International Atomic Energy Agency

INDC(NDS)-97/LNA

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

REPORT OF THE NUCLEAR DATA SECTION

TO THE INTERNATIONAL NUCLEAR DATA COMMITTEE

MARCH 1977 TO AUGUST 1978

August 1978

IAEA NUCLEAR DATA SECTION, KÄRNTNER RING 11, A-1010 VIENNA

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CORRIGENDUM

Please replace section D.5.4. on page 31 by the following text.

D.5.4. EXFOR

The implementation of the generalized EXFOR, namely the introduction of the new keywords ADD-RES, ASSUMED, DECAY-DATA, DECAY-MON, MONITOR, MONIT-REF, RAD-DET, REACTION and REL-REF and the modification of the coding associated with the keywords EN-SEC, FACILITY and STATUS, required major changes in the EXFOR system. The coding associated with the new keywords is often complicated and cryptic, and therefore requires both careful checking at input time and extensive expansion in the edited listings in order to be intelligible for users.

A new nuclides dictionary was introduced to check the nuclide coding which occurs with many of the keywords. This proved to be very necessary and resulted in a considerable clean-up of the EXFOR master files.

The checking program was also modified to produce a summary listing of all error and warning messages from a given EXFOR transmission tape. This listing is used to notify the other centres of errors, thus saving the manpower previously needed to prepare the correspondence.

Other modifications to the system were made to simplify and make more efficient the handling of the various internal files.

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ABSTRACT

Progress report of the IAEA Nuclear Data Section for the 18 - month period March 1977 to August 1978 is presented. Past, current and planned activities are described, status of nuclear data centre services is given.

August 1978

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* Meetings organized by IAEA Nuclear Data Section.

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List of Abbreviations

A+M	Atomic and molecular
ADABAS	Data base management system in use at IAEA
CAJaD	Centre for Data on the Structure of the Atomic Nucleus and Nuclear Reactions of the USSR State Committee on the Utilization of Atomic Energy, located at the Kurchatov Institute in Moscow
CBNM	Central Bureau for Nuclear Measurements, located at Geel, Belgium
CCDN	Centre de Compilation de Donnees Neutroniques, same as NDCC Neutron Data Compilation Centre of the OECD Nuclear Energy Agency at Saclay near Paris; now part of NEA Data Bank
CINDA	Computerized Index of Neutron Data, a specialized bibliography and data index on neutron nuclear data operated jointly by NNCSC, NDCC, NDS and CJD
CINDU	A catalogue of numerical nuclear data libraries available from NDS
CJD	Centr po Jadernym Dannym, the USSR Nuclear Data Centre at F.E.I. Obninsk
CODATA	Committee on Data for Science and Technology
CODEN	International code for the abbreviation of periodical titles used by ASTM, INIS and Chemical Abstracts
CPL	Computer programme Library operated by NEA, and located at Ispra, Italy; now part of NEA Data Bank
CPND	Charged particle nuclear reaction data
CRP	Coordinated research programme
CSISRS	NNCSC's internal system for handling experimental data; the previous system was known as SCISRS
DASTAR	Data Storage and Retrieval system used originally at IAEA/NDS
DBMS	Data base management system
EBCDIC	Extended binary-coded decimal interchange code
EGAS	European Group for Atomic Spectroscopy
ENDF/B	Evaluated Nuclear Data File of the United States
ENSDF	Computer-based Evaluated Nuclear Structure Data File developed by US/NDP

EWGRD	European Working Group on Reactor Dosimetry
ESCAMPIG	Europhysics Study Conference on Atomic and Molecular Physics in Ionized Gases
EXFOR	Exchange Format, initially developed for the international exchange of neutron nuclear data, now being extended to charged particle nuclear data
FPND	Fission product nuclear data
IAEA/NDS	Nuclear Data Section of the International Atomic Energy Agency, also NDS
ICPEAC	International Conference on the Physics of Electronic and Atomic Collisions
ICTP	International Centre for Theoretical Physics
IFRC	International Fusion Research Council
INDC	International Nuclear Data Committee
INIS	International Nuclear Information System, a bibliographic system operated by the IAEA
IWGRRM	International Working Group on Reactor Radiation Measurements
JILA	Joint Institute for Laboratory Astrophysics
JINR	Joint Institute for Nuclear Research in Dubna, USSR
KACHAPAG	Karlsruhe Charged Particle Group
KEDAK	Karlsruhe Evaluated Neutron Data File
LIYaF	Leningrad Institut Yadernoy Fiziki: Leningrad Nuclear Physics Institute of the USSR Academy of Sciences
NDCC	Neutron Data Compilation Centre (Centre de Compilation de Donnees Neutroniques - CCDN) of the OECD Nuclear Energy Agency at Saclay near Paris; now part of NEA Data Bank
NDP	Nuclear Data Project located at the Oak Ridge National Laboratory (also referred to as US/NDP)
NDS	IAEA Nuclear Data Section, Vienna
NEA	Nuclear Energy Agency of the OECD
NEACRP	Committee on Reactor Physics of the Nuclear Energy Agency of the OECD
NEANDC	Nuclear Data Committee of the Nuclear Energy Agency
NNCSC	US National Neutron Cross Section Centre at the Brookhaven National Laboratory, Upton, N.Y.

NND	Neutron Nuclear Reaction Data
NNDC	National Nuclear Data Centre of the United States
NSDD	NSD data = Nuclear Structure and Decay Data
OECD	Organization for Economic Cooperation and Development
RCN	Now ECN = Energy Research Foundation at Petten in the Netherlands
SCISRS	Sigma Centre Information Storage and Retrieval System
SOKRATOR	Soviet Evaluated Neutron Data File Format
TND	Transactinium isotope nuclear data
UKNDL	UK Nuclear Data Library
WRENDA	World Request List for Nuclear Data Measurements published by the IAEA
ZAED	Zentralstelle fuer Atomkernenergie-Dokumentation: Nuclear documentation and information centre for the Federal Republic of Germany; now FIZ, Fachinformationszentrum Energie, Physik, Mathematik Ges. M.B.H. located at the Kernforschungszentrum Karlsruhe in the Federal Republic of Germany

INDC(SEC) Documents Published Since the Last INDC Meeting

INDC(SEC)-063/GA	Aug 77	Minutes of the Second Meeting of the Joint IFRC/INDC Subcommittee on Atomic and Molecular Data for Fusion, Vienna, 14 May 1977. Compiled by A. Lorenz and R. Seamon, August 1977
INDC(SEC)-064/GA	Apr 78	Minutes of the Third Meeting of the Joint IFRC/INDC Subcommittee on Atomic and Molecular Data for Fusion, Vienna, 14 April 1978. Compiled by A. Lorenz and R. Seamon, April 1978
INDC(SEC)-065/UN	May 78	INDC Correspondents for the Exchange of Nuclear Data Information, May 1978. (Supersedes INDC(SEC)-60/U)
INDC(SEC)-066/UN	May 78	List of Documents Received by the INDC Secretariat, May 1978. (Supersedes INDC(SEC)-59/U)
INDC(SEC)-067/L	Aug 78	Consolidated Progress Report for 1977-78 on Nuclear Data Activities in the NDS Service Area.
INDC(SEC)-068/L	Aug 78	Consolidated Progress Report for 1977-78 on Nuclear Data Activities Outside the NDS Service Area.
INDC(SEC)-069/LN	Jun 78	1978 Compilation of National Nuclear Data Committees (Supersedes INDC(SEC)-58/LN)

INDC(NDS) Documents Published Since the Last INDC Meeting

INDC(NDS)-086/GP	Jul 77	Progress in Fission Product Nuclear Data (No. 3) Information about Activities in the Field of Fission Product Nuclear Data (FPND) G. Lammer, May 1977
INDC(NDS)-087/GO	Aug 78	Second IAEA Advisory Group Meeting on Fission Product Nuclear Data, Petten, Netherlands, 5-9 September 1977 Annexes and Selected Contributions to the Review Papers G. Lammer
INDC(NDS)-088/GA	Sep 77	First Meeting of the Atomic and Molecular Data Centre Network - Summary Report Vienna, 9-13 May 1977 A. Lorenz, R.E. Seamon, August 1977
INDC(NDS)-089/G	Aug 77	Minutes of the IAEA Consultants Meeting on the Evaluation of Actinide Neutron Cross Sections, Vienna, 13-14 December 1976 and Discussions of the Programme at the 9th INDC Meeting, Vienna, 16-20 May 1977 Compiled by R. Lessler, July 1977
INDC(NDS)-090/G	Nov 77	Report on the Second Consultants Meeting of Nuclear Reaction Data Centres, Kiev, USSR, 11-16 April 1977 including the Thirteenth Four-Centre Meeting and the Third Meeting and the Third Meeting on Charged Particle Nuclear Data Compilation H. Lemmel, October 1977
INDC(NDS)-091/LN	Nov 77	Compilations and Evaluations of Nuclear Structure and Decay Data, Issue No. 3 Compiled by A. Lorenz, October 1977
INDC(NDS)-092/LN	Apr 78	IAEA Advisory Group Meeting on Nuclear Structure and Decay Data - Summary Report Oak Ridge National Laboratory, 14-18 November 1977 A. Lorenz, March 1978
INDC(NDS)-093/L	Aug 78	Second IAEA Advisory Group Meeting on Fission Product Nuclear Data, Petten, Netherlands, 5-9 September 1977 Conclusions and Recommendations G. Lammer
INDC(NDS)-094/LN	Apr 78	Compilations and Evaluations of Data on the Interaction of Electromagnetic Radiation with Matter Compiled by A. Lorenz, May 1978

INDC(NDS)-095/P	Aug 78	Progress in Fission Product Nuclear Data (No. 4) Information about Activities in the Field of Measurements and Compilations/Evaluations of Fission Product Nuclear Data (FPND) G. Lammer
INDC(NDS)-096/N	June 78	Summary Report of the First Coordinated Research Meeting on the Measurement of Transactinium Isotope Nuclear Data, Vienna, 20-21 April 1978 Prepared by A. Lorenz, June 1978
INDC(NDS)-097/LNA	Aug 78	Report of the Nuclear Data Section to the International Nuclear Data Committee March 1977 to August 1978

INTRODUCTION

This progress report on the activities of the IAEA Nuclear Data Section covers the eighteen months period March 1977 to August 1978.

During this period, towards the end of 1977, R. Lessler left NDS to return to the US, R. Yaghubian left NDS to assume a position in the Agency's Department of Safeguards. Due to several unfortunate circumstances including required budgetary savings Mr. Lessler's post could not yet be filled again; it is hoped to have a replacement by October 1978. In mid-July 1978 N. Dayday from the Cekmece Centre in Instanbul, Turkey, will join NDS on Yaghubian's post. Following the recommendation of INDC at its Eighth Meeting in October 1975, NDS got a new professional physicist post approved in 1978, on which D. Muir from Los Alamos, US, has been employed since June 1978. At the end of July 1978 Mrs. F. Hirschbichler, who served NDS as central data request coordinator for many years, will leave NDS, and it is hoped that this vacancy can soon be filled again. E. Beaty, head of the Section's Atomic and Molecular (A+M) Data Unit, will leave NDS end of July 1978 and will be replaced in September 1978 by F.J. Smith from Queen's University in Belfast, Northern Ireland. End of December 1978 R. Seamon will leave NDS to return to Los Alamos in the US, and negotiations are underway for his successor. Until the end of 1979, i.e. until the end of the trial (1977/78) and evaluation (1979) periods of the Agency's A+M data programme, the professional staff of the A+M Data Unit of NDS will continue to be employed as full-time consultants on special service agreement contracts.

The improvement of NDS services to developing countries occupied a prominent place in the development of the nuclear data activities during the reporting period, in order to cope with the steadily growing number and complexity of data requests received from developing countries. The extensive request and dissemination statistics included in this report for the past two and a half years shows that the number of requests for evaluated data mainly for use in reactor calculations is steadily increasing, and that more than twenty countries, mostly developing countries, are now regularly being provided by NDS with evaluated and experimental neutron data. In this period NDS has handled on the average two large data requests per week and, to fulfil these requests, has disseminated an average of 100 000 data records per week.

A first successful attempt was made to associate scientists from developing countries for a limited time with NDS to enable them to gain experience in data processing using the files and facilities available at NDS. Two scientists from the Institute of Nuclear Technology in Bucharest, Romania, Drs. Cuculeanu and Vasiliu, spent about 10 weeks at NDS on UNDP funds. They implemented a number of computer programmes for the processing of evaluated data files and calculation of multigroup constants for subsequent use in their national nuclear energy programme and developed editing and plotting programmes for evaluated data which will continue to be used at NDS.

An increasing number of requestors from developing countries need to have not only data libraries but also related computer programmes, up-to-date multigroup cross section data and advice on their use and availability. This added a new important component to the services of NDS and led to an intensification of the contacts with the computer programme part of

the NEA Data Bank, the Radiation Shielding Information Centre at Oak Ridge in the US and other pertinent centres.

The co-operation of NDS with the International Centre for Theoretical Physics (ICTP) was successfully started with a four weeks Course on Nuclear Theory for Applications held in Trieste in Winter 1978. This course provided to more than 90 scientists from 29 developing countries for the first time a thorough review of contemporary neutron nuclear reaction theory and advanced training in its application to nuclear data calculations. It stimulated a strong interest and initiated future co-operation between scientists from developing and developed countries in this field. Moreover this Course gave a unique opportunity to discuss in detail nuclear data requirements in developing countries and to get acquainted with their nuclear programmes and capabilities. Numerous nuclear data and computer code requests were brought forward to NDS for purposes of nuclear theory and reactor physics calculations, nuclear training, and development of nuclear data measurement programmes. In response to this strong interest it is planned to continue this co-operation with ICTP with another Course in 1980.

The targets and samples programme was continued by providing seven developing countries with foil material for nuclear data measurements for various purposes. New sample requests for valuable measurements were received in the beginning of 1978 from Colombia, Egypt, India, Pakistan and Romania, which unfortunately had to be deferred to 1979 because of lack of funds.

In response to the recommendation of the IAEA Advisory Group Meeting on Transactinium Isotope Nuclear Data held at Karlsruhe in the Federal Republic of Germany in November 1975 NDS has initiated two coordinated research programmes (CRP) for the intercomparison of actinide neutron data evaluations and for the measurement and evaluation of actinide decay data with the participation of altogether nine developed and developing countries; first research coordination meetings on both programmes were held in April 1978. The first CRP aims at the development of evaluated neutron data files for more than 25 important actinides by the end of 1980 independent of and for later comparison with ENDF/B, the second CRP at the generation and eventual compilation of recommended nuclear decay data for all actinide isotopes.

The Second Advisory Group Meeting on Fission Product Nuclear Data (FPND) held by NDS at Petten, Netherlands, in September 1977 was successful in providing a comprehensive review of changes in FPND requirements and progress in FPND research since the first FPND meeting held in Bologna in November 1973. As a consequence of this meeting NDS will not only continue with the annual publication of the FPND progress reports, but will also publish periodically a list of FPND compilations and evaluations. Another important recommendation from this meeting concerns the generation of a comprehensive compilation of half-lives and associated decay data for all unstable and metastable nuclides.

In the field of neutron data for reactor dosimetry the ENDF/B Dosimetry File is now accepted as reference data file by many users. However it is a national US file and does not include many reactions considered to be of high priority by European and other countries. NDS therefore, in a complementary effort, co-operates with several countries in the

measurement, evaluation and testing of those reactions not included in ENDF/B with the aim to combine these data with the ENDF/B-V Dosimetry File to a comprehensive and truly international file of reactor dosimetry neutron data.

In the filed of nuclear structure and decay data three advisory group meetings held in 1974, 1976 and 1977 have led to the adoption of computer-based systems for the exchange of bibliographic and numerical nuclear structure and decay data between fourteen data centres and groups, and to the organisation and functioning of an international co-operative effort with the aim of achieving a continuous and complete evaluation of mass chain data for all isotopes on a four year cycle.

Since the fall of 1977 neutron and charged particle nuclear data are being transmitted between seven co-operating nuclear reaction data centres in the generalized EXFOR format. This unified format has the great advantage of flexibility for coding the various representations of experimental nuclear reaction data induced by photons, neutrons, charged particles and heavier ions and of enabling exchange and retrieval of all nuclear reaction data with the same computer programmes. A special EXFOR series called EXFOR-VIEN series has been created for selected evaluated neutron nuclear data which are not part of one of the established large evaluated data libraries; the number of requests received for these data proves that this file meets a definite user need.

Concerning CINDA, the originally planned two years publication cycle, started with CINDA 76/77, was extended by a third year. CINDA 78 will thus be published in the form of a fourth and fifth supplement to CINDA 76/77. This decision was based on economical considerations and also gave sufficient time for the clean-up of the CINDA master file before publishing CINDA 78 as a cumulative archival issue envisaged for Spring 1979.

Following the recommendations of the Joint IFRC/INDC Subcommittee on A+M Data for Fusion the A+M data trial programme (1977/78) started successfully with the publication of four issues of the quarterly International Bulletin on Atomic and Molecular Data for Fusion. Much of the preparatory work on the collection of a comprehensive index on atomic collision data for fusion from input provided by the USA, France, USSR and Japan, and from information compiled for the Bulletin, has been completed; there is therefore a reasonable prospect that work on this project can be completed by the end of 1978 as planned. In May 1977 representatives from ten atomic data centres met in Vienna for the first time to report on their work and to develop plans for future co-operation. In the Fall of 1978 the Subcommittee and its parent committees will perform a final review of the trial programme 1977/78 and issue recommendations to the IAEA with regard to the future continuation of this programme after 1979. The year 1979 will be used for an evaluation of the trial programme by the Agency's policy organs and for the final decision regarding its future regularisation as a continuous Agency programme on A+M data for fusion.

A. INDC SECRETARIAT

A.1. INDC Methods of Work

In its function as secretariat to the International Nuclear Data Committee (INDC) NDS has issued a revision to the Methods of Work of the INDC (INDC-27/G) in December 1977.

A.2. Liaison Officers of the INDC

The following changes in the membership of INDC Liaison Officers have occurred in the course of this reporting period:

Hungary:

Dr. L. Jeki
is temporarily replacing Dr. G. Kluge

Austria:

Prof. H.K. Vonach
has replaced Dr. O.J. Eder

The current list of INDC Liaison Officers comprises scientists from 41 IAEA Member States; the list is given in Appendix 1.

As in previous years, INDC Liaison Officers have been requested to submit progress reports in time for distribution at the Tenth INDC Meeting (October 1978). Progress reports submitted by countries not directly represented on the INDC, are compiled into two consolidated reports: one for those countries which are in the NDS service area, published as INDC(SEC)-67/L, and another for those countries outside the NDS service area, published as INDC(SEC)-68/L.

A.3. List of Correspondents

The list of INDC Correspondents for the exchange of nuclear data information is produced from the files of the PROFILE system developed by the Nuclear Data Section. The computer based PROFILE system contains the names and addresses of approximately 3400 scientists, each given one or more (up to 30 possible) distribution or identification codes, which allows for selective retrieval of sets of names together with their addresses in the form of lists, labels, etc. The current list of Correspondents has been distributed in June 1978 as INDC(SEC)-65/UN.

In addition to the formal INDC distribution codes G, L, U and N (defined in the List of INDC Correspondents), the Nuclear Data Section has assigned additional distribution codes for the distribution of reports

of special interest to a limited number of people, interested in specific aspects of nuclear data or in atomic and molecular data.

