

October 7, 1996

To: Distribution

From: *Hans Lemmel* *O. Schwerer*  
H.D. Lemmel and O. Schwerer

**Subject: Conclusions of the 1996 NRDC Meeting**

Please find attached the main results of the Nuclear Reaction Data Centers' Meeting in Brookhaven, 3-7 June 1996. Included are

- the Meeting Summary (with Statement and Appendix on the organization of future NRDC meetings)
- the updated Network summary (WP3)
- the Actions and Conclusions (now sorted by topics)
- the Agreement on CPND compilation responsibilities
- lists of Status Reports and Working Papers
- the list of Participants and the meeting agenda
- the updated "Network Report".

The full meeting report, including all status reports and part of the working papers, will be published later this year as an INDC report.

If you wish to suggest changes or additions in any of the attached materials, please send them at your earliest convenience. (If you cannot respond immediately, let us know by e-mail or fax so that we wait as required.)

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## SUMMARY

### 1. INTRODUCTION

The IAEA Advisory Group Meeting on the Coordination of the Nuclear Reaction Data Centers (NRDC) met in Brookhaven during the week 3-7 June 1996, hosted by the U.S. National Nuclear Data Center (NNDC). The meeting was opened by Dr. R. Bari, Head of the Department of Advanced Technology, Brookhaven National Laboratory, and by H.D. Lemmel (IAEA) as the Scientific Secretary on behalf of the IAEA. C.L. Dunford (NNDC) acted as the Chairman of the plenary sessions. O. Schwerer chaired the technical sessions. V. McLane (NNDC) was the local organizer.

The meeting was attended by 16 participants from 13 Data Centers from China, Hungary, Japan, Russia, Ukraine, USA, and the Centers of NEA and IAEA, plus part-time participants from the U.S. Department of Energy and staff of the NNDC.

The objectives of this Advisory Group Meeting, which was one in a series of biennial Data Centers Coordination Meetings, were to review the status of the cooperation of the NRDC Network for the previous two years, to plan for the forthcoming two years, and to update the nuclear data compilation rules for newly encountered data types.

The Network of eleven nuclear data centers as laid down in the report INDC (NDS)-324, welcomed the meeting attendance, for the first time, of staff of the data center of NIEF in Sarov (previously Arzamas-16), and of the Institute for Nuclear Research (INR) in Kiev, Ukraine.

The main elements of the Network cooperation cover:

- the work-sharing in the Data Center Services to customers worldwide;
- the compilation and exchange of experimental nuclear data, and the maintenance of the jointly operated systems: EXFOR and CINDA;
- the exchange of evaluated nuclear data libraries;
- the exchange and joint operation of related software.

### 2. HIGHLIGHTS

A topic of major importance that was discussed at this meeting was the challenge resulting from the rapid advances of electronic information technologies and the impact on the data dissemination methods by the centers, as discussed under item 3 further below. The centers will make major efforts to further expand their online services, specifically under the widely used World Wide Web technology. NNDC and IAEA/NDS confirmed a cooperation effort accompanied by staff exchange in 1996, with the possible inclusion of NEA-DB and CDFE late in 1996.

As the online information can be updated frequently, the archiving of databases and the correct and accurate referencing of data extracted from online services, present new problems which were discussed at the meeting. Citation guidelines will have to be established and publicized in the online systems together with the data files. The meeting discussed and expressed concern about the further distribution of the Network's data by individuals and organizations outside the Network.

While the development of electronic data center services is essential, it is as essential to devote sufficient efforts on the maintenance and updating of the nuclear databases. Significant progress was reported on the completeness and up-to-datedness of the experimental neutron data files EXFOR, which is basic to all neutron data evaluation work.

In addition to electronic services, handbooks covering the most commonly used data types and nuclear data related textbooks continue to be required. With respect to the CINDA handbook, NDS and NEADB will survey the present needs for a continuing hard-copy publication of CINDA. Attention must be given to the archival function of printed materials such as Nuclear Data Sheets.

The meeting welcomed plans of NNDC to develop a "Super CINDA" file which would incorporate the traditional neutron-data CINDA file, the photonuclear bibliography by CDFE and JAERI, and also a new bibliographic file for charged-particle reaction data including intermediate energy data.

The technical sessions discussed, among other items, the updating of the compilation rules, including updated EXFOR rules covering specific needs for intermediate energy nuclear data. A large list of conclusions and actions resulted from the meeting. The information exchange and data file exchange between the centers were reviewed according to the changing developments of available electronic media.

It was noted that the scope of the jointly maintained databases has widened to cover not only data of practical interest for applications, but also basic nuclear physics.

The meeting reviewed the objectives and requirements for the future Data Center Network Coordination Meetings and requests the IAEA to continue the required funding of these meetings as outlined in the "Statement" given further below.

### 3. ELECTRONIC SERVICES

The Nuclear Reaction Data Centers Meeting discussed the future directions in providing customer services. It is clear that in several centers (i.e. US, NEA, Japan) traditional request services are declining in volume and are being replaced by electronic access to the data produced by the network. The meeting noted the special requirements of those data centers servicing customers in countries where electronic networking is primitive or nonexistent. In such cases, traditional services via paper and magnetic media will continue in addition to the fast increasing online services. Requests for services from the IAEA/NDS by developing

countries are expected to continue at the present level. Therefore it is expected that NDS will have to maintain the present capability to handle information requests in the traditional manner. The centers also recognize the potential need for information distribution via CD-ROM.

The meeting concluded that the Network as a whole has the goal of developing a common customer interface using the widely available and rapidly developing World Wide Web technology. A common basis for reporting access statistics from the WWW is important to be developed. The initial steps in this collaboration will be undertaken in June 1996 by NNDC and IAEA/NDS to be followed by a visit by NNDC staff to Vienna in September. At that working meeting, the NEADB and CDFE are expected to participate. Further input for this project is expected from the joint US Nuclear Data Network's workshop on Nuclear Data and the Internet scheduled for August 1996.

The meeting discussed the need to provide access to information about meetings of interest about Nuclear Data. NNDC maintains on their WEB site, a page of pointers to information about meetings of interest. This item should be addressed during the joint WWW development project.

The meeting expressed concern about the widespread "repackaging" of data originally produced by the network. While recognizing that not much can be done to control this problem, the network expressed its desire that such products accurately reflect the data taken from network sources and that those sources receive proper credit and reference as to version and date of the data base from which the information was extracted.

#### 4. ACHIEVEMENTS SINCE THE LAST MEETING

Since the Paris Meeting in 1994, a new cooperation has been established on photonuclear data, between the CDFE, Moscow, JAERI, and CJD Obninsk, covering a bibliographic file, an EXFOR file with experimental data, and a new evaluated data file.

The cooperation on charged particle nuclear data continued with contributions from Arzamas-16, ATOMKI, CAJaD, CNDC, JCPRG, NEA-DB, NNDC, and RIKEN. Topics of priority were data for medical applications and intermediate energy nuclear data. The agreement on charged-particle data compilation responsibilities was updated.

The four neutron reaction data centers made significant efforts to improve the completeness of the basic neutron data files EXFOR and CINDA.

Important data libraries that have been exchanged during the period since the last meeting include:

- ENDF/B-VI updates and ENDF utility codes by NNDC;
- a large CENDL update by CNDC;
- JENDL-3 updates by JAERI;

- the finalization and release of FENDL by IAEA-NDS;
- the release of EFF by the Data Bank;
- the neutron activation library ADL-3 and the intermediate-energy data library MENDL-2 by CJD;
- a charged-particle data EXFOR compilation by CAJaD and the NEA Data Bank;
- and, last but not least, EXFOR and CINDA transmissions by all centers.

The Minutes of the Meeting, including a long list of Conclusions and Actions, will be included in an INDC(NDS)-report.

#### **Attachments**

- **Statement, on the future of the Data Center Coordination Meetings**
- **Appendix**
- **List of Participants**
- **Agenda**
- **Actions and Conclusions**

## Statement

The meeting took note of the difficulties under the present IAEA rules regarding the conduct of Agency-sponsored meetings, to continue to support the Nuclear Data Center Coordination Meetings in their traditional form. In contrast to other meetings, these Coordination Meetings require the participation of more than one participant per country and, in a few cases, of more than one paid participant from a single country.

The Nuclear Data Centres Networks (as documented in the report INDC(NDS)-324 and the Nuclear Data Newsletter No. 20) include cases with two or three specialized centers in the same country. These centers have, within the Network, specialized functions by which they service the various requirements of the user community worldwide. As all of these centers must be represented at the Network Coordination Meetings, it is vital, under the present economic conditions that, in certain cases, the IAEA provide funding for the meeting attendance of two or three centers from the same country.

For the meetings outside Vienna it is essential that the Nuclear Data Section can continue to be represented by its Section Head and the technical expert of the Section.

The IAEA is requested to continue to provide the umbrella for the Nuclear Data Centers Network including the required funding of meetings as outlined above and, as necessary, to provide exceptions to the usual IAEA meeting rules.

The International Nuclear Data Committee and its Chairman are asked to support this Statement. For further details see the following Appendix.

## Appendix

The participants reviewed the objectives and requirements of the Data Center Coordination Meetings. They concluded that the following meetings, each in a two-years cycle, continue to be needed for the functioning of the Nuclear Data Centers Network.

1. Meetings on the Coordination of the Nuclear Reaction Data Centers Network, including policy matters and work planning to be discussed among the Center Heads and technical matters to be discussed by technical staff:
  - so far held as "Advisory Group Meetings"
  - 11 participating centers, thereof 3 in Russia, 3 in Japan, and 5 in other countries.
  
2. On technical aspects of the cooperation of the Network, to be discussed by technical staff:
  - so far held as "Consultant's Meetings"
  - participating centers the same as under 1 above.

The meetings under 1. and 2. are alternating.

