-D/219.)

D   18) **Concl.**   RSD (residual nucleus) in REACTION SF7 approved; however, to solve all thinkable cases, a nuclide code in SF7 may have to be introduced as soon as programming manpower is available. It should be noted also that RSD in SF8 has a different meaning and confusions could occur. It was agreed also that RSD in SF7 may be used only when no particle code applies.

L,D 19) **Concl.**   The high and low energy components of a cross section (HEN,SIG and LEN,SIG, resp.) are evaluated quantities so far used for photonuclear data only. They will be added to LEXFOR under an appropriate heading.

L   20) **Act McLane**   To provide Lexfor entry for energy spectra of particle pairs and PAR,SIG,P/T.

D   21) **Act Schwerer**   To update dictionary 36 accordingly, possibly introducing longer expansions for these quantities.

D   22) **Act NDS**   Submit new codes for renamed journals.

23) **Concl.**   (Memo CNDC-003) PR,TEM,N should not be introduced; PR,AKE,N should be used instead; data should be converted to AKE using E=3/2T.

D   24) **Concl.**   The journal code JSIU is accepted.

P   25) **Recom All**   The interactive renormalization of EXFOR data, for plotting and processing, should be considered.

26) **Recom CNDC**   Try out the computation format of Brookhaven (output option of the program COFFEE).

M   27) **Act McLane**   If manpower permits, update the EXFOR manual and inform NDS whether it will be possible.

28) **Act NNDC**   To verify whether the conversion of the temporary EXFOR files 6, 7 and 8 has been finished; if not, remind the centers what still has to be done.

29) **Concl.**   It is essential that, in case of several bibliographic references in an EXFOR entry, the primary reference is given first; it is this reference which is used by computer codes (plotting) to identify the dataset.

30) **Concl.**   Corrections done to an EXFOR entry must be described briefly under HISTORY. Flags have to be written in column 80 to indicate which records were altered/inserted/deleted; to know what has been changed is most essential to receiving data centers and customers. The style of HISTORY entries should be such that it is understandable by external customers and not only by data centers staff.

31) **Act All**   Retransmit those entries listed in McLane's list of pending retransmissions.

D   32) **Act NDS**   The structuring of information in certain dictionaries will be transmitted in the next dictionary transmission as proposed in Memo CP-D/220 (without dashes in the first field).

33) **Concl.**   On CAJad's example (sample Exfor entry APROB) for shortliving isomers; it is agreed that still there is no need for a new formalism.

34) **Recom All**   Whoever uses ANDEX is encouraged to submit comments and proposals for improvement to NDS.

35) **Act McLane**   To transmit TRANS M015 to NDS.

36) **Act NDS**   To send TRANS 4084, 4086, 4087, 4088 to NNDC.

37) **Act Schwerer**   Check the very old pending retransmissions (particularly area 1) whether still valid.

M,P 38) **Concl.**   If one or more column headings for DATA errors are given in COMMON/DATA section, they must be coded under ERR-ANALYS. I.e. coding under ERR-ANALYS is now obligatory also in the case of only a single DATA-ERR column. (Change of wording in EXFOR Manual under ERR-ANALYS).

39) **Act NNDC**   To update the EXFOR manual Chapter 7 (dictionaries) on dictionary 6: how to invent report codes for annual reports without a report code on the cover. Accepted procedure is A-(3-digit labcode from dict. 3, e.g. A-ALB-.).

Neutron EXFOR compilation and completeness

40) **Information Nordborg**   Dr. Moxon (UK) has unpublished old neutron data waiting for EXFOR compilation. NEA-DB will compile them as soon as available manpower permits.

Fission-product yield data

P 41) **Act NNDC and NDS**   The FY-CRP meeting requested that EXFOR retrievals by fission-product nuclides be possible. While the NDS EXFOR index provides this possibility, it is not yet possible in the VAX EXFOR retrieval system, which should be updated accordingly.