The "special interest" distribution codes currently used for the dissemination of some INDC documents, in addition to the G, L, U, and N distribution codes, are:

A - Distribution code for atomic and molecular data (A+M) documents concerning the international effort in the field of A+M data for fusion. This group of recipients consists of INDC and IFRC Committee members, heads of data centres, and key personnel responsible for the measurement, compilation, evaluation and dissemination of A+M data.

B - Distribution code for technical reports on the measurement or calculation of A+M data, data evaluations, surveys and compilations, and progress reports. This group of recipients consists of the A distribution plus representatives of all groups of A+M data users and producers (i.e. measurers, theoreticians and evaluators).

D - Recipients of the "CINDU" Catalogue of Numerical Nuclear Data Available from the IAEA Nuclear Data Section.

E - Nuclear structure and decay data.

F - Nuclear Data for Fusion.

H - Transactinium Isotope Nuclear Data.

M - Reactor Dosimetry Nuclear Data.

P - Fission Product Nuclear Data.

Q - Members of National Nuclear Data Committees.

R - Recipients of "WRENDA" World Request List for Nuclear Data.

S - Nuclear Material Safeguards.

T - NDS Targets and Samples Programme.

X - Charged particle nuclear data.

Y - Nuclear Theory and Computer Codes for Nuclear Data Calculations.

A.4. List of Documents

The current list of INDC documents received and distributed by the INDC Secretariat has been published as INDC(SEC)-66/UN in June 1978.

In order to implement the distribution system for "non-neutron" nuclear data documents and reports, all producers of "non-neutron" nuclear data documents in every participating Member State have been asked to comply with the INDC document distribution instructions (i.e. as to the method of nomenclature to be used and the number of copies to be sent to the INDC Secretariat) given in the "List of Documents Received by the INDC Secretariat" (INDC(SEC)-66/UN) and the "List of INDC Correspondents" (INDC(SEC)-65/U) which were published in June 1978.

"Non-neutron" nuclear data reports received as single (or few) copies by the INDC Secretariat, for which no INDC distribution is requested, will be listed in the annually published "List of Documents Received by the INDC Secretariat", together with the neutron data documents received as single copies.

The INDC Secretariat is continuously concerned that many nuclear physics reports related to the measurement or evaluation of nuclear data, such as laboratory reports generated in participating Member States, do not get the adequate dissemination they should have. It therefore urges all responsible for the dissemination of nuclear data information to distribute more documents through the established INDC channels (L, U and N distributions).

A.5. Translation of Documents

Subject to available funds, the IAEA translates a limited number of INDC reports submitted by the Soviet Union.

During the reporting period nuclear data reports of Soviet origin have been translated by the IAEA into English and distributed as INDC documents. Their full titles are given in the latest List of INDC Documents, INDC(SEC)-66/UN.

A.6. Compilation of National Nuclear Data Committees

The 1978 issue of the Compilation of National Nuclear Data Committees has been published as INDC(SEC)-69/LNQ and distributed in June 1978. It supersedes the 1976 compilation, INDC(SEC)-58/LN.

In view of the growth and personnel turn-over of national nuclear data committees, INDC Members and Liaison Officers are urged to ascertain that all members of those committees be included in the list of INDC Correspondents (see A.3. above).

B. MEETINGS

B.1. Past Meetings (March 1977 - August 1978)

B.1.1. 2nd Annual IAEA Consultants' Meeting of Nuclear Reaction Data Centres, Kiev, USSR, 11-16 April 1977

This meeting combined the 13th Annual Meeting of the Four Neutron Nuclear Data Centres ("Four Centres Meeting"), and the 3rd Annual Meeting on Charged Particle Nuclear Data Compilation ("CPND Meeting").

The main topic of this combined meeting is the international nuclear data exchange by means of the EXFOR system, in which now seven data centres actively cooperate and several others participate by receiving or distributing EXFOR data. There were 31 participants and observers representing 17 nuclear data centres or other institutions involved in nuclear data activities. List of participants is given in Appendix 2.

The large number of observers attending at their own cost showed the increasing interest towards the exchange of EXFOR data and other data files. The main functions of the Nuclear Data Section in this context are:

- to provide data files which are mostly compiled in developed countries, to developing countries;
- to coordinate the development and operation of the systems EXFOR (for experimental numerical nuclear reaction data) and CINDA (bibliography and data index).

There was a very heavy agenda. A large number of technical details about the EXFOR system could be solved only by correspondence subsequent to the meeting. The final minutes have been issued as report INDC(NDS)-90/G.

B.1.2. All-Union Conference on Neutron Physics, Kiev, USSR, 18-22 April 1977

This conference is the fourth in a regular series of conferences held in the USSR in intervals of 2-3 years on the subject of neutron physics. It was organized by the Soviet State Committee on the Peaceful Use of Atomic Energy and by the Ukrainian Academy of Sciences. It reviewed in individual papers presented in summary reports progress and current research in experimental and theoretical neutron physics and neutron nuclear data evaluation in the Soviet Union; additional papers from foreign participants covered current experimental research in several major West European, Australian and US laboratories.

In the USSR the field of neutron physics research is very much alive and strongly alined with the country's nuclear energy programme. Current experimental and evaluation work is focussed on neutron data for heavy fertile and fissile materials, and other actinide isotopes generated in reactors, on fission products and on reactor structural

materials. Refined methods for neutron data evaluation and error estimates of evaluated data are being developed. Applied theoretical research centres on average neutron resonance properties, nuclear pre-compound decay and fission theory (double-hump potential barrier concept).

The conference was attended by 300 Soviet and 60 foreign scientists from 15 countries and 3 international organizations. J.J. Schmidt attended the meeting and presented a report on the current cooperation of the four neutron data centres. Interpretation from Russian language into English and French and vice versa was provided throughout the conference. The conference gave the opportunity to meet many scientists and discuss matters of mutual cooperation, particularly with regard to future Agency meetings and projects in the nuclear data field.

In line with the international schedule for nuclear data conferences recommended by the International Nuclear Data Committee (INDC) the next Soviet Conference on Neutron Physics is planned to be held in 1980.

B.1.3. First IAEA Meeting of the A+M Data Centre Network, Vienna, 9-13 May 1977

The First Meeting of the Atomic and Molecular Data Centre Network was held in order to convene representatives of data centres and groups interested in participating in the coordinated international management of atomic and molecular data pertinent to fusion research and technology. The meeting was held on the recommendation of the 1976 Advisory Group Meeting on Atomic and Molecular Data for Fusion and supported by the Joint IFRC/INDC (International Fusion Research Council/International Nuclear Data Committee) Subcommittee on Atomic and Molecular Data for Fusion.

The meeting was attended by 18 participants representing ten existing or planned atomic and molecular data centres, two nuclear data centres, and three international organizations. The list of participants is given in Appendix 3.

The general objective of the effort started at this meeting is the formation of an internationally coordinated network of centres and groups for the systematic world-wide compilation, evaluation, exchange and dissemination of bibliographic and numerical atomic and molecular data required by the fusion community.

The specific objectives of this meeting were the establishment of agreements for the cooperation between the existing A+M data centres and groups and the IAEA/NDS A+M Data Unit, and the initial formulation and adoption of common operational procedures for the implementation of this international effort. The Adopted Agenda is given in Appendix 4. The "Summary Report" of the meeting has been published in INDC(NDS)-88/GB.

B.1.4. Second Meeting of the Joint IFRC/INDC Subcommittee on A+M Data for Fusion, Vienna, 14 May 1977

The second meeting of the Joint IFRC/INDC Subcommittee on Atomic and Molecular Data for Fusion was held in Vienna on 14 May 1977.

This Subcommittee was formed specifically to advise the Director General of the IAEA on the Agency's programme on A+M (atomic and molecular) data for fusion, and to review the progress and achievements of this programme during its trial period (i.e. 1977 and 1978). The list of meeting participants is given in Appendix 5. Plans and schedule for the publication of the Quarterly International Bulletin on Atomic and Molecular Data for Fusion were reviewed and found acceptable, particular emphasis being placed on the need to make the product clearly related to fusion. Concerning the Index to Atomic Collision Data, the A+M Data Unit was instructed to proceed towards a goal of publication by the end of 1978 if possible. For both the Bulletin and the Index priority was given to the needs of magnetic confinement devices; as a further means of directing the efforts of the Unit during the trial period, it was agreed that the Unit would not become involved in granting research contracts for data evaluation or measurements, that all efforts to compile atomic wave functions would be dropped, and that plasma-surface interaction data would not be included in the Atomic Collision Data Index. The Subcommittee felt that since the decision to embark on the A+M Data programme was made, the need for an efficient data collection and dissemination system had become more apparent, and that on the basis of considerable work accomplished, there was good evidence the programme should be continued after the trial period.

The minutes of this meeting were published in report INDC(SEC)-63/GA, and distributed in August 1977.

B.1.5. Ninth Meeting of the European Group for Atomic Spectroscopy (EGAS), Cracow, 12-15 July 1977

The European Group for Atomic Spectroscopy (EGAS) is a part of the European Physical Society which has been holding its own spectroscopy meetings for several years. The group is rather small and specialized. The meetings are relatively informal with much time available for discussion. Many of the papers are presented by students. Two simultaneous sessions of lectures are held with the division being approximately (1) traditional spectroscopy, tabulation of lines and energy levels; (2) optical pumping, lasers and special effects. The meeting was attended by E.C. Beaty.

The programme included several "roundtable discussions". The leader of the discussions typically had some prepared comments and may have asked a few others to prepare short talks. Most of the comments of these discussions are contributed by participants on an extemporaneous basis. One such roundtable discussion concerned "Atomic data for fusion". E. Beaty was invited to make a brief presentation, describing the Agency's work in this area. Professor Martinson, the discussion leader, gave a brief report on the meeting sponsored by the Agency at the Culham Laboratory in November 1976. In general the interest in this topic was high. Many participants are anxious to contribute work in this area as soon as somebody is able to specify exactly which atomic data are needed for fusion development. At this session Dr. V. Boiko, USSR, described the spectroscopic measurements his group is making in this area. His measurements are extensive and motivated rather specifically by relevance to fusion work.

B.1.6. International Conference on the Physics of Electronic and Atomic Collisions

The Tenth International Conference on the Physics of Electronic and Atomic Collisions (X-ICPEAC) held in Paris on 21-27 July 1977, was attended by E.C. Beaty of the IAEA/NDS A+M Data Unit.

B.1.7. Second IAEA Advisory Group Meeting on Fission Product Nuclear Data (FPND), Petten, 5-9 September 1977

The Second IAEA Advisory Group Meeting on Fission Product Nuclear Data (FPND), which was held by the Nuclear Data Section (NDS) in Petten, Netherlands, from 5-9 September 1977, was a follow-up meeting of the first panel on the same subject which had been organized by IAEA/NDS in Bologna, Italy, In November 1973.

The main purpose of this second meeting on FPND was to re-convene users and measurers of FPND in order to review the present stage of requirements for FPND as well as the development and progress in FPND research since the Bologna panel.

The principal results of this meeting were:

- detailed comparisons were performed between the accuracy status and the current requirements for FPND;
- those user areas were clearly delimited which still require an improvement in the status and accuracy of FPND;
- many detailed recommendations for future work on FPND, including coordinating activities to be performed by the IAEA, were formulated.

In particular, IAEA/NDS was asked:

- to continue the annual publication of the FPND progress report and to include FPND requests with detailed justifications in these reports;
- to publish periodically a list of FPND compilations and evaluations;
- to generate a comprehensive compilation of half-lives and associated decay data for all unstable and metastable nuclides; and
- to coordinate activities and to convene smaller specialists meetings to improve the knowledge and accuracy of specific types of FPND.

The meeting was attended by 52 Scientists from 13 Member States and 3 International Organizations.

The List of Review Papers on the meeting is given in Appendix 6. The proceedings of the meeting, including the 15 review papers and the conclusions and recommendations, are intended to be published in the IAEA Technical report series. The conclusions and recommendations will also be issued separately as INDC(NDS)-93. Annexes and selected contributions to the meeting will be published in INDC(NDS)-87.

B.1.8. IAEA Advisory Group Meeting on Nuclear Structure and Decay Data, Oak Ridge National Laboratory, 14-18 November 1977

The third IAEA Advisory Group Meeting on Nuclear Structure and Decay Data (NSDD) was convened at the Oak Ridge National Laboratory, USA, from 14-18 November 1977. The meeting was attended by 19 scientists from 9 Member States and 1 international organization, representing centres and groups concerned with the compilation, evaluation and dissemination of nuclear structure and decay (NSD) data. The list of participants is given in Appendix 7. The meeting was hosted by the US Nuclear Data Project, and was chaired by Dr. S. Pearlstein, head of the US National Nuclear Data Centre.

The principal objective of this meeting was the consolidation of the international network of centres and groups concerned with the evaluation and publication of all isotope mass chains on a four year cycle. In particular, the meeting aimed at improving the channels of communications between the members of the NSDD network, extending the usefulness of the bibliographic (Recent References) and numeric (ENSDF) data systems used by the network, agreeing on the distribution of responsibilities and on guidelines for the systematic evaluation of mass-chain NSD data, and approving NSDD evaluation standards and procedures for the refereed publication of evaluated NSD data. The Adopted Agenda is given in Appendix 8.

While a more detailed account of the meeting proceedings has been issued in the report INDC(NDS)-92/LN, the main achievements, conclusions and recommendations are listed below.

1. The meeting reviewed the development of the international NSDD network since its last meeting in May 1976, and confirmed the conclusions and recommendations reached at that meeting.

2. The meeting reviewed the ongoing horizontal NSDD compilations and evaluations, recognized the usefulness of the three existing compilations of nuclear data compilations and evaluations, and recommended that they be continued to be published until the time of the next meeting.

3. The meeting recommended that existing standard nuclear data reference files be used whenever possible in the performance of horizontal compilations and evaluations in order to reduce the proliferation of reference values.

4. The meeting agreed to accept the Oak Ridge report ORNL-5054/R1 as the basis for the users' manual for the computer based ENSDF (Evaluated Nuclear Structure Data File) system. The Nuclear Data Project was given the responsibility to maintain the manual and to distribute it to the members of the NSDD network.

5. The meeting adopted a procedure to update the ENSDF manual, and agreed to differentiate between major and minor changes to the ENSDF system and devised procedures for their implementation.

6. The international NSDD network members concerned accepted the assignment of specific mass chains as a permanent basis to assure the continuous and complete evaluation of all isotope mass chains on a four year cycle.

7. The meeting accepted procedures to assure a four-year evaluation cycle and agreed to a set of procedures for the reassignment of primary mass chain evaluation responsiblities.

8. The meeting agreed to adopt the standards and procedures for the evaluation of mass chain nuclear structure and decay data as proposed by the Nuclear Data Project.

9. The meeting accepted a set of interim procedures to review and referee mass chain evaluations performed by members of the NSDD network.

10. The meeting agreed on the set of physical properties to be compiled and evaluated in context of the mass chain data evaluation effort.

11. The meeting agreed that the international NSDD network should meet approximately every other year, but without exceeding 2.5 years between two consecutive meetings. The next meeting of the NSDD network was suggested to be held in Leningrad, USSR, during the first quarter of 1980.

B.1.9. NEANDC/NEACRP Specialists' Meeting on Neutron Data for Structural Materials for Fast Reactors, CBNM, Geel, Belgium, 5-8 December 1977

This joint NEANDC/NEACRP Specialists Meeting on Neutron Data for Structural Materials for Fast Reactors, held in December 1977, is part of a series of specialists meetings on important nuclear data topics which are convened by agreement between NEANDC(NEA) and INDC(IAEA). The list of papers presented at this meeting is given in Appendix 9. The summary of the meeting will be published as NEANDC(E) 197A.

This meeting was attended by Dr. K. Okamoto, member of the IAEA Nuclear Data Section, who also took part in the working group on Differential Data.

B.1.10. Winter Courses on Nuclear Physics and Reactors, Part I: Course on Nuclear Theory for Applications, ICTP Trieste, 17 January - 10 February 1978

Two related Courses on Nuclear Physics and Reactors were conducted from January to March 1978 at the International Centre for Theoretical Physics (ICTP) Trieste. Part I of these courses, the Course on Nuclear Theory for Applications, was jointly organized by the IAEA Nuclear Data Section and ICTP and was held from 17 January - 10 February 1978. J.J. Schmidt, head of the IAEA Nuclear Data Section, served as Scientific Director of the Course, with the co-operation of Prof. L. Fonda and the staff from the ICTP.

The purpose of this Course was to offer nuclear physicists and nuclear data specialists from developing countries for the first time a thorough review of the contemporary research on low-energy nuclear reaction theory. The Course also provided training on an advanced level in the application

of nuclear theory and associated computer codes to the interpretation and calculation of neutron nuclear data needed for nuclear reactor calculations. The Course was started with introductory lectures on the importance and evaluation of nuclear data and continued with a series of lectures, special seminars, tutorial sessions and computer code workshops on the following research topics:

- neutron resonance theory;
- nuclear optical model;
- statistical theory of neutron nuclear reactions;
- pre-equilibrium decay; and
- neutron induced nuclear fission.

The list of the course lectures and special seminars is given in Appendix 10.

The Course was attended by 91 participants from 29 developing countries, 12 participants from 6 developed countries, and 5 participants from the CEC Laboratories at Geel and Ispra and from JINR Dubna.

The Course succeeded to direct the interest of many participants from developing countries to the applications of nuclear theory to nuclear data calculations and to initiate future co-operation between scientists from developing and developed countries in this field. In addition, the Course gave a unique opportunity to discuss in detail the programmes, plans and capabilities of national laboratories and university institutes of most of the developing countries represented on the Course in the determination, use and processing of nuclear data. Numerous nuclear data and computer code requests were brought forward to the Nuclear Data Section for purposes of nuclear theory and reactor physics calculations, nuclear training and development of nuclear data measurement programmes; these are gradually being satisfied after completion of the Course.

In response to the large interest of scientists from developing countries in periodic exposure to the progress in applied nuclear theory, ICTP and the Agency's Nuclear Data Section plan holding another course in 1980, in the framework of the ICTP nuclear Physics activities.

The proceedings of the Course will be published as part of the ICTP Report Series.

B.1.11. Third Meeting of the Joint IFRC/INDC Subcommittee on A+M Data for Fusion, Vienna, 14 April 1978

The Joint IFRC/INDC Subcommittee on A+M Data for Fusion met for the third time on 14 April 1978. At this meeting, the Subcommittee reviewed the current status of the programme, made a technical evaluation of the A+M Data Bulletin and the Index to A+M Collision Data, and discussed the future Course of the IAEA A+M Data Programme. The list of participants of this meeting is given in Appendix 11. The minutes of this meeting have been published in report INDC(SEC)-64/GA. The next meeting of this subcommittee is scheduled for 30 September 1978.

B.1.12 First Research Coordination Meeting on the Inter-comparison of Evaluations of Actinide Neutron Nuclear Data, Vienna, 17-19 April 1978

The meeting was attended by 7 participants of the coordinated research programme under this title and 2 observers. The agenda included discussions on progress and coordination of the research projects of the participants, and discussions held in subgroups on specific questions of actinide data evaluation. The list of participating evaluators in this programme and the isotopes being considered by each participating group is given in Appendix 12. See Section C.5.1 for a more detailed description of this programme.

B.1.13 First Research Coordination Meeting on the Measurement of Transactinium Isotope Nuclear Decay Data, Vienna, 20-21 April 1978

The first meeting of the participants in the IAEA Coordinated Research Programme to measure and evaluate nuclear decay data of transactinium isotopes, was convened by the IAEA Nuclear Data Section on 20-21 April 1978, at IAEA Headquarters in Vienna. The attendees of this meeting are listed in Appendix 13. The meeting was chaired by Dr. A.J. Fudge, of AERE Harwell.