3. On the Coordination of the Nuclear Structure and Decay Data Evaluator's Network:
  - so far held as "Advisory Group Meetings"
  - 16 participating centers/groups, thereof 2 in China, 2 in Russia, 6 in USA, and 6 in other countries.

These meetings do not require the representation of countries but rather the representation of all of the participating centers. Under the present economic conditions, several of the participants require funding by the IAEA for the meeting attendance, and in certain cases it is required that the IAEA provides funding for two or three centers from the same country. The meeting invitations by the IAEA provide an essential recognition and stimulant for continued support of the Centers by their funding authorities.

The meetings should be hosted, on a rotational basis, by one of the cooperating centers. When feasible they should be held adjacent to other nuclear data meetings and conferences. For the meetings outside Vienna (specifically the meetings under 1 above), it is essential that the Nuclear Data Section can continue to be represented by its Section Head and the technical expert of the Section, in order to cover the full scope of the agenda.

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## AGENDA

### Plenary session

- P.1 Opening, election of chairman
- P.2 Adoption of the agenda
- P.3 Quick review of the highlights of
  - the last Technical NRDC meeting (INDC(NDS)-343) and
  - the last Advisory Group Meeting (INDC(NDS)-308)
- P.4 Brief status reports of the centres (reports requested in writing)
- P.5 Customer services
  - conventional services
  - electronic services
    - interactive online systems
    - FTP
    - WWW
- P.6 Evaluated data libraries
- P.7 Next NRDC meetings
  - Technical meeting 1997 in Vienna
  - AGM in 1998 in Vienna (or elsewhere?)

### Centre heads session, neutron data centres

- N.1 general situation, manpower
- N.2 customers and role of the centers, future developments

### Centre heads session, all data centres

- C.1 Report on the U.S. Nuclear Reaction Data Network (M. Bhat)
- C.2 Review of data needs and ongoing activities for applications
- C.3 CPND compilation responsibilities
- C.4 general situation, manpower
- C.5 who does what in the next 2 years
- C.6 update of the "Network Document" and of the Network summary in the NRDC Meeting Minutes (see the Actions in INDC(NDS)-343 p.11)

### Technical session (all data types)

- T.1 Maintenance of EXFOR/CINDA dictionaries
  - Review of actions INDC(NDS)-308 App. 3 p. 1
- T.2 Data exchange between centres
  - Update of the list of preferred/acceptable media,  
see INDC(NDS)-308 App. 5
- T.3 Brief EXFOR Guide: for publicity, for online users, for CPND compilers?
- T.4 Review of actions on EXFOR from last Technical NRDC meeting,  
INDC(NDS)-308 App. 3
- T.5 Pending EXFOR matters (dictionary and manual updates, coding rules)
- T.6 The "date" field in the computer files beyond the year 2000
- T.7 TRANS tapes transmitted since last meeting
- T.8 Common graphics software
- T.9 Citation guidelines for computer files

**Technical session (Photonuclear Data)**

- TP.1 Review of actions
- TP.2 Data compilation and evaluation
- TP.3 Cooperations on photonuclear data

**Technical session (CPND)**

- TC.1 Review of actions
- TC.2 Compilation responsibilities and mechanisms to avoid duplications
- TC.3 Compilation and evaluation
- TC.4 Intermediate energy data in EXFOR

**Technical session (Neutron data)**

- TN.1 Sharing of address list information
- TN.2 Review of actions from last Technical NRDC meeting
- TN.3 CINDA
- TN.4 Neutron EXFOR compilation and completeness

**Final plenary session**

- FP1. Summary and conclusion of the Center heads sessions
- FP2. Summary and conclusions of the technical sessions
- FP3. Summary and conclusions of the plenary session
- FP4. Other business
- FP5. Closing of the meeting

**IAEA Advisory Group Meeting  
on the Coordination of the Nuclear Reaction Data Centres  
Brookhaven, 3-7 June 1996**

**hosted by the U.S. National Nuclear Data Center  
on behalf of the U.S. Government**

**ACTIONS and CONCLUSIONS**

**Network document and general matters**

**Action on**

- 1) *NDS* Participants updated the information about their centres in the network document. NDS will prepare the updated document
  - with an updated preface including the history of the document
  - with the "Staff and Program" section moved from Annex 2 to Annex 1
  - and with the updates as received from the participants.
- 2) *NDS* Send out the draft to the center heads, requesting new signatures when the Annex 2 entry was changed.
- 3) *Centre heads* Send to NDS addresses to whom the Network Document should be sent together with a covering letter by IAEA.
- 4) *CONCLUSION* The summary description of the network centres' activities to be included in the Minutes will remain unchanged (except for an obvious mistake).
- 5) *Dunaeva* Submit the official name of the Sarov data centre to the network.
- 6) *CONCLUSION* The meeting strongly supports the continuation or extension of the IAEA activity on Activation Files.
- 7) *NDS* On continuation of NDS activity on IRDF: prepare for a decision on this issue at the next INDC meeting (Consultants' Meeting possibly followed by CRP).
- 8) *All* Provide feedback to NDS on the paper on the INDC Standards File (invite additional participants).
- 9) *Nordborg* Submit a paper on the network to the Trieste conference.
- 10) *CONCLUSION* The next technical NRDC meeting is planned to be held as a 3 day meeting in Vienna, adjacent to the Trieste Nuclear Data Conference in May 1997.
- 11) *CONCLUSION* The next Centre Heads' Meeting is planned to be in Vienna in spring 1998.

### EXFOR/CINDA dictionary system

- 12) *McLane  
Schwerer* (old #8 cont.) Come up with a list of more sorting flags for dict. 36.
- 13) *McLane* (old #10 cont.) Change title of dict. 19 to old one and remove the word 'codes' from the other titles.
- 14) *NDS* Include Sarov in dictionary distribution list, both for TRANS and DANIEL formats, from September 1996.
- 15) *McLane* Update the program DAN2X4 to have the Dict.27 (and 43, 50 )codes left-adjusted and make the other minor corrections requested earlier by NDS.
- 16) *CONCLUSION* On "wildcards" for the "particle considered" field (SF 7) in dictionary 36: the meeting recognizes the need for this new feature in particular for medium and high energy data.
- 17) *McLane* Prepare a version of dictionary 36 including the wildcards but without removing any of the existing codes.
- 18) *McLane and  
volunteers* Prepare test entries to test the new dictionary 36 and distribute to other centres to test their programs.
- 19) *All* Update all programs concerned so that they can digest the test entries
- 20) *McLane* Submit a revised version of memo CP-C/211 (replacing the wildcards '-' and '\*' by '\*F' and '\*FP').
- 21) *CONCLUSION* This proposal will be reviewed at the next technical meeting and be finalized when all centres agree.
- 22) *McLane* Send the Dictionary system Write-up to all centres.
- 23) *NDS* (WP 7, item 8) Remove the heading "For Photonuclear Data only" from all those places in dictionaries where this was agreed at the meeting.
- 24) *McLane  
Schwerer* (old #32 cont.) To provide the necessary changes in Dict. 24, 32 and 36.

### "EXFOR Basics" Manual

- 25) *All* Send comments and corrections on the "EXFOR Basics" Manual to McLane.
- 26) *McLane* Add example entries to the "EXFOR Basics" manual.
- 27) *CONCLUSION* The meeting appreciates V. McLane's efforts to write the EXFOR Basics manual and to update the EXFOR Manual. (The LEXFOR part is not yet finished).
- 28) *All* Proof-read the rewritten EXFOR Manual and send comments to V. MCLANE.

- 29) *McLane* Add instructions on the online system and on the dictionaries to the EXFOR Basics manual.
- 30) *McLane* Update the centres' addresses in the EXFOR Basics manual with the latest ones from the revised Network document.

**EXFOR, general**

- 31) *CJD* (old #14 cont.) Update lab dictionaries for Russian institutes continuously as necessary.
- 32) *McLane* (old #16 cont.) To provide LEXFOR entry for energy spectra of particle pairs and PAR,SIG,P/T.
- 33) *McLane* If staffing permits, update LEXFOR.
- 34) *NNDC* (old #19 cont.) Send the remaining entries from EXFOR files 6, 7, 8 to the other neutron data centres.
- 35) *All* (old #20 cont.) Go through these entries and decide which entries need conversion to EXFOR.
- 36) *All* (old #21 cont.) Retransmit those entries listed in V. McLane's list of pending retransmissions.
- 37) *McLane* (old #23 cont.) Clarify wording on free text in the EXFOR manual. (If both coded information and free text are given for a keyword, it is legal and often necessary to start with free text and give the code(s) only in one of the following lines.)
- 38) *NDS* (old #25 cont.) Distribute corrected Münzel data after final corrections by CAJaD
- 39) *NDS* (old #27 cont.) Provide NEA-DB with an expanded list of errors in old entries from area 2 needing retransmission.
- 40) *NDS* (old #28 cont.) Retransmit entry 22242 with an EXFOR N-series number.
- 41) *CONCLUSION* A flag for relativistic heavy ion data in EXFOR dictionaries (proposed in Actions 39, 40 of last year's meeting) is not needed because NNDC will not transmit such data for the time being.
- 42) *NDS* Remove the quantities on relativistic heavy ion data already introduced from the dictionaries.
- 43) *Lammer* (old #43 cont.) Check existing codes for fission quantities for possible overlap with the case of memo CP-C/209 and existing EXFOR entries for necessary revisions.
- 44) *NEA-DB, NDS, NNDC, CDFE* (related to old #44) Retransmit the "correlation" entries as listed by V. McLane, replacing COR by DA/CRL.

