INTERNATIONAL ATOMIC ENERGY AGENCY

INDC(NDS)-401
Distr.: EL

I N D C **INTERNATIONAL NUCLEAR DATA COMMITTEE**

The Nuclear Data Centres Network

V.G. Pronyaev (ed.)

July 2000

IAEA NUCLEAR DATA SECTION, WAGRAMER STRASSE 5, A-1400 VIENNA

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Printed by the IAEA in Austria
July 1999
Last revision of electronic form: 24 July 2000

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Abstract

The activities of thirteen 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

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.

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 Network of Nuclear Reaction Data Centres, 15 - 19 May 2000, Institute of Physics and Power Engineering, Obninsk, Kaluga reg., Russia.

THE NUCLEAR DATA CENTRES NETWORK

Introduction

The Nuclear Data Centres Network, a worldwide 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 - 2.13) 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:**	+1 631-344-2902	
— **Telefax:**	+1 631-344-2806	
— **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:**	C. Nordborg	
— **Address:**	Le Seine Saint-Germain 12, boulevard des Iles 92130 Issy-les-Moulineaux France	
— **Telephone:**	+33 (1) 45 24 10 90	
— **Telefax:**	+33 (1) 45 24 11 10	
— **E-mail:**	NEA@NEA.FR	**(Internet)**
— **Intercentre FTP file transfer:**	FTP.NEA.FR username: open password: Neadb	
— **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) 2600-21709

— **Telefax:** +43 (1) 26007

— **E-mail:** D.MUIR@IAEA.ORG **(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:** Leipunsky Institute of Physics and Power Engineering
Centr Jadernykh Dannykh
Ploschad Bondarenko
249 020 Obninsk, Kaluga Region
Russia

— **Telephone:** +7 08439-9-8982

— **Telefax:** +7 095-883-3112
+7 095-230-2326

— **E-mail:** MANOKHIN@IPPE.RSSI.RU **(Internet)**

— **Intercenter FTP file transfer:** ACJD.IPPE.RSSI.RU
username: CJD

— **World Wide Web** http://rndc.ippe.obninsk.ru

1.5 Russia Nuclear Structure and Reaction Data Centre (CAJAD)

— **Contact person:** F.E. Chukreev

— **Address:**
Russia Nuclear Structure and Reaction
Data Centre (CAJAD), "Kurchatov Institute"
46 Ulitsa Kurchatova
123182 Moscow
Russia

— **Telephone:** +7 095-196-9968

— **Telefax:** +7 095-882-5804

— **E-mail:** CHUKREEV@POLYN.KIAE.SU **(Internet)**
FELIKS@POLYN.KIAE.SU

1.6 Centre for Photonuclear Experiments Data

(Centr Dannykh Fotoyadernykh Eksperimentov - 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)**
VARLAMOV@DEPNI.NPI.MSU.SU

— **Intercenter FTP file transfer:**
DEPNI.NPI.MSU.SU
username: ftp
password: 'user's e-mail address'

directory: /incoming/varlamov/

— **World Wide Web** http://depni.npi.msu.su/cdfe/

1.7 China Nuclear Data Center (CNDC)

— **Contact person:** Youxiang Zhuang

— **Address:** China Nuclear Data Center
China Institute of Atomic Energy
P.O. Box 275 (41)
Beijing 102413
China

— **Telephone:** +86 10-6935-7830

— **Telefax:** +86 10-6935-7008

— **E-mail:** YXZHUANG@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 319-1195
Japan

— **Telephone:** +81 29-282-5480

— **Telefax:** +81 29-282-5766

— **E-mail:** HASEGAWA@NDC.TOKAI.JAERI.GO.JP **(Internet)**

— **World Wide Web** http://wwwndc.tokai.jaeri.go.jp/

1.9 Japan Charged-Particle Nuclear Reaction Data Group

— **Contact person:** Kiyoshi Kato

— **Address:** Division of Physics
Graduate School of Science
Hokkaido University
Kita-10 Nishi-8, Kita-ku
Sapporo, Hokkaido 060-0810
Japan

— **Telephone:** +81 (11) 706-2684

— **Telefax:** +81 (11) 746-5444

— **E-mail:** KATO@NUCL.SCI.HOKUDAI.AC.JP **(Internet)**

1.10 ATOMKI Charged-Particle Nuclear Reaction Data Group

— **Contact person:** F.T. Tárkányi

— **Address:** Cyclotron Department
Institute of Nuclear Research
of the Hungarian Academy of Sciences
Bem tér 18/c, P.O. Box 51
H-4001 Debrecen
Hungary