The principal objective of this meeting was to initiate the collaboration between the research groups participating in this cooperative project, review the accuracy of existing data so as to agree on the priority of required measurements, and discuss areas of possible cooperation between the participating research groups.

In summary, the meeting:

- reviewed the existing and planned programmes for the measurements and evaluations of transactinium isotope nuclear decay data of each participating research group;
- discussed the nature and scope of the coordinated research programme;
- agreed on ways and means to exchange and disseminate information pertinent to this programme;
- considered the possibility to exchange source samples among the participants of this programme;
- recommended the participation of scientists from developing countries in the programme; and
- reviewed the status of transactinium isotope half-life data, compiled a list of recommended half-life values, and recommended the future review of the spontaneous fission data status.

The participants agreed that the next meeting of this coordinated research programme be convened in conjunction with the Advisory Group Meeting on Transactinium Isotope Nuclear Data planned to be held at a location in Europe in May 1979.

The summary report of the meeting has been published as report INDC(NDS)-96/N.

B.1.14 41st Meeting of the Euratom Working Group on Reactor Dosimetry (EWGRD), 2-3 May 1978, Petten, Netherlands

The main topics of this meeting were:

- Critical analysis of the "Nuclear Data Guide for Reactor Metrology", manual edited by W.L. Zijp: Suggestions on the contents of its future publication.
- The 3rd ASTM/EUR Symposium on Reactor Radiation Measurements, planned to be held from 1 to 5 October 1979, Ispra, Italy; proposals for organization, topics to be included, presentation of papers, selection of the programme committee members (EURATOM), etc.
- Recommendations presented by the Irradiation Damage Sub-Group as "Introduction to Neutron Metrology for Reactor Radiation Damage".
- Information on the Agency's Nuclear Data Section on activity in the field of nuclear data for reactor dosimetry, by M.F. Vlasov.
- Reports presented by M.F. Vlasov: "Review of Differential Neutron Data for Important Reactions not yet included in ENDF/B-V Dosimetry File" and "New Proposed Standard Cross Sections" ($^{237}Np(n,f)$ F.P. and $^{27}Al(n,\alpha)^{24}Na$).

M.F. Vlasov of the Nuclear Data Section attended this meeting and reported on the activity of the IAEA Nuclear Data Section in the field of nuclear data for reactor dosimetry, relating to the two IAEA programmes "Standardization of Reactor Radiation Measurements" and "Benchmark Neutron Fields Applications for Reactor Dosimetry".

Mr. Vlasov also presented the reports "Review of Differential Neutron Data for Important Reactions not yet included in ENDF/B-V Dosimetry File" and "New proposed Standard Cross-Sections" ($^{27}Al(n,\alpha)^{24}Na$ and $^{237}Np(n,f)$F.P.). The first report gives the status of excitation functions of those reactions which should be added to the ENDF/B-V Dosimetry File to expand it to international status. In the second report the status of two reactions recommended at the previous INDC meeting on a tentative basis as new "dosimetry" standards is briefly described. During the discussion the importance of both reactions ($^{27}Al(n,\alpha)^{24}Na$ and $^{237}Np(n,f)$F.P.) as dosimetry standards was underlined. However, the attention was drawn to the availability of Neptunium-237 and the question was raised if the Seibersdorf Laboratory could provide Neptunium samples for distribution. It was also pointed out that a better knowledge of

$\sigma(n,\gamma)$ for $^{238}Np(^{237}Np(n,\gamma)^{238}Np \xrightarrow[\beta-]{2.12d} ^{238}Pu$ was required.

M.F. Vlasov asked for distribution of more copies of the EURATOM periodical "Newsletter on Reactor Neutron Metrology", to the IAEA member states

outside EURATOM. It has been agreed that about 20 - 30 copies will be sent to these countries. A distribution list will be prepared by the Nuclear Data Section.

B.1.15. Third Annual Meeting of the Nuclear Reaction Data Centres, Paris, 19-23 June 1978

The Third Annual Meeting of the Nuclear Reaction Data Centres, combining the 14th "Four Centres" Meeting of the Neutron Nuclear Data Centres and the 4th "CPND" Meeting of the Charged Particle Nuclear Data Centres, took place at OECD Headquarters in Paris, France, during the period 19-23 June 1978. The meeting was organized by IAEA/NDS (H.D. Lemmel) in cooperation with the NEA Data Bank (P. Johnston). The "Tentative Agenda" is given in Appendix 14.

The following centres are expected to attend:

- the four neutron data centres (NNDC, NEA Data Bank, NDS, CJD);
- two charged particle data centres (KACHAPAG Karlsruhe, CAJaD Moscow); the Japanese "study group" under Prof. Tanaka being unable to attend;
- Fachinformationszentrum Energie, Physik, Mathematik Ges. M.B.H., at the Kernforschungszentrum Karlsruhe in the Federal Republic of Germany.

B.1.16. Fourth Europhysics Study Conference on Atomic and Molecular Physics in Ionized Gases, Essen, Fed. Rep. of Germany, 18-20 September 1978

The Fourth Europhysics Study Conference on Atomic and Molecular Physics in Ionized Gases (ESCAMPIG) is scheduled to be held at University of Essen, Federal Republic of Germany on 18-20 September 1978. Representation at this meeting by a member of the IAEA/NDS A+M Data Unit is planned. As in the case of earlier ESCAMPIG Conferences in Versailles, Innsbruck, and Bratislava, the present conference is intended to provide a forum for discussion and exchange of information and ideas on collisional and radiative processes as they influence or reflect the state of an ionized gas.

Sessions are planned with contributed papers on the following topics:

Elementary processes

Transport phenomena

Non-Equilibrium plasmas

Processes in gas laser plasmas

Plasma sources for the study of elementary processes

Plasma-wall interaction

Diagnostic methods.

B.2. Meetings Planned for 1978 and 1979

B.2.1. International Conference on Neutron Physics and Nuclear Data for Reactors and Other Applied Purposes, Harwell, UK, 25-29 September 1978

The OECD Nuclear Energy Agency and the United Kingdom Atomic Energy Authority with the cooperation of the International Atomic Energy Agency and the support of the Commission of European Communities Joint Research Centre have organized an International Conference on Nuclear Physics and Nuclear Data for Reactors and other Applied Purposes. The Conference in which the IAEA cooperates to the extend of providing funds for the participation of scientists from developing countries, is organized jointly by the Nuclear Energy Agency of the OECD and AERE Harwell.

The aim of the Conference is to bring together scientists who are interested in the use, measurement, calculation and evaluation of neutron and nuclear data for applied purposes. The main emphasis will be on the data needed in the fission reactor programme - for the design, operation, safety and shielding of fission reactors, the processing of fuel and the storage or disposal of nuclear waste - but a large fraction of the time will be devoted to the data related to fusion reactors, to bio-medical needs, and to other applied purposes.

B.2.2. Fourth Meeting of the Joint IFRC/INDC Subcommittee on A+M Data for Fusion, Vienna, 30 September 1978

The Fourth and final meeting of the Joint IFRC/INDC Subcommittee is to perform the final evaluation of the Agency's trial A+M data programme (1977-1978), and to give its recommendation to the IAEA regarding the regularization and future course of the Agency's A+M data programme.

B.2.3. IAEA Advisory Group Meeting on Nuclear Data for Reactor Dosimetry, Vienna, 13-17 November 1978

IAEA/NDS will hold an Advisory Group Meeting on "Nuclear Data for Reactor Dosimetry" during the week of 13 to 17 November 1978 at IAEA Headquarters in Vienna, Austria. The meeting will be convened within the framework of the IAEA programmes "Standardization of Reactor Radiation Measurements" and "Benchmark Neutron Fields Applications for Reactor Dosimetry" and is directly related to the previous IAEA Consultants' meeting on "Integral Cross Section Measurements in Standard Neutron Fields for Reactor Dosimetry", 15-19 November 1976, Vienna. (The proceedings of that meeting are published as an IAEA technical report, IAEA-208, Volumes 1 and 2, 1978.)

The development of fast reactor technology and controlled fusion applications has led to a growing realization of the importance of reactor dosimetry data, e.g. for reactor vessel surveillance, shielding problems, fuel cycle considerations. This requires more accurate data for detailed and

accurate dosimetry measurements. Substantial improvements of neutron cross-sections and other dosimetry data have been achieved during the last few years; the reliability of the data and their integral consistency has been proven through the programme on "Benchmark Neutron Fields Application for Reactors Dosimetry".

It has become evident that a more complete and more accurate library of internationally recommended neutron cross-section data for reactor dosimetry is required.

The November meeting will consider the preparation of the internationally recommended neutron cross-section data file for dosimetry applications and will discuss the status of:

- reactor dosimetry neutron data measurements and evaluations;
- dosimetry benchmark neutron fields spectral characterization;
- integral measurements in these fields;
- differential-integral data consistency and progress in neutron differential-energy data adjustment on the basis of integral experiments.

The tentative programme of the meeting is given in Appendix 15.

B.2.4. IAEA Advisory Group Meeting on Nuclear Data for Fusion Reactor Technology, Vienna, 11-15 December 1978

IAEA/NDS is planning to convene a meeting on the topic of nuclear data requirements in fusion reactor technology, at IAEA Headquarters in Vienna on 11-15 December 1978. The description of this meeting and the list of review topics are given in Appendix 16.

B.2.5. IAEA Consultants' Meeting on Delayed Neutron Properties, Vienna, March 1979

As suggested by the INDC Subcommittee on the planning of NDS meetings at the 9th INDC Meeting in May 1977 and supported by the delayed neutron sub-group and the plenary of the Second IAEA Advisory Group Meeting on Fission Product Nuclear Data (FPND) held at RCN Petten, Netherlands in September 1977, the Nuclear Data Section is planning to hold a small Consultants' Meeting on Delayed Neutron Properties at IAEA Headquarters in Vienna in March 1979.

The purpose of the meeting will be to review the present requirements and status of all data on delayed neutron properties with special emphasis on resolving long standing discrepancies in experimental data.

The following topics are to be covered at this meeting:

- present requirements of delayed neutron data for energy applications;
- integral delayed neutron data;
- delayed neutron branching ratios;
- energy spectra.

The information sheet for this meeting is given in Appendix 17.

B.2.6. IAEA Symposium on Physics and Chemistry of Fission, 14-18 May 1979, Jülich, FRG

This IAEA Symposium, organized by the IAEA Physics Section, will be held on the premises of the Kernforschungsanlage at Jülich in the Federal Republic of Germany from 14-18 May 1979. The information sheet for this symposium is given in Appendix 18.

B.2.7. Second IAEA Advisory Group Meeting on Transactinium Isotope Nuclear Data, May 1979

The IAEA Nuclear Data Section plans to convene the Second IAEA Meeting on this subject in May 1979 at a location in Europe. The information sheet for this meeting, and a suggested list of review topics is given in Appendix 19.

B.2.8. Second Research Coordination Meeting on the Intercomparison of Evaluations of Actinide Neutron Nuclear Data

This meeting is planned in spring 1979 in connection with the Advisory Group Meeting on Transactinium Nuclear Data. For details see Chapter C item 5.2.

B.2.9. Second Research Coordination Meeting on Transactinium Isotope Nuclear Decay Data Measurement, May 1979

A second meeting of the participants in the TND decay data measurement CRP is planned to be held in May 1979 in conjunction with the scheduled TND Advisory Group Meeting (see B.2.7). The principal objectives of this meeting will be:

- to review the current status of decay data measurements and evaluations;

- to expand and complete the lists of proposed nuclear decay and spontaneous fission half-lives; and

- to assess the status and accuracy of existing gamma-ray and alpha decay spectra of the transactinium isotopes.

B.2.10. Second Advisory Group Meeting on Atomic and Molecular Data for Fusion, early in 1980

IAEA/NDS is planning to convene a second meeting on Atomic and Molecular (A+M) Data for Fusion as a follow-up of the November 1976 meeting on A+M Data for Fusion which was held at the UKAEA Culham Laboratory. This meeting is proposed to be held early in 1980 at the CEA Laboratory at Fontenay-aux-Roses in France.

The objectives of the meeting will be:

- to review the current trends and associated A+M data requirements in fusion technology;

- to assess the status of the existing A+M data, and

- to evaluate the IAEA programme to coordinate the generation, evaluation and dissemination of A+M data for fusion.

B.2.11. Second IAEA Meeting of the International A+M Data Centre Network, early in 1980

A two-day meeting of the international A+M Data Centre Network is planned to be held immediately following the Advisory Group Meeting on A+M Data for Fusion (see B.2.10), at the CEA Laboratory at Fontenay-aux-Roses. The objective of this meeting will be the consolidation of the data centre network for the systematic world-wide compilation, evaluation, exchange and dissemination of bibliographic and numerical A+M data required by the fusion community. The first meeting of this A+M data centre network was held in May 1977 in Vienna (see INDC(NDS)-88/GB.

B.2.12. Eleventh International Conference on Physics of Electronic and Atomic Collisions

The Eleventh International Conference on the Physics of Electronic and Atomic Collisions (XI - ICPEAC) will be held in Kyoto, Japan, 24 August - 4 September 1979. Attendance of this meeting by a representative of the IAEA/NDS A+M data unit is hoped to be feasible.

B.2.13. Fifth US Conference on Nuclear Cross Sections and Technology, Knoxville, USA, 22-26 October 1979

The Nuclear Data Section intends to co-operate in this Conference in a similar way as in the 1978 Harwell Nuclear Data Conference by disseminating information about the Conference, assisting in its planning and providing limited financial support to enable scientists from developing countries to attend.

C. NUCLEAR DATA ASSESSMENT AND RESEARCH COORDINATION

C.1. WRENDA

In compliance with the recommendation of INDC at its 9th Meeting in May 1977 no new edition of WRENDA has been published during the reporting period. The next edition of WRENDA will be issued in the spring of 1979 and will contain the fusion and safeguards nuclear data requests merged with the fission reaction requests duly tagged.

C.2. Targets and Samples

The targets and samples programme, by which foil materials are procured by the Agency for nuclear data measurements in developing countries, has been continued in the reporting period. While the funds available in 1977 allowed to provide most of the requested support, only half of the originally requested US $ 30.000 was approved for 1978, due to the present severe budgetary limitations of the Agency. Table 1 shows the supply of targets and samples from January 1977 to spring 1978.

The Romanian betatron experiments on enriched uranium samples supplied by NDS for the determination of the absolute delayed γ-ray yield after photofission caused by bremsstrahlung for calibration of safeguards fissile material accountance were finished by the end of 1977. 1978 will be devoted to the evaluation of the measured raw data, and a final detailed report will be published as INDC-report.

New sample requests were received in the beginning of 1978 from Colombia (Fermi age measurements), Egypt (thermal cross section measurements on Eu isotopes), India (actinide fission yield and cross section measurements), Pakistan ((n,α) cross section measurements on V, Cr and Mo isotopes) and Romania (fission cross section measurements on ^{233}U and ^{241}Pu for 2200 m/sec. neutrons). These requests are at present under discussion with the research groups concerned, but due to lack of funds in 1978 have to be deferred to 1979.

C.3. Nuclear Data Section Activity in the Field of Nuclear Data for Reactor Dosimetry

C.3.1. Internationally Recommended File of Neutron Cross Sections for Reactor Dosimetry

The need for an internationally recommended file of neutron data for reactor dosimetry, which could be used by all laboratories in the IAEA Member States, has been stressed previously. The ENDF/B Dosimetry File is now accepted as reference data file by many users, however, it is a national file, and it does not include many reactions considered to be of high priority (such as the reactions $^{103}Rh(n,n')$, $^{93}Nb(n,n')$, $^{19}F(n,2n)$, $^{63}Cu(n,2n)$ etc.) in laboratories in Europe and other countries outside the USA.

The presently available version IV of this file includes the following reactions:

n,n': ^{115}In.

n,2n: ^{55}Mn, ^{59}Co, ^{58}Ni, ^{65}Cu*, ^{127}I.

n,γ: ^{23}Na, ^{45}Sc, ^{58}Fe, ^{59}Co, ^{63}Cu*, ^{115}In, ^{197}Au, ^{232}Th, ^{238}U.

n,p: ^{27}Al, ^{32}S*, ^{46}Ti, ^{47}Ti (also n,n+p), ^{48}Ti (also n,n+p), ^{54}Fe, ^{56}Fe, ^{58}Ni, ^{60}Ni.

n,α: ^{6}Li, ^{10}B, ^{27}Al, ^{59}Co, ^{63}Cu*.

n,f: ^{232}Th, ^{235}U, ^{237}Np, ^{239}Pu.

The lower quality of the evaluation of some reactions included in ENDF/B-IV was identified by the intensive programme of integral cross section measurements in various benchmark neutron fields. These measurements, together with the new experimental results obtained with monoenergetic neutrons, require an urgent updating of ENDF/B-IV. This activity is now under way in the USA (25 reactions will be re-evaluated for ENDF/B-V.

No new reaction will be added to the ENDF-B/IV dosimetry file in this update.

At the recent meeting of the Task Force on Reactor Dosimetry (25-28 March, 1977) convened in parallel with the International Symposium on Neutron Standards and Applications (National Bureau of Standards, Washington, USA), an additional list of reactions was proposed for the Dosimetry File which covers the most urgent European needs as well as those of fusion neutron dosimetry. This list, with the exception of (n,γ)** reactions, is given in Table 2.

A careful evaluation of the proposed reactions (and probably a few others, which may be recommended later as important for dosimetry applications) will permit to expand the role of the ENDF/B Dosimetry File to the international status. It is expected that this evaluation activity will be done without US participation under general coordination of the IAEA Nuclear Data Section. This programme which has already been started, includes the evaluation of differential data (energy-dependent cross sections) produced by three or four groups of evaluators in Member States, the integral measurements of neutron cross sections in benchmark neutron fields with well established neutron spectra (to test integral-differential data consistency), and the analysis and approval of the evaluated data by a group of experts at the IAEA Advisory Group Meeting on Nuclear Data for Reactor Dosimetry, 13-17 November 1978, in Vienna (See B.2.3.).

For some of the reactions under consideration there are not enough experimental results available to perform a proper evaluation and an urgent need exist for new measurements.

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* Reactions in ENDF/B-IV not yet assigned for re-evaluation.

** (n,γ) reactions proposed for ENDF/B Dosimetry File: ^{13}C, ^{40}Ar, ^{50}Cr, ^{55}Mn, ^{54}Fe, ^{109}Ag, ^{164}Dy, ^{176}Lu, ^{181}Ta. They are not assigned yet for evaluation.

The status of the evaluation activity is summarized in the comments to Table 2. The results of these activities will be summarized at the November 1978 Advisory Group Meeting where the structure of the international file, its content, associated error file etc., will also be discussed.

C.3.2. Nuclear Data for Reactor Neutron Spectra Unfolding by Multiple-Foil Activation Technique

Nuclear Data Section participates in the Agency's programme on the "Standardization of Reactor Radiation Measurements" together with the Physics Section of the Seibersdorf Laboratory and some other sections of the IAEA.

The multigroup cross section data to be used with "SAND-2", "Crystal Ball" and with other unfolding codes were prepared for some threshold reactions (e.g. (n,p), (n,n+p) for titanium isotopes). A study is now underway on the effect of the excitation function structure of the reactions on the shape of the unfolded spectrum. For this purpose two sets of recommended multigroup cross-section data (one "sharp", and one "smooth") have been prepared for the same reactions, and used in this study.

Multigroup data for photo-fission cross-sections of ^{232}Th and ^{238}U are in preparation now to check the influence of gamma-radiation fields on unfolded neutron spectra in those cases where ^{232}Th and ^{238}U are components of multi-foil sets.