- 45) *Lammer* (old #47 cont.) Reply to items 1, 2 and 4 of memo 4C/57 (codes PR,NU,FF,PRE,FY/DE, and PAR/IND,FY,G for dict. 36) and propose solutions for the remaining questions on entry 40420 in a CP memo.
- 46) *CJD* (old #48 cont.) Retransmit entry 40420 accordingly, after fulfillment of the previous action.
- 47) *CONCLUSION* WP 7, items 1 and 2 (new dictionary 36 codes ,DA,,COS/RSD and PAR,DA,,SN2) are approved.
- 48) *CONCLUSION* (WP 7, item 3) The dictionary 36 codes  
SEQ,DA  
SEQ,DA/DE  
IND,SIG,G  
IND/UND,SIG,G  
are approved.
- 49) *CONCLUSION* (WP 7, item 3) The proposed new dictionary 36 codes  
,POL/DA/DE and  
,POL/DA/DE,,ANA  
are not approved. They are not needed because these data should be compiled using the existing codes  
,PAR,POL/DA and PAR,POL/DA,,ANA
- 50) *CAJaD* Retransmit the affected entries (O0110 and others) according to Conclusion 49.
- 51) *CONCLUSION* (WP 7, item 4) The proposed new dictionary quantity for differential cross sections integrated over a partial angular range was approved but the proposed new code will be ,DA,,IPA.
- 52) *CONCLUSION* (WP 7, item 5) The N3 flag in the SUBENT record (used e.g. for differential CPND EXFOR entries) is removed..
- 53) *Chukreev* Update TEST-EXF accordingly.
- 54) *McLane* Update the EXFOR Manual accordingly.
- 55) *McLane*  
*Chukreev* (WP 7, item 6) Update check programs to allow embedded blanks in dictionary 7 codes.
- 56) *CONCLUSION* The new particle code HE2 is not accepted until NNDC provides more information on it.
- 57) *McLane* (WP 7, item 9) Provide more information on the proposed new nuclide code 4-BE-6.
- 58) *CONCLUSION* Redundant coding in REACTION SF5 and SF7 must be avoided for the sake of retrieval and plotting codes. If e.g. the code "IND" in SF5 is needed nevertheless, a tautology could be given: (( ) = ( )).

- 59) *CONCLUSION* (WP 7, item 13) The proposed new heading TRMOM is not introduced. Instead, such data should be compiled using the author's representation, for which the new heading WVE-NM for wave number, and the units 1/FM (1/fermi) are introduced.
- 60) *Chukreev* (WP 7, item 13) Draft LEXFOR entry on this data representation, including the formula for converting wave-numbers to angles.
- 61) *All* (WP 7, item 10) Send feedback to V. McLane on the Polarization proposals.
- 62) *CONCLUSION* On the problem with dates beyond 2000: In EXFOR, all date fields will be converted to 4-digit years. In addition, a program will be needed to convert all existing entries to the new date format.
- 63) *McLane* Send to NDS all entries where retransmission had been requested, for NDS to check once more what corrections are requested.
- 64) *All* Review the list of pending retransmissions as produced in last year's report and amended in WP 10.
- 65) *McLane* (related to old #96 on data exchange by diskette) Remove information on medium of exchange from the EXFOR manual, referring to the relevant working paper in the NRDC meeting reports.
- 66) *CONCLUSION* It is legal to have entries from different areas on the same TRANS (e.g. A and B). This is however not the case for combining e.g. neutron data and CPND.
- 67) *McLane* Change the EXFOR Manual on the TRANS and ENDTRANS sequence numbers.

#### EXFOR checking and compilation on PC

- 68) *Chukreev*  
*NDS* Send to NDS new version of TEST-EXF allowing lower case characters in free text. NDS to distribute to other centres.
- 69) *NDS* (old #80 cont.) Check whether V. Osorio can be hired as a consultant for updating ANDEX.
- 70) *McLane* (old #78 cont.) To make a benchmark test of TEST-EXF.

#### Fission-Product Yield data

- 71) *NNDC*  
*NDS* (old #72 cont.) EXFOR retrievals by fission-product nuclides should be possible. While the old NDS EXFOR index provided this possibility, it is not yet possible in the VAX EXFOR retrieval system, which should be updated accordingly.
- 72) *Lammer* (old #73 cont.) To revise the LEXFOR entry on FP yields.



- 73) *NDS* (old #74 cont.) To distribute the ASIYAD-MIFI library.
- 74) *Lammer* (old #75 cont.) Submit a proposal on the coding of mass yields as a CP memo with information on corresponding measurements.

#### CINDA

- 75) *Nordborg* Review distribution list of CINDA book to reduce the number of printed copies.
- 76) *Hasegawa* Check CINDA book distribution for Japan.
- 77) *CONCLUSION* (WP 8) The problem with dates beyond 2000 will be solved for CINDA by integrating it into a new bibliography for all types of reaction data.
- 78) *Nordborg* (related to old #96 on data exchange by diskette) Remove information on medium of exchange from the CINDA manual, referring to the relevant working paper in the NRDC meeting reports.
- 79) *CJD* Send CINDA batches by e-mail not encoded.
- 80) *NDS* Discontinue sending CJD CINDA batches to NEA-DB and NNDC through Vienna.
- 81) *All* (old #104 cont.) Update handbook section and list of compilers.
- 82) *NDS*  
*NEA-DB* Contact the other centres about the handbook section (NDS) and list of compilers (NEA-DB).
- 83) *Lammer* Distribute the list on who is covering what for CINDA to other centres.
- 84) *NDS* Issue a supplement to the meeting report (as a separate document) covering technical information such as CINDA coverage and media for data exchange.

#### Photonuclear Data

- 85) *CDFE*  
*JAERI* (related to old #94) The photonuclear data bibliographic file was made available to the centres at the meeting.
- 86) *Recomm.*  
*CDFE* (old #95 cont.)
- To continue the EXFOR compilation of experimental data.
  - To continue the cooperation with CJD and JAERI to work towards an evaluated photonuclear data library.
  - To continue with the bibliographic index and possibly make this available not only in printed form but also as a computer file.
- 87) *Recomm.*  
*CDFE* Study the possibility of making a WWW homepage on photonuclear data files.

### CPND compilation

- 88) *NDS* (old #84 cont.) To contact the authors of the Landolt-Börnstein CPND compilation to obtain a computer file of this database for free distribution, and to find out whether and how this group can contribute to the network in future.
- 89) *NDS* (old#83 cont.) To send the complete charged-particle EXFOR file to ATOMKI.
- 90) *NDS* Obtain the Chinese data that were sent to T. Benson/IAEA.
- 91) *CONCLUSION* The summary on CPND compilation responsibilities (see Appendix 1) is approved.
- 92) *JCPRG* Check with their institute whether they can do the clearing for Japanese CPND.
- 93) *CONCLUSION* The meeting discussed and expressed interest in the project of a CPND barn-book which would be useful to the network.
- 94) *CAJaD* Create a FINAL version of the EXFOR area B file, using
- CAJaD master file
  - NDS master file
  - TRANS B012 through B015 in the versions modified by NDS.
- 95) *NDS* Send to CAJaD
- the NDS area B master file
  - TRANS B012 through B015 as modified by NDS, merged into 1 file.
- 96) *McLane* Update EXFOR Manual saying that
- CAJaD is responsible for area B
  - NNDC is responsible for area P.
- 97) *Debrecen  
CNDC* (old #86 cont.) Evaluations at Debrecen have been completed. They should be put in ENDF-6 format in cooperation with CNDC.
- 98) *NEA-DB* (old #89 cont.) To keep the NRDC network and specifically the CPND centres informed about developments for intermediate energy CPND.
- 99) *All  
CPND Centres* (old #92 modified) Work on the duplications indicated in several memos by CAJaD.
- 100) *Chukreev* Check O. Schwerer's e-mail on duplications with ATOMKI compilations (April 1996) and decide on the proposed deletion of entry A0488.
- 101) *CONCLUSION* The meeting supports the continued participation of VNIIEF in project #145 "Development of the library of evaluated nuclear data on charged particles for International Thermonuclear Reactor (ITER) and other applications of thermonuclear fusion".

### Evaluated data libraries

- 102) *Recomm.* (old #110 cont.) 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.
- 103) *NEA-DB* (old #113 modified) Possibly release a version of JEF-PC to the network centres for their internal use free of charge.
- 104) *All* (old #116 cont.) To develop a standard for the file transfer access of data files and related documentation.
- 105) *NDS* Distribute the CENDL update (where not yet done).

### Citation Guidelines

- 106) *CONCLUSION* The meeting agrees with the proposals concerning Citation Guidelines for Databases worked out by the subgroup on this topic (see following items 108-115). Any conclusions or actions concerning the future will be reviewed at the next NRDC meeting.
- 107) *CONCLUSION* (old #121 cont.) Anyway, reference guidelines for databases require further discussion.
- 108) *NNDC* Publish EXFOR Manual (as BNL-NCS report).
- 109) *NEA-DB* Publish CINDA Manual (as NEA/NSC report).
- 110) *NDS* To put guidelines for contents of data library documentation on the agenda for the next NRDC meeting.
- 111) *Recomm.*  
*NNDC* Write and publish a NUDAT Manual (as BNL-NCS report).
- 112) *Recomm.*  
*NNDC* Update and publish the Jülich paper on ENSDF by M. Bhat (as BNL-NCS report).
- 113) *Recomm. All* For the online services, the keyword "citation" should be clearly visible within each database.
- 114) *Recomm. All* For ftp servers, a file AAACITE.TXT should be created for each data file type.

- 115) *CONCLUSION* Guidelines for contents of data library documentations:  
Future documentations should include:
- A good abstract.
  - Uses/applications of library.
  - Procedures used for generating and/or maintaining the library.
  - Description of network responsible for contributing to and/or for maintaining the library.
  - Quality control procedures, and reference to codes, benchmarks, etc., used.
  - Contents, or reference to contents.
  - Citations for other databases or computer codes used in producing the library.
  - How to obtain data contained in library.

#### Computer matters

- 116) *CONCLUSION* For the present, PostScript, being the most widely used language for Laser printers, is recommended for the transmission of documents.
- 117) *NDS* Investigate the possibility of a research contract for V. Zerkin to document his graphics software and make it available to the centres.
- 118) *CONCLUSION* The centres recognize the potential need for information distribution by CD-ROM.