— **Telephone:** +36 1-52-417-266

— **Telefax:** +36 1-52-416-181

— **E-mail:** TARKANYI@ATOMKI.HU **(Internet)**

1.11 Ukraine Nuclear Data Center (UKRNDC)

— **Contact person:** Olena O. Gritzay

— **Address:** Ukraine Nuclear Data Center
Neutron Physics Department
SC "Institute for Nuclear Research"
Prospekt Nauki 47, P.O. Box 03680
Kyiv-28
Ukraine

— **Telephone:** +380-44-265-3987

— **Telefax:** +380-44-265-4463

— **E-mail:** OGRITZAY@KINR.KIEV.UA **(Internet)**

— **World WideWeb:** http://www.kinr.kiev.ua/ukrndc

http://www.ukrndc.kiev.ua

1.12 Center of Nuclear Physics Data (CNPD)

— **Contact person:** Svetlana A. Dunaeva

— **Address:** Russian Federal Nuclear Center - VNIIEF
(All-Russian Scientific Research Institute of
Experimental Physics)
pr. Mira, 37
Sarov, Nizhni Novgorod Region
Russia

— **Telephone:** +7 831-304-5770

— **Telefax:** +7 831-304-5569

— **E-mail:** DUNAEVA@EXPD.VNIIEF.RU **(Internet)**

— **Intercenter FTP file transfer:** FTP://FTP.VNIIEF.RU/PUB/DUNAEVA

— **World Wide Web** http://www.vniief.ru

1.13 KAERI Nuclear Data Evaluation Laboratory (KAERI/NDEL)

— **Contact person:** Jonghwa Chang

— **Address:** Nuclear Data Evaluation Laboratory
Korea Atomic Energy Research Institute - KAERI
P.O. Box 105
Yusong, Taejon
Republic of Korea

— **Telephone:** +82 42-868-2884

— **Telefax:** +82 42-868-2636

— **E-mail:** jhchang@kaeri.re.kr **(Internet)**

— **Intercenter FTP file transfer:** atom.kaeri.re.kr
username: anonymous

— **World Wide Web** http://atom.kaeri.re.kr/

(alternative: http://hpngp01.kaeri.re.kr/)

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:** 10 (Scientific/Professional), 3 (data assistants), 1 secretary

— **Allocated to nuclear data activities:** 7.8 (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. Carry out nuclear cross section data evaluations in response to specific users' needs.

j. Maintain computer codes used in processing, storing and retrieving nuclear reaction data, ENDF processing codes and online service codes.

3. Structure and Decay Data:

k. Provide support services for the USNDN. Coordinate designated activities of the NSDD network and provide support services for it.

l. Compile and maintain the Nuclear Structure References (NSR) file containing bibliographic references to nuclear physics publications.

m. 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.

n. 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

o. Carry out mass-chain evaluations for nuclear structure data. The NNDC has a permanent assignment of 39 mass-chains.

p. 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.

q. Organize and host specialized meetings or symposia to discuss and focus on specific problems in nuclear data evaluation or applications and publish the proceedings.

r. 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 j - n are unique responsibilities fulfilled by the NNDC within the network.

• **Signature**_____ **Date** 16May 2000

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 Fission and Fusion (JEFF) library 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Japan, Korea, Mexico, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom.

- **Staff**

— **Total:** 9 “professional” plus 7 “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

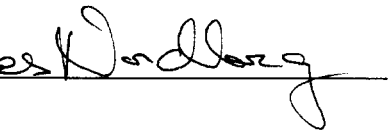
- Compilation of descriptions and numerical data for almost all neutron induced reaction measurements performed in Member countries. (EXFOR)
- Compilation of bibliographic references to measurements, calculations, reviews and evaluations of neutron reaction and other microscopic data, published in Member countries. (CINDA)
- Coordination of the Joint Evaluated Fission and Fusion (JEFF) 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 Chemical Thermodynamic 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** 19 Feb. 1999

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 worldwide scale in order to provide better customer service of higher quality at lower cost by avoiding duplication and adopting common compilation formats and procedures to allow easy data exchange.