C.4. Fission Product Nuclear Data

C.4.1. Fission Product Nuclear Data (FPND) Report Series

The third issue of the report series "Progress in Fission Product Nuclear Data" was published in May 1977. It contained 78 contributions from 34 laboratories about planned, ongoing or recently completed activities in the field of FPND.

The participants of the 1977 FPND meeting in Petten (see section B.1.7.) emphasized the usefulness of this report series and recommended that NDS should continue to issue it in annual intervals. The fourth issue, which will be published in July 1978, will again include a "circular to measurers of FPND", which had already been published in the first issue of "Progress in FPND". This circular specifies the experimental and interpretation detail which measurers should include in the reports on their work, so that evaluators may adequately compare and judge different experimental results.

C.4.2. List of Compilations and Evaluations of Fission Product Nuclear Data

A list of FPND compilations and evaluations, together with some explanatory comments, was reported to the 1977 FPND Meeting in Petten (see section B.1.7.). Following the recommendations of this meeting, IAEA/NDS will keep this list up-to-date and publish it in periodical (initially annual) intervals.

C.5. Transactinium Isotope Nuclear Data (TND)

In response to the recommendations of the Advisory Group Meeting on TND, held in November 1975 at Karlsruhe, IAEA/NDS has initiated two coordinated research programmes (CRP) in context of the IAEA Research Contract Programme in order to improve the status of TND required by nuclear technology. In a coordinated research programme, each participating laboratory represented by a chief investigator, is responsible to submit a yearly progress report on the measurements undertaken in context of this programme. The IAEA, in addition to its coordinating responsibility, assists in the distribution and exchange of information pertinent to the programme, and invites the chief investigators to attend research coordination meetings at appropriate intervals at IAEA expense. The progress and accomplishments of these CRP's will be reviewed at the next Advisory Group Meeting on TND, planned to be convened in May 1979 (see section B.2.7).

C.5.1. Coordinated Research Programme on the Intercomparison of Evaluations of Actinide Neutron Nuclear Data

The CRP on neutron TND evaluation was officially approved by the IAEA in September 1976, and is currently supported by research contracts and research agreements. Initially, an IAEA consultants meeting on the Evaluation of Actinide Neutron Cross-Sections, held in Vienna, 13-14 December 1976, worked out a detailed programme which was considered by the INDC at its meeting in Vienna, 16-20 May 1977 and approved under its title given above. (See INDC(NDS)-89).

In 1977/78 research agreements (resp. contracts) were formulated and approved with the following countries: France, Fed. Rep. of Germany, India, Israel, Italy, Japan, Romania, UK, USSR, covering a list of more than 12 isotopes. The attached list of participants and isotopes considered is given in Appendix 20.

The programme includes review and assessment of experimental data, nuclear model calculations, data evaluation, and comparison of evaluations. Those participants who have overlapping interests with respect to specific nuclides and with respect to nuclear model computer codes will exchange information in the course of their work.

A Research Coordination Meeting (see section B.1.12) was held in Vienna, 17-19 April 1978, attended by the participants of the programme (except France and USSR for different reasons) and by a Swedish group interested in the present status of actinide neutron data.

During the meeting, the participants reported on the progress of their work and on their future plans. Specific problems were discussed in three subgroups on Th-232, Am isotopes, and Cm isotopes. The meeting arrived at the following main conclusions:

- The activities of the participants should be scheduled such that results are available by the end of 1980 to be included in comprehensive actinides neutron data file.
- This file is likely to include evaluations for more than 25 nuclides.
- The evaluations should , as much as possible, be independent from ENDF/B.

- Other conclusions were related to evaluations methods, suitability studies of different model codes, intercomparisons, standard reference values, etc.

The next Research Coordination Meeting for this programme is scheduled for 1979 in conjunction with the Advisory Group Meeting on TND.

Additional participants in this coordinated research programme would be welcomed.

C.5.2. Coordinated Research Programme on the Measurement and Evaluation of Transactinium Isotope Nuclear Decay Data

The CRP on the measurement and evaluation of transactinium isotope decay data was officially approved by the IAEA in December 1977, and is currently supported by five research agreements.

The list of scientists who are participating in this CRP and their work plan for this year is given in Appendix 21. The first meeting of this CRP was held in Vienna, 20-21 April 1978; the summary report of this meeting has been published in INDC(NDS)-96. (See also section B.1.13). The next meeting of this group is planned to be held at the time of the next Advisory Group Meeting on Transactinium Isotope Nuclear Data in May 1979.

At the conclusion of this coordinated research programme it is planned that the participants, in cooperation with IAEA will produce a final report, published in the IAEA Technical Report Series, consisting of a Comprehensive Compilation of recommended nuclear decay data (including half-lives, partial α- and γ- yields with their uncertainties) for all transactinium isotopes.

D. DATA CENTRE ACTIVITIES

D.1. Nuclear Reaction Data

D.1.1. CINDA

CINDA file: Preparation of Cinda entries for new literature continues as a routine work of the four neutron data centres. Based on the positive result of a questionnaire distributed by the NNDC Brookhaven (compare INDC(NDS)-85 p.33), all Cinda entries referring to the same experiment are blocked together and the relevant Exfor accession numbers are added. Furthermore, less important references such as old progress reports after publication of the final paper, are removed from the book (though not from the file). This same procedure was applied also retroactively to old entries. For this "Cinda improvement programme" NDS was little involved since this procedure was applied here already for many years. However, NDS did much of the improvements needed for area 4 (USSR).

CINDA Coding Manual: In April 1977, CCDN issued, after consultation with the other centres, a new Cinda Coding Manual, which relieved NDS from maintaining its own manual, and which contributed to standardizing the style of coding by the various Cinda indexers.

CINDA publication: The originally planned two-year publication cycle of CINDA 76/77 was extended to a third year. This means, that CINDA 78 is being issued as a fourth (spring) and fifth (fall) supplement to CINDA 76/77. This decision was based on economical considerations, and gave sufficient time for finishing the "improvement programme" before issuing CINDA 79 as a cumulative "archival issue" envisaged for Spring 1979.

D.1.2. The Generalized EXFOR System

At the last data centre meetings the original EXFOR system which was designed for neutron nuclear data was generalized to potentially include all types of nuclear reaction data. This involved primarily an improved computer intelligible coding system for data definitions, providing optimum clarity for compilers, and users, as well as improved indexing and retrieval programmes. It has sufficient flexibility for coding the various representations of experimental nuclear reaction data induced by photons, neutrons, charged particles and heavier ions, as well as those spontaneous decay data which fall within the scope of neutron data centres, such as spontaneous fission.

Some examples:

28-NI-62(N,P)27-CO-62-M,,SIG = isomeric(n,p) cross-section.

92-U-235(N,F),,SIG,RTE = $\sigma_f \cdot \sqrt{E}$

96-CF-252(0,F),PR,DE,N = prompt neutron spectrum from spontaneous fission.

96-CM-248(8-O-16,3N+A)102-NO-257,,SIG = (^{248}Cm + 160) reaction cross-section.

Other improvements which were gradually introduced, relate to multi-dimensional tables (e.g. resonance parameters or double differential cross-sections) and to the coding of half-lives and decay-data assumed for deriving the compiled data, corresponding to expressed needs of evaluators.

Since the fall of 1977 neutron data are transmitted between the centres in the generalized EXFOR format: NDS is responsible to maintain and update the Exfor Dictionaries, that is, the tables of agreed abbreviations and provide them regularly to the cooperating centres.

D.1.3. Compilation of Experimental Neutron Data at NDS

The systematic compilation in EXFOR of all neutron data measured in the NDS service area continues, and close contacts with the authors have been established. Careful analysis of the data compiled and questions sent back to the authors together with the EXFOR proof-copy lead frequently to further improvements of the data, including revisions of published values.

Large amounts of resonance parameters obtained by an Australian group at the Oak Ridge ORELA and at the Lucas Heights Van de Graaff accelerators were compiled with top priority. Upon recommendation of the Geel meeting on nuclear data of strucutral materials (see Section B.1.9) the raw capture yield data of the Australian experiments were also compiled. To minimize the efforts, these data are kept in their original format on separate tapes, which are referred to in the corresponding EXFOR entries. Thus, these data will show up in EXFOR retrievals at each of the four centres, and US raw data are already available in the same manner. All data from the NDS service area that existed in earlier compilations (DASTAR, SCISRS-1) have been converted to EXFOR.

The countries in the NDS service area and the USSR contribute about 30% of the data sets or 15% of the data points to the EXFOR library. The annual rate of measured data shows an increasing tendency, whereas the annual rate of measured data in West Europe and USA has been more or less constant since a marked peak in activities around 1970.

D.1.4. Compilation of Other Nuclear Reaction Data at NDS

The creation of a special EXFOR series for selected evaluated neutron nuclear data that are not part of one of the established evaluated data libraries, has been described in INDC(NDS)-85 p.36 (the so-called EXFOR-"VIEN" file standing for "various international evaluated nuclear" data). The request statistics have shown that this file fills a definite user need.

New evaluations recently included in the EXFOR-VIEN file are:

- Ni-58(n,2n), Marcinkowski et al, Poland
- Pu-239,α, Kononov, USSR
- $\bar{\upsilon}$ data, Boldeman, Australia
- Au-197(n,2n),(n,3n),(n,4n), Philis et al, France
- Ba isotopes, all reactions, Strohmaier et al, Austria

Although the EXFOR format is not an ideal format for evaluated data, the existing EXFOR computer programmes and exchange system permit the compilation, transmission and dissemination of these important data without much additional effort.

A new complete evaluation of Nb-93 has been received from D. Seeliger, German Democratic Republic, in SOKRATOR fromat. These data will be transmitted as an EXFOR-VIEN entry to the other centres after some reaction type numbers, newly introduced in SOKRATOR, have been clarified.

NDS does not compile charged-particle or photon induced reaction data. However, if the need for these data can be demonstrated, they can be compiled in EXFOR as well. Once such example is the evaluated data of the ^{9}Be(α,n) reaction, which has been recently used as a test case for compilation in EXFOR.

D.1.5. The EXFOR Data Exchange System

Seven centres are now participating in the EXFOR data exchange. In addition to the established neutron data exchange between the Four Centres, the Karlsruhe Charged Particle Group under Prof. Muenzel has created a steadily growing EXFOR Library of "integral" charged particle data; the centre under Prof. Chukreev at the Kurchatov Institute, Moscow, and a Japanese "study group" under Prof. Tanaka have coded and transmitted first EXFOR tapes. Other groups, in particular Dr. Abramov's photonuclear data group at Obninsk, are likely to join. Several countries, e.g. the German Democratic Republic, Poland and Romania, who were represented at the Kiev Data Centre meeting use the EXFOR system for internal purposes or even contribute EXFOR compilations to the inter-centre data exchange.

A summary description of the EXFOR Data Exchange System is given in Appendix 22.

It should be noted, that the primary purpose of EXFOR remains the compilation and exchange of neutron reaction data between the Four Centres. However all other nuclear reaction data can be exchanged and retrieved with the same computer programmes. Anyone who performs a compilation of any nuclear reaction data should be encouraged to use EXFOR, in order to make his compilation accessible to others by means of the EXFOR exchange system and computer programmes.

D.1.6. Other Nuclear Reaction Data Files

More than 30 data files (or data libraries) are available at NDS. They have been publicized in CINDU-11 and its Supplement issued in 1978. A summary has been given in the 1977 report to the INDC [INDC(NDS)-85 p.37]. Since then several new libraries have been received, the more important are:

- the Japanese evaluated neutron data library JENDL-1;
- Japanese Fission-Product Data Library;
- KEDAK Fission-Product Cross-Section Library (RCN-2);
- new Bologna evaluations; and
- additions to the SOKRATOR Library (Er isotopes).

D.1.7. Request Services

The items D.1.1 - D.1.6 above all relate to data acquisition, which is the pre-condition for good data centre services.

The primary function of all staff members of the NDS Nuclear Reaction Data Unit is to reply speedily and carefully to the increasing number of data requests received. Part of the requests can be filled by a selective data retrieval from different files. However, many requests involve an analysis of the purpose of the request, requiring questions back to the requestors and various follow-up actions.

An increasing number of requestors from developing countries need to have not only data libraries but also related computer programmes, group data and advice about their use and availability. This adds a new important component to the services of the Nuclear Data Section, and contacts with the Computer Programme Library of the NEA Data Bank, the Radiation Shielding Information Centre at Oak Ridge in the United States, and other pertinent centres have been intensified.

Due to the efforts of a Romanian fellowship trainee (see Section D.4.2.) graphical plotting of various cross-section data is now possible as requested by different customers. However, due to lack of manpower, this service could not yet be offered to customers on a regular basis.

D.2. Nuclear Structure and Decay Data (NSDD)

The general objectives of this component of the Nuclear Data Section programme are to review the requirements for NSDD of importance in applications of radiations and isotopes, to coordinate internationally the compilation, evaluation and dissemination of such data, to promote the measurement and evaluation of needed data, and to provide data centre services to NSDD users. The major functions of this sub-programme are listed in Appendix 23.

Since its inception in 1972, the main emphasis of this programme component has been the organization of an internationally coordinated network of data centres, research groups and individual scientists for the systematic compilation, evaluation and dissemination of nuclear structure and decay data. Three advisory group meetings (held in 1974, 1976 and 1977) have led to the adoption of computer-based systems for the exchange of bibliographic and numerical nuclear structure and decay data between the members of a network of data centres and groups, and to the organization of an international cooperative effort with the aim of achieving a continuous and complete evaluation of NSDD for all isotope mass chains on a four year cycle (see Section B.1.8). The next meeting of the NSDD network is planned for the first quarter of 1980.

In the framework of the same programme component, IAEA/NDS has initiated in 1978 a coordinated research programme for the measurement and evaluation of transactinium isotope nuclear decay data (see Sections B.1.13, B.2.9, and C.5.2). The final objective of this activity is to publish an internationally accepted list of transactinium isotope decay data (e.g. half-lives and α and gamma-ray spectra). A preliminary list of proposed half-lives for selected transactinium isotopes has been included in report INDC(NDS)-96/N.

Issue No.3 of the "Compilations and Evaluations of Nuclear Structure and Decay Data" (INDC(NDS)-91/LN) was published and distributed in October 1977; the next issue of this compilation is scheduled to be published in October 1978. A complement to this publication, the "Compilations and Evaluations of Data on the Interaction of Electromagnetic Radiation with Matter" (INDC(NDS)-94/LN) was issued in May 1978, and is planned to be incorporated in the next issue of the complete compilation.

D.3. Atomic and Molecular Data

Following the recommendations of the Joint IFRC/INDC Subcommittee on Atomic and Molecular (A+M) Data for Fusion, the programme of the A+M staff of the IAEA Nuclear Data Section has been devoted to

1. the creation of the International Bulletin on Atomic and Molecular Data for Fusion,
2. the development of an International Index for Atomic Collisions for Fusion, and
3. to the initiation of an international network of A+M data centres.

Since the beginning of the trial period, January 1977, the A+M staff has consisted of two physicists and one programmer, hired on special service agreements.

As of April 1978, four issues of the A+M Data Bulletin have been produced and distributed world-wide to approximately 1000 recipients. For the development of the A+M Collision Data Index, magnetic tapes with bibliographic reference data have been received from the Oak Ridge National Laboratory, the Joint Institute for Laboratory Astrophysics,

and the University of Paris at Orsay. This material is in the process of being translated and merged in a common format with the data index portion of the A+M Data Bulletin. It is planned to produce a first version of the A+M Collision Data Index by the end of 1978. A first meeting of the A+M Data Centre Network, held in May 1977 in Vienna, formulated general plans for future cooperation on the compilation, exchange and dissemination of A+M collision, spectroscopic and surface interaction data.

Assuming that this programme is regularized as of 1 January 1980, the long term A+M Data Programme of the IAEA is proposed to have the following main objectives:

- Continue the periodic publication of the A+M Data Bulletin,
- Maintain the data bank of A+M Collision Data Index, and publish subsequent issues of the Index when needed,
- Institute a decentralized coordinated project for the evaluation of A+M data required by the fusion community by recognized scientists,
- Establish a computerized data bank of evaluated numerical atomic collision data for fusion tailored to the needs of the fusion research community.
- Continue to review A+M data requirements for fusion, and to convene meetings of the A+M data centre network.

The trial IAEA programme on A+M Data for Fusion is to be evaluated by the IAEA during 1979 with respect to its regularization effective 1 January 1980. The IFRC, being the body responsible for the initiation of this programme should, at its August 1978 meeting, review the progress of this programme, and reconfirm the needs of the fusion community for an international A+M data programme for fusion. To help the IFRC with this task, the IAEA Nuclear Data Section will submit in July 1978 a detailed plan for the long-term development of the Agency's A+M data programme.

The Joint IFRC/INDC Subcommittee on A+M Data for Fusion met on 14 April 1978 in Vienna. The Subcommittee reviewed the current status of the trial programme and approved the scope and format of the A+M Data Bulletin and the publication plans for the A+M Collision Data Index. The Subcommittee agreed to meet on 30 September 1978 to make the final evaluation of the trial period 77/78, and to issue its recommendation on the regularization of the IAEA A+M data programme.

Following the 30 September meeting of the Subcommittee, the recommendation will be submitted to the Chairmen of IFRC and INDC for approval, and then passed on to the Director General of the IAEA.

D. 4 Data Centre Services

D.4.1. Visits to Nuclear Institutes in Hungary and Romania in Summer 1977

Upon invitation (Hungary) and on UNDP Mission (Romania) J.J. Schmidt visited from 20-25 June 1977 ATOMKI, the Institute of Nuclear Research of the Hungarian Academy of Sciences, and the Institute of Experimental Physics of the Kossuth University, both in Debrecen, and the Central Research Institute for Physics and the Institute of Isotopes of the Hungarian Academy of Sciences in Budapest, and from 26 June - 1 July 1977 the Institute of Nuclear Technology in Magurele/Bucharest and the Institute for Nuclear Power Reactors in Pitesti. The main purpose of these visits was to strengthen the links between the nuclear data activities in Hungary and Romania and the Nuclear Data Section including extensive lectures on all aspects of nuclear data determination and use and to obtain an up-to-date overview of the present research facilities and activities in nuclear and reactor physics in these countries. A report on these visits has been distributed to INDC participants as document INDC(P)-78/5 and is available upon request from the Nuclear Data Section.

D.4.2. Fellowship Trainees

Between November 1977 and February, 1978, two scientists from Romania spent about 10 weeks at NDS to gain experience in data processing using the files and facilities available at NDS. These visits, financed from UNDP funds, proved to be very useful and encouraging for the future consideration of such fellowships.

The trainees reviewed data available for data evaluation and implemented a number of computer programmes for the processing of evaluated data files and for the calculation of multi-group constants (KEMA/MIGROS) for the subsequent use in their national nuclear data programmes. Programmes for editing and graphical plotting of evaluated data, which were developed by the trainees will continue to be used as NDS.

D.4.3. Data Requests and Dissemination

On the basis of the last two and a half years, NDS has handled on the average one request for experimental data and one request for evaluated data each week; as a result of these requests, an average of 100 000 data records have been sent out per week. In addition NDS receives approximately sixteen requests per month for documents or reports. The records of the last two and a half years show that the number of requests has been increasing with time, particularly for evaluated data, and fluctuating for experimental data.

