International Atomic Energy Agency

INDC(NDS)-23/G

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

REPORT OF THE NUCLEAR DATA SECTION

TO THE INTERNATIONAL NUCLEAR DATA COMMITTEE

JUNE 1969 TO MAY 1970

May 1970

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

Report of the Nuclear Data Section to the International Nuclear Data Committee June 1969 to May 1970

INDC(SEC) and INDC(NDS) Reports referenced in this report

INDC(SEC)-6/G,L (Supplement)	- List of IAEA Meetings for 1970
INDC(SEC)-7/U	- INDC Correspondents for the Exchange of Nuclear Data Information, April 1970
INDC(SEC)-8/U	- List of INDC Documents, May 1970
INDC(NDS)-13/G	- Travel Report of a Mission on Nuclear Data to Mexico, Chile, Argentina and Brazil from 23 June - 1 August 1969, T.A. Byer
INDC(NDS)-14/N	- Compilation of σ Capture for ^{238}U, V. Konshin, November 1969
INDC(NDS)-15/D	- CINDU-9 compilation; November 1969
INDC(NDS)-16/N	- Report of the Fifth Four-Centre Meeting, Moscow, 17-21 November 1969
INDC(NDS)-17/N	- ^{239}Pu α and fission cross section review, V. Konshin and T.A. Byer, May 1970
INDC(NDS)-18/N	- Review of fast capture cross sections for ^{238}U, V. Konshin, May 1970
INDC(NDS)-19/N	- Review of energy dependent $\bar{\nu}$ values for the main fissile isotopes, V. Konshin and F. Manero, May 1970
INDC(NDS)-20/N	- Non-EANDC request list, May 1970
INDC(NDS)-21/N	- Nuclear data needs for safeguards technical development, T.A. Byer, May 1970
INDC(NDS)-22/N	- Requests for targets and foils for nuclear data measurements, L. Hjärne, May 1970

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A. INTRODUCTION

The following progress report of the NDS covers the period from June 1969 to May 1970. This period saw the change of the NDS leadership from Dr. W.M. Good to Dr. J.J. Schmidt. Primarily because of the efficient organization which Dr. Good handed down to his successor, this transition proceeded very smoothly and considerably facilitated the new section head's initiation in his work.

One of the main activities of the NDS during the last year was concerned with the close collaboration with the other three neutron data centres at Brookhaven, Obninsk and Saclay in the development of a computer system for the inter-centre exchange of experimental neutron data, briefly called EXFOR system (see Section E3.). After approval of the basic concepts and formats of this system at the Moscow 4-Centre Meeting in October 1969 and after extensive inter-centre correspondence on actual details of the system, EXFOR is to be implemented by all four centres, and it is expected that a formal agreement on EXFOR can be signed by the centre heads in summer 1970.

In addition to efforts towards a systematic coverage of experimental data in the NDS service area, more effective data dissemination and the establishment of a users interests profile (Section E2.), increasing emphasis is given to comprehensive compilations and reviews of nuclear data areas of particular importance for nuclear reactor development (Section E4.) and the holding of corresponding expert meetings (Section C1.).

In response to discussions and recommendations of INDC at its last meetings two systematic enquiries regarding requests of developing countries for targets and foils for nuclear data measurements, and nuclear data needs for safeguards technical development have recently been started and have already received considerable response (Sections D2. and D3.). A list of requests for neutron data measurements has been compiled from Non-EANDC countries and will be submitted to the INDC meeting (Section D1.).

In conjunction with their individual activities NDS staff members have attended a number of pertinent meetings; Section C1. gives highlights and basic objectives of more than ten conferences, symposia and expert meetings. NDS staff members have been actively involved in the preparation of the Helsinki Conference on Nuclear Data for Reactors and of the two Studsvik meetings on α (^{239}Pu) and $\bar{\nu}$ data.

B. INDC SECRETARIAT ACTIVITIES

B1. Liaison Officers

At the second INDC meeting (June 1969) the committee suggested that the membership of INDC Liaison Officers be extended to include all interested Member States not represented on the INDC. In the course of September 1969, the INDC secretariat has sent out invitations to appoint Liaison Officers to 63 Member States and one International Organization (JINR). In response to these invitations the secretariat has received 19 new Liaison Officer appointments. Together with the 16 Liaison Officers who had been appointed prior to the 2nd INDC meeting, their total number is presently 35. A list of Liaison Officers is included in Appendix A to this report.

In the course of its work, the INDC secretariat has found it desirable, both for the benefit of the INDC as well as for the benefit of the Liaison Officers themselves, to have a document which specifies the functions and responsibilities of INDC Liaison Officers. Included herewith, in Appendix A, is a proposed draft of "Terms of Reference for Liaison Officers of the INDC" for consideration by the Committee during its third meeting.

B2. Documents Distribution and List of Correspondents

a) The current list of INDC documents submitted to the INDC secretariat for distribution will be published and distributed as INDC(SEC)-8/U. This list supersedes the previous list published in November 1969 as INDC(SEC)-4/U. It is proposed to publish a complete cumulative list once a year prior to the INDC meeting, and issue a supplement to this list in October or November of each year. The list of documents received (single copies) will be distributed at the time of the meeting as Appendix I to this report.

b) The current list of "INDC Correspondents for the Exchange of Nuclear Data Information" has been published and distributed as INDC(SEC)-7/U. Because of the continuous changes of the content of this list, a full updated version is proposed to be issued twice a year, in April and November of each year. For the benefit of those who submit documents to the INDC Secretariat for distribution, the number of recipients in each distribution

category is indicated in the foreword of this document; it is requested that INDC members and INDC liaison officers convey this information to their respective documents distribution centres to ensure that adequate number of document copies are sent to the INDC secretariat for distribution.

B3. Proposed Modificationsto "Methods of Work"

The following comments and suggestions reflect the opinion of the INDC Secretariat with regard to the "Distribution and Numbering of Documents" section of the proposed modification to "Methods of Work", Appendix 6 to the Informal Minutes of the second INDC Meeting (pages 63, 64).

a) The secretariat strongly supports the substance of the first paragraph, which emphasizes the need for INDC document originators to identify their documents in a prescribed manner. In addition, it may be desirable to add to that paragraph the following sentences: "INDC members and INDC liaison officers should submit to the INDC Secretariat for distribution the appropriate number of documents for a given distribution category. The current number of recipients in each distribution category is given in the foreword of the periodically issued Lists of INDC Correspondents for the Exchange of Nuclear Data Correspondents".

b) With regard to the second paragraph, it is suggested to reconsider the proposed distribution categories and their definitions, taking into account the following points:

(1) Category "G" - a more specific definition to clearly define the recipients of these documents is desirable. Specifically it is not clear what is meant by "continuing participants".

(2) Category "L" - the proposed category "L" is equivalent to the existing category "N" which has been used by the secretariat for the last two years. In order not to confuse this definition

of the L-distribution for EANDC documents with that of the INDC N-distribution it is recommended to keep the original nomenclature "N".

(3) Category "U" - It is proposed to maintain the existing two general categories "U" and "E", as they have been used during the last two years by the INDC secretariat, because it is necessary to distinguish documents which have an EANDC distribution from those which do not.

Specifically their definitions are:

"U" Distribution:
General distribution of technical INDC documents originated by the IAEA, the Soviet Union and other parts of the world, excluding those documents originated by the US, Canada and countries associated with the EANDC. This distribution list includes individuals on the EANDC distribution list.
(Documents which have an EANDC distribution, should never be assigned an INDC/U distribution.)

"E" Distribution:
General distribution of technical INDC documents originated anywhere in the world. This list excludes individuals on the EANDC distribution list, and those who reside in countries associated with the EANDC. (Documents which have an EANDC distribution, should be given an INDC/E distribution.)

For each of these two cases, the distribution composition and size differs considerably, e.g. 300 recipients for the U-distribution, and 111 recipients for the E-distribution.

B4. Liaison within IAEA

In order to improve the "interface" between the INDC and the overall activities of the IAEA, the NDS has established internally recognized liaison between the INDC Secretariat and those Departments and Divisions

of the Agency whose programs have specific aspects which are of interest to INDC.

This internal liaison, which has been started within the last year, is illustrated in a number of points of this NDS report to the INDC as well as in the sections of this meeting's Agenda entitled: "Panels and Conferences" and "Nuclear data Aspects of IAEA Activities". In particular, the following areas of common interest, where cooperation and contacts have been established, can be mentioned.

- Physics Section of the Division of Research & Laboratories:

  with regard to Nuclear data aspects of their program - Cooperation in the fields of non-neutron nuclear data. Attendance of panel on "Instrumentation of Neutron Inelastic Scattering Research" (Vienna, December 1969).

- Seibersdorf Laboratory of the Division of Research & Laboratories:

  Contracts with regard to assessment of data needs in the field of standards and dosimentry.

- Division of Technical Information:

  investigation of possible common grounds between INIS and certain aspects of our nuclear data efforts. Participation in the INIS Symposium (Vienna, February 1970).

- Division of Nuclear Power and Reactors:

  Participation in topical meetings, e.g. 1969 Winfrith Panel on $\alpha(Pu^{239})$.
  Information link with regard to INGFR meetings and distribution of their minutes to INDC.
  Coordination with regard to "Targets and Foils".
  Attendance of Panel on "Peaceful Nuclear Explosions" (Vienna, February 1970).
  Contact with the IAEA working group on reactor radiation measurement.

- Department of Safeguards and Inspections:

  Collaboration in the survey of nuclear data for safeguards.

- Division of Health, Safety and Waste Management:

  Contacts with regard to Nuclear data for dosimetry.
  Participation in panel on "Nuclear Accident Dosimetry Systems" (Vienna, February 1969).

C. MEETINGS

C1. Reports on past meetings

a. Fourth Annual Meeting of CODATA, June 1969

The Fourth Annual Meeting of the Committee on Data for Science and Technology, briefly CODATA, took place in Rome, Italy, 26-27 June 1969, and was attended by Dr. Good. The following lines abstract his impressions from the meeting and more generally of the status of the development of CODATA.

The membership of CODATA is composed of states maintaining national CODATA committees and scientific unions (IUPAP, IUPAC, IAU, etc.). In addition CODATA meetings are attended by representatives of International Organizations (UNESCO, IAEA, etc.) and other special scientific interests. The Central Office of CODATA is in Frankfurt, Germany, and headed by Dr. Christoph Schäfer. The overall impression was that programme and objectives of CODATA are still in a formative stage.

The general objectives of CODATA as executive committee of the International Council of the Scientific Unions (ICSU) is to provide international coordination and guidance in the fields of compilation of data for science and technology. In the pursuance of these objectives CODATA

a. convenes international conferences and meetings (including CODATA itself),
b. establishes tasks and working groups,
c. maintains publication activities.

Regarding international conferences, the First International CODATA Conference was held in Arnoldshain near Frankfurt, Germany, 30 June - 5 July 1968; it was reported at the last INDC Meeting. The Second International CODATA Conference is scheduled for St. Andrews, Scotland, 7 - 10 September 1970. It is hoped that the programme for this Conference becomes available on time and can be distributed to INDC members at the INDC Meeting. For 11 and 12 September the Fifth Annual Meeting of CODATA itself is planned.

Regarding task and working groups CODATA attaches great importance to promoting effective computer utilization in scientific and technical data handling and convened, e.g., a Task Group on Automated Information Handling in Data Centres, in London, 27 June 1969. Other task groups deal with Key Values for Thermodynamics, Fundamental Constants and Data for Chemical Kinetics.

Regarding publication, the Central Office of CODATA has put particular efforts in the publication of an International Compendium on Numerical Data Projects, Springer Verlag, 1969, which gives a survey of those centres in the world which produce critically evaluated numerical data. This first edition should serve as a draft for the second edition envisaged for 1971. In addition the CODATA central office issues Newsletters and Bulletins.

In the future development of CODATA its role as a forum for the interdisciplinary exchange of ideas and experiences in data compilation and evaluation will play an increasing role. Further suggestions of the meeting were concerned with the provision of guidelines and standards for the judgement of data centre efforts and with the provision of each discipline with listings of needed critical data.