#### World-Wide-Web matters

- 119) *Recomm.* The data centres will look into the development of a common WWW page on the network, in coordination with the NEA's evaluation cooperation.
- 120) *NDS*  
*NEA-DB*  
*CDFE* Arrange that Pierre Nagel and a WWW expert from CDFE come to Vienna at the same time when T. Burrows is there.
- 121) *All* Develop data retrieval statistics under WWW and keep each other informed.

## Agreement on Charged-Particle Data Compilation Responsibility

### Compilation Centers

NNDC	NEADB
Sapporo	RIKEN
ЦАЯД	CNDC
Atomki	

### Area of Responsibility

#### New Data (1989→)

NNDC will be responsible for data from the U.S. and Canada.  
ATOMKI will be responsible for data from Hungary and Jülich.  
ЦАЯД will be responsible for the rest of the world.

#### Old Data (→1988)

Sapporo will be responsible for data from Japan.  
ЦАЯД will be responsible for all other data.

### Data Compilation

#### New Data (1989→)

A center wishing to compile data (C1) will contact the center in whose area of responsibility the data were produced (C2) with a list of the data sets to be compiled. C2 will inform C1, as quickly as possible, whether the data either have been compiled or are in the process of being compiled by another center.

If the data are not compiled or being compiled, C2 will either agree to compile them with priority, or ask that C1 compile the data and send them to C2 to be included in the next regular C2 transmission file.

#### Old Data (→1988)

A center wishing to compile data (C1) will contact all other centers with a list of the data sets to be compiled. The center responsible for the data (Sapporo or ЦАЯД) will inform C1, as quickly as possible, whether the data either have been compiled or are in the process of being compiled by another center.

If the data are not compiled or being compiled, C1 will compile the data and include in the next regular C1 transmission file.

## List of Status Reports

P1	NNDC
P2	NEA Data Bank
P3	NDS
P4	CJD
P5	CAJAD
P6	CDFE
P7	CNDC
P7/Annex 1	The compilation and Evaluation of Charged Particle Cross Sections for Medical Radioisotope Production at CNDC
P7/Annex 2	Activities and Cooperation on Nuclear Data in China during 1995
P8	JAERI/NDC and JNDC
P9	RIKEN Nuclear Data Group
P10	JCPRG
P11	Debrecen Nuclear Data Group
P12	Compilation and Estimation Nuclear Data of Charged Particles on Light Nuclei (VNIIEF)
P13	U.S. Nuclear Reaction Data Network (USNRDN)

### List of Working Papers

- WP1 Conclusions and Actions of the 1995 NRDC meeting  
(pp. 11-21 of INDC(NDS)-343)
- WP2 The Nuclear Data Centres Network, INDC(NDS)-324
- WP3 The Network of Nuclear Reaction Data Centers  
(introductory pages for meeting report)
- WP4 Maintenance of EXFOR/CINDA dictionaries
- WP5 Media for data exchange between centres
- WP6 Distribution of TRANS tapes
- WP7 Pending EXFOR matters
- WP8 Dates for the year 2000 (Memo CP-C/213)
- WP9 EXFOR and CINDA exchange since the 1995 NRDC meeting
- WP10 Summary of pending retransmissions
- WP11 Summary of some typical mistakes in recent TRANS tapes
- WP12 Examples of Citation Guidelines
- WP13 Index of Nuclear Data Libraries available from the  
IAEA Nuclear Data Section (IAEA-NDS-7)
- WP14 "EXFOR Basics" Manual (draft of informal report BNL-NCS-???? by  
V. McLane, with update pages of January 1996)
- WP15 EXFOR Manual (BNL-NCS-????, October 1995 version)  
(contains "EXFOR Systems Manual", without "LEXFOR")
- WP16 Citation Guidelines for Nuclear data Retrieved from Databases Resident  
at the Nuclear Data Centers Network  
(V. McLane, January 1996, BNL-NCS-????)

### Scientific Papers distributed at the meeting

I.N. Boboshin, V.V. Varlamov, The new ENSDF search system NESSY: IBM/PC nuclear spectroscopy database, Nucl. Instrum. Meth. Phys. Res. A369 (1996) 113-119

V.N. Manokhin, Some criteria for selection of evaluated threshold reaction excitation functions

## The Network of Nuclear Reaction Data Centers

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National and regional nuclear reaction data centers, coordinated by the International Atomic Energy Agency, cooperate 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, Paris, France
NDS	-	IAEA Nuclear Data Section
CJD	-	Centr Jadernykh Dannyykh (= Nuclear Data Centre), Obninsk, Russia
CAJaD	-	Centr po Dannym o Stroenii Atomnogo Jadra i Jadernym Reakcijam (= Nuclear Structure and Nuclear Reaction Data Centre), Moscow, Russia
CDFE	-	Centr Dannyykh Fotojadernykh Eksperimentov (= Centre for Photonuclear Experimental Data), Moscow, Russia
CNDC	-	China Nuclear Data Centre, Beijing, China
ATOMKI	-	ATOMKI Charged-Particle Nuclear Reaction Data Group, Debrecen, Hungary
RIKEN	-	Nuclear Data Group, RIKEN Institute of Physical and Chemical Research, Wako-Shi, Japan
JCPRG	-	Japan Charged-Particle Nuclear Reaction Data Group, Hokkaido University, Sapporo, Japan
JAERI	-	Nuclear Data Center of the Japan Atomic Energy Research Institute, Tokai-Mura, Japan
(KACHAPAG)	-	(Karlsruhe Charged Particle Group, Karlsruhe, Germany. Discontinued in 1982, its responsibilities were taken over by CAJaD)

### 1. Neutron Nuclear Data

- 1.a Bibliography and Data Index CINDA:  
Input prepared by NNDC, NEA-DB, NDS, CJD, JAERI  
Handbooks published by IAEA  
Online services by NNDC, NEA-DB and NDS
- 1.b Experimental data exchanged in EXFOR format:  
Input prepared by NNDC, NEA-DB, NDS, CJD, CNDC  
Online services by NNDC, NEA-DB and NDS



- 1.c Data Handbooks based on EXFOR  
published by NNDC (last issue in 1989)
- 1.d Evaluated data exchanged in ENDF format:  
NNDC, NEA-DB, NDS, CJD, CNDC, JAERI and others. Main data libraries:

BROND-2 (Russia)	IRDF-90, Rev. 92(IAEA)
CENDL-2 (China)	JEF-2 (NEA)
ENDF/B-6 (USA)	JENDL-3 (Japan)

Online services by NNDC, NEA-DB and NDS

- 1.e Computer retrieval services upon request of customers:  
NNDC, NEA-DB, NDS, CJD, CNDC
- 1.f International data evaluation cooperation coordinated by NEA-DB

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

- 2.a Bibliography NSR published by NNDC  
Online services by NNDC, NEA-DB and NDS
- 2.b Numerical data exchanged in EXFOR format:  
Input prepared by CAJaD, RIKEN, CNDC, ATOMKI (from 1992), NDS,  
NNDC, JCPRG, NEA-DB  
Online services by NNDC, NEA-DB and NDS  
Coordination of compilation: CAJaD
- 2.c Computer retrieval services upon request of customers:  
NNDC, NEA-DB, NDS, CAJaD, CNDC

## 3. **Photonuclear Data**

- 3.a Numerical data exchanged in EXFOR format:  
Input prepared by CDFE, occasional contributions from NNDC, NDS  
Online services by NNDC, NEA-DB and NDS
- 3.b Bibliography published by CDFE and JAERI
- 3.c Computer retrieval services upon request of customers:  
NNDC, NEA-DB, NDS, CDFE

## **The Nuclear Data Centres Network**

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H.D. Lemmel (ed.)

### **Abstract**

The activities of eleven nuclear data centers are summarized and their cooperation under the auspices of the International Atomic Energy Agency is described. The Nuclear Data Centers Network has been established with the objective of providing nuclear physics databases that are required for nuclear technology, including energy and non-energy nuclear applications.

## Contents

<b>Preface</b> .....	1
<b>The Nuclear Data Centres Network</b> .....	3
<b>ANNEX 1: Addresses</b> .....	5
<b>ANNEX 2: Activities</b> .....	9
<b>ANNEX 3: Specific information</b> .....	33

## **Preface**

On 31 October - 1 November 1994, the IAEA held a consultant's meeting with the objective of preparing a documentation of the Nuclear Data Centres Network sponsored by the IAEA Nuclear Data Section (NDS). The present report was prepared as a result of the recommendations of that meeting. The purposes, goals and working arrangements of this network are described. Each data center has described its contribution to the network. This is a 'living' document which will be revised as necessary. The introductory material will be reviewed biennially at each network meeting.

The addresses of the centers are given in ANNEX 1 which will be updated by NDS as required. ANNEX 2 describing the activities of each center will be revised on the initiative of the data centers after review by the network. ANNEX 3 contains specific Centre information (such as staffing) which is subject to changes.

The original version of this report was reviewed at the Technical Meeting of the Nuclear Reaction Data Centres, Vienna, 2-4 May 1995, amended in August 1995, and printed as report INDC(NDS)-324.

The present version includes amendments to the Annexes as reported at the IAEA Advisory Group Meeting on the Coordination of the Nuclear Reaction Data Centres at the Brookhaven National Laboratory USA, 3-7 June 1996.



## THE NUCLEAR DATA CENTRES NETWORK

### Introduction

The Nuclear Data Centres Network, a world-wide cooperation of nuclear data centres under the auspices of the International Atomic Energy Agency, has been established to coordinate the collection, compilation and dissemination of nuclear data on an international scale. This document has been produced jointly by the Heads of the cooperating Data Centres to describe the activities of each Centre and commitments of each Centre to the Network. The document will be amended as necessary by the Data Centre Heads at their biennial meetings.

