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# INDC International Nuclear Data Committee

## **International Network of Nuclear Reaction Data Centres** **(Draft)**

Prepared by

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April 2010

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## **International Network of Nuclear Reaction Data Centres**

Prepared by

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IAEA Nuclear Data Section, Vienna, Austria

### **Abstract**

The activities of fourteen nuclear data centres are summarized, and their cooperation under the auspices of the International Atomic Energy Agency is described. Each of the centres provides coverage for different geographical zones and/or specific types of nuclear data, thus together providing a complete service for users worldwide. **The International Network of Nuclear Reaction Data Centres (NRDC)** was established with the objective of providing nuclear physics databases that are required for nuclear technology (encompassing energy and non-energy applications) by coordinating the collection, compilation and dissemination of nuclear data on an international scale.

April 2010



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## Preface

The objectives, goals and working arrangements of the **International Network of Nuclear Reaction Data Centres (NRDC)** are summarized, according to the conclusions of the IAEA Technical Meeting on the **International** Network of Nuclear Reaction Data Centres, 20-23 April 2010, Sapporo, Japan.

The purpose and mission of the Network are described in the introductory pages.

Contact addresses of the centres are given in Annex 1.

Lists of the complete activities of each centre are described in Annex 2. Note: only a part of each centre's overall work relates directly to their NRDC Network contribution.

Details of the working arrangements are given in Annex 3.

Compilation responsibilities are listed in Annex 4.

The contents of this 'living' document will be revised as necessary:

introductory material will be reviewed biennially at each Network meeting;

Annex 1 (Addresses) will be updated by the IAEA Nuclear Data Section (NDS) as required;

Overall activities of each centre are described in Annex 2, and will be revised on the initiative of the data centres, after review by the Network;

Annex 3 will be reviewed annually;

Annex 4 will be updated by NDS after consultation with the Network.

The first version of this document was drafted at an IAEA Consultants' Meeting dedicated to this purpose from 31 October - 1 November 1994, approved at the Technical Meeting of the Nuclear Reaction Data Centres, Vienna, 2-4 May 1995, and printed as report INDC(NDS)-324 in August 1995.



# THE INTERNATIONAL NETWORK OF NUCLEAR REACTION DATA CENTRES

## 1. Introduction

The **International Network of Nuclear Reaction Data Centres (NRDC)** constitutes a worldwide cooperation of nuclear data centres under the auspices of the International Atomic Energy Agency. The NRDC Network was established to coordinate the world-wide collection, compilation and dissemination of nuclear reaction data. This document has been produced jointly by the Heads of the cooperating Data Centres to describe the overall activities of each Centre and their commitments to the NRDC Network. The contents will be amended as necessary by the Data Centre Heads at their regular biennial meetings.

## 2. 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*. As defined, the term “nuclear data” includes numerical and related bibliographic data, along with descriptive documentation.

Two international nuclear data networks operate under the auspices of the IAEA: **the International Network of Nuclear Reaction Data Centres (NRDC)**, as described in the present document, and the **International Network of Nuclear Structure and Decay Data (NSDD) Evaluators**, see IAEA report INDC(NDS)-421.

The scope of **the International Network of Nuclear Reaction Data Centres** includes nuclear data required for both energy and non-energy applications, as well as for basic nuclear science. Applications of these nuclear data are numerous, and include nuclear energy development (both fission and fusion), nuclear medicine, process control in manufacturing, material identification using activation analysis, accelerator design and shielding, environmental monitoring, nuclear waste management, nuclear material disposal, space radiation shielding, and design of detectors and physics experiments.

## 3. The NRDC Network

Nuclear data centres provide the essential link between the producers and users of nuclear data. **The International Network of Nuclear Reaction Data Centres (NRDC)** has been established to organize these important preparative and communication activities on an international scale, with the objective of providing the desired nuclear data to users in a convenient and readily-available form. Customer services represent the cornerstone of this Network, which organizes the tasks of collecting, compiling, standardizing, storing, assessing and distributing the vast amounts of nuclear data that exist already and will be produced and needed in the future. Only through the international cooperation of interested groups of scientists in different countries and organizations can the provision of recommended high-quality nuclear data be realized, avoiding duplication of effort and maximizing the use of specialized expertise at each of the cooperating centres.

The NRDC Network is coordinated through regular meetings organized by the IAEA Nuclear Data Section and through direct communication among the centres. Rules and procedures for the compilation and exchange of data files and agreements on **work sharing**, amongst the centres

associated with data acquisition and services to customers, are determined during these Network meetings.

The centres' activities and responsibilities are described in the various annexes. Each centre has agreed to assume responsibility for one or more tasks within the Network for which they have both unique expertise and resources. Information collected or produced in any participating centre will be available without restriction to any of the other centres that are party to the agreement. This information will be available cost-free to all customers of each centre in the Network.

#### **4. Objectives and Tasks**

The primary goal of the Network is the dissemination of nuclear reaction data and associated documentation to users. The following specific tasks must be carried out in order to accomplish this important aim:

- compilation of relevant bibliographic information,
- compilation of experimental nuclear reaction data,
- collection of evaluated nuclear reaction data,
- exchange of nuclear reaction 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.

#### **5. Data Evaluations**

All members of the NRDC Network recognize the importance of separately coordinated nuclear data evaluation activities. Furthermore, the availability of evaluated nuclear data files is essential in order to fulfil the responsibilities of the Network to the world-wide user community. The Network members appreciate the efforts of the Working Party on International Nuclear Data Evaluation Cooperation (WPEC), a working group - hosted by the OECD Nuclear Energy Agency - involved in the coordination of many national and regional evaluation projects, whose activity is complementary to the Network's tasks on evaluated data as outlined above (item 4).

## 6. Nuclear **Reaction Data Centres**

### 6.1 **Core Centres**

The resulting arrangements recognize the special status of the “**Core**” **Centres**:

- National Nuclear Data Center (NNDC), Brookhaven National Laboratory, Upton, USA (see Annex 2.1);
- OECD Nuclear Energy Agency Data Bank (NEA-DB), Paris, France (see Annex 2.2);
- International Atomic Energy Agency Nuclear Data Section (NDS), Vienna, Austria (see Annex 2.3);
- Russia Nuclear Data Centre (CJD), Institute of Physics and Power Engineering, Obninsk, Russian Federation (see Annex 2.4);

that provide coordinated, world-wide customer services covering the entire range of nuclear data described herein. These **Core Centres** also provide comprehensive compilations of experimental neutron reaction data and related bibliographic information.