L 42) **Act Lammer**   To revise the LEXFOR entry on FP yields.

43) **Act CJD**   To send the ASIYAD-MIFI FPY library with brief documentation to NDS (for distribution).

44) **Act Lammer**   Submit a proposal on the coding of mass yields as a CP memo with information on corresponding measurements.

D,L 45) **Concl.**   (Regarding coding of isomeric FY ratios) Proposal 2 in the working paper of Lammer is accepted except for the heading SPINISO etc. Spin information should be given in free text under DECAY-DATA.

D   46) **Concl.**   New code AMFF (ang. mom. of fission fragments) for dict. 20 (ADD-RES) approved.

L,D 47) **Concl.**   Memo CP-D/222 on delayed-neutrons for individual precursors was accepted.

CINDA

48) **Act CJD and NDS**   To observe what publications come out in the former USSR (in particular the Baltic states).

49) **Act NEA-DB and NNDC**   To update EXFOR manual and CINDA manual with information about using diskettes (which format and density etc.) for EXFOR/CINDA transmissions. CAJaD and CNDC can accept only 5.25 inch diskettes, while the other centers can accept both diskette formats.

50) **Act CNDC**   To send regularly a copy of the Chin. Journal of Nuclear Physics to NDS starting with Vol. 12, no. 4 (1990).

51) **Act CNDC**   To cover literature published in Chinese language systematically for CINDA and send the entries to NDS.

52) **Act NDS**   To send the "Chinese CINDA" file as a listing (and/or on diskette) to CNDC.

53) **Act McLane**   To send to CNDC the reader format CINDA checking code CINBAD.

54) **Concl.**   All CINDA checking codes should check at least Z-A-Q.

55) **Act NDS**   Send copy of Osorio's program which makes CINDA entries for an ENDF library to NEA-DB and NNDC.

56) **Concl.**   Blank E-MIN field is now permitted.

C   57) **Act NEA-DB**   To make the appropriate manual update.

P   58) **Act CINDA Centers**   To update Cinda programs accordingly, where necessary.

C   59) **Act Lammer**   To provide a manual revision for pages II.2.8 (hints for coding reactions like (2n,f) or (n,n'f)) and II.2.17 (note under the heading "fission quantities") to NEA-DB.

6.4 Evaluated data libraries

60) **Act NEA-DB**   To distribute JEF-2 to the other neutron-data centers (Dr. Nordborg, NEA-DB: "JEF-2 will be released before Christmas, it will not include complete pointwise data").

61) **Act CJD**   NDS had received a preliminary file of BROND-2, mainly for consideration in the FENDL project. CJD is asked to transmit the final BROND-2 as soon as possible.

62) **Act All**   When preparing evaluated data libraries, characteristic values (thermal cross sections, resonance integrals, etc.) should be quoted in the text or in accompanying documents together with their uncertainties; however, these values (and uncertainties) would be better usable if they were in a computer-readable file.

63) **Act NDS**   To find means and funding for the participation of CJD and CNDC in the joint effort to improve the evaluated data files (meeting in Cadarache, June 93).

64) **Act All Library Originators**   To collect lists of known defaults in the evaluated data libraries, communicate these lists to the other originators data centers, possibly to include such lists in the forthcoming issue of NNDEN.

65) **Act CNDC**   Send CENDL-2 supplement as soon as ready.

66) **Act CNDC**   To convert the ENDF-5 parts of CENDL-2 to ENDF-6 format.

67) **Recom**   One library should use only one format.

68) **Act Liang**   Submit memo's CNDC-002, 004 on format changes in ENDF/B to Dr. R. Roussin, RSIC who is in charge of the format-and-procedures subcommittee. As any format change requires a series of programming changes, it is essential that a proposal for a format change is supported by a convincing justification, demonstrating the deficiency in the present format and the advantages of the proposed format.