A summary of request statistics, for 1976, 1977 and the first five months of 1978 is shown in Table 3. The table reflects the total number of requests handled, including requests received by the center as well as requests originated by NDS. Statistics on reaction data dissemination by data library including all service areas are shown in Tables 4a, 4b and 4c,

for 1976, 1977 and the first five months of 1978, respectively. The same information tabulated for 21 Member States in the NDS/Service Area is show in Table 5. In these statistics, a "data set" corresponds to an EXFOR "Subentry", or to a DFN or MAT number for evaluated data.

As of March 1978, the EXFOR library contained more than 40 000 data sets, or two million data records. Between January 1976 and May 1978, more than 10 000 EXFOR data sets, or 0.7 million records were distributed in the NDS Service Area.

The distribution rate for evaluated data has been increasing over the last three years; this is evident from the figures given in Tables 4 and 5, as well as from Table 6 which lists nuclear reaction data dissemination by country (ordered by number of data sets received per country between January 1976 and May 1978) for both experimental and evaluated data. Table 7, which lists the evaluated data "best sellers", shows that twenty of the evaluated data files held at NDS have been distributed within the NDS Service Area at least twice since 1976, and seven out of the twenty have been distributed more than ten times.

D.5. Programming and Systems Development

D.5.1. General

During 1977 the Data Base Management System (DBMS) ADABAS was installed on the Agency's computer and became available for general use towards the end of the year. The advantages of using a DBMS should be faster implementation of new projects because of a reduction in the amount of own-written software, the facility for changing the data definition without having to modify programs and the availability of software for interactive querying and updating the data. There are some problems with using ADABAS for handling scientific data, in particular with floating-point numbers, which need to be overcome. NDS has implemented a pilot project for the evaluated data index using ADABAS and plans to use it for all the book-keeping associated with data requests and distribution.

D.5.2. Data Index

The index file for EXFOR formatted data has been improved by making all reaction sub-fields available for retrieval purposes. Several of these sub-fields can contain multiple values (for example the process sub-field might contain N+P) and retrievals can now be made from the EXFOR index file on any of the values contained in a multiple-value sub-field. This index file is searched completely in a sequential manner for each retrieval.

An index file for the major evaluated-data files kept at the NDS has been defined using ADABAS and a pilot project is under way to test the implementation. The ENDF/B Dosimetry file has been indexed and loaded into the data base and several sample retrievals have been made.

D.5.3. PROFILE System

There are currently more than 3400 names and addresses stored in the PROFILE master file. The system is used regularly to produce reports and mailing labels for distribution of INDC documents. Two additional reports can now be produced. The Committee List, which can be produced for each member state having a National Nuclear Data Committee, gives the name, address and other information of each committee member. The Participants List, which is intended to be used as an appendix to a report of a meeting, gives the list of participants at that meeting and their addresses.

D.5.4. EXFOR

The implementation of the generalized EXFOR, namely the introduction of the new keywords ADD-RES, ASSUMED, DECAY-DATA, DECAY-MON, MONITOR, MONIT-REF, RAD-DET, REACTION and REL-REF and the modification of the coding associated with the keywords EN-SEC, FACILITY and STATUS, required major changed in the EXFOR system. The coding associated with the new keywords is often complicated and cryptic, and therefore required both careful checking at input time and extensive expansion in the edited listings is used to notify the other centres of errors, thus saving the manpower previously needed to prepare the correspondence.

Other modifications to the system were made to simplify and make more efficient the handling of the various internal files.

D.5.5. WRENDA

As recommended by the INDC, all WRENDA request lists will be printed as one combined list with a symbol for each request indicating whether it is a fission, fusion or safeguard request.

D.5.6. CINDA

The CINDA system has remained reasonably stable. The book-production and checking programmes were modified to accommodate changes in some reference-type codes and the introduction of neutrons for the target nucleus. A programme was also written to prepare the reference and laboratory tables for inclusion at the end of the CINDA book. A further modification to the system will be required after a decision has been taken on how to handle super-heavy elements.

D.5.7. Evaluated Data Libraries

Several programmes received from CPL have been implemented; namely ULIXES and KEPLER for edit-listing UKNDL data and KEDAK data respectively, LINEAR for linearizing ENDF/B data and MISSIONARY for converting data

from ENDF/B format to UKNDL format. A programme has also been written for selecting data from various libraries and processing it into a standard format suitable for input to the cross-section plotting package which already existed.

D.5.8. Requests for Programming Services

A programmer spent one week (at no cost to NDS) in Karlsruhe installing the EXFOR checking, editing and indexing programmes and the dictionary sub-system for the use of Prof. Munzel's CPND group. These programmes are now retransmitted following any major revisions.

The EXFOR checking and editing programme, together with the relevant documentation, have been supplied to Prof. Seeliger, and the checking programme to CCDN.

TABLE 1

SUPPLY OF TARGETS AND SAMPLES DURING 1977 UNTIL SPRING 1978

Requestor	Requested Material	Supplier	Purpose	Application	Cost (US $)
Brazil	Neptunium Oxide	Metronex, Poland	Measurement of (γ,n) and (γ,f) cross sections of ^{237}Np from threshold to 10 MeV.	Isotope production (^{236}Pu) and fission studies.	740
Greece	^{96}Ru	Union Carbide, USA	Study of $(p,m\gamma)$ reaction.	Nuclear structure.	950
Hungary	^{186}Os	ORNL, USA	Measurement of $(n,2n)$ and (n,p) cross sections at 14 MeV.	Mass number dependence of 14 Mev neutron reaction cross section for Os isotopes.	3 660
Hungary	^{48}Ti, ^{58}Ni, ^{60}Ni	Technoprom, USSR	Measurement of (n,p) and (n,t) cross sections at 14 MeV.	1. Radiation damage to fusion wall materials. 2. Fluence monitors.	440
Hungary	Li and Ti isotopes	Technoprom, USSR	(n,t) cross section measurements at 14 MeV, 2.6 MeV and average over ^{252}Cf fission neutron spectrum for Li isotopes and (n,p) cross section measurements for Ti isotopes.	1. Tritium breeding in fusion reactors. 2. Fluence monitors.	3 945
Pakistan	^{150}Nd	ORNL, USA	Measurement of γ-ray spectrum following neutron capture.	Nuclear level spectroscopy	6 780
Poland	Mg isotopes	ORNL, USA	Measurement of (n,α) cross sections at 14 MeV.	Investigation of neutron reaction mechanism.	1 800
Poland	^{108}Pd, ^{190}Os, ^{191}Ir	ORNL, USA	Measurement of fast neutron capture cross sections.	Activation and nuclear structure studies.	1 390
Romania	Ba and Gd isotopes 1 set γ-sources Ref. ECGS	ORNL, USA CEA, France	Measurements of energy and angular distributions of neutrons in (α,n) reactions.	Study of neutron nuclear reaction mechanism and determination of statistical parameters needed in fast neutron cross section calculations.	5 910
Yugoslavia	Isotopic LiH and LiF samples Tritium targets	ORNL, USA Nu Kem, Fed. Rep. of Germany	Neutron elastic and inelastic scattering measurements on lithium isotopes.	1. Standards for nuclear data measurements. 2. Fusion reactor blanket.	2 300

TABLE 2

List of Reactions Proposed to be Added to the Dosimetry File

Reaction	Q (MeV)	Half-life of Residual Nucleus	Priority	Applications	Status Comments
$^{93}Nb(n,n')^{93}Nb^{m}$	-0.030	11-17 y	I	A2, B3	1
$^{103}Rh(n,n')^{103}Rh^{m}$	-0.040	56.1 m	I	A2, 1	1
$^{199}Hg(n,n')^{199}Hg^{m}$	-0.533	42.6 m	L	A2, 1	2
$^{19}F(n,2n)^{18}F$	-10.431	109.7 m	I	B1	1
$^{23}Na(n,2n)^{22}Na$	-12.418	2.60 y	L	A3	3
$^{45}Sc(n,2n)^{44}Sc^{m}$	-11.592	2.44 d	I	B1	4
$^{45}Sc(n,2n)^{44}Sc^{g}$	-11.321	3.92 h			4
$^{63}Cu(n,2n)^{62}Cu$	-10.854	9.76 m	I	A1, B2	1
$^{90}Zr(n,2n)^{89}Zr$	-11.983	78.4 h	I	A1, B1	1
$^{93}Nb(n,2n)^{92}Nb$	-8.826	10.15 d	I	A1, B1, 2	5
$^{197}Au(n,2n)^{196}Au$	-8.08	$^{196}Au^{g}$: 6.2d ($^{196}Au^{m}$: 9.7h)	I	B1	5
$^{197}Au(n,3n)^{195}Au$	-14.748	183 d	I		5
$^{197}Au(n,4n)^{194}Au$	-23.152	39.5 h	L		5
$^{14}N(n,p)^{14}C$	0.626	5736 y	L	C	2
$^{24}Mg(n,p)^{24}Na$	-4.732	15.03 h	L	A1	1
$^{31}P(n,p)^{31}Si$	-0.709	2.62 h	L	A1	1
$^{59}Co(n,p)^{59}Fe$	-0.783	44.6 d	I	B1	6
$^{64}Zn(n,p)^{64}Cu$	0.208	12.70 h	L	A1	1
$^{54}Fe(n,\alpha)^{51}Cr$	0.841	27.70 d	I	B1	6
$^{241}Am(n,f)F.P.$		-	L	A4	7

COMMENTS TO TABLE 2

Priorities: I - immediate need.

L - long range need.

Application: A. Fission Reactor Dosimetry
- A1 Neutron Spectra Unfolding
- A2 Neutron Fluence Monitor
- A3 Activation of Fast Breeder Cooling
- A4 Burn-up Calculation

B. Fusion Reactor Dosimetry
- B1 Neutron Spectra Unfolding
- B2 Neutron Fluence Monitor
- B3 Structural Material Activation

C. Differential Neutron Spectrometry

Status Comments:

1. Evaluation by Prof. Vonach's group, Vienna, Austria.
2. No sufficient data are available, new measurements required.
3. Evaluation by Marcinkowki's group, Warsaw, Poland.
4. Evaluation by NDS, IAEA, Vienna, Australia.
5. Recently was evaluated by Philis et al., France.
6. Evaluation by Vasiliu's group, Bucharest, Romania.
7. Recently was evaluated by Patrick et al., UK.

TABLE 3

SUMMARY OF NDS REQUEST STATISTICS AS OF 30 MAY 1978

REQUEST FOR ⟶		EXPERIMENTAL DATA	EVALUATED DATA	CINDA	DOCUMENTS AND REPORTS	TOTALS
1976	Area 1	1	0	0	30	31
	Area 2	11	7	5	71	94
	Area 3	25	31	4	49	109
	Area 4	0	2	0	4	6
	Totals	37	40	9	154	240
1977	Area 1	3	3	0	65	71
	Area 2	5	12	1	96	114
	Area 3	36	31	2	68	137
	Area 4	1	3	0	4	8
	Totals	45	49	3	233	330
1978 Jan-May	Area 1	0	1	0	13	14
	Area 2	3	7	0	21	31
	Area 3	29	41	0	38	108
	Totals	32	49	0	72	153

TABLE 4a

DISSEMINATION STATISTICS

1976

TYPE	AMOUNT	
EXPERIMENTAL DATA	No. of Sets	No. of Records
1. Neutron Reaction Data		
EXFOR 1-4	1.996	357.477
EXFOR 5-8	947	46.385
TOTAL	2.943	403.862
EVALUATED DATA		
1. Neutron Reaction Data (including fiss.yield data)		
ARAMACO	90	15.040
AUSTRALIAN F.P. (points)	398	186.024
" " (groups)	384	56.112
BOLOGNA F.P.	45	1.336
ENDF/B-IV 7 standards	45	68.075
ENDF/B-IV F.P.	4.981	639.226
ENDF/B-IV Dosimetry	115	28.373
DEVILLERS F.P. (mat.nos.1-4)	4	1.992
French ENDF/B	10	4.130
Japanese ENDF/B F.P.	2	1.222
KEDAK	136	500.579
LLL ENDL	488	843.127
LLL Dosimetry	64	17.090
SAND II	194	25.281
SOCRATOR	3	8.468
UK	352	377.745
2. Charged Particle Reaction Data		
Starter C.P. Data Lib	306	38.400
3. Photonuclear Data		
[no evaluated data files at NDS]		
4. Nuclear Structure and Decay Data		
ENSDF	300	14.600
JUELICH	2.997	98.885
DEVILLERS F.P. (mat.nos.5-639)	676	25.229
ENDF/B-IV F.P.	counted in item 1.	
TOTAL	11.590	2.950.934

TABLE 4b

DISSEMINATION STATISTICS

1977

TYPE	AMOUNT	
EXPERIMENTAL DATA	No. of Sets	No. of Records
1. Neutron Reaction Data		
EXFOR 1-4	806	80.542
EXFOR 5-8	1.077	20.834
CROUCH Library	26	2.794
MUSGROVE	398	398
3. Photonuclear Data		
NNCSC Photo-Neutron Library in EXFOR format	70	49.769
TOTAL	2.377	154.337
EVALUATED DATA		
1. Neutron Reaction Data (including fiss. yield data)		
ARAMACO	135	22.560
AUSTRALIAN F.P. (groups)	578	84.460
" " (points)	386	180.430
BOLOGNA F.P.	517	18.330
DETAN 74	58	41.559
DEVILLERS F.P. (mat.nos. 1-4)	12	5.976
ENDF/B-IV 7 standards	56	117.725
ENDF/B-IV F.P.	2.516	334.246
ENDF/B-IV Dosimetry	91	23.974
ENDF/B-IV Dosimetry (group)	156	52.068
French ENDF/B	14	10.709
Japanese ENDF/B F.P. 75	57	40.406
KEDAK	263	707.089
LLL ENDL 76	552	1.076.800
SAND II	126	16.130
SOCRATOR	58	41.559
UK	361	426.025
UK Dosimetry	22	1.018
VIEN	61	4.133
2. Charged Particle Reaction Data		
Starter C.P. Data Lib	612	76.800
4. Nuclear Structure and Decay Data		
DEVILLERS F.P. (mat.nos. 5-639)	1.911	72.253
ENDF/B-IV F.P.	counted in item 1.	
NDPDEC (ENSDF)	2.997	510.002
TOTAL	12.723	3.827.921

TABLE 4c

DISSEMINATION STATISTICS

1978 (Jan - May)

TYPE	AMOUNT	
EXPERIMENTAL DATA	No. of Sets	No. of Records
1. Neutron Reaction Data		
EXFOR 1-4	2.546	127.275
EXFOR 5-8	2.733	39.444
TOTAL	5.279	166.719
EVALUATED DATA		
1. Neutron Reaction Data (including fiss.yield data)		
ARAMACO	45	7.520
AUSTRALIAN F.P. (points)	48	22.368
BOLOGNA F.P.	62	2.296
DEVILLERS	639	25.689
ENDF/B-IV 7 standards	25	63.777
ENDF/B-IV F.P.	1.652	210.791
ENDF/B-IV Dosimetry	78	20.925
ENDF/B-IV Dosimetry (Group)	78	26.034
JENDL 1	1	1.156
KEDAK	51	186.879
LLL ENDL 76	218	432.363
LLL Dosimetry	32	8.545
SAND II	63	8.065
SOCRATOR	12	13.782
UK	210	268.430
VIEN	20	859
2. Charged Particle Reaction Data	0	0
3. Photonuclear Data [no evaluated data files at NDS]		
4. Nuclear Structure and Decay Data		
JUELICH	1.021	39.607
NDPDEC (ENSDF)	6.993	1.558.102
TOTAL	11.248	2.897.188

TABLE 5

NUCLEAR REACTION DATA DISSEMINATION IN THE NDS SERVICE AREA

	1976				1977				1978 (Jan - May)			
	Experimental Data		Evaluated Data		Experimental Data		Evaluated Data		Experimental Data		Evaluated Data	
	Sets	Records	Sets	Records	Sets	Records	Sets	Records	Sets	Records	Sets	Records
Argentina	20	417	1 232	244 841	116	9 598	4	9 057	-	-	88	67 259
Australia	-	-	999	34 885	19	537	-	-	-	-	-	-
Bangladesh	-	-	-	-	-	-	98	189 549	310	10 373	639	25 689
Brazil	-	-	-	-	-	-	-	-	1 676	86 135	174	295 178
Bulgaria	-	-	-	-	-	-	1 056	273 657	-	-	-	-
Cuba	-	-	-	-	-	-	8	6 741	-	-	-	-
Czechoslovakia	-	-	259	104 529	-	-	67	76 473	-	-	-	-
Egypt	20	20	1 083	44 938	-	-	-	-	-	-	95	70 646
German Dem. Rep.	1 064	113 563	319	218 807	276	2 720	1 875	302 978	423	31 381	1 001	226 215
Guatemala	-	-	-	-	-	-	-	-	-	-	20	58 463
Hungary	232	3 225	835	109 590	-	-	534	275 383	-	-	98	189 549
India	141	3 572	47	9 090	516	38 821	1 077	341 436	-	-	4 836	1 009 244
Iran	-	-	98	189 549	-	-	1 912	269 068	-	-	-	-
Iraq	-	-	-	-	-	-	930	255 123	-	-	197	274 567
Israel	712	217 956	-	-	-	-	5	7 800	4	8 149	-	-
Korea, Rep. of	-	-	-	-	-	-	-	-	-	-	33	21 727
Pakistan	141	21 790	42	2 097	-	-	-	-	2 462	22 942	1 847	335 684
Poland	146	11 410	27	7 343	-	-	21	20 461	-	-	-	-
Romania	-	-	1 184	467 315	919	101 736	5 164	721 003	90	4 300	1 091	243 607
South Africa	31	427	1 462	715 894	18	257	16	7 673	187	869	1 006	47 068
Yugoslavia	-	-	107	206 981	-	-	84	200 900	-	-	97	23 173
Totals:	2 507	372 380	7 694	2 355 859	1 864	153 669	12 851	2 957 302	5 152	164 149	11 222	2 888 169

TABLE 6

DATA DISSEMINATION BY COUNTRY

ordered by number of sets received per country between January 1976 and May 1978

EXPERIMENTAL DATA SETS

PAKISTAN	2.603
GERMAN DEM. REP.	1.763
BRAZIL	1.676
ROMANIA	1.009
ISRAEL	716
INDIA	657
BANGLADESH	310
SOUTH AFRICA	236
HUNGARY	232
POLAND	146
ARGENTINA	136
EGYPT	20
AUSTRALIA	19
TOTAL:	9.523

EVALUATED DATA SETS

ROMANIA	7.439
INDIA	5.960
GERMAN DEM. REP.	3.195
SOUTH AFRICA	2.484
IRAN	2.010
PAKISTAN	1.889
HUNGARY	1.467
ARGENTINA	1.324
EGYPT	1.178
IRAQ	1.127
BULGARIA	1.056
AUSTRALIA	999
BANGLADESH	737
CZECHOSLOVAKIA	326
YUGOSLAVIA	288
BRAZIL	174
POLAND	48
KOREA, REP. OF	33
GUATEMALA	20
CUBA	8
ISRAEL	5
TOTAL:	31.767

TABLE 7

EVALUATED DATA "BEST-SELLERS"

1976-1978 (May)

Frequency of dissemination of evaluated data libraries upon requests received at NDS.

The first column (1) of this Table represents the total number of sets for each library disseminated over the period 1 January 1976-25 May 1978.

The second column (2) is a rounded figure resulting from the division of the figure of column 1 by the number of sets contained in the given evaluated data library. The figure of column 2 represents theoretically the number of times each data set has been sent out on average. The libraries not appearing on this list are those whose column two figure is less than 1/2.