### 6.2 **Regional, National and Specialized Centres**

Regional, national and specialized **centres**:

- **Russia Nuclear Structure and Reaction Data Centre (CAJAD), Moscow, Russian Federation (see Annex 2.5);**
- **MSU SINP Centre for Photonuclear Experiments Data (CDFE), Moscow, Russian Federation (see Annex 2.6);**
- **China Nuclear Data Centre (CNDC), China Institute of Atomic Energy, Beijing, China (See Annex 2.7);**
- **Hokkaido University Nuclear Reaction Data Centre (JCPRG), Hokkaido University, Sapporo, Japan (see Annex 2.8);**
- **JAEA Nuclear Data Centre, Japan Atomic Energy Agency, Tokai-mura, Japan (see Annex 2.9);**
- **ATOMKI Charged-Particle Nuclear Reaction Data Group, Institute of Nuclear Research of the Hungarian Academy of Science, Debrecen, Hungary (see Annex 2.10);**
- **Ukraine Nuclear Data Centre (UKRNDC), Institute for Nuclear Research, Kyiv, Ukraine (see Annex 2.11);**
- **Centre of Nuclear Physics Data (CNPD), RFNC-VNIIEF, Sarov, Russian Federation (see Annex 2.12);**
- **KAERI Nuclear Data Evaluation Laboratory (KAERI-NDEL), Korea Atomic Energy Research Institute, Daejeon, Korea (see Annex 2.13);**
- **Bhabha Atomic Research Centre (BARC), Mumbai, India (see Annex 2.14);**

provide essential complementary functions to the **Core Centres** by assuming particular responsibility for the collection and dissemination of data of a specialized type or application.

## 7. Working Arrangements

The working arrangements for the compilation and exchange of nuclear reaction data are summarized in **Annex 3** (Protocol: Nuclear Reaction Data Centres). As agreed in May 2002, the NDS assumes responsibility for the coordination of the NRDC Network compilation activities. Thus, the NDS will

- (a) assign clear responsibilities for the creation and correction of data compilations, and drive these activities forward,
- (b) ensure implementation of compilation rules,
- (c) decide on all issues relating to dictionary codes,
- (d) be responsible for CINDA and EXFOR distribution to the other data centres.

# Annex 1

## Addresses

### 1.1 National Nuclear Data Center

- **Contact person:** Michael Herman
- **Address:** National Nuclear Data Center  
Bldg. 197D  
Brookhaven National Laboratory  
P.O. Box 5000  
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U.S.A.
- **Telephone:** +1 631-344-2802
- **Telefax:** +1 631-344-2806
- **E-mail:** [nndc@bnl.gov](mailto:nndc@bnl.gov)
- **Intercenter FTP  
file transfer:** [ftp.nndc.bnl.gov](ftp://ftp.nndc.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:** Claes 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](mailto:nea@nea.fr)
- **World Wide Web:** <http://www.nea.fr/>

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

- **Contact person:** Robin A. Forrest
- **Address:** Vienna International Centre, P.O. Box 100  
A-1400 Vienna  
Austria
- **Telephone:** +43 (1) 2600-21709
- **Telefax:** +43 (1) 26007
- **E-mail:** R.Forrest@iaea.org
- **Intercenter FTP  
file transfer:** nds121.iaea.org  
username: ndsx4
- **World Wide Web** <http://www-nds.iaea.org/>

### 1.4 Russia Nuclear Data Centre (CJD)

- **Contact person:** Anatolij I. Blokhin
- **Address:** Leipunsky Institute of Physics and Power Engineering  
Centr Jadernykh Dannykh  
Ploschad Bondarenko, 1  
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- ~~**Intercenter FTP  
file transfer:** [aejd.ippe.rssi.ru](http://aejd.ippe.rssi.ru)  
username: CJD~~
- **World Wide Web** <http://www.ippe.obninsk.ru/podr/cjd/>

## 1.5 Russia Nuclear Structure and Reaction Data Centre (CAJAD)

- **Contact person:** Svetlana Babykina
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Data Centre (CAJAD), “Kurchatov Institute”  
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Russian Federation
- **Telephone:** +7 099-196-9552
- **Telefax:** +7 099-882-5804
- **E-mail:** s.babykina@polyn.kiae.su

## 1.6 Centre for Photonuclear Experiments Data (Centr Dannyykh Fotoyadernyykh Eksperimentov - CDFE)

- **Contact person:** Vladimir V. Varlamov
- **Address:** Skobeltsyn Institute of Nuclear Physics  
Lomonosov Moscow State University  
Leninskie Gory  
119991 Moscow  
Russian Federation
- **Telephone:** +7 495-939-3483
- **Telefax:** +7 495-939-0896
- **E-mail:** varlamov@depni.sinp.msu.ru
  
- **Intercenter FTP** depni.sinp.msu.ru
- **file transfer:** **username: anonymous**  
**password: (one’s) e-mail address**  
directory: /incoming/varlamov/
- **World Wide Web** <http://cdfe.sinp.msu.ru/>

### 1.7 China Nuclear Data Centre (CNDC)

- **Contact person:** Ge Zhigang
- **Address:** China Nuclear Data Centre  
China Institute of Atomic Energy  
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Beijing 102413  
Peoples Republic of China
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### 1.8 Hokkaido University Nuclear Reaction Data Centre (JCPRG)

- **Contact person:** Kiyoshi Kato
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- **Telefax:** +81 (11) 706-2684
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- **World Wide Web** <http://www.jcprg.org/>

### 1.9 Japan Atomic Energy Agency Nuclear Data Centre

- **Contact person:** Jun-ichi Katakura
- **Address:** 2-4 Shirakata Shirane  
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Japan
- **Telephone:** +81 29-282-5480
- **Telefax:** +81 29-282-5766
- **E-mail:** [tokai-ndc-wwwadm@jaea.go.jp](mailto:tokai-ndc-wwwadm@jaea.go.jp)
- **World Wide Web** <http://wwwndc.jaea.go.jp/>

### 1.10 ATOMKI Charged-Particle Nuclear Reaction Data Group

- **Contact person:** Ferenc T. Tárkányi
- **Address:** Cyclotron Department  
Institute of Nuclear Research  
of the Hungarian Academy of Sciences  
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Hungary
- **Telephone:** +36-52-417-266
- **Telefax:** +36-52-416-181
- **E-mail:** tarkanyi@namafia.atomki.hu