The interest in nuclear data contributions to the aims and efforts of CODATA has recently been increasing. In the CODATA Newsletter No. 3 of December 1969 a summary report on "Neutron nuclear data compilation and evaluation - past, present and future", by J.J. Schmidt, was published upon the initiative of CODATA. In its Newsletters, CODATA will also in future regularly inform about progress and news in the nuclear data field. The NDS has been asked to contribute to the forthcoming St. Andrews CODATA Conference a report on "Aspects of critical evaluation of nuclear data information" and to the Annual Meeting of CODATA afterwards a short progress report on "Current activities of the IAEA Nuclear Data Section". In the light of the recommendation of the INDC at its 1969 meeting (Informal Minutes of the Second INDC Meeting, p. 51), the INDC should consider whether it would like to be represented by an observer in addition to the one or two attendees foreseen on the part of the Agency's NDS (probably L. Hjärne and J.J. Schmidt).

b. 1969 Winfrith Specialists Meeting and 1970 Studsvik Meeting on alpha for ^{239}Pu

A meeting of specialists on the value of alpha for ^{239}Pu sponsored by the IAEA Nuclear Power and Reactor Division, was held at Winfrith, U.K., on 30 June - 1 July 1969. The discussions covered differential measurements of ^{239}Pu alpha as well as the evidence from integral experiments regarding ^{239}Pu alpha.

At this meeting, V. Konshin of the NDS presented a review on ^{239}Pu alpha measurements and, in cooperation with the three other data centres (Brookhaven, Saclay, Obninsk), submitted a number of data sets on alpha for ^{239}Pu. The conclusion of the discussions at that time was that the accuracy in alpha, in the energy range 0.1 - 30 keV, achieved in differential measurements can be estimated to be $\pm$ 10 to 15% and that, in order to resolve the still existing discrepancies due to different normalization, the resonance α-values used for normalization should be based on η and/or α measurements which extend down to the thermal energy range.

As far as integral measurements were concerned, it was concluded that the cross section adjustments performed by Barré/Cadarache and Rowlands/Winfrith did not yield conclusive evidence for an increase of α between 10 keV and 1 MeV; it was suggested that further detailed attention should be paid to this energy range.

The NDS has subsequently sponsored a second meeting of specialists on ^{239}Pu-alpha to be held in Studsvik, 12 June 1970, immediately before the Helsinki Conference. The goal of this meeting was to review the progress towards obtaining reliable α-values for ^{239}Pu and to discuss in detail the papers on $\alpha(^{239}Pu)$ submitted to the Helsinki Conference. V. Konshin and T. Byer of the NDS prepared a revised review on the status of the α-values for ^{239}Pu [INDC(NDS)-17/N] which was presented at that meeting (see also Section E4. of this report).

c. IAEA Consultants Meeting on the Status of $\bar{\nu}$ Data for the Main Fissile Nuclides, Studsvik, June 1970

In advance of the Helsinki Conference the IAEA is convening a Consultants Meeting on the Status of $\bar{\nu}$ Data for the Main Fissile Nuclides

in Studsvik, 10 and 11 June 1970. The holding of such a meeting was in fact stimulated by a recommendation of the EANDC at its last meeting in Bournemouth/U.K. in October 1969 and by the still existing discrepancies and inconsistencies in the existing $\bar{\nu}$ data which have a direct bearing on reactor multiplication factors. This meeting will allow the experts to discuss the papers on $\bar{\nu}$ actually submitted to the Helsinki Conference in much better detail in advance of the Conference so that at the Conference itself no individual paper, but only a review of the highlights of the submitted papers as well as of the discussions at the $\bar{\nu}$ meeting has to be given, thus saving time within the rather tight Conference schedule. The main emphasis of the $\bar{\nu}$ meeting will be devoted to problems connected with a probable non-linearity of the energy dependence of $\bar{\nu}$ for ^{235}U and ^{239}Pu in the keV and low MeV energy ranges where fission threshold effects may be important. As introduction to the meeting F. Manero and V. Konshin of the NDS have prepared a review on the status of $\bar{\nu}$ (E) data for the main fissile isotopes (see Section E4. of this report, INDC(NDS)-19/N). Both the content of this report and the highlights and conclusions of the discussions will be reported at the INDC Meeting itself.

d. Second IAEA International Conference on Nuclear Data for Reactors, Helsinki, June 1970

A Second International Conference on Nuclear Data for Reactors is scheduled to be held by the IAEA in Helsinki, 15-19 June 1970. The preparation of the Conference is the responsibility of the Nuclear Data Section. The Conference Programme has been prepared by a Programme Committee consisting of Taschek (USA), Sukhoruchkin (USSR), Rowlands (U.K.), Schmidt (Federal Republic of Germany, now IAEA) and Good (IAEA, now USA). In agreement with the Programme Committee the paper selection was done at the IAEA. The detailed provisional programme of the Conference is reproduced in Appendix B.

The great interest in this Conference is reflected by the very large number of 168 submitted abstracts of contributed papers, about 60% of which will be presented at the Conference in individual and combined talks. In addition 20 invited and special talks and the two summaries on the

status of α (^{239}Pu) and on $\bar{\nu}$ data for fissile nuclei are foreseen. In accord with the INDC recommendation at its 1969 meeting the IAEA is going to publish all of the papers accepted for the Conference; in view of the large number of accepted papers the Conference Proceedings are expected to be about twice as large as the corresponding Proceedings of the Paris Nuclear Data Conference in 1966. Topic i "New Developments in Instruments and Methods" of the original programme has been cancelled because no substantial contributions have been received under this topic justifying a session of its own on the subject. The corresponding papers have been allocated to other topics as appropriate.

In accord with INDC recommendations the Conference is intended to be directed more towards reactor application than the previous similar Conference in Paris in October 1966. This is reflected by the introduction of a particular session (g) on the "Relationships of Microscopic and Integral Data". The microscopic data sessions are subdivided into three parts A (Introductory), B (Contributed), and C (Evaluation) so as to give a balanced view of the experimental and evaluation status of the data concerned. The introductory paper under A is intended to give a comprehensive review of recent progress in the most important experimental nuclear data research concerned. The invited evaluation review paper under C is intended to be complementary to the introductory review paper under A. It should give an outline of the pertinent evaluation work, its quality and comprehensiveness, the evaluation methods used, and the principal difficulties encountered in the evaluation process and comment on different conclusions and results of evaluations. By this way it is hoped that the actual status of the neutron data field, the still existing discrepancies and gaps, and the needs for further experimental and/or evaluation work become apparent. In addition to these more reactor-oriented data a few special papers are foreseen on nuclear data needs for non-reactor purposes, particularly for astrophysics and nuclear fusion.

All speakers of the Conference, particularly the invited speakers, have been asked to turn to the neutron data centre concerned in their area for data they might need to prepare their reports. There is a general agreement between the four world neutron data centres (Brookhaven NNCSC,

Saclay ENEA/CCDN, Obninsk CJD, Vienna IAEA/NDS) to provide the speakers of the Helsinki Conference with all pertinent information needed. Furthermore all speakers and authors of papers for the Helsinki Conference have been requested to send the measured data which they reported on together with a list of all former references pertaining to the particular experiment(s) to the relevant neutron data centre.

e. Second IAEA Symposium on the Physics and Chemistry of Fission, Vienna, July 1969

The Second IAEA Symposium on the Physics and Chemistry of Fission, sponsored by the Physics Section, was held at the IAEA Headquarters in Vienna, 28 July - 2 August 1969. It represents a comprehensive summary of the last four years of fission research which are characterized particularly by important developments in fission theory. Unlike the first IAEA Fission Symposium in 1965, a substantially larger number of contributed papers on fission theory was submitted, indicating generally that the gap between the rich empirical knowledge and the poor theoretical understanding of the fission process is going to be narrowed.

A prominent part of the symposium was devoted to theoretical and experimental investigations of Strutinsky's double-humped fission barrier whose existence is particularly ascertained by observation of intermediate sub-threshold fission in neutron resonances of quite a number of heavy nuclei and by detection of numerous fission isomers. A whole session was devoted to delayed neutron investigations of particular relevance to reactor dynamics and nuclear material safeguards. In recent studies the knowledge of delayed neutron precursors has become much more detailed. Regarding prompt neutrons, one of the most interesting contributions was on the observation of a spin dependence of fission neutron emission in ^{239}Pu resonances by Weinstein et al. from RPI. Also Ryabov et al. from Dubna observed such a dependence, but with opposite sign. Extensive discussion at the symposium brought no solution of this discrepancy.

The Proceedings of the Symposium have already been published and are available from the Agency in the usual way.

f. International IAEA Symposium on Neutron Capture γ-Ray Spectroscopy

An International Symposium on Neutron Capture γ-Ray Spectroscopy was held at Studsvik, 11-15 August 1969. It was sponsored jointly by the Physics Section of the IAEA and the Department of Physics of the Chalmers University of Technology. The Symposium reflected in particular the large progress in this field due to the advent of high-quality Ge(Li) detectors, improvements in electronic data processing and improvements in bent-crystal spectrometers. Concurrently progress has been made in the theoretical interpretation of neutron capture γ-ray spectra, by taking into account for example rotation-vibration interaction, Coriolis coupling and band mixing. An invited talk by H. Maier-Leibnitz on neutron conducting tubes, in particular on the construction and use of real guide tubes, found particular attention.

The Proceedings of the Symposium have already been published and are available from the Agency in the usual way.

g. IAEA Panel on Instrumentation for Neutron Inelastic Scattering Research

This panel meeting was convened by the IAEA Physics Section, 1-5 December 1969, at the IAEA Headquarters in Vienna. Twelve participants and twenty three observers attended the panel, Dr. P.A. Egelstaff (UKAEA, Harwell) chaired the meeting.

The sixteen papers presented at the meeting and the discussions that followed, treated the following topics pertinent to the field of neutron spectroscopy as applied to thermal neutron scattering research:

- Neutron sources
- Neutron detectors
- Computer applications
- Resolution and efficiency of neutron spectrometers
- Cold and hot neutron sources, guide tubes
- Crystal monochromators
- Correlation chopper
- Comparison of spectrometers.

The recommendations which bear a direct relation to the Agency's programme in this field are:

1. The panel recommends that the Agency should continue to organize the symposia on neutron inelastic scattering research. It would be timely to convene the next symposium in 1971. In this year, the Grenoble high flux research reactor will be put in operation, and it might be opportune to organize the symposium in Grenoble. The representative from this center expressed his conviction that the Grenoble Institute Max von Laue - Paul Langevin will be pleased to host the symposium. The programme of the symposium should be divided in three approximately equally strong parts: the techniques and methods, the invited review papers on selected topics, and strongly selected contributed papers on recent results.

2. Recently, several laboratories started to investigate the possibilities for application of neutron inelastic scattering techniques to industry, particularly in chemistry and electronics. It is felt that these possible applications deserve strong attention from the part of the Agency. The panel recommends that a panel on this topic should be organized in two or three years, in order to stimulate the interest of the scientists for the applied research.

3. The Agency's staff should closely follow, and promote, if possible, the further developments in instrumentation for neutron inelastic scattering research. Particular attention should be devoted to improvements in crystal monochromators fabrication, developments in hot and cold neutron sources, and use of correlation chopper for solid state investigations.

h. IAEA Symposium on the Handling of Nuclear Information, Vienna, February 1970

The IAEA Technical Information Division held an "International Symposium on the Handling of Nuclear Information", 16-20 February 1970, in Vienna. This symposium was arranged within the framework of the development of INIS (the International Nuclear Information System), and was attended primarily by documentalists and librarians. The NDS was represented by L. Hjärne in a session on "Specialized Information Centres", in which he gave a paper entitled "The International Neutron Data System".

The main emphasis of this meeting centered on the handling of nuclear documentation, rather than nuclear information per se, other aspects of information were given minor consideration. Among others, the idea of "user's journals" was put forward by Dr. Koch of the American Institute of Physics, which may prove to be a valuable approach for a closer cooperation between journal publishers and data centres.

i. IAEA Panel on Peaceful Nuclear Explosions (PNE), Vienna, March 1970

The first IAEA panel on PNE was held in Vienna at the IAEA Headquarters in March 1970. There were 57 nominated participants from 29 Member States and 2 International Organizations. A total of 8 papers were presented in the Session on Summary Statements, and 17 papers in two technical sessions. The IAEA paper entitled "Technical Status Summary of Peaceful Uses for Nuclear Explosives" was presented by Dr. M. Nordyke of Lawrence Radiation Laboratory, University of California, who served as a consultant to the Agency for the panel.

Most of the technical papers presented at this panel gave consideration to the experience gained to date on the Phenomenology of Contained and Cratering Nuclear Explosions, and their potential industrial applications. Scientific application of PNE was mentioned only briefly, with reference to neutron physics experiments performed to-date and possible future experiments. The recommendations of the panel dealt specifically with

a) the role of the IAEA in the exchange of information on PNE,
b) the role of the IAEA in furthering education with regard to PNE, and
c) future Agency meetings on PNE and the formulation of their scope and agendas.

j. IWGFR Meetings, Vienna, March 1969, and Cadarache, March 1970

In response to the suggestion given by the INDC at the last meeting, the Summary Report of the Second Annual Meeting of the International Working Group on Fast Reactors (Vienna, March 1969) was distributed to INDC members earlier this year.