### Nuclear Data

Nuclear data are essential to the development and application of all nuclear sciences and technologies. These data are conventionally separated into two types, namely properties of a nucleus interacting with radiation or another nucleus called *nuclear reaction data*, and properties of single nuclei called *nuclear structure and radioactive decay data*. The term nuclear data is meant to include numerical data and the related bibliographic and descriptive documentation.

The scope of the Data Centres Network includes nearly all nuclear data required for energy and non-energy nuclear applications, as well as data for basic sciences. Applications of these nuclear data include nuclear energy development (both fission and fusion), nuclear medicine, process control in manufacturing, material identification using activation analysis, accelerator design and shielding, physics experiment and detector design, space radiation shielding, environmental monitoring, nuclear waste management, nuclear material disposal and others.

### Nuclear Data Centres Network

Nuclear data centres provide the essential link between the producers and the users of nuclear data. The Nuclear Data Centres Network has been established to organize this important activity on an international scale with the objective of providing nuclear data in a convenient, readily-available form to users. Customer service is the cornerstone of this Network. The Network organizes the tasks of collecting, compiling, standardizing, storing, assessing and distributing the vast amounts of nuclear data which currently exist or will be produced and needed in the future. Only through an international cooperation of interested groups of scientists in different organizations in different countries can the objective be realized, avoiding duplication of effort and maximizing the use of specialized expertise in each of the cooperating centres.

The Network is coordinated through regular meetings organized by the IAEA Nuclear Data Section, and through direct communications among the centres. The rules and procedures for the compilation and exchange of data files, and agreements on worksharing among the centres concerning data acquisition and services to customers, are determined during Network meetings.

The annexes to this document enumerate the Centres' activities and responsibilities. Each Centre has agreed to assume responsibility for one or more tasks within the Network for which it has both unique expertise and resources. Information collected or produced in any participating Centre will be available without restriction to any of the other Centres which are party to the agreement. This information will be available cost-free to each Centre's customers.

## **Network Objective and Tasks**

Dissemination of nuclear data and associated documentation to users is the primary goal of the Network. In order to accomplish this goal, the following specific tasks must be carried out:

- Compilation of relevant bibliographic information,
- Compilation of experimental nuclear data,
- Collection of evaluated nuclear data,
- Exchange of nuclear data of all types,
- Promotion of the development of special purpose evaluated data files,
- Development of common formats for computerized exchange of nuclear data,
- Coordinated development of computer software for managing and disseminating nuclear data,
- Coordination of the development and dissemination of end-user software for both on-line and local access to nuclear data,
- Documentation of current and future data needs in order to be able to meet changing user demands.

## **Data Evaluation Efforts**

The Network recognizes the importance of separately coordinated nuclear data evaluation activities. The availability of evaluated nuclear data files is essential to the Network's ability to fulfill its responsibilities to the user community.

## **Core Nuclear Data Centres**

This agreement recognizes the special status of the core Nuclear Data Centres located at

- National Nuclear Data Center, Upton, USA (see Annex 2.1);
- Nuclear Energy Agency, Paris, France (see Annex 2.2);
- International Atomic Energy Agency, Vienna Austria (see Annex 2.3);
- Institute of Physics and Power Engineering, Obninsk, Russia (see Annex 2.4); and Kurchatov Institute, Moscow, Russia (see Annex 2.5);

which provide coordinated, world-wide customer services covering the entire range of nuclear data described herein. These core centres also provide complete world-wide compilation of experimental neutron reaction data and related bibliographic information.

## **Other Nuclear Data Centres**

Regional, national and specialized data centres (see annexes 2.6 - 2.11) provide an essential complement to these core data centres by assuming particular responsibility for collection and dissemination of data of a specialized type or application.

**Annex 1**

**Addresses**

**1.1 National Nuclear Data Center**

- **Contact person:** Charles L. Dunford
- **Address:** National Nuclear Data Center  
Bldg. 197D  
Brookhaven National Laboratory  
P.O. Box 5000  
Upton, NY 11973-5000
- **Telephone:** +1 516-344-2902
- **Telefax:** +1 516-344-2806
- **E-mail:** NNDC@BNL.GOV (Internet)
- **Intercenter FTP  
file transfer:** BNLND2.DNE.BNL.GOV  
username: BNLNDC  
(No password required)
- **World Wide Web:** <http://www.nndc.bnl.gov/>

**1.2 OECD Nuclear Energy Agency Data Bank**

- **Contact person:** N. Tubbs
- **Address:** Le Seine Saint-Germain  
12, boulevard des Iles  
92130 Issy-les-Moulineaux  
France
- **Telephone:** +33 (1) 45 24 10 71
- **Telefax:** +33 (1) 45 24 11 10
- **E-mail:** NEA@NEA.FR (Internet)
- **Intercenter FTP  
file transfer:** DB.NEA.FR  
username: ANONYMOUS  
password (retrieve): OPEN  
password (deposite): GUEST
- **World Wide Web:** <http://www.nea.fr>



**1.3 International Atomic Energy Agency - Nuclear Data Section**

- **Contact person:** Douglas W. Muir
- **Address:** Wagramerstr. 5, P.O. Box 100  
A-1400 Vienna  
Austria
- **Telephone:** +43 (1) 2360-1709 (until 2 June 1995)  
+43 (1) 2060-21709 (starting from 6 June 1995)
- **Telefax:** +43 (1) 234564 (until 2 June 1995)  
+43 (1) 2060-7 (from 6 June 1995)
- **E-mail:** MUIR@IAEAND.IAEA.OR.AT (Internet)  
RNDS@IAEA (Bitnet)
- **Intercenter FTP file transfer:** IAEAND.IAEA.OR.AT  
username: NDSOPEN
- **World Wide Web:** <http://iaeand.iaea.or.at/>

**1.4 Russia Nuclear Data Center (CID)**

- **Contact person:** V.N. Manokhin
- **Address:** Federal Research Center IPPE  
Centr Jadernykh Dannykh  
Ploshchad Bondarenko  
249 020 Obninsk, Kaluga Region  
Russia
- **Telephone:** +7 084-399-8982
- **Telefax:** +7 095-883-3112  
+7 095-230-2326
- **E-mail:** MANOKHIN@CJD.OBNINSK.SU (Internet)

**1.5 Russia Nuclear Structure and Reaction Data Centre (CAIAD)**

- **Contact person:** F.E. Chukreev
- **Address:** National Scientific Research Center  
"Kurchatov Institute"  
Russia Nuclear Center  
46 Ulitsa Kurchatova  
123182 Moscow  
Russia
- **Telephone:** +7 095-196-1612  
+7 095-196-9968
- **Telefax:** +7 095-943-0073
- **E-mail:** CHUKREEV@CAJAD.KIAE.SU (Internet)

**1.6 Centre for Photonuclear Experiments Data (CDFE)**

- **Contact person:** Vladimir V. Varlamov
- **Address:** Institute of Nuclear Physics  
Moscow State University  
Vorob'evy Gory  
119899 Moscow  
Russia
- **Telephone:** +7 095-939-3483
- **Telefax:** +7 095-939-0896
- **E-mail:** VARLAMOV@CDFE.NPI.MSU.SU (Internet)
- **Intercenter FTP** CDFE.NPI.MSU.SU
- file transfer:** username: OPEN  
password: GUEST\_1

**1.7 China Nuclear Data Center (CNDC)**

- **Contact person:** Zhang Jingshang
- **Address:** China Nuclear Data Center  
China Institute of Atomic Energy  
P.O. Box 275 (41)  
Beijing 102413  
China
- **Telephone:** +86 10-6935-7275
- **Telefax:** +86 10-6935-7008
- **E-mail:** CNDC@MIPSA.CIAE.AC.CN (Internet)

**1.8 Japan Atomic Energy Research Institute - Nuclear Data Center**

- **Contact person:** Yasuyuki Kikuchi
- **Address:** 2-4 Shirakata Shirane  
Tokai-mura, Naka-gun  
Ibaraki-ken 319-11  
Japan
- **Telephone:** +81 29-282-5480
- **Telefax:** +81 29-282-6122
- **E-mail:** KIKUCHI@CRACKER.TOKAI.JAERI.GO.JP (Internet)

**1.9 RIKEN Nuclear Data Group**

- **Contact person:** Y. Tendow
- **Address:** RIKEN  
Hirosawa 2-1  
Wako-shi  
Saitama 351-01  
Japan
- **Telephone:** +81 (48) 462 1111 (ext. 3272)
- **Telefax:** +81 (48) 462 4641
- **E-mail:** TENDOW@POSTMAN.RIKEN.GO.JP (Internet)
- **World WideWeb:** <http://www.riken.go.jp>

**1.10 Japan Charged-Particle Nuclear Reaction Data Group**

- **Contact person:** Kiyoshi Kato
- **Address:** Department of Physics  
Hokkaido University  
Kita-10 Nishi-8, Kita-ku  
Sapporo 060  
Japan
- **Telephone:** +81 11-706-2684
- **Telefax:** +81 11-746-5444
- **E-mail:** KATO@NUCL.PHYS.HOKUDAI.AC.JP (Internet)

**1.11 ATOMKI Charged-Particle Nuclear Reaction Data Group**

- **Contact person:** F.T. Tárkányi
- **Address:** ATOMKI, Institute of Nuclear Research  
of the Hungarian Academy of Sciences  
Bem tér 18/c, P.O. Box 51  
H-4001 Debrecen  
Hungary
- **Telephone:** +36 52-417-266
- **Telefax:** +36 52-416-181
- **E-mail:** TARKANYI@ATOMKI.HU (Internet)

**Note the changed e-mail address of the ATOMKI group.**

**Annex 2**

**Activities**

A description of the centers is given including items such as background, staff, activities, responsibilities within the Network, and others.