LIBRARY	1	2
ENDF/B-IV 7 standards	126	18
UK-NDL	923	14
LLL ENDL 76	1.258	13
ENDF/B-IV F.P.	9.149	11
ENDF/B-IV Dosimetry	284	11
KEDAK	450	10
ENSDF	10.290	10
SAND II	383	6
DEVILLERS	3.242	5
AUSTRALIAN F.P. (group)	962	5
EXFOR VIEN	30	4
AUSTRALIAN F.P. (points)	832	4
ARAMACO	180	4
JUELICH	4.018	4
BOLOGNA F.P.	624	3
LLL Dosimetry	96	3
CPND Library, ENDF/B	918	3
French ENDF/B	24	3
DETAN 74	72	2
Japanese F.P. 75	59	2

Appendix 1

Current List of Liaison Officers to the INDC

Argentina	Ricabarra, G.
Austria	Vonach, H.K.
Bangladesh	Islam, M.
Belgium	Poortmans, F.
Bolivia	Mariaca, F.
Brazil	Herdade, S.B.
Bulgaria	Nadjakov, E.
Chile	Martens Cook, P.
Colombia	Director, Instituto de Asuntos Nucleares
Czechoslovakia	Rocek, J.
Denmark	Christensen, C.J.
Ecuador	Munoz, R.
Egypt	El-Nady, M.
Finland	Silvennoinen, P.
German Democratic Republic	Seeliger, D.
Greece	Dritsa, S.
Hungary	L. Jeki
Iran	Etemad, M.A.
Iraq	Said, K.I.
Israel	Amiel, K.
Jamaica	Chen, A.A.
Kenya	Gacii, P.
Korea, Dem. Peoples Rep.	Dzang, S.H.
Korea, Republic of	Cho, M.
Kuwait	Shihab-Eldin, A.
Mexico	Graef Fernandez, C.
Netherlands	Bustraan, M.
Norway	Andersen, E.
Pakistan	Khan, A.M.
Philippines	Navarro, Q.O.
Poland	Sujkowski, Z.
Portugal	Carvalho, F.G.
Romania	Rapeanu, S.N.
South Africa	Reitmann, D.
Spain	Velarde Pinacho, G.
Switzerland	Huerlimann, Th.
Thailand	Boonkong, W.
Turkey	Ertek, C.
Uruguay	Lalanne, A.
Yugoslavia	Slaus, I.
Zaire	Pollak, H.

Appendix 2

2nd Consultants' Meeting of Nuclear Reaction Data Center (2nd NRDC Meeting)

Kiev, USSR, 11-16 April 1977

Part I: 13th Meeting of the Four Neutron Nuclear Data Centers

Monday 11 April, Tuesday 12 April, Saturday 16 April

List of Participants

CJD (USSR Centr po Jadernym Dannym)

V. Manokhin (Opening of Meeting)
V. Bychkov
N. Pashinko

NNDC (US National Nuclear Data Center)

S. Pearlstein
C. Dunford

CCDN (NEA Neutron Data Compilation Centre)

H. Derrien
A. Schofield

NDS (IAEA Nuclear Data Section)

J.J. Schmidt (Chairman)
H.D. Lemmel (Scientific Secretary)

List of Observers

Y. Abe	Japan, Kyoto University
N. Bakunjaev	USSR, State Committee, Moskva
Ju.I. Grigor'jan	USSR, Kurchatov Inst., Moskva
D. Hermsdorf	German Dem. Rep., Dresden University
H. Ikegami	Japan, Osaka University
Ju.G. Klimov	USSR, State Committee, Moskva
V.T. Kulik	USSR, Director, Information Centre of the Institute of Materials, Kiev
A. Marcinkowski	Poland, Inst. Badan Jadrowych
L. Pintiliescu	Romania, Inst. de Fisica Atomica
L.L. Sokolovskij	USSR, Kurchatov Inst., Moskva
A.P. Trofimenko	USSR, Ukr. Ak. Nauk, Kiev (Local Secretary)
L.N. Usachev	USSR, Fiziko-En. Inst., Obninsk
G. Vasiliu	Romania, Inst. da Fisica Atomic
V.P. Vertebnyj	USSR, Inst. Jad. Issl. Ukr. Ak. Nauk, Kiev
Miss G.M. Zhuravleva	USSR, Kurchatov Inst., Moskva

2nd Consultants' Meeting of Nuclear Reaction Data Center (2nd NRDC Meeting)

Kiev, USSR, 11-16 April 1977

Part II: Meeting of all Nuclear Reaction Data Centers

Wednesday 13 April to Saturday 16 April

List of Participants and Observers

Kachapag (Karlsruhe Charged Particle Group, Germany Fed. Rep.)

H. Münzel

CAJaD (Centr po Atomn. i Jadern. Dannym, Kurchatov Inst., Moskva, USSR)

F.E. Chukreev (Opening of Meeting)
L.L. Sokolovskij
G.M. Zhuravleva
Ju. I. Grigor'jan

Japanese Study Group for information processing in nuclear physics, Japan

H. Tanaka Hokkaido University
H. Ikegami Osaka University
Y. Abe Kyoto University

CJD (Centr po Jadernym Dannym, FEI Obninsk, USSR)

V. Manokhin
V. Bychkov
N. Pashinko

NNDC (National Nuclear Data Center, BNL, USA)

S. Pearlstein
C. Dunford

CCDN (NEA Neutron Data Compilation Centre, Saclay, France)

H. Derrien
A. Schofield

NDS (IAEA Nuclear Data Section, Vienna, Austria)

J.J. Schmidt (Chairman)
H.D. Lemmel (Scientific Secretary)

LIJaF (Leningradskij Inst. Jad. Fiz., USSR)

I.A. Kondurov

Photonuclear Data Group at Fiziko.Energet. Inst. Obninsk, USSR)

A.I. Abramov

ZAED (Zentralstelle für Atomkernenergie-Dokumentation, Karlsruhe, Germany Fed.Rep.)

H. Behrens

Universität Dresden, German Dem. Rep.

D. Seeliger
D. Hermsdorf

Inst. Badan Jadrowych, Warszawa, Świerk, Poland

A. Marcinkowski

Inst. de Fisica Atomica, Bukuresti, Romania

G. Vasiliu
L. Pintiliescu

Fiziko-Energeticheskij Inst. Obninsk, USSR

L.N. Usachev

Information Center of the Institute of Materials, Kiev, USSR

V.T. Kulik

Inst. Jad. Issl. Ak. Nauk Ukr. SSR, Kiev, USSR

V.P. Vertebnyj
A.P. Trofimenko (Local Secretary)

USSR State Commitee on Peaceful Uses of Atomic Energy, Moskva, USSR

Ju. G. Klimov
N. Bakunjaev

Appendix 3

First Meeting of the

Atomic and Molecular Data Centre Network

Vienna, 9-13 May 1977

List of Participants

1.	Barnett, C.F.	Oak Ridge National Laboratory P.O. Box X Oak Ridge, Tennessee 37830, USA
2.	Beaty, E.	Nuclear Data Section/A+M Data Unit IAEA
3.	Delcroix, J.L.	Laboratoire Physique des Plasmas Univ. de Paris XI, B. 212 Rue G. Clemenceau 15 F-91405 Orsay
4.	Drawin, H.W.	Dept. Phys. Plasmas & Fus. Contrl Association Euratom-C.E.A. sur la Fusion Controlée Rue du Panorama, P.O.B. 6 F-92260 Fontenay-aux-Roses
5.	Dunford, C.L.	National Nuclear Data Center Brookhaven National Laboratory Upton, N.Y. 11973, USA
6.	Ebel, G.	Zentralstelle f. Atomkernenergie-dokumentation Kernforschungszentrum D-7514 Eggenstein-Leopoldshafen
7.	Fuketa, T.	Nuclear Data Center, J.A.E.R.I. Tokai-Mura, Naka-Gun Ibaraki-Ken 319-11, Japan
8.	Itikawa, Y.	Institute of Space & Aeronautical Science University of Tokyo 4-6-1 Komaba, Meguro-Ku Tokyo 153, Japan
9.	Johnston, P.	NEA Neutron Data Compilation Centre P.O.B. 9 F-91190 Gif-sur-Yvette
10.	Katsonis, K.	Nuclear Data Section/A+M Data Unit IAEA

11.	Lorenz, A. (Scientific Secretary)	Nuclear Data Section IAEA
12.	Martynenko, Yu.V.	Institut Atomnoi Energii I.V. Kurchatova 46 Ulitsa Kurchatova Moscow D-182, USSR
13.	Schmidt, J.J. (Chairman)	Nuclear Data Section IAEA
14.	Seamon, R.	Nuclear Data Section/A+M Data Unit IAEA
15.	Smith, F.J.	Computer Centre Queen's University Belfast, B17 1NN Northern Ireland, UK
16.	Suzuki, H.	Dept. of Physics Faculty of Science & Technology Sophia University Chiyoda-Ku, Kioicho 7 Tokyo 102, Japan
17.	Wiese, W.L.	Institute of Basic Standards National Bureau of Standards US Department of Commerce Washington, D.C. 20234, USA
18.	Yankov, G.B.	Institut Atomnoi Energii I.V. Kurchatova 46 Ulitsa Kurchatova Moscow D-182, USSR

Appendix 4

First Meeting of the

Atomic and Molecular Data Centre Network

Vienna, 9-13 May 1977

(Starred items were considered to be of first priority)

Adopted Agenda

- Introductory remarks and election of chairman
- Adoption of agenda and meeting organization

MONDAY

A. Reports from Data Centres

1.* IAEA/Nuclear Data Section (NDS)

2.* Presentations by other data centres concerning their current work, centre services and future plans, and initial proposals for future contributions to the data centre network

B. NDS Bulletin on A+M Data for Fusion

1.* NDS report on current status

2.* Contributions by other data centres to the bulletin

TUESDAY

C. Scope and Classification of A+M Data

1.* Scope and classification of A+M collision data needed for fusion research

2. Scope and classification of other A+M data of interest to fusion research

   a. A+M structure data
   b. A+M plasma/surface interaction data
   c. Macroscopic data

D. Bibliographic Index to Atomic Collision Data

1.* Scope, content, objective and user community of the index

2.* Contributions of A+M data centre network to the index

3.* Feeding of computerized input to the bibliographic index, and consideration of common computer exchange standards

4.* Publication responsibilities, mode and schedule

WEDNESDAY

E. Bibliographic Indexes to Other A+M Data of Fusion Interest

1. A+M structure data

2. Plasma interactions with surfaces

3. Macroscopic data

F. Data Reviews and Assessment

1.* Survey of existing A+M data reviews and evaluations

2.* Discussion and summary of A+M data currently required for fusion which need to be evaluated

3.* How and by whom should the needed evaluations be performed ?

THURSDAY

G. Compilation and Exchange of A+M Collision Data

1.* Survey of existing collision data compilations and current compilation programmes of data centres

2.* Discussion of possible inter-centre exchange of computerized numerical A+M collision data and of common computer exchange formats

H. Compilation and Exchange of Other A+M Data

1. Structure data

2. Surface interaction data

3. Macroscopic data

I.* Data Centre Services

FRIDAY

J. Summary of Meeting

1. Agreed data centre responsibilities

2. List of actions

3. Conclusions and recommendations

4. Next meeting: date, place and suggested agenda items.

Appendix 5

Second Meeting of the Joint IFRC/INDC Subcommittee on A+M Data for Fusion

List of Meeting Participants

Name (Committee Affiliation)	Present at Meeting in capacity as
E.C. Beaty (IAEA)	Observer
C.M. Braams (IFRC)	Joint Subcommittee Chairman
W.G. Cross (INDC Chairman)	Observer
J. Decker (nominated by IFRC) (Advisor of US INDC Member)	Joint Subcommittee member
H.W. Drawin (nominated by IFRC)	Joint Subcommittee member
T. Fuketa (INDC)	Joint Subcommittee member
A. Lorenz (IAEA)	Scientific Secretary
Yu.V. Martynenko (nominated by IFRC)	Joint Subcommittee member
M.K. Mehta (INDC)	Joint Subcommittee member
H.T. Motz (INDC)	Observer
J.J. Schmidt (IAEA/INDC)	Joint Subcommittee member
R.E. Seamon (IAEA)	Observer
N. Suzuki, Nagoya, Japan	Observer
G.B. Yankov (INDC)	Joint Subcommittee member

Appendix 6

Second IAEA Advisory Group Meeting on

Fission Product Nuclear Data (FPND), Petten, 5-9 September 1977

List of Review Papers

RP 1	Review of existing compilations and evaluations of FPND (G. Lammer)
RP 2	Needs and accuracy requirements for FPND in the assessment of environmental aspects (L. Lindborg)
RP 3	Needs and accuracy requirements for FPND in the physics design of power reactor cores (J.L. Rowlands)
RP 4	The importance of fission product nuclear data in reactor design and operation (C. Devillers)
RP 5	Needs and accuracy requirements for FPND in the out-of-pile fuel cycle (H.A.C. McKay)
RP 6	A review of FPND requirements for investigation of irradiated nuclear fuel: burnup measurements, neutron dosimetry, nuclear safeguards (W.J. Maeck)
RP 7	Status of neutron reaction cross sections of fission products in the energy range of resolved and unresolved resonances (E. Fort)
RP 8	Impact of integral measurements on the capture cross-section evaluations of individual fission product isotopes (H. Gruppelaar)
RP 9	Status of fast neutron reaction cross sections of fission products (S. Iijima)
RP 10	Status of fission product yield data (J.G. Cuninghame)
RP 11	Prediction of unmeasured fission yields by nuclear theory or systematics (J.O. Denschlag)
RP 12	Status of decay data of fission products (J. Blachot)
RP 13	Status of delayed neutron data (G. Rudstam)
RP 14	Integral determination of FP neutron cross sections (M. Bustraan)
RP 15	Integral determination of fission product inventory and decay power (R.E. Schenter, T.R. England)

Advisory Group Meeting on Nuclear Structure and Decay Data

Oak Ridge National Laboratory, USA
14-18 November 1977

List of Participants

Ajzenberg-Selove, F. (observer)	US/UP	University of Pennsylvania Philadelphia, Penns. 19174, USA
Bambynek, W.	CBNM/Geel	Bureau Central de Mesures Nucleaires C.E.C. Steenweg naar Retie B-2440 Geel, Belgium
Behrens, H.	FRG/ZAED	Fachinformationszentrum Energie, Physik, Mathematik G.m.b.H. Karlsruhe Kernforschungszentrum D-7514 Eggenstein-Leopoldshafen 2
Bertrand, F. (local secretary) (observer)	US/NDP	Nuclear Data Project Oak Ridge National Laboratory Oak Ridge, Tennessee 37830, USA
Chukreev, F.E.	USSR/CAYaD	Institut Atomnoi Energii I.V. Kurchatova 46 Ulitsa Kurchatova Moscow, D-182, USSR
Erdtmann, G.	FRG/Juelich	Kernforschungsanlage Juelich Ges.m.b.H. Postfach 1913 D-5170 Juelich
Erlandsson, B.	SWD/Lund	Institute of Physics University of Lund Soelvegatan 14 S-223 62 Lund, Sweden
Ewbank, B.	US/NDP	Nuclear Data Project Oak Ridge National Laboratory Oak Ridge, Tennessee 37830, USA
Fuller, E.G. (observer)		National Bureau of Standards Washington, D.C. 20234, USA
Heath, R.L. (observer)	US/INEL	Idaho National Engineering Lab. 550 Second Street Idaho Falls, Idaho 83401, USA
Holden, N.	US/NNDC	National Nuclear Data Center Brookhaven National Laboratory Upton, New York 11973, USA
Kondurov, I.A.	USSR/LIYAF	Data Centre Leningrad Nuclear Physics Inst. Gatchina, Leningrad Region 188350, USSR

Lederer, C.M. (observer)	US/LBL	Lawrence Berkeley Laboratory University of California Berkeley, Calif. 94720, USA
Lorenz, A. (scientific secretary)	IAEA/NDS	Nuclear Data Section International Atomic Energy Agency P.O. Box 590 A-1011 Vienna, Austria
Pearlstein, S.	US/NNDC	National Nuclear Data Center Brookhaven National Laboratory Upton, New York 11973, USA
Reffo, G.	ITY/CNEN	Centro di Calcolo del C.N.E.N. Via Mazzini 2 I-40138 Bologna
Shihab-Eldin, A.	KUW/ISR	Kuwait Institute for Scientific Research Shuwaik, Kuwait
Sokolovskij, L.L.	USSR/CAYaD	Institut Atomnoi Energii I.V. Kurchatova 46 Ulitsa Kurchatova Moscow, D-182, USSR
Tamura, T.	JAP/JAERI	Japan Atomic Energy Research Inst. Division of Physics Tokai-Mura, Naka-Gun Ibaraki-Ken, 319-11, Japan
Tepel. J.	FRG/ZAED	Fachinformationszentrum Energie, Physik, Mathematik G.m.b.H. Karlsruhe Kernforschungszentrum D-7514 Eggenstein-Leopoldshafen 2
Twin, P.J.	UK/Daresbury	Oliver Lodge Laboratory University of Liverpool Liverpool L69 3BX, UK
Van der Leun, C.	NED/Utrecht	Fysisch Laboratorium Sorbonnelaan 4 Utrecht, The Netherlands
Whetstone, S.L.	(US/DOE)	Nuclear Sciences Division of Basic Energy Sciences U.S. Dept. of Energy Washington, D.C. 20545, USA

Advisory Group Meeting on Nuclear Structure and Decay Data

Oak Ridge National Laboratory, U.S.A.

14-18 November 1977

Adopted Agenda

Monday AM and PM

A. Introductory Items

1. Opening statements
2. Election of Chairman
3. Adoption of Agenda

B. Status Reports from NSDD Network Members

1. Manpower commitment
2. Organization of centers
3. Support facilities now available at centers
4. A-chain completion dates and progress

C. Review of Actions which Resulted from the May 1976 Meeting

D. Horizontal NSDD Compilations and Evaluations

1. Selected evaluations
   a) Atomic masses
   b) Spins and moments
   c) Isotopic abundances
   d) Wall chart
2. Selected compilations
   a) Specialized decay data files
   b) Half-life compilations
3. Compilation of evaluations
   a) IAEA
   b) FRG
   c) US

Tuesday AM and PM

E. Bibliographic Reference Systems

1. Recent References
   a) Status report
   b) Documentation
   c) File description and purging
   d) Exchange and dissemination procedures
   e) Use and application of file at centers
2. INIS

F. International Nuclear Structure Data File

1. Evaluation File

a) Status report
b) Documentation
c) File description and purging
d) Exchange and dissemination procedure

2. Working File

Wednesday AM

G. Nuclear Structure Data Evaluation

1. Evaluation Content

a) Data types
b) Procedures
c) Programmes

2. Evaluation Standards

a) Documentation
b) Data to be considered
c) Minimum data required for a data set
d) Minimum data sets required for a nuclide
e) Review procedures
f) Citing of major discrepancies
g) Terminology

3. Evaluation publications

a) Nuclear Data Sheets
b) Table of Isotopes
c) Handbook of Isotopes

4. Support Services

H. Mass Chain Evaluation Responsibilities

I. Miscellaneous

1. Publicity for NSDD Products
2. Liaison with journal Editors
3. Association of evaluators with on-going research

Thursday AM

J. Concluding Session

1. Other topics and unfinished business
2. Summary of conclusions and recommendations
3. Review of actions arising from this meeting
4. Future meetings

Appendix 9

List of Papers Presented at the NEANDC/NEACRP Specialists' Meeting on Neutron Data of Structural Materials, CBNM, Geel, Belgium, 5-8 December 1977

SESSION IA

Chairman : I. Otake

Needs of nuclear data of structural materials for fast reactors.