### 1.11 Ukraine Nuclear Data Centre (UKRNDC)

- **Contact person:** Olena O. Gritzay
- **Address:** Ukraine Nuclear Data Centre  
Neutron Physics Department  
Institute for Nuclear Research  
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- **Telephone:** +380-44-265-3987
- **Telefax:** +380-44-265-4463
- **E-mail:** ogritzay@kinr.kiev.ua
- **World WideWeb:** <http://ukrndc.kinr.kiev.ua/>

### 1.12 Centre of Nuclear Physics Data (CNPd)

- **Contact person:** **Sophiya Taova**
- **Address:** **All-Russian Research Institute** of  
Experimental Physics  
Centre of Nuclear Physics Data  
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Russian Federation
- **Telephone:** +7 831-30 27779
- **Telefax:** +7 831-304-5569
- **E-mail:** taova@expd.vniief.ru
- **World Wide Web** <http://en-cnpd.vniief.ru/>

### 1.13 KAERI Nuclear Data Evaluation Laboratory (KAERI-NDEL)

- **Contact person:** Young-Ouk Lee
- **Address:** Nuclear Data Evaluation Laboratory  
Korea Atomic Energy Research Institute - KAERI  
P.O. Box 105  
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- **Telephone:** +82 42-868-2964
- **Telefax:** +82 42-868-2636
- **E-mail:** yolee@kaeri.re.kr
- **Intercenter FTP file transfer:** [atom.kaeri.re.kr](http://atom.kaeri.re.kr) (*Doesn't work!?*)  
username: anonymous
- **World Wide Web** <http://atom.kaeri.re.kr/>  
*(alternative: <http://hpngp01.kaeri.re.kr/>)*

### 1.14 Bhabha Atomic Research Centre (BARC)

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Bhabha Atomic Research Centre  
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- **Telephone:** +91 22 255 95002
- **Telefax:** +91 22 2550 5151
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- **World Wide Web** <http://www.barc.gov.in/>

## **Annex 2**

### **Activities**

A brief description of each centre is given, including items such as background, staff, activities, responsibilities within the Network and other relevant items. Note: only a fraction of each centre's overall work relates directly to their contribution to the NRDC Network.

## Annex 2.1

### National Nuclear Data Center (NNDC)

- **Background**

The National Nuclear Data Center (NNDC) is the focal point for US nuclear data activities. At a national level, NNDC coordinates the United States of America Nuclear Data Program and Cross Section Evaluation Working Group. On an international level, the centre plays an important role in all major nuclear data networks, including nuclear reactions (NRDC), nuclear structure and decay data (NSDD) and evaluations (WPEC).

Nuclear data activities at BNL started in 1952 under the Brookhaven Neutron Cross Section Compilation Group, which changed to the Sigma Center in 1961, became the National Neutron Cross Section Center in 1967, and finally was defined as the National Nuclear Data Center in 1977.

- **Status**

- **Type of Institute** National organization

- **Participating countries** U.S.A. and Canada

- **Staff and Programmes**

- **Total staff** 7 scientists, 3 professionals, 2 support staff, 1 secretary

- **Allocated to nuclear data activities** 7 scientists, 2.75 professionals, 2 support staff, of which 1 equivalent man year is dedicated to NRDC Network activities

- **Fiscal year and budget cycle** Yearly budget cycle: 1 October to 30 September of the next year.

- **Activities**

- A. **Within the Network**

- Services

- Provide nuclear reaction data services to users in the U.S.A. and Canada, including Web and on-line telnet access.
- Maintain and distribute documents on data compilation, evaluation and testing of nuclear data. These services cover both reaction data, and nuclear structure and decay data.

- Reaction Data

- Compile experimental reaction data measured in the U.S.A. and Canada, maintain the Cross Section Information Storage and Retrieval System (CSISRS), and exchange data in the Exchange Format (EXFOR) with other data centres.

- Compile references of experimental reaction data published in the U.S.A. and Canada, and maintain the Computer Index to Neutron Data (CINDA) as index to CSISRS.
- Provide links between the Cross Section Evaluation Working Group (CSEWG) for nuclear reaction data activities in the U.S.A (as coordinated by NNDC) and the Network. Provide appropriate support services, and maintain the Evaluated Nuclear Data File (ENDF/B) for distribution to other data centres.
- Maintain computer codes used in processing, storing and retrieving nuclear reaction data and ENDF checking codes.

## **B. Unique responsibilities within the Network**

- Compile and exchange EXFOR and CINDA entries originating from the U.S.A. and Canada.
- Maintain and distribute documentation on compilation of nuclear reaction data, particularly the EXFOR Manual.
- Provide nuclear data services to users in the U.S.A. and Canada.

## **C. Outside the scope of the Network**

### Nuclear Structure and Decay Data

- Coordinate the U.S. Nuclear Data Program, including designated activities of the Nuclear Structure and Decay Data (NSDD) network and provide appropriate support services.
- Compile and maintain the Nuclear Science References (NSR) file containing bibliographic references to nuclear physics publications.
- Carry out mass-chain evaluations for nuclear structure and decay data; NNDC is responsible for 55 mass chains.
- Process, check, correct and publish the peer-reviewed journal Nuclear Data Sheets devoted to mass-chain evaluations for  $A = 45-266$  produced by the NSDD network.
- Maintain and distribute nuclear structure related data files (ENSDF, NUDAT, Nuclear Wallet Cards). Maintain, upgrade, and distribute ENSDF physics processing codes.
- Provision of nuclear structure and decay data services, including Web and on-line Telnet access.

- **Signature**     Michael Herman

## Annex 2.2

### NEA Data Bank

- **Background**

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

NEA Data Bank activities have evolved beyond nuclear data and computer programs, and now also include 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 information relevant to computer code validation in the areas of: integral experiments, shielding, criticality safety, fuel behaviour, reactor physics and reactor safety.

The Executive Group of the NEA Nuclear Science Committee manages the work programme of the NEA Data Bank.

- **Status**

- **Type of institute:** International organisation.  
Division 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, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom.

- **Staff and Programmes**

- **Total staff:** 8 professional, 7 support staff
- **Allocated to nuclear data activities:** 2 professional, 1 support staff and external consultants, of which one equivalent man year is dedicated to NRDC Network activities
- **Fiscal year and budget cycle:** Calendar year, with a 2-year work programme and budget cycle.