## Annex 2.1

### National Nuclear Data Center (NNDC)

- **Background**

The National Nuclear Data Center (NNDC) grew out of the neutron data compilation activities started by D.J. Hughes in 1951. Its products and services have expanded over the years and its current activities are listed below. The U.S. Nuclear Data Network (USNDN) Executive Committee coordinates the nuclear structure activities at the NNDC and it gets similar input on reaction data from the Cross Section Evaluations Working Group (CSEWG) Executive Committee.

- **Status**

- Type of institute: National organization

- Participating countries: U.S.A. & Canada

- **Staff and Program**

- Total: 8 (Scientific/Professional), 3 (data assistants), 1 secretary

- Allocated to nuclear data activities: 5.8 (Scientific/Professional), 3 (data assistants)

- Fiscal year and budget cycle: The fiscal year is from October 1 to September 30 of the next year. The budget cycle is yearly.

- **Activities**

- A. **Relevant to the Network**

- 1. **Services:**

- a. Provide nuclear data services to users in the U.S.A. and Canada, including direct on-line computer services.
- b. Participate in and fulfill international data exchange agreements between the U.S. DOE and other national data centers or international organizations for the exchange of experimental and evaluated nuclear data.
- c. Develop and maintain online access and other general data processing codes. Send updates of the online system to other data centers where the NNDC system has been installed.
- d. Maintain and distribute documentation related to data compilation, evaluation and data testing for both reaction and structure data.

- 2. **Reaction Data:**

- e. Coordinate the Cross Section Evaluations Working Group (CSEWG) for nuclear reaction data activities in the U.S.A. and provide support services for it.

- f. Compile experimental data measured in the U.S.A. and Canada and maintain the experimental reaction data files: the Cross Section Information Storage and Retrieval System (CSISRS) and exchange these data in the Exchange Format (EXFOR) with other data centers.
- g. Compile references to experimental neutron reaction data and maintain the Computer Index to Neutron Data (CINDA) file for bibliographic references to microscopic neutron reaction data published in the U.S.A. and Canada.
- h. Maintain Evaluated Nuclear Data Files (ENDF) versions A and B and distribute ENDF/A, ENDF/B, and the evaluated data libraries from abroad such as BROND (Russia), JEF (Europe), FENDL (IAEA), JENDL (Japan) and CENDL (China).
- i. Maintain computer codes used in processing, storing and retrieving nuclear reaction data, ENDF processing codes and online service codes.

3. Structure and Decay Data:

- j. Provide support services for the USNDN. Coordinate designated activities of the NSDD network and provide support services for it.
- k. Compile and maintain the Nuclear Structure References (NSR) file containing bibliographic references to nuclear physics publications.
- l. Maintain and upgrade the codes needed to process, correct and publish the journal Nuclear Data Sheets (NDS) and exercise quality control over the published evaluations in the NDS and the ENSDF.
- m. Maintain and distribute nuclear structure related data files: Evaluated Nuclear Structure Data File (ENSDF), Nuclear Data (NUDAT), and Nuclear Wallet Cards file. Maintain, upgrade, and distribute ENSDF physics processing codes.

B. Outside the scope of the Network

- n. Carry out mass-chain evaluations for nuclear structure data. The NNDC has a permanent assignment of 39 mass-chains.
- o. Process, check, correct and publish in the peer-reviewed journal Nuclear Data Sheets (NDS), mass-chain evaluations for  $A=45-266$  produced by the international NSDD network.
- p. Organize and host specialized meetings or symposia to discuss and focus on specific problems in nuclear data evaluation or applications and publish the proceedings.
- q. Compile and maintain experimental data files for relativistic heavy ion and high energy electron interactions and make them available for online access.

C. Unique responsibilities within the Network

In the above list of activities, items c, d, and i - m are unique responsibilities fulfilled by the NNDC within the network.

• **Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## Annex 2.2

### NEA Data Bank

- **Background**

The coordination of nuclear data compilation within the OECD countries was started in 1964 with the creation of the Neutron Data Compilation Centre (CCDN) at Saclay near Paris, France. This centre participated from the start in the 4-Centre network. In 1978 the NEA Data Bank was established in Saclay, by merging the CCDN and the Computer Program Library (CPL), Ispra, Italy.

Since then the activities of the NEA Data Bank have evolved and comprise, apart from the original activities on nuclear data and computer programs, also projects such as the coordination of the Joint Evaluated File (JEF) of nuclear data, the compilation and critical review of chemical thermodynamic data for waste management applications, and the compilation of nuclear safety data relevant for thermal-hydraulic code validation.

The programme of work of the NEA Data Bank is managed by the Executive Group of the NEA Nuclear Science Committee.

- **Status**

- **Type of institute:** International organisation.  
A section within the Nuclear Energy Agency (NEA) of the Organisation for Economic Cooperation and Development (OECD).
- **Participating countries:** Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Japan, Korea, Mexico, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom.

- **Staff**

- **Total:** 10 "professional" plus 8 "supporting" staff
- **Allocated to nuclear data activities:** 2 "professional", 1 "supporting" staff
- **Fiscal year and budget cycle:** Calendar year, with a 2 year cycle for the programme of work and an annual budget cycle.

- **Activities**

- A. **Within the Network:**

- 1. **Services**

- Nuclear data services to its Member countries, including direct on-line computer services. The services cover both reaction data and structure and decay data.



2. Reaction data

- Compilation of descriptions and numerical data for almost all neutron induced reaction measurements performed in Member countries. (EXFOR)
- Compilation of bibliographic references to measurements, calculations, reviews and evaluations of neutron reaction and other microscopic data, published in Member countries. (CINDA)
- Coordination of the Joint Evaluation File (JEF) project for the production of a complete evaluated neutron data library for use in neutronics calculations in many different applicaton areas.

B. Outside the scope of the Network

- Coordination of the International Evaluation Cooperation, established to promote exchange of information concerning nuclear data evaluations, validations, and related topics, and with the aim to assess and to improve the quality and completeness of evaluated data.
- Collection and Verification of Computer programs used in all areas of nuclear power production. Dissemination of these computer codes to all countries except USA and Canada.
- Collection and critical review of Thermochemical Data for key elements required for geo-chemical modelling in Waste Management applications and on-line computer services for these data.
- Compilation of data from simulated reactor transient experiments, to be used in validating the large thermal-hydraulic computer codes in safety and analysis of reactor transients.

C. Unique responsibilities within the Network

- Compilation and exchange of EXFOR and CINDA entries originating from the NEA Data Bank member countries.
- Maintaining the CINDA coding manual.
- Providing a nuclear data service to NEA Data Bank member countries.

• **Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## Annex 2.3

### IAEA Nuclear Data Section

- **Background**

The Nuclear Data Section (NDS) of the International Atomic Energy Agency was formed in 1964 to provide nuclear data to IAEA Member States. In 1964, the Section along with 3 other neutron reaction data centers formed the 4-Center network. This network was designed to coordinate the compilation and distribution of neutron reaction data on a world-wide scale in order to provide better customer service of higher quality at lower cost by avoiding duplication and adopting common compilation formats and procedures allowing easy data exchange.

In 1975 the NDS initiated a network of charged particle and photo-nuclear data centers to cover nuclear reaction data types not covered by the existing 4-Center network. In 1979 the two networks were merged into the Nuclear Reaction Data Center Networks covering all nuclear reaction data.

Separately the NDS has initiated the Nuclear Structure and Decay Data Network in 1975 to coordinate internationally the evaluation and dissemination of nuclear structure and radioactive decay data. Also in 1975 the Atomic and Molecular Data Unit was formed within the Nuclear Data Section to coordinate evaluation and dissemination of atomic and molecular data.

The nuclear data program of the IAEA is guided by the International Nuclear Data Committee.

- **Status**

— Type of institute: A Section within the Division of Physical and Chemical Sciences of the Research and Isotopes Department of the International Atomic Energy Agency

— Participating countries: 115

- **Staff and Programmes**

— Total staff: 10 "professional" plus 11 "general service"

— Thereof allocated to nuclear data activities: 7 "professional", 10 "general service"

— Fiscal year: Calendar year

— Budget cycle: two years 1995/1996

- **Activities**

A. **Within the Network:**

1. **Services:**

- Nuclear data services to those member countries that are not taken care of by one of the other service centers, including direct on-line computer services.
- Documentation of data libraries in the IAEA-NDS-... series and publicizing in the IAEA Nuclear Data Newsletter.

2. Reaction data:

- Coordination of the nuclear reaction data centers network, including
  - neutron induced reactions,
  - charged-particle and heavy-ion induced reactions,
  - photonuclear reactions.
- Compilation (EXFOR) of numerical data and related information for nuclear reaction data measurements performed in those member countries that are not taken care of by one of the other compilation centres.
- Compilation (CINDA) of bibliographic references to microscopic neutron reaction data and related data, published in those member countries that are not taken care of by one of the other compilation centres. Publication of the CINDA handbooks.
- Coordination of nuclear data generation activities by experiment, theory, evaluation, validation, for the production of specialized data libraries for special applications. Contributions to the nuclear data evaluation efforts that are coordinated by the NEA Data Bank.

3. Structure and decay data

- Coordination of the NSDD evaluators' network.
- Coordination of the production of specialized data libraries.

B. Outside the scope of the Network

- Secretariat of the International Nuclear Data Committee and its subcommittees; nuclear data scientific programs as recommended by the INDC, with emphasis to the assessment of status and needs of nuclear data for energy and non-energy applications.
- Support of nuclear data activities in developing countries by appropriate means such as training, Technical Cooperation projects, research contracts, etc.
- Data center and coordination activities in the field of atomic and molecular data for fusion.

C. Unique responsibilities within the Network

- Data center coordination by organizing coordination meetings, and resulting activities.
- Publications such as CINDA and WRENDA.

• **Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## Annex 2.4

### Centr Jadernykh Dannykh (CJD)

(Russia Nuclear Data Center, IPPE, Obninsk, Russia)

- **Background**

The CJD was formed in 1963, participated from the start in the 4-Center network and was responsible for compilation of neutron data within the former USSR. The CJD works under the Nuclear Data Commission of the Russian Federation Ministry of Atomic Energy and at the present time compiles neutron data published in Russia and the states of the CIS.