In 1975 the NDS initiated a network of charged particle and photonuclear 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 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 programme 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 Department of Nuclear Sciences and Applications of the International Atomic Energy Agency

— **Participating countries:** 115

- **Staff and Programmes**

— **Total staff:** 10 “professional” plus 8 “general service” staff members

— **Thereof allocated to nuclear data activities:** 8 “professional” plus 7 “general service” staff members

— **Fiscal year:** Calendar year

— **Budget cycle:** Two years, for example 2002/2003

- **Activities**

A. Within the Network:

1. Services:

- Nuclear data services to those member countries that are not directly served by one of the other service centers, including direct online computer services.
- Documentation of data libraries in the IAEA-NDS-... series and announcements 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 directly served 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 directly served by one of the other compilation centres. Publication of the CINDA handbooks.

B. Outside the main scope of the Network

- Coordination of nuclear data generation activities, including experiment, theory, evaluation and validation, primarily through the mechanism of IAEA Coordinated Research Projects (CRPs).
- Participation in the activities organized by the NEA Nuclear Science Committee to coordinate major nuclear data evaluation projects.
- Coordination of the Nuclear Structure and Decay Data evaluators' network.
- Coordination of the production of specialized evaluated data libraries such as FENDL.
- Secretariat of the International Nuclear Data Committee and its subcommittees; nuclear data scientific programs as recommended by the INDC.
- Support of nuclear data activities in developing countries by appropriate means, such as training, Technical Cooperation projects, research contracts, *etc.*
- Data center and research 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** 16May 2000

Annex 2.4

RUSSIA NUCLEAR DATA CENTER (CJD)

(Leipunsky Institute of Physics and Power Engineering, 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 Leipunsky Institute of Physics and Power Engineering.

— **Member countries:** Russia

- **Staff and Programmes**

— **Total staff:** 10 “professional” plus 2 “supporting” staff

— **Allocated to nuclear data activities:** 8 “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.

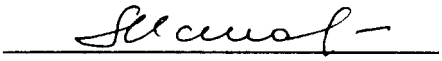
- Compilation of numerical data and related information for neutron reaction data measurements (EXFOR) in Russia and the states of the CIS.
- Evaluation of nuclear data for national and international databases.
- Selected nuclear reactor calculations for nuclear data testing.

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  **Date** 16 May 2000

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:** 4 professionals, 1 supporting staff

— **Allocated to nuclear data activities:** 4 professionals, 1 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 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 16 May 2000

Annex 2.6

MSU INP Centre for Photonuclear Experiments Data

(Centr Dannykh Fotoyadernykh Eksperimentov - CDFE)

- **Background**

The Centre for Photonuclear Experiments Data (Centr Dannykh Fotoyadernykh Eksperimentov - CDFE) of the Institute of Nuclear Physics, Moscow State University, was formed 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 nuclear, primarily photonuclear, data using the EXFOR system, evaluation of photonuclear data and compilation of relevant bibliographic information.

In 1983 the CDFE head 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.

- **Staff**

— **Total staff:** 6 “professional”, 2 “general service”

— **Allocated to nuclear data activities:** 4 “professional”, 2 “general service”

— **Fiscal year:** Calendar year

— **Budget cycle:** 1 year

- **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. Publication of annual bibliographic bulletins and indices, 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.
- Development of various charged particle reaction data catalogues (in co-operation with the CAJAD)

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.

4. Web-site

- Development and maintaining of Web-site with various nuclear reaction and nuclear structure databases.

B. Outside the scope of the Network

- Support of nuclear, primarily photonuclear, data activities in Russia.
- Nuclear data services to the Russia organizations, primarily to universities and institutes, to the Academy of Science and Minatom organizations.

C. Unique responsibilities within the Network

- CDFE is the main center for photonuclear data within the network.
- Compilation of experimental photonuclear data using EXFOR system.
- Evaluation of photonuclear data.
- Publications such as “Photonuclear Data”.
- Web-site maitaining.

- **Signature** _____ **Date** 16 May 2000

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:** 17 “professional” plus 3 “general service”

— **Thereof allocated to nuclear data activities:** 15 “professional”, 3 “general service”

— **Fiscal year:** Calendar year

— **Budget cycle:** five years 1996/2000

- **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 measurements, theoretical calculations, evaluation and benchmark testing in China.

• **Signature** Zhuang Youxiang **Date** 16May 2000

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 version of JENDL-3 (JENDL-3.2) was released in 1994. Since then main efforts have been devoted to anticipated new version JENDL-3.3. 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, however due to restructuring of Tokai Research Establishment of JAERI, the activity will be transferred to other laboratory in Fusion Division.