- **Activities**

- A. **Within the Network:**

1. **Services**

- Nuclear data services to Member countries, including direct on-line computer services,

as well as data provided free of charge on CD-ROM (whether generic or user-specified).

## 2. Reaction data

- Compilation of numerical data and summary abstracts (EXFOR) for almost all neutron-induced reaction measurements performed in Member countries.
- Compilation of bibliographic references (CINDA) to measurements, calculations, reviews and evaluations of neutron reaction and other microscopic data, as published in Member countries.
- 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 covering many different applications.

## **B. Unique responsibilities within the Network**

Compilation and exchange of EXFOR and CINDA entries originating from the Member countries of the NEA Data Bank.

Maintenance of CINDA coding manual.

Provide nuclear data services to Member countries of the NEA Data Bank.

Production of CD-CINDA on an annual basis to coincide with the publication of the CINDA book, which will also be printed by the NEA Data Bank.

## **C. Outside the scope of the Network**

Coordination of the Working Party on International Nuclear Data Evaluation Cooperation (WPEC), established to promote exchange of information concerning nuclear data evaluations, validations, and related topics, and with the aim to assess and improve the quality and completeness of evaluated data.

Collection, verification and validation of computer programs used in all areas of nuclear power production. Dissemination of these computer codes to all countries, apart from the U.S.A. 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 information relevant for computer code validation in the areas of: integral experiments, shielding, criticality safety, fuel behaviour, reactor physics and reactor safety.

- **Signature** Claes Nordborg

## Annex 2.3

### IAEA Nuclear Data Section (NDS)

- **Background**

The Nuclear Data Section (NDS) of the International Atomic Energy Agency was formed in 1964 to provide nuclear data to IAEA Member States. NDS along with three other neutron reaction data centres formed the 4-centre network in 1964. This network was designed to coordinate the compilation and distribution of neutron reaction data on a world-wide basis in order to provide high-quality customer services at lower cost by avoiding duplication and adopting common compilation formats and procedures for easier data exchange.

NDS initiated a network of charged-particle and photonuclear data centres in 1975 to compile nuclear reaction data types not covered by the existing 4-centre network. These two networks were merged in 1979 to form the Nuclear Reaction Data Centres Network which covers all nuclear reaction data.

Separately, the NDS established the Nuclear Structure and Decay Data Network in 1975 to coordinate internationally the evaluation and dissemination of nuclear structure and radioactive decay data. The Atomic and Molecular (A+M) Data Unit was also constituted within the Nuclear Data Section in 1975 to coordinate the evaluation and dissemination of atomic and molecular data.

The nuclear data programme of the IAEA is guided by the International Nuclear Data Committee, while the A+M Subcommittee of the International Fusion Research Council advises on the atomic and molecular data programme.

- **Status**

— **Type of institute:** International organization.  
Section within the Division of Physical and Chemical Sciences, Department of Nuclear Sciences and Applications, International Atomic Energy Agency

— **Participating countries:** 151

- **Staff and Programmes**

— **Total staff:** 12 professional, 5.25 general service staff members

— **Allocated to nuclear data activities:** 10 professional, 4 general service staff members, of which 4 equivalent man years per annum are dedicated to NRDC Network activities (provision and development of relevant databases, plus support service functions)

— **Fiscal year:** Calendar year

— **Budget cycle:** Two-year budget cycle (for example, 2008/2009)

- **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 centres, including direct on-line 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 centres network, including
  - neutron-induced reactions,
  - charged-particle and heavy-ion induced reactions,
  - photonuclear reactions.
- Compilation of numerical data and related information (EXFOR) for nuclear reaction data measurements performed in those Member countries that are not directly served by one of the other compilation centres.
- Compilation of bibliographic references for microscopic neutron reaction data and related data (CINDA), published in those Member countries that are not directly served by one of the other compilation centres.
- Assign responsibilities for the creation and correction of data compilations as coordinator of these activities, and drive this work forward.
- Maintain and distribute EXFOR dictionaries and EXFOR (and CINDA) master file to other network data centres.
- **Compilation of bibliographic references to Nuclear Science References DB (NSR).**

**B. Unique responsibilities within the Network**

Data centre coordination by organizing Network meetings, and reporting resulting activities.

Publication of reports and technical documents - Network meeting reports and relevant technical data (also made available through the Internet and on CD-ROM).

**C. Outside the main scope of the Network**

Coordination of nuclear data generation activities, including experiments, theory, evaluations and validations, primarily through the mechanism of IAEA Coordinated Research Projects (CRPs).

Participation in activities organized by the NEA Nuclear Science Committee to coordinate major nuclear data evaluation projects.

Coordination of the **International Network** of Nuclear Structure and Decay Data Evaluators.

Coordination of the production of specialized evaluated data libraries such as FENDL.

Secretariat of the International Nuclear Data Committee and A+M Subcommittee of the International Fusion Research Council; establish and oversee recommended IAEA nuclear data programmes.

Support nuclear data activities in developing countries by appropriate means, such as training, research contracts, Technical Cooperation projects, *etc.*

Data centre and research coordination activities in the field of atomic and molecular data for fusion.

- **Signature** Robin A. Forrest

## Annex 2.4

### RUSSIA NUCLEAR DATA CENTRE (CJD)

~~(Leipunsky Institute of Physics and Power Engineering, Obninsk, Russian Federation)~~

- **Background**

CJD was formed in 1963, participated from the start in the 4-centre network and was responsible for the 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 compiles neutron data published in Russia and the states of the CIS.

- **Status**

— **Type of institute:** Laboratory within the Department of Nuclear Physics of the Leipunsky Institute of Physics and Power Engineering.

— **Member countries:** Russian Federation

- **Staff and Programmes**

— **Total staff:** 10 professional, 2 supporting staff

— **Allocated to nuclear data activities:** 8 professional, 1 supporting staff, of which 4 equivalent man years are dedicated to NRDC Network activities.

— **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 the Russian Federation.

2. **Reaction Data**

- Compilation of bibliographic references for 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.
-

- Make evaluations from the BROND project available to the Network.

## **B. Unique responsibilities within the Network**

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

## **C. Outside the scope of the Network**

Determination of nuclear data requirements for various applications in the Russian Federation.

Coordination of neutron data evaluations, and development of national evaluated neutron data libraries for general purposes and special applications.

Publication of the journal “VANT, Ser. Yadernye Konstanty”.

Selected nuclear reactor calculations for nuclear data testing.