- **Status**

- **Type of institute:** A laboratory within the Department of Nuclear Physics of the Institute of Physics and Power Engineering.

- **Member countries:** Russia

- **Staff and Programmes**

- **Total staff:** 16 "professional" plus 4 "supporting" staff

- **Allocated to nuclear nuclear data activities:** 14 "professional", 2 "supporting" staff

- **Fiscal year:** Calendar year

- **Budget cycle:** one year

- **Activities**

- A. **Within the Network:**

- 1. **Services**

- Providing neutron data services to institutes and other organizations in Russia.

- 2. **Reaction data**

- Compilation of bibliographic references to measurements, calculations, reviews and evaluations of microscopic neutron reactions (CINDA) in Russia and the states of the CIS.

- Compilation of numerical data and related information for neutron reaction data measurements (EXFOR) in Russia and the states of the CIS.

- Evaluation of nuclear data for national and international databases.

- Selected nuclear reactor calculations for nuclear data testing.

**B. Outside the scope of the Network**

- Determination of nuclear data requirements for various applications in Russia.
- Coordination of activity of neutron data evaluation and development of national evaluated neutron data libraries for general purpose and special applications.
- Publication of the journal "VANT, Ser. Yadernye Konstanty".

**C. Unique responsibilities within the Network**

- Compilation and exchange of CINDA and neutron EXFOR entries originating from Russia and the states of the CIS.

• **Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## Annex 2.5

### **Russia Nuclear Structure and Reaction Data Centre (CAJAD)** (National Scientific Research Center "Kurchatov Institute", Moscow, Russia)

- **Background**

The CAJAD was formed in 1973. Initially, this Centre had the responsibility for the compilation of integral charged particle data and for preparing bibliographic entries, according to NSR file rules, for Russian nuclear physics papers. CAJAD participated in the ENSDF activity from the start. CAJAD works under the Nuclear Data Commission of the Russian Federation Ministry of Atomic Energy.

- **Status**

- **Type of Institute:** A Laboratory within the General and Nuclear Physics Institute of the Russian Research Centre "Kurchatov Institute"
- **Participating countries:** Russia

- **Staff**

- **Total staff:** 5 professionals, 2 supporting staff
- **Allocated to nuclear data activities:** 5 professionals, 2 supporting staff

- **Activities**

- A. **Relevant to the Network:**

1. **Services**

- Charged particle reaction data, nuclear structure and decay data for Russian users. International service is possible in special cases such as assistance to foreign scientists to obtain more detailed information on published Russian investigations.

2. **Reaction Data**

- Compilation of numerical data and related information for charged particle induced reactions (integral and - time by time - differential). The scope of the publications is international, according to current tasks of CAJAD.
- Evaluation of some charged particle reactions (monitor reactions, mainly).
- CAJAD will continue to develop the EXFOR checking code for PC.

3. Structure and Decay Data

- CAJAD has the responsibility for some nuclear mass chains for ENSDF.
- CAJAD will participate in the development of International Nuclear Decay Data and Cross-Section Database.
- CAJAD will continue to develop methods of experimental data analysis in case of contradictions and ambiguous interpretations.
- CAJAD will continue its activity for the computer codes, which will help to evaluate quantum data.

B. Outside the scope of the Network

- Computer codes for some applications. Examples: (alpha, neutron) reactions, identification of nuclides, electromagnetic radiation penetration, stopping power for charged particles.
- Determination of nuclear (non-neutron) data requests for applications.

C. Unique responsibilities within the Network

- Coordination of charged particle reaction compilations for EXFOR.

• **Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## Annex 2.6

### MSU INP Centre for Photonuclear Experiments Data (CDFE)

- **Background**

The Centre for Photonuclear Experiments Data (Centr Dannykh Fotoyadernykh Eksperimentov - CDFE) of the Moscow State University, Institute of Nuclear Physics, was formed in 1979 to provide photonuclear data for scientific and educational organizations and for organizations which are working under the auspices of the Russian (former USSR) Nuclear Data Commission.

From 1980 it is a member of the IAEA Nuclear Reaction Data Centres Network with the tasks of compilation and international exchange of experimental photonuclear data using the EXFOR system, evaluation of photonuclear data and compilation of relevant bibliographic information.

In 1983 the CDFE joined the Russia Committee of Education (RCE) Nuclear Data Centres Network which has been established for compilation, evaluation, and dissemination of nuclear data primarily to universities and institutes of RCE.

- **Status**

— **Type of organization:** The Centre for Photonuclear Experiments Data is a laboratory of the Institute of Nuclear Physics of the Moscow State University. The CDFE is the main organization of the Russia Committee of Education Nuclear Data Centre Network.

- **Activities**

- A. **Within the Network**

- 1. **Services**

- Photonuclear data services to member countries.

- 2. **Reaction Data**

- Compilation (EXFOR) of numerical data and related information for photon induced reaction measurements. International exchange of nuclear data in form of EXFOR entries.
- Compilation of bibliographic references to measurements, reviews and evaluations of photonuclear reactions; annual bibliographic bulletins and indexes. Such as the series "Photonuclear Data".
- Development of methods for evaluation of photonuclear data obtained with significant systematical disagreements in various kinds of experiments.
- Production of an evaluated photonuclear reaction cross section library.



- Experimental measurements of photonuclear data using various facilities (betatron, race-track microtron).
- Theoretical calculations of photonuclear data. Development of models for the description of photonuclear data.

3. Structure and decay data

- Development of computer software for managing nuclear data from international data file (ENSDF) using IBM/PC and compatible computers. Example: "NESSY", the New ENSDF Search System.

**B. Outside the scope of the Network**

- Support of nuclear data activities within the Russia Committee of Education Nuclear Data Centres Network.
- Nuclear data services to the Russia Committee of Education organizations, primarily to universities and institutes, to the Academy of Science and Minatom organizations.

**C. Unique responsibilities within the Network**

- Within the network CDFE is the main center for photonuclear data.
- Compilation of experimental photonuclear data using EXFOR system.
- Publications such as "Photonuclear Data".

• **Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## Annex 2.7

### China Nuclear Data Center

- **Background**

The China Nuclear Data Center (CNDC) was founded in 1975. The CNDC is a national center for generating, collecting, processing and disseminating nuclear data, and providing services to all nuclear data users in China. The China Nuclear Data Coordination Network (CNDCN) is composed of some institutes and universities in China, which are taking up the nuclear data measurements and evaluation. It is coordinated by the CNDC. At present, the network has about 20 members.

- **Status**

- **Type of institute:** The CNDC within the Nuclear Physics Division of the China Institute of Atomic Energy
- **Members of CNDCN:** About 20 institutes and universities in China

- **Staff and Programmes**

- **Total staff:** 20 "professional" plus 8 "general service"
- **Thereof allocated to nuclear data activities:** 15 "professional", 3 "general service"
- **Fiscal year:** Calendar year
- **Budget cycle:** three years 1993/1995

- **Activities**

- A. **Within the Network:**

- 1. **Services:**

- Nuclear data to all users in China and some countries in Asia.
      - Documentation, mainly published in "Communication of Nuclear Data Progress" (CNDP).

2. Reaction data:

- Participation and coordination of the Chinese Nuclear Data Coordination Network, including
  - Nuclear data measurement;
  - Nuclear data evaluation;
  - Model program development and computation;
  - Group constant generation and benchmark testing;
  - Charged particle nuclear reaction data;
  - Fission product yield data;
  - Atomic and molecular data;
  - Nuclear parameters library.
- Compilation (EXFOR) of numerical data and related information for nuclear reaction data measurements performed in China.
- Compiling (CINDA) of bibliographic references to microscopic neutron reaction data and related data, published in Chinese.
- Construction and Management on Chinese Evaluated Nuclear Data Library (CENDL). Contribution to the nuclear data evaluation efforts that are coordinated by IAEA.

3. Nuclear structure and decay data

Carry out the following tasks under NDS/IAEA coordination:

- Evaluation and update of NSDD for  $A=51-56$  and  $195-198$ .
- High spin data evaluation for some nuclides.
- Evaluation for some data of specialized data libraries including International Nuclear Decay Database, Chart of Nuclides and Table of Isotopes.

B. Outside the scope of the Network

- Develop the cooperation and exchange in the nuclear data field with other national and international nuclear data organizations.

C. Unique responsibilities within the Network

- Coordination meetings and resulting activities of nuclear data measurement, theory calculation, evaluation and benchmark testing in China.

• Signature \_\_\_\_\_

Date \_\_\_\_\_

## Annex 2.8

### JAERI Nuclear Data Center

- **Background**

JAERI Nuclear Data Center (JAERI/NDC) was established in 1968 under support of Japanese Nuclear Data Committee (JNDC) which was formed in 1963 in the Atomic Energy Society of Japan.

JAERI/NDC has devoted its main efforts to develop Japanese Evaluated Nuclear Data Library (JENDL) in cooperation with JNDC. Its first version, JENDL-1 completed in 1977, JENDL-2 in 1984, JENDL-3 in 1989, and the latest and final version of JENDL-3 (JENDL-3.2) was released in 1994. Besides JENDL, the evaluation of the decay heat library (JNDC Nuclear Data Library for Fission Products) has been made since 1974.

JAERI/NDC has published a Chart of the Nuclides every 4 years since 1976, and joined the international mass chain evaluation for ENSDF in 1977.

JAERI/NDC has the role of a national nuclear data center: It disseminates both the experimental and evaluated nuclear data to users in Japan and functions as the channel to the foreign and international nuclear data centers. JAERI/NDC serves as the secretariat of JNDC.

Besides the nuclear data activities, JAERI/NDC started the evaluation of atomic and molecular data in 1976, and serves as the secretariat of the Research Committee on Atomic and Molecular Data of JAERI.