Remaining CPND matters

69) **Act McLane**   To distribute, after consultation with F. Chukreev, the EXFOR converted CPND file of R. White (Livermore) on light-element neutron-producing reactions.

70) **Act NDS**   To contact CAJaD and Arzamas to obtain the quasi-EXFOR file of experimental data underlying the Arzamas evaluation.

71) **Recom**
    Chukreev

To compile and evaluate the B-11 + p reaction.

72) **Act**
    CAJaD
    CNDC
    RIKEN
    ATOMKI

To continue to work, under mutual consultation, towards compilation and evaluation of monitor reactions and of medical radioisotope production reactions according to the needs stated at earlier meetings.

73) **Act NDS**

To try to arrange a CRP on this topic which would be an essential stimulation for finding support for this work at CAJaD, CNDC, RIKEN, ATOMKI and perhaps others.

74) **Concl.**

It is confirmed that no monitor data for deuteron beams exist and that there is a strong need for such data.

75) **Act NNDC**

To produce a "Short guide to ENDF" for evaluators of integral charged-particle data and send it to Dr. Chukreev.

76) **Act CAJaD**
    and all who
    who need it

To send list of references of publications needed but not available, to NDS who will try to deliver copies of those publications.

77) **Act NDS**

To send complete integral CPND file to Dr. Tárkányi, DEBRECEN/ATOMKI (including index).

78) **Act CAJaD**

To request assistance from other centers in case of difficulties to contact authors.

M   79) **Concl.**

Dr. Chiba announced new name of their group: All correspondence should be addressed to Dr. Chiba, Japan Charged-Particle Nuclear Reaction Data Group. This requires an EXFOR manual update. Leader of JCPRG continues to be Prof. H. Tanaka. The network-internal abbreviation will be JCPRG; this is not an official abbreviation.

80) **Act NDS**

Add Tárkányi to Newsletter distribution.

81) **Concl.**

ATOMKI will use EXFOR accession-numbers starting with D4001 and up and send these entries to NDS.

Photonuclear data

82) **Act McLane**

To send report on the agreement between CDFE, LLNL and NNDC (on cooperation in compilation and evaluation) to NDS for inclusion in the minutes.

83) **Information**   CSEWG has a subcommittee (under Roger White, Livermore) on CPND and PhotoND in ENDF format, which can be contacted for enquiries and proposals.

84) **Act Blokhin**   To write up their proposals for format changes for photonuclear **and Varlamov** data in ENDF and to send them to Roger White, Livermore.

NRDC Meeting
Vienna, 1-3 September 1992

List of Working Papers

1   Russian Nuclear Data Center Status Report
2   ASIYAD-MIFI Fission Product Yield Library
3   BOFOD-90, the evaluated photo-neutron data library
4   Memo 4C-4/53: Conversion of Rider's quasi-Exfor entries
        for the area 4 into Exfor format
5   Memo CNDC-001: The activity on Exfor compilation and
        exchange in China
6   The compilation, calculation and evaluation of CPND at CNDC
7   The main subject of data compilation in CAJaD
8   CDFE Status Report
9   NEA DATA BANK Progress Report
10 New Location of the OECD Nuclear Energy Agency
11 Status of the RIKEN Nuclear Data Group
12 Report of SGIP to the 1992 Technical NRDC Meeting
13 Comments on the EXFOR/CINDA dictionary database on the VAX
14 Pending Exfor matters
15 Exfor coding of isomeric fission yield ratios
16 Memo CNDC-003 (Proposed dictionary updates)
17 Last TRANS tapes received by NDS
18 CSISRS Library Statistics
19 Pending Exfor retransmissions
20 Disturbing mistakes in Exfor TRANS tapes
21 Area 3 fission yield entry conversion
22 BROND-2 General Purpose File
23 Memo CNDC-002: Proposal for ENDF format modification
24 Memo CNDC-004: The problem of energy distribution interpolation
        in ENDF/B format