- **Signature Anatolij I. Blokhin**

## Annex 2.5

### **Russia Nuclear Structure and Reaction Data Centre (CAJAD)** (Russian Research Centre “Kurchatov Institute”, Moscow, Russia)

- **Background**

CAJAD was formed in 1973, and was initially responsible for the compilation of integral charged-particle data and for preparing bibliographic entries (according to NSR file rules) for Russian nuclear physics papers. The centre had also participated in the ENSDF activity from the beginning. CAJAD works under the auspices of the Nuclear Data Commission of the Russian Federation Ministry of Atomic Energy.

- **Status**

- **Type of institute:** Laboratory within the General and Nuclear Physics Institute of the Russian Research Centre “Kurchatov Institute”.
- **Participating countries:** Russian Federation

- **Staff**

- **Total staff:** 4 professionals, 1 supporting staff
- **Allocated to nuclear data activities:** 4 professionals, 1 supporting staff, of which 1.5 equivalent man years are dedicated to NRDC Network activities.

- **Activities**

**A. Relevant to the Network:**

1. Services

- Provision of charged-particle reaction data **to users in Russia.**

2. Reaction Data

- Compilation of numerical data and related information for charged-particle induced reactions (integral and differential). Scope of publications is international, and is based on the various on-going tasks of CAJAD.
- **Maintenance of the B-library.**
- **Evaluation of some charge-particle reactions for medical applications.**

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

- Preparation of the data base from experiments with radioactive beams for  $Z=2-20$
- Evaluation of some charge-particle reactions for medical applications.

- **Signature** Svetlana Babykina

## Annex 2.6

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

~~(Centr Dannykh Fotoyadernykh Eksperimentov – CDFE)~~

- **Background**

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

CDFE became a member of the IAEA Nuclear Reaction Data Centres Network in 1980, with the tasks of compilation and international exchange of experimental nuclear data (primarily photonuclear) using the EXFOR system, evaluation of photonuclear data and compilation of relevant bibliographic information. The centre was the lead organization of the Russia Committee of Education (RCE) Nuclear Data Centres Network from 1983 to 1991, dedicated to the compilation, evaluation, and dissemination of nuclear data (primarily to universities and institutes of RCE).

- **Status**

- **Type of organization:** Laboratory **within** the Skobeltsyn Institute of Nuclear Physics of the Lomonosov Moscow State University.
- **Participating countries:** Russian Federation

- **Staff and Programmes**

- **Total staff:** 4 professional, 2 general service
- **Allocated to nuclear data activities:** 3 professional, 1 general service, of which 2 equivalent man years are dedicated to NRDC Network activities.
- **Fiscal year:** Calendar year
- **Budget cycle:** One year

- **Activities**

#### A. **Within the Network**

##### 1. Services

- Photonuclear data services to IAEA Member countries.
- Web-site maintenance of nuclear reaction and nuclear structure databases.

##### 2. Reaction Data

- Compilation of numerical data and related information (EXFOR) for photon-induced reaction measurements. International exchange of nuclear data as 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 in various kinds of experiments.
- ~~Web-site maintenance of nuclear reaction databases.~~
- ~~Production and maintenance of an evaluated photonuclear reaction cross section library.~~
- ~~Development of various charged particle reaction data catalogues (in co-operation with the CAJAD)~~

## **B. Unique responsibilities within the Network**

- CDFE is main centre for photonuclear data within the Network.
- Compilation of experimental photonuclear data using EXFOR, ~~coordination of other NRDC member activity in photonuclear data compilation.~~
- Evaluation of photonuclear data.

## **C. Outside the scope of the Network**

### 1. Related to Photonuclear Data

- Experimental measurement of photonuclear data using various facilities (~~betatron and~~ race-track microtrons).
- Theoretical calculations of photonuclear data, and development of models for the description of photonuclear data.

### 2. Nuclear Structure and Decay Data

- Development of computer software for managing nuclear data from ENSDF using IBM/PC and compatible computers (e.g., ~~“NESSY” New ENSDF Search System “Relational ENSDF”~~).

### 3. Web-site

Development and maintenance of Web-site (~~<http://depni.sinp.msu.ru/cdfe>~~ <http://cdfe.sinp.msu.ru/>) in terms of the various nuclear ~~reaction and~~ nuclear structure relational databases.

Support of nuclear, primarily photonuclear, data activities in Russian Federation.

Nuclear data services to Russian organizations, primarily to universities and other educational institutes, and to the ~~Russian~~ Academy of Science ~~and Minatom~~ organizations.

- **Signature** Vladimir V. Varlamov

## Annex 2.7

### China Nuclear Data Centre(CNDC)

- **Background**

The China Nuclear Data Centre (CNDC) was founded in 1975 as the national centre for the generation, collection, processing and dissemination of nuclear data, and provision of services to all nuclear data users in China. The China Nuclear Data Coordination Network (CNDCN) is composed of specific institutes and universities in China that undertake nuclear data measurements and evaluation. At present, the network has about 20 members, and is coordinated by the CNDC

- **Status**

- **Type of institute:** Within the Nuclear Physics Division of the China Institute of Atomic Energy
- **Members of CNDCN:** About 19 institutes and universities in China

- **Staff and Programmes**

- **Total staff:** 16 professional, 3 general service
- **Allocated to nuclear data activities:** 14 professional, 3 general service, of which ? equivalent man year is dedicated to NRDC Network activities.
- **Fiscal year:** Calendar year
- **Budget cycle:** Five years (for example, 2001/2005)

- **Activities**

- A. **Within the Network:**

1. Services:

- Provision of 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:

- Liaise between the Chinese Nuclear Data Coordination Network, and NRDC Network concerning:
  - nuclear data measurements;
  - nuclear data evaluations;

- model program development and computation;
  - group constant generation and benchmark testing;
  - charged-particle nuclear reaction data;
  - fission product yield data;
  - photonuclear data;
  - nuclear parameters library.
- Compilation of numerical data and related information (EXFOR) for nuclear reaction measurements performed in China.
  - Compilation of bibliographic references (CINDA) to microscopic neutron reaction data and related data published in Chinese.
  - Construction and management of Chinese Evaluated Nuclear Data Library (CENDL). Contribute to the nuclear data evaluation efforts coordinated by IAEA-NDS.

## **B. Unique responsibilities within the Network**

Coordination of meetings and resulting activities that involve nuclear data measurements, theoretical calculations, evaluations and benchmark testing in China.

