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INDC-41/G

INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

REPORT OF THE CHAIRMAN OF THE INTERNATIONAL NUCLEAR DATA COMMITTEE FOR THE PERIOD 1983 - 1985

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August 1986

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The International Nuclear Data Committee 1983 - 85

During the three-year period 1983 - 85, during which I had the honour to serve as the Chairman, the INDC carried out its thirteenth and fourteenth meetings in Rio de Janeiro (16-20 May 1983) and at Vienna (1-5 October 1984), respectively. During that period INDC committee members were from Australia, Brazil, Canada, France, FRG, GDR, India, Italy, Japan, Sweden, UK, USA and USSR. Additionally, advisers and observers from more than ten Member States and two international organizations participated in both meetings.

The voluminous results of the INDC meetings are summarized in the minutes as compiled by J.L. Rowlands (IAEA publication INDC-39/U, Vienna, January 1984) and by B.H. Patrick (unpublished, Vienna, August 1985). Therefore, in this short report only a brief outline of the work carried out by the INDC will be presented. For more detailed information readers are referred to the minutes as well as to the large number of INDC-reports published in connection with the nuclear data activities of the IAEA, especially to the report of the Nuclear Data Section of the INDC (INDC(NDS)-159/LNA, Vienna, August 1984).

The Committee's working methods have been further improved. For most of the items working documents have been distributed by the NDS well before the meetings, so that the topics proposed could be studied thoroughly before the meeting.

The most important technical subjects considered by the INDC are discussed in six specialized standing and one ad-hoc sub-committees before being considered in plenary sessions. The following sub-committees exist:

- Subcommittee A (nuclear data need for fission reactors)
  Chairman: J.L. Rowlands/A.B. Smith

- Subcommittee B (nuclear data need for fusion reactors and other applications)
  Chairman: R. Haight

- Subcommittee on Standards
  Chairman: H. Condé

- Subcommittee on Discrepancies
  Chairman: H. Motz

- Subcommittee on Transfer of Nuclear Data Technology to Developing Countries
  Chairman: D. Seeliger

- Subcommittee on Meetings and Future NDS Programme
  Chairman: A. Michaudon

- Ad-hoc Subcommittee on the Barn
  Chairman: W.G. Cross

A new feature of INDC meetings was the introduction of topical discussions on specific areas of nuclear data activities. In Rio de Janeiro a topical meeting was held on "Nuclear Physics and Nuclear Data Research in Brazil" with the participation of scientists from six major Brazilian research institutes and industrial firms reflecting the general interest of the INDC to the needs of developing countries. During the 14th INDC meeting, a topical session was held on the use and requirements for nuclear data in geophysics, safeguards and medical radiotherapy, including presentations by well-qualified experts in these fields.

In addition to the support given to the most important traditional nuclear data activities, e.g., the regular publication of the CINDA data index and the nuclear data exchange between regional nuclear data centres, the INDC also turned its attention with great flexibility to the new problems which it faces.

One of the problems which have received stronger emphasis over the last few years has been the transfer of nuclear data related technology to developing countries, which is also reflected by the growing number of INDC members from these countries. Consideration of the proposed representation of the People's Republic of China as a full member on the INDC was a further step in this direction.

Highlights of the Nuclear Data Activities

At the 14th INDC meeting, the 20th anniversary of the IAEA nuclear data programme was appreciated by M. Zifferero, Deputy Director General and head of the Department of Research and Isotopes, on behalf of the Director General. He mentioned in his opening speech: "During these years, this programme has grown from a small effort, whose original objective was the establishment of an East-West data exchange, to a full-fledged international data centre activity .... As part of the Agency's physics activities basic to atomic

energy, the nuclear data programme provides compact and visible output of nuclear physics research of immediate benefit to the nuclear programmes of many Member States ... in response to more than 5.000 requests during the past 20 years over 6000 technical reports, almost half a million sets of numerical data and some 500 data processing computer codes have been distributed by the Nuclear Data Section .... In short, the nuclear data programme has benefitted many nuclear scientists and engineers in developing as well as developed Member States and has shown a remarkable dynamism in adapting its activities to the changing needs and priorities of the Agency's Member States. This is largely due to the valuable advice and guidance provided by the INDC during these years."

The reporting period was marked by further consolidation of the activities in the frame of the Interregional Technical Cooperation Project for Nuclear Data Techniques and Instrumentation (IAEA publication TC/INT/1/018). Expert services and equipment have been provided to several of the more advanced laboratories in developing countries. Two research coordination meetings on the measurement and analysis of 14 MeV neutron nuclear data held at Gaussig (GDR) and Chiang Mai (Thailand) have been useful for discussing research programms, problems and results of corresponding laboratories in developing countries participating in this project. The Training Course and Study Tour on Neutron Physics and Nuclear Data Measurements conducted in the USSR in September 1983 provided the participants with information concerning the recent development of neutron physics and nuclear data techniques.

Through the Coordinated Research Programs the INDC has generally tried to respond to the demands for new or more precise nuclear data. The following two CRP's are typical examples in this context:

The AGM on Basic and Applied Problems of Nuclear Level Densities (Brookhaven, 1982) recommended investigations of (p,n) and (α,n) reactions, because the present results of nuclear level density calculations are not completely satisfactory. After detailed discussions at the 13th and 14th meetings, the INDC endorsed the revised scope of the new CRP on Measurement and Analysis of Double-differential Neutron Emission Spectra in (p,n) and (α,n) Reactions, and recommended its implementation. Another example is the new CRP on Method for the Calculation of Fast Neutron Nuclear Data for

Structural Materials, which was also carefully discussed at both INDC meetings and was finally recommended for its implementation. The final aim of this CRP will be the improvement of the different evaluated nuclear data libraries for structural materials, including the International Nuclear Data Library (INDL).