The Summary Report of the Third Annual Meeting of the IWGFR (Cadarache, March 1970) will be distributed to INDC members and commented upon at the time of the meeting.

C2. Comments on Future Meetings

a. IAEA Meetings in 1970

In January of this year the NDS distributed a "List of IAEA Meetings for 1970", as INDC(SEC)-6/G,L, in order to inform INDC Members and Liaison Officers of the currently Agency-planned panels, working group meetings and symposia relevant to the INDC scope of activity. A supplement to INDC(SEC)-6, which will cover the latter half of 1970 in more detail will be distributed at the time of the meeting.

b. Proposed NDS Panels for 1971 and 1972

The NDS plans to convene the following meetings, subject to the availability of funds:

for 1971, a Panel Meeting on Methods of Evaluation and
a Panel Meeting on the Status of Fission Neutron Spectrum Data;

for 1972, a Second Panel Meeting on Standards for Nuclear Data Measurements, and
a Panel Meeting on the Status of Heavy Element Nuclear Data.

The plan to hold a Panel Meeting on Methods of Evaluation responds to a recommendation of the INDC at its last meeting (Informal Minutes of the Second INDC Meeting, Brookhaven, June 1969, p. 14, 51, 54). A preliminary agenda for this meeting has been drafted for INDC consideration and is given in Appendix C.

At its last meeting in Bournemouth/U.K. in October 1969 the EANDC suggested that the NDS of the IAEA collect all the data on the prompt fission neutron spectrum and possibly issue a report on the present knowledge of N(E). In response to this a thorough compilation and review of available previous and current prompt fission neutron spectrum measurements at thermal and higher energies, including also spontaneous N(E) measurements for ^{252}Cf will be performed by the NDS in the near future This review should serve as an introduction to an expert meeting on the status of fission neutron spectrum data planned for 1971.

The Panel Meeting on Standards planned for 1972 will be a follow-up meeting of the IAEA Standards Panel held in Brussels in May 1967. In the preparation of this Panel in particular the results of the forthcoming EANDC Topical Conference on Standards in Argonne National Laboratory in October 1970 will have to be taken into account.

The specific topic of the Panel Meeting on the Status of Heavy Element Nuclear Data is not yet defined. Possibilities depending upon the actual development of nuclear data interests and measurements would be resonance parameter statistics, including in particular resonance fission, a topic already proposed at the last INDC Meeting, status and needs of nuclear data for transactinum nuclei or status and confidence level reached for cross sections of the most important fissile and fertile nuclei.

D. COORDINATING ACTIVITIES

D1. Non-EANDC Request List for Neutron Data Measurements

At its last meeting in June 1969 the INDC recognized the importance and usefulness of a world-wide request list for neutron-data measurements, and suggested that it should be modelled after the existing EANDC RENDA request list. This request list would include neutron data measurement requests from non-EANDC countries and the USSR.

With regard to these recommendations, a letter has been sent to earlier recipients of RENDA, as well as to INDC Liaison Officers and correspondents in Non-EANDC Member States asking them for their opinion about the usefulness of a world-wide request list and inviting them to submit a representative list of requests which would reflect the needs in their country, as well as information on those requests, listed in RENDA, which are planned to be or are being performed.

As a result of this initial query, the following requests have been received since March 1968: 17 requests from the USSR, 9 requests from Brazil, 4 requests from Finland, 6 requests from Bulgaria, 3 requests from Taiwan, 5 requests from East Germany, 12 requests from Hungary, 16 requests from Australia, 9 requests from IAEA and Chalk River, 8 requests from India, 6 requests from South Africa, and 15 requests from Pakistan.

Thus, a total of 110 new requests for neutron data measurements have been received from Non-EANDC countries, in addition to the 135 requests from the USSR received in November 1968. An additional 400 requests, confirming or supporting existing RENDA requests, have also been received from the USSR.

The Nuclear Data Section has combined the above listed requests into one document as document INDC(NDS)-20/N and published the first Non-EANDC request list. This list will be separately submitted for consideration at the INDC Meeting.

D2. Targets and Foils for Nuclear Data Measurements

Acting upon a recommendation by the INDC (see Informal Minutes of the Second INDC Meeting, Brookhaven, June 1969, p. 52), the NDS has initiated a survey to map the needs for samples for nuclear data measurements. A letter, a sample of which is enclosed as Appendix D, has been sent out to approximately seventy physicists at institutions mostly in developing countries, asking for an evaluation of their needs in this regard. A number of replies have been received, and already at this stage one can say that a substantial effort to meet the needs appears to be justified. An assessment of the status as well as the results of this investigation is presented in report INDC(NDS)-22/N submitted separately for consideration to the INDC Meeting.

At the same time the NDS has requested the IAEA Secretariat that budgetary provisions for the supply of material and fabrication of such samples for use by developing countries be included in the Agency's future programme. After evaluation of what such a programme might cost, it was recommended that a yearly sum of $25.000 be allocated for this purpose. This proposal has been accepted provisionally by the Agency and is included in the preliminary budget estimate for 1972 (see document GOV 1390, page 105).

D3. Nuclear Data for Safeguards Technical Development

In view of the tremendous increase in Safeguards Research and Development over the past two years, there was a brief discussion at the Second Meeting of the INDC (2-6 June 1969) on the role of basic nuclear data in the technical development of nuclear safeguards

instrumentation. The Committee then expressed the general feeling that in order to obtain a deeper insight into the scope of safeguards nuclear data problems, it would be beneficial for the Third Meeting of the INDC (22-26 June 1970) to be supplied with more specific definitions and priorities of the actual nuclear data needs for safeguards, with particular reference being made to the merits of the existing data request lists.

Arising out of this suggested course of action, consultations were held between the staffs of the Nuclear Data Section and the Division of Development (Department of Safeguards and Inspection) regarding the nuclear data needs for safeguards technical development. As a result of these consultations, a circular letter (see Appendix E) was drafted and dispatched on 16 February 1970 to seventy scientists, at some forty-three Institutes in nineteen Member States, who are actively engaged in developing destructive or non-destructive materials assay techniques for safeguards. The crucial aim of the letter was to ascertain from the individual experts"what improvements, if any, in existing nuclear data should be undertaken for safeguards purposes ?"

At the end of April, replies had been received from over eleven Member States and the response of the individual experts has been particularly positive, with many of them already submitting well documented and formulated nuclear data requests for safeguards. A detailed analysis of the replies and request lists, which will be the subject matter of a separate report, is presently being undertaken by the staff of the NDS in collaboration with the staff of the Department of Safeguards and Inspection (INDC(NDS)-21/N to be published).

D4. Non-neutron nuclear data

In addition to the proposal by Dr. Hollander to establish international cooperation in the compilation of data on radioactive isotopes and nuclear levels , which was reported at the previous INDC meeting (see Informal Minutes of the Second INDC Meeting, Brookhaven, June 1969, p. 39, 52), the Agency has recently received a new letter from Dr. Hollander proposing that a consultants meeting be held, for example around the time of one of two larger meetings in this year:

"Nuclear Structure Symposium of the Thousand Lakes", Finland, 2-8 August, or "Conference on the Properties of Nuclei far from the Region of Beta-stability", Leysin, Switzerland, 31 August - 4 September.

The Physics Section of the IAEA considers to hold a consultants meeting of the kind which Dr. Hollander mentions in his second letter, hopefully already this year. Close contacts will be kept on this matter between the Physics and the Nuclear Data Sections.

E. DATA CENTRE ACTIVITIES

E1. CINDA

a. Publication program

In January 1970, the first supplement to CINDA-69 was published by the DTIE Oak Ridge and distributed in February. A cumulative second supplement, which will also be printed by DTIE Oak Ridge, is scheduled for June/July 1970.

Up to this year the CINDA volumes and supplements have been published alternatively by the CCDN (Saclay) and the USAEC DTIE (Oak Ridge). The next complete volume, CINDA-71, will be published by the IAEA early in 1971 with a cut-off date for entries around 15 December 1970. Two supplements to CINDA-71 are planned for summer 1971 and winter 1971/72. The time schedule for a new complete CINDA publication will strongly depend on the number of new entries and revisions of old entries, the latter being correlated with the development of EXFOR.

NDCC Saclay will continue to do the computer operations for CINDA and will provide the Agency with the edited computer input for publication.

b. New format of the CINDA publication

Beginning with CINDA-71, the CINDA-books will have the format of the Agency's conference proceedings, that is a page size of 16 cm x 24 cm. This format had to be chosen, because the production in the present larger format would be at least 50% more expensive. We believe that the page layout can be modified so that the printed characters do not become illegibly small. Two possible solutions are shown in Appendix F. We are also investigating the possibility of computer-controlled photo-type-setting, but this is not likely to become available in time for CINDA-71. For details of the Agency's CINDA publication program see Appendix G.

c. Status of CINDA coverage

Within the framework of the world coverage of the neutron data literature for CINDA the NDS scans 42 report series and 60 journals

from its service area and collects CINDA entries from the USSR. In addition to this "new" CINDA input the NDS revises and completes older entries as part of its data compilation task; this in turn helps considerably to complete the data files. To quote a figure of the NDS contribution to CINDA, about 25% of the entries in CINDA-69 are of NDS origin.

Further progress has been made to improve the completeness of CINDA for current and old literature. The present coverage seems to be fairly good except for US lab-reports. The number of CINDA entries contributed from DTIE Oak Ridge has appreciably decreased. Except for the WASH-series almost no US lab-report series was included in the first supplement to CINDA-69.

d. CINDA and International Data Index

In the volume of CINDA-69, entries of which the data are available in SCISRS, NEUDADA or DASTAR, were marked with "DATA" on the right-hand margin of the page. In the subsequent volume, the "DATA"-flag has been omitted due to a fault in the Oak Ridge printout program. The new EXFOR system provides facilities for a more systematic link between CINDA and the data files but details can only be developed when EXFOR is in full operation. For the time being, the data indexes of CINDU and the NDCC-Newsletters will continue to exist independently from CINDA. It is certainly desirable to merge these data indexes and CINDA into one. This seems, however, not possible as long as the CINDA computer operations are not centralized at one center, e.g. at Saclay, where anyway most of the CINDA work is done.

E2. NDS Area Service

a. Area coverage and data collection

One of the continuing primary responsibilities of the NDS is the systematic collection and compilation of experimental neutron data from its service area. The growth of the DASTAR data file can be judged from comparison of the volume of successive editions of the CINDU catalogue. The current catalogue CINDU-9 edited in October 1969, when compared to CINDU-8 shows that the number of

data sets from the NDS service area entered into DASTAR has doubled since January 1969; this, however, is an exceptionally large increase.

CINDU-10 is planned to be published in the course of the next few months (summer 1970). It will continue to index all data stored at NDS, that is:

- the EXFOR library
- the DASTAR library (i.e. those data which have not yet been converted to EXFOR), including the Chalk River scattering-law data
- the CJD (Obninsk) evaluated data on differential elastic and inelastic cross sections
- the KEDAK evaluated data library
- parts of the UK evaluated data library, including the Bologna capture evaluations for fission product isotopes.

In the course of the last year particular efforts have been made to complete the back coverage of literature originating from the NDS service area. For this purpose earlier journals and report series from the serviced countries are systematically scanned. In the case of some countries, such as Yugoslavia, South Africa and Taiwan, the coverage is almost complete. In most of the remaining countries both back- and current-coverage is at least 50% complete.

The aforementioned list of stored data shows that the DASTAR/CINDU system contains also data from the other three neutron data centres, in particular also evaluated data. The CINDU-9 catalogue has reference to a total of about 1500 experimental data sets contained in DASTAR, about half of which have originated from the NDS service area. This corresponds to a total of about 150.000 experimental data lines. The evaluated data libraries contain approximately 94.000 data lines (where one data line corresponds to one energy and may include from one to about ten cross sections).

b. Regional field trips

As part of the overall effort to improve the service of the data centre, the NDS provides for one field trip every year to regions

within its service area. The field trip to Latin America which was announced in the previous progress report (INDC(NDS)-10), at the time of the last meeting has taken place during the summer of 1969 and is summarized below. A field trip to the Eastern European countries is planned for the fall of this year.

Latin American field trip

This mission, which was requested by Mexico, Chile and Brazil, was undertaken by Dr. T.A. Byer of the Nuclear Data Section to Mexico, Chile, Brazil and Argentina between 23 June to 1 August 1969. The purpose of these visits was to establish close contact with the pertinent authorities in the national nuclear energy commissions, and above all, to develop such contacts with the working nuclear physicists and engineers in the most important laboratories and institutes, in order to better ascertain the activities, demands and needs of these scientists concerning nuclear data and related fields, as well as to familiarize them with the services offered by the Agency in this area of activity.