## **C. Outside the scope of the Network**

### Nuclear Structure and Decay Data

Undertake the following tasks under IAEA-NDS coordination:

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

Cooperate and exchange nuclear data with other national and international nuclear data organizations.

- **Signature** Ge Zhigang

## Annex 2.8

### Hokkaido University Nuclear Reaction Data Centre (JCPRG)

- **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 this project started, a mutual agreement with the JAERI Nuclear Data Centre was concluded; this Study Group would be responsible for Charged-Particle Nuclear Reaction Data while JAERI would be in charge of Nuclear Neutron Data.

The original database (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 retrieval functions added to the original NRDF system, the project developed from the stage of research and development to the practical working stage of data compilation and data dissemination in 1987. Subsequently, the Study Group was reorganized to become the Japan Charged-Particle Nuclear Reaction Data Group (JCPRG) in NRDC, and was assigned an annual budget through the Nuclear Physics Laboratory, Department of Physics, Hokkaido University by the Ministry of Education, Science and Culture. This regular JCPRG budget ended in 2001, and was replaced by a yearly competitive process.

The primary aims of JCPRG are to construct and 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. JCPRG is also responsible for transforming NRDF to EXFOR format, and sending these files to IAEA-NDS.

On April 1, 2007, the Japan Charged-Particle Nuclear Reaction Data Group (JCPRG) was reorganized to the Hokkaido University Nuclear Reaction Data Centre (JCPRG) as a measure taken in the Faculty of Science, Hokkaido University. At the same time, the graduate school collaboration field "Nuclear Data" science with Japan Atomic Energy Agency (JAEA) was established in the Department of CosmoSciences of the Graduate School of Science, Hokkaido University.

JCPRG comprises an Advisory Committee, a Steering Committee and the NRDF-to-EXFOR Working Group. The Advisory Committee consists of representatives from the main laboratories and institutes in Japan. The Steering Committee manages the work programme of JCPRG, under the advice and guidance of the Advisory Committee.

- **Status**

— **Type of institute:** Centre within Faculty of Science, Hokkaido University

— **Member countries:** Japan

- **Staff and Programmes**

— **Members of Executive Committee:** 7 nuclear physicists, 1 information scientist

- **Allocated to JCPRG Office:** 2 nuclear physicists, 1 secretary
- **Allocated to JCPRG activities:** 2 nuclear physicists, 1 secretary, of which one equivalent man year is dedicated to NRDC Network activities. 6 nuclear physicists as part timers (in 2010).
  
- **Fiscal year:** Yearly from 1 April to 31 March
- **Budget cycle:** One year

- **Activities**

- A. **Within the Network:**

Reaction Data:

- Compilation of charged-particle and photo-nuclear reaction data produced in Japan (NRDF format).
- Conversion of NRDF data into EXFOR format.
- Contribute to the development of common formats for the computerized exchange of nuclear data

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

Compilation of all charged-particle and photo-nuclear reaction data produced in Japan, and conversion into EXFOR

Provide charged-particle and photo-nuclear nuclear reaction data service to Japanese users

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

On-line computer services of NRDF to Japanese users as well as by Web site (in English).

Publication of “NRDF Annual Report” to coordinate and promote nuclear data.

Development of computer codes for specific applications of compiling, managing and disseminating nuclear data,

- **Signature** Kiyoshi Katō

## Annex 2.9

### JAEA Nuclear Data Centre

- **Background**

JAERI Nuclear Data Centre (JAERI/NDC) was established in 1968, with the support of Japanese Nuclear Data Committee (JNDC) which was formed in 1963 within the Atomic Energy Society of Japan. Main efforts of JAERI/NDC have been devoted to the development of the Japanese Evaluated Nuclear Data Library (JENDL) in cooperation with JNDC. JENDL-1 was completed in 1977, JENDL-2 in 1984, JENDL-3 in 1989, and the latest version of JENDL-3 (JENDL-3.3) was released in 2002. Efforts have also focused on the development of the JENDL special purpose files: latest version of JENDL Fission Product Decay Data File was released in 2000, and JENDL Dosimetry File 99 in 2001. 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.

As the national nuclear data centre, JAERI/NDC disseminates both experimental and evaluated nuclear data to users in Japan, and functions as the communications channel to foreign and international nuclear data centres. JAERI/NDC also serves as the secretariat of JNDC.

Besides nuclear data activities, JAERI/NDC began evaluating atomic and molecular data in 1976. However, due to restructuring of Tokai Research Establishment of JAERI, this activity was transferred to Plasma Analysis Division, Department of Fusion Plasma Research, Naka Fusion Research Establishment in October 2000.

- **Status**

— **Type of institute:** Laboratory within Nuclear Science and Engineering Directorate, JAEA

— **Member countries:** Japan

- **Staff and Programmes**

— **Total staff:** 7 physicists, 2 secretaries

— **Allocated to nuclear data activities:** 7 physicists, 2 secretaries, of which ? equivalent man year is dedicated to NRDC Network activities.

**Fiscal year and budget cycle:** Yearly from 1 April to 31 March

- **Activities**

**A. Within the Network:**

1. Services:

- Nuclear data services to domestic users.
- Communications channel to foreign and international centres for data and information exchange.

2. Reaction Data:

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

**B. Unique responsibilities within the Network**

Provide large-scale nuclear data library produced in Japan to all centres (e.g., JENDL).

**C. Outside the scope of the Network**

Nuclear Structure and Decay Data:

- Publish Chart of the Nuclides every 4 years (latest version, 2000).
- Evaluation, validation and dissemination of JNDC Nuclear Data Library for Fission Products (for decay heat calculations).
- Contribute mass chain evaluations of ENSDF ( $A = 118$  to  $129$ ).

Member of NEA/NSC Working Party on International Nuclear Data Evaluation Cooperation (WPEC), and various IAEA Coordinated Research Programmes.

- **Signature** Jun-ichi Katakura

## Annex 2.10

### ATOMKI Charged-Particle Nuclear Reaction Data Group

- **Background**

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

Compilation work was initially based on cross section measurements and practical applications. The existing database of charged-particle nuclear reactions was found to be inadequate, with increasing demands for more precise data. Therefore, a comprehensive charged-particle data programme has started, covering the establishment of a computerized database, the (re)measurement of the most important reaction data, and a critical evaluation of the compiled data. Integral reaction data were also measured and used in medical isotope production, activation analysis, thin-layer activation technique and other fields using cyclotrons, in collaborative studies with a number of foreign institutes.