For many years the INDC has supported the close and fruitful cooperation between the IAEA NDS and the International Centre for Theoretical Physics (ICTP, Trieste) on the holding of courses and workshops on nuclear theory and data for applications. The 1986 course was recommended to have a close connection between nuclear data and reactor physics in lectures and exercises. The continual interest of young scientists from many developing countries as well as the careful evaluation of the output of previous courses stimulated by the INDC advises the further continuation of this effort with a two year periodicity.

One of the most important topics of the INDC activities was the careful discussion of the scope and timing of different technical meetings such as Conferences, Symposia, Advisory Group Meetings, Consultants Meetings and Specialists Meetings organized by the IAEA in the nuclear data field as well as the evaluation of most important results of previous meetings.

The INDC has supported the agreed cycle of major nuclear data conferences in each of USA, USSR and Western Europe/Japan. Although the originally agreed three year cycle is now practically broken, new arrangements for the next years seem to be highly desirable for the international nuclear data community. Reflecting new fields of interest, the INDC has recommended the organization of Advisory Group Meetings on the following topics:

- Nuclear Data for Radiotherapy (1985)
- Atomic Data for Plasma Modelling (1985)
- Neutron Sources (1986)
- Nuclear Data for Fusion (1986) and
- Atomic and Molecular Data for Fusion (1987).

Consultants Meetings were recommended to maintain existing nuclear data cooperations, such as NRDC, NSDD and A+M DC Networks at a high level, and also to review very specific topics like:

- Radiation Damage,
- Gamma-ray standards and
- TND fast fission cross sections, nu-bar and resonance parameters.

The requirement for improved microscopic and macroscopic nuclear data in geophysical applications is another topic which was presented to the Committee for consideration. The INDC approved a Specialists Meeting on Nuclear Data for Geophysics and recommended that the NDS should review the status of available microscopic data guided by priority lists to be prepared by experts in the field. Depending on the output of this activities further steps should be considered at subsequent INDC meetings.

Activities of the IAEA Nuclear Data Section

As part of the INDC's advisory role on the nuclear data activities of the IAEA, the Committee reviewed the programme and activities of the Nuclear Data Section during the reporting period. The programme proposed and provided was approved in general and the work of the NDS was recommended. Today, the NDS having more than 20 years of experience as an international centre for nuclear data covers an immense amount of activities encompassing data assessment and research coordination, data processing and exchange, data services and transfer of nuclear data technology to developing countries. The NDS maintains contacts with more than 200 research laboratories in more than 73 Member States. Within the common neutron reaction data base format, EXFOR, now more than three million data records are available to the users in the Member States. The annual publication by the IAEA of the Computer Index to the Literature on Neutron Data, CINDA contains references to more than 120 000 original publications. This has stimulated the publication of an analoguous catalogue for atomic collision data, CIAMDA.

As mentioned above, aside from these traditional activites, NDS has introduced different ways of supporting developing Member States in the data field, by the

- transfer of expertise in nuclear data measurement techniques and instrumentation,

- contributions to the development of their scientific infrastructure and

- education and training of young scientists.

Working under the constraint of zero budgetary growth, the NDS, following the recommendations of the INDC, had to phase out some of the lower priority areas. It was one of the most important tasks of the INDC to review the NDS programme and to identify those parts of the programme which should be maintained and those which should be reduced or phased out.

The general recommendation of the INDC for changes in the NDS programme was to follow as much as possible the Agency's overall programme and priorities, such as nuclear safety, safeguards and support to developing countries, selecting suitable new undertakings in line with the high level of expertise built up in the NDS over the years. This means in particular, that a possible widening of the scope of NDS should not be detrimental to the current nuclear data activities for nuclear science and technology programmes. The INDC, after long discussions, came to the conclusion that the NDS should not undertake work on macroscopic or bulk matter properties, because this type of work should better be done by the users rather than by a multiple purpose international data centre. Basing on both experience and capabilities in the field of microscopic, mainly nuclear and atomic data, the NDS remains also in future a powerful team for cooperation with other sections or institutes both inside and outside of the IAEA in such important new areas like

- material behaviour in radiation fields;
- fusion applications;
- environment, including the radioactive waste management in the marine area;
- biomedical and geophysical applications, and others.

Comments on the future of the INDC

At the 13th and 14th INDC Meetings several discussions took place concerning the present and future role and scope of the Committee. It was clearly expressed by the INDC that most of its present members are experts in nuclear physics making the INDC as a whole a competent body for reviewing nuclear data activities of the IAEA. As a consequence, a few years ago, when

the NDS started activities in the area of A+M data for fusion, the appropriate body to review this work was found to be a special IFRC Sub-committee with INDC chairman participation.

An analoguous situation could arise, if the NDS in future would expand its activities to a broader non-nuclear data scope such as material parameters. In any case the INDC recommends to maintain the current nuclear data activities, which were the original goal of the NDS, at a sufficient level corresponding to the nuclear power and technology programme in the Member States, and especially to the need of developing countries. Having in mind the zero-growth budget situation, the INDC does not advise to include additional unrelated problems into the NDS programme.