- **Status**

— **Type of institute:** A laboratory in the Department of Nuclear Energy System, Tokai Research Establishment, JAERI

— **Member countries:** domestic

- **Staff and Programmes**

— **Total staff:** 8 physicists and 2 secretaries

— **Thereof allocated to nuclear data activities:** 6 physicists 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, Covariance, 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 (WPEC) and various IAEA Coordinated Research Programs.

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. (Latest version is 1996.)

- **Signature** Akira Hasegawa **Date** 16May 2000

Annex 2.9

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 institue:** Nuclear Physics Laboratory, Division of Physics, Graduate School of Science, Hokkaido University
(Office of Executive Committee)

— **Member countries:** 1 (Domestic)

- **Staff and Programmes**

— **Members of Executive Committee:** 8 "nuclear physicists" and 1 "information scientist"

— **Allocated to JCPRG Office:** 2 “nuclear physicists” plus 1 secretary

— **Part-time:** 3 “nuclear physicists” (in 1999)

— **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

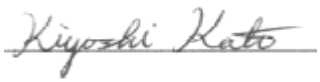
3. Structure and decay data:
   - None

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 reponsibilities 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**  **Date** 16May 2000

Annex 2.10

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 Department of the Institute of Nuclear Research of the Hungarian Academy of Sciences.

— **Participating country:** Hungary

- **Staff and Programmes**

— **Total:** 6 “nuclear physicists” 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, reactions for productions of medical radioisotopes and reactions for thin layer activation technique.

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, for medical radioisotope production and for thin layer activation technique.

C. Unique reponsibilities within the Network

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

- **Signature**  **Date** 16May 2000

Annex 2.11

Ukraine Nuclear Data Center

(Scientific Center “Institute for Nuclear Research”, Kiev, Ukraine)

- **Background**

Officially UKRNDC was formed in 1996 and is responsible for compilation of neutron and nuclear structure data published in Ukraine.

- **Status**

— **Type of institute:** A subdivision within the Department of Neutron Physics of the Scientific Center “Institute for Nuclear Research”.

— **Participating country:** Ukraine

- **Staff and Programmes**

— **Total:** 6 “professionals”

— **Allocated to nuclear data activities:** 6 “professionals”

— **Fiscal year:** Calendar year

— **Budget cycle:** 3 years

- **Activities**

A. Within the Network:

1. Services:

   - Nuclear data services for customers in Ukraine.

2. Reaction Data:

   - Compilation of CINDA and EXFOR data published in Ukrainian scientific journals and reports.

3. Structure and decay data:

   - Compilation of data published in Ukraine on nuclear decay, reactions and structures for Nuclear Structure Reference file (NSR)

B. Outside the scope of the Network

- Multigroup cross-section libraries preparation for nuclear technology needs in Ukraine.

- Dissemination of computer codes for basic and applied calculations.

- Nuclear data support to meet the requirements connected with the Chernobyl problem (the RBMK units decommission, 4th (destroyed) block nuclear safety, etc.)

C. Unique reponsibilities within the Network

- None

• **Signature** _____ **Date: 16 May 2000**

Annex 2.12

Center of Nuclear-Physics Data (CNPD)

(RFNC-VNIIEF, Sarov, Russia)

- **Background**

The CNPD grew out of the compilation activities on charged particle reaction data started at the RFNC-VNIIEF in 1977. Officially it was formed in 1997 to provide nuclear services to the users.

- **Status**

— **Type of institute:** The Center of Nuclear-Physics Data is the group of the the Institute of Nuclear and Radiative Physics within the Russian Federal Nuclear Center.

— **Member countries:** Russia

- **Staff and Programmes**

— **Total staff:** 5 “professional” plus 2 “supporting” staff

— **Allocated to nuclear nuclear data activities:** 5 “professional”, 1 “supporting” staff

— **Fiscal year:** Calendar year

— **Budget cycle:** one year

- **Activities**

A. Within the Network:

1. Services

- To provide nuclear data services to users in Russia and the republics of the former USSR.
- Computer codes for some applications, for example:

Software for Maxwell and non-Maxwell velocities calculation of main thermonuclear reactions;

Software for cross section evaluation of charged particle reaction on light nuclei;

Development of algorithms for extrapolation of nuclear data into the lower energy region, which is interesting for astrophysics.

Creation of the task-oriented databases.

2. Reaction data

- Compilation of numerical data and related information for charged particle reaction data on light nuclei. International exchange data in the form of EXFOR entries.

