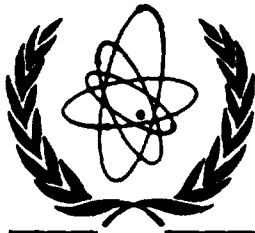




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INTERNATIONAL NUCLEAR DATA COMMITTEE

The Nuclear Data Centres Network

H.D. Lemmel (ed.)

March 1997

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

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The Nuclear Data Centres Network

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.

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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.

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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 I

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) 2060-21709
- **Telefax:** +43 (1) 2060-7
- **E-mail:** MUIR@IAEAND.IAEA.OR.AT (Internet)
- **Intercenter FTP file transfer** IAEAND.IAEA.OR.AT
username: NDSOPEN
- **World Wide Web** <http://www-nds.iaea.or.at>

1.4 Russia Nuclear Data Center (CJD)

- **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 (CAJAD)

- **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:** Akira Hasegawa
- **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:** HASEGAWA@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)

Annex 2

Activities

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

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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 MR/Bhad

Date May 15, 1995

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 application 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 geochemical 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 Ngel Tuds

Date 18th May 95

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

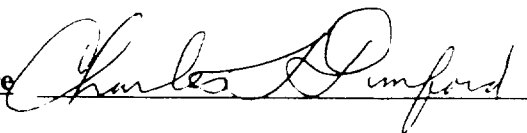
- Coordination of the NSDD evaluators' network.
- Coordination of the production of specialized data libraries.

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 6 - July - 1995

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:** 13 "professional" plus 2 "supporting" staff

— **Allocated to nuclear nuclear data activities:** 11 "professional", 1 "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** *S. S. S. S. S.* **Date** 20.02.97

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.

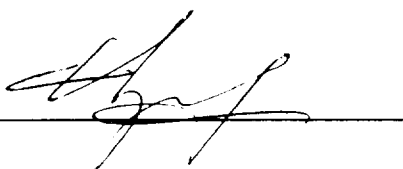
B. Outside the scope of the Network

- 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**



A handwritten signature in black ink, appearing to be 'H. G. ...', written over a horizontal line.

Date

04- Feb - 97

Annex 2.6

MSU INP Centre for Photonuclear Experiments Data (CDFE)

- **Background**

The Centre for Photonuclear Experiments Data (Centr Dannyykh Fotoyadernyykh 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 _____

05.02.1997

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 Zhang Jingshan

Date May 17, 1995

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, (α ,n), Fusion, Actinides, Photo-reaction, PKA/KERMA, High Energy etc.).
- Contribution of CINDA entries from Japanese journals and reports.

3. Structure and decay data:

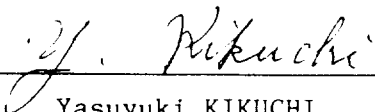
- Evaluation, validation and dissemination of the JNDC Nuclear Data Library for Fission Products for decay heat calculations.
- Contribution of mass chain evaluations (A=118-129) of ENSDF.

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** 
Yasuyuki KIKUCHI
General Manager

Date 31 May 1995

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

- **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:**

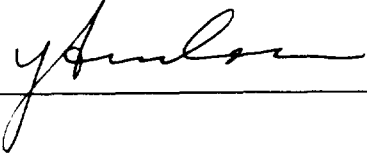
- Mass-chain evaluation for $A = 118-129$ as a member of the Japanese group. (ENSDF)
- Compilation of secondary sources appeared in Japan, such as annual reports, conference proceedings etc., concerning measurements and calculations on nuclear decay, reactions and structure into the Nuclear Structure 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** 7 February 1997

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
Hajime Tanaka
Head of JCPRG

Date May 15, 1995

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

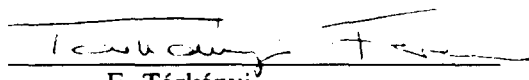
B. Outside the scope of the Network

- 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

March 07, 1997

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