Amongst the four countries visited there are a total of nine new accelerators whose installation has either just been completed or will be completed by mid/late 1970. A large fraction of the experimental physics programme of six of these new accelerators is being or will be devoted to neutron measurements and one of the needs expressed by these groups related to the question of foils and targets for performing experiments. Due to the high cost of and/or the lack of adequate fabrication services locally, the availability of targets remains a particularly severe problem. The Nuclear Data Section is presently examining ways and means whereby it can assist in overcoming this problem.

Great interest was expressed on the part of the accelerator groups in the EANDC Compilation of Requests for Neutron Data Measurements, RENDA, which presently contains some 900 requested neutron measurements. In view of the large increase in the number of accelerator facilities in the region, and because of the lack of contacts with other groups outside their region, these Latin American groups have recommended

that the Agency organize a Regional Study Group Meeting on Accelerator Utilization in the near future.

The importance of a greater degree of exchange of evaluated neutron data and related information between the Four Neutron Data Centres was evident among the active neutron data user groups in Argentina and Brazil. In addition, it was generally felt by the neutron data users that the Data Centres should place greater emphasis on the review and evaluation activities as represented by the 2200 m/sec evaluation and the recent survey on the α value of ^{239}Pu, since such surveys provide them with an immediate indication as to which data are inconsistent, inaccurate or non-existent.

The mission was particularly valuable in that it provided an opportunity to assess the needs and growth of neutron physics activities in the region, as well as providing the scientific community with a better understanding of the services available from the Agency.

A full account of this field trip has been published and distributed as INDC(NDS)-13/G.

c. Data centre operation

One of the principal developments within the NDS data centre operation in the course of the last year has been the establishment of a Data Centre Operations Office which co-ordinates all aspects of data collection, dissemination and exchange. In this way the input and output of the centre is centrally monitored, with the object of optimizing the service functions of the data centre.

A general program to integrate a number of these functions into a system of interrelated computer programs has been started in the latter half of 1969 and is expected to be fully operational by the end of 1970. So far this system is composed of four information source files and a set of service programs; these are:

(1) A data information Request Log designed to keep continuous account of all requests for data, documents and CINDA retrievals which are sent to and from the NDS. The Request Log was initiated in 1966; in the course of the last 4 years of its use approximately 450 requests

have been recorded. (Request statistics are given in Appendix H - this will be distributed at the time of the meeting).

(2) A data dissemination log for both experimental and evaluated data which have been sent out in answer to specific data requests. This log does not include those data which have been transmitted through the centre as a result of the data exchange functions of the centre. Statistics of data dissemination during the last four years are given in Appendix H (to be released at the time of the meeting).

(3) A professional activity file, or Profile, of all NDS correspondents and personnel associated with nuclear data programs in the NDS service area. This has been started in response to one of the recommendations of the IAEA Panel on Neutron Data Compilation. This particular file is intended to serve mainly as a basis for co-ordination of future NDS activities and as a potential basis for an automatic data centre user service. (Sample statistics in Appendix H to be released at the time of the meeting).

(4) An address file of all institutes, laboratories and universities with which the NDS communicates.

(5) A set of service programs which are designed to produce combined output from the information source files in any needed combination. One example of such a combined output is the list of correspondents which is published by the NDS for the INDC. Other such combined outputs are in the planning stage.

d. Data exchange and dissemination

As part of the data service to the NDS service area an average total of about 100 requests, both incoming and outgoing, are processed per year. These requests range from individual experimental data sets to complete libraries of evaluated data. In 1969 this corresponded to 350 individual sets of experimental data comprising a total number of approximately 30.000 data lines, and to 500 individual sets of evaluated data comprising a total number of approximately 320.000 data lines (where one data line corresponds to one energy, and may include from one to about ten cross sections).

Regarding the exchange of neutron data between the Obninsk Nuclear Data Centre on the one side and the CCDN (Saclay) and the NNCSC (Brookhaven) on the other side a free exchange of experimental neutron data has been established and is functioning regularly. Through this arrangement every neutron and reactor physicist in the world has potential access to all compiled experimental neutron data. A limited amount of evaluated data exchange has taken place. During 1969, 310.000 data lines contained in tapes received from NNCSC and CCDN were transmitted through the NDS centre. More complete statistics on the volume of exchanged data are given in Appendix H (to be distributed at the time of the meeting).

E3. Data Centre Development and Inter-Centre Co-ordination

a. Development of the exchange format

This past year has seen the most concerted effort by the four international data centres to arrive at a common basis for an unambiguous exchange of neutron data on an international scale. Started during a programmer's workshop at the NNCSC at Brookhaven over a year ago, followed by the Four Centre Meeting in December 1968 and a visit of two members of the IAEA Nuclear Data Section to the USSR Nuclear Data Information Centre at Obninsk in March 1969, the effort received further support and guidance from the participants of the Panel on Neutron Data Compilation (February 1969). These activities have been reflected in the individual efforts of members of each of the four centres whose object has been to arrive at an agreement on a universally acceptable and workable classification of neutron reactions, and on an inter-centre data exchange format.

In November 1969, a Four-Centre Meeting has taken place in Moscow. At that meeting the four-centre representatives formulated the basic framework and concept of such an inter-centre data exchange format. The report of this meeting has been distributed as document INDC(NDS)-16/N.

The exchange format which was given the name "EXFOR" is designed to allow centre-to-centre transmission of nuclear cross

section information consisting of bibliographic, physical descriptive and actual data information. It is intended to meet the diverse needs of the four international data centres (Brookhaven, Saclay, Vienna, and Obninsk) and has been designed for flexibility rather than optimization of data processing.

The exchange format as proposed would allow a large variety of bibliographic, physics and data information to be transmitted in an easily machine-readable (for checking and indicating possible errors) and personnel-readable format (for passing judgement on and, if necessary, correcting the errors indicated by the machine).

One of the principal parts of the Four-Centre Meeting discussions was the neutron reaction specification scheme which aims at the definition and classification of neutron induced reactions and their related parameters so that they could be used and codified in the structure of the inter-centre exchange format. Significant support and interest to this effort was given by Professor H. Goldstein who has been the main proponent of the CINDA effort.

b. Status of EXFOR

Based on the agreements reached at the Moscow Four-Centre Meeting and supplemented by Four-Centre discussions through "4C-Memos", an EXFOR-manual, which defines the formats and codes of EXFOR, has been prepared by the NDS and is now in use at all four centres.

Note that EXFOR is a centre-to-centre transmission format. The centre-to-centre exchange format should not be confused with either a centre input format or a centre-to-user format. The centre input format should evolve independently at each centre in order to allow the computers at each centre to be used in an optimum manner. Similarly, the centre-to-user formats should be developed to meet the needs of the users within the centre's service area. Converting the information from the exchange format to a format or formats that best meet the needs of the centres will be the responsibility of the individual centres. The centres will continue to use their own formats according to their particular needs and facilities.

At the NDS all new data are now compiled in EXFOR format. The conversion of old DASTAR data to EXFOR is in progress. However,

some data that are outside the scope of EXFOR (such as half-lives or those evaluated data that are not part of an evaluated data library) will continue to have DASTAR accession-numbers. All data which are available from the NDS data centre will continue to be indexed in the CINDU catalogue.

With the advent of EXFOR the data centre service function of the NDS will be considerably improved with regard to retrieval selectivity and completeness in the satisfaction of user requests. The ultimate aim is to provide each of the four centres with the complete file of the available experimental data.

c. Programmers' workshop

One of the recommendations which resulted from the 5th Four-Centre Meeting (Moscow, November 1969) was to hold a Programmer's Workshop at the IAEA in Vienna during the month of May 1970 to co-ordinate the programming efforts devoted to EXFOR at the four data centres.

The workshop is scheduled to take place from 25-29 May 1970. It is hoped that representatives from all four data centres will be present. The main topics will be reports on the progress at each of the centres on the implementations of EXFOR, the resolution of any differences and recommendations for any modifications required in light of experience gained with the format. Future plans for the systems to be used at each centre as well as the possibility of future co-operation in the programming and implementation of these systems will be discussed.

A report of the workshop will be available at the time of the meeting in June upon request.

d. Compiler's Manual

In addition to the EXFOR manual, which defines the format and codes used in EXFOR, a compiler's manual is required. At the Moscow Four-Centre Meeting it was made the task of the NDS to prepare and distribute this manual to the other centres. It will serve to advise the compilers how to use EXFOR; it includes precise definitions of

reactions and quantities, and specifies which secondary information must be entered for different types of data. It is to be regarded as an essential means of improving the quality of the compiled information.

E4. Data Reviews

An increasing activity of the NDS within this last year has been devoted to detailed reviews of important nuclear data. In support of the meetings which it sponsors and in response to the evidence which has resulted from the assessment of important data needs, the NDS has continued and amplified the preparation of reviews of selected neutron data parameters of specific isotopes of particular relevance to nuclear reactor projects. The first example of such a review, which has been performed as a co-operative effort of the NDS and physicists from Canada, the UK and the USA was the "Survey of values of the 2200 m/sec constants for four fissile nuclides" published in 1965 (At.En.Rev.3,2,1965) and updated in 1969 (At.En.Rev.7,3,1969). Some less extensive reviews have been performed by the NDS in the course of the last year: a review of the α values and fission cross sections for Pu^{239} for fast neutron energies, a review of fast U^{238} capture cross sections and a review of energy dependent $\bar{\nu}$ values for the main fissile isotopes. A short description of these three reviews is given below.

a. Review of fast fission cross sections and α values for Pu^{239}

This review represents a detailed study of the present status of fission cross section data for Pu^{239} in the energy region 5 KeV to 15 MeV and of the capture to fission ratio, α, for Pu^{239} in the energy region 0.1 KeV to 1 MeV. It has been performed by T. Byer and V. Konshin and, as far as α is concerned, will serve as introduction to the expert meeting on "The present status of the $\alpha(Pu^{239})$ values" which will be held at Studsvik, Sweden, on 12 June 1970. In this form the report is also submitted to the INDC Meeting. Afterwards, new results from the Helsinki Conference and from the $\alpha(Pu^{239})$ meeting will be incorporated and the report will be published as document INDC(NDS)-17/N.

This review of σ_f and α, performed because of the well-known importance of these two quantities in fast reactor calculations and design, investigates the present status of the available experimental data,

gives a detailed listing and critical comparison of these data with due account of the experimental methods used and finally lists the $\alpha(E)$ and $\sigma_f(E)$ data resulting from this comparison.

b. Review of fast capture cross sections for U^{238}

The review of the U^{238} capture cross section in the energy region of 2 KeV to 10 MeV, performed by V. Konshin, has been published as INDC(NDS)-18/N; also this is submitted separately to the INDC Meeting. This analysis supersedes the earlier review, published as INDC(NDS)-14/N, and includes recent measurements which have become available since that date. The following criteria were used in the present analysis of the available experimental U^{238} capture cross section data:

(a) Greater weight was given to the more recent data,

(b) the weighted mean value of the U^{238} capture cross section at 30 KeV was used as the reference value, the experimental data, used for obtaining this value, were analyzed and renormalized where necessary,

(c) the experimental data of Moxon in the energy region from 1 to 100 KeV, normalized to the weighted mean value at 30 KeV, were used to obtain a reference curve shape,

(d) data which did not agree with the selected reference curve were not used in the evaluation. The values of the U^{238} capture cross section obtained in this work are in agreement with the recent evaluation by Davey to within 2-5%, in spite of the different reference values used.

c. Status of $\bar{\nu}(E)$ data for the main fissile isotopes

Following a recommendation of the EANDC during its last meeting in October 1969 in Bournemouth, England, and as introduction to the IAEA Consultants' Meeting on "The status of $\bar{\nu}$ data for the main fissile isotopes", to be held in Studsvik, Sweden, on 10 and 11 June, a review of the present status of $\bar{\nu}$ data for the main fissile isotopes has been performed by F. Manero and V. Konshin and will be published after incorporation of still unconsidered new results from the Helsinki Conference and the Studsvik $\bar{\nu}$ meeting as document INDC(NDS)-19/N. This report deals

with the energy dependence of $\bar{\nu}$ for the main fissile isotopes with due account of $\bar{\nu}$ standards. Because of the thorough treatment in the recent revision of 2200 m/sec constants for the fissile nuclides by G.C. Hanna et al. (At.En.Rev.7,3,1969), thermal $\bar{\nu}$ values were not included in this review.

With regard to the spontaneous $\bar{\nu}$ value of Cf^{252}, consideration of the latest final results by de Volpi published after the review of Hanna et al. have not resolved the large discrepancies which exist between the available measured values. Since most of the spontaneous fission $\bar{\nu}$ values for other isotopes (e.g. Pu^{240}, Pu^{242} and Cm^{244}) have been measured relative to $\bar{\nu}$ (Cf^{252}) their uncertainties reflect the discrepancies in the $\bar{\nu}(Cf^{252})$ values.