- Compilation of numerical data and related information for various kinds of nuclear reaction data measurements performed in RFNC-VNIIEF with the co-operation of CJD, CAJAD and CDFE.

- Development of methods for evaluation of charged particle reaction data.

- Production of an evaluated reaction cross section library.

- Experimental measurements of neutrons, charged particles and photonuclear data using various facilities (linear accelerator, tandem Van de Graaf, neutron generator and so on).

B. Outside the scope of the Network

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

- Determination of nuclear requirements for applications at RFNC-VNIIEF.

C. Unique responsibilities within the Network

- General responsibilities mentioned above and no unique ones.

Signature  **Date** 22.09.98

Annex 2.13

KAERI Nuclear Data Evaluation Laboratory (KAERI/NDEL)

(KAERI, Yusong, Republic of Korea)

- **Background**

The Nuclear Data Evaluation Laboratory (KAERI/NDEL) of the Korea Atomic Energy Research Institute was established in 1996.

KAERI/NDEL has devoted its main efforts to supply the processed and evaluated nuclear data to the national nuclear research and development projects.

- **Status**
  - **Type of institute:** The NDEL within the department of Advanced Reactor Technology of the Korea Atomic Energy Research Institute
  - **Member country:** Domestic

- **Staff**
  - **Total Staff:** 8 scientist + 1 technician
  - **Fiscal year:** Calendar year
  - **Budget cycle:** 1 year

- **Activities**

A. Within the Network:

1. Services:
   - Nuclear data services to domestic users
   - The channel to foreign and international centres in the data and information exchange.
2. Reaction Data:
   - Compilation of numerical data and related information for nuclear reaction data measurements published in Korea.
   - Compilation of bibliographic references to microscopic nuclear reaction data and related data, published in Korea.

B. Outside the scope of the Network:

- Research and development in evaluation of nuclear data
- Preparation of multigroup libraries for the neutron transport codes

C. Unique responsibilities with in the Network

- Providing nuclear data services to Korean users

- **Signature** Jaehwa Chang **Date** 23 June 1999

ANNEX 3

Table. Centre identification characters used as the first character in EXFOR entry or subentry number for identification of the centre responsible for the input and transmission of the data. The character defines also the type of the data compiled.

Character	Responsible centre	Type of the data
0	Preliminary	For internal center use (i.e., not included on exchange files).
1	NNDC (Brookhaven)	Neutron nuclear data
2	NEA-DB (Paris)	Neutron nuclear data
3	NDS (Vienna)	Neutron nuclear data
4	CJD (Obninsk)	Neutron nuclear data
6	data from area 2	Data entered by NNDC; not part of the normal neutron nuclear data 2, 3, 4 series.
8	data from area 4	
9	NDS (Vienna)	Dictionary transmission
A	CAJaD (Moscow)	Charged-particle nuclear data
B	KaChaPaG (Karlsruhe). Updates of these entries are the responsibility of CAJaD	Charged-particle nuclear data.
C	NNDC (Brookhaven)	Charged-particle nuclear data
D	NDS (Vienna)	Charged-particle nuclear data
E	JCPDG (Sapporo)	Charged-particle nuclear data
F	VNIIEF (Sarov)	Charged-particle nuclear data
G	NDS (Vienna)	Photonuclear data
H	NNDC (Brookhaven)	Special internal use for relativistic particle reaction data
L	NNDC (Brookhaven)	Photonuclear data
M	CDFE (Moscow)	Photonuclear data
N	NEA-DB (Paris)	Special use for memos only
O	NEA-DB (Paris)	Charged-particle nuclear data
P	NNDC (Brookhaven). Updates of these entries are the responsibility of NNDC.	Charged-particle nuclear data from MacGowen file
Q	CJD (Obninsk)	Photonuclear data
R	RIKEN	Charged-particle nuclear data
S	CNDC	Charged-particle nuclear data
T	VNIIEF/NNDC	Charged-particle nuclear data
V	NDS (Vienna)	Special use for selected evaluated neutron data 'VIEN' file.

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Online: TELNET or FTP: iaeand.iaea.or.at
username: IAEANDS for interactive Nuclear Data Information System
usernames: ANONYMOUS for FTP file transfer;
FENDL2 for FTP file transfer of FENDL-2.0;
RIPL for FTP file transfer of RIPL;
NDSONL for FTP access to files sent to NDIS “open” area.
Web: http://www-nds.iaea.or.at