Establishment of the computerized charged-particle reaction database was supported by the National Committee for Technical Development, Hungary.

- **Status**

— **Type of institute:** Team within the Cyclotron Department of the Institute of Nuclear Research, Hungarian Academy of Sciences.

— **Participating country:** Hungary

- **Staff and Programmes**

— **Total staff:** 6 nuclear physicists (all part time), of which 0.25 equivalent man years are dedicated to NRDC Network activities.

— **Fiscal year:** Calendar year

— **Budget cycle:** One year

- **Activities**

**A. Within the Network:**

1. Services:

- Charged-particle reaction data for Hungarian users. International services also include the provision of compiled and recommended data for monitor reactions, reactions for the production of medical radioisotopes, and reactions for thin-layer activation analysis.

2. Reaction Data:

- Compilation of new cross-section data for nuclear reactions induced by charged particles, as performed at Forschungszentrum Jülich (Germany) and in Hungary.
- Compilation of older data when required
- Review and evaluation of low- and intermediate-energy charged-particle data used in various applications.

**B. Unique responsibilities within the Network**

Compilation of all charged-particle nuclear data produced, as specified above.

**C. Outside the scope of the Network**

Provision of charged-particle reaction data to Hungarian users.

Measurement of the most important reaction data used for monitoring beam parameters, for medical radioisotope production, and for thin-layer activation analysis.

- **Signature** Ferenc T. Tárkányi

## Annex 2.11

### Ukraine Nuclear Data Centre (UKRNDC)

(~~Institute for Nuclear Research, Kyiv, Ukraine~~)

- **Background**

UKRNDC was formed in 1996, with initial responsibility for the compilation of neutron data published in the Ukraine. Both the products and services have expanded over the years, and current activities are listed below.

- **Status**

— **Type of institute:** Subdivision within the Department of Neutron Physics, Institute for Nuclear Research.

— **Participating country:** Ukraine

- **Staff and Programmes**

— **Total staff:** 6 professionals

— **Allocated to nuclear data activities:** 6 professionals, of which 2 equivalent man years are dedicated to NRDC Network activities.

— **Fiscal year:** Calendar year

— **Budget cycle:** 3 years

- **Activities**

A. **Within the Network:**

1. Services:

- Nuclear data services for users in Ukraine, including Web service.

2. Reaction Data:

- Compilation of numerical data and related information for neutron and charged-particle reaction data measurements (EXFOR) in Ukraine.
- Compilation of bibliographic references to measurements, calculations, reviews and evaluations of microscopic neutron and charged-particle reaction data (CINDA) published in Ukrainian scientific journals and reports.

3. Web-site

- Development of Web-site with various nuclear reaction data and computer codes to

facilitate customer work with nuclear data in the Ukraine.

**B. Unique responsibilities within the Network**

Responsibilities mentioned above.

**C. Outside the scope of the Network**

Experimental measurements of neutron data using the neutron filter beam technique.

Creation of task-oriented databases and preparation of multigroup cross-section libraries for nuclear technology needs in the Ukraine.

Dissemination of free world-wide computer codes for basic and applied calculations.

Development of computer codes for specific applications.

Nuclear data support to meet requirements connected with Chernobyl (decommissioning of RBMK units, 4<sup>th</sup> block nuclear safety, etc.).

Educational support of senior course students at Kyiv University and Slavutych Nuclear Data Bank staff (provision of lecturers for teaching course on “Nuclear Data for Science and Technology”).

- **Signature** Olena O. Gritzay

## Annex 2.12

### Centre of Nuclear Physics Data (CNPD)

(~~RFNC-VNIIEF, Sarov, Russian Federation~~)

- **Background**

CNPD evolved from compilation activities dedicated to charged-particle reaction data, which started at RFNC-VNIIEF in 1977. Officially, the data centre was formed in 1997 to provide nuclear services to users.

- **Status**

— **Type of institute:** Research Group within the Institute of Nuclear and Radiative Physics, Russian Federal Nuclear Centre.

— **Member countries:** Russian Federation

- **Staff and Programmes**

— **Total staff:** 5 professional, 2 support staff

— **Allocated to nuclear nuclear data activities:** 5 professional, 1 support staff, of which 1 equivalent man year is dedicated to NRDC Network activities.

— **Fiscal year:** Calendar year

— **Budget cycle:** One year

- **Activities**

A. **Within the Network:**

1. Services

- Provide nuclear data services to users in Russia and the republics of the former USSR.

2. Reaction Data

- Compilation of numerical data and related information for charged-particle reaction data on light nuclei. International exchange of data as EXFOR entries.
- Compilation of numerical data and related information for various nuclear reaction data measurements performed in RFNC-VNIIEF with the co-operation of CJD, CAJAD and CDFE.
- Development of methods for the evaluation of charged-particle reaction data.

- Production of an evaluated reaction cross-section library.

## **B. Unique responsibilities within the Network**

Responsibilities mentioned above.

## **C. Outside the scope of the Network**

Research and development of measurements, calculations and compilations of nuclear data.

Determination of nuclear requirements for applications at RFNC-VNIIEF.

- Provision of computer codes for specific applications, for example:
  - Maxwellian and non-Maxwellian velocity calculations of main thermonuclear reactions;
  - cross-section evaluations of charged-particle reactions on light nuclei;
  - development of algorithms for extrapolation of nuclear data into the lower energy region (of interest in astrophysics);
  - creation of task-oriented databases.
- Experimental measurements of neutrons, charged particles and photonuclear data using various facilities (linear accelerator, tandem Van de Graaf, neutron generator, *etc*).

- **Signature** Sophya Taova

## 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 considerable effort to ensure the supply of processed and evaluated nuclear data for national nuclear research and development projects.

- **Status**

- **Type of institute:** **Laboratory** within Department of Advanced Reactor Technology, Korea Atomic Energy Research Institute

- **Member country:** Republic of Korea

- **Staff**

- **Total Staff:** 8 scientists, 1 technician, of which ? equivalent man year are dedicated to NRDC network activities

- **Fiscal year:** Calendar year

- **Budget cycle:** One year

- **Activities**

**A. Within the Network:**

1. **Services:**

- Nuclear data services to domestic users
- Communications channel to foreign and international centres for 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, as published in Korea.

## **B. Unique responsibilities with in the Network**

Provision of nuclear data services to Korean users

## **C. Outside the scope of the Network:**

Research and development in the evaluation of nuclear data.