Four fissile isotopes were investigated with regard to the energy dependence of $\bar{\nu}$, i.e. U^{233}, U^{235}, Pu^{239} and Pu^{241}. With respect to $\bar{\nu}(E)$ for U^{235} and Pu^{239}, from the consideration of the existing data, including particularly the recent measurements of Soleilhac et al, it can be concluded that $\bar{\nu}(E)$ for these two isotopes from about 1 to 15 MeV is satisfactorily known. The analysis of the available data gives indeed evidence for a non-linear energy dependence of $\bar{\nu}$ below 1.5 MeV for U^{235}. The existing experimental information for Pu^{239} below 1 MeV is still unsufficient and inconclusive regarding possible deviations from a linear shape.

For the other two isotopes U^{239} and Pu^{241} the scarcity of $\bar{\nu}(E)$ measurements, at present does not allow a conclusive analysis without additional experimental data.

APPENDIX A

INDC Liaison Officers

Argentina	C. Mattei
Austria	P. Weinzierl
Belgium	M. Nève de Mevergnies
Bolivia	F. Paz Lora
Bulgaria	E. Nadjakov
Chile	P. Martens Cook
China	Ji-Peng Chien
Colombia	Director, Instituto de Asuntos Nucleares
Congo	H. Pollak
Czechoslovakia	J. Rocek
Ecuador	E. Grossmann
Finland	A. Palmgren
Greece	A. Katsanos
Hungary	L. Pal
Israel	G. Ben-David
Italy	V. Benzi
Jamaica	A.A. Chen
Kenya	P. Gacii
Korea	Mun-Kyu Chung
Mexico	C. Graef Fernandez
Netherlands	M. Bustraan
Norway	E. Andersen
Pakistan	M. Islam
Philippines	Qu.O. Navarro
Portugal	G.F. Carvalho
Romania	A. Berinde
South Africa	D. Reitmann
Spain	G. Velarde
Sweden	T. Wiedling
Switzerland	Th. Hürlimann
Thailand	P. Areebhol
Turkey	T. Enginol
United Arab Republic	M. El-Nady
Viet-Nam	Vo-Xuan-Bang
Yugoslavia	N. Raisic

Draft

"TERMS OF REFERENCE"

for Liaison Officers of the INDC

1. Definition of Liaison Officers

Liaison Officers are scientists working in the field of neutron nuclear data in IAEA Member States, or international organizations, not represented on the International Nuclear Data Committee (INDC), who have a broad knowledge of their country's, or organizations's, neutron/nuclear physics programs. Their function is to provide a communication link between the scientists producing and/or using nuclear data in their community, and the INDC.

2. Appointment of Liaison Officers

Liaison Officers are appointed by the appropriate office within their government, or within their international organization, at the request of and in consultation with the IAEA through the offices of the INDC Secretariat, which is part of the IAEA Nuclear Data Section.

3. Channels of Communication

The main communication link between the Liaison Officers and the INDC is through the INDC Secretariat.

Liaison Officers shall be provided with lists of all official INDC documents, copies of which they may request from the Scientific Secretary of the INDC. The Scientific Secretary shall send the draft agenda of every INDC meeting to all liaison officers at the same time that it is sent to the Committee members.

Where active interest in items of an INDC meeting is indicated by a liaison officer, he may request approval from the Chairman of the INDC through the Scientific Secretary to attend that meeting as an observer at no expense to the IAEA.

4. General Functions of the Liaison Officers

In their capacity to serve as a link between their state's nuclear data program and the INDC, the Liaison Officers' functions are the following:

- To submit a progress report, on request by the INDC Secretariat, on the nuclear data activities within their countries or organizations in time for presentation at the yearly INDC meetings.
- To communicate with the INDC Secretariat concerning matters in which the INDC could be expected to be of assistance to the nuclear data programs in their respective communities.
- To disseminate, within their scientific communities, information (e.g. documents, newsletters, etc. ...) sent to them by the INDC Secretariat.
- To supply information (list of names, publications, measuring facilities, etc. ...) requested occasionally by the INDC Secretariat.

5. Specific Functions of Liaison Officers within the IAEA Nuclear Data Section Service Area

The Liaison Officers in those countries which are within the service area of the IAEA Nuclear Data Section have the additional function to serve as a link between the IAEA Nuclear Data Section and those scientists within their scientific community who are active as users or producers of nuclear data.

To keep these Liaison Officers informed of the interaction between the IAEA NDS and their scientific community, a copy of every letter sent by the NDS to the scientists within their respective country will be sent to the Liaison Officer. It is hoped that this procedure will promote the dissemination of information from the IAEA NDS and encourage the collection of nuclear data information for the NDS.

APPENDIX B

INTERNATIONAL ATOMIC ENERGY AGENCY
INTERNATIONAL CONFERENCE ON NUCLEAR DATA FOR REACTORS

Helsinki, Finland
15-19 June 1970

PROVISIONAL PROGRAMME

Monday, 15 June

9.30 a.m.	Opening of the Conference
	Session I
	Topic a: General Aspects of the Needs and Uses for Nuclear Data
2.00 p.m.	Session II
	Topic a: (continued)
2.40 p.m.	Topic b: Cross Sections and Techniques for High Precision Neutron Nuclear Data Measurements

Tuesday, 16 June

9.00 a.m.	Session III
	Topic c: Nuclear Data in the Thermal and Resonance Energy Regions $A > 220$
2.00 p.m.	Session IV
	Topic c: (continued)
3.15 p.m.	Topic e: Nuclear Data in the Thermal and Resonance Energy Region: $A < 220$

Wednesday, 17 June

9.00 a.m.	Session V
	Topic d: Nuclear Data Above the Resonance Energy Region: $A > 220$
2.00 p.m.	Session VI
	Topic d: (continued)
2.35 p.m.	Topic f: Nuclear Data Above the Resonance Energy Region: $A < 220$

Thursday, 18 June

9.00 a.m.	Session VII Topic g: Relationships of Microscopic and Integral Data
Afternoon	Free

Friday, 19 June

8.30 a. m.	Session VIII Topic h: Evaluation Problems and Methods
1.30 p. m.	Session IX Topic h: (continued)

Closing of the Conference

PROVISIONAL PROGRAMME

MONDAY, 15 June

	9.30 a.m.	Opening Ceremony	
	10.00 a.m.	SESSION I	
	Topic a.	General Aspects of the Needs and Uses for Nuclear Data	
CN 26/101	J.J. Schmidt	IAEA, 1010 Vienna Austria	General Status of Nuclear Data Requirements (invited paper)
CN 26/102	P. Greebler B.A. Hutchins C.L. Cowan	General Electric Co. Sunnyvale, Calif. 94086 USA	Implications of Nuclear Data Uncertainties to Reactor Design and Operation (inv. paper)
CN 26/103	D.D. Clayton	Rice University Houston, Texas, USA	The Importance and Needs for Neutron Nuclear Data to Astrophysics (invited paper)
CN 26/104	Yu.F. Chernilin	I.V.Kurchatov Inst. of Atomic Energy, Moscow, USSR	Nuclear Data Requirements for controlled thermonuclear devices (special paper)
CN 26/98	Dr. Crocker	United Kingdom	Nuclear Data Needs for Thermonuclear Devices
	2.00 p.m.	SESSION II	
	Topic a.	(continued)	
CN 26/105	J. Lynn	A.E.R.E. Harwell Didcot, Berks. U.K.	Progress in Understanding Neutron Interactions with Nuclei (special paper)
	Topic b.		
	2.40 p.m.	Cross Sections and Techniques for High Precision Neutron Nuclear Data Measurements	
CN 26/106	A.J. Deruytter	Euratom Geel, Belgium	Status of Experiment and Evaluation for High Precision Neutron Nuclear Data Measurements (invited paper)
CN 26/26 /25	M.G. Sowerby M.C. Moxon et al.	AERE, Harwell Didcot, Berks.U.K.	Measurements and Evaluations of Li^6 and B^{10} (n,α) Cross sections in the keV Neutron Energy Range

CN 26/71 72	J.L. Leroy et al.	Centre d'Etudes Nucléaires de Cadarache Saint-Paul-lez-Durance France	Measurements of (n,α) and Elastic Scattering Cross Sections on Li-6 at keV and MeV Neutron Energies
CN 26/24 /23	J.E. Lynn H.H. Knitter et al.	AERE Harwell, U.K./ Euratom,Geel,Belgium	Measurement and Analysis of Total and Differential Elastic Scattering Cross Sections for Carbon for Neutron Energies below 2MeV
CN 26/8 10	F.H. Fröhner E.Schneider	Kernforschungszentrum Karlsruhe, Postf.3640 75 Karlsruhe,Germany, Fed.Rep. of	Measurement and Interpretation of Gold Transmission for keV Neutron Energy
CN 26/35	E.R. Rae et al.	AERE Harwell, Didcot Berkshire, U.K.	A Neutron Detector with a Flat Energy Response for Use in Time-of-Flight Experiments
CN 26/ 9	F. Käppeler et al.	Kernforschungszentr. Karlsruhe, 75,Germany, Fed. Rep. of	Absolute Neutron Flux Determination
CN 26/69 70	J.L. Leroy et al.	Centre d'Etudes Nucl. de Cadarache, France	Absolute Flux Determination and Measurements of Fission Cross sections for U-235 and Pu-239 for Neutron Energies between 15keV and 1 MeV

TUESDAY, 16 June

9.00 a. m. SESSION III

Topic c: Nuclear Data in the Thermal and Resonance Energy Regions A > 220

CN 26/107	G.D. James	AERE Harwell, Didcot, Berks., U.K.	Cross Sections of the Heavy Nuclei in the Resonance Region (invited paper)
CN 26/2	G.C. Hanna et al.	Atomic Energy of Canada Ltd.,Chalk River Ontario, Canada	Measurements of Alpha and Fission Cross Section Ratios for U-233, U-235 and Pu-239 at Thermal Energies
CN 26/33 47 84 86 89	M.G. Sowerby et al.	AERE Harwell, Didcot, Berks.,U.K.	Status Report on α(Pu-239) Measurements in the keV Neutron Energy Range

CN 26/36	E.R. Rae et al.	AERE Harwell, Didcot Berks., U.K.	Observation of an Isomeric Level in U-239 by Means of the U-238 (n,γ) U-239 Reaction
CN 26/42	R.E. Chrien et al.	BNL, Physics Dept. Upton, N.Y. USA	High Energy γ-Rays Following Neutron Capture in Pu-239 and U-235
CN 26/17,16 18,19 95,20 21	G. Rohr W. Kolar et al.	Euratom, Geel, Belgium	Summary Report on Geel Neutron Resonance Measurements on Heavy Fertile and Fissionable Nuclei
CN 26/60 61 62 63	H. Derrien A. Michaudon et al.	Centre d'Etudes Nucl. de Saclay, B.P.no 2 Gif-sur-Yvette, France	Summary Report on Saclay Neutron Resonance Measurements on Heavy Fissionable Nuclei
CN 26/88 /92	M.S. Moore J.A. Farrell et al.	Los Alamos Scient.Lab. Los Alamos, New Mexico 87544 USA	Underground Explosion Measurements of Neutron Cross sections for Pu-239 and Cm Isotopes
	2.00 p. m. Topic c	SESSION IV (continued)	
CN 26/48	D.V.S, Ramakrishna M.P. Navalkar	Bhabha Atomic Research Centre, Trombay, Bombay India	Determination of Resonance Parameters of Pu-240 using Crystal Spectrometer
CN 26/85	M.N. Nikolaev et al.	Inst.of Physics and Power Engineering Obninsk, Kaluga Reg. USSR	Temperature Dependence of the Cross Section Structure of U-238 in the Unresolved Resonance Region
CN 26/108	M.Ribon	Centre d'Etudes Nucl. de Saclay, Gif-sur-Yv. France	Nuclear Data in the Thermal and Resonance Energy Region A > 220 (invited paper)
	Topic e: 3.15 p. m.	Nuclear Data in the Thermal and Resonance Energy Region: A < 220	
CN 26/109	H.V. Muradyan	USSR	Introductory (invited paper)
CN 26/11	F. Fröhner K.N. Müller et al.	Fed.Rep. of Germany	High Resolution Neutron Total and Capture Cross section Measurements on Individual Isotopes of Sc, Ti, Cr, Fe and Ni in the keV Neutron Energy Range