- **Status**

- Type of institute: A laboratory in the Department of Reactor Engineering, Tokai Research Establishment, JAERI
- Member countries: domestic

- **Staff and Programmes**

- Total staff: 9 physicists, 2 programmers and 3 secretaries
- Thereof allocated to nuclear data activities: 7 physicists, 1 programmer and 2 secretaries
- Fiscal year and budget cycle: 1 April - 31 March every year

- **Activities**

- A. **Within the Network:**

- 1. **Services:**

- Nuclear data services to domestic users.
    - The channel to foreign and international centers in the data and information exchange.

- 2. **Reaction Data:**

- Evaluation, validation and dissemination of JENDL General Purpose File (JENDL-1,2,3) and JENDL Special Purpose File (Dosimetry, Activation, Gas-Production, ( $\alpha$ ,n), Fusion, Actinides, Photo-reaction, PKA/KERMA, High Energy etc.).
    - Contribution of CINDA entries from Japanese journals and reports.

- 3. **Structure and decay data:**

- Evaluation, validation and dissemination of the JNDC Nuclear Data Library for Fission Products for decay heat calculations.
    - Contribution of mass chain evaluations (A=118-129) of ENSDF.

- B. **Outside the scope of the Network**

- Joining NEANSC Working Party on International Evaluation Cooperation and various IAEA Coordinated Research Programs.
  - Evaluation of Japanese Evaluated Atomic and Molecular Data Library (JEAMDL).
  - Contribution to the ALLADIN network.

- C. **Unique responsibilities within the Network**

- Providing the large scale nuclear data library produced in Japan such as JENDL to all the centers.
  - Publication of the Chart of the Nuclides every 4 years.

- **Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## Annex 2.9

### RIKEN Nuclear Data Group

- **Background**

The RIKEN Nuclear Data Group was formed in 1983 within the Radiation Laboratory, RIKEN with an invitation from NDS IAEA to join the international network of charged particle nuclear data compilation in EXFOR. For the first step the target for compilation was restricted to the reaction cross sections to produce selected 20 radioisotopes commonly used in biomedical study and applications. Compilation works continue up to this time after the start in 1984. The restricted scope of radioisotopes has been widened for the moment.

- **Status**

- Type of institute: A special group within the Radiation Laboratory of RIKEN, the Institute of Physical and Chemical Research
- Participating country : Japan

- **Staff and Programmes**

- Total: 4 "professional" and 1 "general service"
- Fiscal year: from April to March next year
- Budget cycle: 1 year

- **Activities**

- A. **Within the Network:**

1. **Services:**

- Regular nuclear data services are not offered, however, in case of need domestic users are invited to request data services at any time.

2. **Reaction data:**

- Compilation of the numerical data for nuclear reaction cross sections induced by charged particles to produce radioisotopes commonly used in biomedical fields. Along with this, compilation of the data for some related reaction cross sections other than the above mentioned. (EXFOR)

3. **Structure and decay data:**

- Mass-chain evaluation for  $A = 118-129$  as a member of the Japanese group. (ENSDF)
- Compilation of secondary sources appeared in Japan, such as annual reports, conference proceedings etc., concerning measurements and calculations on nuclear decay, reactions and structure into the Nuclear Structure Reference file. (NSR)

**B. Outside the scope of the Network**

- Research and development in measurements, calculations and compilation of nuclear data.

**C. Unique responsibilities within the Network**

- General responsibilities mentioned above and no unique ones.

• **Signature** \_\_\_\_\_

**Date** \_\_\_\_\_

## Annex 2.10

### Japan Charged-Particle Nuclear Reaction Data Group

- **Background**

A research project to compile Charged-Particle Nuclear Reaction Data was initiated in 1974, which was approved by the Theoretical Nuclear Physics Society and the Experimental Nuclear Physics Society in Japan. When starting this project, a work-sharing was agreed with the JAERI Nuclear Data Center, that this study group is in charge of Charged-Particle Nuclear Reaction Data and JAERI in charge of Nuclear Neutron Data.

The original database called NRDF (Nuclear Reaction Data File) was devised by the study group under the sponsorship of the Japanese Ministry of Education, Science and Culture through the Grant-in-Aid for Scientific Research. With data-storage and data retrieval functions added to the original NRDF system, the project developed from the researching and testing stage to the practical working stage of data compilation and data dissemination in 1987. Since this year the study group was reorganized to the Japan Charged Particle Nuclear Reaction Data Group which is abbreviated as JCPRG and has been assigned regular annual budget to the Nuclear Physics Laboratory, Department of Physics, Hokkaido University by the Ministry of Education, Science and Culture.

The basic aim of JCPRG activities is to construct and to provide an academic-oriented database according to an original and unique format by compiling and storing all charged-particle nuclear reaction data produced with Japanese accelerators. As international contributions of distributing the accumulated charged-particle nuclear reaction data for use, JCPRG transforms parts of NRDF to EXFOR format and sends them to IAEA NDS.

JCPRG consists of an "Advisory Committee" and an "Executive Committee". The Advisory Committee comprises 12 members from main nuclear laboratories and institutes in Japan. The Executive Committee is responsible for the yearly activities to be carried out by JCPRG under the guidance and suggestion of the Advisory Committee.

- **Status**

- **Type of institute:** Nuclear Physics Laboratory, Department of Physics, Hokkaido University (Office of Executive Committee)
- **Member countries:** 1 (Domestic)

- **Staff and Programmes**

- **Members of Executive Committee:** 7 "nuclear physicists" and 1 "information scientist"
- **Allocated to JCPRG Office:** 2 "nuclear physicists" plus 1 secretary
- **Part-time:** 6 "nuclear physicists" (in 1993)



- **Fiscal year:** From April to March
- **Budget cycle:** One year

- **Activities**

- A. Within the Network:**

- 1. **Services:**

- On-line retrieval service of EXFOR index and dissemination of the data to Japanese users

- 2. **Reaction Data:**

- Compilation of Charged-Particle Nuclear Reaction Data produced in Japan with NRDF format
    - Translation of NRDF data into EXFOR format
    - Contribution to the development of common formats for the computerized exchange of nuclear data

- 3. **Structure and decay data:**

- None

- B. Outside the scope of the Network**

- On-line computer services of NRDF to Japanese users through the National Science Information Network
  - Publication of "NRDF Annual Report" for coordination and promotion of utilization of nuclear data

- C. Unique responsibilities within the Network**

- Compiling all charged-particle nuclear data produced in Japan and translating into EXFOR
  - Providing charged-particle nuclear data service to Japanese users

- **Signature** \_\_\_\_\_  
Hajime Tanaka  
Head of JCPRG

**Date** \_\_\_\_\_

## Annex 2.11

### ATOMKI Charged-Particle Nuclear Reaction Data Group

- **Background**

The ATOMKI Charged-Particle Nuclear Reaction Data Project was started in 1992 within the Institute of Nuclear Research of the Hungarian Academy of Sciences (ATOMKI), Debrecen, with an invitation from NDS IAEA to join the international network to compile and evaluate integral data of charged particle induced nuclear reactions.

Initially, the compilation work was connected to cross section measurements and practical applications. In collaboration with different foreign institutes, integral reaction data were measured and used in the field of medical isotope production, activation analysis, thin layer activation technique and other fields using cyclotron. In view of the poor status of the existing database and the increasing demands for more precise data, a complex charged particle data programme was started which covered the establishment of a computerized database, the (re)measurement of the most important reaction data and a critical evaluation of the compiled data.

The establishment of the computerized charged particle reaction database was supported by the National Committee for Technical Development of Hungary.

- **Status**

- Type of institute: A team within the Cyclotron Application Department of the Institute of Nuclear Research of the Hungarian Academy of Sciences.
- Participating country: Hungary

- **Staff and Programmes**

- Total: 5 "professional" in part time
- Fiscal year: Calendar year
- Budget cycle: One year

- **Activities**

- A. **Within the Network:**

- 1. **Services:**

- Charged particle reaction data for Hungarian users. International service is possible in the field of compiled and recommended data for monitor reactions and reactions for productions of medical radioisotopes.

2. Reaction Data:

- Compilation of new numerical data for cross sections of nuclear reactions induced by charged particles performed in Forschungszentrum Jülich (Germany) and Hungary. Compilation of old data needed for the preparation of recommended data.
- Reviews and evaluations of low and middle energy charged particle data used in different practical fields.

3. Structure and decay data:

- None

B. Outside the scope of the Network

- Service of charged particle reaction data to Hungarian users.
- Measurement of the most important reaction data used for monitoring the beam parameters and for medical radioisotope production.

C. Unique responsibilities within the Network

- Compiling all charged-particle nuclear data produced specified as above.

• Signature \_\_\_\_\_

F. Tárkányi  
Head of Data Group

Date \_\_\_\_\_

## Annex 3

### Specific information

This Annex contains specific details about the cooperating data centers which may change more frequently.

**Note:** In the present issue information is given only for those centers for which information was recently provided as an update to the information given in Annex 2.

#### 3.6 MSU INP Centre for Photonuclear Experiments Data

- **Staff**

- **Total staff:** 7 "professional" plus 3 "general service"
- **Thereof allocated to nuclear data activities:** 5 "professional" and 2 "general service"
- **Fiscal year:** Calendar year
- **Budget cycle:** 1 year 1996

#### 3.9 RIKEN Nuclear Data Group

- **Staff and programme**

- **Total staff:** 4 "professional" plus 1 "general service"
- **Fiscal year:** from April to March next year
- **Budget cycle:** 1 year

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online: TELNET or FTP: [IAEAND.IAEA.OR.AT](http://IAEAND.IAEA.OR.AT)  
username: IAEANDS for interactive Nuclear Data Information System  
username: ANONYMOUS for FTP file transfer  
username: FENDL for FTP file transfer of FENDL files  
For users with web-browsers: <http://www.iaea.or.at>

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