Preparation of multigroup libraries for neutron transport codes.

- **Signature** Young-Ouk Lee

## Annex 3

### 2010 Protocol: Nuclear Reaction Data Centres

Approved at 2002 NRDC Meeting held at NEA DB, Paris, 27-30 May 2002

Reviewed and amended at the 2003 NRDC Meeting held at Vienna, 17 June 2003

To be reviewed and amended at the 2010 NRDC Meeting held at Sapporo, 20-23 April 2010

The Nuclear Data Section (NDS) will assume a more pro-active role coordinating all Nuclear Reaction Data Centres (NRDC). NDS staff will be responsible in this extended role for ensuring that data compilations are undertaken and completed in an efficient, productive and timely manner. Thus, the role of NDS will be as follows:

- (a) assign clear responsibilities for the creation and correction of data compilations, and drive these activities forward,
- (b) ensure implementation of compilation rules,
- (c) decide on all issues relating to dictionary codes,
- (d) be responsible for CINDA and EXFOR distribution to the other data centres,
- (e) be responsible for central EXFOR Web Service and EXFOR Master file central storage.

#### 1. Compilation Responsibilities

NDS will assign areas of responsibility for data compilation. If a centre assigned a particular area of compilation (e.g., neutron data from a country or countries)<sup>1</sup> does not carry out their responsibilities (i.e., compile all new data for that area in a timely manner), the NDS coordinator will re-assign all or part of those responsibilities to another volunteer centre.

A centre responsible for an area of compilation may agree with another network centre to share the compilation work for that area on a regular basis. However, the responsibility for coverage and quality of the compilation remains with the responsible centre.

Compilation responsibilities as assigned by NDS are given in **Annex 4** (February 2010).

#### 2. Decisions Concerning Compilation Rules and New Quantities

Final decisions on proposals concerning compilation rules and new quantities can be made with Core Centre<sup>2</sup> agreement after discussions among all centres. NDS will be the final arbiter in case the Core Centres are unable to reach a decision.

#### 3. Decisions Concerning Dictionary Codes

NDS will be the final arbiter for all decisions concerning dictionary codes (see also Section 2, above).

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<sup>1</sup> An area may be defined in terms of a given projectile or set of projectiles, for a given country or group of countries, for a given data type or data types, or for any combination of these.

<sup>2</sup> Core centres will be defined by NDS, based on contributions to the network and user service capabilities.

#### **4. EXFOR/CINDA Transmissions**

All preliminary and final EXFOR and CINDA transmissions will be sent to NDS, who will be responsible for distributing all final transmissions.

#### **5. Corrections to EXFOR/CINDA Entries**

NDS may correct or assign volunteers to correct preliminary transmissions, that have not been corrected and resubmitted as final transmissions in a timely manner.

#### **6. Urgent Compilation Needs**

If a centre requires a particular data set to be compiled immediately, the centre should send a request to the responsible centre with a copy to NDS. If the responsible centre cannot compile the data to the timetable requested, the requesting centre may compile the data as an area Z entry. This entry will be sent to both the original responsible centre and NDS. If the responsible centre does not intend entering the data in a timely fashion, the NDS may transmit the new Z entry to all centres. The responsible centre can subsequently delete the Z entry, if they are able to replace the earlier compilation with their own entry for their area.

#### **7. Corrections to Entries Compiled at Another Centre**

Notification of errors found in entries originating from another centre should be communicated to all centres. The NDS should make sure corrections are undertaken in a timely manner. If they are not, the coordinator will request one of the other centres to submit the corrected entries.

#### **8. Maintenance of the Master File**

NDS will maintain and distribute the EXFOR (and CINDA) Master file.

#### **9. Problematic entries**

**Problematic entries which had to be removed from a preliminary transmission can be put into a special subdirectory of the NDS open area.** These entries will be reviewed by the other centres and can be finalized at the next NRDC meeting.

#### **10. NDS staff**

Naohiko Otsuka (NDS) has been appointed coordinator of the NRDC Network.

#### **Notes**

a). As a consequence of the above, the link between the geographical area of the Institute and the accession number, which has been in place for all neutron data, is no longer obligatory and may be lifted in certain cases. Similarly, for corrections to entries of another centre according to Section 7 above, entries of different accession number areas can be transmitted on the same TRANS file.

b). This protocol will be reviewed at each NRDC meeting.

~~Annex 4~~

~~Responsibilities for EXFOR Compilations~~

~~Merged into the NRDC Protocol~~

<u>Centre</u>	<u>Basic responsibility</u>	<u>Additional compilation</u>
<del>NNDC</del>	<del>Neutron data, CPND and PhND from USA and Canada</del>	
<del>NEA-DB</del>	<del>Neutron data from NEA Data Bank member countries</del>	<del>CPND (coordinated by NDS)</del>
<del>NDS</del>	<del>Neutron data and CPND from “rest of the world” (areas not covered otherwise)</del>	<del>PhND from “rest of the world”</del>
<del>CJD</del>	<del>Neutron data from former Soviet Union (except Ukraine)</del>	
<del>CaJaD</del>	<del>CPND from former Soviet Union (except Ukraine)</del>	<del>CPND from “rest of the world” (coordinated by NDS)</del>
<del>CDFE</del>	<del>Photonuclear data</del>	
<del>CNDC</del>	<del>Neutron data and CPND from China (entries submitted through NDS)</del>	
<del>JCPRG</del>	<del>CPND and PhND from Japan</del>	<del>CPND for projectiles with non-positive baryon number from all parts of the world.</del>
<del>ATOMKI</del>	<del>CPND from ATOMKI and data measured in cooperation with Jülich or with Free Univ. Brussels (entries submitted through NDS)</del>	
<del>UkrNDC</del>	<del>Neutron data, CPND and PhND from Ukraine (entries submitted through NDS)</del>	
<del>CNPD</del>	<del>CPND on light nuclei, coordinated with other Centres</del>	
<del>Indian compilation activity<sup>*</sup></del>	<del>Neutron data and CPND from India, coordinated and assisted by NDS</del>	
<del>KAERI</del>	<del>Neutron, CPND and PhND data from Korea (entries submitted through NDS)</del>	

~~CPND – Charged particle induced nuclear reaction data;~~

~~PhND – Photonuclear reaction data~~

<sup>\*</sup> coordinated by Dr. S. Ganesan, B.A.R.C., Mumbai, India

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