CN 26/87	M.V. Pasechnik et al.	Institute of Physics of the Ukrainian SSR Acad. of Sci; Kiev, USSR	Neutron Cross Sections of Isotopes used as Absorbers in Atomic Reactors
CN 26/38	F. Widder S. Chakraborty	Inst.Fédéral de Recherches en Matière de Réacteurs 5303Würenlingen,Suisse	Capture Cross Section Measurements of Vanadium,Manganese, Caesium,Europium and Dysprosium in the Neutron Energy Range fr.0,01 eV to 20 eV
CN 26/14	H.H.Jung et al.	Inst.f.Reine und Ang. Kernphysik der Univ. Kiel,2057 Geesthacht Germany , Fed.Rep. of	Measurements of Neutron Resonance Total Cross sections for Fission Product Isotopes
CN 26/3 /58	* W.H.Walker E.Sokolowski A.Okazaki	* Atomic Eng.of Canada Chalk River,Ontario/ Studsvik, Fack Nyköping 1,Sweden	The Evaluation of Fission Product Yield Data
CN 26/110	J.S. Story	Fast Reactor Phys.Div. Winfrith,Dorset, U.K.	Evaluation (invited paper)

WEDNESDAY, 17 June

SESSION V

	9.00 a. m. Topic d:	Nuclear Data Above the Resonance Energy Region: A > 220	
CN 26/111	W.P. Poenitz	Argonne Nat.Lab. Argonne, Illinois USA	Recent Experimental Data of Heavy Nuclei (invited paper)
CN 26/68	M. Soleilhac et al.	Centre d'Etudes de Bruyeres le Chatel Montrouge, France	Measurement of Total Neutron Cross Sections of Nickel, U-235 and U-238 between 100 keV and 1200 keV
CN 26/12	D. Kopsch et al.	Inst.f.Angew.Kernphysik, Kernforschungszentrum Karlsruhe Germany, Fed.Rep. of	New Total Neutron Cross Section Measurements of Uranium between 0,5 - 32,0 MeV
CN 26/78 77	V.A.Tolstikov, Yu.Ya.Stavissky et al.	Inst.of Physics and Power Eng. Obninsk USSR	Measurements of U-238 neutron Capture Cross sections in the keV Neutron Energy Range

CN 26/41	C.D. Bowman et al.	Lawrence Rad.Lab. Livermore, Cal.94550 USA	KeV Fission Cross Section of U-235 with High Resolution
CN 26/7	F. Käppeler, E. Pfletschinger	Inst.f.Angew. Kernphysik, Kernforschungszentrum Karlsruhe Germany, Fed.Rep. of	Fission Cross Section Ratio Pu-241/U-235
CN 26/4	L. Jéki et al.	Central Res.Inst. for Physics of the Hungar. Academy of Sci. Budapest 114, Hungary	Fission Neutron Spectrum from 0,01 to 1,0 MeV
CN 26/57	T. Wiedling et al.	Studsvik, Fack 611 01 Nyköping 1 Sweden	Neutron Energy Spectra from Neutron-Induced Fission of U-238 at 1,35 and 2,02 MeV
CN 26/5	D. Reitmann et al.	Atomic Energy Board, Pelindaba, Transvaal South Africa	Inelastic Scattering of Fast Neutrons from U-238
CN 26/66	M.Soleilhac et al.	Centre d'Études de Bruyères le Chatel Montrouge, France	Measurements of (n,2n) and (n,3n) Cross Sections relative to Fission Cross Sections in Fissionable Materials
CN 26/112	W.G. Davey	Argonne Nat.Laboratory Argonne, Illinois 60439 USA	Status of Important Heavy Element Nuclear Data above the Resonance Region (invited paper)
	2.00 p. m.	SESSION VI	
	Topic d:	(continued)	
CN 26/ 59 67 40,74 88,90	D. Colvin	U.K. Atomic Energy Establishment Harwell, Didcot., Berks.,	Summary Report on Measurements for Fissionable Nuclei
	14.35 p.m. Topic f:	Nuclear Data Above the Resonance Energy Region: $A < 220$	
CN 26/113	S. Cierjacks	Kernforschungszentrum Karlsruhe, Germany	Introductory-I (invited paper)
CN 26/114	A.I. Abramov, Yu.Ya.Stavisski	Institute of Phys. and Power Engineering Obninsk, USSR	Introductory II- Cross Sections for the Radiative Capture of Neutrons above the Resonance Energy Region

CN 26/44 /43	W. Lopez et al.	Gulf General Atomic Incorp. San Diego, Cal. 92112 USA	Measurements of Cross Sections for the Radiative Capture of 1 keV to 1 MeV Neutrons by U-238, Au, Mo, W, Ta, Gd, Re and Rh
CN 26/81	D.L. Broder et al.	Inst. of Physics and Power Engineering, Obninsk, USSR	Inelastic Neutron Scattering - (n, n' γ) - by Fluorine, Iron, Cobalt, Nickel and Tantalum Nuclei
CN 26/ 29 30 31	S. Tanaka et al.	JAERI, Tokai-Mura Naka-Gun, Ibaraki-Ken Japan	Measurement and Analysis of Elastic and Inelastic Scattering Cross Section in the MeV Neutron Energy Range for Al, Si, S, Fe, and Zn.
CN 26/53 54 55,56	T. Wiedling et al.	Studsvik, Fack 611 01 Nyköping 1 Sweden	Fast Neutron Elastic and Inelastic Scattering for V, Cr, Fe and Ni
CN 26/79	O.A. Salnikov et al.	Inst. of Phys. and Power Engineering, Obninsk, USSR	Inelastic Scattering of Fast Neutrons by Chromium, Manganese, Cobalt, Nickel, Yttrium, Zirconium, Tungsten, and Bismuth Nuclei
CN 26/115	V. Benzi	C.N.E.N., Centro di Calcolo, Via Mazzini 40138 Bologna, Italy	Evaluation (invited paper)

THURSDAY, 18 June

SESSION VII

9.00 a. m. Topic g: Relationships of Microscopic and Integral Data

CN 26/116	C.G. Campbell	A.E.E. Winfrith United Kingdom	Introductory I (invited paper)
CN 26/117	H. Küsters	Inst.f. Angew.Kern-physik, Kernforschungs-zentrum Karlsruhe Rep. of Germany	Introductory II (invited paper)
CN 26/118	V.A. Naumov	Inst. of Nuclear Energy of the Beloruss.Acad. of Sci., Minsk, USSR	Introductory III (invited paper)

CN 26/73	J.Y. Barré, J. Bouchard et al.	Centre d'Etudes Nucl. de Cadarache, Saint-Paul-lex-Durance France	Complementary Role of Integral Experiments in Relation to Differential Measurements for a Fast Neutron Reactor Project - Example of Plutonium Isotopes
CN 26/92	G.H. Best et al.	Univ. of California Los Alamos Scientific Lab., Los Alamos, New Mexico, USA	Calculations of Jezebel and Godiva with Recent ENDF/B Microscopic Data
CN 26/49	V. Benzi et al.	C.N.E.N., Centro di Calcolo, Via Mazzini 40138 Bologna, Italy	The Influence of the Uncertainties of σ^f_{25} in the Monte Carlo calculations of Small Fast Critical Assemblies
CN 26/39	A. Fabry et al.	S.C.K./C.E.N. 2400 Mol, Belgium	Implications of Fundamental Integral Measurements on High Energy Nuclear Data for Reactor Physics
CN 26/6	M. Najzer et al.	Inst. "Jožef Stefan" Ljubljana, Jamova 39 Yugoslavia	Fission Spectrum Averaged Neutron Cross Sections for Some Threshold Detectors
CN 26/75	V.A.Kuznetsov et al.	Inst.of Physics and Power Engineering Obninsk, USSR	Integral Measurements of the Average Number of Secondary Neutrons $\bar{\nu}_{eff}$ Emitted in one Capture Event in Intermediate Critical Assemblies
CN 26/1	R.H. Ricabarra et al.	Com.Nacional de Energia Atomica San Martin 8250 Buenos Aires Argentina	Infinite Dilution Activation Resonance Integrals with a Li-drifted Ge-gamma Ray Spectrometer and Comparison with Calculated Resonance Integrals
CN 26/51	T.L.Andersson et al.	Studsvik 611 01 Nyköping Sweden	Integral Measurement of Fission Product Capture Cross Section in some Fast Reactor Spectra

Thursday afternoon free

FRIDAY, 19 June

SESSION VIII

Topic h.	8.30 a. m.	Evaluation Problems and Methods	
CN 26/119	S. Pearlstein	N.N.C.S.C. Brookhaven Nat. Lab. Upton, N.Y., USA	Progress in International Nuclear Data Compilation and Exchange (A Report of the Four Neutron Data Centres) (special paper)
CN 26/120	H. Alter	Atomics International Canoga Park, Calif. 91305 USA	The Application of Interactiv Computer Graphics to Neutron Data Evaluation Problems
CN 26/80	A.I.Abramov L.P. Abagjan V.A. Tolstikov	Inst. of Physics and Power Eng.,, Obninsk USSR	Cross Sections for Radiative Neutron Capture by U-238 Nuclei.
CN 26/83	T. Pitterle	Westinghouse Electr. Corp., Waltz Mill Site Madison, Pa.,USA	Evaluation of U-238 Neutron Cross Sections for the ENDF/B File
CN 26/34	M.G. Sowerby et al.	A.E.R.E. Harwell, Didcot, Berks. U.K.	A Simultaneous Evaluation of the Fission Cross Sections of U-235, Pu-239 and U-238 and the Capture Cross Section of U-238 in the Energy Range 100 eV to 20 MeV
CN 26/15	B. Hinkelmann	Kernforschungs-zentrum Karlsruhe F.Rep. of Germany	Evaluation of Neutron Nuclear Data for Several Actinides in the Energy Range from Thermal to 10 MeV
CN 26/13	J. Nebe G.J. Kirouac	Kernforschungs-zentrum Karlsruhe Fed. Rep. of Germany	Multilevel Resonance Analysis of the Total Neutron Cross Sections of Na-23 and Ca below 1 MeV
CN 26/93	G.de Saussure et al.	Oak Ridge Nat. Lab. Oak Ridge, Tenn.37830 USA	Multilevel analysis of the U-233 and U-235 Capture and Fission Cross Section
CN 26/50	F.T. Adler D.B. Adler	Physics Dept., Univ. of Illinois, Urbana, Ill.61801, USA	Correlated Analysis of Fissile Element Cross-Sections and Interpretation in Terms of R-Matrix Parameters
CN 26/64 /65	P. Ribon et al.	Centre d'Etudes Nucl. de Saclay, Gif-sur-Yv. France	An Attempt at Analysis of the U-235 Resonances and a Program for Analysing the Shape of the Resonances

SESSION IX

Topic h	1.30 p. m.	Continuation	
CN 26/28	K. Nishimura et al.	JAERI, Tokai-Mura, Naka-Gun, Ibaraki-Ken Japan	Fast Neutron Capture Cross Sections of Cr, Fe, Ni and Mo
CN 26/32	M.C. Moxon et al.	A.E.R.E. Harwell, Didcot, Berks., U.K.	Neutron Capture Cross Section of Structural and Cladding Materials in the Energy Range 1 - 100 keV
CN 26/91	A. Prince	Brookhaven Nat.Lab. Upton, N.Y. 11973 USA	Analysis of High Energy Neutron Cross Sections for Fissile and Fertile Isotopes
CN 26/22	M. Coppola V. Benzi et al.	EURATOM, Geel, Belgium	Study of Pu-239 Neutron Angular Distributions in the Energy Range between 0,2 and 5,5 MeV
CN 26/27	K. Nishimura et al.	J.A.E.R.I., Tokai-Mura Naka-Gun, Ibaraki-Ken Japan	Analysis of Neutron Inelastic Scattering by U-238
CN 26/52	J.R.Eriksson	Studsvik, Fack, 611 01 Nyköping 1 Sweden	Compound Nucleus Calculations of Low-Energy Neutron Reaction Cross Sections Using Level Densities from Exact Counting of Shell Model States
CN 26/76 /82	V.S. Stavinsky et al.	Inst. of Physics and Power Engineering, Obninsk, USSR	Density of Excited States of Atomic Nuclei

Summary Panel

Closing of the Conference

APPENDIX C

Proposed Agenda Items for an IAEA Panel Meeting on Methods of Evaluation

1. Scope, basic rules and quality control of neutron nuclear data evaluation

2. Primary requirements and problems in the establishment of computer libraries of evaluated data and associated computer programmes

3. Methods and weighting procedures used in neutron nuclear data evaluation

4. Problems of evaluation of discrepant experimental data into "best" values

5. Role and efficiency of nuclear theory and systematics in
   a. interpreting given experimental results,
   b. filling reliably gaps in experimental information,
   c. assisting to solve discrepancies in available experimental information.