A. Filip, J.P. Trapp, D. Calamand, L. Costa, J.P. Chaudat, presented by M. Hammer (CEA Cadarache)

Integral experiments on structural materials carried out in the frame of CEA/CNEN cooperation.

V. Benzi (CNEN Bologna)

Measurements and calculations of integral capture cross-sections of structural materials in fast reactor spectra.

S. Seth, G. Brunson, K. Gmür, M. Jermann, C. McCombie, R. Richmond, U. Schmocker. (Swiss Federal Institute, Würenlingen)

Tests of some FD5 activation cross-sections by Zebra irradiations.

M.F. Murphy, D.W. Sweet, W.H. Taylor.
Paper presented by A.T.D. Butland (UKAEA Winfrith)

Semi-integral structural material transmission experiment at the BR1 reactor.

G. and S. De Leeuw (CEN/SCK Mol)

Benchmark tests of JENDL-1 for structural materials.

I. Otake (PNC Tokyo)

SESSION IB

Chairman : E. Fort

Structural material data evaluation for JENDF-1.

T. Asami (JAERI, Tokai-Mura)

Evaluation of keV resonance data for Cr, Fe, Ni.

F. Fröhner (KfK, Karlsruhe)

Comments about resonance parameters of Fe below 650 keV : old evaluations, and recent experimental data.

P. Ribon (CEA Saclay)

Evaluation of natural molybdenum between 5 keV and 5 MeV.

E. Fort (CEA Cadarache)

Evaluations and adjustment of radiative capture cross sections of natural Mo and the stable Mo isotopes.

H. Gruppelaar, J.W.M. Dekker (ECN Petten)

Evaluation of the capture cross section of natural Ti from 10^{-5} eV to $20 \cdot 10^{6}$ eV.

G. Simon, O. Bersillon, G. Mosinski, C. Philis, J. Trochon, N. Verges (CEA Bruyères-le-Châtel)

Evaluation of the (n,p) cross sections of natural Ti and its isotopes from thresholds to 20 MeV.

O. Bersillon, C. Philis. Paper presented by G. Simon (CEA Bruyères-le-Châtel).

SESSION IC

Chairman S.M. Qaim

Status report about some activation, hydrogen and helium producing cross sections of structural materials.

A. Paulsen (CBNM Geel)

Importance and status of (n,α)-cross sections for a reliable prediction of radiation damage in stainless steel.

B. Goel (Kfk Karlsruhe)

Experimental studies of (n,xp), (n,xd) and (n,xα) cross sections, angular distributions and spectra with a magnetic quadrupole spectrometer.

R.C. Haight and S.M. Grimes (LLL, Livermore)

Measurement and systematics of fast neutron induced hydrogen and helium producing reaction cross sections of FRT-related structural materials.

S.M. Qaim, G. Stöcklin (KFA Jülich)

SESSION IIA

Chairman F.G. Perey

Mechanisms for radiative capture in medium-mass nuclei.

J.E. Lynn (AERE Harwell)

Energy-averaged cross sections of fast-reactor structural materials.

A.B. Smith, R. McKnight and D. Smith (ANL)

s-wave resonance parameters in the structural materials.

B.J. Allen and A.R. de L. Musgrove (AAEC, Lucas Heights)

Neutron sensitivity of capture gamma ray detectors.

B.J. Allen, A.R. de L. Musgrove (AAEC, Lucas Heights) R.L. Macklin (ORNL) and R.R. Winters (Denison University)

Neutron capture cross section of ^{57}Fe

B.J. Allen, A.R. de L. Musgrove (AAEC, Lucas Heights) R. Taylor (James Cook University) and R.L. Macklin (ORNL)

A complete set of experiments for Fe and their analysis.

F.G. Perey (ORNL).

Capture cross section measurements on natural Fe and Ni.

D.G. Gayther, M.C. Moxon, B.W. Thomas, B. Thom (AERE Harwell)

Structural material transmission measurements on the Harwell synchro-cyclotron.

G.D. James, D.B. Syme, P.H. Bowen, A.D. Gadd, and I.L. Watkins (AERE Harwell)

First results on capture, scattering and transmission cross sections of separated Fe isotopes obtained at GELINA.

F. Corvi, G. Rohr, H. Weigmann (CBNM Geel)
F. Poortmans, L. Mewissen, E. Cornelis (SCK/CEN Mol)

SESSION II B

Chairman J.E. Lynn

s-wave resonances and doorway states in ^{56}Fe below 800 keV.

S. Cierjacks, I. Chouky (KfK Karlsruhe)

Capture and total cross section measurements on ^{58}Fe below 325 keV.

Ly Di Hong, H. Beer, F. Käppeler (KfK Karlsruhe)

Refit : A least square fitting program for the resonance analysis of neutron transmission data.

M.C. Moxon, (AERE Harwell)

Capture cross section measurements on the separated isotopes of Ti.

B. Thom, D.B. Gayther, M.C. Moxon (AERE Harwell)

Resonance analysis of neutron transmission measurements on natural iron samples.

M.C. Moxon, J.B. Brisland (AERE Harwell)

Resonance analysis of Ni transmission data.

D.B. Syme, P.H. Bowen (AERE Harwell)

Resonance parameters, capture γ-rays and reaction mechanism in ^{98,100}Mo + n.

H. Weigmann (CBNM Geel)

Coherent optical and stastistical model calculations of neutron cross sections for Mo isotopes.

Ch. Lagrange (Bruyères-le-Châtel)

Appendix 10

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

Winter Courses on Nuclear Physics and Reactors

Part I: Course on Nuclear Theory for Applications

List of course lectures

Introductory lectures

Dr. J.J. Schmidt, IAEA, Austria (4 lectures):
Nuclear data, their importance and evaluation.

I. Neutron resonance theory

(Scientific co-ordinator: F. Fröhner)

Dr. M.S. Moore, Los Alamos, USA (4 lectures):
Fundamentals and approximations of multilevel resonance theory for reactor physics applications.

Dr. F. Fröhner, Karlsruhe, Fed. Rep. of Germany (8 lectures):
Applied neutron resonance theory.

II. Optical model

(Scientific co-ordinators: J.J. Schmidt and F. Dietrich for J. Salvy)

Prof. C. Mahaux, Liège, Belgium (4 lectures):
Theoretical aspects of the optical model.

Dr. J. Salvy, Bruyères-le-Chatel, France
Matrix methods in optical model - spherical nuclei -.

(3 lectures presented by Dr. F. Dietrich, Livermore, USA)

Dr. A. Prince, Brookhaven, USA (3 lectures)
Phenomenological optical potentials and optical model computer codes.

III. Statistical theory of neutron nuclear reactions

(Scientific co-ordinator: P.A. Moldauer)

Dr. P.A. Moldauer, Argonne, USA (6 lectures):
Statistical theory of neutron nuclear reactions.

Dr. V.S. Ramamurthy, Bombay, India (6 lectures):
Theories and approximations of nuclear level densities.

Dr. G. Reffo, Bologna, Italy (4 lectures):
Parameter systematics for statistical theory calculations of neutron reaction cross sections.

Dr. A. Prince, Brookhaven, USA (2 lectures):
Statistical theory applications and associated computer codes.

Dr. M. Motta, Bologna, Italy (1 lecture and 1 workshop):
The role of desk calculators in nuclear data evaluation.

IV. Pre-equilibrium decay

(Scientific co-ordinator: D. Seeliger)

Prof. V.E. Bunakov, Leningrad, USSR (4 lectures):
Foundations and models of pre-equilibrium decay.

Prof. D. Seeliger, Dresden, German Democratic Republic (4 lectures):
Application of pre-equilibrium decay models to the calculation of neutron reaction data.

Prof. H. Jahn, Karlsruhe, Fed. Rep. of Germany (2 lectures):
Absolute value calculations of inelastic neutron scattering cross sections taking into account the pre-equilibrium decay mechanism.

Dr. A. Prince, Brookhaven, USA (2 lectures):
Computer codes incorporating pre-equilibrium decay.

Dr. B. Strohmaier, Dr. M. Uhl, Vienna, Austria (2 lectures):
STAPRE - A statistical model code with consideration of pre-equilibrium decay.

V. Fission theory

(Scientific co-ordinator: J.E. Lynn)

Dr. M. Brack, Grenoble, France (6 lectures):
Fundamentals of the double-humped fission barrier.

Dr. J.E. Lynn, Harwell, United Kingdom (8 lectures):
Fission barrier theory and its application to the calculation of actinide neutron cross sections.

List of special seminars

held by participants during the Course
on Nuclear Theory for Applications

I. General

M.K. Mehta, Bombay, India:
Importance of nuclear physics for developing countries.

R. Ricci, Legnaro, Italy:
Facilities and perspectives of nuclear physics in Italian laboratories.

II. Resonance theory

S. Ganesan, Kalpakkam, India:
On the treatment of the unresolved resonance region and Doppler effect calculations for fast power reactors.

D.B. Syme, Harwell, United Kingdom:
Recent analysis of Ni resonances including the description of a new R-matrix code (multilevel, one channel) used in the analysis.

S.S. Ahmed, Karachi, Pakistan:
Iterative R-matrix method for the exact calculation of reaction cross sections.

III. Optical model

D.C. Agrawal, Varanasi, India:
Characteristics of nuclear potentials.

Ch. Stoyanov, Dubna, USSR:
Description of neutron and gamma strength functions in the quasi-particle - phonon model.

W. Haider, Aligarh, India:
Dispersion relation and surface peaking in the real part of the nuclear optical potential.

A.H. Hussein, Dhahran, Saudi Arabia:
Scattering of 10 MeV polarized neutrons from Pb and Bi in the angular range 1 to 65°.

F.D. Santos, Lisbon, Portugal:
Polarization transfer in (d,n) reactions.

I.-T. Cheon, Seoul, Korea:
Phenomenological pion form factor and pionic atoms.

IV. Statistical theory and nuclear level densities

A. Marcinkowski, Swierk, Poland:
Comparison of nuclear level densities calculated with the superconductivity model with experiment.

V. Pre-equilibrium decay

F. Shahin, Mansoura, Egypt:
Fluctuations connected with pre-compound emission in excitation functions for the $^{25}Mg(^{3}He,P)$ reaction.

R. Parthasarathy, Madras, India:
Pre-compound emission of neutrons in muon capture.

VI. Fission theory

M. Zielinska-Pfabe, Warsaw, Poland:
Angular momenta of fission fragments.

VII. Nuclear structure

A.M. Khan, Dacca, Bangladesh:
Isospin symmetry breaking in mirror beta decays.

B.P. Singh, Roorkee, India:
Triple angular correlation studies of the radiations from radioactive decay.

A.M. Osman, Cairo, Egypt:
Short-range correlations in nuclei.

VIII. Heavy ion physics

W. Nawrocka, Wroclaw, Poland:
Deep inelastic heavy ion collisions.

L. Satpathy, Bhubaneswar, India:
On the anomaly of high spin states.

Third Meeting of the Joint IFRC/INDC Subcommittee on A+M Data for Fusion

List of Meeting Participants

Name (Committee Affiliation)	Present at Meeting in Capacity of	Home Address
E.C. Beaty (IAEA)	Head Atomic and Molecular Data Unit	IAEA, Nuclear Data Section
C.M. Braams (IFRC)	Subcommittee Chairman	FOM-Instituut voor Plasmafysica Rijnhuisen, Jutphaas, The Netherlands
H.W. Drawin (IFRC)	Subcommittee Member	Dept. Phys. Plasmas & Fus. Contr. Association Euratom-C.E.A. sur la Fusion Controlee Rue du Panorama, P.O.B. 6 F-92260 Fontenay-aux-Roses
T. Fuketa (INDC)	Subcommittee Member	Nuclear Data Centre Japan Atomic Energy Research Institute Tokai-Mura, Naka-Gun Ibaraki-Ken 319-11 Japan
K. Katsonis (IAEA)	Member Atomic and Molecular Data Unit	IAEA, Nuclear Data Section
A. Lorenz (IAEA)	Scientific Secretary	IAEA, Nuclear Data Section
M.K. Mehta (INDC)	Subcommittee Member	Bhabha Atomic Research Centre Nuclear Physics Division Trombay, Bombay 400 085
J.E. Phillips (IAEA)	Subcommittee Member	IAEA, Physics Section
J.J. Schmidt (IAEA)	Subcommittee Member	IAEA, Nuclear Data Section
R.E. Seamon (IAEA)	Member Atomic and Molecular Data Unit	IAEA, Nuclear Data Section
P.M. Stone* (IFRC)	Subcommittee Member	Division of Magnetic Fusion Energy U.S. Department of Energy Washington, D.C. 20545

*Attending for J. Decker

Appendix 12

First Research Coordination Meeting on the

Inter-Comparison of Evaluations of Actinide Neutron Nuclear Data

List of Participants

Name:	Address:
M. Caner	Soreq Nuclear Research Centre Atomic Energy Commission Yavne 70600 Israel
J. E. Christiansson	Institute of Physics Göteborgs Universitet Fack S-402 20 Goeteborg Sweden
T. Fuketa	Division of Physics Japan Atomic Energy Research Institute Tokai-Mura, Naka-Gun Ibaraki-Ken 319-11 Japan
B. Goel	Institut füer Neutronenphysik und Reaktortechnik Postfach 3640 D-7500 Karlsruhe Fed. Rep. of Germany
H. D. Lemmel	IAEA, Nuclear Data Section
M. K. Mehta	Bhabha Atomic Research Centre Nuclear Physics Division Trombay, Bombay 400 085 India
E. Menapace	Centro di Calcolo del C.N.E.N. Via Mazzini 2 I-40138 Bologna Italy
B. H. Patrick	Nuclear Physics Div., Bldg. 418 Atomic Energy Research Establ. Harwell, Didcot, Oxon. OX11 ORA United Kingdom

Name:	Address:
H. Sandberg	Department of Reactor Physics Chalmers Tekniska Högskola Fack S-402 20 Sweden
J. J. Schmidt	IAEA, Nuclear Data Section
G. Vasiliu	Institute for Atomic Physics P.O. Box 5204 Bucharest-Magurele Romania

Appendix 13

First Coordinated Research Programme Meeting

on the Measurement of Transactinium Isotope Nuclear Decay Data

List of Participants

A. J. Fudge Chemistry Division, V.E.C. Group AERE Harwell, Didcot Oxfordshire OX11 ORA United Kingdom	Chief investigator (AERE, Harwell).
T. Fuketa Nuclear Data Center Japan Atomic Energy Research Institute Tokai-Mura, Naka-Gun Ibaraki-Ken 319-11 Japan	Proxy for chief investigator H. Umezawa (JAERI).
J. Legrand Laboratoire de Metrologie des Rayonnement Ionisants Boite Postale No. 2 F-91190 Gif-sur-Yvette France	Chief investigator (LMRI, Saclay).
A. Lorenz IAEA Nuclear Data Section	Project office (IAEA/NDS).
G. Malet Centre d'Etudes Nucleaires de Saclay B.P. No. 2 F-91190 Gif-sur-Yvette France	Member of LMRI Group.
M. K. Mehta Head, Nuclear Physics Division Bhabha Atomic Research Centre Trombay, Bombay 400 085 India	Proxy for chief investigator H. C. Jain (BARC, Trombay).
Charles W. Reich E.G. & G. Idaho Inc. P.O. Box 1625 Idaho Falls, Idaho 83401 U.S.A.	Chief investigator (EG&G, Idaho).
J. J. Schmidt Head, IAEA Nuclear Data Section	Head, IAEA Nuclear Data Section.
R. Vaninbroukx Central Bureau for Nuclear Measurements Steenweg naar Retie B-2440 Geel Belgium	Chief investigator (CBNM, Geel).

Appendix 14

3rd NRDC-Meeting, Paris, 19-23 June 1978

Tentative agenda, 2nd draft 78/5/30

Part 1: on all Nuclear Reaction Data

1. Opening, etc
2. Brief status reports of the Centers (participants to submit written reports)
3. Review of Actions from the previous meeting
4. The EXFOR system: rules, Manual Dictionaries, proposals, etc (all items of interest to neutron centers only to be discussed later in Part 4 of the Meeting)
5. EXFOR support programming and program exchange
6. Data Center activities in Data Base Management Systems
7. Customer services
8. Future plans
9. Nuclear Data Tagging and Flagging in INIS
10. Photonuclear Data
11. Miscellaneous, Conclusions, etc

Part 2: Discussions among Center Heads

21. Organization, commitments and cooperation of centers
22. Assessment of present work, scope, priorities and customer services
23. Planning and coordination of future specialists' meetings on nuclear data
24. Future changes in data needs and center scope
25. Funding of future NRDC Meetings
26. Miscellaneous, Conclusions, etc
27. Date of the 1979 meeting in the US

Part 3: on Charged Particle Nuclear Data

31. CPND Bibliography
32. Exchange of CPND, experiences with TRANS tapes
33. Evaluation of CPND
34. Publications and other plans
35. Miscellaneous, Conclusions, etc

Part 4: on Neutron Nuclear Data

41. CINDA
42. WRENDA (new issue in 1979)
43. EXFOR (remaining items from No.4 above)
44. Exchange of EXFOR data, experiences with TRANS tapes
45. EXFOR completeness (e.g. 4C-3/222)
46. Conversion and transmission of pre-1970 experimental neutron data
47. Evaluated data
48. Miscellaneous, Conclusions, etc

Notes: For part 1 all participants are present.
Part 2 to take place mostly in parallel with Parts 3 and 4.
Parts 1, 3 and partially 2 involving the CPND centers, should be finished by Wednesday.
On Thursday morning an excursion to the NEA Data Bank at Saclay could take place. Some of the discussions could be held during this visit.
If necessary, staff of NNDC, NEA Data Bank and NDS could meet on Saturday morning in the hotel (OECD building being closed) to discuss details of the Minutes of the Meeting.

Appendix 15

Advisory Group Meeting on Nuclear Data for Reactor Dosimetry

Vienna, 13 to 17 November 1978

Tentative Programme

I. Differential Neutron Cross Section Data for Reactor Dosimetry

A. Status of the ENDF/B-V Dosimetry File.

B. Status of data for important reactions not included in ENDF/B-V Dosimetry File: recent measurements and evaluations.

C. The internationally recommended neutron cross-section data file for dosimetry applications (purpose, contents, structure, error file, etc.).

II. Spectral Characterization of Dosimetry Benchmark Neutron Fields

A. Status of fundamental neutron (^{235}U thermal neutron induced fission and ^{252}Cf spontaneous fission) spectra.

B. Spectral characterization of other dosimetry benchmark neutron fields: Progress since November 1976.

C. Accelerator - based dosimetry benchmarks.

III. Integral Data in Benchmark Neutron Fields

A. Progress in integral data and their accuracy.

B. Review of the measurements at higher energies for fast reactor dosimetry and CTR.

IV. Differential-Integral Data Consistency and Progress in Neutron Cross-Section Data Adjustment on the Basis of Integral Experiments

A. Progress in integral-differential data consistency.

B. New results in data adjustment.

Appendix 16

Advisory Group Meeting on

Nuclear Data for Fusion Reactor Technology

IAEA, Vienna, 11-15 December 1978

INFORMATION SHEET

1. Introduction

In view of the vital role of fusion as a potential solution to the world energy problem, it can be expected that the development of fusion reactor technology will rapidly grow in importance in the years to come. As fusion research programmes in IAEA Member States progress toward the construction of larger experimental devices, and prototype facilities and towards more detailed design of full-scale fusion reactors, the nuclear data requirements are growing and will become even more stringent in the future.

In order to keep pace with this development, the Nuclear Data Section of the IAEA, is oonvening the first international meeting on nuclear data for fusion with the principal purpose to assess the nuclear data needs for the development of fusion reactor technology, to review the status of the required nuclear data, and to recommend actions for their improvement.