6. Problems and achievements of computerized "automatic" evaluation

7. Status and confidence level of existing computer libraries of evaluated data

8. Needs and proposals for improvements in the methods of evaluation

9. Important evaluation needs and cooperation of the four international neutron data centres in the assessment of these needs

10. Status and possible improvements in the assistance of the four data centres to laboratory and other evaluation activities, in particular usefulness of physics information contained in the centres' experimental data files for evaluation

11. International cooperation in evaluation and coordination of evaluation activities, also role and achievements of International Committees and of the four data centres in this respect

12. Status and possible improvements in the international exchange of evaluated data

APPENDIX D

INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ
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Circular Letter for Targets and Foils Requests

10 December 1969

Dear

During recent years we have become increasingly aware of the fact that the procurement of targets and samples needed for nuclear (especially neutron) data presents a severe problem to physicists particularly in developing countries. We have had several individual cases, which have demonstrated the need for a streamlined procedure. In past meetings the International Nuclear Data Committee (INDC) has paid particular attention to this problem and recommended us to provide the Committee with more detailed information on this subject. Acting upon that recommendation, we are therefore in the process of surveying the present and near-future needs for and availability of samples.

As a first step, we want to compile a comprehensive list of sample needs in order to initiate a systematic approach to the problem. Such a list may also serve a secondary purpose: Those who have the means of supporting nuclear data measurements, by making targets available, may find cases where the sample problem could be dealt with directly on a bilateral basis.

Without committing ourselves at present for the actual success of our efforts, we nevertheless hope and believe that you will find it serving your interest to provide us with a list of targets and samples, which you will need at your institute, and which you cannot acquire locally. Such a list should give in detail:

1. The purpose for which the targets are needed. This should include a short description of the experiment, as planned, its time-scale and perhaps a reference to any related published work.

2. The type of facility at which the experiment will be performed.

3. The desired specifications and/or range of tolerable specifications of the required targets.

4. The financial arrangements made (funds granted or applied for) in support of the experiment. Indicate also specifically whether or not the funding of the samples is expected to present a problem.

As we intend to distribute the lists of specifications to those who might be in a position to supply targets and to the INDC members for them to prepare comments for the next INDC meeting, we would be grateful if you could send us your reply before the end of January 1970.

Sincerely yours,

J.J. Schmidt L. Hjärne

Nuclear Data Section
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and Laboratories

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APPENDIX E

INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ
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IN REPLY PLEASE REFER TO.
PRIÈRE DE RAPPELER LA RÉFÉRENCE.

16 February 1970

Nuclear Data for Safeguards Technical Development

At the last meeting of the International Nuclear Data Committee (INDC), which acts as an advisory body to the Director General of the International Atomic Energy Agency (IAEA) on all matters pertaining to nuclear data, one of the agenda items which was briefly discussed was the role of basic nuclear data in the technical development of international safeguards. The general feeling expressed by the Committee was that it would be particularly helpful if by the time of its next meeting (to be held in Vienna, 22-26 June 1970), it could be supplied with more specific definitions and priorities of the actual nuclear data needs for safeguards development, with particular reference being made to the merits of the existing neutron data request lists which have, to-date, been primarily oriented towards the data needs for reactor research and development.

Such a list of needs could serve to stimulate further experimental effort, on an international scale through the IAEA, towards performing those high priority measurements on nuclear materials for which existing data are either inconsistent, incomplete or unknown. In addition, it could also serve the purpose of initiating reviews and evaluations for those classes of data regarded as being of prime importance. Purely for the purposes of illustration, such relevant areas may include such diverse fields as photonuclear reaction data, fission neutron data, capture gamma-ray data and gamma and alpha particle spectrometry; of course, this is clearly not a comprehensive list.

In this context, we would find it particularly helpful if you could provide us with your comments on, as well as a list of, such present and near-future data needs, as viewed from the standpoint of someone

actively engaged in developing destructive or non-destructive materials assay techniques for safeguards. Framed in more direct language, in your opinion what improvements, if any, in existing nuclear data should be undertaken for safeguards purposes?

The views on and lists of specific data needs which are transmitted to the Agency in response to this enquiry, will be submitted to the June meeting of the INDC, following which the Committee may arrive at specific recommendations, if this is warranted, which could then lead to actions along the lines referred to earlier. We would be grateful if you could send us your reply by 15 April 1970, so as to allow both the Agency and the members of the INDC sufficient time to assess the situation in preparation for the June meeting of the Committee.

Looking forward to your reply,

Yours sincerely,

J.J. Schmidt
Scientific Secretary
International Nuclear
Data Committee

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Appendix E continued, page 4

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APPENDIX F

CINDA Page Samples

The following two sample pages show possible solutions how CINDA could look in the Agency's 16 cm x 24 cm format. In sample A the serial numbers were eliminated, in sample B both serial numbers and isotope designation fields were removed. Note that the offset-print has a clearer appearance than the present Xerox copies.

A final decision on the page layout has not yet been made.

94 PLUTONIUM DEC. 26, 1968 PAGE 144 94 PLUTONIUM

ELEMENT S A	QUANTITY	TYPE	ENERGY MIN	ENERGY MAX	DOCUMENTATION REF VOL PAGE DATE	LAB	COMMENTS	DATA
PU 239	N3N REACTION	EVAL-REPT	1.3 7	1.4 7	LA- 3528 7/68	LAS	HUNTER+ CURV+TBL OF RECOMMENDED SIGS	*
PU 239	FISSION	EVAL-JOUR	6.0-2	1.0 7	NSE 4 166 8/58	LAS	KIEHN.10GROUPS. FOR SN CALCULATIONS	
PU 239	FISSION	EVAL-REPT	PILE		CRRP-1191 3/64	CRC	WESTCOTT EFF SIG SEE ALSO CRRP-960	
PU 239	FISSION	EXPT-PROG	3.0 5	2.5 6	YFI-5 4 0/67	FEI	SMIRENKIN+ CURVE SIG RATIO 239/U235	
PU 239	FISSION	EXPT-PROG	5.5 0	1.0 5	YFI-5 61 0/67	DUB	RJABOV+ CURVES	
PU 239	FISSION	EVAL-JOUR	1.4 1	9.0 1	PR 165 1371 1/68	LAS	FARRELL REICH-MOORE FIT TO DATA	
PU 239	FISSION	EXPT-PROG	2.5-2		EANDC(E)89U153 2/68	GEL	DERUYTTER+.REL TO 10B(N,A) IN PROG	*
PU 239	FISSION	EXPT-JOUR	5.0 0	2.3 4	AE 24 351 4/68	CCP	RYABOV+.CURVES,TOF	
PU 239	FISSION	EVAL-REPT	1. 3	1.4 7	LA- 3528 7/68	LAS	HUNTER+ CURV+TBL OF RECOMMENDED SIGS	
PU 239	FISSION	EXPT-JOUR	THR		JNE 22 477 8/68	ALD	KEITH+ REL.TO CAPT XSEC CO59	
PU 239	FISSION	EVAL-REPT	1.0 3	1.0 5	AERE-M 2065 0/68	HAR	JAMES+ L SQ FIT PU239 U235 AND RATIO	
PU 239	FISSION	EXPT-PROG	5	6	WASH1124 110 N/68	LAS	SMITH+ TO BE PUBLISHED IN NSE NDG	
PU 239	FISSION	EXPT-PROG	3. 4	1.5 6	WASH1124 4 N/68	ANL	POENITZ,NDG,TO BE COMPLETED. ABS SIG	
PU 239	FISSION	THEO-PROG	4.0 1	1.5 2	WASH1124 5 N/68	ANL	HILL+ KAPUR-PEIERLS FIT PETREL DATA	
PU 239	FISSION	EXPT-PROG	1. 2	1.5 4	WASH1124 94 N/68	LRL	CZIRR SCINT EXPT IN PROGRESS NDG	
PU 239	FISSION	THEO-ABST	4. 1	1.5 2	BAP 13 1409 11 N/68	ANL	LAMBROPOULOS+ KAPUR-PEIERLS FIT NDG	*
PU 239	ETA	EVAL-REPT	PILE		CRRP-960 1/62	CRC	WESTCOTT EFF SIG BUT SEE CRRP-1191	
PU 239	ALPHA	EXPT-PROG	5.5 0	6.0 4	YFI-5 61 0/67	DUB	RJABOV+ CURVES	
PU 239	ALPHA	THEO-JOUR	1.0 2	5.0 5	NST 5 86 2/68	JAP	KIKUCHI P AN.CALC C CHANNEL THEORY	
PU 239	ALPHA 2	EXPT-JOUR	5.0 0	2.3 4	AE 24 351 4/68	CCP	RIABOV+.CURVE,PULSD REACTOR FRENCH EAF24(4) 81 4/68	
PU 239	ALPHA	EXPT-JOUR	5.0 0	2.3 4	AE 24 351 4/68	CCP	RYABOV+.CURVES,TOF	*
PU 239	ALPHA	EXPT-PROG	1. 3	3. 4	RPI-328-133 21 6/68	RPI	GWIN+ LINAC AVG ALFA CURVE PRELIM	*
PU 239	ALPHA	EXPT-ABST	FAST		AF 37 326 9/68	AE	ANDERSSON+. DIFFERENT FRO SPEC. NDG	*
PU 239	ALPHA	EXPT-PROG	1. 1	3.0 4	WASH1124 141 N/68	ORL	GWIN RPI LINAC ONLY QUALITATIVE DATA	
PU 239	ALPHA	EXPT-PROG	1. -2	3. 4	WASH1124 46 N/68	GA	FRIESENHAHN+ TOF+SCINT NO DATA GIVEN	
PU 239	NU	EVAL-JOUR	6.0-2	1.0 7	NSE 4 166 8/58	LAS	KIEHN.10GROUPS. FOR SN CALCULATIONS	
PU 239	NU	EXPT-PROG	2.2 1	1.0 2	RPI-328-133 30 6/68	RPI	WEINSTEIN+ FREQUENCY HISTOGRAM SHOWN	
PU 239	NU	EVAL-REPT	0.	1.4 7	LA- 3528 7/68	LAS	HUNTER+ CURV OF RECOMMENDED VALUES	
PU 239	NU	EXPT-PROG	2. 1	1. 2	WASH1124 160 N/68	RPI	BLOCK+ LINAC AVG NU AT RESONANCES	
PU 239	DELAYD NEUTS	EVAL-REPT	0.	2.5 6	LA- 3528 7/68	LAS	HUNTER+ DELAYED NEUT ENERGY DIST	
PU 239	FRAG NEUTS	EXPT-JOUR	THR		ARN 16 379 4/66	CRC	FRASER+MILTON GRAPH NEUTRON YIELD	
PU 239	SPECT FISS N	EXPT-JOUR	THR		PR 88 536 N/52	CRC	FRASER ANGULAR DIST CURVES CFD THEOR	
PU 239	SPECT FISS N	EXPT-JOUR	THR		PR 88 823 N/52	LAS	NERESON FOTOPLATE 0.5-8MEV NEUTS	
PU 239	SPECT FISS N 2	EXPT-PROG	2.5-2		YFI-6 94 68 ENGLISH	RI	BELOV+. SPECTRUM TEMPERATURE. TABLE INDC-260E /69	
PU 239	SPECT FISS G	EXPT-PROG	THR		WASH1124 46 N/68	GA	VERBINSKI+ NAI NO DATA GIVEN TBC	
PU 239	FISS YIELD	EXPT-REPT	THR	FISS	LA- 1997 2/56	LAS	FORD+ 2ES RELATIVE YLDS+N099 ABS YLD	*
PU 239	FISS YIELD	EXPT-REPT	NDG		AERE-M 1078 12 8/62	HTR	BURGUS.	
PU 242	RESON PARAMS	EXPT-REPT	7.6 2	2.9 4	AERE-R 5924 0/68	HAR	JAMES WF 2 RES	
PU 242	STRNTH FNCTN 2	EXPT-REPT	8. -3	8. 3	IN- 1132 6/68 SUPERSEDES WASH1079 66 0/67	HTR	YOUNG+ TRANS S-WAVE STF#0.85+-0.10	
PU 242	FISSION	EXPT-REPT	1.6 1	3.5 4	AERE-R 5924 0/68	HAR	JAMES SUB THRS NEQT OBSERVED WF 2RES	
PU 242	FISSION	EXPT-PROG	1. 2	5. 3	WASH1124 99 N/68	LAS	BERGEN+ BOMB NEUTS TBC NO DATA GIVN	
PU 242	NU 2	EXPT-PROG	SPON		YFI-6 38 68 ENGLISH	FEI	PROKHOROVA+. VALUE GIVEN. TBP -E INDC-260E /69	
PU 242	SPECT FISS N 2	EXPT-PROG	SPON		YEI-6 94 68 ENGLISH	RI	BELOV+. SPECTRUM TEMPERATURE. TABLE INDC-260E /69	*
PU 242	PHOTO-FISSN	EXTH-CONF	5.0 6	9.0 6	6TKHARKOV 216 2/67	FEI	RABOTNOV+.ANG DISTRB.CHANNEL EFFECT	
PU 242	RES INT ABS 2	EXPT-REPT	8. -3	8. 3	IN- 1132 6/68 SUPERSEDES WASH1079 66 0/67	HTR	YOUNG+ TRANS FAST CHOPPR 1090+-608	
PU 242	N,GAMMA	EVAL-REPT	PILE		CRRP-960 1/62	CRC	WESTCOTT EFF SIG TABLE 20-760 DEG C	

CINDA SAMPLE A)

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QUANTITY	TYPE	ENERGY MIN	ENERGY MAX	DOCUMENTATION REF	VOL	PAGE	DATE	LAB	COMMENTS	DATA
FRAG SPECTRA	EXPT-JOUR	THR	1.4 7	PR	95	126	7/54	LAS	WAHL 2ES IONIZAT CHMBR FRAG E DIST	
FRAG SPECTRA	EXPT-JOUR	THR		PR	96	1366	0/54	LAS	LEACHMAN+ VELOCTY DIST OF SLOWD FRAG	
FRAG SPECTRA	EXPT-JOUR	5.0-5	7.5 6	PR	120	198	0/60	LAS	SIMMONS+ FRAGMENT ANGULAR DIST 14ES	
FRAG SPECTRA	COMP-REPT	THR		KFK-693			0/67	KFK	MUENZEL+ RANGE DIST OF FISS FRAG	
FRAG SPECTRA	EXPT-PROG	THR		EANDC(E)89U154			2/68	GEL	DERUYTTER+.CFD FRAG SPEC SPON 240PU	
FRAG SPECTRA	EXPT-JOUR	1.5 5	1.5 6	PR	174	1539	0/68	ANL	HUIZENGA+ 13ES ANG DIST 6ANGS	*
2									SUPERSEDES 68WASH 603 3/68	
3									SUPERSEDES NYO-3938-1 6/68	
FRAG CHARGE	COMP-REPT	THR	FISS	APED-5398			3/68	GEP	MEEK+ 2ENERGIES TABLES	
PHOTO-FISSN	EXPT-JOUR	1.2 7	2.0 7	PR	95	1009	8/54	ANL	HUIZENGA+ 3ES RELATIVE FISS YIELDS	
FISS PROD GS	THEO-REPT			LA- 2811			0/62	LAS	GRIFFIN BETA+GAMMA DECAY CALCULATNS	
FISS PROD GS	THEO-REPT	FISS		USNRDL-TR-1009			0/65	NRD	TURNER GROSS F PROD GAMMA SPEC CALCT	
FISS PROD GS	EXPT-REPT	THR		GA- 7348			0/66	GA	WALTON+ NAI DET,DELAYED GS,ES+YLDS	
2									SUPERSEDES WASH1071 64 N/66	
RES INT FISS	EXPT-PROG		2.0 4	YFI-5 61			0/67	DUB	RJABOV+ TABLES	*
RES INT FISS	EXPT-JOUR	5.0 0	2.0 4	AE	24	351	4/68	CCP	RIABOV+.VAL GVN,PULSED REACTOR	*
2									FRENCH EAF24(4) 81 4/68	
RES INT FISS	EXPT-JOUR	5.0 0	2.0 4	AE	24	351	4/68	CCP	RYABOV+.TABLE,16 ENERG INTERVALS	
RES INT FISS	THEO-JOUR	2.9 2	3.0 3	NSE	34	181	N/68	WEW	DYOS STATISTICAL CALC 17.81+-1.41B	
ABSORPTION	EXPT-REPT	1. -2	3.0 0	LA- 91			6/44	LAS	ANDERSON+ TRANS 1057B AT 0.025EV	
ABSORPTION	EVAL-REPT	PILE		CRRP-1191			3/64	CRC	WESTCOTT EFF SIG SEE ALSO CRRP-960	
RES INT CAPT	EXPT-PROG		2.0 4	YFI-5 61			0/67	DUB	RJABOV+ TABLES	
RES INT CAPT	EXPT-JOUR	5.0 0	2.0 4	AE	24	351	4/68	CCP	RIABOV+.VAL GVN,PULSED REACTOR	
2									FRENCH EAF24(4) 81 4/68	
RES INT CAPT	EXPT-JOUR	5.0 0	2.0 4	AE	24	351	4/68	CCP	RYABOV+.TABLE,16 ENERG INTERVALS	
RES INT CAPT	THEO-JOUR	2.9 2	3.0 3	NSE	34	181	N/68	WEW	DYOS STATISTICAL CALC 10.36+-0.80B	
N,GAMMA	EVAL-JOUR	6.0-2	1.0 7	NSE	4	166	8/58	LAS	KIEHN.10GROUPS. FOR SN CALCULATIONS	
N,GAMMA	EVAL-REPT	PILE		CRRP-960			1/62	CRC	WESTCOTT EFF SIG BUT SEE CRRP-1191	
N,GAMMA	EVAL-JOUR	1.0 2	2.5 2	NIM	62	29	1/68	ALD	HORSLEY+ EVALUATION	
N,GAMMA	EXPT-JOUR	5.0 0	2.3 4	AE	24	351	4/68	CCP	RIABOV+.CURVE,PULSD REACTOR	*
2									FRENCH EAF24(4) 81 4/68	
N,GAMMA	EVAL-REPT	1. 3	3.5 6	LA- 3528			7/68	LAS	HUNTER+ CURV+TBL OF RECOMMENDED SIGS	
N,GAMMA	EXPT-PROG	1. 2	1.5 4	WASH1124 94			N/68	LRL	CZIRR SCINT ANAL TO BE COMPLETED NDG	

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QUANTITY	TYPE	ENERGY MIN	ENERGY MAX	DOCUMENTATION REF	VOL	PAGE	DATE	LAB	COMMENTS	DATA
EVALUATION	EVAL-JOUR	6.0-2	1.0 7	NSE	4	166	8/58	LAS	KIEHN.TOT,FISS,NG,NU,TRANSF.10GROUPS	
EVALUATION	EVAL-REPT	1. -3	1.5 7	APDA-218			6/68	APD	PITTERLE+ EVAL FOR ENDF/B CURVES	
EVALUATION	EVAL-REPT	1. 3	1.4 7	LA- 3528			7/68	LAS	HUNTER+ TOT NF SEL NG SIN N2N N3N NU	*
TOTAL XSECT	EVAL-JOUR	6.0-2	1.0 7	NSE	4	166	8/58	LAS	KIEHN.10GROUPS. FOR SN CALCULATIONS	*
TOTAL XSECT	EXPT-CONF	2.0 1	5.0 3	66PARIS II	135		0/66	GEL	BOECKHOFF+.LINAC TOF.TRANSM .8TO5KEV	
TOTAL XSECT	EVAL-REPT	1. -3	1.5 7	APDA-218			6/68	APD	PITTERLE+ EVAL FOR ENDF/B CURVES	
TOTAL XSECT	EVAL-REPT	1. 3	1.4 7	LA- 3528			7/68	LAS	HUNTER+ CURVE OF RECOMMENDED SIGS	
RESON PARAMS	EXPT-CONF	2.0 1	5.0 3	66PARIS II	135		0/66	GEL	BOECKHOFF+158EO.SHAPE ANAL.E 800EVUP	
RESON PARAMS	EXPT-CONF	2.0 1	2.9	68WASH D6			3/68	GEL	CAO+.AERA ANAL OF SCAT YLD WN	
RESON PARAMS	EXPT-CONF	2.0 2	3.3 2	68WASH D8			3/68	GEL	NIGNECO+THEO8ALD.AERA ANAL WF INTERP	
RESON PARAMS	EXPT-JOUR	7.5 2	3.4 3	NP	A112	527	5/68	GEL	NIGNECO+.WF FROM 1 LVL AREA ANALYSIS	
ELASTIC	EVAL-REPT	1. 3	1.4 7	LA- 3528			7/68	LAS	HUNTER+ CURV+TBL OF RECOMMENDED SIGS	*
DIFF ELASTIC	EVAL-REPT	1. -3	1.5 7	APDA-218			6/68	APD	PITTERLE+ EVAL FOR ENDF/B CURVES	

CINDA SAMPLE B)

APPENDIX G

INTERNATIONAL ATOMIC ENERGY AGENCY

INTEROFFICE MEMORANDUM

TO: Distribution

DATE 23 March 1970

through: Mr. André Pinkelstein
Director
Dep. of Res. and Isotopes

OUR REF.:

FROM: H.D. Lemmel, J.J. Schmidt

YOUR REF.:

SUBJECT: Status of CINDA as an IAEA publication as of 12 March 1970

This memo summarizes the various aspects of the present status of CINDA as an IAEA publication. Its content is consistent with the conclusions and recommendations evolving from a meeting of Messrs. Woolston, Gillcrist, Gottschalk, Metzendorf, Grell, Lemmel and Schmidt on 10 March 1970 in Mr. Metzendorf's Office.

Distribution:
Mr. Pinkelstein
Mr. Fischer
Mr. Metzendorf
Mr. Woolston
Mr. Gillcrist
Mr. Scherk
Mr. Grell
Mr. Gottschalk
Mrs. Attree
Mr. Byer
Mr. Lemmel
Mr. Schmidt

1. It is attempted to obtain for CINDA 71 a computer-controlled phototypesetting, if this is economically feasible and can be fitted in realistic programming schedules. These problems are now being investigated. However, as long as this new method is in an experimental state, it must be assumed that, as before, CINDA 71 will be printed on the basis of a computer print-out. The computer print-out pages or the print-tape will be supplied by the ENEA-NDCC Saclay for reduction in size and off-set reproduction by IAEA.

2. The format of the CINDA books and the cover will be that of the Agency's conference proceedings, that is 16 cm x 24 cm paper format, and up to 14,5 cm x 22,5 cm (or 14,0 cm x 22,0 cm) typing area.

3. It will be possible to design a new layout of the printed pages so that the characters do not become illegibly small due to the smaller page format.

4. For 1971/beginning 1972 one main CINDA volume and two supplements are foreseen with the following publication schedule:

   a. CINDA 71, main volume, January 1971, ca. 1500 pages

   b. CINDA 71, first supplement, June 1971, ca. 200 pages

   c. CINDA 71, second (cumulative)supplement, January 1972, ca. 300 pages.

   This adds up to a total of 2000 pages, valid for computer print-out reproduction and the new page layout mentioned under 2.

   Note, that, with the exception of January 1971 as publication date for the main volume of CINDA 71, the other publication dates and all page numbers quoted can only be tentative and depend upon the actual amount of new CINDA entries coming in. Also tentatively, a new main CINDA volume, CINDA 72, is foreseen for publication around mid 1972, after the publication of the second supplement of CINDA.

5. The in-house responsibilities are

   * with Mr. J.J. Schmidt, in cooperation with Saclay and other parties concerned, for all matters of the contents and the page layout of CINDA up to the final computer print-out, and also, in cooperation with Mr. Gillcrist and Mr. Metzendorf, for all matters connected with the system analysis for producing CINDA by computer-controlled phototypesetting

   * with Mr. H. Metzendorf for all matters of printing, distribution and pricing of CINDA.

6. There will be the following different modes of distribution:

a. Free distribution:

200 copies to Member States (2 copies each, thereof one to the INDC liaison officer where applicable);

50 copies to the Nuclear Data Section staff and external co-workers;

b. Sales distribution:

(i) Bulk shipment:

ca. 500 copies to USA;
525 copies to ENEA;
about 50 copies to the USSR.

The copy-price for bulk shipment is not exceeding US$ 12 per 2000 pages including surface transport to ENEA and USSR and air-freight to USA.

(ii) Individual sale:

100 - 400 (?) copies sold through the Agency's sales agents. The price (ZZZ) is not yet fixed.

100 - 150 copies to individual scientists outside the bulk-shipment areas of USA, ENEA and USSR, corresponding to the previous free distribution by the Nuclear Data Section. The individual sales price will be TTT US$ (TTT = 50% of ZZZ) including surface mail. Air-freight will be charged extra.

7. According to the estimates under 6., the total number of copies is estimated between 1500 and 1900.

8. The Agency requires for the <u>first</u> issue of CINDA, i.e. for CINDA 71, main volume, up to 8 weeks at maximum between receipt of the computer print-out and the appearance of the books, not counting the two weeks around Christmas and New Year. The date when the computer print-out will be available, is still subject to agreement with all ENEA and USA parties involved, but is likely to be in November or December 1970.

APPENDIX H

NDS Data Centre Statistics

(To be distributed at the 3rd INDC Meeting.)

APPENDIX I

List of Documents Received (Single Copies)

(To be distributed at the 3rd INDC Meeting.)