2. Objectives

The meeting should bring together fusion experts knowledgeable in the requirements of nuclear data with nuclear physicists cognizant of the status of nuclear data in order to

- identify and list the specific nuclear data requirements, with their required accuracies and priorities;
- identify the existence and availability of compiled and evaluated nuclear data and compare them with the requirements;
- identify and discuss measurements, compilations and evaluations required to satisfy the current and foreseeable nuclear data needs for fusion reactor technology; and
- formulate specific recommendations and measures for future activities and their coordination.

3. Organization

To meet these objectives, the meeting will be organized around two sets of invited review papers (see Annex I) covering the data requirements in the first session (Session A), and the data status in the second session (Session B). The review papers presented during the first part of the meeting will form the basis for discussions and preparations of the conclusions and recommendations which will be formulated by separate working groups during the second part of the meeting. The discussion of the working group reports and the adoption of the conclusions and recommendations by the plenary meeting will take place during the third and last part of the meeting.

Presentation of papers

The review papers should be comprehensive and concise surveys based not only on the reviewer's own work and expertise, but also on contributions from other specialists in other laboratories and institutes; they should also include lists of specific nuclear data required for well-defined applications, including the required data accuracies and priorities.

For both review sessions, reviewers should include proposals for specific recommendations, addressed either to the data requirements or the data status, which could be discussed at the meeting and form part of the final conclusions and recommendations.

In addition to the presentation of the invited review papers, a limited number of contributed papers on any of the topics of the two review sessions could also be presented at the meeting.

Working Groups

Following the presentation and discussion of the review and contributed papers in sessions A and B (which is anticipated to take the first two days of the meeting), it is proposed to form working groups which would meet separately on the third and fourth day of the meeting.

Each working group will focus on one area of importance to fusion reactor technology; for example

- neutronics (including blanket neutronics, tritium breeding, energy conversion and hybrid reactors),
- radiation effects (including nuclear heating, radiation damage, transmutation, shielding and safety), and
- charged particle reactions,

and formulate, from information presented during the review sessions A and B, a report on the requirements and status of nuclear data in each of the data areas considered, including 1) a comparison of requirements with the available data, and 2) a set of conclusions and recommendations for the measurement or evaluation of specific data, with an indication of priorities and required accuracies.

Discussions

Presentation of the working group reports, their discussion, and the adoption of the proposed conclusions and recommendations, will take place in plenary session during the last day of the meeting.

Publication of Proceedings

Subject to the approval of the Agency's Publications Committee, the proceedings of this meeting, including the review papers, the working group reports, and the conclusions and recommendations are planned to be published in the IAEA Report Series.

4. Participation

Nominations of participants will be accepted only if they are submitted by the Government of a Member State of the International Atomic Energy Agency or by an international organization.

Advisory Group Meeting on Nuclear Data for Fusion Reactor Technology

Vienna, 11-15 December 1978

Review Topics

Introductory Paper: Status of Fusion Reactor Development

A. Nuclear Data Requirements for Fusion Reactor Design

1. Fusion reactor calculations: neutronics design, blanket neutronics and tritium breeding.
2. Nuclear heating and energy conversion.
3. Transmutation and activation of reactor wall and structural materials.
4. Radiation damage.
5. Shielding, safety and environmental considerations.
6. Hybrid reactors.
7. Advanced fusion fuel cycles and plasma reactions.

B. Status of Nuclear Data Required for Fusion Reactor Design

1. Cross section sensitivity analysis for fusion reactor calculations.
2. Theoretical approach to nuclear data required for fusion reactor calculations.
3. Evaluated files of nuclear cross sections for fusion reactor calculations.
4. Neutron reaction data in the 1 to 20 MeV energy range (n,xn and charged particle production).
5. Neutron total, elastic and inelastic scattering and gamma-ray production data.
6. Status of 14 MeV neutron cross section data.
7. Charged particle nuclear data for fusion and other reactions.

Consultants' Meeting on Delayed Neutron Properties, IAEA, Vienna, March 1979

INFORMATION SHEET

1. Introduction

Uncertainties in delayed neutron yields, periods and spectra have been a long-term concern in the development of fission-energy systems. This has been recognized with a number of measurement programs that have provided a wealth of new information in the last year.

Therefore the Nuclear Data Section of the IAEA, in accordance with the recommendation issued by the International Nuclear Data Committee (INDC) at its 9th Meeting in May 1977, which was strongly supported by the Second IAEA Advisory Group Meeting on Fission Product Nuclear Data held at ECN Petten, Netherlands, in September 1977, is planning to hold a small Consultants' Meeting on Delayed Neutron Properties at IAEA Headquarters in Vienna March 1979.

2. Objectives

The meeting should bring together 10–15 specialists to achieve the following objectives:

- review the current requirements for delayed neutron data with special emphasis on energy applications;
- review the status of delayed neutron data and, in particular, try to resolve the existing discrepancies in experimental data;
- formulate specific recommendations for necessary future work and its coordination.

3. Organization

To meet these objectives the meeting will be organized around two sets of review papers covering delayed neutron data requirements for energy applications and the status of integral and differential delayed neutron data, respectively. In addition to the review papers the presentation of several contributed papers, mostly on recent experimental results, is foreseen.

Presentation of papers

The review papers should be comprehensive and concise. Those review papers dealing with applications should include lists of the needed nuclear data together with their required accuracies and priorities.

For both review sessions, reviewers should include proposals for specific recommendations, addressed either to the data requirements or the data status, which could be discussed at the meeting and form part of the final conclusions and recommendations.

Working Groups

Following the presentation and discussions of the review and contributed papers the meeting will have to decide whether to proceed with the detailed discussions in plenary or by working groups.

Discussions

Presentation of the results of the meeting and the adoption of the proposed conclusions and recommendations will take place in plenary session during the last day of the meeting.

Publication of Proceedings

Subject to the approval of the Agency's Publications Committee, the proceedings of this meeting, including its conclusions and recommendations are planned to be published in the IAEA Report Series.

IAEA

Symposium on Physics and Chemistry of Fission

14 - 18 May 1979
Jülich, FRG

INFORMATION SHEET

1. Introduction

The International Atomic Energy Agency will convene its Fourth Symposium on Physics and Chemistry of Fission which is expected to summarize the advances and achievements of the research in this field in recent years. Previous Agency-organized symposia in Salzburg (1965), Vienna (1969) and Rochester (1973) have become landmarks in the recent history of fission research, and have stimulated the study of different topics related to nuclear fission.

2. Scope and list of topics

The Symposium will deal with theoretical concepts and calculations concerning the fission process, and with recent experimental results relevant to the interpretation of fission phenomena. Papers describing progress in heavy ion physics and nuclear spectroscopy will be considered for the programme of the Symposium only if directly connected with fission research.

The main topics to be discussed at the Symposium are:

1) Fission, isomers, barriers, probabilities

a) Experiment:
- Ground state spontaneous fission
- Fission isomers (ground state properties, low lying excited states, excitation functions)
- Fission barriers (intermediate structure, (n, gamma f) reactions, beta delayed fission)
- Fission probabilities above barrier

b) Theory:
- Static potential energy surfaces
- Barrier penetration
- Level density calculations

2) Fission at high spins and high excitations

a) Experiment:
- Fission following heavy ion fusion
- Fission following heavy ion scattering

b) Theory:
- Potential energy surfaces and level densities at high spin

3) Late stages in fission

a) Fragment properties:
- Gross features and fine structures of mass, charge and energy distribution
- Light particle emission
- Neutron emission
- Gamma ray emission

b) Properties of heavy ion reactions directly related to fission

c) Dynamical and statistical theories:
- Quantum mechanical theories
- Classical and semiclassical theories
- Thermodynamical and statistical theories

4) Fission by "exotic reactions" (such as muon and pion induced fission)

A Paper Selection Committee will approve the contributions to be included in the book of extended synopses (see item 6 below). This publication will be distributed at the meeting free of charge, and will serve as a basis for discussion. A limited number of contributed papers will be selected for oral presentation; published in full length in the proceedings of the Symposium.

A number of review papers will be invited, with the objective of presenting a complete and coherent status of fission studies today.

International Atomic Energy Agency

OECD Nuclear Energy Agency

Appendix 19

Second Advisory Group Meeting on

Transactinium Isotope Nuclear Data

Spring 1979

INFORMATION SHEET

1. Introduction

This meeting is being convened as a sequel to the first IAEA meeting on the topic of transactinium isotope nuclear data (TND), held at the Kernforschungszentrum Karlsruhe, in November 1975. The participants of that meeting substantiated the importance of TND in the calculation of nuclear fuel cycles of thermal and fast reactors, in the formulation of nuclear waste management and material safeguard practices, and in the application of the actinide isotopes in life sciences and industry. The meeting recommended to implement a long-term programme to broaden the availability and improve the accuracy of the required TND through concerted measurement and evaluation efforts.

As this meeting is convened in cooperation with the OECD Nuclear Energy Agency (NEA) the participants will be asked to report to both IAEA and NEA on the current status of the topics discussed and to recommend guidelines for future work in this field.

2. Objectives

The meeting should bring together the producers of TND, responsible for their measurement and evaluation, with the users of TND concerned with their applications, to achieve the following objectives:

- re-assess the TND requirements in the light of new technological developments since the last meeting,
- review the status of the required TND in the light of new measurements and evaluations,
- consider the requirements for TND in fields of applications not strongly emphasized at the first meeting, such as actinide burn-up (core processing of fuel), and problems associated with indefinite storage of fuel and waste management in general.
- formulate specific recommendations and measures for future activities and their coordination.

3. Organization

To meet these objectives, the meeting will be organized around two sets of invited review papers (see Annex I) covering the data requirements in the first session (Session A), and the data status in the second session (Session B). The review papers presented during the first part of the meeting will form the basis for discussions and preparations of the conclusions and recommendations which will be formulated by separate working groups during the second part of the meeting. The discussion of the working group reports and the adoption of the conclusions and recommendations by the plenary meeting will take place during the third and last part of the meeting.

Presentation of papers

The review papers should be comprehensive and concise surveys based not only on the reviewer's own work and expertise, but also on contributions from other experts in other laboratories and institutes; they should also include lists of specific nuclear data required for well defined applications, including the required data accuracies and priorities.

For both review sessions, reviewers should include proposals for specific recommendations, addressed either to the data requirements or the data status, which could be considered by the working groups and form part of the final conclusions and recommendations.

In addition to the presentation of the invited review papers, a limited number of contributed papers on any of the topics of the two review sessions could also be presented at the meeting.

Working Groups

Following the presentation and discussion of the review and contributed papers in sessions A and B (which is anticipated to take the first two days of the meeting), it is proposed to form working groups which would meet separately on the third and fourth day of the meeting.

It is proposed to form three working groups, each of which would focus on a specific TND category, for example:

- thermal and resonance neutron cross sections and parameters
- fast neutron cross sections, and
- nuclear structure and decay data.

It is proposed to exclude the following data from consideration at this meeting:

- prompt gamma-ray production, and
- neutron cross sections of U-235, U-238 and Pu-239.

Each working group will be responsible to formulate on the basis of information presented during the review sessions A and B, a report on the requirements and status in each of the considered data categories, including 1) a listing comparing the required data (with required accuracies and priorities) with the data status, and 2) a set of conclusions and recommendations for the measurement or evaluation of specific data, with an indication of priorities and required accuracies.

Discussion

Presentation of the working group reports, their discussion, and the adoption of the proposed conclusions and recommendations, will take place in plenary session during the last day of the meeting.

Publication of Proceedings

Subject to the approval of the Agency's Publications Committee, the proceedings of this meeting, including the review papers, the working group reports, and the conclusions and recommendations are planned to be published in the IAEA Report Series.

4. Participation

Nominations of participants will be accepted only if they are submitted by the Government of a Member States of the International Atomic Energy Agency or by an international organization.

Proposed Review Papers

A. Survey of TND Requirements

1. Design and operation of reactors:
   a) thermal reactors
   b) fast reactors
2. Advanced fuel cycle alternatives.
3. In-core processing of fuel (nuclear incineration).
4. Fuel fabrication, transport and re-processing.
5. Nuclear material safeguards.
6. Nuclear waste management.
7. Environmental consideration.

B. Review of TND Status

1. Status of TND experimental neutron cross section compilation.
2. Progress in neutron data evaluation in the USA.
3. Status of TND in the evaluated nuclear structure data file (ENSDF).
4. Status of neutron data for the ^{232}Th - ^{233}U fuel.
5. Progress report on the coordinated research programme on the measurement and evaluation of TND decay data.
6. Progress report on the coordinated research programme on the inter-comparison of evaluations of actinide neutron nuclear data.
7. Status of nuclear data for Pu240, Pu241, Pu242 and Am241 (Results of the Workshop to be held at BNL in November 1978).
8. Status of neutron yielding reactions. (α,n; γ,n; etc.).

Appendix 20

Coordinated Research Programme on the Inter-Comparison of Evaluations of Actinide Neutron Nuclear Data

Participants and Isotopes Considered.

France

Evaluators: J. Salvy, C. Philis, J. Jary, C. Lagrange, Centre d'Etudes de Brugere-le-Chatel

Nuclides: U, Pu, Am isotopes.

Fed. Rep. of Germany

Evaluators: H. Küsters, F. Fröhmer, H. Jahn, U. Fischer, B. Goel, Kernforschungszentrum, Karlsruhe

Nuclides: Am-241, Am-242m, Am-243, Cm-244

India

Evaluators: M.K. Mehta, S.K. Guptah, S.B. Garg etal BARC, Trombay

Nuclides considered: Th-232, Th-233, Pa-233

Israel

Evaluators: S. Yiftah, M. Caner, S. Wexler, Soreg Nuclear Research Centre

Nuclide: Cm-244

Italy

Evaluators: E. Menapace, A. Montaguti, A. Ventura, CNEN, Bologna

Nuclides: Pu-241, Pu-242, Am-241, Am-243, Cm-242

Japan

Evaluators: T. Fuketa, S. Igarasi, T. Asami, Y. Kikuchi, T. Nakagawa, J.A.E.R.I., Tokai-mura

Romania

Evaluators: G. Vasiliu, M. Silvia, G. Dan, D. Nicolae, C. Michaela, Inst. of Nuclear Power, Bucharest

Nuclides: Th-232, U-233, Pa-231, Pa-232, Pa-233

UK

Evaluators: J.E. Lynn, M.G. Sowerby, B.H. Patrick, G.D. James, AERE Harwell

USSR

Evaluators: L. N. Usachev, B.D. Kuzminov, V.N. Manokhin

Nuclides: Am-241, Am and Cm isotopes

Appendix 21

Coordinated Research Programme on the Measurement and Evaluation of Transactinium Isotope Nuclear Decay Data

Participants	Current Work Plan
Dr. A.J. Fudge Chemistry Division Building 220 AERE Harwell, Didcot Oxfordshire OX11 ORA United Kingdom	Measurements of I_α, I_γ and $T_{1/2}$ of selected transactinium nuclides. (Selection to be announced).
Dr. J. Legrand Laboratoire de Metrologie des Rayonnement Ionisants Boite Postale No. 2 F-91190 Gif-sur-Yvette, France France	Measurement of energies and absolute intensities of gamma radiation emitted by ^{241}Am and ^{239}Pu, followed by the same measurements for ^{238}Pu and ^{240}Pu.
Dr. Charles W. Reich Idaho National Engineering Lab. 550 Second Street Idaho Falls, Idaho 83401 USA	Measurement of absolute intensities of the gamma-rays emitted from the decay of ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{235}U, ^{233}Pa, ^{233}U and ^{241}Pu.
Dr. H. Umezawa Division of Chemistry JAERI Tokai-mura, Naka-gun Ibaraki-ken 319-11 Japan	Measurement of the ratio of alpha decay and spontaneous fission of ^{242}Cm.
Dr. R. Vaninbroukx Central Bureau for Nuclear Measurements Steenweg naar Retie B-2440 Geel Belgium	Determination of the decay data of the ^{238}Pu, ^{239}Pu, ^{241}Pu and ^{241}Am isotopes.

The EXFOR Data Exchange System

This summary is necessarily brief and incomplete. For additional details, see Minutes of the Kiev Nuclear Reaction Data Centre's Meeting, INDC(NDS)-90.

1. Neutron Nuclear Data

Neutron Nuclear Data are compiled and disseminated by the following four centres in a geographical distribution of labour as specified:

NNDC, Brookhaven: USA and Canada (= area 1)

NEA Data Bank, Saclay: OECD countries in West-Europe and Japan (= area 2)

NDS, Vienna: Non-OECD countries except USSR (= area 3)

CJD, Obninsk: USSR (= area 4)

Each centre maintains the EXFOR Master File of its area, and holds copies of the Master Files of the other three areas for retrievals and distribution within its area.

The bibliographic data index CINDA is operated by the same four centres, the Master File is maintained at the NEA Data Bank, the book is printed by IAEA.

2. Integral Charged Particle Nuclear Data

KACHAPAG Karlsruhe compiles all integral CPND for which it also maintains the **EXFOR Master** File.

CAJaD compiles integral CPND from USSR and sends them to KACHAPAG.

NNDC compiles large data sets from USA and Canada and sends them to KACHAPAG.

Copies of the KACHAPAG File are held at NNDS, NEA Data Bank, NDS, CAJaD and ZAED for distribution to customers.

The bibliographic data index is compiled, maintained and printed by NNDC.

3. Differential CPND

CAJaD intends to compile in EXFOR differential CPND from USSR.

The Japanese Study Group intends to compile in EXFOR CPND from Japan and selected differential CPND.

Dr. Marcinkowski's group at IBJ intends to compile in EXFOR selected differential CPND.

NNDC, NEA Data Bank, NDS, CAJaD and ZAED will act as distribution centres.

4. Photonuclear Reaction Data

The Photonuclear Data Group at Obninsk intends to compile in EXFOR photonuclear data from USSR.

NNDC is the point of contact for formal international exchange of photonuclear data in EXFOR format. Existing informal arrangements between the Photonuclear Data Centre (NBS) and other groups continue in parallel.

NNDC, NEA Data Bank, NDS, the Photonuclear Data Group Obninsk, and ZAED act as distribution centres.

Programme of the Nuclear Structure and Decay Data (NSDD)

Component of the Nuclear Data Section

Major Functions

A. Coordination of NSDD Evaluation and Exchange

Coordinate international network of NSDD centres and groups to compile, evaluate, and disseminate NSDD; specifically to:

- convene periodic meetings representatives of NSDD centres and groups to organize and maintain international NSDD evaluation network;
- maintain contact with the NSDD network and the national or regional centres to promote NSDD compilations, exchange and evaluations.

B. Assessment of NSDD Data Status and Needs

Review adequacy of existing data, assess their availability, and their needs; specifically to:

- organize and convene meetings on specific topics related to NSDD applications;
- write (or contribute to) specific data surveys or reviews, identifying data needed and their required accuracies;
- maintain current awareness of NSDD needs in fields of isotope and radiation applications (e.g. nuclear materials safeguards, environmental and biomedical research, etc.);
- initiate coordinated research programmes in response to NSDD needs (e.g. CRP on the measurement of transactinium isotope half-lives).

C. Service: Data Centre Functions

Function as central information office to serve as a world-wide referral centre for NSDD; specifically to:

- maintain a data centre service for NSDD, answering requests for data and related information, receive, handle and dispatch magnetic tapes, distribute NSDD reports, etc.;
- compile and index NSDD evaluations, reviews, surveys and compilations;
- publish an annual bulletin of current compilations, evaluations of NSD data.